

KARUSA BATTERY ENERGY STORAGE SYSTEM (BESS) AND ASSOCIATED INFRASTRUCTURE, ON FARM DE HOOP 202, NEAR SUTHERLAND, NORTHERN CAPE PROVINCE

Basic Assessment Report

July 2022

DFFE Reference No.: 14/12/16/3/3/1/2555

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PROJECT DETAILS

DFFE Reference No.	:	<u>14/12/16/3/3/1/2555</u>
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Client	:	Enel Green Power South Africa (Pty) Ltd
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When used as a reference this report should be cited as: Savannah Environmental (2022) Basic Assessment Report for the Karusa BESS and Associated Infrastructure, near Sutherland, Northern Cape Province.

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PURPOSE OF THE BASIC ASSESSMENT REPORT AND INVITATION TO COMMENT

Enel Green Power South Africa (Pty) Ltd has appointed Savannah Environmental as the independent environmental consultant to undertake the Basic Assessment (BA) for the Karusa Battery Energy Storage System (BESS) and associated infrastructure on Farm De Hoop 202, near Sutherland, Northern Cape Province. The BA process is being undertaken in accordance with the requirements of the 2014 EIA Regulations (as amended) promulgated in terms of the National Environmental Management Act (NEMA; Act No. 107 of 1998).

This Basic Assessment (BA) report has been compiled in accordance with Appendix 1 of the EIA Regulations, 2014 (as amended) and consists of the following sections:

- » **Chapter 1** provides background to the proposed Karusa BESS and the BA process.
- » **Chapter 2** provides a description of the proposed project, the identified and assessed alternatives, need and desirability of the project, the approach to undertaking a BA process and the strategic regulatory and legal context for energy planning in South Africa, specifically in relation to the proposed BESS.
- » **Chapter 3** presents an overview of the Basic Assessment (BA) process undertaken.
- » **Chapter 4** describes the existing biophysical, regional, and social environment within and surrounding the study area.
- » **Chapter 5** provides an assessment of the potential direct, indirect and cumulative impacts associated with the proposed development and presents recommendations for the mitigation of significant impacts.
- » **Chapter 6** presents the conclusions and recommendations based on the findings of the BA Report.
- » **Chapter 7** provides the references used in the compilation of the BA Report.

The draft BA report was made available for review from **Monday, 23 May 2022 to Thursday, 23 June 2022** at the following location: <https://savannahsa.com/public-documents/energy-generation/karusa-battery-energy-storage-system/>. All comments received and recorded during the 30-day review period have been included, considered and assessed within this Final Basic Assessment Report (refer to Comments & Response Report (C&RR) in **Appendix C9**). This report is submitted for the consideration of the National Department of Forestry, Fisheries and the Environment (DFFE) in the decision-making process. Changes made in this Final Basic Assessment Report have been underlined for ease of reference.

EXECUTIVE SUMMARY

Enel Green Power South Africa (Pty) Ltd proposes the construction and operation of a Battery Energy Storage System (BESS) and associated grid infrastructure in the proximity of the Karusa Wind Energy Facility (WEF) ~45km south of the town of Sutherland along the R354 and 47km north west of the town of Laingsburg along the R323 in the Northern Cape Province. (**Figure 1.1 and Table 1.1**). The Karusa WEF is a Round 4 REIPPPP Preferred Bidder project currently under construction.

The general purpose and utilisation of a BESS is to save and store excess electrical output as it is generated, allowing for a timed release of electricity to the grid when the capacity is required the most and the provision of ancillary services to ensure reliable operation of power networks during normal operation and contingency events. BESS systems therefore provide flexibility and reliability services for the efficient operation of the electricity grid.

The infrastructure considered within this BA process includes:

- » A BESS with a capacity of up to 2 000 MWh, inside containers with a footprint of up to 6ha in extent and a maximum height of 3 m. Both lithium-ion and Redox-flow technology are being considered for the project, depending on which is most feasible at the time of implementation.
- » Access roads to the BESS (10 m in width, approximately 70 m long) branching off of the existing roads, and internal roads (up to 8 m wide) to be located within the total BESS footprint area.
- » 33kV MV cabling between the BESS and the MV/HV substation and up to 132kV HV cabling to the HV substation
- » Fencing around the BESS for increased security measures.
- » Up to 132kV overhead or underground power line to be connected to the existing Hidden Valley Substation.
- » Temporary laydown area to be located within the BESS footprint.
- » Firebreak to be located within the BESS footprint.
- » A Substation with a maximum height of - HV bus-bar up to 10 m max and an HV Building up to 4 m max

The BESS facility and all associated infrastructure will be located within Farm De Hoop 202. The affected property has been identified by the applicant as the preferred project site suitable for the development of a BESS.

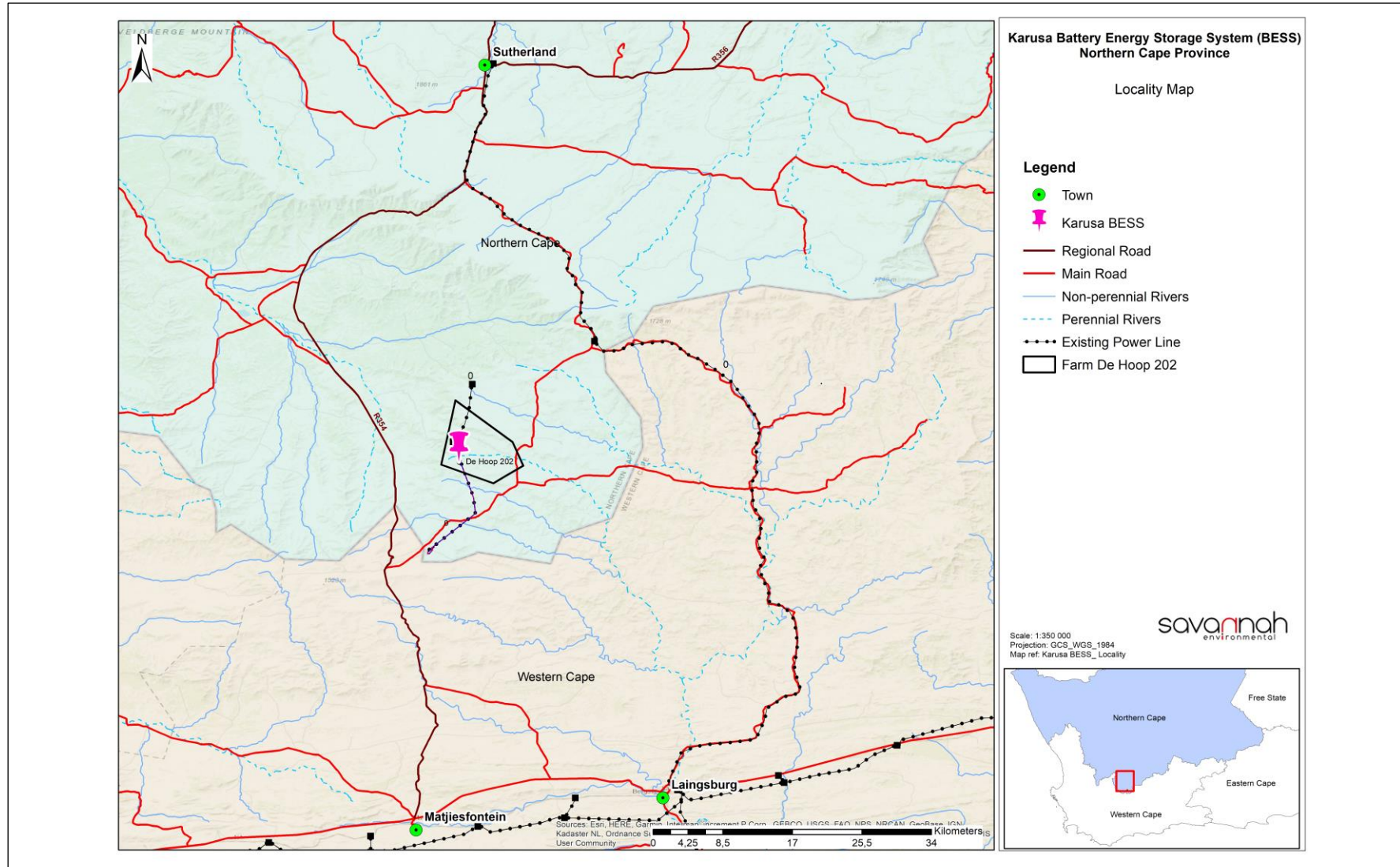


Figure 1: Locality map showing the site for the proposed development of the Karusa BESS and associated infrastructure on Farm De Hoop 202

Specialist studies undertaken in support of this application were identified through the DFFE online screening tool, and were required to be undertaken in accordance with the relevant Specialist Protocols (GNR320 of 20 March 2020). In this regard, and based on experience within the study area, the following specialist studies have been undertaken:

Ecological Impacts

The completion of a comprehensive desktop study, in conjunction with the results from the field survey, suggest there is a medium-high confidence in the information provided within the ecological assessment undertaken for the project. The survey ensured that there was suitable ground-truth coverage of the open-spaces or natural habitats, and ecosystems were assessed to obtain a general species (fauna and flora) overview and the major current impacts were observed.

The assessment area was identified with the screening as possessing a Very High sensitivity within a Terrestrial Biodiversity context, with the area and surrounding landscape regarded as part of a CBA. Presently, there are natural habitats within the assessment area that possess a High SEI. This is due to the combination of their functional integrity and conservation importance.

One (1) NT mammal species was recorded during the survey period. Based on the habitat present, there is also a high likelihood of select SCC occurring within the assessment area. Several plant Species of Conservation Concern that are provincially protected were recorded from the study area. Permits will be required for the trimming, removal or relocation of any such species from the provincial authorities.

The karoo scrub and rocky outcrop ecosystems were still natural to largely natural based on the diversity of species recorded, and the habitat physiognomy. The current natural ecosystems provide important ecosystem services including water regulation and pollination. However, certain areas are degraded due to overgrazing and erosion were still nevertheless functional. The findings of the field survey are therefore congruent with the screening tool.

Areas of rocky outcrops delineated as assigned an SEI of "Very High" sensitivity are considered no go areas. These may be spanned by overhead powerlines but no construction infrastructure is to be placed in these areas, including access tracks. Personnel are not to use these areas for any reason.

Based on the provided options for the proposed kV line:

- Option A
 - a) Overhead
 - b) Underground
- Option B
 - a) Overhead
 - b) Underground
- Option C
 - a) Overhead
 - b) Underground

The option with the least impacts is Option A, adjacent to the existing constructed road. Use of this option would reduce further fragmentation as well as limiting loss of biodiversity and SCC to one area. The Overhead option would decrease the impacts to vegetation and allow for the avoidance of no-go areas (one such area is present along Option A) however, this would have a greater impact on avifauna. The

underground option will increase impacts to flora but decrease impacts to avifauna. Both are considered to have equal impacts overall and the decision on which option to use should be based on engineering, maintenance and cost considerations.

Based on a combination of desktop and in-field delineation, two (2) potential forms of a watercourse were identified and delineated within the 500 m regulated area applied. These include an artificial wetland system and episodic drainage lines/ features. No natural wetland systems were identified for the project area. The drainage lines are not characterised by riparian vegetation and grasses, these systems represent bare surfaces with evidence of surface run-off.

A 15 m buffer width was recommended for the project area (all drainage features) for the construction and operational phases. The buffered areas and drainage features have been allocated as a medium sensitivity.

An impact statement is required as per the NEMA regulations with regards to the proposed development. The main impacts on ecology expected from the proposed activity are the loss of CBA areas, degradation and further fragmentation of surrounding natural habitats, the direct mortality of fauna species and the emigration of fauna SCC due to disturbance. Impacts are expected to be of low to moderate significance following the implementation of mitigation measures.

Considering the above-mentioned information, the proposed development will result in the destruction of some functional habitats. It is the opinion of the specialist that the proposed activities can go ahead provided areas of high SEI are avoided, and control of introduced alien invasive plants, as well as erosion mitigation is implemented. All Biodiversity Management Objectives provided in the specialist report included in Appendix D and mitigation measures provided in other supporting specialist reports must be implemented.

Due to the presence of non-perennial watercourses within the 500 m regulatory area, a risk assessment was completed in line with Section 21 (c) and (i) of the National Water Act, 1998, (Act 36 of 1998). Regarding the overhead or underground options, there are expected low post-mitigation risks, and a General Authorisation is permissible for the development.

Impacts on Heritage Resources

Based on the existing heritage information available for the proposed development in addition to the fieldwork conducted by Booth (2012, 2015, 2020), CTS Heritage (2021) and Almond (2015, 2016), it is unlikely that the proposed development will negatively impact on significant heritage resources. There is no heritage objection to the proposed development and no preferred alternative from a heritage perspective. Furthermore, due to the number of Renewable Energy Facility projects in the immediate vicinity of this development that have already been granted Environmental Authorisation (EA, Figure 5), and due to the existing Soetwater OHL in the vicinity of the development, it is likely that this project will have low levels of cumulative impact significance for Heritage (archaeology, palaeontology and cultural landscape). That being said, due to the general heritage sensitivity of the broader context, it is recommended that:

- » If concentrations of historical and pre-colonial archaeological heritage material and/or human remains (including graves and burials) are uncovered during construction, all work in the vicinity must cease immediately and be reported to the South African Heritage Resources Agency (SAHRA) so that systematic and professional investigation/excavation can be undertaken. Phase 2 mitigation in the form of test-pitting/sampling or systematic excavations and collections of the pre-colonial shell middens and

associated artefacts will then be conducted to establish the contextual status of the sites and possibly remove the archaeological deposit before development activities continue.

- » A person must be trained as a site monitor to report any archaeological sites found during the development. Construction managers/foremen and/or the Environmental Control Officer (ECO) should be informed before construction starts on the possible types of heritage sites and cultural material they may encounter and the procedures to follow when they find sites. The attached Chance Fossil Finds Procedure must be noted for inclusion into the EMPR to be adhered to in construction and excavation phases of development.
- » Should substantial fossil remains such as vertebrate bones and teeth, plant-rich fossil lenses, fossil wood or dense fossil burrow assemblages be exposed during construction, the responsible ECO/EO/Environmental Representative should safeguard these, preferably in situ, and alert SAHRA, i.e. The South African Heritage Resources Authority, as soon as possible (Contact details: Mr P. Hine P.O. Box 4637, Cape Town 8000. Tel: 021 462 4502. Email: phine@sahra.org.za) so that appropriate action can be taken by a professional palaeontologist, at the Proponent's expense. Mitigation would normally involve the scientific recording and judicious sampling or collection of fossil material as well as associated geological data (e.g. stratigraphy, sedimentology, taphonomy) by a suitably qualified palaeontologist.

Agricultural Impacts

One main low sensitivity soil form was identified within the assessment area, namely the Oakleaf soil form. The land capability sensitivities (DAFF, 2017) indicate land capabilities with "Low" and "Moderate" sensitivities, which correlates with the findings from the baseline assessment. This sensitivity was confirmed by the specialist on site.

The assessment area is not associated with any arable soils, due to the type of soil as well as the climate, which in itself limits crop production significantly. The land capabilities associated with the regulated area are only suitable for grazing, which corresponds with the current land use.

It is the specialist's opinion that the proposed developments will have no impacts on the agricultural production ability of the land. Additionally, the proposed activities will not result in the segregation of any high production agricultural land. Therefore, the proposed development may be favourably considered. From an agricultural potential perspective, the overhead power line is preferred, however either alternative is acceptable.

Noise Impacts

The BESS facility generates low levels of noise relating to the climate control system. Considering the potential development zone, this BESS would be further than 1 000 m from the closest identified NSD at any location within this proposed area. At an estimated noise level of less than 60 dB, this is an insignificant noise and this noise will be inaudible at a distance further than 200 m from such a BESS. The sound will be inaudible at the closest NSD. The noise from the climate control system of the BESS is significantly less than the noise that will be generated by the proposed Karusa WEF, and noise from the climate control system will not cumulatively add to the noise of the WEF. The power line was not considered within this assessment as no noise is expected to be associated with this infrastructure.

It is therefore the opinion of the specialist that there exists no potential for a noise impact and that no further Scoping or other acoustical studies would be required for the proposed BESS and associated infrastructure. No specific mitigation measures regarding noise or additional noise measurements are recommended. No additional conditions regarding noise are recommended for inclusion in the EMPr. It is therefore recommended that the Karusa BESS project be approved.

Cumulative Impacts

The Karusa BESS development is located within the authorised footprint of the Karusa Wind Farm. Based on the specialist cumulative assessments and findings regarding the development of the BESS (refer to **Chapter 5** and specialist reports contained within **Appendix D - G**) and its small contribution to the overall impact within the surrounding area, it can be concluded that there are no cumulative impacts or risks identified as unacceptable with the development of the BESS. In addition, no impacts that will result in whole-scale change are expected as a result of the BESS. Considering all aspects, cumulative impacts associated with the BESS have been assessed to be acceptable, with no unacceptable loss or risk are expected.

Comparative Assessment of the Power Line Alternatives

As stated previously, three power line alternative corridors were assessed within this BA process, with both overhead and underground cabling an option. The table below provides a summary of the comparative assessment of these alternatives as provided by the specialists.

Field of study	Alternative 1	Alternative 2	Alternative 3
Soils	Acceptable No preference	Acceptable No preference	Acceptable No preference
Ecology	Preferred (either overhead or underground)	Less preferred but acceptable	Less preferred but acceptable
Heritage	Acceptable No preference	Acceptable No preference	Acceptable No preference
Noise	Acceptable No preference	Acceptable No preference	Acceptable No preference

From the above table it can be concluded that Alternative 1 (i.e. adjacent to the existing constructed road) is the overall preferred alternative for implementation, although all alternatives are considered acceptable provided that identified sensitive areas are avoided. The Overhead option would decrease the impacts to vegetation and allow for the avoidance of no-go areas (one such area is present along Option A) however, this would have a greater impact on avifauna. The underground option will increase impacts to flora but decrease impacts to avifauna. Both are considered to have equal impacts overall and the decision on which option to use should be based on engineering, maintenance and cost considerations.

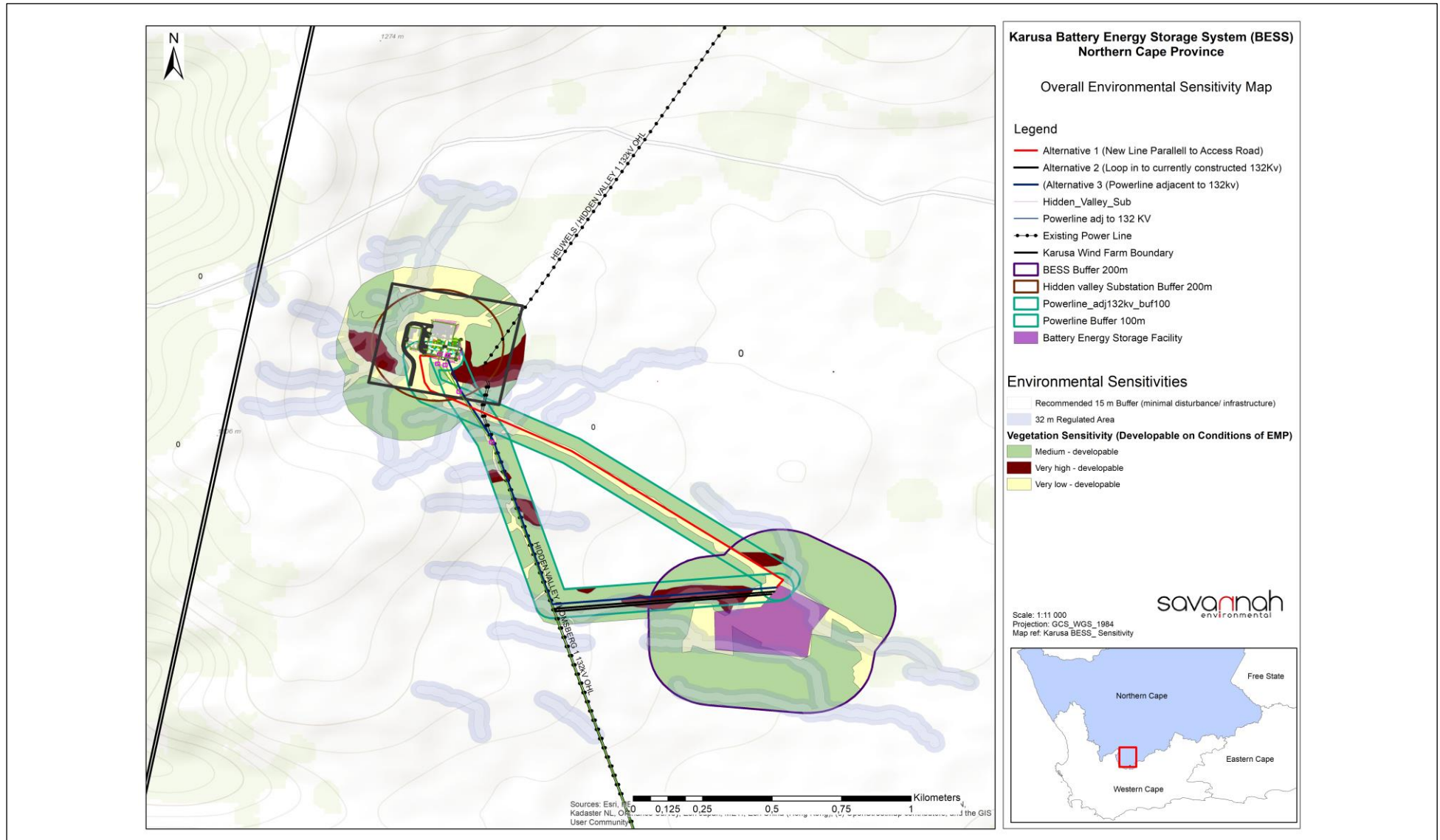


Figure 2: Environmental sensitivity map for the BESS and 500m Assessment Zone

DEFINITIONS AND TERMINOLOGY

Alternatives: Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives July include location or site alternatives, activity alternatives, process or technology alternatives, temporal alternatives or the 'do nothing' alternative.

