Basic Assessment for Proposed Eskom Battery Storage System at Paleisheuwel Substation, Paleisheuwel, West Coast, Western Cape

Basic Assessment Report

Report Prepared for

Eskom Holdings SOC Limited

SRK Report Number 533767/02

DEFF Reference Number: To be provided

Report Prepared by

August 2019

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August 2019

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Profile and Expertise of EAPs

SRK Consulting (South Africa) (Pty) Ltd (SRK) has been appointed by Eskom Holdings SOC Limited (Eskom) as the independent consultants to undertake the Basic Assessment (BA) process required in terms of the National Environmental Management Act 107 of 1998 (NEMA).

SRK Consulting was established in 1974 and comprises over 1 300 professional staff worldwide, offering wide-ranging expertise in the natural resources and environmental sectors. SRK's Cape Town environmental department has a proven track record of managing large, complex environmental and engineering projects in the Western Cape, Africa and internationally. SRK has rigorous quality assurance standards and is ISO 9001 certified.

As required by NEMA, the qualifications and experience of the key independent Environmental Assessment Practitioners (EAPs) undertaking the BA are detailed below and Curriculum Vitae provided in Appendix A.

Project Director: Christopher Dalgliesh, BBusSc (Hons), MPhil (EnvSci)
Certified with the Interim Board for Environmental Assessment Practitioners South Africa (CEAPSA)
Chris Dalgliesh is a Partner at SRK Consulting and the Head of the Environmental Department in Cape Town. He has over 26 years of experience as an environmental consultant working on a broad range of Environmental Impact Assessment (EIA), auditing, environmental planning and management, public consultation and environmental management system projects. Chris's experience includes managing and co-ordinating major EIAs throughout Southern Africa and South America in the mining, energy, land-use planning and development, water and waste management, and industrial sectors.

Project Manager: Amy Hill, BSc (Hons)
Amy Hill is an Environmental Consultant at SRK Consulting and has 4 years of experience in the biodiversity and ecology sector. She is experienced in managing a number of BA and Water Use Authorisation processes and has contributed to numerous EIA processes, notably in the commercial and industrial sectors. Amy has drafted Environmental Management Plans (EMPrs), performed Environmental Control Officer duties and coordinated stakeholder engagement processes. She holds a BSc (Hons) in Biodiversity and Ecology from the University of Stellenbosch.

Statement of SRK Independence

Neither SRK nor any of the authors of this Report have any material present or contingent interest in the outcome of this Report, nor do they have any pecuniary or other interest that could be reasonably regarded as being capable of affecting their independence or that of SRK.

SRK has no beneficial interest in the outcome of the assessment which is capable of affecting its independence.

Disclaimer

The opinions expressed in this report have been based on the information supplied to SRK by Eskom. SRK has exercised all due care in reviewing the supplied information, but conclusions from the review are reliant on the accuracy and completeness of the supplied data. SRK does not accept responsibility for any errors or omissions in the supplied information and does not accept any consequential liability arising from commercial decisions or actions resulting from them. Opinions presented in this report apply to the site conditions and features as they existed at the time of SRK's investigations, and those reasonably foreseeable. These opinions do not necessarily apply to conditions and features that may arise after the date of this Report, about which SRK had no prior knowledge nor had the opportunity to evaluate.

Proposed Eskom Battery Storage System at Paleisheuwel Substation: EAP Affirmation

Section 16 (1) (b) (iv), Appendix 1 Section 3 (1) (r), Appendix 2 Sections 2 (i) and (j) and Appendix 3 Section 3 (s) of the Environmental Impact Assessment (EIA) Regulations, 2014 (promulgated in terms of the NEMA), require an undertaking under oath or affirmation by the EAP in relation to:

- The correctness of the information provided in the report;
- The inclusion of comments and inputs from stakeholders and interested and affected parties;
- The inclusion of inputs and recommendations from the specialist reports where relevant; and
- Any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties.

SRK and the EAPs managing this project hereby affirm that:

- To the best of our knowledge the information provided in the report is correct, and no attempt has been made to manipulate information to achieve a particular outcome. Some information, especially pertaining to the project description, was provided by the applicant and/or their sub-contractors. In this respect, SRK's standard disclaimer (inserted in this report) pertaining to information provided by third parties applies.
- To the best of our knowledge all comments and inputs from stakeholders and interested and affected parties have been captured in the report and no attempt has been made to manipulate such comment or input to achieve a particular outcome. Written submissions are appended to the report while other comments are recorded within the report. For the sake of brevity, not all comments are recorded verbatim and are mostly captured as issues, and in instances where many stakeholders have similar issues, they are grouped together, with a clear listing of who raised which issue(s).
- Information and responses provided by the EAP to interested and affected parties are clearly presented in the report. Where responses are provided by the applicant (not the EAP), these are clearly indicated.

Executive Summary

Table of Contents

1 Introduction 1
1.1 Introduction 1
1.2 Purpose of the Report 1
1.3 Structure of this Report 3
1.4 Content of Report 3
1.5 Assumptions and Limitations 6
2 Governance Framework and Environmental Process 7
2.1 Legal Requirements 7
2.1.1 National Environmental Management Act 107 of 1998 7
2.1.2 EIA Regulations, 2014 8
2.1.3 National Environmental Management: Biodiversity Act 10 of 2004 9
2.1.4 National Water Act 36 of 1998 9
2.1.5 National Heritage Resources Act 25 of 1999 10
2.2 Planning Policy Framework 10
2.2.1 Spatial Planning and Land Use Management Act 16 of 2013 (SPLUMA) 11
2.2.2 Western Cape Provincial Spatial Development Framework (2014) 11
2.2.3 West Coast District Municipality Integrated Development Plan (2017 – 2022) 11
2.2.4 Cederberg Local Municipality IDP (2017-2022) 11
2.2.5 Cederberg Local Municipality Spatial Development Framework (SDF) (2012) 12
2.2.6 Cederberg Local Municipality By-Law on Municipal Land Use Planning (2019) 12
2.2.7 Western Cape Nature Conservation Laws Amendment Act, 2000 12
2.3 Environmental Process 12
2.3.1 BA Process and Phasing 14
3 Project Description and Motivation 16
3.1 Proponent's Motivation 16
3.2 Description of the Project Area 17
3.2.1 Site Description 17
3.2.2 Surrounding Land Use 19
3.3 Project Alternatives 19
3.3.1 Technology Alternatives 19
3.3.2 Location / Site Alternatives 22
3.3.3 Activity Alternatives 23
3.3.4 Layout Alternatives 23
3.3.5 The No-Go Alternative 23
3.4 Project Construction and Infrastructure 23
3.4.1 BESS Platform 23
3.4.2 Access Roads 24
3.4.3 Associated Infrastructure 24
3.4.4 Laydown Areas and Site Camps 24
3.4.5 Fuel Storage 24

3.4.6 Stormwater Management 24
3.4.7 Water Supply 25
3.4.8 Waste Management 25
3.4.9 Air Quality Management 25
3.4.10 Noise and Vibration Management 25
3.4.11 Construction Traffic 26
3.4.12 Construction Hours 26
3.4.13 Workforce 26
3.4.14 Investment 26
3.5 Operation and Maintenance Activities 28
3.5.1 Water Supply 28
3.5.2 Waste Management 28
3.5.3 Workforce 28
3.5.4 Monitoring and Emergency Procedures 28
4 Description of the Affected Environment 29
4.1 Biophysical Environment 29
4.1.1 Topography and Geology 29
4.1.2 Hydrogeology 29
4.1.3 Land Capability 29
4.1.4 Climate 30
4.1.5 Air Quality 30
4.1.6 Noise 30
4.1.7 Flora 30
4.2 Socio-Economic Environment 34
4.2.1 Regional Socio-economic Environment 34
4.2.2 Local Socio-economic Environment 36
5 Stakeholder Engagement 37
5.1 Objectives and Approach to Stakeholder Engagement 37
5.2 Stakeholder Engagement during the Basic Assessment Phase 37
5.2.1 Newspaper Advertisements and Posters 37
5.2.2 Identification of Key Stakeholders and IAPs 37
5.2.3 Notification of BAR for Public Comment 38
5.2.4 Way Forward 38
6 Environmental Impact Assessment 39
6.1 Introduction 39
6.1.1 Environmental Impacts Identified 39
6.1.2 Specialist Studies Undertaken 39
6.1.3 Alternatives Assessed in the EIA 39
6.1.4 Risk Assessment 40
6.1.5 Impact Rating Methodology 40
6.1.6 Integration of Studies into the BAR and Review 42

6.2 Less Significant (or Minor) Impacts 42
6.2.1 Potential Impact LC1: Reduced Land Capability 42
6.2.2 Potential Impact N1: Increased Noise Levels 43
6.3 Potential Groundwater Impact 44
6.3.1 Assessment of Impacts: Construction Phase 44
6.3.2 Assessment of Impacts: Operational Phase 46
6.3.3 The No-Go Alternative 48
6.3.4 Mitigation Measures: Groundwater Impact 48
6.4 Potential Botanical Impacts 50
6.4.1 Assessment of Impacts: Construction Phase 50
6.4.2 Assessment of Impacts: Operational Phase 52
6.4.3 The No-Go Alternative 54
6.4.4 Mitigation Measures: Botanical Impacts 54
6.5 Potential Socio-Economic Impacts 56
6.5.1 Assessment of Impacts: Construction Phase 56
6.5.2 The No-Go Alternative 56
6.5.3 Mitigation Measures: Socio-Economic Impacts 56
6.6 Potential Human Health Impacts 57
6.6.1 Assessment of Impacts: Construction Phase 57
6.6.2 Assessment of Impacts: Operational Phase 58
6.6.3 The No-Go Alternative 59
6.6.4 Mitigation Measures: Human Health Impacts 59
6.7 Potential Visual Impacts....60
6.7.1 Assessment of Impacts: Construction Phase 60
6.7.2 Assessment of Impacts: Operational Phase 62
6.7.3 The No-Go Alternative 63
6.7.4 Mitigation Measures: Potential Visual Impacts 63
6.8 Potential Traffic Impacts 64
6.8.1 Assessment of Impacts: Construction Phase 64
6.8.2 The No-Go Alternative 65
6.8.3 Mitigation Measures: Potential Traffic Impacts 65
6.9 Cumulative Impacts 65
7 Conclusions and Recommendations 67
7.1 Environmental Impact Statement....67
7.1.1 Evaluation and Summary of Positive and Negative Impacts 67
7.1.2 Principal Findings....75
7.2 Analysis of Need and Desirability of the Project....76
7.3 Recommendations....77
7.4 Conclusion and Authorisation Opinion....77
7.5 Way Forward....78
8 References....80

Appendices

Appendix A: Curriculum Vitae of the EAP(s)

Appendix B: Vegetation Specialist Study

Appendix C: Paleisheuwel Stormwater Management Plan

Appendix D: Stakeholder Database

Appendix E: Eskom Risk Assessment

Appendix F: Environmental Management Programme

List of Tables

Table 2-1: NEMA listed activities (2014) applicable to the proposed project....9
Table 3-1: Property details of the Paleisheuwel BESS site....17
Table 4-1: Plant species recorded on site....31
Table 5-1: Activities planned during the BA Process....37
Table 6-1: Criteria used to determine the consequence of the impact....40
Table 6-2: Method used to determine the consequence score....41
Table 6-3: Probability classification....41
Table 6-4: Impact significance ratings....41
Table 6-5: Impact status and confidence classification....41
Table 6-6: Significance of deterioration of groundwater quality from accidental (non-routine) electrolyte spills during construction – Technology Alternative 1....45
Table 6-7: Significance of deterioration of groundwater quality from accidental (non-routine) electrolyte spills during construction – Technology Alternative 2....46
Table 6-8: Significance of deterioration of groundwater quality from accidental (non-routine) electrolyte spills – Technology Alternative 1....47
Table 6-9: Significance of deterioration of groundwater quality from accidental (non-routine) electrolyte spills – Technology Alternative 2....48
Table 6-10: Significance of loss of vegetation and plant SCC during construction....51
Table 6-11: Significance of loss of ecological connectivity during construction....52
Table 6-12: Significance of loss of vegetation and plant SCC from an accidental (non-routine) event - Technology Alternative 1....53
Table 6-13: Significance of loss of vegetation and plant SCC from an accidental (non-routine) event - Technology Alternative 2....54
Table 6-14: Significance of increased employment, income and skills development during construction 56
Table 6-15: Significance of impaired human health from increased ambient pollutant concentrations during construction....57
Table 6-16: Significance of human fatalities / injuries caused by battery fires / explosions during operation – Technology Alternative 1....59
Table 6-17: Significance of human fatalities / injuries caused by a battery fire / explosion during operation – Technology Alternative 2....59
Table 6-18: Significance of altered sense of place and visual intrusion during construction....61
Table 6-19: Significance of altered sense of place from increased traffic during construction....62
Table 6-20: Significance of altered sense of place and visual intrusion during operation – Layout Alternative 1....62
Table 6-21: Significance of altered sense of place and visual intrusion during operation – Layout Alternative 2....63
Table 6-22: Significance of increased nuisance on existing road users and surrounding residents during construction....64
Table 6-23: Significance of compromised road surface integrity of the regional road network during construction....65
Table 6-24: Cumulative impacts....66
Table 7-1: Summary of potential impacts of the project....68
Table 7-2: Comparison of technology alternatives....74
Table 7-3: Comparison of layout alternatives....74

Table 8-1: Environmental consequence criteria 87
Table 8-2: Likelihood criteria 87
Table 8-3: Risk matrix 88
Table 8-4: Risk rating 88

List of Figures

Figure 1-1: Paleisheuwel substation locality map 2
Figure 2-1: BA process 14
Figure 3-1: Electrical energy storage systems 16
Figure 3-2: The Paleisheuwel Substation as seen from various viewpoints 19
Figure 3-3: Battery cells in a battery module 20
Figure 3-4: Integrated self-contained battery system 21
Figure 3-5: Energy generation mechanism of flow batteries 22
Figure 3-6: Flow battery storage container 22
Figure 3-7: Proposed layout of construction area at Paleisheuwel 27
Figure 4-1: Vegetation type at the site 31
Figure 4-2: The study area shown in relation to the WCBSP 33
Figure 4-3: Plant SCC and protected species distribution 34

Acronyms and Abbreviations

BA	Basic Assessment
BAR	Basic Assessment Report
BESS	Battery Energy Storage Systems
CBA	Critical Biodiversity Area
CSP	Concentrating Solar Power
DEA	Former Department of Environmental Affairs
DEFF	Department of Environment, Forestry and Fisheries
DEA&DP	(Western Cape) Department of Environmental Affairs and Development Planning
DEAT	Department of Environmental Affairs and Tourism
DWS	Department of Human Settlements, Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMPr	Environmental Management Programme
ESA	Ecological Support Area
Eskom	Eskom Holdings SOC Limited
GN	Government Notice
ha	Hectares
HIA	Heritage Impact Assessment
HWC	Heritage Western Cape
IAPs	Interested and Affected Parties
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
LM	Local Municipality
MLM	Matzikama Local Municipality
MW	Megawatts
NEMA	National Environmental Management Act 107 of 1998 as amended
NEM:BA	National Environmental Management: Biodiversity Act 10 of 2004
NGO	Non-Governmental Organization
NHRA	National Heritage Resources Act 25 of 1999
NSBA	National Spatial Biodiversity Assessment
NWA	National Water Act 36 of 1998
PV	Photovoltaic
SAHRA	South African National Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SAWS	South African Weather Station
SCC	Species of Conservation Concern

SDF	Spatial Development Framework
S&EIR	Scoping and Environmental Impact Reporting
SG Code	Surveyor General Code
SPLUMA	Spatial Planning and Land Use Management Act 16 of 2013
SRK	SRK Consulting (South Africa) (Pty) Ltd
StatsSA	Statistics South Africa
SWMP	Stormwater Management Plan
VEGMAP	Vegetation Map of South Africa, Lesotho and Swaziland
WCBSP	Western Cape Biodiversity Spatial Plan
WCDM	West Coast District Municipality
WEF	Wind Energy Facility

Glossary

Basic Assessment Report	The report produced to relay the information gathered and assessments undertaken during the Environmental Impact Assessment.
Community	Those people who may be impacted upon by the construction and operation of the project. This includes neighbouring landowners, local communities and other occasional users of the area
Construction Phase	The stage of project development comprising site preparation as well as all construction activities associated with the development.
Consultation	A process for the exchange of views, concerns and proposals about a project through meaningful discussions and the open sharing of information.
Critical Biodiversity Area	Areas of the landscape that must be conserved in a natural or near-natural state in order for the continued existence and functioning of species and ecosystems and the delivery of ecosystem services.
Cumulative Impacts	Direct and indirect impacts that act together with current or future potential impacts of other activities or proposed activities in the area/region that affect the same resources and/or receptors.
Dispatchable	An electrical power system that can be turned on or off.
Ecological Support Area	Areas which play an important role in supporting the ecological functioning of critical biodiversity areas and/or in delivering ecosystem services that support socio-economic development.
Ecology	The study of the interrelationships of organisms with and within their physical surroundings
Ecosystem	The interconnected assemblage of all living organisms that occupy a given area and the physical environment with which they interact.
Electrical Grid	The system designed to provide electricity all the way from its generation to the customers that use it for their daily needs.
Electrolyte	The electrolyte of a battery consists of soluble salts, acids or other bases in liquid, gelled and dry formats. Electrolyte also comes in a polymer, as used in the solid-state battery. Electrolyte serves as catalyst to make a battery conductive by promoting the movement of ions from the cathode to the anode on charge and in reverse on discharge.
Endemic / Endemism	Species unique (native or restricted) to a defined geographic location, i.e. ecological state of a species being unique to a defined geographic location.
Environment	The external circumstances, conditions and objects that affect the existence of an individual, organism or group. These circumstances include biophysical, social, economic, historical and cultural aspects.
Environmental Authorisation	Permission granted by the competent authority for the applicant to undertake listed activities in terms of the NEMA EIA Regulations, 2014.
Environmental Impact Assessment	A process of evaluating the environmental and socio-economic consequences of a proposed course of action or project.

Environmental Management Programme	A description of the means (the environmental specification) to achieve environmental objectives and targets during all stages of a specific proposed activity.
Fauna	The collective animals of a particular region, habitat or geological period.
Flora	The collective plants of a particular region, habitat or geological period.
Heritage Resources	Refers to something tangible or intangible, e.g. a building, an area, a ritual, etc. that forms part of a community's cultural legacy or tradition and is passed down from preceding generations and has cultural significance.
Hydrology	The scientific study of the movement, distribution, and quality of water on Earth, including the water cycle, water resources and environmental watershed sustainability.
Impact	A change to the existing environment, either adverse or beneficial, that is directly or indirectly due to the development of the project and its associated activities.
Independent EAP	An independent person with the appropriate qualifications and experience appointed by the Applicant to manage the Environmental Impact Assessment process on behalf of the Applicant.
Integrated Environmental Management	The practice of incorporating environmental management into all stages of a project's life cycle, namely planning, design, implementation, management and review.
Mitigation measures	Design or management measures that are intended to minimise or enhance an impact, depending on the desired effect. These measures are ideally incorporated into a design at an early stage.
Operational Phase	The stage of the works following the Construction Phase, during which the development will function or be used as anticipated in the Environmental Authorisation.
Red Data List	Species of plants and animals that because of their rarity and/or level of endemism are included on a Red Data List (usually compiled by the IUCN) which provides an indication of their threat of extinction and recommendations for their protection.
Scoping	A procedure to consult with stakeholders to determine issues and concerns and for determining the extent of and approach to an EIA and EMPr (one of the phases in an EIA and EMPr). This process results in the development of a scope of work for the EIA, EMPr and specialist studies.
Specialist study	A study into a particular aspect of the environment, undertaken by an expert in that discipline.
Stakeholders	All parties affected by and/or able to influence a project, often those in a position of authority and/or representing others.
Sustainable development	Sustainable development is generally defined as development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs. NEMA defines sustainable development as the integration of social, economic and environmental factors into planning, implementation and decision-making so as to ensure that development serves present and future generations.

1 Introduction

1.1 Introduction

Eskom Holdings SOC Limited (Eskom) proposes installing Battery Energy Storage Systems (BESSs) at various (existing) distribution substations throughout South Africa to:

- Strengthen the electricity distribution network and address current voltage and capacity constraints;
- Integrate a greater amount of renewable energy [in this case Paleisheuwel Solar Photovoltaic (PV) Plant] into the electricity grid; and
- Reduce the requirement for investment in new conventional generation capacity (i.e. gas, nuclear, coal) and new distribution substations and powerlines to strengthen networks.

The BESS will strengthen the electricity distribution network from the Paleisheuwel Solar PV Plant to the West Coast area, and make the electricity generated by renewable energy dispatchable .

SRK Consulting (South Africa) (Pty) Ltd (SRK) was appointed by Eskom to undertake the Basic Assessment (BA) processes for the proposed BESSs at the Paleisheuwel Substation and the Skaapvlei Substation along the West Coast in the Western Cape.

The subject of this Basic Assessment Report (BAR) is the proposed installation of a new BESS at the Paleisheuwel Substation (“the project”, refer to Figure 1-1). A separate BAR has been compiled for the proposed BESS at the Skaapvlei Substation.

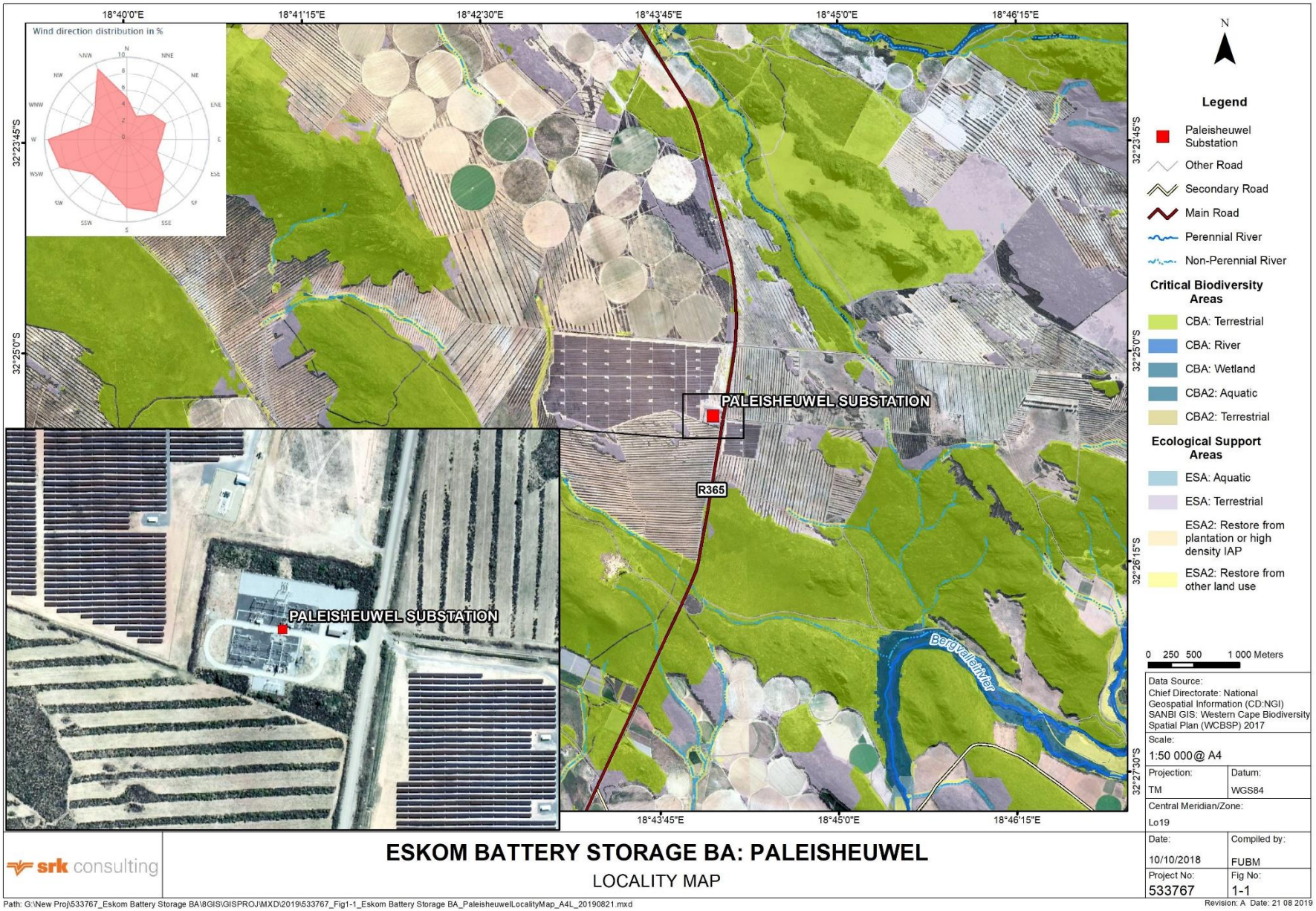
1.2 Purpose of the Report

In terms of relevant legislation, the project may not commence prior to obtaining a suite of authorisations (see Section 2). This report has been compiled in support of these applications. The BAR documents the steps undertaken during the pre-application phase to assess the significance of impacts and determine measures to mitigate the negative impacts and enhance the benefits (or positive impacts) of the proposed project. The report presents the findings of the BA and a description of the proposed public participation that forms part of the process.

The BAR is accompanied by an Environmental Management Programme (EMPr), which documents the management and monitoring measures that need to be implemented during the Design, Construction and Operational Phases of the project to ensure that impacts are appropriately mitigated, and benefits enhanced.

More specifically, the objectives of this BAR are to:

- Inform the stakeholders about the proposed project and the BA process followed;
- Obtain contributions from stakeholders (including the applicant, consultants, relevant authorities and the public) and ensure that issues, concerns and queries raised are fully documented and addressed;
- Assess in detail the potential environmental and socio-economic impacts of the project;
- Identify environmental and social mitigation measures to address the impacts assessed; and
- Produce a BAR that will assist the Department of Environment, Forestry and Fisheries (DEFF), formerly known as the Department of Environmental Affairs, to decide whether (and under what conditions) to authorise the proposed development.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32°27'30"S
Wind direction distribution in %
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
PALEISHEUWEL SUBSTATION
R365
Bergvallei Weir
Legend
Paleisheuwel Substation
Other Road
Secondary Road
Main Road
Perennial River
Non-Perennial River
Critical Biodiversity Areas
CBA: Terrestrial
CBA: River
CBA: Wetland
CBA2: Aquatic
CBA2: Terrestrial
Ecological Support Areas
ESA: Aquatic
ESA: Terrestrial
ESA2: Restore from plantation or high density IAP
ESA2: Restore from other land use
0 250 500 1 000 Meters
Data Source:
Chief Directorate: National Geospatial Information (CD:NGI)
SANBI GIS: Western Cape Biodiversity Spatial Plan (WCBSP) 2017
Scale:
1:50 000@ A4
Projection:
TM
Datum:
WGS84
Central Meridian/Zone:
Lo19
Date:
10/10/2018
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Project No:
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srk consulting
ESKOM BATTERY STORAGE BA: PALEISHEUWEL
LOCALITY MAP
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Revision: A Date: 21 08 2019

1.3 Structure of this Report

This report discusses relevant environmental legislation and its application to this project, outlines the BA process, presents a detailed project description and environmental baseline, details the stakeholder engagement process followed and assesses the potential impacts of the project before concluding the report with a set of pertinent findings and key recommendations.

The report consists of the following sections:

Section 1: Introduction

Provides an introduction and background to the proposed project and outlines the purpose of this document and the assumptions and limitations applicable to the study.

Section 2: Governance Framework and Environmental Process

Provides a brief summary and interpretation of the relevant legislation as well as pertinent strategic planning documents and outlines the approach to the environmental process.

Section 3: Project Description

Describes the location and current status of the site and provides a brief summary of the surrounding land uses as well as background to, motivation, and description of, the proposed project.

Section 4: Description of the Affected Environment

Describes the biophysical and socio-economic characteristics of the affected environment against which potential project impacts are assessed.

Section 5: Stakeholder Engagement

Details the stakeholder engagement approach and summarises stakeholder comments that informed the impact assessment.

Section 6: Environmental Impact Assessment

Describes the specialist studies undertaken and assesses the potential impacts of the project utilising SRK's proven impact assessment methodology.

Section 7: Conclusions and Recommendations

Provides an Environmental Impact Statement (EIS), describes the need and desirability of the project, and summarises the recommendations of the BAR.

The BAR has been prepared in accordance with Section 19 of the Environmental Impact Assessment (EIA) Regulations, 2014 (as amended).

1.4 Content of Report

Section 3 of Appendix 1 of the EIA Regulations, 2014, prescribes the required content in a BAR. These requirements and the sections of this BAR in which they are addressed, are summarised in Table 1-1.

Table 1-1: Content of BAR as per EIA Regulations, 2014

GN 982, Appendix 1 S 3(1) Ref.:	Item	Section Ref.:
(3) (a)	Details of:	
(a) (i)	The Environmental Assessment Practitioner (EAP) who prepared the report	p. ii
(a) (ii)	The expertise of the EAP, including a Curriculum Vitae	p. ii, App A
	Location of the activity, including	

GN 982, Appendix 1 S 3(1) Ref.:	Item	Section Ref.:
(b) (i)	The 21 digit Surveyor General code of the properties	3.2.1
(b) (ii)	The physical address and farm name (where available)	3.2.1
(b) (iii)	The coordinates of the boundary of the property / properties (where (3) (b) (i) and (3) (b) (ii) are not available)	3.2.1
(c)	A plan indicating the location of the proposed activity / activities and associated infrastructure, or:	Figure 3-7
(c) (i)	For linear activities: a description and coordinates of the corridor in which the proposed activity is to be undertaken	N/A
(c) (ii)	On land where the property has not been defined, the coordinates within which the activity is to be undertaken	N/A
(d)	A description of the scope of the proposed activity, including:	3
(d) (i)	All listed and specified activities trigger and being applied for	2.1.2
(d) (ii)	A description of the associated structures and infrastructure related to the development	3.4 and 3.5
(e)	A description of the policy and legislative context within which the development is proposed including	2
(e) (i)	an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and	2
(e) (ii)	how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments;	2
(f)	A motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred location	7.2
(g)	A motivation for the preferred site, activity and technology alternative	7.1
(h)	A full description of the process followed to reach the proposed development footprint within the approved site, including:	
(h) (i)	Details of all the alternatives considered;	3.3
(h) (ii)	Details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	5
(h) (iii)	A summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them	N/A will be included in the Final BAR
(h) (iv)	the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	4
(h) (v)	The impacts and risks identified, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts can be reversed, may cause irreplaceable loss of resources, and can be avoided, managed or mitigated	6
(h) (vi)	the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives	6.1.5
(h) (vii)	positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects	6.2 - 6.8
(h) (viii)	The possible mitigation measures that could be applied and level of residual risk	6.2 - 6.8
(h) (ix)	The outcome of the site selection matrix	3.3.2
(h) (x)	If no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and	3.3

GN 982, Appendix 1 S 3(1) Ref.:	Item	Section Ref.:
(h) (xi)	A concluding statement indicating the preferred alternatives, including preferred location of the activity	7.4
(i)	A full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred location through the life of the activity, including:	6
(i) (i)	A description of all environmental issues and risks that were identified during the environmental impact assessment process	6.2 - 6.8
(i) (ii)	An assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;	6.2 - 6.8
(j)	An assessment of each identified potentially significant impact and risk, including:	6.2 - 6.8
(j) (i)	Cumulative impacts	6.9
(j) (ii)	The nature, significance and consequences of the impact and risk	6.2 - 6.8
(j) (iii)	The extent and duration of the impact and risk	6.2 - 6.8
(j) (iv)	The probability of the impact and risk occurring	6.2 - 6.8
(j) (v)	The degree to which the impact and risk can be reversed	6.2 - 6.8
(j) (vi)	The degree to which the impact and risk may cause irreplaceable loss of resources	6.2 - 6.8
(j) (vii)	The degree to which the impact and risk can be avoided, managed or mitigated;	6.2 - 6.8
(k)	Where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report;	6.2 - 6.8
(l)	An EIS which contains	7.1
(l) (i)	A summary of the key findings of the environmental impact assessment	7.1
(l) (ii)	A map at an appropriate scale which superimposes the proposed activity and its associated structures and the infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers	7.1
(l) (iii)	A summary of the positive and negative impacts and risks of the proposed activity and identified alternatives	7.1
(m)	Based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management outcomes for the development for inclusion in the EMPr;	6.2 - 6.8, 7.3
(n)	Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation	7.4
(o)	A description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	7.4
(p)	A reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	7.4
(q)	Where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded, and the post construction monitoring requirements finalised	N/A
(r)	An undertaking under oath or affirmation by the EAP in relation to	p. iii
(r) (i)	The correctness of the information provided in the reports	p. iii
(r) (ii)	The inclusion of comments and inputs from stakeholders and I&APs	p. iii
(r) (iii)	The inclusion of inputs and recommendations from the specialist reports where relevant; and	p. iii
(r) (iv)	Any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties; and	To be provided in Final BAR

GN 982, Appendix 1 S 3(1) Ref.:	Item	Section Ref.:
(s)	Where applicable, details of any financial provision for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	N/A
(t)	Where applicable, any specific information required by the competent authority; and	N/A
(u)	Any other matter required in terms of section 24(4)(a) and (b) of the Act.	N/A

1.5 Assumptions and Limitations

As is standard practice, the report is based on a number of assumptions and is subject to certain limitations. These are as follows:

- The Vegetation Specialist Study was subject to certain limitations as indicated in the attached report (Appendix B);
- SRK's assessment of the significance of impacts of the proposed project on the affected environment has been based on the assumption that the activities will be confined to those described in Section 3. If there are any substantial changes to the project description, impacts may need to be reassessed;
- Where detailed design information is not available, the precautionary principle, i.e. a conservative approach has been adopted that overstates negative impacts and understates benefits;
- It is assumed that the stakeholder engagement process undertaken during the BA process identified all relevant concerns of stakeholders; and
- Eskom will in good faith implement the agreed mitigation measures identified in this report and the attached EMPr. To this end, it is assumed that Eskom will commit sufficient resources and employ suitably qualified personnel to do so.

Notwithstanding the above, SRK is confident that these assumptions and limitations do not compromise the overall findings of the report.

2 Governance Framework and Environmental Process

2.1 Legal Requirements

There are a number of regulatory requirements at local, provincial and national level with which the proposed development will have to conform. Some of the key legal requirements include the following:

- National Environmental Management Act 107 of 1998 (NEMA);
- EIA Regulations, 2014, promulgated in terms of NEMA (GN 982, as amended by GN 326);
- National Environmental Management: Biodiversity Act 10 of 2004 (NEM:BA);
- National Water Act 36 of 1998 (NWA); and
- National Heritage Resources Act 25 of 1999 (NHRA).

A brief summary of SRK's understanding of the relevant Acts and Regulations that are applicable to this study is provided below. Note that other legislative requirements may also pertain to the proposed project. As such, the summary provided below is not intended to be definitive or exhaustive and serves only to highlight key environmental legislation and obligations.

2.1.1 National Environmental Management Act 107 of 1998

NEMA establishes a set of principles which all authorities have to consider when exercising their powers. These include the following:

- Development must be sustainable;
- Pollution must be avoided or minimised and remedied;
- Waste must be avoided or minimised, reused or recycled;
- Negative impacts must be minimised; and
- Responsibility for the environmental consequences of a policy, project, product or service applies throughout its life cycle.

Section 28(1) states that "*every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring*". If such degradation/pollution cannot be prevented, then appropriate measures must be taken to minimise or rectify such pollution. These measures may include:

- Assessing the impact on the environment;
- Informing and educating employees about the environmental risks of their work and ways of minimising these risks;
- Ceasing, modifying or controlling actions which cause pollution/degradation;
- Containing pollutants or preventing movement of pollutants;
- Eliminating the source of pollution; and
- Remedying the effects of the pollution.

Legal requirements for this project

Eskom has a responsibility to ensure that the proposed activities and the BA process conform to the principles of NEMA. In terms of Section 28 of NEMA, the proponent is obliged to take actions to prevent pollution or degradation of the environment, and to ensure that the environmental impacts associated with the project are considered and mitigated where possible.

2.1.2 EIA Regulations, 2014

Sections 24 and 44 of NEMA make provision for the promulgation of regulations that identify activities which may not commence without an Environmental Authorisation (EA) issued by the competent authority (in this case the DEFF). In this context, the EIA Regulations, 2014, promulgated in terms of NEMA, govern the process, methodologies and requirements for the undertaking of EIAs in support of EA applications. Listing Notices 1-3 in terms of NEMA list activities that require EA ("NEMA listed activities").

The EIA Regulations, 2014, lay out two alternative authorisation processes. Depending on the type of activity that is proposed, either a BA process or a Scoping and Environmental Impact Reporting (S&EIR) process is required to obtain EA. Listing Notice 1[1] lists activities that require a BA process, while Listing Notice 2[2] lists activities that require S&EIR. Listing Notice 3[3] lists activities in certain sensitive geographic areas that also require a BA process.

The regulations for both processes – BA and S&EIR - stipulate that:

- Public participation must be undertaken as part of the assessment process;
- The assessment must be conducted by an independent EAP;
- The relevant authorities must respond to applications and submissions within stipulated timeframes;
- Decisions taken by the authorities can be appealed by the proponent or any other Interested and Affected Party (IAP); and
- A draft EMPr must be compiled and released for public comment.

The EIA Regulations, 2014, set out the procedures to be followed and content of reports compiled during the BA and S&EIR processes.

The NEMA National Appeal Regulations[4] make provision for appeal against any decision issued by the relevant authorities. In terms of the Regulations, an appeal must be lodged with the relevant authority in writing within 20 days of the date on which notification of the decision (EA) was sent to the applicant or IAP (as applicable). The applicant, the decision-maker, IAPs and organ of state must submit their responding statement, if any, to the appeal authority and the appellant within 20 days from the date of receipt of the appeal submission.

The proposed project includes activities that are listed in terms of the EIA Regulations, 2014 (see Table 2-1).

[1] GN R983, as amended by GN 327
[2] GN R984, as amended by GN 325
[3] GN R985, as amended by GN 324
[4] GN R993, as amended by GN R205

Table 2-1: NEMA listed activities (2014) applicable to the proposed project

No.	Listed activity	Comments
Listing Notice 1 (GN R983)		
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 capacity of the battery storage containers will be greater than 80 but less than 500 m³.

Legal requirements for this project

Eskom is obliged to apply for EA for the triggered activity listed in Table 2-1 and to undertake a BA process in support of the application, in accordance with the procedure stipulated in the EIA Regulations, 2014.

2.1.3 National Environmental Management: Biodiversity Act 10 of 2004

The purpose of the NEM:BA is to provide for the management and conservation of South Africa's biodiversity and the protection of species and ecosystems that warrant national protection. The NEM:BA makes provision for the publication of bioregional plans and the listing of ecosystems and species that are threatened or in need of protection. Threatened or Protected Species Regulations (2007), Guidelines for the Determination of Bioregions and the Preparation and Publication of Bioregional Plans (2009) and a National List of Ecosystems that are Threatened and in Need of Protection (2011) have been promulgated in terms of NEM:BA.

A published bioregional plan is a spatial plan indicating terrestrial and aquatic features in the landscape that are critical for conserving biodiversity and maintaining ecosystem functioning. These areas are referred to as Critical Biodiversity Areas (CBAs) in terms of NEM:BA. Bioregional plans provide guidelines for avoiding the loss or degradation of natural habitat in CBAs with the aim of informing EIAs and land-use planning (including Environmental Management Frameworks [EMFs], Spatial Development Frameworks [SDFs], and Integrated Development Plans [IDPs]).

Permits to carry out a restricted activity involving listed threatened or protected species or alien species may only be issued after an assessment of risks and potential impacts on biodiversity has been undertaken.

Legal requirements for this project:

A bioregional plan has not been formally published for any area in the Western Cape Province. According to the Western Cape Biodiversity Spatial Plan (2017), the site is not located in a CBA or ESA (see Section 4.1.7.3).

2.1.4 National Water Act 36 of 1998

Water use in South Africa is controlled by the NWA. The executive authority is the Department of Human Settlements, Water and Sanitation (DWS). The NWA recognises that water is a scarce and unevenly distributed national resource in South Africa. Its provisions are aimed at achieving sustainable and equitable use of water to the benefit of all users and to ensure protection of the aquatic ecosystems associated with South Africa's water resources. The provisions of the Act are aimed at discouraging pollution and wastage of water resources.

In terms of the Act, a land user, occupier or owner of land where an activity that causes or has the potential to cause pollution of a water resource has a duty to take measures to prevent pollution from

occurring. If these measures are not taken, the responsible authority may do whatever is necessary to prevent the pollution or remedy its effects, and to recover all reasonable costs from the responsible party.

Section 21 of the NWA specifies a number of water uses which require authorisation in terms of Section 22 (1) of the Act, unless they are listed in Schedule 1 of the NWA, are an existing lawful use, fall under a General Authorisation published in terms of Government Notice (GN) 509 of 2016 or if the responsible authority waives the need for a licence.

Legal requirements for this project:

There are no watercourses or wetlands within 500 m of the proposed site. No water uses are triggered, and as such, Water Use Authorisation is not required for the project.

2.1.5 National Heritage Resources Act 25 of 1999

The protection and management of South Africa's heritage resources are controlled by the NHRA. The enforcing authority for this act is the South African National Heritage Resources Agency (SAHRA). In the Western Cape, SAHRA has delegated this authority to Heritage Western Cape (HWC). In terms of the Act, historically important features such as graves, trees, archaeological artefacts/sites and fossil beds are protected. Similarly, culturally significant symbols, spaces and landscapes are also afforded protection.

Section 38 of the NHRA requires that any person who intends to undertake certain categories of development must notify HWC at the very earliest stage of initiating such a development and must furnish details of the location, nature and extent of the proposed development. A Notice of Intent to Develop (NID) must be submitted to enable HWC to decide whether a Heritage Impact Assessment (HIA) will be required.

Section 38 also makes provision for the assessment of heritage impacts as part of a BA process and indicates that, if such an assessment is deemed adequate, a separate HIA is not required. There is however the requirement in terms of Section 38 (8) for the consenting authority (in this case the DEFF) to ensure that the evaluation of impacts on the heritage resources fulfils the requirements of the relevant heritage resources authority (HWC), and that the comments and recommendations of the heritage resources authority are taken into account prior to the granting of the consent.

Section 38(1) of the NHRA specifies activities that trigger the need for the proponent to notify HWC of the proposed development in order for HWC to determine the need for further heritage assessment.

Legal requirements for this project:

The proposed project does not trigger any activities in terms of the NHRA.

2.2 Planning Policy Framework

This section discusses a number of key formal planning policies relevant to the project. The policies and plans briefly discussed below include regional and local development and spatial plans, including the:

- Spatial Planning and Land Use Management Act 16 of 2013 (SPLUMA);
- Western Cape Provincial SDF (2014);
- West Coast District Municipality IDP (2017-2022);
- Cederberg Local Municipality IDP (2017-2022); and
- Cederberg Local Municipality SDF (2017-2022).

This section implicitly examines the extent to which the proposed project is consistent with relevant plans, supported by an explicit analysis of need and desirability in Section 7.2.

2.2.1 Spatial Planning and Land Use Management Act 16 of 2013 (SPLUMA)

SPLUMA provides broad principles for provincial laws that regulate planning. SPLUMA also provides clarity on how planning law interacts with other laws and policies.

SPLUMA delegates the responsibility for land use and zoning applications to the municipality. The land use, zoning and spatial planning is therefore driven by the municipal level IDP and SDF which, according to SPLUMA, must be aligned with the provincial IDP and SDF.

The municipal SPLUMA by-laws prescribe the mechanisms for land use applications and appeals. A property is compliant with SPLUMA if:

- There are approved building plans;
- The use of the property is in accordance with the municipal zoning; and
- There are no encroachments over the building lines and property boundaries.

The proposed project is compliant with SPLUMA as the battery storage facility will be located adjacent to an existing substation, immediately adjacent to the Paleisheuwel Solar PV Plant, and in accordance with the zoning of the property (zoned “Authority Zone”).

2.2.2 Western Cape Provincial Spatial Development Framework (2014)

The Western Cape Provincial SDF (2014) identifies investment in infrastructure to address current needs and backlogs as a priority in the Province. Specifically, development of the renewable energy sector has been identified as important. Part of the Province’s policy is to: “*Pursue energy diversification and energy efficiency in order for the Western Cape to transition to a low carbon, sustainable energy future, and delink economic growth from energy use.”* The Province has also made a commitment to supporting renewable energy in suitable rural areas.

The BESS project will strengthen the electricity distribution network from the Paleisheuwel Solar PV Plant to the West Coast area, and make the generated electricity dispatchable[5].

2.2.3 West Coast District Municipality Integrated Development Plan (2017 – 2022)

A key objective of the West Coast District Municipality IDP (2017-2022) is to provide service delivery in an environmentally sustainable manner.

The Municipality strides for sustainable development, and the improvement of the quality of life of all citizens of the West Coast region. This can be affected by, *inter alia*, establishing projects that ensure environmental sustainability and contribute to a better quality of life for all its citizens.

This project will improve service delivery in the West Coast District Municipality as it will ensure the reliability of electricity supply to customers. The project will also improve environmental sustainability in the Municipality, as it will allow for greater integration of renewable energy from the Paleisheuwel Solar PV Plant into the grid.

2.2.4 Cederberg Local Municipality IDP (2017-2022)

A key objective of any local municipality, in accordance with the Constitution, is service delivery through the provision of electricity. The Cederberg Local Municipality IDP states that shortage of

[5] A dispatchable source of electricity refers to an electrical power system that can be turned on or off (www.energyeducation.ca)

electricity supply is a key challenge in the Municipality. The IDP further notes that the need for development within the Municipality will require upgrading of electrical infrastructure.

The project will assist the Cederberg Local Municipality in ensuring long term, reliable electricity supply to allow for future development.

2.2.5 Cederberg Local Municipality Spatial Development Framework (SDF) (2012)

The Cederberg Local Municipality Spatial Development Framework (SDF) notes insufficient electricity provision as a threat to the Municipality, particularly in, and surrounding, Clanwilliam. In terms of bulk infrastructure provision, the SDF states that the Municipality must provide environmentally friendly infrastructure and services in rural areas.

The project will allow for the storage of renewable electricity generated by the Paleisheuwel Solar PV Plant, and will assist in ensuring reliable electricity supply in the Cederberg Local Municipality.

2.2.6 Cederberg Local Municipality By-Law on Municipal Land Use Planning (2019)

According to the By-law, no person may commence, continue, or cause the commencement or continuation of land development, without the approval of the Municipality.

The owner of the property may apply to the Municipality for land-use approval, in terms of the By-law, in relation to the development of the land concerned.

The proposed project is compliant with the By-Law as the BESS will be located within the operation area of the Paleisheuwel Solar PV Plant, adjacent to an existing substation, and in accordance with the land-use of the property.

2.2.7 Western Cape Nature Conservation Laws Amendment Act, 2000

In terms of the Western Cape Nature Conservation Laws Amendment Act 2000, no person may, without a permit, pick, import, export, transport, possess, cultivate or trade in a specimen of a specially protected plant or a protected plant species.

Legal requirements for this project:

Four species protected in terms of the Western Cape Nature Conservation Laws Amendment Act 2000 were recorded on site and will require permits from CapeNature for removal.

2.3 Environmental Process

The general approach to this study is guided by the principles contained in Section 2 of NEMA and those of Integrated Environmental Management (IEM).

NEMA lists a number of **principles** that apply to the actions of organs of state and that also serve as reference for the interpretation of environmental legislation and administration of environmental processes. The principles most relevant to environmental assessment processes and projects for which authorisation is required are summarised below.

Principles relevant to the EIA process:

- Adopt a risk-averse and cautious approach;
- Anticipate and prevent or minimise negative impacts;
- Pursue integrated environmental management;
- Involve stakeholders in the process; and
- Consider the social, economic and environmental impacts of activities.

Principles relevant to the project:

- Place people and their needs at the forefront of concern and serve their needs equitably;
- Ensure development is sustainable, minimises disturbance of ecosystems and landscapes, pollution and waste, achieves responsible use of non-renewable resources and sustainable exploitation of renewable resources;
- Assume responsibility for project impacts throughout its life cycle; and
- Polluter bears remediation costs.

This BA process complies with these principles through its adherence to the EIA Regulations, 2014, and associated guidelines, which set out clear requirements for, *inter alia,* impact assessment and stakeholder involvement (see below), and through the assessment of impacts and identification of mitigation measures. An initial analysis of the project's compliance with the aims of sustainable development is provided in the impact assessment.

In accordance with the IEM Information Series (DEAT, 2004), an open, transparent approach, which encourages accountable decision-making, has been adopted.

The underpinning principles of IEM require:

- Informed decision making;
- Accountability for information on which decisions are made;
- A broad interpretation of the term "environment";
- An open participatory approach in the planning of proposals;
- Consultation with interested and affected parties;
- Due consideration of alternatives;
- An attempt to mitigate negative impacts and enhance positive impacts of proposals;
- An attempt to ensure that the social costs of development proposals are outweighed by the social benefits;
- Democratic regard for individual rights and obligations;
- Compliance with these principles during all stages of the planning, implementation and decommissioning of proposals; and
- The opportunity for public and specialist input in the decision-making process.

The study will also be guided by the requirements of the EIA Regulations, 2014 (see Section 2.1.2), which are more specific in their focus and define the detailed approach to the BA process, as well as relevant guidelines published by the DEFF and the Western Cape Department of Environmental Affairs and Development Planning (DEA&DP), including:

- DEFF's Integrated Environmental Management Guideline: Guideline on Need and Desirability (2017), which contains *"information on best practice and how to meet the peremptory requirements prescribed by the legislation and sets out both the strategic and statutory context for the consideration of the need and desirability of a development involving any one of the NEMA listed activities*" (DEA, 2017);
- DEA&DP's EIA Guideline and Information Document Series (DEA&DP, 2013), which includes guidelines on Generic Terms of Reference (ToR) for EAPs and Project Schedules, Public Participation, Alternatives, Need and Desirability and Exemption Applications and Appeals; and
- DEFF's Public Participation Guideline (DEA, 2012), which provides information and guidance for applicants, stakeholders and EAP's on the public participation requirements as prescribed in the EIA Regulations of 2014.

2.3.1 BA Process and Phasing

The BA process consists of two phases, namely the Pre-Application (which has been completed) and Basic Assessment Phases (the current phase) (see Figure 2-1 below).