Commence: The start of any physical activity, including site preparation and any other activity on site furtherance of a listed activity or specified activity, but does not include any activity required for the purposes of an investigation or feasibility study as long as such investigation or feasibility study does not constitute a listed activity or specified activity.

Commissioning: Commissioning commences once construction is completed. Commissioning covers all activities including testing after all components of the wind turbine are installed.

Construction: Construction means the building, erection or establishment of a facility, structure or infrastructure that is necessary for the undertaking of a listed or specified activity. Construction begins with any activity which requires Environmental Authorisation.

Cumulative impacts: Impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities (e.g. discharges of nutrients and heated water to a river that combine to cause algal bloom and subsequent loss of dissolved oxygen that is greater than the additive impacts of each pollutant). Cumulative impacts can occur from the collective impacts of individual minor actions over a period and can include both direct and indirect impacts.

Decommissioning: To take out of active service permanently or dismantle partly or wholly, or closure of a facility to the extent that it cannot be readily re-commissioned. This usually occurs at the end of the life of a facility.

Direct impacts: Impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity (e.g. noise generated by blasting operations on the site of the activity). These impacts are usually associated with the construction, operation, or maintenance of an activity and are generally obvious and quantifiable.

'Do nothing' alternative: The 'do nothing' alternative is the option of not undertaking the proposed activity or any of its alternatives. The 'do nothing' alternative also provides the baseline against which the impacts of other alternatives should be compared.

Endangered species: Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating. Included here are taxa whose numbers of individuals have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction.

Emergency: An undesired/ unplanned event that results in a significant environmental impact and requires the notification of the relevant statutory body, such as a local authority.

Endemic: An "endemic" is a species that grows in a particular area (is endemic to that region) and has a restricted distribution. It is only found in a particular place. Whether something is endemic or not depends on the geographical boundaries of the area in question and the area can be defined at different scales.

Environment: the surroundings within which humans exist and that are made up of:

- The land, water and atmosphere of the earth;
- Micro-organisms, plant and animal life;
- Any part or combination of (i) and (ii) and the interrelationships among and between them; and
- The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

Environmental impact: An action or series of actions that have an effect on the environment.

Environmental management: Ensuring that environmental concerns are included in all stages of development, so that development is sustainable and does not exceed the carrying capacity of the environment.

Environmental management programme: An operational plan that organises and co-ordinates mitigation, rehabilitation and monitoring measures in order to guide the implementation of a proposal and its ongoing maintenance after implementation.

Heritage: That which is inherited and forms part of the National Estate (Historical places, objects, fossils as defined by the National Heritage Resources Act of 2000).

Indigenous: All biological organisms that occurred naturally within the study area prior to 1800.

Indirect impacts: Indirect or induced changes that may occur because of the activity (e.g. the reduction of water in a stream that supply water to a reservoir that supply water to the activity). These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place because of the activity.

Interested and affected party: Individuals or groups concerned with or affected by an activity and its consequences. These include the authorities, local communities, investors, work force, consumers, environmental interest groups, and the public.

Method statement: A written submission to the ECO and the site manager (or engineer) by the EPC Contractor in collaboration with his/her EO.

Mitigation hierarchy: The mitigation hierarchy is a framework for managing risks and potential impacts related to biodiversity and ecosystem services. The mitigation hierarchy is used when planning and implementing development projects, to provide a logical and effective approach to protecting and conserving biodiversity and maintaining important ecosystem services. It is a tool to aid in the sustainable management of living, natural resources, which provides a mechanism for making explicit decisions that balance conservation needs with development priorities

No-go areas: Areas of environmental sensitivity that should not be impacted on or utilised during the development of a project as identified in any environmental reports.

Pollution: A change in the environment caused by substances (radio-active or other waves, noise, odours, dust or heat emitted from any activity, including the storage or treatment or waste or substances.

Pre-construction: The period prior to the commencement of construction, includes activities which do not require Environmental Authorisation (e.g. geotechnical surveys).

Rare species: Taxa with small world populations that are not at present Endangered or Vulnerable but are at risk as some unexpected threat could easily cause a critical decline. These taxa are usually localised within restricted geographical areas or habitats or are thinly scattered over a more extensive range. This category was termed Critically Rare by Hall and Veldhuis (1985) to distinguish it from the more generally used word "rare."

Red data species: Species listed in terms of the International Union for Conservation of Nature and Natural Resources (IUCN) Red List of Threatened Species, and/or in terms of the South African Red Data list. In terms of the South African Red Data list, species are classified as being extinct, endangered, vulnerable, rare, indeterminate, insufficiently known or not threatened (see other definitions within this glossary).

Significant impact: An impact that by its magnitude, duration, intensity, or probability of occurrence July have a notable effect on one or more aspects of the environment.

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CHAPTER 1: INTRODUCTION

Enel Green Power South Africa (Pty) Ltd proposes the construction and operation of a Battery Energy Storage System (BESS) and associated grid infrastructure in the proximity of the Karusa Wind Energy Facility (WEF) ~45km south of the town of Sutherland along the R354 and 47km north west of the town of Laingsburg along the R323 in the Northern Cape Province. **(Figure 1.1 and Table 1.1)**. The Karusa WEF is a Round 4 REIPPPP Preferred Bidder project currently under construction.

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Table 1.1: Location of proposed infrastructure

Province	Northern Cape Province
District Municipality	Namakwa District Municipality
Local Municipality	Karoo Hoogland Local Municipality
Ward number	Ward 3
Current Land use zone	Agriculture
Nearest town(s)	Sutherland and Laingsburg
Affected properties	Portion 0 Farm De Hoop 202
21 digit general surveyor code	C07200000000020200000

The proposed project will include the following infrastructure:

- » A BESS with a capacity of up to 2 000 MWh, inside containers with a footprint of up to 6ha in extent and a maximum height of 3m. Both lithium-ion and Redox-flow technology are being considered for the project, depending on which is most feasible at the time of implementation.
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- » Temporary laydown area to be located within the BESS footprint.
- » Firebreak to be located within the BESS footprint.
- » A Substation with a maximum height of - HV bus-bar up to 10 m max and an HV Building up to 4 m max.

This BA Report describes and assesses this proposed project and consists of the following chapters:

- » **Chapter 1** provides background to the proposed Karusa BESS and the BA process.

- » **Chapter 2** provides a description of the proposed project, the identified and assessed alternatives, need and desirability of the project, the approach to undertaking a BA process and the strategic regulatory and legal context for energy planning in South Africa, specifically in relation to the proposed BESS.
- » **Chapter 3** presents an overview of the BA process undertaken.
- » **Chapter 4** describes the existing biophysical, regional, and social environment within and surrounding the study area.
- » **Chapter 5** provides an assessment of the potential direct, indirect and cumulative impacts associated with the proposed development and presents recommendations for the mitigation of significant impacts.
- » **Chapter 6** presents the conclusions and recommendations based on the findings of the BA Report.
- » **Chapter 7** provides the references used in the compilation of the BA Report.

1.1. Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

This BA Report has been prepared in accordance with the requirements of the EIA Regulations published on 08 December 2014 (as amended in April 2017) promulgated in terms of Chapter 5 of the National Environmental Management Act (Act No 107 of 1998). This chapter of the BA Report includes the following information required in terms of Appendix 1: Content of Basic Assessment Reports:

Requirement	Relevant Section
3(a) the details of the (i) EAP who prepared the report and (ii) the expertise of the EAP, including a curriculum vitae.	The details of the EAP who prepared the report and the expertise of the EAP is included in section 1.3 . The curriculum vitae of the EAP, project team and independent specialists are included in Appendix A .
3(b) the location of the activity including (i) the 21 digit Surveyor General code of each cadastral land parcel, (ii) where available the physical address and farm name and (iii) where the required information in items (i) and (ii) is not available, the co-ordinates of the boundary of the property or properties.	The location of the Karusa BESS is included in Table 1.1 , and Figure 1.1 . The information provided includes the 21-digit Surveyor General code of the affected properties and the farm names. Additional information is also provided regarding the location of the development which includes the relevant province, local and district municipalities, ward and current land use.

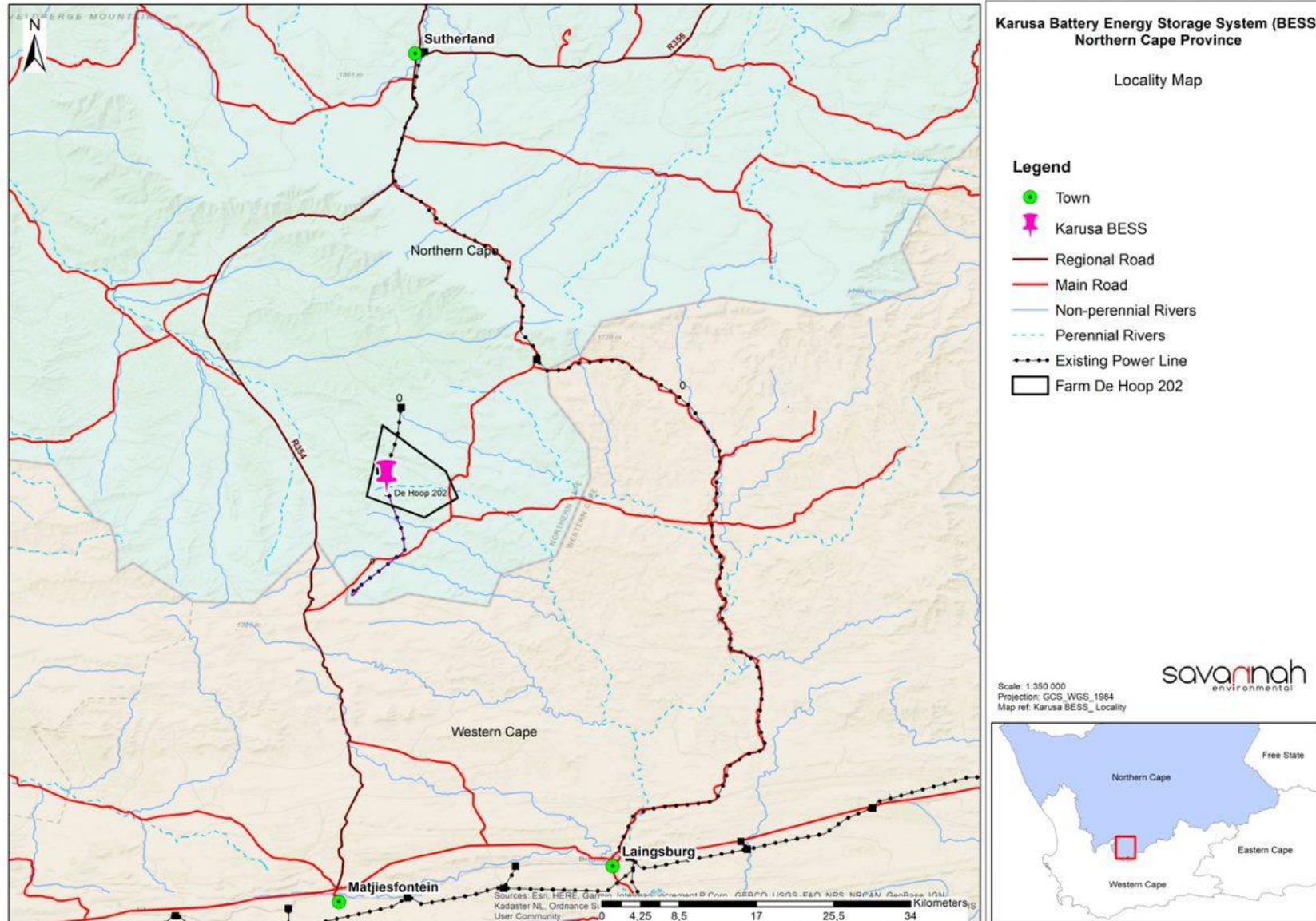


Figure 1.1: Locality Map of the Karusa BESS

1.2. Details of the Environmental Assessment Practitioner and Expertise to conduct the BA process

In accordance with Regulation 12 of the 2014 EIA Regulations (GNR 326), Enel Green Power South Africa (Pty) Ltd has appointed Savannah Environmental (Pty) Ltd as the independent environmental consultant to undertake the Basic Assessment and prepare the BA Report for the Karusa BESS and associated infrastructure. Neither Savannah Environmental nor any of its specialists are subsidiaries of, or are affiliated with Enel Green Power South Africa (Pty) Ltd. Furthermore, Savannah Environmental does not have any interests in secondary developments that may arise out of the authorisation of the proposed project.

Savannah Environmental is a leading provider of integrated environmental and social consulting, advisory and management services with considerable experience in the fields of environmental assessment and management. The company is wholly woman-owned (51% black woman-owned) and is rated as a Level 2 Broad-Based Black Economic Empowerment (B-BBEE) Contributor. The company was established in 2006 with a clear objective to provide services to the infrastructure development sector. Savannah Environmental benefits from the pooled resources, diverse skills and experience in the environmental field held by its team that has been actively involved in undertaking environmental studies for a wide variety of projects throughout South Africa and neighbouring countries. Strong competencies have been developed in project management of environmental processes, as well as strategic environmental assessment and compliance advice, and the assessment of environmental impacts, the identification of environmental management solutions and mitigation/risk minimising measures.

The Savannah Environmental team have considerable experience in basic assessments and environmental management, and have been actively involved in undertaking environmental studies, for a wide variety of projects throughout South Africa, including those associated with electricity generation and transmission.

The Savannah Environmental team comprises:

- » **Raquel Peters**, the principle author of this BA Report holds a BA (Hons) Environmental Management degree (with distinction) from the University of South Africa. She is a Junior Environmental Consultant at Savannah Environmental and her key focus is on undertaking environmental impact assessments, GIS mapping, environmental permitting and authorisations, compliance auditing, public participation, and environmental management plans and programmes.
- » **Jo-Anne Thomas**, the project manager on this project, is a registered EAP with the Environmental Assessment Practitioners Association of South Africa (EAPASA - 2019/726) and a registered professional scientist with the South African Council for Natural Scientific Professions (SACNASP). She provides technical input for projects in the environmental management field, specialising in Strategic Environmental Advice, Environmental Impact Assessment studies, environmental auditing and monitoring, environmental permitting, public participation, Environmental Management Plans and Programmes, environmental policy, strategy and guideline formulation, and integrated environmental management. Her key focus is on integration of the specialist environmental studies and findings into larger engineering-based projects, strategic assessment, and providing practical and achievable environmental management solutions and mitigation measures. Responsibilities for environmental studies include project management (including client and authority liaison and management of specialist teams); review and manipulation of data; identification and assessment of potential negative environmental impacts and benefits; review of specialist studies; and the identification of mitigation measures.

- » **Nondumiso Bulunga** – the public participation consultant for this project holds a master's degree in advanced Geographical Information System and has eight years of experience in the environmental field. Her key focus is on environmental and social impact assessments, public participation, stakeholder engagement environmental management screening as well as mapping using ArcGIS for a variety of environmental projects.

The CVs of the EIA Consulting Team are included in **Appendix A** and the EAP Declaration of Independence and Affirmation is included in **Appendix L**.

In order to adequately identify and assess potential environmental impacts associated with the proposed Karusa BESS, the following specialist consultants have provided input into this BA Report:

Specialist	Area of Expertise
Leigh-Anne de Wet, Ivan Baker and Andrew Husted of The Biodiversity Company	Avifauna, Ecology, Wetlands, Aquatic Ecology and Soil, Land Use, Land Capability and Agricultural Potential
Jenna Lavin of CTS Heritage	Heritage (including Archaeology Palaeontology and Cultural Heritage)
Morne de Jager of EARES	Noise Compliance statement

CHAPTER 2: PROJECT DESCRIPTION

This chapter provides an overview of the Karusa BESS and associated infrastructure, and details the project scope, which includes the planning/design, construction, operation and decommissioning activities required for the development, as well as a description of the preferred site location, activity and technology alternatives, and the 'do-nothing' option for the project.

2.1. Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

This chapter of the BA Report includes the following information required in terms of the EIA Regulations, 2014 - Appendix 1: Content of Basic Assessment Reports:

Requirement	Relevant Section
3(b) the location of the activity including (i) the 21digit Surveyor General code of each cadastral land parcel, (ii) where available the physical address and farm name and (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties.	The location of the proposed Karusa BESS and associated infrastructure is detailed in Chapter 1, Table 1.1 .
3(c)(i)(ii) a plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or on land where the property has not been defined, the coordinates within which the activity is to be undertaken	A layout map illustrating the BESS and associated infrastructure is included as Figure 2.1 . The footprint of the BESS and power line and the associated buffer areas has been assessed within this BA Report and the independent specialist studies.
3(d)(ii) a description of the scope of the proposed activity, including a description of the activities to be undertaken including associated structures and infrastructure	A description of the activities to be undertaken with the development of the Karusa BESS and associated infrastructure is included in Table 2.1 and Table 2.2 .
3(e)(i) a description of the policy and legislative context within which the development is proposed including 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	This section provides an overview of the policy and legislative context which is considered to be associated and relevant to the development of the BESS and associated infrastructure. The regulatory and planning context has been considered at international, national, provincial and local level.
3(e)(ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools, frameworks and instruments.	Tables 3.1, 3.2, 3.3 and 3.4 illustrate the compliance of the proposed BESS and associated infrastructure with the legislation, policies, plans, guidelines, tools, frameworks and instruments.
3 (f) a motivation for the need and desirability for the proposed development, including the needs and desirability of the activity in the context of the preferred location.	The need and desirability of the development of the BESS and associated infrastructure is included and discussed as a whole within section 2.2 .

Requirement	Relevant Section
3(g) a motivation for the preferred site, activity and technology alternative	The motivation for the alternatives associated with the development of the BESS and associated infrastructure are included in section 2.3
3(h)(i) details of the alternative considered	The details of all alternatives considered as part of the BESS and associated infrastructure are included in sections 2.4.1 – 2.4.4.
3(h)(ix) the outcome of the site selection matrix	The site selection process followed by the developer in order to identify the site for the BESS and associated infrastructure is described in section 2.4.1.
3(h)(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such	Where no alternatives have been considered, motivation has been included in section 2.4.

2.2. Need and desirability

Energy storage, specifically through the use of battery systems has recently gained considerable attention globally as the use of varied sources of energy becomes widespread. Electricity is not always produced at the exact time that it is needed, requiring temporary or long-term storage to allow for a regulated supply. This problem is most evident with base load power generation sources that are most efficient when running continuously, and thus produce power at times (at night, for example) when electricity demand is low. Additionally, alternatives to base load generation such as non-dispatchable variable Renewable Energy (RE) generators, can only provide power when the resource – commonly solar or wind - is available, at times when the energy is not necessarily required, further exacerbating the need for storage and the regulation of output energy from these facilities.

Given the relationship between, and the necessity of the proposed BESS facility in the proximity of the Karusa WEF, similar need and desirability considerations to those applicable to the Karusa WEF are applicable. These are aligned with national, regional, and local policies and plans, as detailed below:

- » The need for the country to respond to the international commitments regarding climate change and reduction in carbon emissions.
- » The need at a national level to diversify the power generation technology mix to include up to 14.4 GW of renewables by 2030, as defined in the Integrated Resource Plan (IRP), 2019 (as discussed in detail in **section 3**).
- » The need to align development with the requirements of the National Development Plan to address the identified socio-economic issues affecting development in South Africa.
- » The need for sustainable development at a Provincial level, including the need to utilise its extensive resources for the benefits of the local area.
- » The identification of the need for potential IPP projects to become operational in the local municipality as per the Karoo Hoogland Local Municipality Integrated Development Plan.

From a technical perspective, the proposed BESS and associated infrastructure is considered desirable in terms of accessibility, access to the national grid, minimal environmental impacts and its contribution to socio-economic upliftment which is detailed below;

- » The proposed project will provide strategic access to the grid via the Hidden Valley substation and the 132kV power line.
- » Minimal construction will be required for the power line, which is to be constructed within an existing disturbed area, therefore environmental impacts will be kept to a minimum.
- » There are existing feeder bays at the substation connection point.
- » The broader area of the project site comprises a network of easily accessible roads to the proposed BESS.
- » Wind generators are located in close proximity to the project site and the BESS can provide services to improve the reliability of Eskom's grid system, to compensate for intermittency from wind generators and to shift production when it is required the most.
- » The BESS will provide support to remove network congestion in the region thereby enabling the installation of additional renewable energy generation in future.
- » The BESS will improve the socio-economic climate of the region as it contributes to a more reliable source of electricity which makes the region attractive to potential investors.

From an overall environmental sensitivity and planning perspective, the proposed BESS and associated infrastructure supports the broader strategic context of the municipality as it will be an integral part of a Karusa Wind Energy Facility which is considered a driver for economic growth in the region as per the Namakwa District Municipality's Integrated Development Plan (IDP) (as detailed in Section 2.5 below). It is also in line with broader societal needs and the public interest as it is linked to a renewable energy facility (Karusa WEF), for which there is national policy and support. No exceedance of social, ecological, heritage or avifaunal limits will result from the construction of the proposed BESS, and no significant disturbance of biological diversity is anticipated, as detailed in this Basic Assessment Report.

The project will help realise the objectives of the municipal IDP of the Namakwa District (as detailed in section 2.5) and will ensure the quality of life of the community through purposeful and quality service, and the effective and optimal utilisation of resources. This project will assist in supporting the local and national electricity supply through its contribution to the National Eskom Grid as a result of the support provided in extending the operational period of the wind farm. The project will also assist in minor local job creation which will help achieve IDP objectives and boost revenue returns for the local and regional economy.

2.3 Nature and extent of the Karusa BESS and associated infrastructure

As detailed in Chapter 1, the BESS and associated infrastructure is proposed in close proximity to the authorised Karusa WEF substation on Farm De Hoop 202, near Sutherland, Northern Cape. The project is planned independent of the Karusa WEF, and will provide energy to the grid as per the requirements of the off-taker (be this Eskom or a private off-taker). The project will consist of the following infrastructure:

- » A BESS with a capacity of up to 2 000 MWh inside containers with a footprint of up to 6ha in extent and a maximum height of 3m. Both lithium-ion and Redox-flow technology are being considered for the project, depending on which is most feasible at the time of implementation.
- » Access roads to the BESS (10m in width approximately 70m long) branching off to the existing roads, and internal roads (up to 8m wide) to be located within the total BESS footprint area.
- » 33kV MV cabling between the BESS and the MV/HV substation and up to 132kV HV cabling to the HV substation
- » Fencing around the BESS for increased security measures.