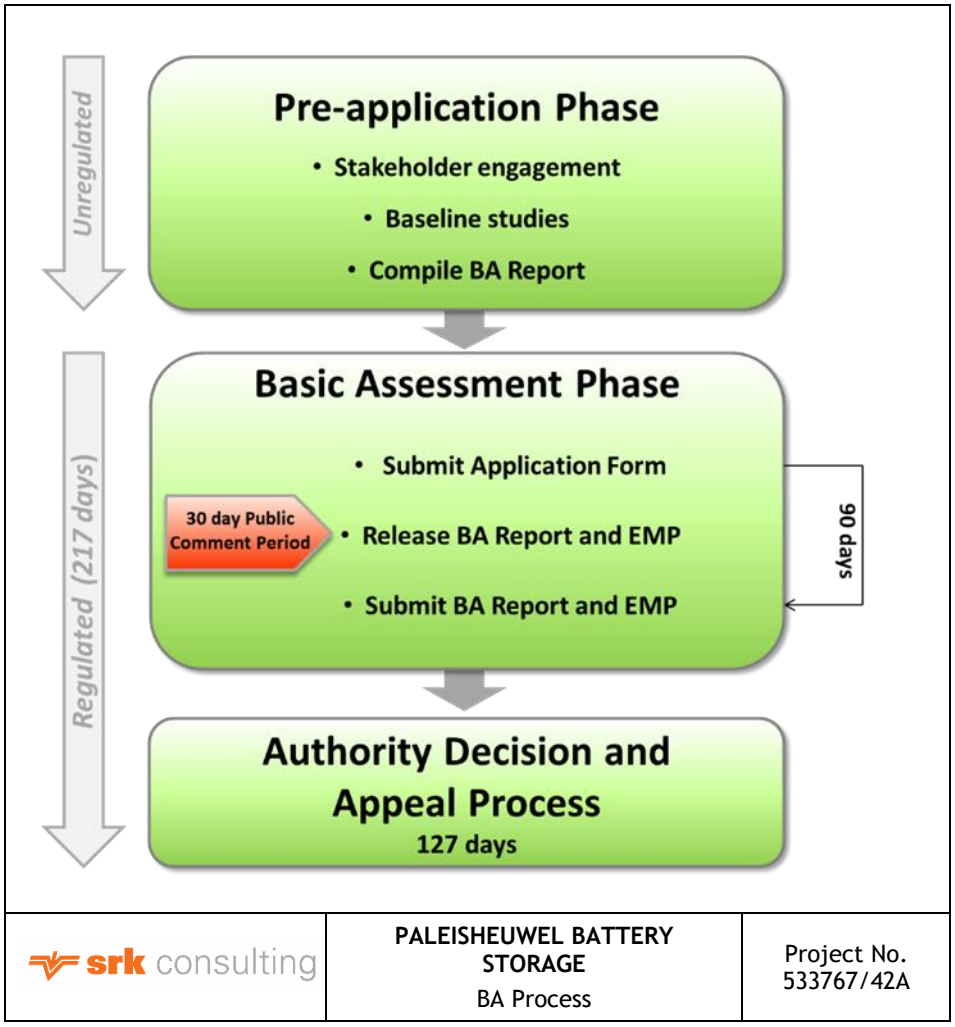


Figure 2-1: BA process

The objectives of the Pre-Application Phase were to:

- Identify stakeholders, including neighbouring landowners/ residents and authorities;
- Undertake specialist studies;
- Compile the draft BA Report which should:
  - Describe the affected environment;
  - Document and contextualise the biophysical baseline conditions of the study area and the socio-economic conditions of affected communities;
  - Assess in detail the potential environmental and socio-economic impacts of the project;
  - Identify environmental and social mitigation measures to avoid and/or address the impacts assessed; and
  - Develop and/or amend environmental and social management plans based on the mitigation measures developed in the BAR and EMPr.

The objectives of the BA Phase are to:

- Inform stakeholders of the proposed activity, feasible alternatives and the BA process;
- Provide stakeholders with the opportunity to participate effectively in the process and identify any issues and concerns associated with the proposed activity;
- Build capacity amongst stakeholders during the BA process so that they may actively and meaningfully participate;
- Inform and obtain contributions from stakeholders, including relevant authorities, the public and local communities and address their relevant issues and concerns; and
- Submit a final BAR to the DEA.

Further detail about activities undertaken or planned during the BA process is presented in Section 5.

3 Project Description and Motivation

3.1 Proponent's Motivation

Eskom proposes installing BESSs at existing distribution substations throughout South Africa to:

- Strengthen the electricity distribution network and address current voltage and capacity constraints;
- Integrate a greater amount of renewable energy into the electricity grid; and
- Reduce the requirement for investment in new conventional generation capacity (i.e. gas, nuclear, coal) and new distribution substations and powerlines to strengthen networks.

Various types of Energy Storage Systems exist; namely, mechanical, electrochemical, chemical, electrical and thermal (see Figure 3-1). Eskom is pursuing electrochemical storage in the form of BESS technologies. The use of BESS technology has been increasing rapidly worldwide. The growth in the BESS industry is expected to continue as costs of these systems are declining. While costs are still relatively high when compared to conventional grid electricity, the cost of battery energy storage has been decreasing since the 1990s (AIG, undated; Platte River Power Authority, 2017).

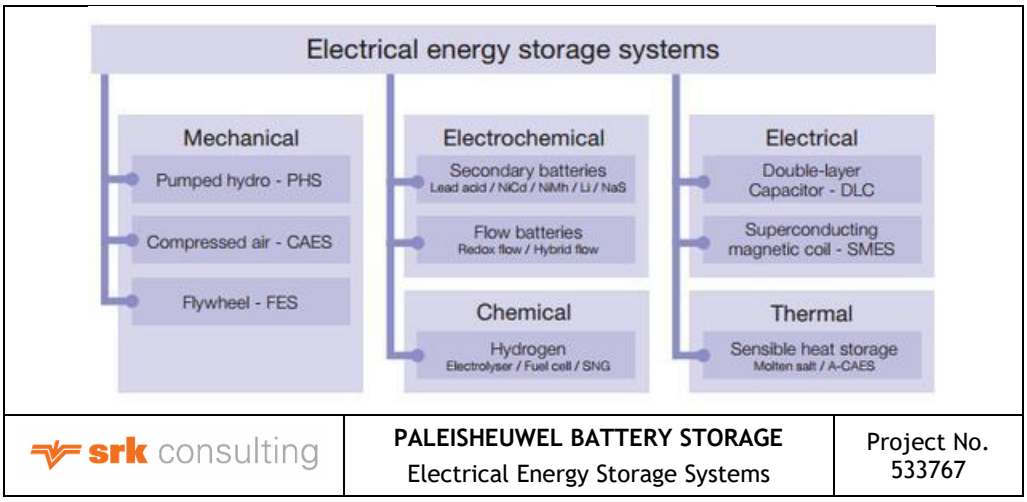


Figure 3-1: Electrical energy storage systems

Source: Fraunhofer ISE

Battery storage technologies are widely used because they improve energy security by optimising energy supply and demand, reducing the need to import electricity, and reducing the need to continuously adjust generation unit output. In addition, BESSs can provide system security by supplying energy during electricity outages, minimizing the disruption and costs associated with power cuts. Another reason for the rising popularity of BESSs is that they can enable the integration of more renewables in the energy mix (AIG, undated).

BESSs can decrease the requirement for investment in new conventional generation capacity, resulting in financial savings and reduced emissions from electricity generation. Using storage systems also means fewer and cheaper electricity transmission and distribution system upgrades are required (AIG, undated).

Eskom was granted a loan facility by the World Bank and co-financiers, as part of the Medupi 2010 USD 3.5 billion loan agreement, to implement carbon friendly generation plants which offset Medupi environmental impacts. The Kiwano Concentrating Solar Power (CSP) project was selected and agreed to by Eskom and the funders; however, due to technology risk, cost of execution and a non-responsive tender process, an alternative project had to be selected. Eskom and the funders then agreed that Eskom could use the funds allocated for the Kiwano CSP for an alternative (renewable)

project. The funders approved the BESS project as a suitable alternative to the Kiwano CSP if the total storage capacity per day is approximately 1440MWh which is equivalent to 525GWh energy production per annum if the Kiwano CSP was commissioned.

The following criteria were considered in the selection of suitable sites for the BESS:

- Proximity of BESS to existing or confirmed future renewable energy generators[6]. The following renewable energy sources were identified in the West Coast area:
    - Electra 75 MW Photovoltaic (PV) facility (Paleisheuwel);
    - Aurora 9 MW PV facility (Vredelus);
    - Sere 100 MW WEF (Skaapvlei); and
    - Kerschbosch 65 MW WEF (Hopefield).
- Situations where the distribution network in the West Coast area will see notable benefits from the introduction of BESS:
    - Reduction in electricity supply losses;
    - Peak load reduction on critically loaded network components;
    - Peak load reduction allowing for deferment of capital investment;
    - Reduction in loading / congestion of upstream High Voltage networks;
    - Improvement of local network attributes and quality of supply; and
    - Peak load reduction where the peak load is concurrent with national system peak (i.e. winter evenings).
- Availability of sufficient Medium Voltage connection capacity for the BESS; and
- Availability of sufficient space at the substation for installation of the BESS containers.

The subject of this BAR is the proposed BESS to be installed at the Paleisheuwel Substation. Separate BARs have been compiled for the proposed BESSs at the other substations.

3.2 Description of the Project Area

3.2.1 Site Description

The Paleisheuwel Substation is located adjacent to the Paleisheuwel Solar PV Plant, operated by Operated by Enel Green Power. Access to the Paleisheuwel Substation is via the R365, which continues north to Lamberts Bay and south to Portersville (refer to Figure 1-1 and Figure 3-2).

The proposed BESS will be located and developed within the fenced property boundary of the Substation on vacant (and transformed) and vegetated areas. Details and photographs of the site are provided in Figure 3-2 and Figure 3-4.

Table 3-1: Property details of the Paleisheuwel BESS site

Name of substation	Portion Number/Erf	SG Code	Size of Property	Four Corners of Substation	Land Use Zoning
Paleisheuwel	Erf 10/400	C02000000000040000010	3.62 ha	32°25'19.66"S 18°44'04.49"E 32°25'24.56"S 18°44'03.36"E	Authority Zone

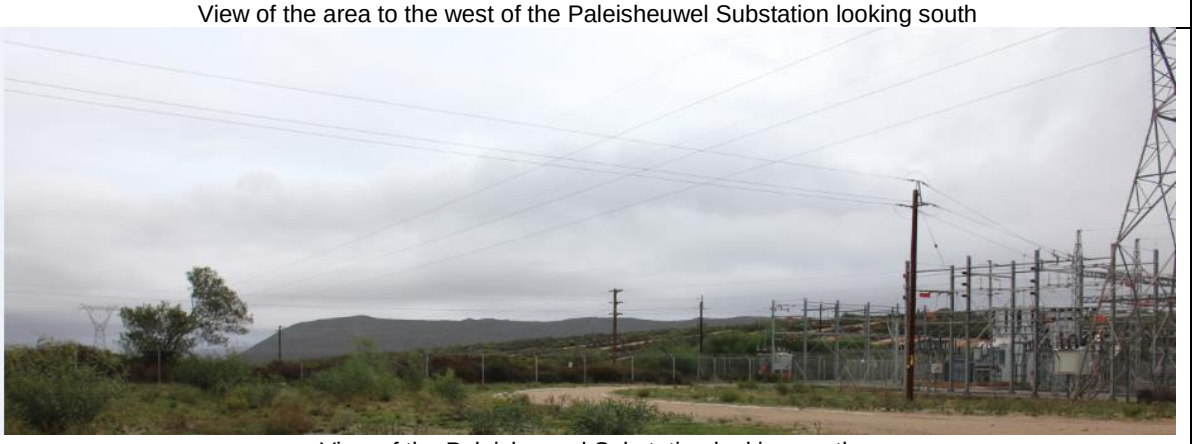
[6] The World Bank requested that sites be identified where the batteries can be charged by renewable projects.

				32°25'26.97"S 18°44'10.61"E	
				32°25'20.54"S 18°44'11.91"E	

View of the access road to the east of the Paleisheuwel Substation

The Paleisheuwel Substation as seen from the R365 (north-east) with the Paleisheuwel Solar Park to the right

View of the area to the west of the Paleisheuwel Substation looking south



View of the Paleisheuwel Substation looking south

srk consulting	**PALEISHEUWEL BATTERY STORAGE** Paleishuewel Substation	Project No. 533767

Figure 3-2: The Paleisheuwel Substation as seen from various viewpoints

3.2.2 Surrounding Land Use

Besides the Paleisheuwel Solar PV Plant, which has a capacity of 75 MW, extensive agriculture is the primary land use in the study area, although tourism is of increasing significance in the region. The closest town to the Paleisheuwel Solar PV Plant is Redelinghuys (approximately 20 km south west of the Substation). The Redelinghuys area is known for potato farming and rooibos harvesting.

The upper reaches of the Verlorenvlei (where it flows into the Atlantic Ocean at Elands Bay) are located approximately 30 km north east of the Paleisheuwel Substation. The Verlorenvlei, a RAMSAR site, is famous for its prolific birdlife and unspoiled fynbos flora and fauna and is one of the largest natural wetlands along the West Coast. During the flower season (July to September) numerous wildflowers emerge in the area.

3.3 Project Alternatives

Appendix 1 Section 3 (h)(i) of the EIA Regulations, 2014, requires that all BA processes must identify and describe alternatives to the proposed activity that are feasible and reasonable. Different types or categories of alternatives can be identified, e.g. technology alternatives, location alternatives, type of activity, design or layout alternatives, and operational alternatives. The “No-Go” or “no development” alternative must also be considered.

Not all categories of alternatives are applicable to this project, as discussed below.

3.3.1 Technology Alternatives

A battery is a device that is able to store electrical energy in the form of chemical energy and convert that energy into electricity.

There are three main components of a battery: two terminals made of different chemicals (typically metals), the anode and the cathode; and the electrolyte, which separates these terminals. The electrolyte is a chemical medium that allows the flow of electrical charge between the cathode and anode. When a device (or, the electrical grid) is connected to a battery, chemical reactions occur on the electrodes that create a flow of electrical energy to the device (or the electrical grid).

During a discharge of electricity, the chemical on the anode releases electrons to the negative terminal and ions in the electrolyte through an oxidation reaction. At the positive terminal, the cathode accepts electrons, completing the circuit for the flow of electrons. The function of the electrolyte is to put the different chemicals of the anode and cathode into contact with one another in a way that the chemical potential can equilibrate from one terminal to the other, converting stored chemical energy into useful electrical energy (MIT, 2012).

Eskom is considering two BESS technology alternatives for battery storage:

- Self-contained (solid state) batteries (refer to Section 3.3.1.1); and
- Flow batteries (refer to Section 3.3.1.2).

A single battery technology or combination thereof will be implemented at Paleisheuwel. The chemical composition of the BESS can be hazardous (typically comprised of a blend of one or more of the hazardous substances listed in SANS 10234), and the batteries will therefore be stored in intermodal containers (or similar) in a bunded area. The design capacity of the BESS to store dangerous goods will not exceed 500 m³.

3.3.1.1 Self-contained Batteries

Self-contained (solid state) batteries are suitable to many applications and create a robust and adaptable energy grid. Self-contained battery cells typically consist of a graphite anode, metal-oxide cathode, and an electrolyte gel packaged in a flat pouch or rolled up like a jelly-roll. The electrolyte typically consists of a mixture of any of the following materials: lithium nickel cobalt aluminium oxide, lithium nickel manganese cobalt oxide, lithium nickel manganese oxide or lithium cobalt oxide. Sealed thermal management systems within the batteries contain coolants and refrigerants (ethylene glycol and tetrafluoroethane). Solid state batteries contain either liquid, gel or solid state electrolytes.

Battery cells are integrated into battery modules, which are installed in standard racks similar to those used for telecommunication equipment (refer to Figure 3-3 below). Typically, the racks are then installed in a specially prepared shipping container to function as an integrated battery system (refer to Figure 3-4 below) (Platte River Power Authority, 2017).

Solid State batteries are suitable for energy storage applications with power ratings from 10's of kW to 10's of MW with storage durations between minutes to several hours.

As a worst-case scenario, the total footprint of each container will be ~63 m^2. This consists of the footprint of the container (~30m^2) and spacing between each container to adhere to safety requirements (~33 m^2).

srk consulting	PALEISHEUWEL BATTERY STORAGE Battery cells in battery module	Project No. 533767

Figure 3-3: Battery cells in a battery module

Source: Engadget.com

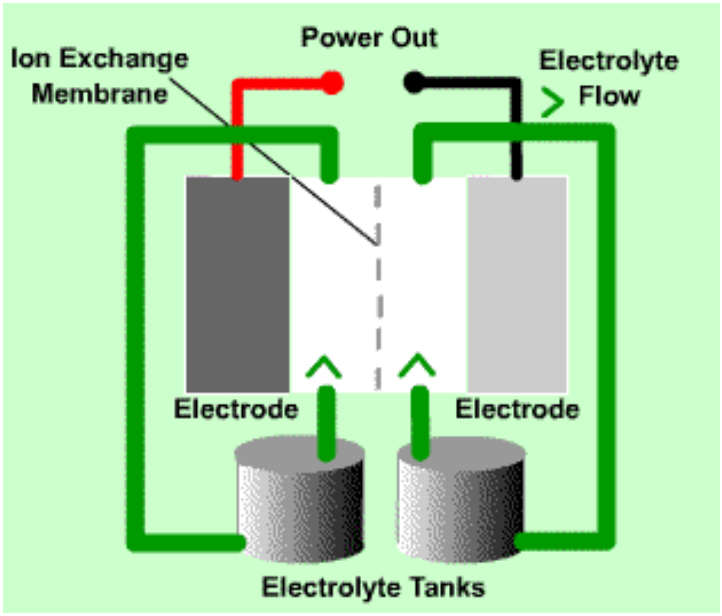
srk consulting	**PALEISHEUWEL BATTERY STORAGE** Integrated self-contained battery system	Project No. 533767

Figure 3-4: Integrated self-contained battery system

Source: Insideevs.com

3.3.1.2 Flow Batteries

Flow batteries are suitable for energy storage applications with power ratings from 10's of kW to 10's of MW with storage durations between 2-10 hours. All flow batteries share the common topology of a battery cell with flowable electrolyte pumped between storage tanks (refer to Figure 3-5 below). Electrolyte is pumped through the cell for charging or discharging and is stored in separate tanks for longer duration storage. The electrolyte storage tanks and cells can be installed in specially prepared shipping containers (refer to Figure 3-5 and Figure 3-6). The containers typically have secondary and tertiary containment for the electrolyte fluid (Platte River Power Authority, 2017).



srk consulting	**PALEISHEUWEL BATTERY STORAGE** Energy generation mechanism of flow batteries	Project No. 533767

Figure 3-5: Energy generation mechanism of flow batteries

Source: mpoweruk.com

srk consulting	**PALEISHEUWEL BATTERY STORAGE** Flow battery storage container	Project No. 533767

Figure 3-6: Flow battery storage container

Source: Renewable Energy Focus

3.3.2 Location / Site Alternatives

A number of site locations were screened out by Eskom - refer to Section 3.1 for a detailed discussion regarding the criteria that were considered in the selection of suitable sites for the BESS. Eskom proposes to install a BESS at the existing Paleisheuwel Substation primarily because of:

1) Location – the BESS will be located within the Paleisheuwel Substation adjacent to the Paleisheuwel Solar PV Plant; and
2) Land Ownership - Eskom owns the property and therefore does not need to acquire new land, reducing the cost of connection to evacuate into the grid.

Location / site alternatives have thus not been considered for further assessment.

However, the EAP and a vegetation specialist considered the location of the proposed BESS footprint adjacent to the Paleisheuwel Substation and did not identify any environmental constraints or specific areas of high sensitivity.

3.3.3 Activity Alternatives

The purpose of the project is to install a BESS at Paleisheuwel Substation to improve security of electricity supply and to reduce demand on electricity networks during peak load.

The World Bank has provided funding for the BESS project since the Kiwano CSP is no longer a feasible renewable alternative and, therefore, no other activity alternatives (other than the No-Go alternative) are considered acceptable or viable by the proponent. Activity alternatives (other than the No-Go alternative) are not considered further in the BA process.

3.3.4 Layout Alternatives

A considerable amount of pre-planning, informed by technical factors, has been considered in designing the layout of the BESS at the Paleisheuwel Substation. Factors that have informed the layout include:

- Design considerations, which includes proximity to the existing network and infrastructure at the Substation for easy integration;
- Vehicular access to the BESS platform; and
- Few environmental constraints (i.e. no surface water features, no endangered ecosystems, etc.)

Based on the above considerations, the layout presented in Figure 3-7 has been selected for assessment, with two minor variations:

- Layout Alternative 1: BESS housed inside a building/ shed; and
- Layout Alternative 2: Stand-alone containerized battery units (unhoused) (refer to Figure 3-4).

3.3.5 The No-Go Alternative

The No-Go alternative will be considered in the BAR in accordance with the requirements of the EIA Regulations, 2014. The No-Go alternative entails no change to the *status quo*, in other words the proposed BESS and associated infrastructure will not be built and the opportunity to optimize energy supply and demand will be forgone.

3.4 Project Construction and Infrastructure

3.4.1 BESS Platform

10 MW of storage capacity is required at Paleisheuwel.

Individual platforms will be constructed adjacent to the Substation to accommodate the BESS containers (see Figure 3-7). The total footprint of the battery storage area to be installed is ~0.8 ha. All batteries will be located within the fenced property boundary of the Substation.

The construction of the BESS will include:

- Earthworks - cutting to create a level platform and importing and compacting of fill material;
- Stormwater management infrastructure;
- Installation of an earth protection layer; and
- A stone chip finishing layer to match existing at the Substation.

Fill (if required) and stone chip will be sourced from local licensed quarries.

Clearance of indigenous vegetation will be required to construct the platforms and accommodate laydown areas (total of ~0.8 ha to be cleared) (see Figure 3-7).

3.4.2 Access Roads

The existing access road to the Paleisheuwel Substation will be used, and no additional access roads are required.

3.4.3 Associated Infrastructure

Network integration equipment (e.g. power cables, control cables, isolators, circuit breakers, transformers, etc.) will be required to connect the new BESS to existing infrastructure at the Substation.

The site may also require additional fencing, security equipment, lighting, and/or control room upgrades. Furthermore, a lightening mast may be constructed for protection / telecommunications, however, this will be attached to the existing substation.

3.4.4 Laydown Areas and Site Camps

The laydown area and site camp will be located within the footprint of the existing substation platform.

Temporary accommodation may be required for security guards. This will be a caravan, located within the footprint of the site camp. After construction, the laydown area will be rehabilitated with topsoil.

The locations of the laydown area and site camp at Paleisheuwel are indicated in Figure 3-7.

3.4.5 Fuel Storage

Up to 1 000 liters of fuel (petrol and diesel) will be temporarily stored on site during the construction phase. Fuel will be stored in tanks and bowsers in bunded areas. The fuel tanks and bowsers will be removed off site promptly upon completion of the construction phase.

3.4.6 Stormwater Management

Although BESS containers are self-contained, Eskom will implement stormwater measures on site to divert stormwater away from the BESS containers and divert accidental leaks / spillages away from the natural environment. These measures are informed by a Stormwater Management Plan (SWMP) undertaken as part of the BA process (Appendix C).

Key recommendations of the SWMP include the following:

- Ensure that stormwater originating from upgradient (stormwater that could flow across the site from external areas) is diverted around the platform;
- Draw up and strictly enforce a procedure for the storage, handling and transport of the battery containers (hazardous materials). This procedure should be informed by hazardous material safety data sheets and discussions with the supplier; and

- Place clearly visible signage on the platform indicating emergency numbers if stormwater (or any other environmental) issues are identified.

3.4.7 Water Supply

Water will be required on site during construction for domestic use (ablutions, drinking), compaction of fill material and concrete batching. It is anticipated that water demand will not exceed ~150 m^3 per day for construction activities.

Water will be trucked to site from surrounding towns depending on availability.

Potable water will be brought to site for human consumption.

Eskom will implement measures to reduce water use and prevent water pollution.

3.4.8 Waste Management

Eskom will implement waste management procedures during construction to minimise or recycle waste (where possible).

Waste produced during the construction phase will be typical construction rubble (spoil rock or sand or soil, and concrete), general waste, dirty / used oil and grease, contaminated material and soil and contaminated water. Waste management during construction will be the responsibility of the contractor.

All construction waste will be removed from work areas and disposed of at approved and licensed (municipal) waste disposal facilities. Where possible, options for the reuse or recycling of waste materials will be favoured over disposal.

The volume of waste that will be generated cannot be estimated at this stage, but is not expected to be significant or place strain on local waste management and disposal facilities.

At this stage Eskom proposes to temporarily store less than 100 m^3 general waste and less than 80 m^3 hazardous waste[7].

3.4.9 Air Quality Management

Sources of emissions during the construction phase will include dust generated by the movement of construction vehicles and bulk earthworks as well as exhaust emissions from construction vehicles and machinery.

Emissions during construction will be limited as far as possible through stabilisation of any exposed areas and watering of gravel roads where dust becomes problematic. However, the closest residents to the site are approximately 1 km away and no dust nuisance is anticipated for these residents. Construction vehicles, plant and machinery will be maintained in good working order to minimise emissions.

3.4.10 Noise and Vibration Management

Sources of noise and vibration during construction include construction vehicles, plant and machinery. Nuisance impacts of noise will need to be managed although sensitive receptors are limited.

[7] Deviations from this may require the need to obtain approval in terms of the National Environmental Management Waste Act 59 of 2008 (NEM:WA).

3.4.11 Construction Traffic

Construction traffic would include construction equipment, large vehicles / trucks for material delivery as well as smaller passenger vehicles used to transport construction staff to and from the site. The number of construction vehicle trips per day is unknown at this stage. Construction vehicles will confine movement to normal working hours (07h00 – 18h00, Monday to Saturday).

The BESS units will either be transported from the Port of Cape Town or from the Port of Saldanha to the Substation on trucks.

3.4.12 Construction Hours

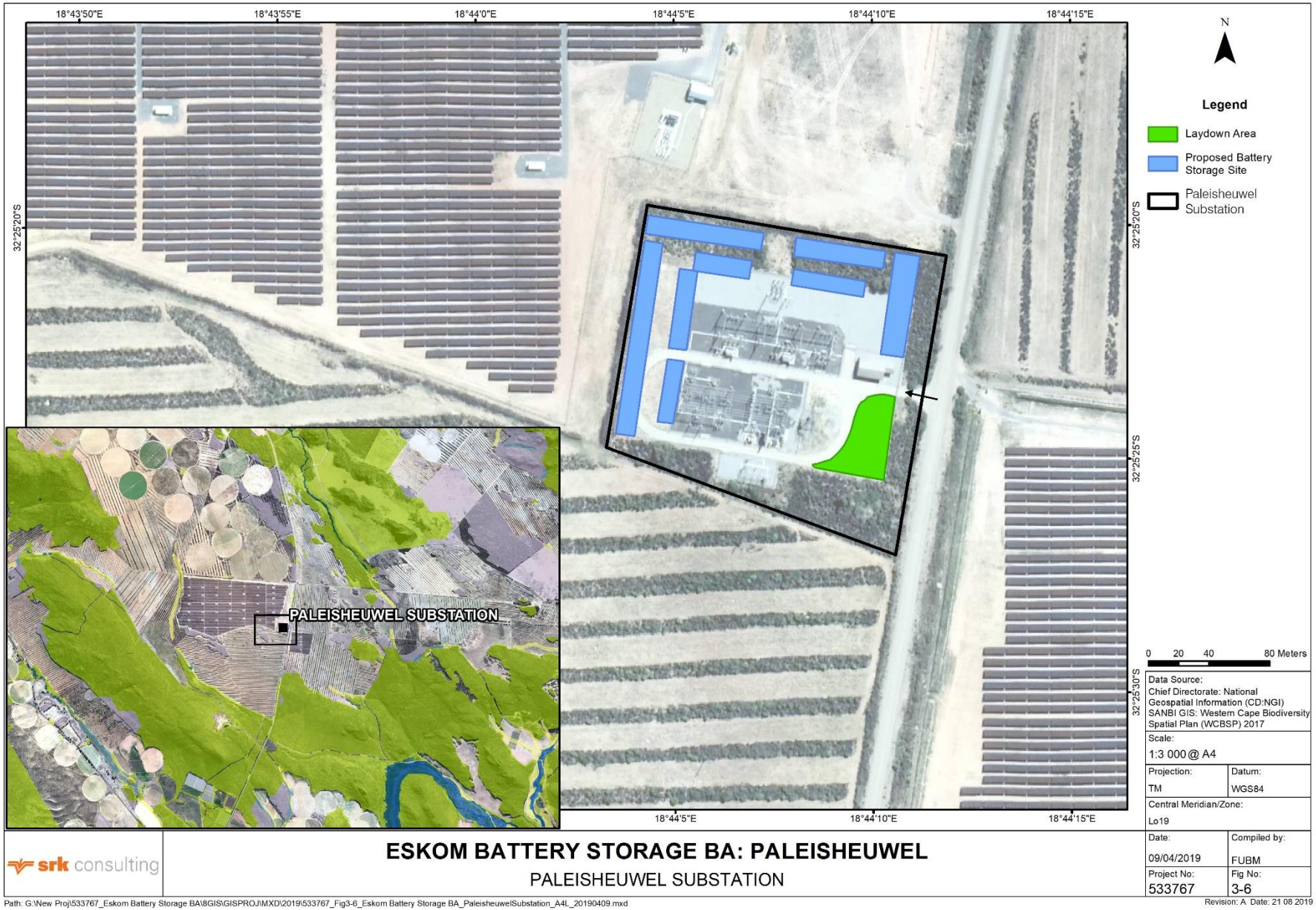
The majority of the construction activities are expected to occur during normal working hours (07h00 - 18h00). Construction activities will largely be limited to Mondays to Saturdays. Construction activities will only be allowed on Sundays where unavoidable, and if the contractor is able to provide the engineer with adequate motivation.

3.4.13 Workforce

As work will be carried out by contractors, it is not possible to accurately estimate the size of the workforce, but 80% of the new job opportunities will be reserved primarily for Historically Disadvantaged Individuals (HDIs) and, in particular, youth.

3.4.14 Investment

The proposed BESS project as a whole (i.e. including all sites thought South Africa) will require an investment of approximately R 16.2 billion for a period of four years, and will be sponsored by the World Bank (see Section 3.1).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3.5 Operation and Maintenance Activities

Following the completion of the construction phase, the BESS and substation extension will be commissioned. There will be no physical operational activities on-site other than ongoing maintenance and refurbishment and replacement of equipment.

Maintenance activities will comprise:

- Periodic testing and inspection of equipment and infrastructure;
- Periodic maintenance of the batteries, roads, storm water infrastructure and associated infrastructure; and
- Occasional trimming and clearing of vegetation around the BESS platform to maintain safety clearance.

Eskom's existing management practices and plans for the Paleisheuwel Substation will apply to the BESS area.

It is anticipated that the BESS will be operational for the foreseeable future (i.e. long-term), and no Decommissioning Phase is anticipated.

3.5.1 Water Supply

No additional water is required for the BESS during operations.

3.5.2 Waste Management

No waste will be generated during normal operations of the BESS. However, battery cells or electrolyte fluid (depending on the technology type) will need to be replaced. The supplier will be responsible for removing the battery cells or replacing the electrolyte fluid (whichever applies) from site during the guarantee period and ensuring that battery cells are properly disposed of in accordance with the NEM:WA.

Should a WML be required during the operational phase, this will be obtained from the competent authority.

Depending on the technology type, components of the batteries will be recycled where possible.

3.5.3 Workforce

Maintenance of the BESS will be undertaken by specialised contractors and therefore no local jobs will be created.

3.5.4 Monitoring and Emergency Procedures

Typically, the batteries will have a battery monitoring system that detects:

- Thermal management;
- Cell performance;
- Fault detection;
- Over/under voltage;
- Over/under temperature; and
- Over current.

Furthermore, the batteries are designed with fuses, insulation, fire barriers, and fire suppression systems.

4 Description of the Affected Environment

The following chapter presents an overview of the biophysical and socio-economic environment in which the proposed project is located to:

- Understand the general sensitivity of, and pressures on, the affected environment;
- Inform the identification of potential issues and impacts associated with the proposed project; and
- Conceptualise practical mitigation measures.

Some components of the baseline have been generated based on literature review. However, where appropriate, baseline information has been supplemented or generated by the vegetation specialist (Nemai Consulting) appointed to undertake a baseline and impact assessment for the proposed project.

The final specialist study is attached as Appendix B.

4.1 Biophysical Environment

4.1.1 Topography and Geology

The topography of the broader study area can be described as undulating plains with rocky outcrops. The study area is located within the Olifants River Valley. The Olifants River Valley is formed in Table Mountain Series sandstone. As a result, there are numerous outcrops of this rock forming cliffs, ridges, terraces and koppies. Several rock shelters and caves occur in these outcrops.

Moving towards the coast, the terrain becomes less hilly and is characterised by low relief dunes formed by wind-blown (aeolian) sands.

The site is underlain by folded quartzitic sandstones of the Peninsula Formation of the Table Mountain Group. At the site, these rocks are predominantly obscured by an overburden of sand of variable thickness (SRK, 2014).

4.1.2 Hydrogeology

Groundwater in the study area occurs in a fractured aquifer. Depth to the groundwater table is approximately 115 m below ground level (bgl), yielding 0.13 L/s (low) (SRK, 2014).

The Electrical Conductivity (EC)[8] at the site and surrounds ranges between 0 and 70 mS/m indicating that the overall quality of the groundwater is good and potable, provided the iron content is reduced to an acceptable level (SRK, 2014).

4.1.3 Land Capability

The study area is largely rural and dominated by agriculture and associated industries and services. Rooibos, potato and lucerne are the predominant crops surrounding the site.

Grazing capacity is low - approximately 30 ha per Large Stock Unit (the equivalent of one head of cattle).

The site is located adjacent to Eskom's Paleisheuwel Solar PV Plant extending ~200 ha. The PV plant was completed in 2014 and feeds electricity into the national grid.

[8] Groundwater quality is measured as Electrical Conductivity (EC), i.e. salinity. In terms of the SANS 241:2015 Drinking Water Limits, an EC concentration less than (or equal to) 170 mS/m is acceptable for potable water.

4.1.4 Climate

The West Coast area is characterized by a semi-arid Mediterranean climate with maximum temperatures ranging from 20°C - 30°C, depending on the season. Extreme summer temperatures can often exceed 40°C. The climate is strongly influenced by the cold Benguela current and coastal berg wind conditions.

The West Coast area typically receives between 100 mm to 200 mm of precipitation per annum (p.a.), with the majority of the precipitation occurring during the winter months, although this tends to be higher in the mountainous areas. Redelinghuys (nearest settlement to the site) receives on average 300 - 400 mm of precipitation p.a.

4.1.5 Air Quality

There are no significant sources of air pollution in the study area. It is therefore expected that air quality in the project area is good. Many roads in the development area are dirt roads and small volumes of dust are generated from the movement of vehicles.

4.1.6 Noise

There are no significant sources of noise in the area, but some noise is propagated by vehicles.

Due to the low population density there are few noise receptors. Noise receptors are, however, likely to be sensitive to disturbance.

4.1.7 Flora

This section is based on the Vegetation Impact Assessment (2019) undertaken by Nemai Consulting (see Appendix B).

4.1.7.1 Regional Context

The study area is on the West Coast of South Africa within the Fynbos Biome (Mucina and Rutherford 2006). The Fynbos Biome comprises three distinct, naturally fragmented vegetation types (fynbos, renosterveld and strandveld), all of which occur in winter- and summer-rainfall areas (Mucina & Rutherford 2006). Regions supporting the Fynbos Biome consist of various geological substrates including (amongst others) sandstone, quartzite, granite, gneiss, shales and limestone sediments.

The Fynbos Biome is predicted to be severely impacted upon by climate change, with estimates of as high as a 50% loss of the Fynbos Biome. The drastic climatic changes predicted could alter the conditions required for the persistence of the biome, such as changes in rainfall patterns and temperature, which in turn lead to changes in the plant communities which are able to persist in the area (Nemai, 2019).

4.1.7.2 National Vegetation Types

The study area falls within the Leipoldtville Sand Fynbos vegetation type according to *The Vegetation Map of South Africa, Lesotho and Swaziland* (VEGMAP) (SANBI, 2012) (see Figure 4-1). Leipoldtville Sand Fynbos and the associated landscape features are described by Rebelo *et al*. (in Mucina & Rutherford, 2006) as follows:

"Plains, slightly rolling in places, covered with shrublands with an upper open stratum of emergent, 2–3 m tall shrubs in clumps. The vegetation matrix is formed by fairly dense, 1–1.2 m tall restiolands, with numerous medium tall to low shrubs scattered in between. Understorey with a conspicuous winter to spring herbaceous complement of annuals and geophytes occurs in years with good rain. Structurally, these are mainly restioid and asteraceous fynbos types, with localised patches of proteoid fynbos also present."

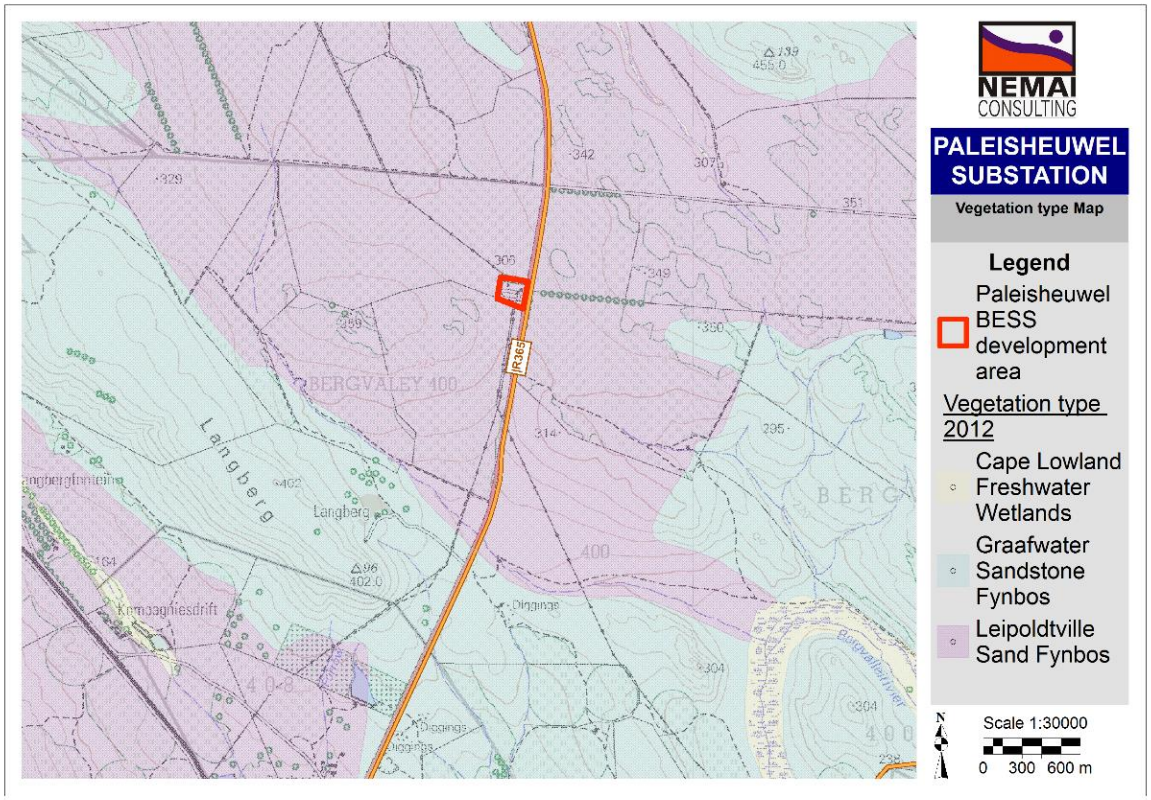

Figure 4-1: Vegetation type at the site

Source: Nemai, 2019

4.1.7.3 Ecological Condition of the Vegetation at the Site

Plant species recorded during a site visit are listed in Table 4-1 below. Provincially protected and threatened species have been emboldened.

Table 4-1: Plant species recorded on site

Family	Common name	Ecological status (SA Red list categories)	Form
Fabaceae	Red eye	Invader Category 1b	Tree
Fabaceae	Port Jackson willow	Invader Category 1b	Tree
Hyacinthaceae	Sticky tamarack	Least Concern	Herb
Hyacinthaceae	Soldier-in-the-box	Least Concern	Herb
Fabaceae	Langbeen Capegorse	Least Concern	Shrub
Asparagaceae	Red-stemmed asparagus	Least Concern	Shrub
Amaryllidaceae	**Candelabra lily**	**Schedule 4 Protected Flora Cape Nature**	**Succulent**
Aizoaceae (Mesembryanthemaceae)	Sea Fig	Least Concern	Succulent
Gentianaceae		Least Concern	Herb
Asteraceae	Rhinoceros bush	Least Concern	Herb
Asteraceae	Cape Daisy	Least Concern	Herb
Ebenaceae	Blueberry Bush	Least Concern	Shrub
Ebenaceae	Blue bush	Least Concern	Shrub
Sapindaceae	Sand Olive	Least Concern	Shrub

Family	Common name	Ecological status (SA Red list categories)	Form
Ebenaceae	Guarri	Least Concern	Shrub
Asteraceae	Clanwilliam Daisy	Least Concern	Herb
Poaceae	Weeping Love Grass	Least Concern	Grass
Poaceae	Perennial Veld Grass	Least Concern	Grass
Asteraceae		Least Concern	Herb
Asteraceae	Blue Margarite	Least Concern	Herb
Hyacinthaceae	Cape cowslips	Least Concern	Herb
Proteaceae	**Sandveld Pincushion**	**Vulnerable Schedule 4 Protected Flora Cape Nature**	**Shrub**
Fabaceae	Blue lupin	Weed	Herb
Asteraceae		Least Concern	Shrub
Apocynaceae	**Bokhoring**	**Schedule 4 Protected Flora Cape Nature**	**Herb**
Polygalaceae	Tortoise berry	Least Concern	Herb
Polygalaceae	Tortoise berry	Least Concern	Shrub
Asteraceae	Ossierapuisbos	Least Concern	Herb
Oleaceae		Least Concern	Shrub
Asteraceae		Least Concern	Herb
Oxalidaceae	Pink Sorrel	Least Concern	Herb
Thymelaeaceae	Gonna bush	Least Concern	Shrub
Thymelaeaceae		Least Concern	Shrub
Pinaceae	Cluster pine	Invader 2	Tree
Rhamnaceae		Least Concern	Shrub
Celastraceae	False Spike-thorn	Least Concern	Shrub
Asteraceae	Sandgombos	Least Concern	Shrub
Brassicaceae	Wild radish	Weeds	Herb
Lamiaceae	Brown Salvia	Least Concern	Shrub
Anacardiaceae	Langsteel Korentebossie	Least Concern	Shrub
Anacardiaceae	Margaret's Rock Currant	Least Concern	Shrub
Proteaceae	**Marshmallow Spiderhead**	**Schedule 4 Protected Flora Cape Nature**	**Shrub**
Asteraceae	Slangbos	Least Concern	Shrub
Asteraceae	steekblaarslangbos	Least Concern	Shrub
Aizoaceae (Mesembryanthemaceae)	**Kinkelbossie**	**Schedule 4 Protected Flora Cape Nature**	**Shrub**
Restionaceae	Namaqua thatching reed	Least Concern	Reed
Asphodelaceae		Least Concern	Herb
Restionaceae	Sonqua Sunreed	Least Concern	Grass-like restio

Overall, the natural vegetation found on the site is dominated by the perennial, grass-like restio *Willdenowia incurvata* (Sonqua Sunreed) and remnants of Leipoldtville Sand Fynbos vegetation type remain on site.

Various alien invasive plant species and weeds are dominant around the substation fence and *Acacia saligna* (Port Jacksons willow) and *Acacia cyclops* (Red eye) were recorded in abundance on the site (Nemai, 2019).

4.1.7.4 Vegetation Sensitivity

The Western Cape Biodiversity Spatial Plan (WCBSP) is a biodiversity planning assessment that delineates priority biodiversity and spatial (land) features such as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) in order to safeguard the "continued existence and functioning of species and ecosystems, including the delivery of ecosystem services, across terrestrial and freshwater realms" (CapeNature, 2017). The purpose of the WCBSP is to inform sustainable development, including (a) development planning, (b) environmental assessment and regulation, (c) natural resource protection and management in the broader sense.

The site is mapped to fall within one conservation planning unit in terms of the WCBSP: ESA 1 category (ecological support areas in a natural, near-natural or moderately degraded condition).

Despite pockets of natural habitat adjacent to the substation boundary, the area is completely transformed. As such, the ESA on site is isolated and does not provide any ecological functionality nor does it sustain any CBAs or terrestrial features (Nemai, 2019).

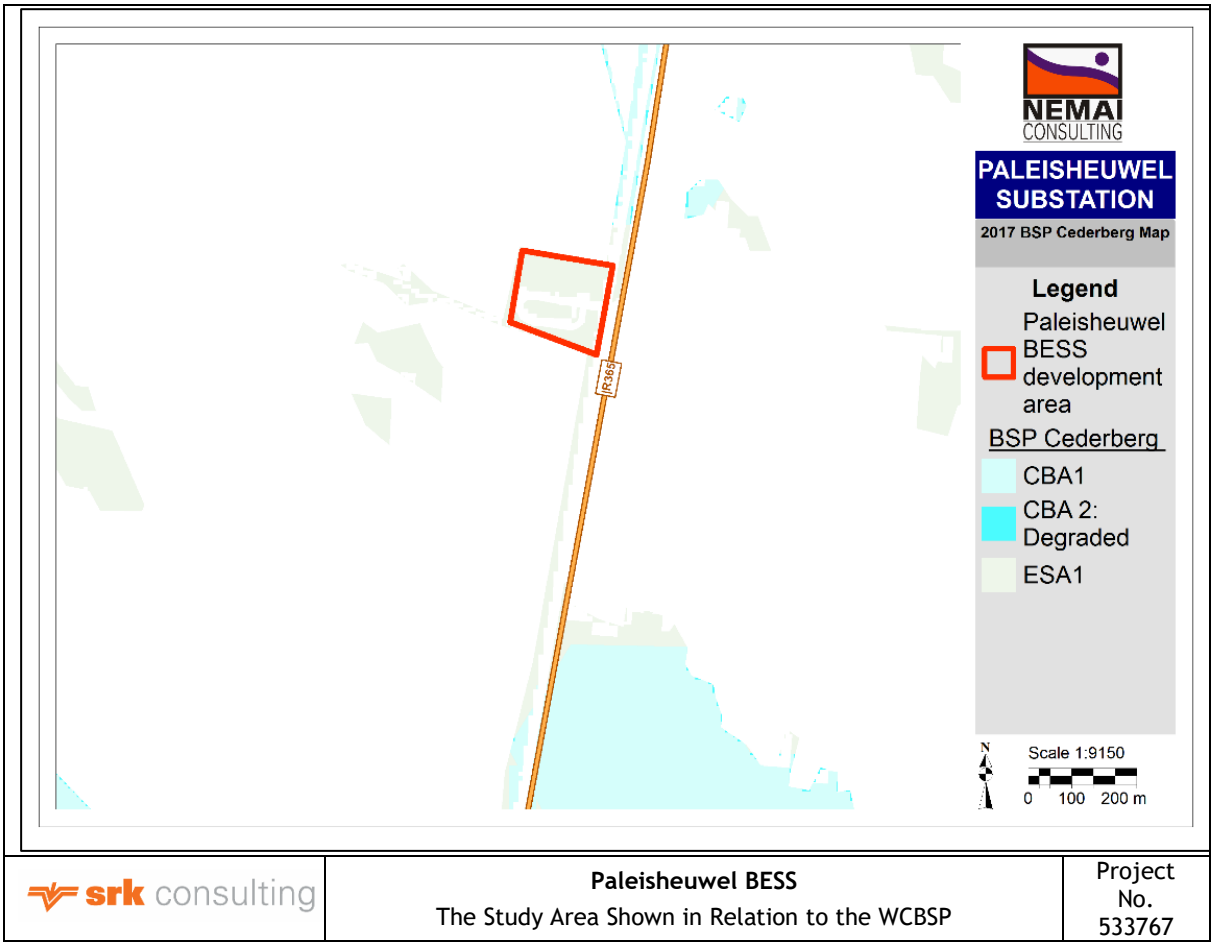

Figure 4-2: The study area shown in relation to the WCBSP

4.1.7.5 Conservation

Leipoldtville Sand Fynbos is listed as *Endangered* with a conservation target (percent of area) from National Spatial Biodiversity Assessment (NSBA) (2011) of 29%. At present, none of the vegetation type is statutorily conserved, despite 55% having already undergone transformation (primarily due to potato and rooibos cultivation).

Leipoldtville Sand Fynbos is listed as a *Vulnerable* ecosystem in terms of National List of Ecosystems that are Threatened and in Need of Protection (2011) promulgated in terms of NEM:BA.

During the field survey, one plant Species of Conservation Concern (SCC) was observed on site: *Leucospermum rodolentum* (see Figure 4-3). According to Goldblatt *et al*. (2008), this plant species is listed as *Vulnerable*. There are likely to be additional SCC species present at the site which were not observed as some species are naturally rare or are only visible at specific times of the year.

Four species protected in terms of the Western Cape Nature Conservation Laws Amendment Act (2000) were recorded on site and will require permits from CapeNature for removal. Provincially protected species recorded on site include species from the following families and their distribution on the site is shown in Figure 4-3:

- *Amaryllidaceae*;
- *Apocynaceae*;
- *Mesembryanthemaceae*; and
- *Proteaceae*.

Figure 4-3: Plant SCC and protected species distribution

4.2 Socio-Economic Environment

4.2.1 Regional Socio-economic Environment[9]

The study area is located in the West Coast District Municipality (WCDM), which stretches over 400 km of the Atlantic Ocean coastline of the Western Cape Province. The WCDM borders the Northern Cape Province in the north and the Cape Metro and Cape Winelands District Municipality of the Western

[9] This socio-economic baseline is based almost entirely on the Statistics South Africa 2011 community survey. A major assumption therefore of this baseline is that socio-economic conditions have remained, at least, relatively stable over the preceding eight year period.

Cape Province in the south and south-east. It includes the Local Municipalities (LMs) of Matzikama, Cederberg, Bergrivier, Saldanha and Swartland.

According to Census 2011 data available from Statistics South Africa (StatsSA), the WCDM had a population of 391 766, indicating an annual population growth rate of 3.3% from 2001. Some 17.1% of the population reside in the Matzikama LM, 12.7% in the Cederberg LM, 15.8% in the Bergrivier LM, 25.3% in the Saldanha LM and 29.0% in the Swartland LM (Census, 2011).

The Coloured population group, with 67% of the total population in the WCDM, was by far the most represented group in the district. Both the White and African groups made up 16% each of the total population in 2011, while the Indian (or Asian) group represented only 1%. Between 2007 and 2011, the racial composition of the WCDM remained fairly stable; however, representation by the Coloured group decreased, and the African group increased from 9% in 2007 to 16% in 2011. Other minor changes in proportional representation of groups were experienced.