- » Up to 132kV overhead or underground power line to be connected to the existing Hidden Valley Substation.
- » Temporary laydown area to be located within the BESS footprint.
- » Firebreak to be located within the BESS footprint.
- » A Substation with a maximum height of - HV bus-bar up to 10 m max and an HV Building up to 4 m max

The following is being considered within the Basic Assessment process for this project:

- » Buffer around the BESS site of 200m
- » Power line corridor (100m) with 50m either side of centre line
- » Buffer around Hidden Valley Substation of 200m

A summary of the details and dimensions of the planned BESS and associated infrastructure associated with the project is provided in **Table 2.1**.

Table 2.1: Details of the proposed BESS and associated infrastructure.

Infrastructure	Footprint, dimensions and details
Technology	Lithium-Ion or Redox-flow technology
BESS footprint	Up to 6ha in total extent, including foundation and containerised battery system <u>and an MV/HV substation</u>
Capacity	Capacity of up to 2 000MWh
Access road to the BESS	This will branch off from the existing roads and will be 10m wide and approximately 70m long, with internal roads of up to 8m wide within the BESS footprint.
Medium Voltage Cabling	33kV MV cabling between the BESS and the MV/HV substation
High Voltage Cabling	Up to 132kV HV cabling to the HV substation
Underground cabling depth	Maximum of 1.5 – 1.8m
Length of power line	Up to 1.6km
Height of power line towers	Up to 40m maximum
Substation height	HV bus-bar up to 10m max – HV Building up to 4m max
Fencing	Fencing around the entire footprint of the BESS will be installed for access restriction and security measures.
Laydown Area	Up to 10. 000 sqm (<u>1 ha</u>) to be located within the 6ha BESS footprint
Power line Corridor	The corridor will be 100 m wide in total (50 m either side of the centre line)
Buffer around the substation	A 200 m buffer is proposed around the Hidden Valley substation
Buffer around the BESS site	A 200 m buffer is proposed around the BESS site

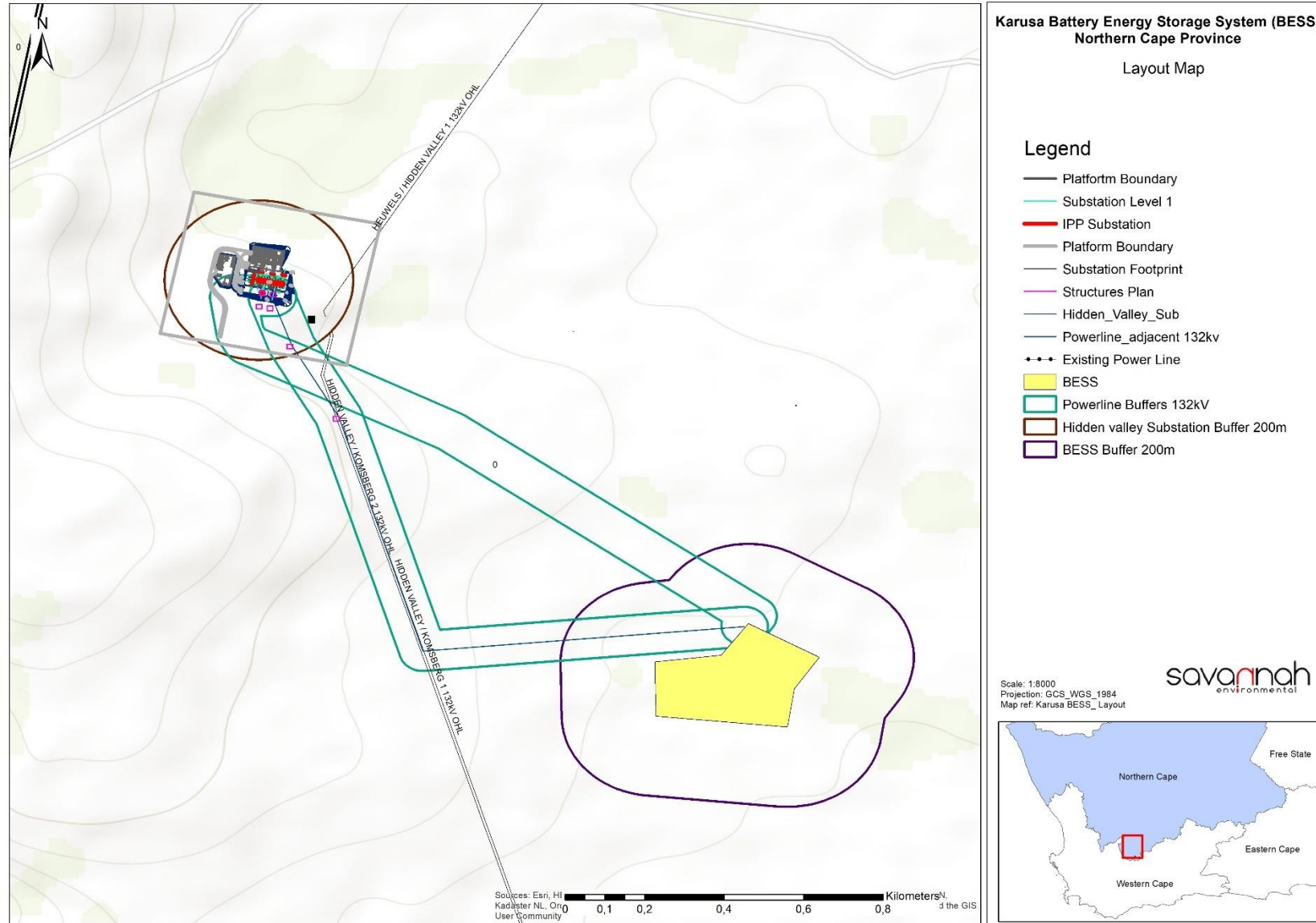


Figure 2.1: Layout map of the proposed BESS and associated infrastructure

2.3.1 Project Development Phases associated with the Karusa BESS

Table 2.2: Details of the project development phases (i.e., construction, operation and decommissioning), applicable to all alternatives and infrastructure proposed

Construction Phase	
Requirements	<ul style="list-style-type: none"> » Duration of the construction phase is expected to be 10-12 months. » Create direct construction employment opportunities. Subject to project final size, with an estimation of 250-300 employees and a maximum of 400-500 employees. » No on-site labour camps. Employees to be accommodated in the nearby towns such as Sutherland (+/- 46km) and Laingsburg (+/- 45km) and transported to and from site on a daily basis via a bus shuttle service. » Overnight on-site worker presence would be limited to security staff. » Construction waste will be temporarily stored on site and waste removal and sanitation will be undertaken by a sub-contractor or appointed contractor on a regular basis. » Electricity required for construction activities will be generated by a generator or will be sources from available Eskom distribution networks in the area. » Water required for the construction phase will be supplied by the municipality. In addition, borehole water will be used. Should water availability at the time of construction be limited, water will be transported to site via water tanks. Water will be used for sanitation as well as construction works.
Construction sequence: BESS	<p>A BESS is constructed in the following simplified sequence:</p> <ul style="list-style-type: none"> » Step 1: Surveying of the development area, engaging with affected landowners, environmental specialist walkthroughs (where needed), <u>preliminary engineering</u>. » Step 2: <u>Detailed electrical/civil BoP design and micro-sitting of the infrastructure based on geo-technical, topographical conditions (soil investigations) and identified environmental sensitivities; and search and rescue activities</u> » Step 3: <u>Site preparation, Site Camp facilities erection, Vegetation clearance</u> » <u>Trenching LV/MV cable way, concrete setting & earthing system installation;</u> » Step 4: Construction of the BESS foundations; » Step 5: Bess Containers delivery on site, Assembly and construction of the BESS infrastructure on site; <ul style="list-style-type: none"> • For lithium-ion batteries, the battery cell packs (containing electrolyte solution) will be brought to site as sealed units which will be installed and connected on site. • For Redox-flow batteries, the battery system will be installed on site and then electrolyte solution will be pumped into the system from mobile storage drums/totes which are temporarily brought to site to deliver the electrolyte solution. No storage facility for the storage of electrolyte solution/s outside of the battery unit will be developed on site » Step 6: Assembly and construction of <u>container to container/MV/HV substation and cabling / overhead powerlines</u> connecting the BESS to the nearby substation. Erection of fencing around the BESS. » Step 7: Cold & Hot Commissioning;

	<ul style="list-style-type: none"> » Step 8: Scada System & TLC Installation; » Step 9: Rehabilitation of disturbed areas; » Step 10: Continued maintenance. <p>It is anticipated that the construction of the BESS and associated infrastructure will take up to 12 months to complete.</p>
<p>Construction sequence: overhead Power line</p>	<p>Overhead power lines are constructed in the following simplified sequence:</p> <ul style="list-style-type: none"> » Step 1: Surveying of the development area, engaging with affected landowners, environmental specialist walkthroughs to inform permitting requirements and micro-siting of the pylon infrastructure. » Step 2: Detailed design and micro-siting of the infrastructure based on geo-technical, topographical conditions and identified environmental sensitivities; » Step 3: Search-and-rescue activities, vegetation clearance and construction of access roads/tracks (where required) and watercourse crossings (where required); » Step 4: Construction of tower foundations; » Step 5: Assembly and erection of infrastructure on site; » Step 6: Stringing of conductors; » Step 7: Rehabilitation of disturbed areas; » Step 8: Continued maintenance.
<p>Underground cabling</p>	<p>Underground cables are installed in the following simplified sequence:</p> <ul style="list-style-type: none"> » Step 1: Surveying of the development area, engaging with affected landowners, environmental specialist walkthroughs to inform permitting requirements and micro-siting of the pylon infrastructure. » Step 2: Final design and micro-siting of the infrastructure based on geo-technical, topographical conditions and identified environmental sensitivities; » Step 3: Search-and-rescue activities, vegetation clearance and construction of access roads/tracks (where required) and watercourse crossings (where required); » Step 4: Excavation of trenches and placement of cables; » Step 5: Refill of trenches and rehabilitation of disturbed areas; » Step 6: Continued maintenance.
<p>Activities to be undertaken</p>	
<p>Conduct surveys prior to construction</p>	<ul style="list-style-type: none"> » Including, but not limited to: a geotechnical survey, final environmental walkthroughs (where required), site survey (including the final location of the BESS) and confirmation of the BESS footprint, and all other associated infrastructure.
<p>Undertake site preparation</p>	<ul style="list-style-type: none"> » Including the clearance of vegetation at the BESS foundation, establishment of the laydown areas, the establishment of access roads/tracks and excavations for foundations. » Stripping of topsoil to be stockpiled, backfilled, removed from site and/or spread on site. » To be undertaken in a systematic manner to reduce the risk of exposed ground being subjected to erosion. » Include search and rescue for identified species of concern within the disturbance footprint before construction.

Establishment of laydown areas and batching plant on site	<ul style="list-style-type: none"> » A laydown area for the storage of BESS infrastructure components within the ~6ha BESS footprint, » Concrete batching to take place within the footprint of the BESS to facilitate the concrete requirements for BESS infrastructure foundations.
Facility installation	<ul style="list-style-type: none"> » Installation of BESS infrastructure within the BESS footprint. » Installation of MV and HV cabling to connect the BESS to the nearby substation.
Undertake site rehabilitation	<ul style="list-style-type: none"> » Commence with rehabilitation efforts once construction is completed in an area, and all construction equipment is removed. » On commissioning, access points to the site that will not be required for the operation phase will be closed and prepared for rehabilitation.

Operation Phase

- » Duration will be 20 years, or longer depending on battery replacement requirements.
- » Requirements for security and maintenance of the infrastructure.
- » Employment opportunities relating mainly to operation activities and maintenance. Expected daily presence of 4-5 EGP internal employees and 20-30 third party EPC contractors' personnel. More employment opportunities will be made available upon development of new BESS plants.

Activities to be undertaken

Operation and Maintenance	<ul style="list-style-type: none"> » Monitoring alarm signals from SCADA System for alarm history check, etc. on a weekly or monthly basis. » Periodical on-site visual inspection outside and inside BESS. » Containers/inverter cabins, transformers etc. according to the BESS manufacturer.
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Decommissioning Phase

Requirements	<ul style="list-style-type: none"> » Decommissioning of the grid connection infrastructure at the end of its economic life cycle and that of the renewable energy facilities for which it will facilitate the grid connection. » There is a possibility of upgrading the infrastructure as an alternative to decommissioning. The local infrastructure could be made available for future projects in line with social and environmental responsibility programmes proposed by the local government. » Expected lifespan of approximately 15 - 20 years (with maintenance) before decommissioning is required. » Decommissioning activities, if ultimately required, are to comply with the legislation relevant at the time.
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Activities to be undertaken

Site preparation	<ul style="list-style-type: none"> » Confirming the integrity of access to the grid connection infrastructure to accommodate the required equipment. » Mobilisation of decommissioning equipment.
Disassemble components and rehabilitation	<ul style="list-style-type: none"> » The power line and central collector substation infrastructure components (Li-ion batteries, etc.) will be disassembled by specialists and reused and recycled (where possible). » Where components cannot be reused or recycled, these will be disposed of in accordance with the regulatory requirements at the time of decommissioning. » Disturbed areas, where infrastructure has been removed, will be rehabilitated, if required, and depending on the future land-use of the affected areas and the relevant legislation applicable at the time of decommissioning.

It is expected that the areas of the project site affected by the infrastructure (development footprint) will revert to their original land-use (i.e., primarily agriculture) once the Karusa BESS has reached the end of its economic life and all infrastructure has been decommissioned.

2.4 Alternatives Considered during the BA Process

In accordance with the requirements of Appendix 1 of the 2014 Environmental Impact Assessment (EIA) Regulations (GNR 326) (as amended), reasonable and feasible alternatives, including but not limited to site and technology alternatives, as well as the “do-nothing” alternative should be considered.

The DEA Guidelines for determining alternatives states that the key criteria for consideration when identifying alternatives are that they should be “practicable”, “feasible”, “relevant”, “reasonable” and “viable”. Essentially there are two types of alternatives:

- » Incrementally different (modifications) alternatives to the project.
- » Fundamentally (totally) different alternatives to the project.

In this instance, ‘the project’ refers to the Karusa BESS and associated power line, which is proposed to store energy from the off-taker and feed this into the Eskom grid at the Hidden Valley Substation.

2.4.1 Fundamentally Different Alternatives

Fundamentally different alternatives are usually assessed at a strategic level and, as a result, project-specific environmental impact assessments (including BA processes) are therefore limited in scope and ability to address fundamentally different alternatives. At a strategic level, electricity generating alternatives have been addressed as part of the DMRE’s current Integrated Resource Plan for Electricity 2010 – 2030 (IRP), and will continue to be addressed as part of future revisions. With regards to the current IRP, storage is included as part of the energy generation technologies proposed to 2030. The applicant is considering this technology to extend the generation capability of the Karusa WEF. No fundamentally different alternatives are considered feasible and therefore none are considered within this report.

2.4.2 Location Alternatives

The ideal location for the BESS and associated infrastructure was considered from a land and environmental perspective. As the BESS is required to be located in close proximity to the authorised WEF, no feasible location alternatives were identified. The preferred location for the proposed project is the only area within close proximity of the WEF that has a suitable terrain for the location of the BESS. In addition, the identified area has been previously utilised for laydown during the construction of the wind farm and is thus considered an already disturbed area. The environmental impact will therefore be limited.

Three alternative power line corridor alternatives were proposed for investigation as follows:

1. Alternative 1: Loop in and Loop out of the Hidden Valley-Komsberg line
2. Alternative 2: New power line to the Hidden Valley Substation following the routing of the Hidden Valley-Komsberg line
3. Alternative 3: New power line to the Hidden Valley Substation following the access road to the north of the BESS site

The option of implementing the power line either as an overhead line or underground cabling has been considered,

2.4.3 Design and layout alternatives

Lithium-ion batteries are currently popular in the global grid battery storage market. Compared to other battery options, lithium-ion batteries have high energy density and are lightweight making it a more effective option. There are alternatives to lithium-ion that are currently being developed such as dual carbon and sodium-ion, however these options have not reached maturity and are therefore not considered. The proposed project will use lithium technology for the BESS with the option of using flow batteries for future improvement and application within the site.

2.4.4 BESS Technology Alternatives

The general purpose and utilisation of a Battery Energy Storage System (BESS) is to save and store excess electrical output as it is generated, allowing for a timed release when the capacity is required the most and the provision of ancillary services to ensure reliable operation of power networks during normal operation and contingency events. BESS systems therefore provide flexibility and reliability services for the efficient operation of the electric grid. **Figures 2.2 to 2.8** below illustrate a typical utility scale BESS system (a Lithium-ion BESS) as applied in the context of a Renewable Energy Facility.



Figure 2.2: Li-Ion BESS implementation for a Renewable Energy facility (Source: Enel Green Power).



Figure 2.3: Li-Ion BESS containerised modules located within the BESS enclosure footprint (Source: Enel Green Power).

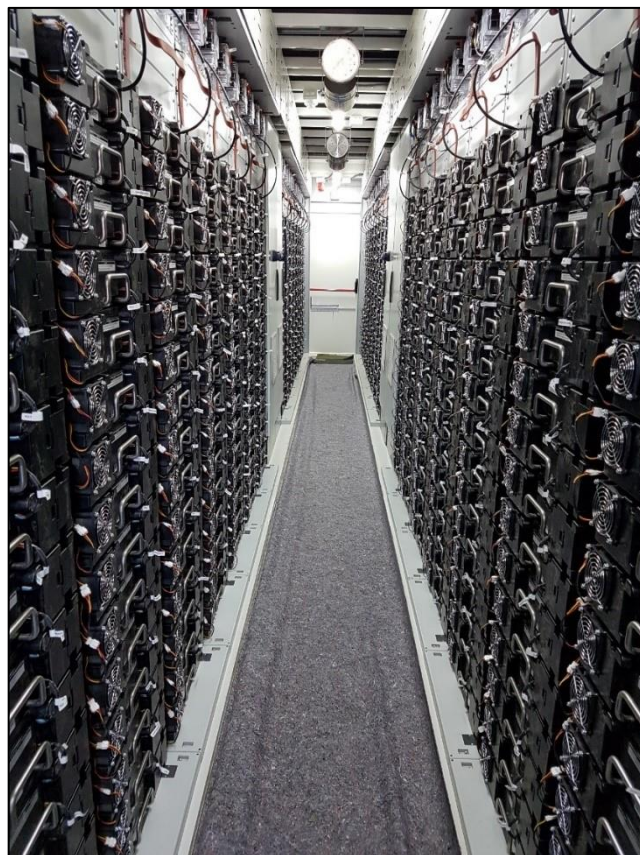


Figure 2.4: Li-Ion BESS internal design and implementation of a container used within a BESS (Source: Enel Green Power).



Figure 2.5: Illustration of battery storage units installed by Tesla (Source: fastcompany.com).

The proponent has taken cognisance of the fact that the technology within a BESS frequently advances and as such has not determined the specific technology that will be utilised at this stage. Two technology types however are envisaged, both of which have been assessed in this report to ensure that all impacts related to both types have been addressed:

- » Lithium-Ion technology (e.g. Lithium Ferrophosphate (LFP), Nickel Manganese Cobalt Oxide (NMC) or similar technology and chemistries); and
- » Redox-flow technology (e.g. vanadium flow battery, or similar technology and chemistries).

Both technologies include batteries housed within containers which are fully enclosed and self-contained. It is important to note that while both types are detailed and assessed in this report, no specific technology is proposed as that preferred for authorisation, as both are expected to have similar impacts due to their design and functions being closely related. Therefore, the assessment proposes both technologies for authorisation (i.e. a BESS of either Lithium-Ion or Redox-flow type), to allow the proponent to determine the precise technology when the project is implemented, on the understanding that further investigation into the specific technologies available at the time of being awarded preferred bidder status will allow for one of two to be selected and ultimately developed.

These technologies are described below.

i) Lithium-Ion technology

In comparison to electrochemical coupled batteries like nickel-cadmium, a lithium-ion (Li-ion) battery is a rechargeable electrochemical battery operating on a wide array of chemistries where lithium ions are transferred between the electrodes during the charge and discharge reactions (Parsons, 2017).

A Li-ion cell is comprised of three main components; cathode and anodes electrodes, and an electrolyte that allows lithium ions to move from the negative electrode to the positive electrode during discharge and back when charging (**Figure 2.6**) (Parsons, 2017). While charging, lithium ions flow from the positive metal oxide electrode, to the negative graphite electrode which is reversed during discharge (i.e. ion flow is in the opposite direction).