The WCDM has a well-balanced regional economy, with a good mix of primary, secondary and tertiary activities. The district has a comparatively larger primary and secondary sector compared to that of the province, and a vibrant tertiary sector with finance and business services, transport and communication, and the retail and wholesale sectors contributing strongly to growth and employment. Following the recessional impacts in 2009 these tertiary sectors accounted for more than 75% of the recovery growth (Provincial Treasury, 2013).

In 2011 138 587 persons were employed and 23 569 were unemployed in the WCDM, with an unemployment rate of 14.5% (StatsSA, 2011) (i.e. 14.5% of the economically active population who was actively seeking jobs were unemployed). 85.5% of those seeking employment in 2011 were employed. Unemployment in the WCDM in 2001 was 13.8%, and increased to 15% in 2007 (StatsSA, 2007), before decreasing to 14.5% in 2011.

The highest unemployment rate in 2011 was recorded for the Saldanha LM (23.1%) and the lowest was for the Bergrivier LM (6.8%). Unemployment declined most markedly in the Matzikama LM, from 16.5% in 2001 to 14.0% in 2011, while in the Swartland LM unemployment increased from 10.2% in 2001 to 12.7% in 2011 (Census, 2011).

In 2011, 68% of the district population over the age of 20 years either had no education (5%) or had not achieved grade 12 (63%) (StatsSA, 2011). The highest level of education for 24% of the population was matric, while only 8% had some form of higher education (StatsSA, 2011). Although these figures show an improvement since 2007, education levels in the district are still very low and a key development strategy of district policy is skills development (IDP, 2011).

Although service delivery within the WCDM generally improved from 2007 to 2011, 89% of households in the district in 2011 were formal and 10% informal, compared to 92% formal households in 2007 (StatsSA, 2011). In 2011 99% of all households in the WCDM had access to piped water, and 96% of these households had access to water inside their own dwelling. The proportion of households with access to piped water inside their dwellings has increased significantly in the district from 67.2% in 2001 to 87.3% in 2007, and 96% in 2011. The number of households with access to electricity for lighting decreased slightly from 94.5% in 2007 to 94.4% in 2011, while in 2011 89% of households in the district had access to electricity for cooking and 70% for heating (StatsSA, 2011). Access to sanitation in the WCDM has decreased slightly from 2007 to 2011. 95% of households in the WCDM had access to flush toilet (92%) or other sanitation (3%) in 2011, compared to 94% access to flush toilets and 5.5% access to other sanitation in 2007. Although this decrease isn't significant, it is concerning that 5% of the district population have no access to sanitation whatsoever.

4.2.2 Local Socio-economic Environment

The project is located in the Cederberg Local Municipality, which covers Citrusdal, Clanwilliam, Elands Bay, Graafwater, Lamberts Bay, Leipoldtville and Wupperthal.

With a Regional Gross Domestic Product (GDPR) of R3.4 billion, the Cederberg municipal area had the smallest economy in the WCDM in 2016, contributing 13.3% to the WCDM GDPR and 14.6% to employment (MERO, 2018).

The main economic sectors in the Cederberg municipal area in 2016 were the agriculture, forestry and fishing sector; the manufacturing sector; the wholesale and retail trade, catering and accommodation sector; and the transport, storage and communication sector. Collectively, these sectors contributed 68.4% to the Cederberg municipal area economy in 2016 (MERO, 2018).

The economy of the Cederberg municipal area is estimated to have grown at an above average rate of 4.4% in 2017. The estimated economic growth was boosted by strong growth in the agriculture, forestry and fishing sector (10.4%) and the manufacturing sector (4.7%) (MERO, 2018).

Approximately 68% of the Cederberg population (or approximately 36 005 people) is between 15 and 64 years old (i.e. of working age). The age distribution in the Cederberg Local Municipality is very similar to that for the WCDM, with the same proportion of elderly people (over 65 years) (www.municipalities.co.za).

Women and men are equally represented in the Cederberg Local Municipality, with only a very slightly higher proportion of males (51.1%) to females (48.9%), unlike gender distribution in the WCDM, which has a slightly higher proportion of females (50.3%) to males (49.7%) (www.municipalities.co.za).

5 Stakeholder Engagement

Stakeholder engagement forms a key component of the BA process. The objectives of stakeholder engagement are outlined in this section, followed by a summary of the approach followed in compliance with Chapter 6 of the EIA Regulations, 2014.

5.1 Objectives and Approach to Stakeholder Engagement

The overall aim of public consultation is to ensure that all stakeholders have adequate opportunity to provide input into the process and raise their comments and concerns. More specifically, the objectives of public consultation are to:

- Identify IAPs and inform them about the proposed development and BA process;
- Provide the public with the opportunity to participate effectively in the process and identify relevant issues and concerns;
- Coordinate cooperation between organs of state in the consideration of the assessment; and
- Provide the public with the opportunity to review documentation and assist in identifying mitigation and management options to address potential environmental issues.

5.2 Stakeholder Engagement during the Basic Assessment Phase

Table 5-1 outlines the stakeholder engagement activities planned during the BA Process.

Table 5-1: Activities planned during the BA Process

Task	Objectives	Dates
Advertise commencement of BA process and release BAR for public comment period	To notify IAPs of the commencement of the BA process and to provide a description of the proposed project and the affected environment, as well as a description and assessment of potential environmental issues.	29 August 2019
Submit Application Forms to DEFF	To register the application for EA.	26 August 2019
Public comment period	To provide stakeholders with the opportunity to review and comment on the results of the BAR.	29 August 2019 to 28 September 2019
Compile Issues and Responses Summary and finalise BAR	To record all issues and concerns raised and collate these comments in the final report which provides DEFF with information to decide whether to authorise the project.	1 October 2019

The key activities undertaken in the stakeholder engagement process during the BA process are described further below.

5.2.1 Newspaper Advertisements and Posters

A newspaper advertisement (in English and Afrikaans) announcing the commencement of the BA process, the availability of the BAR and inviting IAPs to register on the project database have been placed in Die Weslander on 29 August 2019.

In addition to the advertisement, an A2 poster was placed at the entrance to the Paleisheuwel Substation. The poster contained brief details of the proposed project and process and the contact details of the consultant.

5.2.2 Identification of Key Stakeholders and IAPs

Relevant IAPs from local, provincial and national authorities, conservation bodies, Non-Governmental Organisations (NGO) groups, local businesses and forums and surrounding land owners and

occupants were considered for inclusion in the initial notification of the project and BA process. Relevant authorities were automatically registered as IAPs.

As specified in GN R 982, authorities and all persons who submit written comments, attend meetings or request in writing to be placed on the register will be registered as IAPs.

The notification database is attached as Appendix D. The database of registered stakeholders will be updated throughout the process.

5.2.3 Notification of BAR for Public Comment

Identified stakeholders have been notified of the release of the draft BAR for public review. Notification letters have been posted, faxed or e-mailed to all registered IAPs (a list of registered IAPs notified of the draft BA Report is included as Appendix D).

Hard copies of the draft BAR are available for public review at the following venues:

- Citrusdal Public Library; and
- SRK's office in Rondebosch, Cape Town.

The report is also accessible as an electronic copy on SRK's website www.srk.co.za (via the "library" and then "public documents" links). A copy (either hardcopy or electronic) of the draft BAR / EMPr has been made available to each of the following authorities, to facilitate comment:

- DEFF;
- Department of Environmental Affairs & Development Planning (DEA&DP);
- Western Cape Department of Agriculture;
- CapeNature;
- WCDM; and
- MLM.

DEFF was notified that the reports were sent to the organs of state listed above to request their comment. Proof of notifications will be provided to DEFF in the Final BAR.

Stakeholders will be afforded a 30-day comment period, ending on 28 September 2019.

5.2.4 Way Forward

Following initial review of the BAR, issues raised by authorities and the public will be summarised and responded to in an Issues and Responses Summary, which will be appended to the Final BAR. The BAR will be updated (if necessary) taking stakeholder input into account. The Final BAR will then be submitted to the DEFF for decision making. IAPs will be informed of the submission of the Final BAR, including the Issues and Responses Summary, to the DEFF.

6 Environmental Impact Assessment

6.1 Introduction

6.1.1 Environmental Impacts Identified

Based on the professional experience of the EIA team, legal requirements (Section 2), the nature of the proposed activity (Section 3), the nature of the receiving environment (Section 4), the following key environmental issues – potential negative impacts and potential benefits – were identified:

- **Groundwater** – potential deterioration of groundwater quality from accidental battery spills during construction and operation;
- **Botanical** – potential loss of vegetation (including plant SCCs) during construction and operation and loss of ecological connectivity during construction;
- **Socio-economic** – potential socio-economic benefits to the wider community in the form of increased employment, income and skills development during construction;
- **Human Health** – potential impaired human health from increased ambient pollutant concentrations from construction activities and potential fatalities / injuries caused by battery fires / explosions and exposure to chemicals during operation;
- **Visual** – potential alteration of the sense of place, and visual intrusion during construction and operation; and
- **Traffic** - potential increase in traffic on existing access roads and compromised road surface integrity during construction.

6.1.2 Specialist Studies Undertaken

A Vegetation Specialist Study was undertaken to investigate the key potential direct, indirect and cumulative impacts of the project on vegetation. The Vegetation Specialist Study is included as Appendix B to this report.

The other impacts were assessed by SRK specialists and EAPs, and stand-alone specialist studies were not considered necessary.

Furthermore, there are no watercourses or wetlands within 500 m of the proposed site and (as confirmed by HWC) no reason to believe that the proposed project will impact on heritage resources. As such, no heritage or freshwater ecology specialist studies were deemed necessary.

6.1.3 Alternatives Assessed in the EIA

During the prefeasibility phase of most projects various development alternatives are investigated. Furthermore, the EIA Regulations, 2014, require that all BA processes must identify and describe “alternatives to the proposed activity that are feasible and reasonable”.

In the case of the Paleisheuwel BESS project, various alternatives have been considered during the initial screening phase of the project, many of which were eliminated for technical reasons (refer to Section 3.3).

6.1.3.1 Technology Alternatives

The following battery storage technology alternatives were assessed in Sections 6.3, 6.4 and 6.6 and are discussed in further detail in Section 3.3.1:

- Self-contained (solid state) batteries (refer to Section 3.3.1.1); and

- Flow batteries (refer to Section 3.3.1.2).

6.1.3.2 Layout Alternatives

The following layout alternatives for the BESS were assessed in Section 6.7 and are discussed in further detail in Section 3.3.4:

- Layout Alternative 1: BESS housed inside a building/ shed; and
- Layout Alternative 2: Stand-alone Containerized Battery Units (unhoused).

6.1.3.3 No-Go Alternative

The No-Go alternative will be considered in the BAR in accordance with the requirements of the EIA Regulations, 2014. The No-Go alternative entails no change to the *status quo*, in other words the proposed BESS and associated infrastructure will not be built and the opportunity to optimize energy supply and demand will be forgone.

6.1.4 Risk Assessment

In order to understand the nature and level of risks associated with the two technology alternatives, Eskom undertook a risk assessment in April 2019 (see Appendix E).

The risk assessment process included the identification, analysis and evaluation of risks associated with the two battery types. Eskom identified a number of risks which, in the unlikely event of their occurrence, could potentially result in environmental impacts. The risks and related ratings have informed the impact assessment and are discussed in more detail in Appendix E.

By comparing the consequence of the risk with the likelihood of the risk occurring in a risk matrix, Eskom were able to evaluate the risk to determine whether the level of risk pre- and post controls is acceptable or tolerable.

6.1.5 Impact Rating Methodology

The assessment of impacts was based on specialists' expertise, SRK's professional judgement, field observations and desk-top analysis.

The significance of potential impacts that may result from the proposed project was determined in order to assist decision-makers (typically by a designated competent authority or state agency, but in some instances, the applicant).

The **significance** of an impact is defined as a combination of the **consequence** of the impact occurring and the **probability** that the impact will occur.

The criteria used to determine impact consequence are presented in the table below.

Table 6-1: Criteria used to determine the consequence of the impact

Rating	Definition of Rating	Score
A. *Extent* *– the area (distance) over which the impact will be experienced*		
Local	Confined to the study area or part thereof	1
Regional	The region, e.g. Municipality	2
(Inter) national	Nationally or beyond	3
B. ***Intensity*** *– the magnitude of the impact in relation to the extent and the sensitivity of the receiving environment, taking into account the degree to which the impact may cause irreplaceable loss of resources*		
Low	Site-specific and wider natural and/or social functions and processes are negligibly altered	1

Medium	Site-specific and wider natural and/or social functions and processes continue albeit in a modified way	2
High	Site-specific and wider natural and/or social functions or processes are severely altered	3
C. ***Duration***– *the timeframe over which the impact will be experienced and its reversibility*		
Short-term	Up to 2 years and reversible	1
Medium-term	2 to 15 years and reversible	2
Long-term	More than 15 years and irreversible	3

The combined score of these three criteria corresponds to a **Consequence Rating**, as follows:

Table 6-2: Method used to determine the consequence score

***Combined Score* (A+B+C)**	3 – 4	5	6	7	8 – 9
Consequence Rating	Very low	Low	Medium	High	Very high

Once the consequence was derived, the probability of the impact occurring was considered, using the probability classifications presented in the table below.

Table 6-3: Probability classification

Probability– *the likelihood of the impact occurring*	
Improbable	< 40% chance of occurring
Possible	40% - 70% chance of occurring
Probable	> 70% - 90% chance of occurring
Definite	> 90% chance of occurring

The overall **significance** of impacts was determined by considering consequence and probability using the rating system prescribed in the table below.

Table 6-4: Impact significance ratings

		Probability			
		Improbable	Possible	Probable	Definite
Consequence	Very Low	**INSIGNIFICANT**	**INSIGNIFICANT**	**VERY LOW**	**VERY LOW**
	Low	**VERY LOW**	**VERY LOW**	**LOW**	**LOW**
	Medium	**LOW**	**LOW**	**MEDIUM**	**MEDIUM**
	High	**MEDIUM**	**MEDIUM**	**HIGH**	**HIGH**
	Very High	**HIGH**	**HIGH**	**VERY HIGH**	**VERY HIGH**

Finally, the impacts were also considered in terms of their status (positive or negative impact) and the confidence in the ascribed impact significance rating. The prescribed system for considering impacts status and confidence (in assessment) is laid out in the table below.

Table 6-5: Impact status and confidence classification

Status of impact	
Indication whether the impact is adverse (negative) or beneficial (positive).	+ ve (positive – a 'benefit')
	– ve (negative – a 'cost')
Confidence of assessment	
The degree of confidence in predictions based on available information, SRK's judgment and/or specialist knowledge.	Low
	Medium
	High

The impact significance rating should be considered by authorities in their decision-making process based on the implications of ratings ascribed below:

- **INSIGNIFICANT**: the potential impact is negligible and **will not** have an influence on the decision regarding the proposed activity/development.
- **VERY LOW**: the potential impact is very small and **should not** have any meaningful influence on the decision regarding the proposed activity/development.
- **LOW**: the potential impact **may not** have any meaningful influence on the decision regarding the proposed activity/development.
- **MEDIUM**: the potential impact **should** influence the decision regarding the proposed activity/development.
- **HIGH**: the potential impact **will** affect the decision regarding the proposed activity/development.
- **VERY HIGH**: The proposed activity should only be approved under special circumstances.

6.1.6 Integration of Studies into the BAR and Review

The completed botanical specialist study and its findings have been integrated into the BAR. The key findings of the specialist study were evaluated and integrated into the overall project impacts.

SRK has considered the suite of potential impacts in a holistic manner and in certain instances, based on independent professional judgment and this integrated approach, may have altered impact significance ratings provided by the specialist.

The specialist has made recommendations for the management of impacts, and the BA team has assessed these recommendations. For the sake of brevity, only **key** (i.e. non-standard essential) mitigation measures are presented in impact rating tables (later in this section), with a collective summary of all recommended mitigation measures presented at the end of each discipline.

6.2 Less Significant (or Minor) Impacts

Certain impacts, while important, are considered likely to be less significant. These include:

- **Land capability –**Reduced land capability during construction; and
- **Noise** - Increased noise levels during construction.

These impacts are not expected to be significant and have therefore not been subjected to detailed impact analysis. However, they have been assessed by the EAPs through desktop investigation and ground-truthing and are discussed below. Mitigation measures are also identified.

6.2.1 Potential Impact LC1: Reduced Land Capability

Aspects of the construction activities that are anticipated to lead to reduced land capability are as follows:

- Repetitive movement of construction vehicles and machinery over exposed surfaces resulting in soil compaction at the project footprint, thereby disturbing the soil structure;
- Physical disturbance may increase the risk of erosion (by wind and stormwater) and may damage soil structure, thereby reducing water infiltration rates and water retention capacity;

- Vegetation clearance and topsoil stripping are likely to negatively affect the nutrient cycle of the topsoil horizon thereby reducing soil fertility and vegetative growth; and
- Accidental hydrocarbon leaks or spills from vehicles, machinery, temporary fuel storage containers and waste generated during construction resulting in the contamination of the soil, thereby altering the soils chemical composition.

However, the affected area is non-arable with very low grazing capacity / wilderness land capability (see Section 4.1.3) and the change in land use will not cause any loss to agricultural production in the area.

The impact is assessed to be ***insignificant*** with and without mitigation.

6.2.1.1 Mitigation Measures: Land Capability Impact

Essential land capability mitigation measures during **construction** are as follows:

- Restrict construction activities to the project footprint areas.
- Minimise vegetation clearance and the footprint of construction activities to what is essential.
- Strip the topsoil layer prior to construction and stockpile the topsoil in a demarcated area for rehabilitation.
- Replace harvested topsoil in areas that are to be rehabilitated as soon as sections of the works are completed (i.e. not only following the completion of all works).
- Locate all topsoil stockpiles in areas where they will not have to be relocated prior to replacement for final rehabilitation.
- Locate topsoil stockpiles away from aggregate, cement, concrete, fuels, litter, oils, domestic and wastes.
- Strip and store topsoil and subsoil separately.
- Use appropriately sized drip trays for all refuelling, repairs done on vehicles / machinery or when vehicles are parked – ensure these are strategically placed to capture any fuel / oil spills.
- Ensure hazardous materials (especially fuel) are stored in suitable hazardous material storage facilities/containers constructed from impermeable materials. The storage facilities must have bund containment capacity equal to 110% of the largest container.
- Immediately clean up spills and dispose of contaminated soil at a licensed waste disposal facility.
- Rehabilitate disturbed areas incrementally and as soon as possible, not necessarily waiting until completion of the construction phase.
- Use conserved topsoil as soon as possible to maintain soil nutrient cycles.
- Do not stockpile topsoil higher than 4 m to ensure that the nutrient cycles are maintained over a large surface to volume ratio.

6.2.2 Potential Impact N1: Increased Noise Levels

Noise pollution results from unwanted or excessive noise with effects that range from nuisance to more harmful effects such as sleep disturbance, high stress levels and impaired hearing.

Existing noise levels in the area are typical of a remote location and both daytime and night time average noise levels are expected to be low.

The closest receptors are located at the Paleisheuwel PV Solar facility (employees) and scattered farmsteads along the R365 (nearest ~3.5 km away).

Traffic and construction activities are anticipated sources of noise. Such impacts are typically limited to the immediate area surrounding the construction site and to the construction period (short-term).

The impact is assessed to be of ***very low*** significance and with the implementation of mitigation is reduced to ***insignificant***.

6.2.2.1 Mitigation Measures: Noise Impacts

Essential noise mitigation measures during **construction** are as follows:

- Comply with the applicable municipal and / or industry noise regulations.
- Maintain all machinery, vehicles, and other equipment in good working order to minimise excess noise.
- Limit vehicle speeds to 30 km/h on all unsurfaced access tracks.
- Enclose diesel generators used for power supply to reduce unnecessary noise.
- Respond rapidly to complaints and take appropriate corrective action.

6.3 Potential Groundwater Impact

6.3.1 Assessment of Impacts: Construction Phase

Two potential construction phase groundwater impact were identified:

- GW1: Deterioration of Groundwater Quality from Accidental Hydrocarbon Spills.
- GW2: Deterioration of Groundwater Quality from Accidental (non-routine) Electrolyte Spills.

6.3.1.1 Potential Impact GW1: Deterioration of Groundwater Quality from Accidental Hydrocarbon Spills

Up to 1 000 liters of fuel (petrol and diesel) will be temporarily stored on site during the construction phase. Fuel will be stored in tanks and bowsers in bunded areas. The fuel tanks and bowsers will be removed off site promptly upon completion of the construction phase.

Noting that fuel will be stored in a bunded area for no more than 90 days at a time (temporarily) and since the groundwater table is deep, contamination of groundwater by an accidental hydrocarbon spill during construction is not expected to significantly impact on groundwater quality.

The impact is assessed to be ***insignificant*** with and without mitigation.

6.3.1.2 Potential Impact GW2: Deterioration of Groundwater Quality from Accidental (non-routine) Electrolyte Spills

Assessing the impacts of an unforeseen event or accident is difficult as the potential volume and conditions of discharge cannot be predicted. The risk of an accidental or non-routine event is informed by the risk assessment undertaken by Eskom (refer to Appendix E).

It should be noted that the assessment of the potential impacts below is based on the premise that a hydrocarbon or electrolyte spill occurs. In other words, the probability ratings as presented in the assessment tables below are the probability of the impacts occurring, should a spill take place, and not the probability of a spill occurring.

Technology Alternative 1: Self-contained (solid state) batteries

Self-contained batteries contain either liquid, gel or solid-state electrolytes. For the purposes of this study, and to assess the impacts conservatively, SRK has assumed that a solid-state battery containing liquid electrolyte will be used.

In the event of an accidental electrolyte spill, hazardous substances may contaminate surrounding soil resulting in groundwater contamination and the resultant deterioration of groundwater quality.

The risk of a self-contained battery electrolyte spill is conservatively assessed to be ***medium*** (see Appendix E). This is based on a likelihood of occurrence of 20% - 70% and short-term environmental consequences.

However, being a closed system (primary and secondary containment) equipped with a monitoring system, noting that the batteries will be assembled off-site, the unlikely event that all battery cells will spill at the same time, an engineered storm water design and deep groundwater table, contamination of groundwater by hazardous substances from self-contained batteries during construction is not expected to have a meaningful impact on groundwater quality.

The impact is assessed to be ***very low*** with and without mitigation (see Table 6-8).

Table 6-6: Significance of deterioration of groundwater quality from accidental (non-routine) electrolyte spills during construction – Technology Alternative 1

	Extent	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Without mitigation	Local	Low	Long-term	Low	Possible	**VERY LOW**	– ve	Medium
	1	1	3	5				
Essential Mitigation Measures: • Ensure battery transport and installation by accredited staff / contractors. • Compile (and adhere to) a procedure for the safe handling of battery cells. • Compile an emergency response plan and implement should an emergency occur. • Ensure that spill kits are available on site for clean-up of spills and leaks. • Drip-trays must be placed under vehicles and equipment when not in use. • Immediately clean up spills and dispose of contaminated soil at a licensed waste disposal facility. • Dispose of waste appropriately to prevent pollution of soil and groundwater. • Record and report all fuel, oil, hydraulic fluid or electrolyte spills to the PM / Engineer / ERP and ECO so that appropriate clean-up measures can be implemented. A copy of these records must be made available to authorities on request throughout the project execution.								
With mitigation	Local	Low	Long-term	Low	Improbable	**VERY LOW**	– ve	Medium
	1	1	3	5				

Technology Alternative 2: Flow batteries

The proposed method of installation for flow batteries is unknown at this stage, however, for the purposes of this study, and to assess the impacts conservatively, SRK has assumed that flow battery tanks will be installed and filled with electrolyte fluid on-site.

In the event of an accidental electrolyte spill, hazardous substances may contaminate surrounding soil resulting in groundwater contamination and the resultant deterioration of groundwater quality.

The risk of an electrolyte spill is conservatively assessed to be to ***high*** (see Appendix E). This is based on a likelihood of occurrence of 20% - 70% and medium-term recovery.

However, being equipped with a monitoring system, the unlikely event that all battery cells will spill at the same time, an engineered storm water design and deep groundwater table, contamination of groundwater by hazardous substances from flow batteries during construction is not expected to have a meaningful impact on groundwater quality.

The impact is assessed to be ***very low*** with and without mitigation (see Table 6-8).

Table 6-7: Significance of deterioration of groundwater quality from accidental (non-routine) electrolyte spills during construction – Technology Alternative 2

	Extent	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Without mitigation	Local	Low	Long-term	Low	Possible	**VERY LOW**	– ve	Medium
	1	1	3	5				
Essential Mitigation Measures: • Ensure battery transport and installation by accredited staff / contractors. • Compile (and adhere to) a procedure for the safe handling of battery cells. • Compile an emergency response plan and implement should an emergency occur. • Ensure that spill kits are available on site for clean-up of spills and leaks. • Drip-trays must be placed under vehicles and equipment when not in use. • Immediately clean up spills and dispose of contaminated soil at a licensed waste disposal facility. • Dispose of waste appropriately to prevent pollution of soil and groundwater. • Record and report all fuel, oil, hydraulic fluid or electrolyte spills to the PM / Engineer / ERP and ECO so that appropriate clean-up measures can be implemented. A copy of these records must be made available to authorities on request throughout the project execution.								
With mitigation	Local	Low	Long-term	Low	Improbable	**VERY LOW**	– ve	Medium
	1	1	3	5				

6.3.2 Assessment of Impacts: Operational Phase

One potential groundwater impact was identified in the Operational Phase:

- GW2: Deterioration of Groundwater Quality from Accidental (non-routine) Electrolyte Spills.

Electrolytes spills during the operational phase may occur from mishandling batteries, inappropriate battery storage, and battery overheating/charging.

Assessing the impacts of an unforeseen event or accident is difficult as the potential volume and conditions of discharge cannot be predicted. The risk of an accidental or non-routine event is informed by the risk assessment undertaken by Eskom (refer toAppendix E).