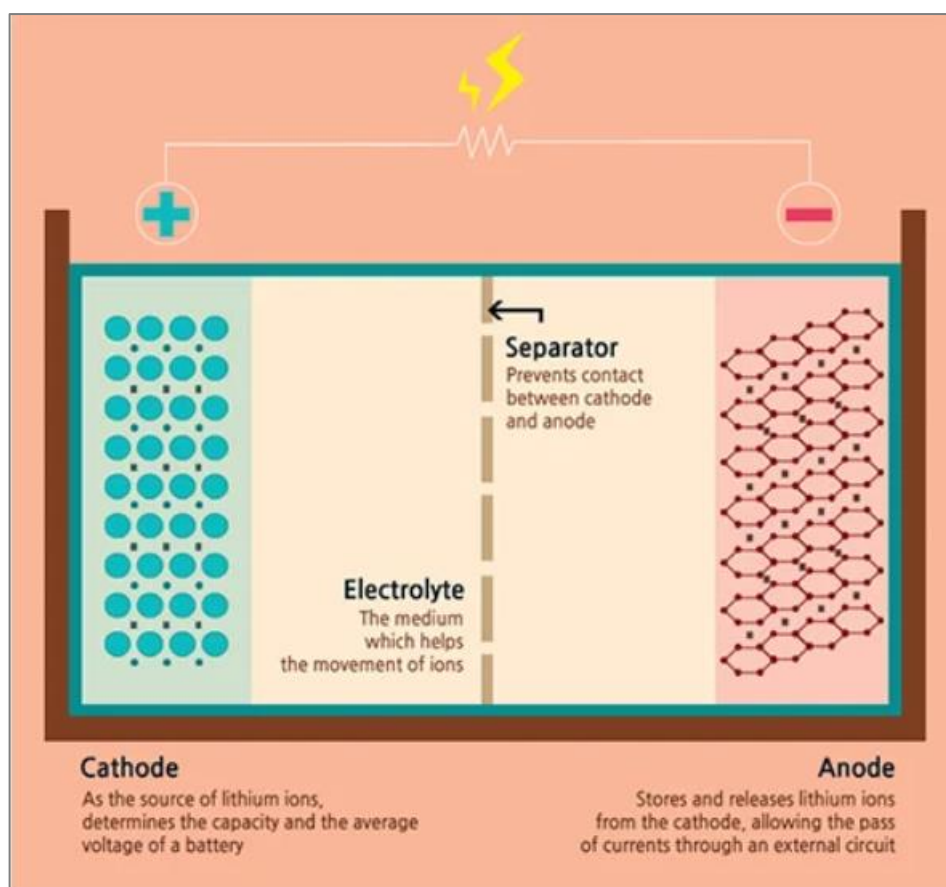


Figure 2.6: An example of a Li-ion cell and its component (Source: <https://eepower.com/technical-articles/changing-the-world-with-lithium-ion-batteries/#>)

Li-ion battery cells contain two reactive materials which are capable of electron transfer chemical reactions (commonly a lithium source cathode and a graphite anode). Lithium ion batteries utilise both lithium and a heavy metal (commonly cobalt or manganese) in the reactions required for energy storage. Lithium can however be recycled, adding the future potential use of this battery technology, however the recycling process is difficult and expensive.

This battery type is expected to be a dominant energy storage technology for utility-scale applications, with cycle durations up to 4 hours (Parsons, 2017). Developmental concerns related to the technology included cell monitoring and fire (due to thermal runaway, i.e. a heat positive feedback resulting in runaway heating

of the unit) although fire detection, cooling and suppression systems largely address these concerns (Parsons, 2017).

The High round-trip efficiency (the fraction of energy put into the storage that can be retrieved), high power and energy density of this technology provide a significant advantage where a small footprint and available space are an issue. A significant disadvantage to Li-ion has been the high initial cost, as well as the limited cycle lives produced by earlier (historical) chemistries used in the battery (Parsons, 2017). Regardless, recent technological advances and large-scale manufacturing have reduced the price drastically and increased performance, with the result that Li-ion batteries are expected to be an important BESS through to 2030 in both small- and large-scale applications.

ii) Flow Batteries

Flow batteries contain tanks filled with electrolyte, which flows through an electrochemical cell or reaction stack (**Figure 2.7**) (Parsons, 2017). They store and release energy through a reversible electrochemical reaction between two electrolytes (chemical reactants), which are separated by a membrane through which charging and discharging occurs. These batteries provide an energy output greater than or equal to lead acid batteries, and their storage capacity is dependent upon the size of the electrolyte tanks while the power output is dependent on the size of the reaction stack (Parsons, 2017).

Flow batteries are a technology of battery which requires mechanical systems (pumps, pipes, and tanks) and are therefore inherently more complex than a solid-state battery (for example, lithium-ion, lead or advanced lead acid batteries discussed above). The greatest advantage these batteries exhibit is their scalability and their longer duration discharge cycles which are more cost efficient when compared to solid-state batteries (Parsons, 2017). The most successful and widespread of these batteries use vanadium (discussed below) and zinc-bromine chemistries.

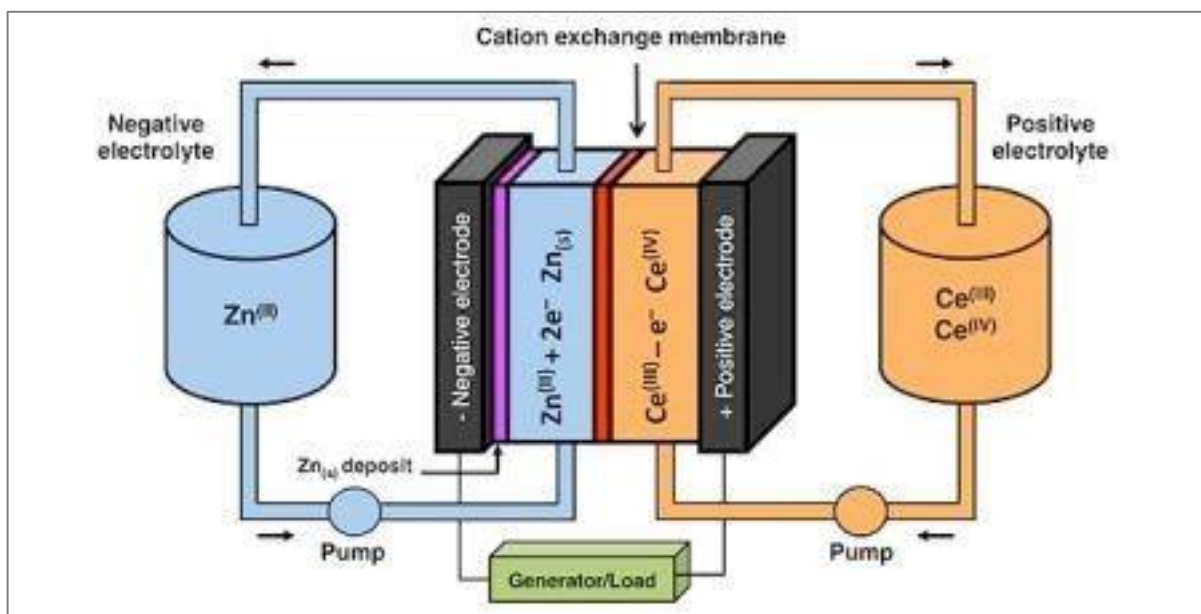


Figure 2.7: An example of a flow battery and its component

(Source: <http://www.upsbatterycenter.com/blog/flow-batteries-bring-light-africa/#prettyPhoto>)

Redox Flow Batteries (RFB) are a class of electrochemical energy storage technology which entail a chemical reduction and oxidation reaction that stores energy in liquid electrolyte solution flowing through a battery of electrochemical cells during charge and discharge. They are therefore a subset (or one variant) of flow batteries and essentially work by two separate containers of dissolved chemical components, separated by a membrane, which facilitate ion exchange (and thus the resulting flow of electric current) across the membrane when an electrical load is applied to the system. These batteries may act as a fuel cell, where spent electrolyte solution is exchanged once no longer effective, or rechargeable, where regeneration may be achieved by applying a source of electricity to the electrolyte). The energy capacity of this battery is a function of the volume of the electrolyte solution, allowing for a high degree of scalability.

iii) **Vanadium Redox-flow technology (e.g. vanadium flow battery, or similar technology)**

The use of vanadium modules within the redox-flow battery technology (**Figure 2.8**) has been shown by a few companies to have potential for significant scale-up of to the megawatt (MW) scale and discharge durations of 4 to 12+ hours (Parsons, 2017). Scaled up systems are beneficial in that they void the need for multiple, smaller redundant systems. Vanadium employed in this technology exploits the ability of vanadium solutions to exist in four different oxidation states, which allows the battery to employ only one electroactive element (vanadium solution) in various states, as opposed to an additional chemical reactant in the opposing electrolyte cell.

Vanadium is an abundant, but expensive resource in South Africa, accounting for up to 35% of the BESS' cost (Parsons, 2017). Vanadium is a nontoxic chemical, however, the electrolyte (commonly sulphuric acid) is caustic and poses corrosive and environmental hazards similar to lead-acid batteries (Parsons, 2017).

Environmental impacts and their severity are likely to be influenced by the size and scale of the system employed, as larger quantities of land may be used for electrolyte storage as compared to other systems. In addition, while the electrolytes aren't specifically toxic, other chemicals used in their implementation (for example bromine) may be and therefore containment and safe handling are needed. No significant waste products are created by their use as the storage system has the capability to indefinitely perform discharge cycles (Parsons, 2017).

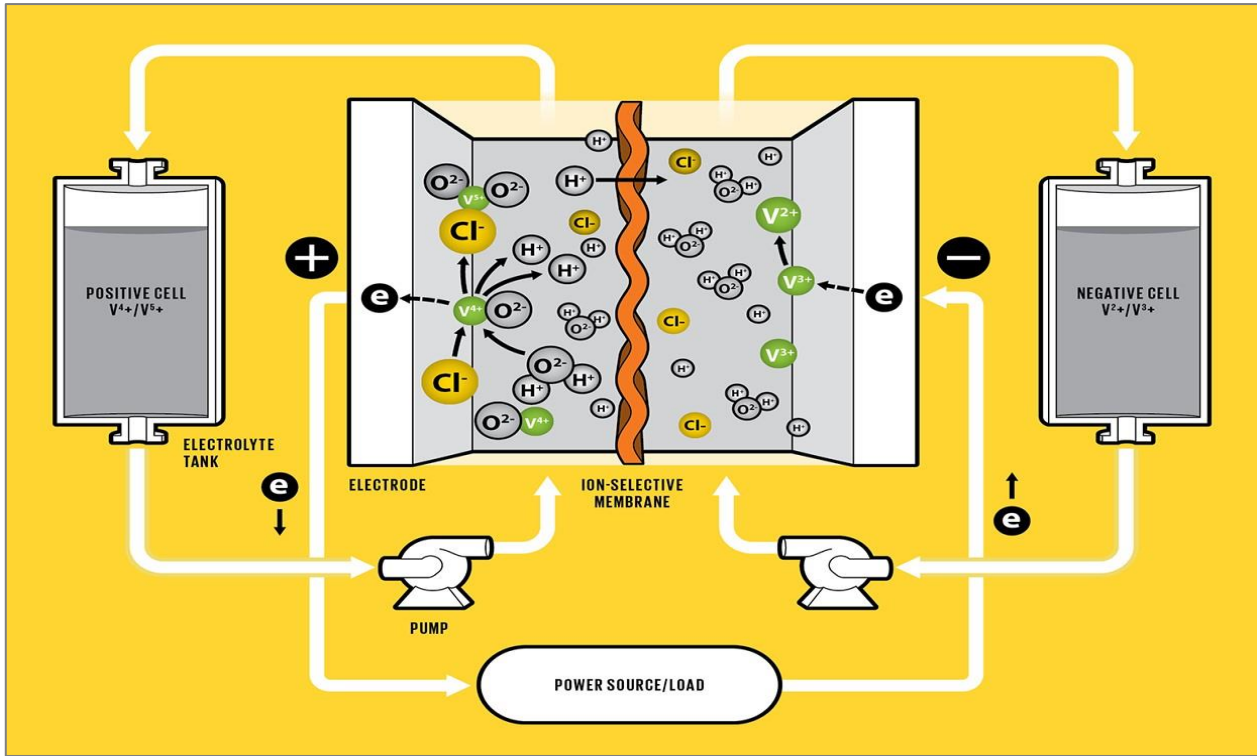


Figure 2.8: Vanadium modules within the redox-flow battery technology

(Source: <https://spectrum.ieee.org/green-tech/fuel-cells/its-big-and-longlived-and-it-wont-catch-fire-the-vanadium-redoxflow-battery>)

The primary advantages of vanadium redox batteries are they are highly scalable (by simply increasing the electrolyte and stack size), they can be left completely discharged for long periods without reducing their storage potential, their flow battery design type voids the capacity degradation due to single cell non-flow batteries and their electrolyte is aqueous, inherently safe and non-flammable (Wikipedia, 2020). Disadvantages include relatively poor energy-to-volume ratio in comparison with standard storage batteries, the relatively high toxicity of oxides of vanadium, the heavy nature (and thus mainly stationary application) of the electrolyte solution and their relatively poor round trip efficiency (Wikipedia, 2020).

Vanadium flow batteries will likely be a dominant long-duration discharge application in the coming 5 years, and they could dominate the long-duration market (>4 hours) over the middle to long term through 2030 (Parsons, 2017).

2.4.5 The 'Do Nothing' Alternative

The 'do-nothing' alternative is the option of Enel Green Power (Pty) Ltd not constructing the BESS infrastructure. This would result in no environmental impacts (positive or negative). This alternative is assessed in Chapter 5 of this BA Report as required in terms of the EIA regulations.

The proposed project will improve the socio-economic climate of the region by creating employment opportunities for local people. If the project is not implemented, this will not be realized.

2.5. Regulatory and planning context

The regulatory hierarchy of policy and planning documentation that supports the development of a project of this nature consists of three tiers of authority who exercise control through both statutory and non-statutory instruments – that is National, Provincial and Local levels. These policies are discussed in more detail in the following sections, along with the provincial and local policies or plans that have relevance to the proposed development of the Karusa BESS and associated infrastructure.

At **National Level**, the main regulatory agencies are:

- » **Department of Forestry, Fisheries and the Environment (DFFE):** This Department is responsible for environmental policy and is the controlling authority in terms of NEMA and the 2014 EIA Regulations (GN R326) as amended. DFFE is the competent authority for this project (as per GNR 779 of 01 July 2016).
- » **South African Heritage Resources Agency (SAHRA):** SAHRA is a statutory organisation established under the National Heritage Resources Act (No. 25 of 1999) (NHRA), as the national administrative body responsible for the protection of South Africa's cultural heritage.
- » **Department of Water and Sanitation:** This Department is responsible for effective and efficient water resources management to ensure sustainable economic and social development. This Department is also responsible for evaluating and issuing licenses pertaining to water use (i.e. Water Use Licenses (WUL) and General Authorisation), where these may be applicable.
- » **Department of Mineral Resources and Energy (DMRE):** This Department is responsible for granting approvals for the use of land which is contrary to the objects of the Mineral and Petroleum Resource Development Act (No. 28 of 2002) (MPRDA) in terms of Section 53 of the MPRDA. Therefore, in terms of the Act, approval from the Minister is required to ensure that the proposed activities do not sterilise mineral resource that July occur within the broader study area and development area.
- » **The Department of Agriculture, Land Reform and Rural Development (DALRRD):** This Department is the custodian of South Africa's agricultural resources and is primarily responsible for the formulation and implementation of policies governing the agricultural sector. Furthermore, the Department is also responsible for issuing permits for the disturbance or destruction of protected tree species listed under Section 15 (1) of the National Forest Act (No. 84 of 1998) (NFA).
- » **National Energy Regulator of South Africa (NERSA):** This body is responsible for regulating all aspects of the electricity sector and will ultimately issue licenses for IPP projects to generate electricity.

At **Provincial Level**, the main regulatory agencies are:

- » **Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform** is a Commenting Authority for the project and is also responsible for issuing any biodiversity and conservation-related permits. The Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform's involvement relates specifically to sustainable resource management, conservation of protected species and land care.
- » **Northern Cape Department of Roads and Public Works (NCDRPW):** NCDRPW is responsible for roads and the granting of exemption permits for the conveyance of abnormal loads on public roads.
- » **Ngwao Boswa Kapa Bokone (NBKB):** NBKB, the Northern Cape Provincial Heritage Resources Authority is responsible for the identification, conservation and management of heritage resources, as well as commenting on heritage related issues within the Province.

- » **Northern Cape Department of Transport, Safety and Liaison:** This Department provides effective co-ordination of crime prevention initiatives, provincial police oversight, traffic management and road safety towards a more secure environment.

At the **Local Level** the local and municipal authorities are the principal regulatory authorities responsible for planning, land use and the environment. In the Northern Cape, both the local and district municipalities play a role. The local municipality within which the BESS and associated infrastructure is located is the **Karoo Hoogland Municipality**, which forms part of the **Namakwa District Municipality**. In terms of the Municipal Systems Act (Act No 32 of 2000) it is compulsory for all municipalities to go through an IDP process to prepare a five-year strategic development plan for the area under their governance.

The relevant legislation and policies listed and discussed below are relevant to the Karusa BESS and associated infrastructure.

2.6. Policy and Planning Considerations on International, National, Provincial and Local Levels

2.6.1. Policy and Planning on a National Level

National policies and plans adopted by South Africa, which are considered to be relevant to the development of the Karusa BESS and associated infrastructure in the context of its function to provide stored electricity to the grid have been summarised in **Table 3.1**.

Table 3.1: National policies, plans and legislation relevant to the Karusa BESS and associated infrastructure

Policy, Plan or Legislation	Is the development of the Karusa BESS and associated infrastructure aligned with this policy, plan or legislation?
Constitution of the Republic of South Africa, 1996	<p>Yes. Section 24 of the Constitution pertains specifically to the environment. It states that everyone has the right to an environment that is not harmful to their health or well-being, and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation, promote conservation and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.</p> <p>The Constitution outlines the need to promote social and economic development. Section 24 of the Constitution therefore requires that development be conducted in such a manner that it does not infringe on an individual's environmental rights, health, or well-being. This is especially significant for previously disadvantaged individuals who are most at risk to environmental impacts.</p>
National Environmental Management Act (No. 107 of 1998) (NEMA)	Yes. South Africa's environmental legislation sets the framework for environmental management in South Africa. NEMA is founded on the principle that everyone has the right to an environment that is not harmful to their health or well-being as contained within the Bill of Rights.

Policy, Plan or Legislation	Is the development of the Karusa BESS and associated infrastructure aligned with this policy, plan or legislation?
	<p>The national environmental management principles states that the social, economic and environmental impacts of activities, including disadvantages and benefits, must be considered, assessed, evaluated, and decisions must be appropriate in the light of such consideration and assessment.</p> <p>The need for responsible and informed decision-making by government on the acceptability of environmental impacts is therefore enshrined within NEMA.</p>
<p>The National Energy Act (2008)</p>	<p>Yes. One of the objectives of the Act is to promote the diversity of the supply of energy and its sources. In this regard, the preamble makes direct reference to renewable resources and states that provision must be made for increased generation and consumption of renewable energies. In terms of Section 8 of the Act, a licence issued by the Regulator is required to operate any generation, transmission or distribution facility; import or export any electricity; or (c) be involved in trading.</p>
<p>White Paper on the Energy Policy of South Africa, 1998</p>	<p>Yes. The South African Energy Policy of 1998 identifies five key objectives, namely increasing access to affordable energy services, improving energy sector governance, stimulating economic development, managing energy related environmental impacts and securing supply through diversity. In order to meet these objectives South Africa needs to optimally use available energy resources. The development of the Karusa BESS and associated infrastructure will enable the contribution, albeit only to a limited extent, to the achievement of the five objectives of the Energy Policy of the country. These five objectives include: Increasing access to affordable energy services; Improving energy governance; Stimulating economic development; Managing energy-related environmental and health impacts and Securing supply through diversity</p>
<p>The Electricity Regulation Act, 2006 (Act No. 4 of 2006), as amended</p>	<p>Yes. The Act establishes a national regulatory framework for the electricity supply industry of the country and introduces the National Energy Regulator as the custodian and enforcer of the National Electricity Regulatory Framework. The Act also provides for licences and registration as the manner in which generation, transmission, distribution, trading and the import and export of electricity are regulated. The developer of the Karusa BESS and associated infrastructure will have to ensure compliance with this Act for the storage and future distribution of power into the national grid.</p>
<p>National Development Plan (NDP)</p>	<p>Yes. The NDP aims at eliminating poverty and reducing inequality by 2030 and identifies 9 key challenges and associated remedial plans. Managing the transition towards a low carbon national economy is identified as one of the 9 key national challenges. Investment in electricity infrastructure is identified as one of the priorities for the country</p>

Policy, Plan or Legislation	Is the development of the Karusa BESS and associated infrastructure aligned with this policy, plan or legislation?
	<p>in order to improve investment and support job creation and poverty alleviation. The Karusa BESS will allow for a timed release of electricity to the grid when the capacity is required the most, thereby supporting the electricity system and contributing to sustainable electricity infrastructure.</p>
<p>Integrated Energy Plan (IEP)</p>	<p>Yes. The IEP takes into consideration the crucial role that energy plays in the entire economy of the country and is informed by the output of analyses founded on a solid fact base. Eight key objectives were identified which relate mainly to the security, cost, access, diversity, efficiency, impact in terms of emissions, conservation and social benefits in terms of energy planning. The Karusa BESS will allow for a timed release of electricity to the grid when the capacity is required the most, thereby supporting the electricity system and contributing to sustainable electricity infrastructure with reduced emissions.</p>
<p>Integrated Resource Plan (IRP) 2010 - 2030</p>	<p>Yes. The IRP attempts to harmonize the dichotomy, especially with regard to nuclear, gas and energy storage technologies, which technologies require more consideration of future developments.</p> <p>Energy security in the context of this IRP is defined as South Africa developing adequate generation capacity to meet its demand for electricity, under both the current low-growth economic environment and even when the economy turns and improves to the level of 4% growth per annum. Generation capacity must accordingly be paced to restore the necessary reserve margin and to be ahead of the economic growth curve at least possible cost.</p> <p>The IRP (2019) includes allocations for the identified technology mix as defined through the various investigations undertaken for the planning horizon. Provision has been included for 5000MW of storage capacity to be installed by 2030. The development of the proposed Karusa BESS and associated infrastructure enables the storage of energy, to later be evacuated into the national grid and thereby contributes to the energy mix of the country as set out in the IRP.</p>
<p>Strategic Integrated Projects (SIP)</p>	<p>Yes. In 2010, a National Development Plan was drafted to address socio-economic issues affecting development in South Africa. These issues were identified and placed under 18 different Strategic Integrated Projects (SIPs) to address the spatial imbalances of the past by addressing the needs of the poorer provinces and enabling socio-economic development. The development of the Karusa BESS and associated infrastructure will support the Strategic Integrated Projects within one SIP, which relates to the development of the associated infrastructure. This is known as SIP 9– electricity transmission and distribution for all.</p>

Policy, Plan or Legislation	Is the development of the Karusa BESS and associated infrastructure aligned with this policy, plan or legislation?
	<p>In support of SIP 9, the Department of Environmental Affairs undertook a Strategic Environmental Assessment (SEA) which aims to provide guidance for the efficient and sustainable expansion of strategic electricity grid infrastructure in South Africa. The Karusa BESS and associated infrastructure is located within the Komsberg Renewable Energy Development Zone (REDZ) and is therefore considered to be aligned with national planning in this regard.</p>
New Growth Path (NGP) Framework, 2010	<p>Yes. The purpose of the New Growth Path (NGP) Framework is to provide effective strategies towards accelerated job-creation through the development of an equitable economy and sustained growth. The target of the NGP is to create 5 million jobs by 2020. With economic growth and employment creation as the key indicators identified in the NGP. To achieve this, government will seek to, amongst other things, identify key areas for large-scale employment creation, as a result of changes in conditions in South Africa and globally, and to develop a policy package to facilitate employment creation in these areas. The proposed Karusa BESS and associated infrastructure will assist with the creation of both temporary and permanent employment opportunities during the construction and operation phases, which will contribute, albeit to a limited extent, to the economy and sustainable growth.</p>
National Climate Change Response Strategy	<p>Yes. This strategy aims to address issues identified as priorities for dealing with climate change in the country. The focus of the strategy is adapting to climate change; developing a sustainable energy programme; adopting an integrated response by the relevant government departments; compiling inventories of greenhouse gases; accessing and managing financial resources; and research, education, and training. The development the Karusa BESS and associated infrastructure will enable additional storage and uptake of energy into the national grid which will reduce the need for the use of non-renewable resources as an energy resource and thereby assist in addressing climate change and global warming.</p>
Climate Change Bill, 2018	<p>Yes, with limited relevance. The Bill provides a framework for climate change regulation in South Africa aimed at governing South Africa's sustainable transition to a climate resilient, low carbon economy and society. The Bill provides a procedural outline that will be developed through the creation of frameworks and plans. The bill aims to provide for the coordinated and integrated response to climate change and its impacts, provide effective management of inevitable climate change impacts and to make a fair contribution to the global effort to stabilise greenhouse gas concentrations. The Karusa BESS and associated infrastructure relates only to the storage and later evacuation of energy into</p>

Policy, Plan or Legislation	Is the development of the Karusa BESS and associated infrastructure aligned with this policy, plan or legislation?
	the national grid and would therefore not result in the generation or release of emissions during its operation.