It should be noted that the assessment of the potential impacts below is based on the premise that a electrolyte spill occurs. In other words, the probability ratings as presented in the assessment tables below are the probability of the impacts occurring, should a spill take place, and not the probability of a spill occurring.

6.3.2.1 Potential Impact GW3: Deterioration of Groundwater Quality from Accidental (non-routine) Electrolyte Spills

Technology Alternative 1: Self-contained (solid state) batteries

Self-contained batteries contain either liquid, gel or solid-state electrolytes. For the purposes of this study, and to assess the impacts conservatively, SRK has assumed that a solid-state battery containing liquid electrolyte will be used.

In the event of an accidental electrolyte spill, hazardous substances may contaminate surrounding soil resulting in groundwater contamination and the resultant deterioration of groundwater quality.

The risk of a of a self-contained battery electrolyte spill is assessed to be to ***medium*** (see Appendix E). This is based on a likelihood of occurrence of 20% - 70% and short-term environmental consequences.

However, being a closed system (primary and secondary containment) equipped with a monitoring system, the unlikely event that all battery cells will spill at the same time, an engineered storm water design and since the likelihood of groundwater occurring in the area is low, contamination of groundwater by hazardous substances from self-contained batteries during operation and maintenance is not expected to have a meaningful impact on groundwater quality.

The impact is assessed to be ***very low*** with and without mitigation (see Table 6-8).

Table 6-8: Significance of deterioration of groundwater quality from accidental (non-routine) electrolyte spills – Technology Alternative 1

	Extent	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Without mitigation	Local	Low	Long-term	Low	Possible	**VERY LOW**	– ve	Medium
	1	1	3	5				
Essential Mitigation Measures: • Implement the storm-water management plan and ensure appropriate water diversion systems are put in place. • Compile (and adhere to) a procedure for the safe handling of battery cells. • Compile an emergency response plan and implement should an emergency occur. • Ensure that spill kits (if appropriate) are available on site for clean-up of spills and leaks. • Drip-trays or containment measures must be placed under equipment that poses a risk when not in use. • Immediately clean up spills and dispose of contaminated soil at a licensed waste disposal facility. • Dispose of waste appropriately to prevent pollution of soil and groundwater. • Install monitoring systems to detect leaks or emissions. • On-site battery maintenance should be done over appropriate drip trays/containment measures and any hazardous substances must be disposed of appropriately. • Record and report all fuel, oil, hydraulic fluid or electrolyte spills to the PM / Engineer / ERP so that appropriate clean-up measures can be implemented. A copy of these records must be made available to authorities on request throughout the project execution. • Provide environmental awareness training to all personnel on site. Training should include discussion of: o Potential impact of electrolyte spills on groundwater; o Suitable disposal of waste and effluent; o Key measures in the EMPr relevant to worker's activities; o How incidents and suggestions for improvement can be reported. o Ensure that all attendees remain for the duration of the training and on completion sign an attendance register that clearly indicates participants' names. **Best Practice Mitigation Measures**: • Consider an aqueous electrolyte which significantly reduces the hazards associated with organics and acids.								
With mitigation	Local	Low	Long-term	Low	Improbable	**VERY LOW**	– ve	Medium
	1	1	3	5				

Technology Alternative 2: Flow batteries

The risk of an electrolyte spill occurring is conservatively assessed to be ***high*** (see Appendix E). This is based on a likelihood of occurrence of 70% - 90% and immaterial environment consequences.

In the event of an accidental electrolyte spill, electrolytes may contaminate surrounding soil resulting in groundwater contamination and the resultant deterioration of groundwater quality.

However, since the likelihood of groundwater occurring in the area is low, and with the implementation of primary and secondary containment contamination of groundwater by electrolytes from flow batteries during operation and maintenance is not expected to have a meaningful impact on groundwater quality.

The impact is assessed to be ***very low*** with and without mitigation (see Table 6-9).

Table 6-9: Significance of deterioration of groundwater quality from accidental (non-routine) electrolyte spills – Technology Alternative 2

	Extent	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Without mitigation	Local	Low	Long-term	Low	Possible	**VERY LOW**	– ve	Medium
	1	1	3	5				
Essential Mitigation Measures: • Implement the storm-water management plan and ensure appropriate water diversion systems are put in place. • Compile (and adhere to) a procedure for the safe handling of battery cells. • Compile an emergency response plan and implement should an emergency occur. • Ensure that spill kits (if appropriate) are available on site for clean-up of spills and leaks. • Drip-trays or containment measures must be placed under equipment that poses a risk when not in use. • Immediately clean up spills and dispose of contaminated soil at a licensed waste disposal facility. • Dispose of waste appropriately to prevent pollution of soil and groundwater. • Install monitoring systems to detect leaks or emissions. • On-site battery maintenance should be done over appropriate drip trays/containment measures and any hazardous substances must be disposed of appropriately. • Record and report all fuel, oil, hydraulic fluid or electrolyte spills to the PM / Engineer / ERP so that appropriate clean-up measures can be implemented. A copy of these records must be made available to authorities on request throughout the project execution. • Provide environmental awareness training to all personnel on site. Training should include discussion of: o Potential impact of electrolyte spills on groundwater; o Suitable disposal of waste and effluent; o Key measures in the EMPr relevant to worker's activities; o How incidents and suggestions for improvement can be reported. o Ensure that all attendees remain for the duration of the training and on completion sign an attendance register that clearly indicates participants' names. **Best Practice Mitigation Measures**: • Consider an aqueous electrolyte which significantly reduces the hazards associated with organics and acids.								
With mitigation	Local	Low	Long-term	Low	Improbable	**VERY LOW**	– ve	Medium
	1	1	3	5				

6.3.3 The No-Go Alternative

The No-Go alternative entails no change to the *status quo*. The No-Go alternative will have no impacts on groundwater quality since the likelihood of groundwater occurring in the area is low.

6.3.4 Mitigation Measures: Groundwater Impact

Essential groundwater mitigation measures during **construction** for all technology alternatives are as follows:

- Design and construct hazardous material storage facilities, especially fuel storage, with suitable impermeable materials and a minimum bund containment capacity equal to 110% of the largest container.
- Ensure that contaminants (including cement) are not placed directly on the ground (e.g. mix concrete on plastic sheeting).
- Develop (or adapt and implement) procedures for the safe transport, handling and storage of potential pollutants.
- Avoid unnecessary use and transport of hazardous substances.
- Keep Material Safety Data Sheets for all hazardous materials on site and ensure that they are available for reference by staff responsible for handling and storage of materials.
- Place appropriately sized drip trays under vehicles and equipment when not in use – ensure these are strategically placed to capture any spillage of fuel, oil, etc.

- Clean up any spills immediately, through containment and removal of free product and appropriate disposal of contaminated soils.
- Ensure battery transport and installation by accredited staff / contractors.
- Compile (and adhere to) a procedure for the safe handling of battery cells.
- Compile an emergency response plan and implement should an emergency occur.
- Ensure that spill kits are available on site for clean-up of spills and leaks.
- Drip-trays must be placed under vehicles and equipment when not in use.
- Immediately clean up spills and dispose of contaminated soil at a licensed waste disposal facility.
- Dispose of waste appropriately to prevent pollution of soil and groundwater.
- Record and report all fuel, oil, hydraulic fluid or electrolyte spills to the PM / Engineer / ERP and ECO so that appropriate clean-up measures can be implemented. A copy of these records must be made available to authorities on request throughout the project execution.

Essential groundwater mitigation measures during **operation** for all technology alternatives are as follows:

- Implement the storm-water management plan and ensure appropriate water diversion systems are put in place.
- Compile (and adhere to) a procedure for the safe handling of battery cells.
- Compile an emergency response plan and implement should an emergency occur.
- Ensure that spill kits (if appropriate) are available on site for clean-up of spills and leaks.
- Drip-trays or containment measures must be placed under equipment that poses a risk when not in use.
- Immediately clean up spills and dispose of contaminated soil at a licensed waste disposal facility.
- Dispose of waste appropriately to prevent pollution of soil and groundwater.
- Install monitoring systems to detect leaks or emissions.
- On-site battery maintenance should be done over appropriate drip trays/containment measures and any hazardous substances must be disposed of appropriately.
- Record and report all fuel, oil, hydraulic fluid or electrolyte spills to the PM / Engineer / ERP so that appropriate clean-up measures can be implemented. A copy of these records must be made available to authorities on request throughout the project execution.
- Provide environmental awareness training to all personnel on site. Training should include discussion of:
    - Potential impact of electrolyte spills on groundwater;
    - Suitable disposal of waste and effluent;
    - Key measures in the EMPr relevant to worker's activities;
    - How incidents and suggestions for improvement can be reported.
    - Ensure that all attendees remain for the duration of the training and on completion sign an attendance register that clearly indicates participants' names.

Best practice groundwater mitigation measures during **operation** for Technology Alternative 1 is as follows:

- Consider an aqueous electrolyte which significantly reduces the hazards associated with organics and acids.

6.4 Potential Botanical Impacts

This assessment is based on the Vegetation Impact Assessment undertaken by Nemai Consulting (Pty) Ltd dated August 2019 (see Appendix B).

The ToR for the study were to:

- Describe the existing baseline floral characteristics of the study area and place this in a regional context. Include a description of biodiversity patterns at a community and ecosystem level (main vegetation type, plant communities in the vicinity and threatened/vulnerable ecosystems), at species level (threatened Red List species, Protected species, presence of alien species) and in terms of significant landscape features;
- Describe the sensitivity of the site and its environs, and map these resources;
- Undertake a site walk-through to determine the final location of infrastructure based on ecological sensitivity of the study area;
- Identify and assess potential impacts of the project and the alternatives, including impacts associated with the construction and operation phases, using SRK's prescribed impact rating methodology;
- Indicate the acceptability of alternatives and recommend a preferred alternative;
- Identify and describe potential cumulative impacts of the proposed development in relation to proposed and existing developments in the surrounding area;
- Recommend mitigation measures to avoid and/or minimise impacts and/or optimise benefits associated with the proposed project; and
- Recommend and draft a monitoring campaign, if applicable.

6.4.1 Assessment of Impacts: Construction Phase

Two direct construction phase botanical impacts were identified:

- B1: Loss of Vegetation and Plant SCC; and
- B2: Loss of Ecological Connectivity

6.4.1.1 Potential Impact B1: Loss of Vegetation and Plant SCC

Construction related activities will require the physical disturbance and removal of vegetation and soils, thereby removing/altering floral habitat and floral communities. Disturbance associated with construction activities may also cause the proliferation of alien and invasive species in the area.

The proposed BESS does not fall within a threatened ecosystem (National List of Threatened Terrestrial Ecosystems, 2011), within a formal or informal protected area (NBA, 2011) or within a focus area for protection (NPAES, 2010).

Although only one SCC, *Babiana virescens*, was observed on the project footprint during a site inspection, this may be strongly influenced by the season in which the survey was carried. Regardless, it is unlikely that the construction activities would compromise local populations of SCC.

The loss of vegetation and SCC is therefore likely to be local in nature as the impact will not be of broader significance.

The impact is assessed to be ***low*** with and without mitigation (Table 6-10).

Table 6-10: Significance of loss of vegetation and plant SCC during construction

	Extent	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Without mitigation	Local	Low	Long-term	Low	Definite	**LOW**	– ve	High
	1	1	3	5				
Essential Mitigation Measures: • Limit vegetation clearance and the footprint of construction activities to what is absolutely essential. • Define all areas outside of the planned project and construction footprint as no-go areas. • Demarcate construction footprints and restrict access beyond these areas. • Restrict the movement of construction vehicles to new and existing access roads only. • Appoint a suitably qualified person to identify SCC and protected species within the construction footprint and oversee the rescue and relocation of these species. • Undertake rescue and relocation of species prior to the commencement of construction related activities. • Obtain a floral permit from CapeNature for the removal of SCC and protected species. • Avoid removal of SCC and provincially protected plants where possible. • Appoint a botanist/ rehabilitation specialist to compile a rehabilitation plan and oversee the rehabilitation process. • Curtail sheet runoff from cleared areas and access roads to avoid the erosion of exposed soils and downslope areas: o Install erosion berms within disturbed areas to prevent gully formation. Install berms every 50m where the road has a slope of less than 2%, every 25m where the road slopes between 2% and 10%, every 20m where the road slopes between 10% and 15% and every 10m where the road slope is greater than 15%; and o Use cleared vegetation to brush pack (cover over) cleared areas to reduce the area of exposed soils (where practical). • Implement an alien plant monitoring and eradication programme until disturbed areas have recovered and stabilised. • Remove all alien and weed species encountered within areas disturbed by construction activities: o Where possible, remove alien species by hand and not with chemicals; o Keep footprint areas as small as possible when removing alien plant species; and o Dispose of removed alien plant material at a licensed waste disposal site. **Best Practice Mitigation Measures:** • Relocation/replanting of rescued SCC and protected plant species should preferably take place in Autumn, once the rains have fallen, in order to fast track establishment of these plant species on site.								
With mitigation	Local	Low	Long-term	Low	Definite	**LOW**	– ve	High
	1	1	3	5				

6.4.1.2 Potential Impact B2: Loss of Ecological Connectivity

The primary objective of the ESA traversing the site is to maintain ecological connectivity for flora and faunal species. The development poses a limited threat to the functioning of the affected ESA in terms of the direct impact on species diversity (biodiversity pattern) as well as on broad-scale ecological processes (biodiversity process).

Construction of the BESS platform and associated infrastructure is unlikely to significantly alter the overall functioning of the ESA, given the already transformed nature of the surrounding areas. Furthermore, the project is unlikely to disrupt ecological connectivity as fauna are likely to already avoid the affected area on account of the existing activities at the Paleisheuwel PV Solar Park, Paleisheuwel Substation and close proximity to the R365.

According to SRK's Impact Assessment Methodology, the significance of the impact is assessed to be very low with and without the implementation of mitigation (see Table 6-10). However, given the large scale of transformation in the study area, it is the professional opinion of SRK that the significance of this impact should be of ***very low*** significance without mitigation and with the implementation of mitigation this impact should be reduced to ***insignificant***.

Table 6-11: Significance of loss of ecological connectivity during construction

	Extent	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Without mitigation	Local	Low	Long-term	Low	Improbable	**VERY LOW**	– ve	High
	1	1	3	5				
Essential Optimisation Measures: • Limit vegetation clearance and the footprint of construction activities to what is absolutely essential. Where possible, avoid sensitive habitats. • Define all areas outside of the planned project and construction footprint as no-go areas. • Demarcate construction footprints and restrict access beyond these areas. • Rehabilitate areas affected by scarring and put measures in place to prevent erosion. • Rehabilitate areas as soon as sections of the works are completed (i.e. not only following the completion of all works).								
With mitigation	Local	Low	Long-term	Low	Improbable	**VERY LOW**	– ve	High
	1	1	3	5				

6.4.2 Assessment of Impacts: Operational Phase

One potential direct operational phase impacts on the botanical environmental was identified:

- B3: Loss of Vegetation and Plant SCC from an Accidental (non-routine) Event.

Accidental events can include electrolyte spills, battery explosions and/or fires. Of the three events, battery explosions and fires are likely to result in loss of vegetation and plant SCC.

Battery fires and/or explosions may occur from mishandling batteries, inappropriate battery storage, and battery overheating/charging.

Assessing the impacts of an unforeseen event or accident is difficult as the nature and extent of the accident cannot be predicted. The risk of an accidental or non-routine event is informed by the risk assessment undertaken by Eskom (refer to Appendix E).

It should be noted that the assessment of the potential impacts below is based on the premise that an accidental event occurs. In other words, the probability ratings as presented in the assessment tables below are the probability of the impacts occurring, i.e. should a spill take place, and not the probability of the accidental event occurring.

6.4.2.1 Potential Impact B3: Loss of Vegetation and Plant SCC from an Accidental (non-routine) Event

Technology Alternative 1: Self-contained (solid state) batteries

The risks associated with self-contained batteries relate mainly to battery overcharging, thermal runaway and high temperatures within the cells, all of which could result in battery explosions and/or fires.

The risk of a battery fire / explosion occurring is assessed to be ***high*** (see Appendix E). This is based on a likelihood of occurrence of 20% - 70% and measurable environmental consequences.

While fire can play an integral role in shaping vegetation communities, battery fires / explosions are likely to result in the emission of toxic gases and deposition of particulate (such as heavy metals) likely to contaminate soil. Although some heavy metals, such as cobalt and manganese (typically used in lithium ion batteries), are essential in trace amounts for flora, higher concentrations of these metals may lead to excessive accumulation of metals, becoming toxic to the plants.

The proposed BESS does not fall within a threatened ecosystem (National List of Threatened Terrestrial Ecosystems, 2011), within a formal or informal protected area (NBA, 2011) or within a focus area for protection (NPAES, 2010).

The impact is assessed to be of ***low*** significance and with the implementation of mitigation is reduced to ***very low*** (Table 6-12).

Table 6-12: Significance of loss of vegetation and plant SCC from an accidental (non-routine) event - Technology Alternative 1

	Extent	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Without mitigation	Local	Medium	Medium-term	Low	Probable	**LOW**	– ve	High
	1	2	2	5				
Essential Mitigation Measures: • Ensure that sufficient / appropriate fire-fighting equipment is available on site. • Suitably maintain firefighting equipment. • Minimize the storage of flammable liquids on site (over and above the BESS or to fuel the BESS). • Ensure that all personnel on site are aware of the location of firefighting equipment on the site and how the equipment is operated. • Compile an Emergency Response Plan (including a Fire Management Plan) and ensure that this is located on site at all times and that all personal are familiar with the procedures. This should be reviewed annually. • Liaise with the local fire-firefighting department with regards to emergency procedures. • Provide suitable emergency and safety signage on site, and demarcate any areas which may pose a safety risk (including hazardous substances.). Emergency numbers for local police, fire department, Eskom and the Local Municipality must be placed in a prominent clearly visible area on site. • Ensure that no fires are permitted on or adjacent to site except in areas designated for this purpose. Any such designated areas should be situated as far as possible from vegetated areas, flammable material stores any other high fire risk, or environmentally sensitive areas. • Ensure that areas for the storage of fuel and other flammable materials comply with standard fire safety regulation. • Provide an emergency tipping area for waste loads identified to be on fire or otherwise deemed to be an immediate risk. • Prepare and annually review a fire risk assessment. • Clear invasive alien plant species from disturbed areas for at least 5 years following completion of the project. • Rehabilitate affected areas in terms of a rehabilitation plan compiled by a suitable botanist / rehabilitation specialist.								
With mitigation	Local	Low	Medium-term	Low	Possible	**VERY LOW**	– ve	High
	1	1	2	4				

Technology Alternative 2: Flow batteries

The risk of a flow battery fire / explosion occurring is assessed to be ***low*** (see Appendix E). This is based on a likelihood of occurrence of 5% - 20% and short-term environmental consequences.

The impacts of a flow battery fire and/or explosion are likely to be similar to those discussed above for solid-state batteries.

The impact is assessed to be of ***low*** significance and with the implementation of mitigation is reduced to ***very low*** (Table 6-13).

Table 6-13: Significance of loss of vegetation and plant SCC from an accidental (non-routine) event - Technology Alternative 2

	Extent	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Without mitigation	Local	Medium	Medium-term	Low	Probable	**LOW**	– ve	High
	1	2	2	5				
Essential Optimisation Measures: • Same as for Technology Alternative 1								
With mitigation	Local	Low	Medium-term	Low	Possible	**VERY LOW**	– ve	High
	1	1	2	5				

6.4.3 The No-Go Alternative

The No-Go alternative entails no change to the *status quo*. The No-Go alternative will have no impacts on existing botanical resources on the site.

6.4.4 Mitigation Measures: Botanical Impacts

Essential botanical management measures during **construction** are as follows:

- Limit vegetation clearance and the footprint of construction activities to what is absolutely essential.
- Define all areas outside of the planned project and construction footprint as no-go areas.
- Demarcate construction footprints and restrict access beyond these areas.
- Restrict the movement of construction vehicles to new and existing access roads only.
- Appoint a suitably qualified person to identify SCC and protected species within the construction footprint and oversee the rescue and relocation of these species.
- Undertake rescue and relocation of species prior to the commencement of construction related activities.
- Obtain a floral permit from CapeNature for the removal of SCC and protected species.
- Avoid removal of SCC and provincially protected plants where possible.
- Appoint a botanist / rehabilitation specialist to compile a rehabilitation plan and oversee the rehabilitation process.
- Curtail sheet runoff from cleared areas and access roads to avoid the erosion of exposed soils and downslope areas:
    - Install erosion berms within disturbed areas to prevent gully formation. Install berms every 50m where the road has a slope of less than 2%, every 25m where the road slopes between 2% and 10%, every 20m where the road slopes between 10% and 15% and every 10m where the road slope is greater than 15%; and
    - Use cleared vegetation to brush pack (cover over) cleared areas to reduce the area of exposed soils (where practical).
- Implement an alien plant monitoring and eradication programme until disturbed areas have recovered and stabilised.
- Remove all alien and weed species encountered within areas disturbed by construction activities:

  - Where possible, remove alien species by hand and not with chemicals;
  - Keep footprint areas as small as possible when removing alien plant species; and
  - Dispose of removed alien plant material at a licensed waste disposal site.

- Limit vegetation clearance and the footprint of construction activities to what is absolutely essential. Where possible, avoid sensitive habitats.
- Define all areas outside of the planned project and construction footprint as no-go areas.
- Demarcate construction footprints and restrict access beyond these areas.
- Rehabilitate areas affected by scarring and put measures in place to prevent erosion.
- Rehabilitate areas as soon as sections of the works are completed (i.e. not only following the completion of all works).

Essential botanical management measures during **operatio**n are as follows:

- Ensure that sufficient / appropriate fire-fighting equipment is available on site.
- Suitably maintain firefighting equipment.
- Minimize the storage of flammable liquids on site (over and above the BESS or to fuel the BESS).
- Ensure that all personnel on site are aware of the location of firefighting equipment on the site and how the equipment is operated.
- Compile an Emergency Response Plan (including a Fire Management Plan) and ensure that this is located on site at all times and that all personal are familiar with the procedures. This should be reviewed annually.
- Liaise with the local fire-firefighting department with regards to emergency procedures.
- Provide suitable emergency and safety signage on site, and demarcate any areas which may pose a safety risk (including hazardous substances.). Emergency numbers for local police, fire department, Eskom and the Local Municipality must be placed in a prominent clearly visible area on site.
- Ensure that no fires are permitted on or adjacent to site except in areas designated for this purpose. Any such designated areas should be situated as far as possible from vegetated areas, e.g. flammable material stores any other high fire risk, or environmentally sensitive areas.
- Ensure that areas for the storage of fuel and other flammable materials comply with standard fire safety regulation.
- Provide an emergency tipping area for waste loads identified to be on fire or otherwise deemed to be an immediate risk.
- Prepare and annually review a fire risk assessment.
- Clear invasive alien plant species from disturbed areas for at least 5 years following completion of the project.
- Rehabilitate affected areas in terms of a rehabilitation plan compiled by a suitable botanist / rehabilitation specialist.

6.5 Potential Socio-Economic Impacts

6.5.1 Assessment of Impacts: Construction Phase

One potential direct construction phase impact was identified:

- SE1: Increased Employment, Income and Skills Development.

6.5.1.1 Potential Impact SE1: Increased Employment, Income and Skills Development

Employment provides many socio-economic benefits to employees and their dependants, including:

- Improved material wealth and standard of living;
- Enhanced potential to invest and improved access to social services such as education and health services;
- Enhanced skills transferred to previously unskilled workers, facilitating employment prospects of such workers; and
- Contribution to a sense of independence, freedom and pride, which may promote a good work ethic.

While construction employment will be temporary, workers have the opportunity to improve their economic prospects in the longer term if they take full advantage of the income, experience and skills transferred to them through the project.

The extent of the benefit is deemed regional, as specialist contractors are likely to be sourced from outside of the immediate community. The intensity of the benefit is considered medium, as the number of jobs created will be significant but extending over the short term.

The benefit is assessed to be of ***very low*** (+ve) significance with and without the implementation of optimisation (Table 6-14).

Table 6-14: Significance of increased employment, income and skills development during construction

	Extent	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Without Optimisation	Regional	Low	Short-term	Very Low	Probable	**VERY LOW**	+ve	High
	2	1	1	4				
Essential Mitigation Measures: • Maximise use of local skills and resources through preferential employment of skilled locals where practicable. • Develop and implement a fair and transparent labour and recruitment policy. • Ensure gender equality in recruitment, as far as possible. • Provide suitable training. •								
With Optimisation	Regional	Low	Short-term	Very Low	Definite	**VERY LOW**	+ve	High
	2	1	1	4				

6.5.2 The No-Go Alternative

The No-Go alternative entails no change to the *status quo* although the No-Go alternative is expected to result in a loss of job creation opportunities.

6.5.3 Mitigation Measures: Socio-Economic Impacts

Essential socio-economic mitigation measures during **construction** are as follows:

- Maximise use of local skills and resources through preferential employment of skilled locals where practicable.
- Develop and implement a fair and transparent labour and recruitment policy.
- Ensure gender equality in recruitment, as far as possible.
- Provide suitable training.

6.6 Potential Human Health Impacts

6.6.1 Assessment of Impacts: Construction Phase

One direct construction phase impact on human health was identified:

- HH1: Impaired Human Health from Increased Ambient Pollutant Concentrations.

6.6.1.1 Potential Impact HH1: Impaired Human Health from Increased Ambient Pollutant Concentrations

The following construction activities may contribute to increased ambient pollutant concentrations in the study area:

- Vegetation clearing;
- Stripping and stockpiling of soil resources and earthworks;
- Collection, storage and removal of construction related stockpiles / waste;
- Construction of infrastructure; and
- Operation of construction vehicles / equipment (dust entrainment and vehicle exhaust emissions).

Dust generating activities along with additional construction vehicle traffic along the R365 would temporarily affect air quality in the area immediately adjacent to the site and the R365.

The nearest sensitive receptors include employees at the Paleisheuwel PV facility (offices ~ 500 m north of the site) and motorists on the R365 (adjacent to the site). The nearest farmstead (abutting the R365) is approximately 3.5 km south of the site. Air quality impacts can be readily mitigated by standard housekeeping measures.

The impact is assessed to be of ***very low*** significance and with the implementation of mitigation is reduced to ***insignificant*** (Table 6-15).

Table 6-15: Significance of impaired human health from increased ambient pollutant concentrations during construction

	Extent	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Without mitigation	Regional	Low	Short-term	Very Low	Probable	**VERY LOW**	-ve	Medium
	2	1	1	4				
Essential Mitigation Measures: • Limit and phase vegetation clearance and the construction footprint to what is essential. • Limit vehicle speeds to 40 km/h on unconsolidated and non-vegetated areas. • Avoid clearing of vegetation until necessary (i.e. just before earthworks). • Reduce airborne dust through e.g. dampening dust-generating areas, roads and stockpiles with water. • Utilise screens in high dust-generating areas. • Use high quality (low sulphur) diesel for construction vehicles / equipment where practical. • Maintain all machinery, vehicles, vessels and other equipment in good working order to minimise exhaust fumes.								
	Regional	Low	Short-term	Very Low	Improbable	**INSIGNIFICANT**	-ve	Medium

With mitigation	2	1	1	4				

6.6.2 Assessment of Impacts: Operational Phase

One potential direct operational phase impact on human health was identified:

- HH2: Human fatalities / injuries caused by battery fires / explosions.

Unplanned battery fires or explosions may result in the loss of human lives and/or injuries.

Assessing the impacts of an unforeseen event is difficult as the nature and severity of the accident cannot be predicted. The risk of an accidental or non-routine event is informed by the risk assessment undertaken by Eskom (refer to Appendix E).

It should be noted that the assessment of the potential impact below is based on the premise that an accidental event occurs. In other words, the probability ratings as presented in the assessment tables below are the probability of the impacts occurring, i.e. should a spill take place, and not the probability of the accidental event occurring.

6.6.2.1 Potential Impact HH2: Human fatalities / injuries caused by battery fires / explosions

Technology Alternative 1: Self-contained (solid state) batteries

The biggest concern with regards to self-contained (solid state) batteries is the possibility of battery overcharging, thermal runaway and/or high temperatures within battery cells resulting in system failures and potential combustion or an explosion.

The risk of a self-contained battery fire / explosion occurring is assessed to be ***high*** (see Appendix E). This is based on a likelihood of occurrence of 20% - 70% and measurable environmental consequences.

Lethal and sub-lethal impacts to humans include absorption of volatile hydrocarbons though direct contact and inhalation of toxic fumes and direct exposure to flames. These toxic effects can cause injury or illness, death, and reduced human health. The receptors most vulnerable to battery fires / explosions include any temporary staff at the BESS site, personnel at the Paleisheuwel PV facility (stationed in the admin building and workshop), first-responders (e.g. fire-fighters) and motorists on R365 (adjacent to the site).

The impact is assessed to be ***medium*** with and without mitigation (Table 6-16).

Table 6-16: Significance of human fatalities / injuries caused by battery fires / explosions during operation – Technology Alternative 1

	Extent	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Without mitigation	Local	High	Long-term	High	Possible	**MEDIUM**	-ve	High
	1	3	3	7				
Essential Mitigation Measures: • Compile an Emergency Response Plan and ensure that this is located on site at all times and that all personal are familiar with the procedures. • Ensure that emergency procedures (in relation to fire, spills, contamination of the ground, accidents to employees, use of hazardous substances, etc.) are established prior to commencing operation. • Make all emergency procedures available, including responsible personnel, contact details of emergency services, etc. to all the relevant personnel. Clearly demarcate emergency procedures at the relevant locations around the site. • Provide suitable emergency and safety signage on site, and demarcate any areas which may pose a safety risk (including hazardous substances.). • Ensure that no fires are permitted on or adjacent to site except in areas designated for this purpose. Any such designated areas should be situated as far as possible from vegetated areas, e.g. flammable material stores any other high fire risk, or environmentally sensitive areas. • Ensure that no smoking is permitted. • Ensure that sufficient fire-fighting equipment is available on site. • Ensure that all personnel on site are aware of the location of firefighting equipment on the site and how the equipment is operated. • Liaise with the local fire-firefighting department with regards to emergency procedures.								
With mitigation	Local	High	Long-term	High	Improbable	**MEDIUM**	-ve	High
	1	3	3	7				

Technology Alternative 2: Flow batteries

The risk of a flow battery fire / explosion occurring is assessed to be ***low*** (see Appendix E). This is based on a likelihood of occurrence of 5% - 20% and short-term environmental consequences.

The impacts of a flow battery fire / explosion are likely to be the same as those discussed above for self-contained batteries.

The impact is assessed to be ***medium*** with and without mitigation (Table 6-16).

Table 6-17: Significance of human fatalities / injuries caused by a battery fire / explosion during operation – Technology Alternative 2

	Extent	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Without mitigation	Local	High	Long-term	High	Possible	**MEDIUM**	-ve	High
	1	3	3	7				
Essential Mitigation Measures: • Same as for Technology Alternative 1								
With mitigation	Local	High	Long-term	High	Improbable	**MEDIUM**	-ve	High

6.6.3 The No-Go Alternative

The No-Go alternative entails no change to the *status quo*. The No-Go alternative alleviates any risks associated with potential battery fires / explosions.

6.6.4 Mitigation Measures: Human Health Impacts

Essential human health mitigation measures during **construction** are as follows:

- Limit and phase vegetation clearance and the construction footprint to what is essential.
- Avoid clearing of vegetation until necessary (i.e. just before earthworks).
- Reduce airborne dust through e.g.:

- Dampening dust-generating areas, roads and stockpiles with water; and
- Utilising screens in high dust-generating areas.

- Use high quality (low sulphur) diesel for construction vehicles / equipment (where practical).
- Maintain all machinery, vehicles, vessels and other equipment in good working order to minimise exhaust fumes.

Essential human health mitigation measures during **operations** for all technology alternatives are as follows:

- Compile an Emergency Response Plan and ensure that this is located on site at all times and that all personal are familiar with the procedures.
- Ensure that emergency procedures (in relation to fire, spills, contamination of the ground, accidents to employees, use of hazardous substances, etc.) are established prior to commencing operation.
- Make all emergency procedures available, including responsible personnel, contact details of emergency services, etc. to all the relevant personnel. Clearly demarcate emergency procedures at the relevant locations around the site.
- Secure the Site Camp, particularly to restrict access to fuels and any other hazardous substances.
- Provide suitable emergency and safety signage on site, and demarcate any areas which may pose a safety risk (including hazardous substances, deep excavations etc.).
- Ensure that no fires are permitted on or adjacent to site except in areas designated for this purpose. Any such designated areas should be situated as far as possible from vegetated areas, e.g. the conservation area, flammable material stores any other high fire risk, or environmentally sensitive areas.
- Ensure that no smoking is permitted on the site except for within a designated area in the Site Camp (to be included in the Site Camp Method Statement). Suitable firefighting equipment must be readily available in this area.
- Suitably maintain firefighting equipment.
- Ensure that sufficient fire-fighting equipment is available on site.
- Ensure that all personnel on site are aware of the location of firefighting equipment on the site and how the equipment is operated.
- Liaise with the local fire-firefighting department in regard to correct procedures to combat battery fires.

Best practice human health mitigation measures during operations for technology alternative 3 is as follows:

- Add complexing agents to electrolyte to reduce potential for air borne release of toxic bromine.

6.7 Potential Visual Impacts

6.7.1 Assessment of Impacts: Construction Phase

Two direct construction phase impact on visual resources were identified:

- V1: Altered Sense of Place and Visual Intrusion caused by Construction Activities.
- V2: Altered Sense of Place from Increased Traffic during Construction.

6.7.1.1 Potential Impact V1: Altered Sense of Place and Visual Intrusion

Visual impacts will be generated by construction activities such as vegetation stripping and bulk earthworks, which can cause scarring, and from construction infrastructure, plant and materials on site (e.g. site camp and stockpiles). Dust generated at the site will be visually unappealing and may further detract from the visual quality of the area. Such impacts are typically limited to the immediate area surrounding the construction site and to the construction period.

Limited loss of sense of place is expected during construction since construction activities and the change in the state of the site (scarring, construction equipment and dust generation) are moderately consistent with the current character and nature of the surrounding area (substation and PV facility buildings). Construction activities will also be visible to a very limited number of receptors.

The impact is assessed to be of ***very low*** significance with and without the implementation of mitigation. (Table 6-18).

Table 6-18: Significance of altered sense of place and visual intrusion during construction

	Extent	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Without mitigation	Local	Low	Short-term	Very Low	Definite	**VERY LOW**	-ve	High
	1	1	1	3				
Essential mitigation measures: • Limit and phase vegetation clearance and the footprint of construction activities to what is essential. • Avoid excavation, handling and transport of materials which may generate dust under high wind conditions. • Prepare/review a detailed dust suppression/control management programme, such as regular wetting and/or use of non-contaminating agents, to reduce dust on dust-generating facilities (e.g. roads), especially during the dry season and when conditions are windy. • Ensure speed limits on all gravel roads are respected at all times. • Keep construction sites tidy and all activities, material and machinery contained within an area that is as small as possible. • Control litter and keep construction sites as clean and neat as possible. • Rehabilitate disturbed areas incrementally and as soon as possible, not necessarily waiting until completion of the construction phase. • Minimise the use of night-lighting. No high mast or spot-light security lighting or up-lighting allowed.								
With mitigation	Local	Low	Short-term	Very Low	Probable	**VERY LOW**	-ve	High
	1	1	1	3				

6.7.1.2 Potential Impact V2: Altered Sense of Place from Increased Traffic during Construction

The increased number of construction vehicles on the road (and the related noise impacts) will reduce the sense of place to neighbouring receptors. The impaired sense of place will have a greater impact within the foreground as sensitive receptors in close proximity to the R365, for example, will be particularly exposed to this impact.

The impact is assessed to be of **very low** significance with and without mitigation (Table 6-19).

Table 6-19: Significance of altered sense of place from increased traffic during construction

	Extent	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Without mitigation	Local	Low	Short-term	Very Low	Definite	**VERY LOW**	-ve	High
	1	1	1	3				
Essential mitigation measures: • Restrict construction deliveries to Mondays to Saturdays between the hours of 07h00 and 18h00. • Maintain all vehicles in good working order.								
With mitigation	Local	Low	Short-term	Very Low	Probable	**VERY LOW**	-ve	High
	1	1	1	3				

6.7.2 Assessment of Impacts: Operational Phase

One potential direct visual impact was identified during the operational phase:

- V3: Altered sense of place and visual intrusion.

6.7.2.1 Potential Impact V3: Altered Sense of Place and Visual Intrusion

Layout Alternative 1: BESS housed inside a building/ shed

The BESS will be visually compatible with the industrial nature of the Substation and PV facility, thereby absorbing the BESS to a certain degree. Furthermore, the remoteness of the area ensures that there are only a very limited number of receptors in the area.

A shed structure may be marginally more (visually) intrusive than open BESS Platform as the overall mass of the shed will be marginally greater than the open BESS Platform (i.e. with no shed).

The impact is assessed to be of ***low*** significance and with the implementation of mitigation is reduced to ***very low*** (Table 6-20).

Table 6-20: Significance of altered sense of place and visual intrusion during operation – Layout Alternative 1

	Extent	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Without mitigation	Local	Low	Long-term	Low	Probable	**LOW**	-ve	High
	1	1	3	5				
Essential mitigation measures: • Paint the battery storage containers (and where possible, associated infrastructure such as fencing) grey or brown. Avoid the use of light colours (e.g. white). • Do not increase the height of existing buildings, unless specifically required for operations. • Be sensitive towards the use of glass or material with a high reflectivity which may cause glare and increase visual impacts.								
With mitigation	Local	Low	Long-term	Low	Possible	**VERY LOW**	-ve	High
	1	1	3	5				

Layout Alternative 2: Stand-alone Containerized Battery Units (unhoused)

An unhoused BESS platform would have largely similar visual impacts to a housed BESS platform, although a shed structure may be marginally more (visually) intrusive than an unhoused BESS platform (i.e. with no shed).

The impact is assessed to be of ***low*** significance and with the implementation of mitigation is reduced to ***very low*** (Table 6-20).

Table 6-21: Significance of altered sense of place and visual intrusion during operation – Layout Alternative 2

	Extent	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Without mitigation	Local	Low	Long-term	Low	Probable	**LOW**	-ve	High
	1	1	3	5				
Essential Optimisation Measures: • Same as for Technology Alternative 1								
With mitigation	Local	Low	Long-term	Low	Possible	**VERY LOW**	-ve	High
	1	1	3	5				

6.7.3 The No-Go Alternative

The No-Go alternative entails no change to the *status quo*. The No-Go alternative will have no visual impacts or benefits.

6.7.4 Mitigation Measures: Potential Visual Impacts

Essential visual mitigation measures during **construction** are as follows:

- Limit and phase vegetation clearance and the footprint of construction activities to what is essential.
- Avoid excavation, handling and transport of materials which may generate dust under high wind conditions.
- Prepare/review a detailed dust suppression/control management programme, such as regular wetting and/or use of non-contaminating agents, to reduce dust on dust-generating facilities (e.g. roads), especially during the dry season and when conditions are windy.
- Ensure speed limits on all gravel roads are respected at all times.
- Keep construction sites tidy and all activities, material and machinery contained within an area that is as small as possible.
- Control litter and keep construction sites as clean and neat as possible.
- Rehabilitate disturbed areas incrementally and as soon as possible, not necessarily waiting until completion of the construction phase.
- Minimise the use of night-lighting. No high mast or spot-light security lighting or up-lighting allowed.
- Restrict construction deliveries to Mondays to Saturdays between the hours of 07h00 and 18h00.
- Maintain all vehicles in good working order.

Essential visual mitigation measures during **operations** are as follows:

- Paint the battery storage containers (and where possible, associated infrastructure such as fencing) grey or brown. Avoid the use of light colours (e.g. white).
- Do not increase the height of existing buildings, unless specifically required for operations.
- Be sensitive towards the use of glass or material with a high reflectivity which may cause glare and increase visual impacts.

6.8 Potential Traffic Impacts

6.8.1 Assessment of Impacts: Construction Phase

Two potential direct construction phase impacts on the traffic of the area were identified:

- T1: Increased nuisance on existing road users and surrounding residents; and
- T2: Compromised road surface integrity of the regional road network.

6.8.1.1 Potential Impact T1: Increased Nuisance on Existing Road Users and Surrounding Residents

A limited increase in traffic, compared to the existing traffic on the roads, is expected during the construction phase mainly comprising large vehicles and trucks delivering material / infrastructure, as well as smaller passenger vehicles. Construction vehicles will have to drive through Piketberg on the R366 and Het Kruis along the R365 to access the site. Increased traffic could cause a nuisance to residents along the transport routes.

In addition, road safety may be of concern because of increased traffic volumes and may pose a risk to communities.

The impact is assessed to be of ***very low*** significance and with the implementation of mitigation is reduced to ***insignificant*** (Table 6-22).

Table 6-22: Significance of increased nuisance on existing road users and surrounding residents during construction

	Extent	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Without mitigation	Local	Low	Short-term	Very Low	Probable	**VERY LOW**	-ve	High
	1	1	1	3				
Essential mitigation measures: • Restrict construction deliveries to Mondays to Saturdays between the hours of 07h00 and 18h00. • Maintain all vehicles in good working order. • Manage construction sites and activities to minimise impacts on road traffic as far as possible, e.g. minimise the unnecessary movement of construction vehicles. • Maintain and repair roads damaged by construction vehicles, in consultation with relevant road authorities. • Ensure that large construction vehicles are suitably marked to be visible to other road users and pedestrians. • Ensure that all safety measures are observed and that drivers of construction vehicles comply with the rules of the road. • Investigate and respond to complaints about traffic.								
With mitigation	Local	Low	Short-term	Very Low	Possible	**INSIGNIFICANT**	-ve	High
	1	1	1	3				

6.8.1.2 Potential Impact T2: Compromised Road Surface Integrity of the Regional Road Network

An increase in heavy, construction traffic on the gravel road (R365) to the site is likely to damage the road and compromise road surface integrity. Although the additional traffic is unlikely to exceed the traffic (volume) limits set by the Department of Transport's Structural Design, Construction and Maintenance Guidelines for Unpaved Roads (TRH20, 1990), the additional trucks on R365 may damage the road, particularly in the wetter months.

The impact is assessed to be of ***low*** significance and with the implementation of mitigation is reduced to ***very low*** (Table 6-23).

Table 6-23: Significance of compromised road surface integrity of the regional road network during construction

	Extent	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Without mitigation	Regional	Low	Short-term	Low	Probable	**LOW**	-ve	High
	2	1	2	5				
Essential mitigation measures: • Ensure that vehicle axle loads do not exceed the technical design capacity of the road. • Maintain and repair damage caused by trucks on R365, in consultation with relevant road authorities.								
With mitigation	Regional	Low	Short-term	Low	Possible	**VERY LOW**	-ve	High
	2	1	2	5				

6.8.2 The No-Go Alternative

The No-Go alternative entails no change to the status quo. Due to the low traffic volumes the current road network will continue to operate at acceptable levels-of-service and no impacts or benefits on existing traffic are anticipated.

6.8.3 Mitigation Measures: Potential Traffic Impacts

Essential traffic mitigation measures during **construction** are as follows:

- Restrict construction deliveries to Mondays to Saturdays between the hours of 07h00 and 18h00.
- Maintain all vehicles in good working order.
- Manage construction sites and activities to minimise impacts on road traffic as far as possible, e.g. minimise the unnecessary movement of construction vehicles.
- Use appropriate road signage, in accordance with the South African Traffic Safety Manual, providing flagmen, barriers etc. at the various access points where necessary to inform other road users of construction activities.
- Maintain and repair roads damaged by construction vehicles, in consultation with relevant road authorities.
- Ensure that large construction vehicles are suitably marked to be visible to other road users and pedestrians.
- Ensure that all safety measures are observed and that drivers of construction vehicles comply with the rules of the road.
- Investigate and respond to complaints about traffic.

6.9 Cumulative Impacts

Anthropogenic activities can result in numerous and complex effects on the natural and social environment. While many of these are direct and immediate, the environmental effects of individual activities (or projects) can combine and interact with other activities in time and space to cause incremental or aggregate effects. Effects from disparate activities may accumulate or interact to cause additional effects that may not be apparent when assessing the individual activities one at a time (Canadian Environmental Protection Agency, date unknown). Cumulative impacts can also be defined as the total impact that a series of developments, either present, past or future, will have on the environment within a specific region over a particular period of time (DEAT IEM Guideline 7, Cumulative effects assessment, 2004).

For the most part, cumulative impacts or aspects thereof are too uncertain to be quantifiable, due mainly to a lack of data availability and accuracy. This is particularly true of cumulative impacts arising

from potential or future projects, the design or details of which may not be envisaged, finalised or available and the direct and indirect impacts of which have not yet been assessed. Given the limited detail available regarding such future developments, the analysis will be of a more generic nature and focus on key issues and sensitivities for the project and how these might be influenced by cumulative impacts with other activities.

Cumulative impacts associated with the project are limited (Table 6-24).

Table 6-24: Cumulative impacts

Aspect	Cumulative Impact	Significance
Noise	The noise generated by construction activities will add to the cumulative noise level. Construction activities, predominantly earthmoving activities and the movement of large construction vehicles will add to the cumulative noise levels in the area. There are relatively few other noise sources in the area and very few sensitive receptors.	Very Low (-ve)
Groundwater	Despite the potential groundwater contamination from surrounding agricultural activities, the water table is deep and as such potential groundwater contamination (from an accidental event) is not expected to impact cumulatively on groundwater resources.	Very Low (-ve)
Botanical	Agricultural and industrial development in the surrounding areas has transformed the vegetation and faunal habitat in the area. Loss of vegetation would result from clearing of vegetation for the BESS platform or in the unlikely event of a battery fire / explosion. The footprint area associated with the project is not deemed significant in extent and will not significantly add to the cumulative effect of loss of any endangered vegetation types.	Low (-ve)
Socio-economic	The project will contribute to job creation in the area in the short term (i.e. during the construction phase).	Very Low (+ve)
Human Health	Air quality in the area of influence is generally good; furthermore, there are limited activities (farming, mining, industry) affecting ambient air quality. As the impacts on human health are linked to accidental events, the project will not cumulatively impact on receptors.	Very Low (-ve)
Visual	Vegetation clearance (and scarring), dust, infrastructure and vehicles travelling along gravel roads will add to the cumulative visual impact on sense of place. However, the cumulative impact is significantly reduced by the limited number of sensitive receptors.	Very Low (-ve)
Traffic	Over the short-term (i.e. in the construction phase), increased local traffic will be able to be accommodated within the design capacity of the local road network. The project is likely to cumulatively impact traffic on the R365 should construction take place during peak traffic times/seasons (i.e. harvesting season). No cumulative impact on traffic is expected during the operational phase.	Low (-ve)

7 Conclusions and Recommendations

This chapter evaluates the impact of the proposed project. The principal findings are presented in this chapter, followed by an analysis of the need and desirability of the project and a discussion of the key factors DEFF will have to consider in order to take a decision which is aligned with the principles of sustainable development. Key recommendations are also presented.

As is to be expected, the construction of the BESS and associated infrastructure will have the potential to cause impacts, both negative and positive. The BA has examined the available project layout information and drawn on both available (secondary) and specifically collected (primary) baseline data to identify and evaluate environmental (biophysical and socio-economic) impacts of the proposed project. The BAR aims to inform decision-makers of the key considerations by providing an objective and comprehensive analysis of the potential impacts and benefits of the project, and has created a platform for the formulation of mitigation measures to manage these impacts, presented in the EMPr (see Appendix F).

This chapter presents the general conclusions drawn from the BA process, which should be considered in evaluating the project. It should be viewed as a supplement to the detailed assessment of individual impacts presented in Chapter 6.

7.1 Environmental Impact Statement

The EIA Regulations, 2014 prescribe the required content of a BAR, including, *inter alia*, an EIS, which is presented in the section below.

7.1.1 Evaluation and Summary of Positive and Negative Impacts

The evaluation is undertaken in the context of:

- The project information provided by the proponent;
- The risk assessment provided by the proponent;
- The assumptions made for this BAR;
- The assumption that the recommended (essential) mitigation measures will be effectively implemented; and
- The assessment provided by the botanical specialist.

This evaluation aims to provide answers to a series of key questions posed as objectives at the outset of this report, which are repeated here:

- Assess in detail the environmental and socio-economic impacts that may result from the project;
- Identify environmental and social mitigation measures to address the impacts assessed; and
- Produce a BAR that will assist DEFF to decide whether (and under what conditions) to authorise the proposed development.

The evaluation and the basis for the subsequent discussion are represented concisely in Table 7-1, which summarises the potentially significant impacts and their significance ratings before and after application of mitigation and/or optimisation measures.

Table 7-1: Summary of potential impacts of the project

*Potential negative impacts are shaded in reds, benefits are shaded in greens. Insignificant impacts have not been shaded. Only **key (non-standard essential)** mitigation/optimisation measures are presented.*

ID #	Impact	Significance rating		Preferred Alternative	Key mitigation/optimisation measures
		Before mitigation/ optimisation	After mitigation/ optimisation		
CONSTRUCTION PHASE IMPACTS					
GW	**Groundwater Impacts**				
GW1	Deterioration of Groundwater Quality from Accidental Hydrocarbon Spills	Insignificant	Insignificant	-	• Design and construct hazardous material storage facilities, especially fuel storage, with suitable impermeable materials and a minimum bund containment capacity equal to 110% of the largest container. • Ensure that contaminants (including cement) are not placed directly on the ground (e.g. mix cement on plastic sheeting). • Develop (or adapt and implement) procedures for the safe transport, handling and storage of potential pollutants. • Avoid unnecessary use and transport of hazardous substances. • Keep Material Safety Data Sheets for all hazardous materials on site and ensure that they are available for reference by staff responsible for handling and storage of materials. • Place appropriately sized drip trays under vehicles and equipment when not in use – ensure these are strategically placed to capture any spillage of fuel, oil, etc. • Clean up any spills immediately, through containment and removal of free product and appropriate disposal of contaminated soils.
GW2	Deterioration of Groundwater Quality from Accidental (non-routine) Electrolyte spills	**Technology Alternative 1**		*Technology Alternative 1, however, both acceptable*	• Ensure battery transport and installation by accredited staff / contractors. • Compile (and adhere to) a procedure for the safe handling of battery cells. • Compile an emergency response plan and implement should an emergency occur. • Ensure that spill kits are available on site for clean-up of spills and leaks. • Drip-trays must be placed under vehicles and equipment when not in use. • Immediately clean up spills and dispose of contaminated soil at a licensed waste disposal facility. • Dispose of waste appropriately to prevent pollution of soil and groundwater. • Record and report all fuel, oil, hydraulic fluid or electrolyte spills to the PM / Engineer / ERP and ECO so that appropriate clean-up measures can be implemented. A copy of these records must be made available to authorities on request throughout the project execution.
		Insignificant	Insignificant		
		Technology Alternative 2			
		Very Low	Very Low		
B	**Botanical Impacts**				
B1	Loss of Vegetation and Plant SCC	Low	Low	-	• Limit vegetation clearance and the footprint of construction activities to what is absolutely essential. • Define all areas outside of the planned project and construction footprint as no-go areas. • Demarcate construction footprints and restrict access beyond these areas. • Restrict the movement of construction vehicles to new and existing access roads only.