2.6.2. Policy and Planning at a Provincial Level

Policies and plans have been adopted by the Northern Cape Province for the management of the area and are considered to be relevant to the development of the Karusa BESS and associated infrastructure. **Table 3.2** provides a summary of the relevant provincial plans and policies.

Table 3.2: Provincial policies and plans relevant to the Karusa BESS and associated infrastructure

Policy or Plan	Is the development of the Karusa BESS and associated infrastructure aligned with this policy or plan?
Northern Cape Provincial Spatial Development Framework (PSDF), 2012	<p>Yes. The Northern Cape Provincial Spatial Development Framework (PSDF) 2012 states that the overarching goal for the province is to enable sustainability through sustainable development. The province considers social and economic development as imperative in order to address the most significant challenges facing the Northern Cape, which is poverty.</p> <p>The overall energy objective of the province includes promoting the development of renewable energy supply schemes which are considered to be strategically important for increasing the diversity of domestic energy supply and avoiding energy imports, while also minimising the detrimental environmental impacts. With the developed and proposed independent power producer capacity, the province will produce more than 100% of its own electrical power needs from renewable energy resources (although this energy will be fed into the national grid for national use). The development of the Karusa BESS and associated infrastructure will enable additional storage and uptake of energy into the national grid which will promote the province's objectives.</p>
The Northern Cape Climate Change Response Strategy	<p>Yes. The key aspects of the Northern Cape Climate Change Response Strategy (NCCCRS) Report are summarised in the MEC's (NCPG: Environment and Nature Conservation) 2011 budget speech: "<i>The Provincial Climate Change Response Strategy will be underpinned by specific critical sector climate change adaptation and mitigation strategies that include the Water, Agriculture and Human Health sectors as the 3 key Adaptation Sectors, the Industry and Transport alongside the Energy sector as the 3 key Mitigation Sectors with the Disaster Management, Natural Resources and Human Society, livelihoods and Services sectors as 3 remaining key. Sectors to ensure proactive long-term responses to the frequency and intensity of extreme weather events such as flooding and wildfire, with heightened requirements for effective disaster management</i>".</p> <p>Key points from the MEC address include the NCPG's commitment to develop and implement policy in accordance with the National Green Paper for the National Climate Change Response Strategy (2010), and an acknowledgement of the NCP's extreme vulnerability to climate-change driven desertification. The development and promotion of a provincial green economy, including green jobs, and environmental learnership is regarded as an important provincial intervention in addressing climate change. The renewable energy sector, including solar and wind energy (but also biofuels and energy from waste), is explicitly indicated as an important element of the Provincial Climate Change Response Strategy. The MEC further indicated that the NCP was involved in the</p>

Policy or Plan	Is the development of the Karusa BESS and associated infrastructure aligned with this policy or plan?
	<p>processing 7 wind energy facility and 11 solar energy facility EIA applications (March 2011)³.</p> <p>The development of Karusa BESS and associated infrastructure will assist in achieving (although only to a limited extent) the promotion of the provincial green economy of the Northern Cape through the storage and later evacuation of generated energy into the electricity grid.</p>

2.6.3. Policy and Planning on a District and Local Level

Strategic policies at the district and local level have similar objectives for the respective areas, namely the delivery of basic services, including the provision of electricity. The development of the proposed Karusa BESS and associated infrastructure is considered to align with the aims of these policies. **Table 3.3** below provides a summary of the district and local level policies and plans considered to be relevant to the development of the Karusa BESS and associated infrastructure.

Table 3.3: District and local policies and plans relevant to the Karusa BESS and associated infrastructure

Policy or Plan	Is the development of the Karusa BESS and associated infrastructure aligned with this policy or plan?
Namakwa District Municipality Integrated Development Plan (IDP), 2017 - 2022	Yes. The plan identifies the need for support to the local municipalities to deliver basic services such as water, sanitation, housing, electricity and waste management. The IDP also seeks to establish good governance by enforcing the climate change response plan. The development of the Karusa BESS and associated infrastructure for the Karusa Wind Energy Facility will contribute to the delivery of basic services, however only to a limited extent. The proposed Karusa BESS and associated infrastructure will contribute to the application of the climate change response plan through zero production of greenhouse gas emissions during the operation of the facility.
Karoo Hoogland Municipality Draft Integrated Development Plan (IDP), 2018/2019	Yes. The IDP identifies climate change as a significant issue and notes that it is predicted to negatively impact on the agricultural sector in Namakwa District Municipality. Increased temperatures, drought, and the increase in frequency and severity of storm events will impact on the crops that can be grown and potentially result in a loss of livestock. It is recognised that climate change can impact on the natural environment and people. The need for alternative energy sources has been identified as one of the priorities for implementation. Reliability of electricity has also been identified as an issue in the municipality, and improvement in this regard is required to ensure delivery of basic services. The Karusa BESS will allow for a timed release of electricity to the grid when the capacity is required the most, thereby supporting the electricity system and contributing to a more reliable electricity infrastructure with reduced emissions.

From the evidence provided in the above tables the Karusa BESS and associated infrastructure aligns with several, if not, all of the policies detailed above. The Karusa BESS will have a large role to play in assisting to achieve several policies' climate change and energy goals, resulting in the Karusa BESS being a vital component for the energy transition and play its part in assisting all policies related to climate change. The Karusa BESS will also allow the storage of power which can later be evacuated into the national grid and thereby promotes diversity of supply of energy and the source of supply, in line with the several objectives of the Act's detailed above and this will assist with the further growth and development of the renewable energy sector.

In conclusion the Karusa BESS and associated infrastructure will assist in supporting the energy sector of the country and add to the diversification of the energy mix, which is moving away from coal and towards the use of gas and renewable energy.

CHAPTER 3: APPROACH TO UNDERTAKING THE BASIC ASSESSMENT PROCESS

In terms of the EIA Regulations of December 2014 (amended in April 2017) published in terms of the NEMA (Act No. 107 of 1998) as amended, the development of the Karusa BESS and associated infrastructure triggers listed activities requiring environmental authorisation.

The BA process aims at identifying and describing potential environmental impacts associated with the construction of the Karusa BESS and associated infrastructure. In order to ensure that a comprehensive assessment is provided to the competent authority and I&APs regarding the impacts of the construction of the BESS and associated infrastructure, detailed independent specialist studies were undertaken as part of the BA process. This process included a public participation process which included I&APs, the competent authority, directly impacted landowners/occupiers, adjacent landowners/occupiers, relevant Organs of State departments, ward councillors and other key stakeholders. This chapter serves to outline the process that was followed during the BA process.

3.1 Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

This chapter of the BA report includes the following information required in terms of Appendix 1: Content of the BA Report:

Requirement	Relevant Section
3(d)(i) a description of the scope of the proposed activity, including all listed and specified activities triggered and being applied for.	All listed activities triggered as a result of the development of the proposed BESS have been included in section 3.2, Table 3.1. The specific project activity relating to the relevant triggered listed activity has also been included in Table 3.1.
3(e) a description of the policy and legislative context within which the development is proposed including- (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. (ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments.	A description of the policy and legislative context within which the BESS is proposed is included in section 3.6.
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.	The details of the public participation process undertaken for the project has been included and described in section 3.3.2 and Appendix C.
3(h)(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which	All comments raised during the 30-day review and comment period of the BA Report and through on-going consultation with I&APs will be included as part of a C&R

Requirement	Relevant Section
the issues were incorporated, or the reasons for not including them.	report (Appendix C5) to be submitted as part of the Final BA Report to Department of Forestry, Fisheries and the Environment (DFFE) for decision-making.
3(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.	The methodology used to assess the significance of the impacts of the proposed infrastructure has been included in section 3.3.
(o) a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed.	The assumptions and limitations of the BA process being undertaken is included in section 3.6.

3.2 Relevant legislative permitting requirements

The legislative permitting requirements applicable to the proposed project as identified at this stage in the process are described in more detail under the respective sub-headings.

3.2.1 National Environmental Management Act (No. 107 of 1998) (NEMA)

NEMA is South Africa's key piece of national environmental legislation that provides for the authorisation of certain controlled activities known as "listed activities". In terms of Section 24(1) of NEMA, the potential impact on the environment associated with listed activities must be considered, investigated, assessed and reported on to the competent authority (the decision-maker) charged by NEMA with granting of the relevant EA. Since the proposed Karusa BESS is associated with an energy related activity (i.e. storage) and therefore relates to the IRP 2010 – 2030, 2019¹, the National DFFE has been determined as the Competent Authority in terms of GNR 779 of 01 July 2016. The Provincial Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform is a Commenting Authority on the project.

The need to comply with the requirements of the EIA Regulations published under the NEMA ensures that proponents are provided the opportunity to consider the potential environmental impacts of their activities early in the project development process, and also allows for an assessment to be made as to whether environmental impacts can be avoided, minimised or mitigated to acceptable levels. Comprehensive, independent environmental studies are required to be undertaken in accordance with the EIA Regulations to provide the competent authority with sufficient information in order for an informed decision to be taken regarding the project and Application for Environmental Authorisation.

The BA process being conducted for the Karusa BESS and associated infrastructure is being undertaken in accordance with Section 24 (5) of the NEMA. Section 24 (5) of NEMA pertains to Environmental Authorisations (EAs), and requires that the potential consequences for, or impacts of, listed or specified activities on the environment be considered, investigated, assessed, and reported on to the competent authority. Listed Activities are activities identified in terms of Section 24 of the NEMA which are likely to have a detrimental effect on the environment, and which may not commence without an EA from the competent authority

¹ The Integrated Resource Plan (IRP) is legislated policy which regulates power generation planning.

subject to the completion of an environmental assessment process (either a Basic Assessment (BA) or full Scoping and EIA).

Table 3.1 details the listed activities in terms of the EIA Regulations, 2014 (as amended) which apply to the Karusa BESS, and for which an Application for Environmental Authorisation has been submitted to DFFE. The table also includes a description of the specific project activities which relate to the applicable listed activities.

Table 3.1: Listed activities as per the EIA regulations which are triggered by the BESS and associated infrastructure.

Number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice):	Description of each listed activity and relevance to the project
Listing Notice 1 (GN 327 of 2017)	11	<p>The development of facilities or infrastructure for the transmission and distribution of electricity –</p> <p>i) Outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts</p> <p>Associated infrastructure as part of the Karusa BESS development will include a powerline with a capacity of 132kV outside of urban areas.</p>
Listing Notice 1 (GN 327 of 2017)	14	<p>The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.</p> <p>The proposed BESS may contain electrolyte solutions considered to be a dangerous good. Although the BESS itself is not considered to be a facility for the storage of dangerous goods (rather, the function of the BESS is to store energy), the total volume of electrolyte solution used in the BESS may exceed 80m³ but will be less than 500m³.</p> <p>Please note that no stand-alone facilities for the storage of dangerous goods external to the BESS will be developed.</p>
Listing Notice 1 (GN 327 of 2017)	24	<p>The development of a road</p> <p>(ii) with a reserve wider than 13.5 meters, or where no reserve exists where the road is wider than 8 metres.</p> <p>Access roads to the BESS branching off to the existing roads will be up to 10m in width and</p>

Number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice):	Description of each listed activity and relevance to the project
		approximately 70m long). Internal roads will be up to 8m wide.
Listing Notice 1 (GN 327 of 2017)	27	<p>The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation.</p> <p>Up to 6 ha of indigenous vegetation will be cleared to accommodate the development of the BESS and associated facilities (such as laydown area, access road and MV cabling, MV/HV substation and HV cabling to connect the BESS to the Hidden Valley substation).</p>
Listing Notice 1 (GN 327 of 2017)	28	<p>Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development:</p> <p>(ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare.</p> <p>The site could potentially be zoned under agriculture and therefore may be a need to apply for re-zoning.</p>
Listing Notice 3 (GN 324 of 2017)	4	<p>The development of a road wider than 4 metres with a reserve less than 13,5 metres.</p> <p>g. Northern Cape ii. Outside urban areas: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;</p> <p>Access roads to the BESS (10m in width, approximately 70m long) branching off of the existing roads, and internal roads (up to 8m wide) to be located within the total BESS footprint area.</p> <p>It is anticipated that the road to the BESS will branch off from the authorised Karusa Wind Energy Facility access roads.</p> <p>The project area is located within CBA1.</p>
Listing Notice 3 (GN 324 of 2017)	10	<p>The development and related operation of facilities or infrastructure, for the storage, or for the</p>

Number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice):	Description of each listed activity and relevance to the project
		<p>storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 30 cubic metres or more but not exceeding 80 cubic meters.</p> <p>g. Northern Cape iii. Outside urban areas: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans</p> <p>The proposed BESS may contain electrolyte solutions considered to be a dangerous good. Although the BESS itself is not considered to be a facility for the storage of dangerous goods (rather, the function of the BESS is to store energy), the total volume of electrolyte solution used in the BESS within the CBA area may exceed 30m³ but will be less than 80m³.</p> <p>Please note that no stand-alone facilities for the storage of dangerous goods external to the BESS will be developed.</p>
Listing Notice 3 (GN 324 of 2017)	12	<p>The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.</p> <p>g. Northern Cape ii. Within critical biodiversity areas identified in bioregional plans;</p> <p>Up to 6ha of vegetation will be cleared to accommodate the development of the BESS and associated facilities (including but not limited to access and internal roads and MV cabling, MV/HV substation and HV cabling to connect the BESS to the Hidden Valley substation etc.). The site is located within a Critical Biodiversity Area as indicated in the Northern Cape CBA/ESA map (Northern Cape Provincial Biodiversity Sector Plan).</p>

3.2.2 National Water Act (No. 36 of 1998) (NWA)

In accordance with the provisions of the National Water Act (No. 36 of 1998) (NWA), all water uses must be licensed with the Competent Authority (i.e. the Regional DWS). Water use is defined broadly, and includes taking and storing water, activities which reduce stream flow, waste discharges and disposals, controlled activities (activities which impact detrimentally on a water resource), altering a watercourse, removing water found underground for certain purposes, and recreation.

Due to the presence of non-perennial watercourses within the 500 m regulatory area, a risk assessment was completed in line with Section 21 (c) and (i) of the National Water Act, 1998, (Act 36 of 1998). Regarding the overhead or underground options, there are expected low post-mitigation risks, and a General Authorisation is permissible for the development.

3.2.3 National Heritage Resources Act (No. 25 of 1999) (NHRA)

The National Heritage Resources Act (No. 25 of 1999) (NHRA) provides an integrated system which allows for the management of national heritage resources and to empower civil society to conserve heritage resources for future generations. Section 38 of NHRA provides a list of activities which potentially require the undertaking of a Heritage Impact Assessment.

Section 38: Heritage Resources Management

- 1). *Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as –*
 - a. *the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;*
 - b. *the construction of a bridge or similar structure exceeding 50m in length;*
 - c. *any development or other activity which will change the character of a site –*
 - i). *exceeding 5 000m² in extent; or*
 - ii). *involving three or more existing erven or subdivisions thereof; or*
 - iii). *involving three or more erven or divisions thereof which have been consolidated within the past five years; or*
 - iv). *the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;*

Must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

In terms of Section 38(8), approval from the heritage authority is not required if an evaluation of the impact of such development on heritage resources is required in terms of any other legislation (such as NEMA), provided that the consenting authority ensures that the evaluation of impacts fulfils the requirements of the relevant heritage resources authority in terms of Section 38(3) and any comments and recommendations of the relevant resources authority with regard to such development have been taken into account prior to the granting of the consent. However, should heritage resources of significance be affected by the proposed

BESS, a permit is required to be obtained prior to disturbing or destroying such resources as per the requirements of Section 48 of the NHRA, and the SAHRA Permit Regulations (GNR 668).

A Heritage Screening Assessment has been undertaken as part of the BA Process (refer to **Appendix F**).

3.3 Overview of the Basic Assessment Process for the Karusa BESS

Key tasks undertaken for the BA included:

- » Consultation with relevant decision-making and regulating authorities (at National, Provincial and Local levels).
- » Submission of the completed Application for Environmental Authorisation to the competent authority (i.e. DFFE) in terms of Regulations 5 and 6 of the EIA Regulations, 2014 (GNR 326), as amended.
- » Undertaking a public participation process in accordance with Chapter 6 of GNR326, and the Department of Environmental Affairs Public Participation guidelines (2017).
- » Undertaking of independent specialist studies in accordance with Appendix 6 of the EIA Regulations, 2014 (GNR326), as amended and the relevant specialist protocols as per GN 320 of March 2020.
- » Preparation of a BA report and EMPr in accordance with the requirements of Appendix 1 and Appendix 4 of GNR326.
- » 30-day public and authority review period of the BA report.
- » Compilation of a C&R report detailing the comments raised by I&APs, addressing these comments in detail and finalisation of the BA report.
- » Submission of a final BA report to the DFFE for review and decision-making

The tasks are discussed in detail in the sub-sections below.

3.3.1. Authority Consultation and Application for Authorisation in terms of the 2014 EIA Regulations (as amended)

In terms of Government Notice 779 of 01 July 2016, the DFFE is the competent authority for all projects related to the IRP. As the project is located within the Northern Cape Province, the Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (DAEARDLR) is a Commenting Authority on the project. Consultation with the regulating authorities (i.e. DFFE and DAEARDLR) as well as with all other relevant Organs of State will continue throughout the BA process. To date, this consultation has included the following:

- » Submission of a Public Participation Plan for approval prior to the commencement of the process.
- » Submission of an application for Environmental Authorisation to the DFFE.
- » Submission of the BA Report for review and comment by:
 - * The competent and commenting authorities.
 - * State departments that administer laws relating to a matter affecting the environment relevant to an application for Environmental Authorisation.
 - * Organs of State which have jurisdiction in respect of the activity to which the application relates.

A record of all authority correspondence undertaken during the BA process is included in **Appendix B** and **Appendix C**.

3.3.2. Public Participation Process

Public participation is an essential and regulatory requirement for an environmental authorisation process and is guided by Regulations 41 to 44 of the EIA Regulations 2014 (GN R326) (as amended). The purpose of public participation is clearly outlined in Regulation 40 of the EIA Regulations 2014 (GN R326) (as amended) and is being followed for this proposed project.

The sharing of information forms the basis of the public participation process and offers the opportunity for I&APs to become actively involved in the BA process from the outset. The public participation process is designed to provide sufficient and accessible information to I&APs in an objective manner. The public participation process affords I&APs opportunities to provide input into and receive information regarding the BA process in the following ways:

During the BA process the online stakeholder engagement platform will allow for the following:

1. provide an opportunity to submit comments regarding the project;
2. assist in identifying reasonable and feasible alternatives;
3. contribute relevant local information and knowledge to the environmental assessment;
4. allow registered I&APs to verify that their comments have been recorded, considered and addressed, where applicable, in the environmental investigations;
5. foster trust and co-operation;
6. generate a sense of joint responsibility and ownership of the environment; and
7. comment on the findings of the environmental assessments.

During the decision-making phase:

8. to advise I&APs of the outcome of the competent authority's decision, and how and by when the decision can be appealed.

The public participation process therefore aims to ensure that:

9. Information containing all relevant facts in respect of the application is made available to potential stakeholders and I&APs for their review.
10. The information presented during the public participation process is presented in such a manner, i.e. local language and technical issues, that it avoids the possible alienation of the public and prevents them from participating.
11. Public participation is facilitated in such a manner that I&APs are provided with a reasonable opportunity to comment on the project.
12. Various ways are provided to I&APs to correspond and submit their comments i.e. online stakeholder engagement platform, fax, post, email, WhatsApp and short message service (SMS).
13. An adequate review period is provided for I&APs to comment on the findings of the BA Report.

The Public Participation Process undertaken for the proposed BESS and associated infrastructure considers the restrictions and limitations imposed by Government through various means to limit the risks associated with COVID-19 in terms of consultations with I&APs. A Public Participation Plan was prepared and submitted to the DFFE on **04 April 2022**. Approval of the Plan was provided by the DFFE Case Officer via email on **Wednesday, 06 April 2022 (Appendix C4)**.