					• Appoint a suitably qualified person to identify SCC and protected species within the construction footprint and oversee the rescue and relocation of these species.
					• Undertake rescue and relocation of species prior to the commencement of construction related activities.
					• Obtain a floral permit from CapeNature for the removal of SCC and protected species.
					• Avoid removal of SCC and provincially protected plants where possible.
					• Appoint a botanist/ rehabilitation specialist to compile a rehabilitation plan and oversee the rehabilitation process.
					• Curtail sheet runoff from cleared areas and access roads to avoid the erosion of exposed soils and downslope areas:
					  ○ Install erosion berms within disturbed areas to prevent gully formation. Install berms every 50m where the road has a slope of less than 2%, every 25m where the road slopes between 2% and 10%, every 20m where the road slopes between 10% and 15% and every 10m where the road slope is greater than 15%; and
					  ○ Use cleared vegetation to brush pack (cover over) cleared areas to reduce the area of exposed soils (where practical).
					• Implement an alien plant monitoring and eradication programme until disturbed areas have recovered and stabilised.
					• Remove all alien and weed species encountered within areas disturbed by construction activities:
					  ○ Where possible, remove alien species by hand and not with chemicals;
					  ○ Keep footprint areas as small as possible when removing alien plant species; and
					  ○ Dispose of removed alien plant material at a licensed waste disposal site.

B2	Loss of Ecological Connectivity	Very Low	Insignificant	-	• Limit vegetation clearance and the footprint of construction activities to what is absolutely essential. Where possible, avoid sensitive habitats. • Define all areas outside of the planned project and construction footprint as no-go areas. • Demarcate construction footprints and restrict access beyond these areas. • Rehabilitate areas affected by scarring and put measures in place to prevent erosion. • Rehabilitate areas as soon as sections of the works are completed (i.e. not only following the completion of all works).
SE	**Socio-Economic Impact**				
SE1	Increased Employment, Income and Skills Development	Very Low	Very Low	-	• Maximise use of local skills and resources through preferential employment of skilled locals where practicable. • Develop and implement a fair and transparent labour and recruitment policy. • Ensure gender equality in recruitment, as far as possible. • Provide suitable training.
HH	**Human Health Impact**				

HH1	Impaired Human Health from Increased Ambient Pollutant Concentrations	Very Low	Insignificant	-	• Limit and phase vegetation clearance and the construction footprint to what is essential. • Avoid clearing of vegetation until necessary (i.e. just before earthworks). o Reduce airborne dust through e.g.: o Dampening dust-generating areas, roads and stockpiles with water; and • Utilising screens in high dust-generating areas. • Use high quality (low sulphur) diesel for construction vehicles / equipment (where practical). • Maintain all machinery, vehicles, vessels and other equipment in good working order to minimise exhaust fumes.
V	**Visual Impacts**				
V1	Altered sense of place and visual intrusion	Very Low	Very Low	-	• Limit and phase vegetation clearance and the footprint of construction activities to what is essential. • Avoid excavation, handling and transport of materials which may generate dust under high wind conditions. • Prepare/review a detailed dust suppression/control management programme, such as regular wetting and/or use of non-contaminating agents, to reduce dust on dust-generating facilities (e.g. roads), especially during the dry season and when conditions are windy. • Ensure speed limits on all gravel roads are respected at all times. • Keep construction sites tidy and all activities, material and machinery contained within an area that is as small as possible. • Control litter and keep construction sites as clean and neat as possible. • Rehabilitate disturbed areas incrementally and as soon as possible, not necessarily waiting until completion of the construction phase. • Minimise the use of night-lighting. No high mast or spot-light security lighting or up-lighting allowed.
V2	Altered Sense of Place from Increased Traffic during Construction	Very Low	Very Low	-	• Restrict construction deliveries to Mondays to Saturdays between the hours of 07h00 and 18h00. • Maintain all vehicles in good working order.
T	**Traffic Impacts**				

T1	Increased Nuisance on Existing Road Users and Surrounding Residents	Very Low	Insignificant	-	• Restrict construction deliveries to Mondays to Saturdays between the hours of 07h00 and 18h00. • Maintain all vehicles in good working order. • Manage construction sites and activities to minimise impacts on road traffic as far as possible, e.g. minimise the unnecessary movement of construction vehicles. • Use appropriate road signage, in accordance with the South African Traffic Safety Manual, providing flagmen, barriers etc. at the various access points where necessary to inform other road users of construction activities. • Maintain and repair roads damaged by construction vehicles, in consultation with relevant road authorities. • Ensure that large construction vehicles are suitably marked to be visible to other road users and pedestrians. • Ensure that all safety measures are observed and that drivers of construction vehicles comply with the rules of the road. • Investigate and respond to complaints about traffic.
T2	Compromised Road Surface Integrity of the Regional Road Network	Low	Very Low	-	• Ensure that vehicle axle loads do not exceed the technical design capacity of the road. • Seal R365, in consultation with relevant road authorities. • Maintain and repair damage caused by trucks on R365, in consultation with relevant road authorities.
OPERATIONAL PHASE IMPACTS					
GW	**Groundwater Impacts**				
GW3	Deterioration of Groundwater Quality from Accidental (non-routine) Electrolyte spills	**Technology Alternative 1**		*Impacts the same, either alternative preferred*	• Implement the storm-water management plan and ensure appropriate water diversion systems are put in place. • Compile (and adhere to) a procedure for the safe handling of battery cells. • Compile an emergency response plan and implement should an emergency occur. • Ensure that spill kits (if appropriate) are available on site for clean-up of spills and leaks. • Drip-trays or containment measures must be placed under equipment that poses a risk when not in use. • Immediately clean up spills and dispose of contaminated soil at a licensed waste disposal facility. • Dispose of waste appropriately to prevent pollution of soil and groundwater. • Install monitoring systems to detect leaks or emissions. • On-site battery maintenance should be done over appropriate drip trays/containment measures and any hazardous substances must be disposed of appropriately. • Record and report all fuel, oil, hydraulic fluid or electrolyte spills to the PM / Engineer / ERP so that appropriate clean-up measures can be implemented. A copy of these records must be made available to authorities on request throughout the project execution. • Provide environmental awareness training to all personnel on site. Training should include discussion of: o Potential impact of electrolyte spills on groundwater;
		Very Low	Very Low		
		Technology Alternative 2			
		Very Low	Very Low		

					○ Suitable disposal of waste and effluent; ○ Key measures in the EMPr relevant to worker's activities; ○ How incidents and suggestions for improvement can be reported. ○ Ensure that all attendees remain for the duration of the training and on completion sign an attendance register that clearly indicates participants' names.
B	**Botanical Impacts**				
B3	Loss of Vegetation and Plant SCC	**Technology Alternative 1**		*Impacts the same, either alternative preferred*	• Ensure that sufficient / appropriate fire-fighting equipment is available on site. • Suitably maintain firefighting equipment. • Minimize the storage of flammable liquids on site (over and above the BESS or to fuel the BESS). • Ensure that all personnel on site are aware of the location of firefighting equipment on the site and how the equipment is operated. • Compile an Emergency Response Plan (including a Fire Management Plan) and ensure that this is located on site at all times and that all personal are familiar with the procedures. This should be reviewed annually. • Liaise with the local fire-firefighting department with regards to emergency procedures. • Provide suitable emergency and safety signage on site, and demarcate any areas which may pose a safety risk (including hazardous substances.). Emergency numbers for local police, fire department, Eskom and the Local Municipality must be placed in a prominent clearly visible area on site. • Ensure that no fires are permitted on or adjacent to site except in areas designated for this purpose. Any such designated areas should be situated as far as possible from vegetated areas, e.g. flammable material stores any other high fire risk, or environmentally sensitive areas. • Ensure that areas for the storage of fuel and other flammable materials comply with standard fire safety regulation. • Provide an emergency tipping area for waste loads identified to be on fire or otherwise deemed to be an immediate risk. • Prepare and annually review a fire risk assessment. • Clear invasive alien plant species from disturbed areas for at least 5 years following completion of the project. • Rehabilitate affected areas in terms of a rehabilitation plan compiled by a suitable botanist / rehabilitation specialist.
		Low	Very Low		
		Technology Alternative 2			
		Low	Very Low		
HH	**Human Health Impacts**				
HH2		**Technology Alternative 1**			• Ensure that sufficient / appropriate fire-fighting equipment is available on site.

<table>
<tr><td rowspan="4"></td><td rowspan="4">Human fatalities / injuries caused by battery fires / explosions</td><td>Medium</td><td>Medium</td><td rowspan="4">Impacts the same, either alternative preferred</td><td rowspan="4">• Suitably maintain firefighting equipment.
• Minimize the storage of flammable liquids on site (over and above the BESS or to fuel the BESS).
• Ensure that all personnel on site are aware of the location of firefighting equipment on the site and how the equipment is operated.
• Compile an Emergency Response Plan (including a Fire Management Plan) and ensure that this is located on site at all times and that all personal are familiar with the procedures. This should be reviewed annually.
• Liaise with the local fire-firefighting department with regards to emergency procedures.
• Provide suitable emergency and safety signage on site, and demarcate any areas which may pose a safety risk (including hazardous substances.). Emergency numbers for local police, fire department, Eskom and the Local Municipality must be placed in a prominent clearly visible area on site.
• Ensure that no fires are permitted on or adjacent to site except in areas designated for this purpose. Any such designated areas should be situated as far as possible from vegetated areas, e.g. flammable material stores any other high fire risk, or environmentally sensitive areas.
• Ensure that areas for the storage of fuel and other flammable materials comply with standard fire safety regulation.
• Provide an emergency tipping area for waste loads identified to be on fire or otherwise deemed to be an immediate risk.
• Prepare and annually review a fire risk assessment.</td></tr>
<tr><td colspan="2">Technology Alternative 2</td></tr>
<tr><td>Medium</td><td>Medium</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td>V</td><td colspan="5">Visual Impacts</td></tr>
<tr><td rowspan="5">V3</td><td rowspan="5">Altered sense of place and visual intrusion</td><td colspan="2">Layout Alternative 1</td><td rowspan="5">Impacts the same, either alternative preferred</td><td rowspan="5">▪ Paint the battery storage containers (and where possible, associated infrastructure such as fencing) grey or brown. Avoid the use of light colours (e.g. white).
▪ Do not increase the height of existing buildings, unless specifically required for operations.
▪ Be sensitive towards the use of glass or material with a high reflectivity which may cause glare and increase visual impacts.</td></tr>
<tr><td>Low</td><td>Very Low</td></tr>
<tr><td colspan="2">Layout Alternative 2</td></tr>
<tr><td>Low</td><td>Very Low</td></tr>
<tr><td colspan="2"></td></tr>
</table>

Relevant observations with regard to the overall impact ratings, assuming mitigation measures are effectively implemented, are:

- The predicted *groundwater* impact, associated with deterioration of groundwater quality from accidental (non-routine) electrolyte or hydrocarbon spills is rated as *insignificant* to *very low* during construction and *very low* during operation.
- The predicted *botanical* impacts, associated with the loss of vegetation and SCC and loss of ecological connectivity, are rated as *insignificant to low* during construction and *very low* during operation. This takes account of the mostly well represented and conserved receiving environment and specific measures to protect SCC.
- The predicted *socio-economic* benefit*,* associated with increased employment, income and skills development is rated as *very low*.
- The predicted *human health* impacts, associated with impaired human health from increased ambient pollutant concentrations and potential human fatalities / injuries caused by battery fires / explosions, are rated as *insignificant* during construction and *medium* during operations.
- The predicted *visual* impacts associated with the altered sense of place and visual intrusion are rated as *very low* during construction and during operations.
- The predicted *traffic* impacts associated with increased nuisance on existing road users and compromised road surface integrity are rated as *insignificant* and *very low* respectively during construction.

Other than the impact on groundwater during construction (during which Technology Alternative 1 will have lower impacts), the impacts are rated the same for all technology alternatives. Because a fire / explosion can have greater impact (*medium*) than an electrolyte spill (*very low*), and because the risk of a fire / explosion is grater for Technology Alternative 1, Technology Alternative 2 is preferred (see Table 7-2).

Table 7-2: Comparison of technology alternatives

Impact category	Alternative 1	Alternative 2
Groundwater	*Preferred*	Acceptable
Botanical	Acceptable	*Preferred*
Human Health	Acceptable	Acceptable

The visual impact for Layout Alternative 1 and Layout Alternative 2 is the same (and acceptable), although Layout Alternative 2 is marginally preferred.

Table 7-3: Comparison of layout alternatives

Impact category	Layout Alternative 1	Layout Alternative 2
Visual and Sense of Place	Acceptable	*Marginally preferred*

Given the considerations above, implementation of Technology Alternatives 2and Layout Alternative 2 are supported by the EAP, although all alternatives are deemed acceptable and feasible.

Cumulative impacts in the region mainly derive from existing agricultural activities. Cumulative biophysical impacts are predominantly of very low significance given the very limited scale of existing and planned development and associated anthropogenic activity in the area. Cumulative botanical and traffic impacts are considered more significant (albeit low). The contribution of the BESS Project to cumulative impacts is very limited at a regional scale.

7.1.2 Principal Findings

The project will entail so-called triple bottom line costs, i.e. social, environmental and economic costs. The triple bottom line concerns itself with environmental (taken to mean biophysical) sustainability, social equity and economic efficiency and is typically employed by companies seeking to report on their performance. The concept serves as a useful construct to frame the evaluation of environmental impacts of the project.

The challenge for DEFF is to take a decision which is sustainable in the long term and which will probably entail trade-offs between social, environmental and economic costs and benefits. The trade-offs are documented in the report, which assesses environmental impacts and benefits and compares these to the No-Go alternative. SRK believes it will be instructive to reduce the decision factors to the key points which the authorities should consider. These points constitute the principal findings of the BA:

1. Eskom proposes to install a Battery Energy Storage Systems (BESSs) at Paleisheuwel Substation along the West Coast in the Western Cape.
2. The site is located adjacent to the Paleisheuwel PV Solar facility and within the Paleisheuwel substation, owned and operated by Eskom.
3. The purpose of the project is to address network constraints and ensure reliability of electricity supply in the future.
4. Key aspects of the project include the extension of the existing substation, construction of the BESS platform and access road and installation of battery infrastructure.
5. The study area is sparsely populated with less than 10 people per km² mostly concentrated within the small towns and villages of the area. Isolated farmsteads are scattered throughout the surrounding area.
6. Besides the Paleisheuwel PV Solar facility, agriculture is the primary land use in the study area.
7. Potential environmental aspects considered include groundwater, botanical, socio-economic, human health, visual and traffic.
8. Key ecological impacts are associated with a loss of vegetation and plant SCC. These impacts are mitigated to acceptable levels through the strict implementation of the EMPr.
9. The impacts associated with the development of Technology Alternatives 1 and 2 are considered to be acceptable, although Technology Alternative 2 is preferred.
10. The impacts associated with the development of Layout Alternative 1 or Layout Alternative 2 are considered to be acceptable. Layout Alternative 2 is marginally preferred from an environmental perspective, as it will have a marginally lower visual impact.
11. The low socio-economic benefit of increased employment and electrical supply from this key infrastructure project is an important consideration.
12. The No-Go alternative implies that the BESS and associated infrastructure will not be constructed, significant impacts will not materialise and that reliable electrical supply to surrounding areas will not be secured.
13. A number of mitigation and monitoring measures have been identified to avoid, minimise and manage potential environmental impacts associated with the proposed development. These are further laid out in the EMPr.

7.2 Analysis of Need and Desirability of the Project

Best practice as well as the EIA Regulations, 2014 (Appendix 3 Section 3 [f]) requires that the need and desirability of a project (including viable alternatives) are considered and evaluated against the tenets of sustainability. This requires an analysis of the effect of the project on *social, economic and ecological* systems; and places emphasis on consideration of a project's *justification* not only in terms of financial viability (which is often implicit in a [private] proponent's intention to implement the project), but also in terms of the specific needs and interests of the community and the opportunity cost of development (DEA&DP, 2013).

The principles in NEMA (see Section 2.1.1) serve as a guide for the interpretation of the issue of "need", but do not conceive "need" as synonymous with the "general purpose and requirements" of the project. The latter might relate to the applicant's project motivation, while the "need" relates to the interests and needs of the broader public. In this regard, an important NEMA principle is that environmental management must ensure that the environment is "held in public trust for the people, the beneficial use of environmental resources must serve the public interest and the environment must be protected as the people's common heritage" (DEA, 2014).

There are various proxies for assessing the need and desirability of a project, notably national and regional planning documents which enunciate the strategic needs and desires of broader society and communities: project alignment with these documents must therefore be considered and reported on in the EIA process. With the use of these documents or - where these planning documents are not available - using best judgment, the EAPs (and specialists) must consider the project's strategic context, or justification, in terms of the needs and interests of the broader community (DEA&DP, 2013).

The consideration of need and desirability in EIA decision-making therefore requires the consideration of the strategic context of the project along with broader societal needs and the public interest (DEA, 2017). However, it is important to note that projects which deviate from strategic plans are not necessarily undesirable. The DEFF notes that more important are the social, economic and ecological impacts of the deviation, and "the burden of proof falls on the applicant (and the EAP) to show why the impacts…might be justifiable" (DEA, 2010).

The need of the project in terms of motivation for the project is discussed in Section 3.1. The desirability in terms of the different environmental aspects is discussed below.

- The Cederberg Local Municipality IDP notes that the Municipality is nearing its capacity in terms of electricity supply, especially to new developments. This will pose a challenge for long-term economic development in the Municipality, and the Municipality will need to upgrade electricity infrastructure to accommodate new developments. To this end, electricity supply and maintenance of infrastructure is listed as a focus area for the Municipality's efficient provision of basic services.
- The project aims to address this concern by strengthening the electricity distribution network and address current voltage and capacity constraints, integrating a greater amount of renewable energy into the electricity grid and reduce the requirements for investment in new conventional generation capacity.
- The Environmental Policy adopted by the Municipality in their IDP aims to manage the environment in a sustainable manner through sustainable development and contribute to the improvement of quality of life of all citizens within the Cederberg Local Municipality (IDP, 2017). This can be affected by, *inter alia*, establishing projects that ensure environmental sustainability and contribute to job creation and a better quality of life for all its citizens. The BAR assesses the environmental impacts of the project, and compares these to the potential benefits in order to inform authorities' decisions regarding the necessary approvals for the project. In this way, the Environmental Policy of the Municipality is fulfilled.

- Furthermore, the Environmental Policy aims to work with all relevant stakeholders and spheres of government in the spirit of good government. This is achieved for this project through the BA process.
- The Cederberg Local Municipality IDP (2017) recognises that rural predominance and resource constraints place pressure on the Municipality's capacity to meet service infrastructure needs of the residents, and encourages the optimal utilisation of existing resources and seeks to support intensive use of land by providing infrastructure and bulk services.
- The security of supply to users in the Cederberg Local Municipality is therefore directly in line with the objectives of the IDP for the local municipality.
- Environmental impacts are acceptable and do not prejudice local communities or public interest/health. Although an ESA will be affected, there will be no detrimental loss of natural resources.

7.3 Recommendations

The specific recommended mitigation and optimisation measures are presented in Chapter 6 and the EMPr (Appendix F) and key measures are summarised in Table 7-1 above. Eskom would need to implement these mitigation measures to demonstrate compliance and adherence to best practice. Although it is in theory possible that the potential impacts (or unintended consequences) of implementing mitigation and optimisation measures could offset their intended effect, the majority of the recommendations made in this BAR are procedural and/or can be implemented without resulting in any physical effects. The potential for such unintended consequences in the case of the Paleisheuwel BESS project is therefore considered negligible.

Key recommendations, which are considered essential, are:

1. Implement the EMPr to guide construction, operation and maintenance activities and to provide a framework for the ongoing assessment of environmental performance;
2. Appoint an ECO to oversee the implementation of the EMPr and supervise any construction activities;
3. Implement the SWMP; and
4. Implement measures to reduce the risks of accidental events (e.g. electrolyte spills and battery fires/explosions).

7.4 Conclusion and Authorisation Opinion

This Draft BAR has identified and assessed the potential biophysical and socio-economic impacts associated with the proposed BESS and associated infrastructure.

In terms of Section 31 (n) of NEMA, the EAP is required to provide an opinion as to whether the activity should or should not be authorised. In this section, a qualified opinion is ventured, and in this regard SRK believes that sufficient information is available for DEFF to take a decision.

The project will result in unavoidable adverse biophysical impacts. Working on the assumption that Eskom is committed to ensuring that the EMPr is strictly implemented, none of these adverse impacts are considered unacceptably significant.

In conclusion, and noting that the project is an important strategic project that will allow Eskom to strengthen the electricity distribution network and address current voltage and capacity constraints, SRK is of the opinion that on purely 'environmental' grounds (i.e. the project's potential socio-economic and biophysical implications) the application as it is currently articulated should **be approved,** provided

the essential mitigation measures are implemented. Ultimately, however, the DEFF will need to consider whether the project benefits outweigh the potential impacts.

7.5 Way Forward

This BAR is now available for public comment and SRK invites stakeholders to review the report and to participate in the public consultation process. An Executive Summary of this report has been distributed to registered stakeholders and is available from SRK on request (details below).

Copies of this report are also available for review at the following venues:

- Citrusdal Public Library;
- SRK's office in Rondebosch, Cape Town; and
- SRK's website: www.srk.co.za – click on the 'Library' and 'Public Documents' links.

Comments on the BAR can be submitted to:

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This BAR may be amended based on comments received from stakeholders. Stakeholders' comments on the BAR will assist DEFF in making a decision regarding the application. The public is therefore urged to submit comment. If you require assistance in compiling and submitting comments, please contact us and we will ensure that you receive appropriate support.

Comments must be submitted by **28 September 2019** to be incorporated into the Final BAR.

Once stakeholders have commented on the information presented in the BAR, the Final BAR will be prepared and submitted to DEFF for approval. Once a decision is taken by authorities, this decision will be communicated to registered IAPs.

Prepared by

Amy Hill

Environmental Consultant

Reviewed by

Scott Masson	BM Engelsman Pr Eng Pr CPM
Senior Environmental Consultant	Partner

All data used as source material plus the text, tables, figures, and attachments of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.

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Appendix A:
Curriculum Vitae of the EAP(s)

Appendix B:
Vegetation Specialist Study

Appendix C:
Paleisheuwel Stormwater Management Plan

Appendix D:
Stakeholder Database

Appendix E:
Eskom Risk Assessment

Risk Assessment

In order to understand the nature and level of risks associated with the two technology alternatives, Eskom undertook a risk assessment in April 2019.

The risk assessment process included the identification, analysis and evaluation of risks associated with the three battery types. Eskom identified a number of risks which, in the event of their occurrence, could potentially result in environmental impacts. The risks and related ratings have informed the impact assessment and are discussed in more detail in Section 6.

By comparing the consequence of the risk with the likelihood of the risk occurring in a risk matrix, Eskom were able to evaluate the risk to determine whether the level of risk is acceptable or tolerable.

The criteria used by Eskom to determine risk consequence is presented in Table 8-1 below. Note that the consequence criteria considered a number of potential outcomes (including financial sustainability, legal compliance, etc.); however, for the purposes of this report, SRK has summarised those criteria with potential environmental consequences only.

Table 8-1: Environmental consequence criteria

Category	Criteria
6	Irreversible, long-term environmental harm
5	Prolonged environmental harm
4	Measurable environmental harm, medium-term recovery
3	Immaterial effect on the environment, medium-term recovery
2	Short-term transient environmental harm
1	Minor environmental harm

Source: Eskom, 2019

The criteria used to determine the likelihood of the risk occurring is presented in Table 8-2 below.

Table 8-2: Likelihood criteria

Category	Criteria
E	• Could occur within “days to weeks”, or • Impact is imminent, or • ≥ 90% probability
D	• Could occur within “weeks to months”, or • Balance of probability will occur, or • ≥ 70% and < 90% probability
C	• Could occur within “months to years”, or • May occur shortly but a distinct probability it won’t, or • ≥ 20% and < 70% probability
B	• Could occur in “years to decades”, or • May occur but not anticipated, or • ≥ 5% and < 20% probability
A	• More than a “100-year event” • Exceptionally unlikely, even in the long-termfuture • < 5% probability

Source: Eskom, 2019

The overall risk was determined by considering *Consequence* and *Likelihood* using the risk matrix in Table 8-3 below.

Table 8-3: Risk matrix

Consequences	A	B	C	D	E
6	I	I	I	I	I
5	II	II	II	I	I
4	III	III	II	I	I
3	IV	III	II	II	I
2	IV	IV	III	II	II
1	IV	IV	III	III	III
	Likelihood				

Source: Eskom, 2019

The risk ratings are based on the level of treatment required to address the incident (should the risk be realised) (refer to Table 8-4).

Table 8-4: Risk rating

Priority	Risk Rating	Treatment
I	Very High	Short term. Normally within 1 month.
II	High	Medium term. Normally within 3 months.
III	Medium	Normally within 1 year.
IV	Low	Ongoing control as part of a management system.

Appendix F:
Environmental Management Programme

SRK Report Distribution Record

Report No. 533767/2

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Name/Title	Company	Copy	Date	Authorised by
Chief Directorate	DEFF: Integrated Environmental Authorisations	1 HC + CD	26 August 2019	HILL
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Adri La Meyer	DEA&DP	3 HC + 3 CDs		
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