The traditional means and opportunities available for the undertaking of public participation are still covered and implemented as part of this plan considering current Regulations to limit risks associated with COVID-19. Alternative means of undertaking consultation has been designed and will be implemented by Savannah Environmental to ensure that I&APs are afforded sufficient opportunity to raise comments on the project through an interactive web-based platform readily available and accessible to any person interested in the project and enables the PPP to be undertaken in line with Regulations 41 to 44 of the EIA Regulations, 2014, as amended. This online stakeholder engagement platform allows the EAP to visually present details regarding the project and our consultation documentation, including project maps and plans, presentations, and posters regarding the project, and report available for review.

The use of online tools enables stakeholders and I&APs to explore the project-specific content in their own time and allows them to participate in a meaningful way in the consultation process. The online platform allows for project information to be shared and made available. Access to the project documentation via the Savannah Environmental website will be unrestricted to all I&APs. I&APs wanting to access the project information via this portal will be required to register and will receive a unique code (via an automated system) to access the report of interest. This step and the online portal support the EAP in maintaining a complete and accurate record and database of all parties who have interest in the project (and who choose to access the report via the online portal), in line with the requirements of the Regulations.

The online stakeholder engagement platform considers the limitations applied by the Regulations prohibiting the gathering of people, as well as limitations which certain I&APs may have in terms of access to computers and internet as well as access to public spaces which are not open for operation or which have restricted access.

The benefits of the online stakeholder engagement platform include:

- » Ability to create a dedicated project-specific online platform to enable easy access to project-related information.
- » Ability to reach a wider audience, allowing more widespread consultation for major infrastructure projects.
- » Allowing stakeholders and I&APs the opportunity to engage on a project without leaving their office or home.
- » Enabling stakeholders and I&APs to register their interest in a project (for inclusion on the project database), and automatically gaining access to comprehensive project documentation.
- » Enabling the EAP to maintain a complete database of I&APs through maintaining a record of persons accessing the online stakeholder consultation platform.
- » Enabling the EAP and stakeholders/I&APs to meet virtually.

- » Provides a resilient solution to a public consultation process.

Where I&APs do not have the applicable facilities (i.e., access to internet, mobile phones, or computers), provision has been made to include these I&APs in the consultation process by:

- » Consulting with the Ward Councillor, the ward committee members to ensure broader inclusion.
- » Consulting with community representatives, formalised community structures and local community forum members to ensure broader inclusion.
- » Inviting direct consultation with the Public Participation team to ensure broader inclusion and support by assisting with the submission of comments.
- » Use of the 'Please call me' alert of the dedicated cell phone number to allow a call-back at zero expense to the I&AP.
- » Hard copy documentation may be made available to local public facilities, but will only be provided where appropriate sanitary conditions can be maintained.

In terms of the requirement of Chapter 6 of the EIA Regulations of December 2014, as amended, the following key public participation tasks have been undertaken:

- » Fix a notice board at a place conspicuous to the public at the boundary or on the fence of—
 - (i) the site where the activity to which the application relates is or is to be undertaken; and
 - (ii) any alternative site mentioned in the application;
- » Give written notice to:
 - (i) the owner or person in control of that land if the applicant is not the owner or person in control of the land;
 - (ii) the occupiers of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
 - (iii) owners and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
 - (iv) the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area;
 - (v) the municipality which has jurisdiction in the area;
 - (vi) any organ of state having jurisdiction in respect of any aspect of the activity; and
 - (vii) any other party as required by the competent authority.
- » Place an advertisement in one local newspaper.
- » Open and maintain a register of I&APs and Organs of State.
- » Release a BA Report for a 30-day review period.
- » Prepare a Comments and Responses (C&R) report which documents the comments received on the BA process and the responses provided by the project team.

Please refer to the Public Participation Plan for the schematic illustration of tools that are available to I&APs and stakeholders to access project information and interact with the public participation team to obtain project information and resolve any queries that may arise, and to meet the requirements for public participation (**Appendix C**).

i. Stakeholder identification and Register of Interested and Affected Parties

42. A proponent or applicant must ensure the opening and maintenance of a register of I&APs and submit such a register to the competent authority, which register must contain the names, contact details and addresses of –
- (a) All persons who, as a consequence of the public participation process conducted in respect of that application, have submitted written comments or attended meetings with the proponent, applicant or EAP;
 - (b) All persons who have requested the proponent or applicant, in writing, for their names to be placed on the register; and
 - (c) All organs of state which have jurisdiction in respect of the activity to which the application relates.

I&APs have been identified through a process of networking and referral, obtaining information from the Karusa WEF database and Savannah Environmental's existing stakeholder database, liaison with potentially affected parties in the greater surrounding area and a registration process involving the completion of a reply form. Key stakeholders and affected and surrounding landowners have been identified and registered on the project database. Other stakeholders are required to formally register their interest in the project through either directly contacting the Savannah Environmental Public Participation team via email or fax or use of the online stakeholder engagement platform. An initial list of key stakeholders identified and registered is listed in **Table 3.3**.

Table 3.3: List of Stakeholders identified for the inclusion in the project database during the public participation process for the proposed Karusa BESS and associated infrastructure

Organs of State
National Government Departments
Department of Forestry, Fisheries and the Environment (DFFE)
Department of Mineral Resources and Energy (DMRE)
Department of Agriculture, Land Reform, and Rural Development (DALRRD)
Department of Water and Sanitation
Department of Communications & Digital Technologies
Department of Science and Innovation
Government Bodies and State-Owned Companies
Air Traffic Navigation Services (ATNS)
Eskom Holdings SOC Limited
National Energy Regulator of South Africa (NERSA)
South African Civil Aviation Authority (CAA)
South African Heritage Resources Agency (SAHRA)
South African National Roads Agency Limited (SANRAL)
South African Radio Astronomy Observation (SARAO)
Southern African Large Telescope
Telkom SA SOC Ltd
Transnet SA SOC Limited
Provincial Government Departments
Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform

Local Government Departments
Namakwa District Municipality
Karoo Hoogland Local Municipality
Landowners
Affected landowners, tenants and occupiers
Neighbouring landowners, tenants and occupiers
Commenting Stakeholders
BirdLife South Africa
Endangered Wildlife Trust (EWT)
Wildlife and Environment Society of South Africa (WESSA)
Small, medium and micro enterprises (SMMEs)
Formal local organisations
Adjacent landowners, occupiers and tenants

As per Regulation 42 of the EIA Regulations, 2014 (as amended), all relevant stakeholder and I&AP information has been recorded within a register of I&APs (refer to **Appendix C2** for a listing of the recorded parties). In addition to the above-mentioned EIA Regulations, point 3.1 of the Public Participation Guidelines has also been followed. The register of I&APs contains the names of²:

- » all persons who requested to be registered on the database through the use of the online stakeholder engagement platform or in writing and disclosed their interest in the project;
- » all Organs of State which hold jurisdiction in respect of the activity to which the application relates; and all persons who submitted written comments or attended virtual meetings and viewed the narrated presentations on the Savannah Environmental online platform during the public participation process.

I&APs have been encouraged to register their interest in the BA process from the onset of the project, and the identification and registration of I&APs will be on-going for the duration of the BA process. The database of I&APs will be updated throughout the BA process and will act as a record of the I&APs involved in the public participation process.

ii. **Advertisements and Notifications**

- 40.(2)(a) Fixing a notice board at a place conspicuous to and accessible by the public at the boundary, on the fence or along the corridor of –
- (i) The site where the activity to which the application or proposed application relates is or is to be undertaken; and
 - (ii) Any alternative site.
- 40.(2)(b) Giving written notice, in any of the manners provided for in section 47D of the Act, to –
- (i) The occupiers of the site and, if the proponent or applicant is not the owner or person in control of the site on which the activity is to be undertaken, the owner or person in control of the site where the activity is or is to be undertaken and to any alternative site where the activity is to be undertaken;

² Contact details and addresses have not been included in the I&AP database as this information is protected by the Protection of Personal Information Act (Act No. 4 of 2013).

- (ii) Owners, persons in control of, and occupiers of land adjacent to the site where the activity is or is to be undertaken and to any alternative site where the activity is to be undertaken;
 - (iii) The municipal councillor of the ward in which the site and alternative site is situated and any organisation of ratepayers that represent the community in the area;
 - (iv) The municipality which has jurisdiction in the area;
 - (v) Any organ of state having jurisdiction in respect of any aspect of the activity; and
 - (vi) Any other party as required by the competent authority.
- 40.(2)(c) Placing an advertisement in –
- (i) One local newspaper; or
 - (ii) Any official Gazette that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations;
- 40.(2)(d) Placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or district municipality in which it is or will be undertaken: Provided that this paragraph need not be complied with if an advertisement has been placed in an official Gazette referred to in paragraph (c)(ii); and
- 40.(2)(e) Using reasonable alternative methods, as agreed to by the competent authority, in those instances where a person is desirous of but unable to participate in the process due to –
- (i) Illiteracy;
 - (ii) Disability; or
 - (iii) Any other disadvantage.

The BA process was announced with an invitation to the Organs of State, potentially affected and neighbouring landowners and the general public to register as I&APs and to actively participate in the process. This was achieved via the following:

- » Compilation of a background information letter (refer to **Appendix C2**) providing technical and environmental details on the project and details on how to become involved in the BA process. This letter will be distributed to Organs of State, potentially affected and neighbouring landowners, as well as registered stakeholders/IAPs of the proposed Karusa BESS via email on **Friday, 20 May 2022**. The evidence of the distribution is contained in **Appendix C2** of the BA Report.
- » Placement of site notices announcing the BA process at visible points along the boundary of the study area (i.e. the boundaries of the affected property), in accordance with the requirements of the EIA Regulations on **05 April 2022**. Photographs and the GPS co-ordinates of the site notices are included in **Appendix C3** of the BA Report.
- » Placement of an advertisement in Die Noordwester Uitgewers Newspaper on **Friday, 20 May 2022** at the commencement of the 30-day review and comment period. This advert announced the project, the BA process, the details to access the Savannah Environmental online platform, as well as the availability of the BA report on this platform, and invited comment on the BA Report. This advert also included the details on the review period for the BA report. A copy of the newspaper advert as sent to the newspaper is included in **Appendix C3** of the BA Report. The newspaper advert tear sheet has been included in **Appendix C3** of this Final Basic Assessment Report.
- » The BA Report has been made available for review by I&APs for a 30-day review and comment period from **Friday, 23 May 2022** to **Monday, 23 June 2022**. The report is available for download on the Savannah Environmental's website. Where requested, electronic versions of the BA Report has been provided via

WeTransfer, Dropbox (or other similar platforms) or on CD or USB. The evidence of distribution of the BA Report has been included in this final BA Report (refer to **Appendix C**).

iii. Public Involvement and Consultation

In order to accommodate the varying needs of stakeholders and I&APs within the greater study area, as well as capture their views, comments, issues and concerns regarding the project, various opportunities have been and will continue to be provided to I&APs to note their comments and issues. I&APs have been consulted through the following means:

Table 5.3: Consultation undertaken with I&APs for the Karusa BESS and associated infrastructure

Activity	Date
Distribution of the process notification letter including the registration and stakeholder comments and reply form. These letters were distributed to Organs of State, Government Departments, Ward Councillors, landowners within the surrounding area (including neighbouring landowners), registered I&APs and key stakeholder groups.	20 May 2022
Placement of site notices on-site and in public places.	05 April 2022
Advertising of the availability of the BA Report for a 30-day review period in Die Noordwester Uitgewers newspaper, including details on how to access the online platform and the BA Report via this means.	20 May 2022
Availability of the BA Report for a 30-day review and comment period was announced.	23 May 2022
30-day review and comment period of the BA Report.	23 May 2022 to 23 June 2022
Where requested, virtual meetings will be held through an appropriate virtual platform	Undertaken during the 30-day review period if requested.
On-going consultation (i.e. telephone liaison; e-mail communication) with all I&APs	Throughout BA process

iv. Registered I&APs entitled to Comment on the BA Report

- 43.(1) A registered I&AP is entitled to comment, in writing, on all reports or plans submitted to such party during the public participation process contemplated in these Regulations and to bring to the attention of the proponent or applicant any issues which that party believes may be of significance to the consideration of the application, provided that the interested and affected party discloses any direct business, financial, personal or other interest which that party may have in the approval or refusal of the application.
- (2) In order to give effect to section 24O of the Act, any State department that administers a law relating to a matter affecting the environment must be requested, subject to regulation 7(2), to comment within 30 days.
- 43.(1) The applicant must ensure that the comments of interested and affected parties are recorded in reports and plans and that such written comments, including responses to such comments and records of meetings, are attached to the reports and plans that are submitted to the competent authority in terms of these Regulations.
- (2) Where a person desires but is unable to access written comments as contemplated in sub-regulation (1) due to –
 - (a) A lack of skills to read or write;

- (b) Disability; or
 - (c) Any other disadvantage;
- Reasonable alternative methods of recording comments must be provided for.

I&APs registered on the database were notified via e-mail of the release of the BA Report for a 30-day review and comment period, invited to provide comment on the BA Report, and informed of the manner and timeframe within which such comment was to be made. The report was made available for download from the Savannah website <https://savannahsa.com/public-documents/energy-generation/karusa-battery-energy-storage-system/> and in CD format (where requested). The report has been made available for a 30-day review and comment period to specific Organs of State including the Department of Water and Sanitation, and Northern Cape DAEARDLR.

Where I&APs were not able to provide written comments, other means of consultation, such telephonic discussions have been used to provide the I&APs with a platform to verbally raise their concerns and comments on the proposed development. No meetings were requested from I&APs during the 30-day review and comment period and as such, none were conducted.

v. **Identification and Recording of Comments**

Comments raised by I&APs over the duration of the BA process have been synthesised into a Comments and Responses (C&R) Report which has been included in **Appendix C9** of this Final BA Report. The C&R report consists of written comments received as well as responses provided by the EIA team and the proponent, where relevant. No telephonic discussions were held and no virtual or in-person meetings have been conducted during the 30-day review and comment period.

Issues raised during the 30-day review period are summarised below (refer to the C&RR in **Appendix C9**):

- » Department of Forestry, Fisheries and the Environment (DFFE): The DFFE has provided inputs into the BA report regarding the Public Participation Process and related documents that should be included in the final BA report. The department also provided general comments regarding regulated timeframes, the period for which the Environmental Authorisation is required and Section 24F of the National Environmental Management Act, Act No. 107 of 1998 which states that no activity may commence prior to an Environmental Authorisation being granted by the department.
- » Department of Forestry, Fisheries and the Environment (DFFE): Biodiversity Conservation Department – the department provided recommendations that are to be considered in this BA report and the EMPr which include pre-construction walk-throughs of the approved development footprint; the acquisition of permits from relevant authorities for the removal or disturbance of threatened or protected species (TOPs), Red Data listed or provincially protected species; the establishment of appropriate buffers around medium sensitive habitats and the inclusion of an Alien Invasive Plant Species Management Plan (refer to Appendix F of the EMPr which has been appended as Appendix H of the Final BAR.
- » South African Heritage Resources Agency (SAHRA): The recommendations of specialists are supported and should be adhered to. These include alerting the SAHRA APM Unit should any archaeological remains be found; alerting the SAHRA Burial Grounds and Graves (BGG) Unit if any unmarked human burials are uncovered; contracting a professional archaeologist or paleontologist as soon as possible if any heritage

resources are uncovered during the course of the development for inspection, and if it is of important significance, a phase 2 rescue operation may be required subject to permits issued by SAHRA. The Final BA report and EMPr (Environmental Management Programme) must be submitted to SAHRA for record purposes and the decision regarding the EA (Environmental Authorisation) Application must be communicated to SAHRA and uploaded to the SAHRIS (South African Heritage Resources Information System) Case application (Case ID: 18651).

3.4 Assessment of Issues Identified through the BA Process

In terms of GN R960 (promulgated on 5 July 2019) and Regulation 16(1)(b)(v) of the 2014 EIA Regulations (as amended), the submission of a Screening Report generated from the national web based environmental screening tool is compulsory for the submission of applications in terms of Regulation 19 and 21 of the 2014 EIA Regulations.

The requirement for the submission of a Screening Report (**Appendix K**) for the proposed development is applicable as it triggers Regulation 19 of the 2014 EIA Regulations (as amended). **Table 3.5** provides a summary of the specialist assessment requirements identified for the project site in terms of the screening tool and responses to each assessment requirement based on the nature and extent of the project.

Table 3.5: Sensitivity ratings from the DFFE's web-based online Screening Tool associated with the Karusa BESS

Specialist Assessment	Sensitivity Rating as per the Screening Tool (relating to the need for the study)	Project Team Response
Agricultural Theme	Medium	An Agricultural Compliance Statement has been undertaken and included as Appendix E of the BA report.
Animal Species Theme	Low	Specialist studies have been undertaken and included in the terrestrial and aquatic ecology impact assessment included in Appendix D of the BA report.
Aquatic Biodiversity	Low	Specialist studies have been undertaken and included in the terrestrial and aquatic ecology impact assessment included in as Appendix D of the BA report.
Archaeological and Cultural Heritage Theme	Low	A Heritage Screening Assessment including Archaeological and Cultural Heritage has been undertaken and included in Appendix F of the BA report.
Civil Aviation	Low	Specialist studies have not been undertaken as it is not applicable to the project area. Consultation with the Civil Aviation Authority (CAA) will be undertaken during the BA process to determine any specific comments.
Defence	Low	Specialist studies have not been undertaken as there are no defence sites within close proximity of the project area.
Palaeontology Theme	Very High	A Heritage Screening Assessment including Palaeontology has been undertaken and is included in Appendix F of the BA report.

Specialist Assessment	Sensitivity Rating as per the Screening Tool (relating to the need for the study)	Project Team Response
Plant Species Theme	Medium	Specialist studies have been undertaken and included within the terrestrial and aquatic ecology impact assessment included as Appendix D of the BA report.
Terrestrial Biodiversity Theme	Very High	Specialist studies have been undertaken and included the terrestrial and aquatic ecology impact assessment included as Appendix D of the BA report.
Noise Impact		Specialist studies have been undertaken and included within the Noise Compliance Statement as Appendix G of the BA report.

Based on the results of the screening, and from experience on similar projects and in the study area, the EIA project team has identified the following issues as requiring investigation.

Table 3.6: Issues identified for investigation and specialist consultants appointed to evaluate the potential impacts associated with the construction of the low-level watercourse crossing.

Issue/Assessment	Specialist Name	Specialist Company	Appendices
Terrestrial and Aquatic Ecology	Andrew Husted & Leigh-Ann De Wet	The Biodiversity Company	Appendix D
Agricultural Potential Compliance Statement	Ivan Baker	The Biodiversity Company	Appendix E
Heritage Impact Assessment and Palaeontology	Jenna Lavin	CTS Heritage	Appendix F
Noise Compliance Statement	Morne de Jager	EARES	Appendix G

Specialist studies considered direct, indirect and cumulative environmental impacts associated with the BESS and associated infrastructure.

Issues were assessed in terms of the following criteria:

- » The **nature**, a description of what causes the effect, what will be affected, and how it will be affected;
- » The **extent**, wherein it is indicated whether the impact will be local (limited to the immediate area or site of development), regional, national or international. A score of between 1 and 5 is assigned as appropriate (with a score of 1 being low and a score of 5 being high);
- » The **duration**, wherein it is indicated whether:
 - * The lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
 - * The lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
 - * Medium-term (5–15 years) – assigned a score of 3;
 - * Long term (> 15 years) - assigned a score of 4;
 - * Permanent - assigned a score of 5.
- » The **magnitude**, quantified on a scale from 0-10, where a score is assigned:
 - * 0 is small and will have no effect on the environment;
 - * 2 is minor and will not result in an impact on processes;

- * 4 is low and will cause a slight impact on processes;
- * 6 is moderate and will result in processes continuing but in a modified way;
- * 8 is high (processes are altered to the extent that they temporarily cease);
- * 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- » The **probability of occurrence**, which describes the likelihood of the impact actually occurring. Probability is estimated on a scale, and a score assigned:
 - * Assigned a score of 1–5, where 1 is very improbable (probably will not happen);
 - * Assigned a score of 2 is improbable (some possibility, but low likelihood);
 - * Assigned a score of 3 is probable (distinct possibility);
 - * Assigned a score of 4 is highly probable (most likely);
 - * Assigned a score of 5 is definite (impact will occur regardless of any prevention measures).
- » The **significance**, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high;
- » The **status**, which is described as either positive, negative or neutral;
- » The degree to which the impact can be reversed;
- » The degree to which the impact may cause irreplaceable loss of resources;
- » The degree to which the impact can be mitigated.

The **significance** is determined by combining the criteria in the following formula:

$S = (E+D+M) P$; where

S = Significance weighting.

E = Extent.

D = Duration.

M = Magnitude.

P = Probability.

The **significance weightings** for each potential impact are as follows:

- » **< 30 points:** Low (i.e. where this impact would not have a direct influence on the decision to develop in the area);
- » **30-60 points:** Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated);
- » **> 60 points:** High (i.e. where the impact must have an influence on the decision process to develop in the area).

As per requirements of the EIA Regulations, specialist studies assessed the cumulative impacts of the project together with other similar developments. The role of the cumulative assessment is to test if such impacts are relevant to the proposed project in the proposed location (i.e. whether the addition of the proposed project in the area will increase the impact). This section addresses whether the construction of the proposed development will result in:

- » Unacceptable risk
- » Unacceptable loss

- » Complete or whole-scale changes to the environment or sense of place
- » Unacceptable increase in impact

Taking the above assessment into consideration, the specialists provide an overall conclusion regarding whether the proposed development will result in any unacceptable loss or impact considering all the projects proposed in the area.

As the Applicant has the responsibility to avoid or minimise impacts and plan for their management (in terms of the EIA Regulations, 2014 (as amended)), the mitigation of significant impacts is discussed. Assessment of impacts with mitigation is made in order to demonstrate the effectiveness of the proposed mitigation measures. An Environmental Management Programme (EMPr) is included as **Appendix H** and a Generic EMPr is included as **Appendix I**.

3.5 Assumptions and Limitations of the BA Process

The following assumptions and limitations are applicable to the studies undertaken within this BA process:

- » All information provided by the developer and I&APs to the environmental team was correct and valid at the time it was provided.
- » It is assumed that the BESS identified by the developer represents a technically suitable solution for the storage of generated power associated with the Karusa WEF.
- » This report and its investigations are project-specific, and consequently the environmental team did not evaluate any other BESS technology alternatives.

Refer to the specialist studies in **Appendices D – G** for specialist study specific limitations.

3.6 Policies, Legislation and Guidelines that have informed the preparation of this Basic Assessment Report

The following legislation and guidelines have informed the scope and content of this BA Report:

- » National Environmental Management Act (Act No. 107 of 1998);
- » EIA Regulations of December 2014, published under Chapter 5 of NEMA (as amended in GNR R326 in Government Gazette No 40772 of April 2017);
- » Department of Environmental Affairs (2017), Public Participation guidelines in terms of NEMA EIA Regulations;
- » Department of Environmental Affairs (2017), Integrated Environmental Management Guideline: Guideline on Need and Desirability. and
- » Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation.

Table 3.7 provides an outline of the legislative permitting requirements applicable to the construction of the Karusa BESS and associated infrastructure as identified at this stage in the project development.

Table 3.7: Applicable Legislation, Policies and/or Guidelines permitting requirements associated with the BESS for the Karusa WEF

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
National Legislation			
Constitution of the Republic of South Africa (No. 108 of 1996)	<p>In terms of Section 24, the State has an obligation to give effect to the environmental right. The environmental right states that:</p> <p><i>“Everyone has the right –</i></p> <ul style="list-style-type: none"> » <i>To an environment that is not harmful to their health or well-being, and</i> » <i>To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:</i> <ul style="list-style-type: none"> * <i>Prevent pollution and ecological degradation,</i> * <i>Promote conservation, and</i> * <i>Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.”</i> 	Applicable to all authorities	There are no permitting requirements associated with this Act. The application of the Environmental Right however implies that environmental impacts associated with proposed developments are considered separately and cumulatively. It is also important to note that the “right to an environment clause” includes the notion that justifiable economic and social development should be promoted, through the use of natural resources and ecologically sustainable development.
National Environmental Management Act (No 107 of 1998) (NEMA)	<p>The 2014 EIA Regulations have been promulgated in terms of Chapter 5 of NEMA. Listed activities which may not commence without EA are identified within the Listing Notices (GNR 327, GNR 325 and GNR 324) which form part of these Regulations (GNR 326).</p> <p>In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these listed activities must</p>	DFFE – Competent Authority Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (DAEARD & LR) is a Commenting Authority on the project.	The listed activities triggered by the proposed project <u>have been identified</u> and have been assessed as part of the BA process for the project. The BA process will culminate in the submission of a final BA report to the competent in support of the application for EA.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>be assessed and reported on to the competent authority charged by NEMA with granting of the relevant environmental authorisation.</p> <p>In terms of GNR 543 of 4 December 2014, a Basic Assessment Process is required to be undertaken for the proposed project.</p>		
<p>National Environmental Management Act (No 107 of 1998) (NEMA)</p>	<p>In terms of the “Duty of Care and Remediation of Environmental Damage” provision in Section 28(1) of NEMA 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, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.</p> <p>In terms of NEMA, it is the legal duty of a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts.</p>	<p>DFFE</p> <p>DAEARD&LR is a Commenting Authority on the project.</p>	<p>While no permitting or licensing requirements arise directly by virtue of the proposed project, this section finds application through the consideration of potential cumulative, direct, and indirect impacts. It will continue to apply throughout the life cycle of the project.</p>
<p>Environmental Conservation Act (No. 73 of 1989) (ECA)</p>	<p>The Noise Control Regulations in terms of section 25 of the ECA contain regulations applicable for the control of noise in the provinces of Limpopo, North West, Mpumalanga, Northern Cape, Eastern Cape and KwaZulu-Natal.</p>	<p>DFFE</p> <p>DAEARD&LR Karoo Hoogland Local Municipality</p>	<p>Minor construction noise is associated with the construction phase of the project. Considering the location of the BESS and associated infrastructure in relation to residential areas and provided that appropriate mitigation measures are implemented, construction noise is unlikely to present a significant intrusion to</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>The Noise Control Regulations cover the powers of a local authority, general prohibitions, prohibitions of disturbing noise, prohibitions of noise nuisance, use of measuring instruments, exemptions, attachments and penalties.</p> <p>In terms of Noise Control Regulations, no person shall make, produce or cause a disturbing noise, or allow it to be made, produced or caused by any person, machine, device or apparatus or any combination thereof (regulation 04).</p>		<p>the local community. Additionally, a noise compliance statement conducted by a noise specialist (Appendix G) indicated noise impact of a low significance on all potential noise sensitive developments.</p>
<p>National Water Act (No. 36 of 1998) (NWA)</p>	<p>A water use listed under Section 21 of the NWA must be licensed with the Regional DWS, unless it is listed in Schedule 1 of the NWA (i.e. is an existing lawful use), is permissible under a GA, or if a responsible authority waives the need for a licence.</p> <p>Water use is defined broadly, and includes consumptive and non-consumptive water uses, taking and storing water, activities which reduce stream flow, waste discharges and disposals, controlled activities (activities which impact detrimentally on a water resource), altering a watercourse, removing water found underground for certain purposes, and recreation.</p> <p>Consumptive water uses may include taking water from a water resource</p>	<p>Regional Department of Human Settlements, Water and Sanitation</p>	<p>Where development activities impede or divert the flow of water in a watercourse, or alter the bed, banks, course or characteristics of watercourse, or are located with the regulated area of a watercourse or wetland, Section 21(c) and 21 (i) of the NWA would be triggered, and the project proponent would need to apply for a WUL or register a GA with the DWS.</p> <p>Due to the presence of non-perennial watercourses within the 500 m regulatory area, a risk assessment was completed in line with Section 21 (c) and (i) of the National Water Act, 1998, (Act 36 of 1998). Regarding the overhead or underground options, there are expected low post-mitigation risks, and a General Authorisation is permissible for the development.</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>(Section 21(a)), and storing water (Section 21(b)).</p> <p>Non-consumptive water uses may include impeding or diverting of flow in a water course (Section 21(c)), and altering of bed, banks or characteristics of a watercourse (Section 21(i)).</p>		
<p>Minerals and Petroleum Resources Development Act (No. 28 of 2002) (MPRDA)</p>	<p>In accordance with the provisions of the MPRDA a mining permit is required in accordance with Section 27(6) of the Act where a mineral in question is to be mined, including the mining of materials from a borrow pit.</p>	<p>Department of Mineral Resources and Energy</p>	<p>Any person who wishes to apply for a mining permit in accordance with Section 27(6) must simultaneously apply for an Environmental Authorisation in terms of NEMA.</p> <p>No borrow pits are expected to be required for the construction of the BESS and associated infrastructure, and as a result a mining permit or EA is not required to be obtained.</p>
<p>National Environmental Management: Air Quality Act (No. 39 of 2004) (NEM:AQA)</p>	<p>The National Dust Control Regulations (GNR 827) published under Section 32 of NEM:AQA prescribe the general measures for the control of dust in all areas, and provide a standard for acceptable dustfall rates for residential and non-residential areas.</p> <p>In accordance with the Regulations (GNR 827) any person who conducts any activity in such a way as to give rise to dust in quantities and concentrations that may exceed the dustfall standard set out in Regulation 03 must, upon receipt of a notice from the air quality officer,</p>	<p>DAEARD&LR is a Commenting Authority on the project.</p> <p>Namakwa District Municipality</p>	<p>In the event that the project results in the generation of excessive levels of dust, the possibility could exist that a dustfall monitoring programme would be required for the project, in which case dustfall monitoring results from the dustfall monitoring programme would need to be included in a dust monitoring report, and a dust management plan would need to be developed. However, with mitigation measures implemented, the proposed project is not anticipated to result in significant dust generation.</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>implement a dustfall monitoring programme.</p> <p>Any person who has exceeded the dustfall standard set out in Regulation 03 must, within three months after submission of the dustfall monitoring report, develop and submit a dust management plan to the air quality officer for approval.</p>		
<p>National Heritage Resources Act (No. 25 of 1999) (NHRA)</p>	<p>Section 07 of the NHRA stipulates assessment criteria and categories of heritage resources according to their significance.</p> <p>Section 35 of the NHRA provides for the protection of all archaeological and palaeontological sites, and meteorites.</p> <p>Section 36 of the NHRA provides for the conservation and care of cemeteries and graves by SAHRA where this is not the responsibility of any other authority.</p> <p>Section 38 of the NHRA lists activities which require developers or any person who intends to undertake a listed activity to notify the responsible heritage resources authority and furnish it with details regarding the location, nature, and extent of the proposed development.</p> <p>Section 44 of the NHRA requires the compilation of a Conservation Management Plan as well as a permit from</p>	<p>South African Heritage Resources Agency</p> <p>Ngwao Boswa Kapa Bokone (NBKB)</p>	<p>A Heritage Screening Assessment has been undertaken as part of the BA process (refer to Appendix E of this BA Report). The proposed BESS development and associated infrastructure is not anticipated to impact significant built environment or palaeontological heritage resources.</p> <p>Should a heritage resource be impacted upon, a permit may be required from SAHRA in accordance with of Section 48 of the NHRA, and the SAHRA Permit Regulations (GNR 668). This will be determined once the final location of the development footprint and its associated infrastructure within the development area has been determined.</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>SAHRA for the presentation of archaeological sites as part of tourism attraction.</p>		
<p>National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEM:BA)</p>	<p>Section 53 of NEM:BA provides for the MEC / Minister to identify any process or activity in such a listed ecosystem as a threatening process.</p> <p>Three government notices have been published in terms of Section 56(1) of NEM:BA as follows:</p> <ul style="list-style-type: none"> » Commencement of TOPS Regulations, 2007 (GNR 150). » Lists of critically endangered, vulnerable and protected species (GNR 151). » TOPS Regulations (GNR 152). <p>It provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), and vulnerable (VU) or protected. The first national list of threatened terrestrial ecosystems has been gazetted, together with supporting information on the listing process including the purpose and rationale for listing ecosystems, the criteria used to identify listed ecosystems, the implications of listing ecosystems, and summary statistics and national maps of listed ecosystems (NEM:BA: National list of ecosystems that are threatened and in need of protection,</p>	<p>DFFE DAEARD&LR</p>	<p>Under NEM:BA, a permit would be required for any activity which is of a nature that may negatively impact on the survival of a listed protected species.</p> <p>The abundance of plant species of conservation concern within the site is low and no significant impacts on such species can be expected. Should any species be required to be impacted or relocated, the appropriate biodiversity permits will be required to be obtained.</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
National Forests Act (No. 84 of 1998) (NFA)	<p>(Government Gazette 37596, GNR 324), 29 April 2014).</p> <p>According to this Act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. Notice of the List of Protected Tree Species under the National Forests Act (No. 84 of 1998) was published in GNR 734.</p> <p>The prohibitions provide that “no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister”.</p>	DFFE - Forestry	A licence will not be required for the removal of protected trees as none were identified on site.
National Veld and Forest Fire Act (No. 101 of 1998) (NVFFA)	<p>Chapter 4 of the NVFFA places a duty on owners to prepare and maintain firebreaks, the procedure in this regard, and the role of adjoining owners and the fire protection association. Provision is also made for the making of firebreaks on the international boundary of the Republic of South Africa. The applicant must ensure that firebreaks are wide and long enough to have a reasonable chance of preventing a veldfire from spreading to or from neighbouring land, it does not cause soil erosion, and it is reasonably free of inflammable material capable of carrying a veldfire across it.</p> <p>Chapter 5 of the Act places a duty on all owners to acquire equipment and have</p>	DFFE	While no permitting or licensing requirements arise from this legislation, this Act will be applicable during the construction and operation of the proposed infrastructure establishment, in terms of the preparation and maintenance of firebreaks, and the need to provide appropriate equipment and personnel for firefighting purposes.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>available personnel to fight fires. Every owner on whose land a veldfire may start or burn or from whose land it may spread must have such equipment, protective clothing and trained personnel for extinguishing fires, and ensure that in his or her absence responsible persons are present on or near his or her land who, in the event of fire, will extinguish the fire or assist in doing so, and take all reasonable steps to alert the owners of adjoining land and the relevant fire protection association, if any.</p>		
<p>Hazardous Substances Act (No. 15 of 1973) (HAS)</p>	<p>This Act regulates the control of substances that may cause injury, or ill health, or death due to their toxic, corrosive, irritant, strongly sensitising or inflammable nature or the generation of pressure thereby in certain instances and for the control of certain electronic products. To provide for the rating of such substances or products in relation to the degree of danger, to provide for the prohibition and control of the importation, manufacture, sale, use, operation, modification, disposal or dumping of such substances and products.</p> <p>» Group I and II: Any substance or mixture of a substance that might by reason of its toxic, corrosive etc., nature or because it generates pressure through decomposition, heat or other means, cause extreme risk of injury etc., can be declared as Group I or Group II substance</p>	<p>Department of Health (DoH)</p>	<p>It is necessary to identify and list all Group I, II, III, and IV hazardous substances that may be on site and in what operational context they are used, stored or handled. If applicable, a license would be required to be obtained from the Department of Health (DoH).</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<ul style="list-style-type: none"> » Group IV: any electronic product, and » Group V: any radioactive material. <p>The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.</p>		
<p>National Environmental Management: Waste Act (No. 59 of 2008) (NEM:WA)</p>	<p>The Minister may by notice in the Gazette publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment.</p> <p>The Minister may amend the list by –</p> <ul style="list-style-type: none"> » Adding other waste management activities to the list. » Removing waste management activities from the list. » Making other changes to the particulars on the list. <p>In terms of the Regulations published in terms of NEM:WA (GNR 912), a BA or EIA is required to be undertaken for identified listed activities.</p> <p>Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that:</p> <ul style="list-style-type: none"> » The containers in which any waste is stored, are intact and not corroded or in 	<p>DFFE – hazardous waste</p> <p>DAEARD&LR general waste</p>	<p>No listed activities are triggered by the proposed establishment of the BESS and associated infrastructure, and therefore no Waste Management License is required to be obtained. General and hazardous waste handling, storage and disposal will be required during construction and operation. The National Norms and Standards for the Storage of Waste (GNR 926) published under Section 7(1)(c) of NEM:WA will need to be considered in this regard.</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<ul style="list-style-type: none"> » Any other way rendered unfit for the safe storage of waste. » Adequate measures are taken to prevent accidental spillage or leaking. » The waste cannot be blown away. » Nuisances such as odour, visual impacts and breeding of vectors do not arise, and » Pollution of the environment and harm to health are prevented. 		
<p>National Road Traffic Act (No. 93 of 1996) (NRTA)</p>	<p>The technical recommendations for highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads" outline the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed.</p> <p>Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges, and culverts.</p> <p>The general conditions, limitations, and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power/mass ratio, mass distribution, and general operating</p>	<p>SANRAL – national roads</p> <p>NC DoT</p>	<p>An abnormal load / vehicle permit may be required to transport the various components to site for construction. These include route clearances and permits will be required for vehicles carrying abnormally heavy or abnormally dimensioned loads. Transport vehicles exceeding the dimensional limitations (length) of 22m. Depending on the trailer configuration and height when loaded, some of the on-site substation components may not meet specified dimensional limitations (height and width).</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the National Road Traffic Act and the relevant Regulations.		
<i>Provincial Policies / Legislation</i>			
Northern Cape Nature Conservation Act (No. 9 of 2009)	<p>This Act provides for the sustainable utilisation of animals, aquatic biota and plants; provides for the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora; provides for offences and penalties for contravention of the Act; provides for the appointment of nature conservators to implement the provisions of the Act; and provides for the issuing of permits and other authorisation. Amongst other regulations, the following apply to the current project:</p> <ul style="list-style-type: none"> » Boundary fences must not be altered in such a way as to prevent wild animals from freely moving onto or off of a property; » Aquatic habitats must not be destroyed or damaged; » The owner of land upon which an invasive species is found (plant or animal) must take the necessary steps to eradicate or destroy such species. <p>The Act provides lists of protected species for the province.</p>	Northern Cape DAEARD&LR	An ecology impact assessment has been undertaken for the project (refer to Appendix D). A collection/destruction permit must be obtained from the Northern Cape Nature Conservation for the trimming, removal or relocation of any protected plant or animal species found on site.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
<p>GNR 805 of 29 May 2019 under the Astronomy Geographic Advantage Act, No. 21 of 2007</p>	<p>These regulations apply to specified activities within the Sutherland Central Astronomy Advantage Area declared for optical astronomy purposes and related scientific endeavours.</p> <p>The restriction of the specified activities within the Sutherland Central Astronomy Advantage Area is intended to protect the optical astronomy observations carried out within the Sutherland Core Astronomy Advantage Area from a detrimental impact.</p> <p>The regulation sets out minimum lighting levels for specified activities within the Sutherland Central Astronomy Advantage Area, including establishing a minimum acceptable night time brightness levels, as well as prescribed conditions for lighting activities and the nature of lighting used. In addition, dust and wind turbine conditions are provided within the Sutherland Central Astronomy Advantage Area. The regulation state that:</p> <p>(1) Unless authorised by the management authority, no person may allow any general area lighting and outdoor recreational lighting activities within the Sutherland Central Astronomy Advantage Area to cause the average night sky brightness stated in sub -regulation 3(2) to be</p>	<p>Department of Science and Technology</p>	<p>All construction activities must be in accordance with these regulations, in particular by obtaining earthwork approval from the DST prior to construction commencing, and adherence of lighting types and levels on site to the minimum standards specified in the regulations.</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>exceeded within the Sutherland Core Astronomy Advantage Area.</p> <p>In addition to:</p> <p>5. Activities creating air pollution (1) Any person who intends to conduct any activity within the Sutherland Central Astronomy Advantage Area that may involve any earth works creating dust, must submit an application on the prescribed form (Annexure B), a copy of which can be obtained from the management authority, for approval by the management authority prior to commencing such activities.</p> <p>Fines of up to R 200 000.00 are determined for any intentional contravention of the regulations</p>		

CHAPTER 4: DESCRIPTION OF THE RECEIVING ENVIRONMENT

This chapter provides a description of the environment that may be affected by the development of the Karusa BESS and associated infrastructure. This information is provided to assist the reader in understanding the possible effects of the project on the environment within which it is proposed to be developed. Aspects of the biophysical and social environment that could be directly or indirectly affected by, or could affect, the BESS and associated infrastructure have been described. This information has been sourced from both existing information available for the area as well as from inputs from specialist consultants who have completed detailed field investigations and aims to provide the context within which this BA process is being conducted.

4.1. Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

This chapter of the BA Report includes the following information required in terms of Appendix 1: Content of BA Reports:

Requirement	Relevant Section
3(h)(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, heritage and cultural aspects	The environmental attributes associated with the Karusa BESS and associated infrastructure and the broader environment are described and considered within this chapter and include the following:
	The regional, local and social setting within which the BESS and associated infrastructure is located is described in section 4.2 and 4.3
	The climatic conditions of the project area are described in section 4.4 .
	The biophysical characteristics of the broader study area and the surrounding areas, as well as for the Karusa BESS and associated infrastructure, are described in sections 4.5 to 4.7 . This includes features such as, topography, soil, land types and agricultural potential, the ecological profile (including fauna, flora, avifauna and hydrological features) of the broader study area.
	The heritage of the affected environment (including archaeology, palaeontology and cultural landscape) is discussed in section 4.8 .
	The noise associated with the project area is discussed in section 4.9 .

A more detailed description of each aspect of the affected environment is included in the specialist reports contained within the **Appendices D-G**.

4.2. Regional Setting

The Northern Cape Province is located in the north-western extent of South Africa and constitutes South Africa's largest province, occupying an area of 372 889km² in extent, equivalent to nearly a third (30.5%) of the country's total land mass. It is also South Africa's most sparsely populated province with a population of

1 193 780, and a population density of 3.1/km². The capital city is Kimberley, and other important towns include Upington, Springbok, Kuruman, De Aar and Sutherland. The Northern Cape is the only province in South Africa which borders Namibia and plays an important role in terms of providing linkages between Namibia and the rest of South Africa. The Orange River, which is South Africa's largest river, is a significant feature and is also the main source of water in the province, while also constituting the international border between the Northern Cape (i.e. South Africa) and Namibia.

The Northern Cape is rich in minerals including alluvial diamonds, iron ore, asbestos, manganese, fluorspar, semi-precious stones and marble. The mining sector in the province is the largest contributor of the provincial Gross Domestic Product (GDP) and of a great importance to South Africa as it produces 37% of the country's diamonds, 44% of its zinc, 70% of its silver, 84% of its iron ore, 93% of its lead and 99% of its manganese.

The province has fertile agricultural land in the Orange River Valley, especially at Upington, Kakamas and Keimoes, where grapes and fruit are cultivated intensively. The interior Karoo relies on sheep farming, while the karakul-pelt industry is one of the most important in the Gordonia District of Upington. Wheat, fruit, peanuts, maize and cotton are produced at the Vaalharts Irrigation Scheme near Warrenton. The agricultural sector employs approximately 19.5% of the total formally employed individuals. The sector is also experiencing significant growth in value-added activities, including game-farming, while food production and processing for the local and export markets is also growing significantly (PGDS, July 2011). Furthermore, approximately 96% of the land in the province is used for livestock and game farming, while, approximately 2% is used for crop farming mainly under irrigation in the Orange River Valley and the Vaalharts Irrigation Scheme.

The Northern Cape offers unique tourism opportunities including wildlife conservation destinations, natural features, historic sites, festivals, cultural sites, star gazing, adventure tourism, agricultural tourism, ecotourism, game farms, and hunting areas, etc. The Province is home to the Richtersveld Botanical and Landscape World Heritage Site, which comprises a United Nations Educational, Scientific and Cultural Organisation (UNESCO) World Heritage Site under the World Heritage Convention. The province is also home to two (2) Transfrontier National Parks, namely the Kgalagadi Transfrontier Park, and the Richtersveld or Ai-Ais Transfrontier Park, as well as five (5) national parks and six (6) provincial reserves. In addition, the province plays a significant role in South Africa's science and technology sector, as it is home to the Square Kilometre Array (SKA), the Southern African Large Telescope (SALT), and the Karoo Array Telescope (MeerKAT).

The Northern Cape is made up of 5 district municipalities, namely Francis Baard, John Taolo Gaetsewe, Namakwa, Pixley ka Seme and ZF Mgcawu (refer to **Figure 4.1**). The project site is located within the The Namakwa District Municipality.



Figure 4.1: District municipalities of the Northern Cape Province (Source: Municipalities of South Africa)

The Namakwa District Municipality is a Category C municipality located in the Northern Cape Province. It is bordered by Namibia in the north, ZF Mgcawu Local Municipality in the north-east, Cape Winelands District Municipality in the south, West Coast District Municipality in the south-west, Pixley Ka Seme District Municipality in the east, Central Karoo District Municipality in the south-east, and the Atlantic Ocean in the west. It is the largest district in the province, approximately 126 836km² in extent, making up over a third of its geographical area. It is comprised of six local municipalities: Nama Khoi, Hantam, Khai-Ma, Kameiesberg, Karoo Hoogland and Richtersveld (refer to **Figure 4.2**).



Figure 4.2: Local Municipalities of the Namakwa DM (Source: Municipalities of South Africa).

The broader study area for the Karusa BESS and associated infrastructure is located within the Karoo Hoogland LM. The Karoo Hoogland LM is a Category B municipality and is situated in the Namakwa District of the Northern Cape Province. It is the second largest of the six municipalities in the district, making up a quarter of its geographical area, with an extent of 30 230km², accounting for a quarter of the DMs geographical area. The key towns within the LM include, Frasersburg, Sutherland and Williston.

The community, social and personal services sector with 42.5%, is the biggest contributor of the LM's GDP and of great importance to the economy of the Namakwa DM. The transport, storage and communication sector contribute 15%, the wholesale and retail trade, catering and accommodation sector contribute 13.7%, the agriculture, forestry and fishing sector contribute 13%, the finance, insurance, real estate and business services sector contribute 8.8% and the manufacturing sector 5.9%.

The population distribution in Karoo Hoogland Municipality is: Fraserburg: 23% of total population, non-urban areas (Rural): 31% of total population, Sutherland: 19% of total population and Williston: 27% of total population. It is evident that the most significant portion of Karoo Hoogland's urban population resides in Williston (27%). The Karoo Hoogland LM also has a large rural population, with 31% of its population residing in the non-urban (NU) regions within the Municipality which covers approximately 99% of the LM's geographical area.

The age distribution of a population is important because the largest age group inevitably indicates its own demands on the market. Many residents are still dependent on government grants and is the unemployment rate currently 23.1%. This has a negative influence on the payment of services and a total of 1035 households are subsidized by the service subsidized scheme. The Karoo Hoogland population can be regarded as having a high dependency ratio. With 10.6% of the population over the age of 65 and 24.5% are under 15 years. The latter youth group will be demanding education, housing and jobs in the near future. The Karoo Hoogland gender distribution is 47, 8% males and 52, 2% females.

4.3. Local setting of the project site

The project site is located approximately ~45km north of the closest town, Sutherland. Built infrastructure within and around the project site are limited to regional roads, and main roads. These roads include the R354 and R356. The broader area also comprises of existing power lines and perennial and non-perennial rivers. The site is located within the Karusa Wind Energy Facility which is currently nearing completion of construction.

4.4. Climatic Conditions

The climate of the study area is arid to semi-arid. Rainfall July fall at any time of the year, although there is a peak in autumn / winter on the lowlands and slightly earlier (March) on the uplands. Mean temperatures of the mountainous regions are generally lower than the plains to the south of the escarpment. Frost is a common phenomenon in the mountainous areas with up to 50 days of frost per year. Mean annual rainfall is 180 to 200 mm per year. The mean daily maximum and minimum temperatures 29.9°C and 0.9°C for January and July, respectively.

4.5. Land types, Soils and Agricultural Potential

4.5.1. Land use and Landcover of The Study Area

The project site is located on land that ranges in elevation from 1 125 to 1 237 metres above mean sea level (mamsl). The majority of the study area is characterised by a slope percentage between 0 and 10%, with some smaller patches within the project area characterised by a slope percentage up to 35. This illustration indicates a non-uniform area with undulating slopes, mountainous areas and ridges.

4.5.2. Land types

Two different land types are associated with the proposed project area. The proposed Karusa BESS and associated power lines lie predominantly within the Fc 266 and Ib 288 land types. The Fc land type consists of Glenrosa and/or Mispah soil forms with the possibility of other soils occurring throughout. Lime is rare or absent within this land type in upland soils but generally present in low-lying areas. The Ib land type consists of miscellaneous land classes including rocky areas with miscellaneous soils. These two land types are illustrated in figures 4.3 and 4.4 below. The most sensitive soil form expected throughout the project area is that of the Oakleaf soil form. This soil form consists of an orthic topsoil on top of a deep neocutanic horizon. Figure 4.5 below shows an example of a neocutanic diagnostic horizon.

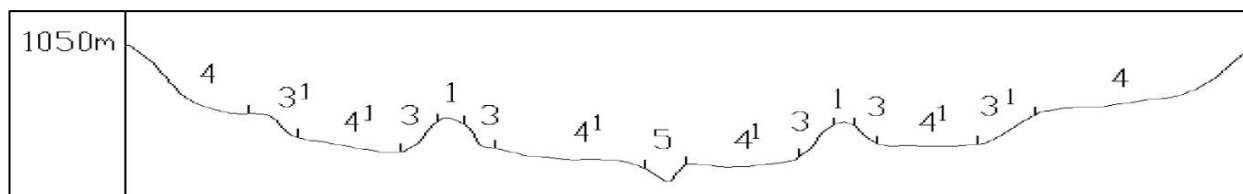


Figure 4.3: Illustration of land type Fc 266 terrain unit (Land Type Survey Staff, 1972 - 2006)

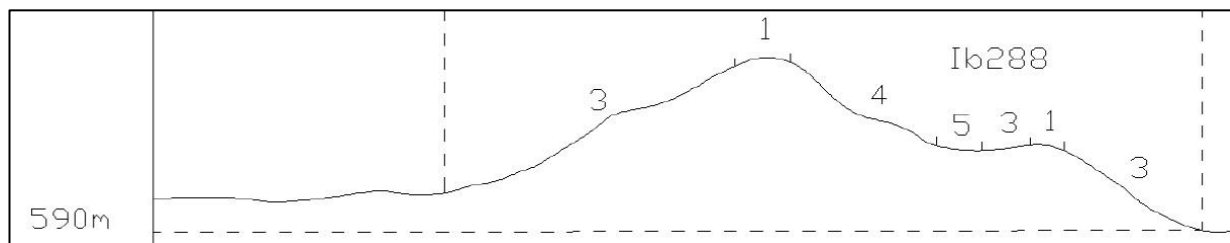


Figure 4.4: Illustration of land type IB 288 terrain unit (Land Type Survey Staff, 1972 - 2006)



Figure 4.5 Example of a neocutanic diagnostic horizon

4.5.3 Land Capability

The Oakleaf soil form has been determined to have a land capability of class “III” and “IV” as well as a climate capability level 8 given the low Mean Annual Precipitation (MAP) and the high Mean Annual Potential Evapotranspiration (MAPE) rates. The combination between the determined land capabilities and climate capabilities results in a land potential of “L6”, which is defined as having very restricted potential. Regular and/or severe limitations due to soil, slope, temperatures or rainfall. The broader study area can be classified as non-arable.

4.6. Ecological Profile of the Study Area and Development Area

4.6.1. Broad-Scale Vegetation Description

1. The project area comprises the Shale Renosterveld vegetation type (within the Fynbos biome), forming the predominant renosterveld group which accounts for 86% of the extent of renosterveld (Mucina & Rutherford, 2006). This vegetation extends beyond the fynbos and into the karoo shales where a higher grass cover is observed as a result of rainfall patterns. On a fine-scale vegetation type, the proposed development overlaps with a single vegetation type, the Central Mountain Shale Renosterveld (**Figure 4.6**). This vegetation type occurs in the Northern and Western Cape provinces on the Southern and south-eastern slopes of the Klein-Roggeveldberge and Komsburg below the Roggeveld section of the Great Escarpment (facing the Moordenaars Karoo) as well as farther east below Besemgoedberg and Suurkop west of Merweville and in the west in the Karookop area between Losper se Berg and high points around Thyshoogte.

2.

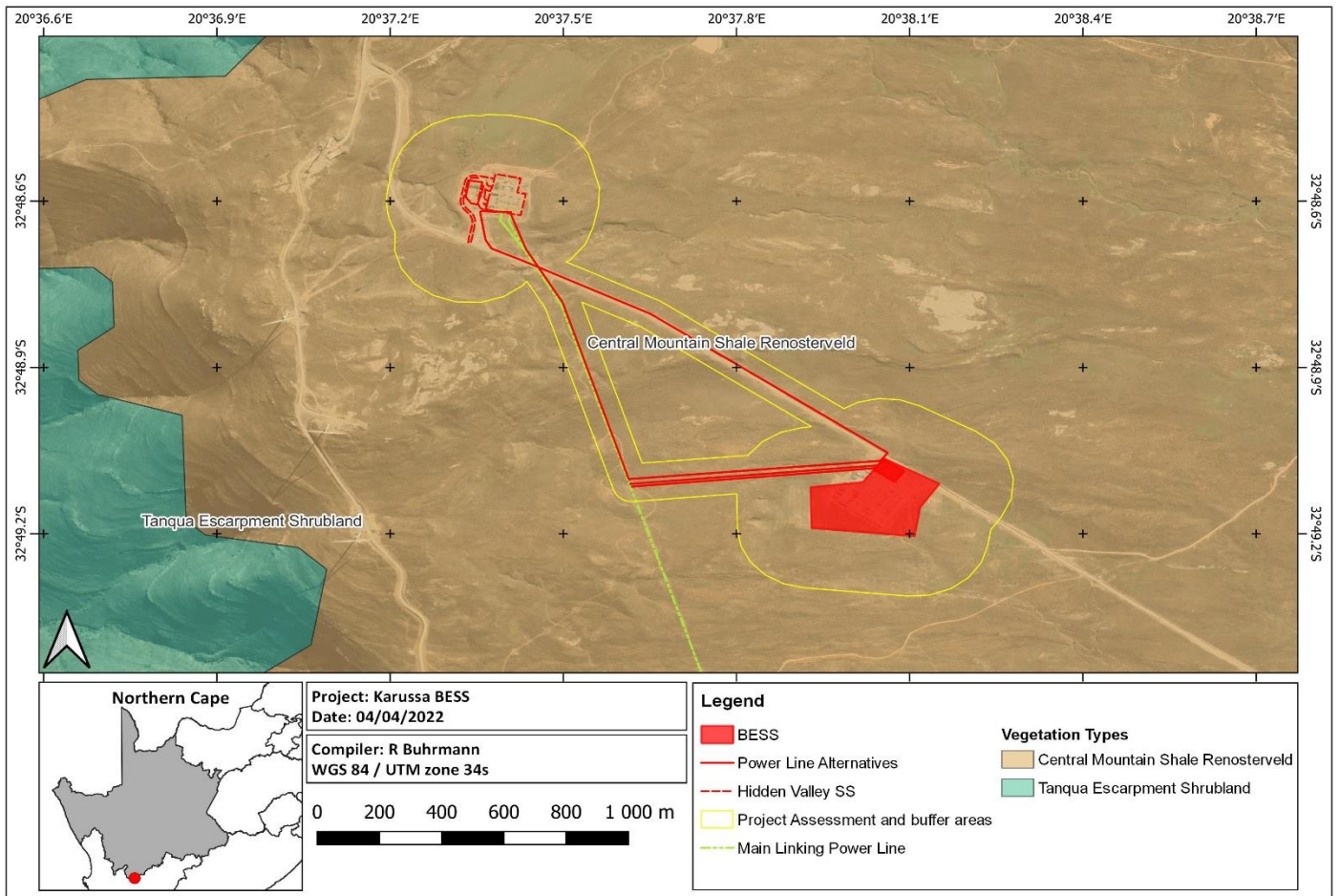


Figure 4.6: Map illustrating the vegetation types associated with the assessment area and surrounding landscape based on the Vegetation Map of South Africa, Lesotho & Swaziland

Critical Biodiversity Areas (CBAs)

The project area overlaps with a CBA 1 area, with the buffer of the BESS located in a CBA 2 area (**Figure 4.7**).

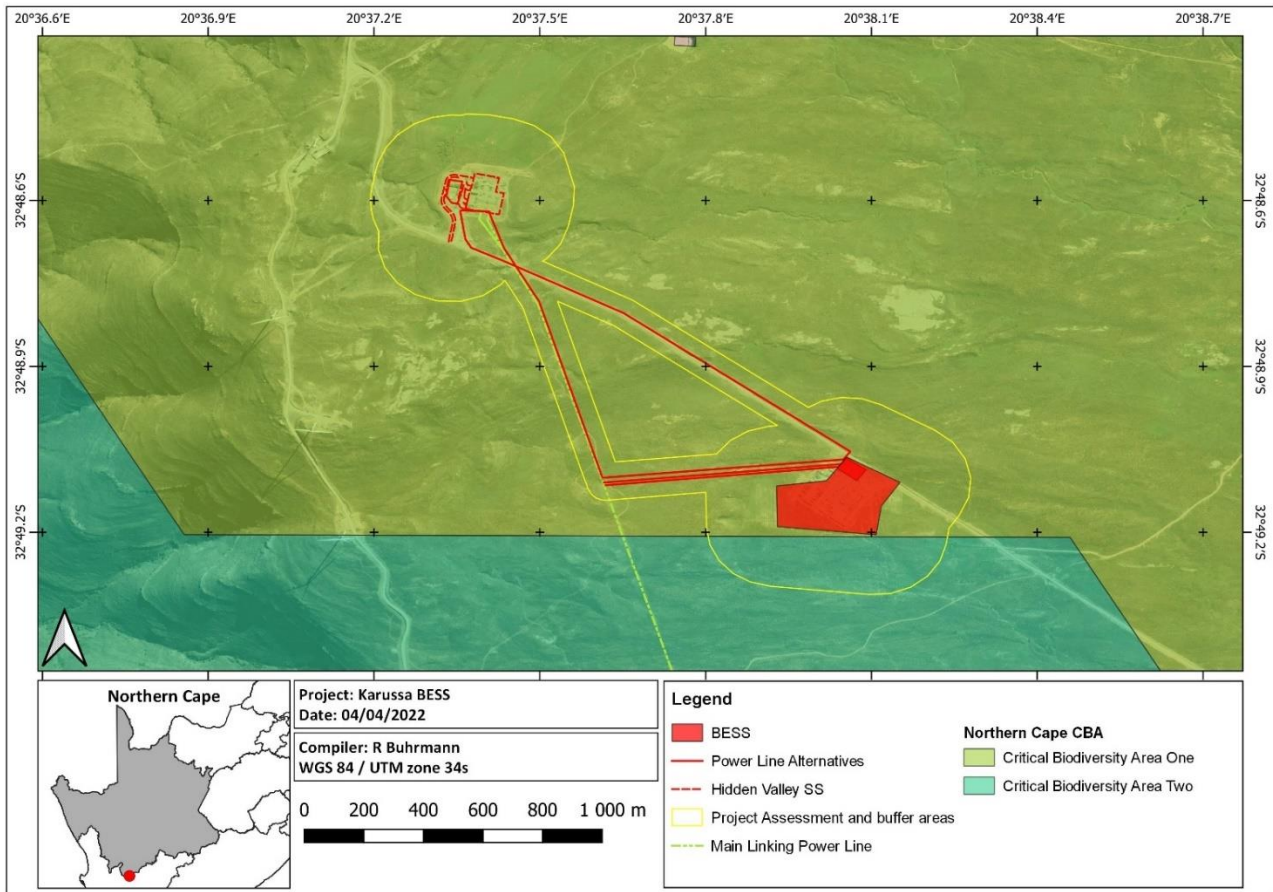


Figure 4.7: Map illustrating the location of Critical Biodiversity Areas proximal to the assessment area

Site of Ecological Importance (SEI)

The different habitat types within the assessment area were delineated and identified based on observations during the field assessment as well as available satellite imagery. These habitat types were assigned Ecological Importance (EI) categories based on their ecological integrity, conservation value, the presence of species of conservation concern and their ecosystem processes.

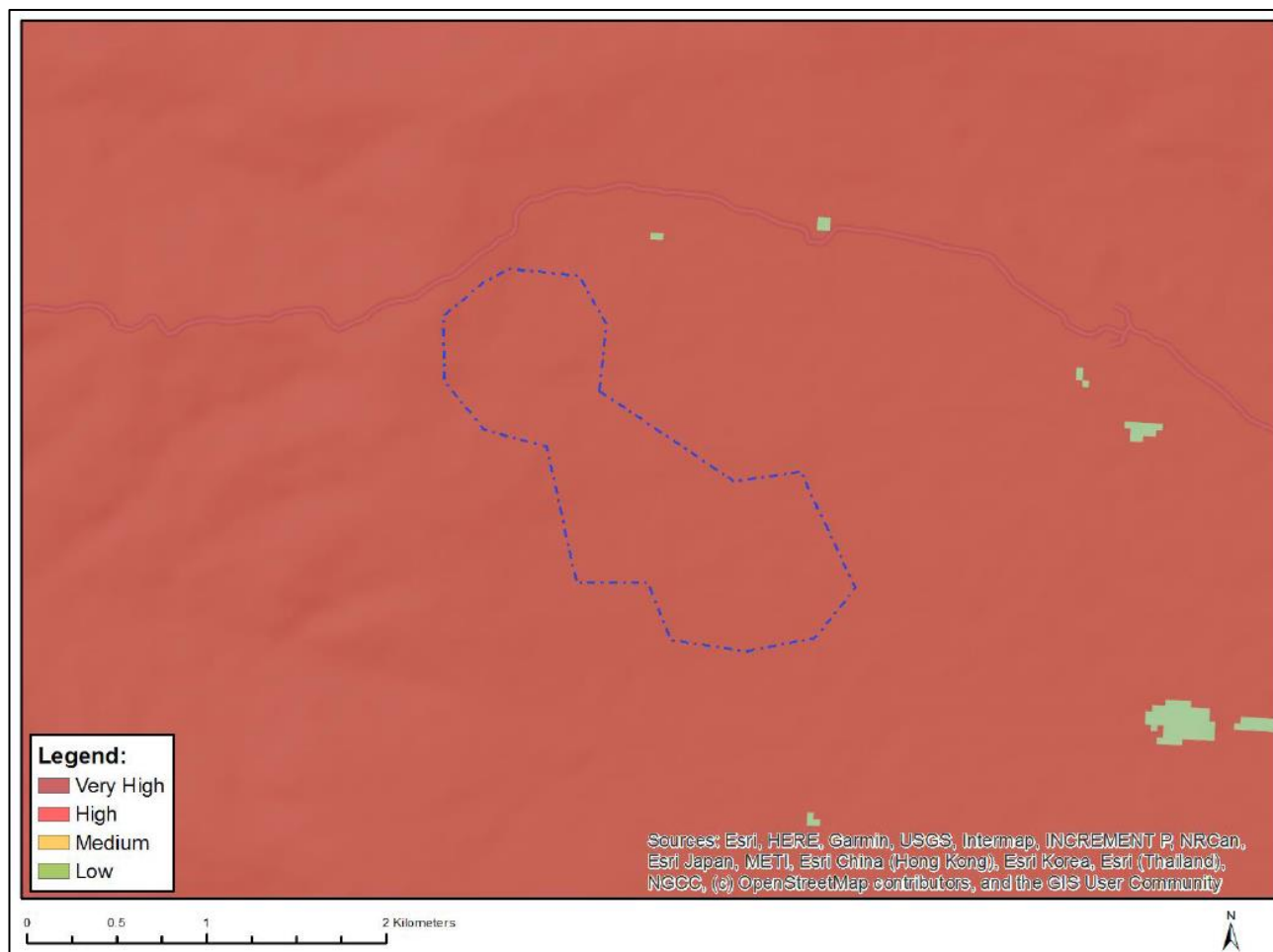


Figure 4.8: Combined Terrestrial Biodiversity Sensitivity of the assessment area as per the DFFE screening tool report

Four different habitat types were delineated within the assessment area (**Table 4.1, Figure 4.9**). All habitats within the assessment area of the proposed development were allocated a sensitivity category or SEI. The sensitivities of the habitat types delineated are illustrated in **Error! Reference source not found.**

Habitats categorised as Transformed consisted of buildings, roads, and cleared areas and were determined to be a 'Very Low' SEI.

Table 4.1: Summary of habitat types delineated within the field assessment area of the proposed development

Habitat	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Transformed	Very Low	Very Low	Very Low	Very High	Very Low
Karoo Scrub	Medium	High	Medium	Medium	Medium
Rocky outcrops	High	High	High	Low	Very high
Riparian thicket	Medium	High	Medium	Medium	Medium

The study area was split into four areas. The transformed area comprises of the site camp and associated infrastructure as well as existing roads, the existing substation and agricultural areas. These areas cannot be rehabilitated, and no longer comprise indigenous vegetation. It has no real ecological importance. The

small area of riparian thicket occurs between rocky outcrops and agricultural areas. This area of the site is well grazed but has an assemblage of species not recorded elsewhere on the site. It has an SEI of medium.

Some areas of the site form low cliff faces with corresponding niche habitats able to support a different assemblage of flora and fauna species from the surrounding habitat. It is here that the majority of provincially protected succulent species were recorded. It is also highly likely that the inaccessibility of these areas to grazers may result in them housing greater populations of conservation important geophytic flora species (this should be confirmed in the wet season). As such, these areas have a Very High SEI.

The remainder of the site comprises karoo shrubland (the Central Mountain Shale Renosterveld as described by Mucina and Rutherford (2006)). This habitat type is largely intact, with low levels of disturbance aside from impacts associated with grazing. High numbers of provincially protected succulent species occur in this vegetation type, as well as some geophytic species. It has a Medium SEI.

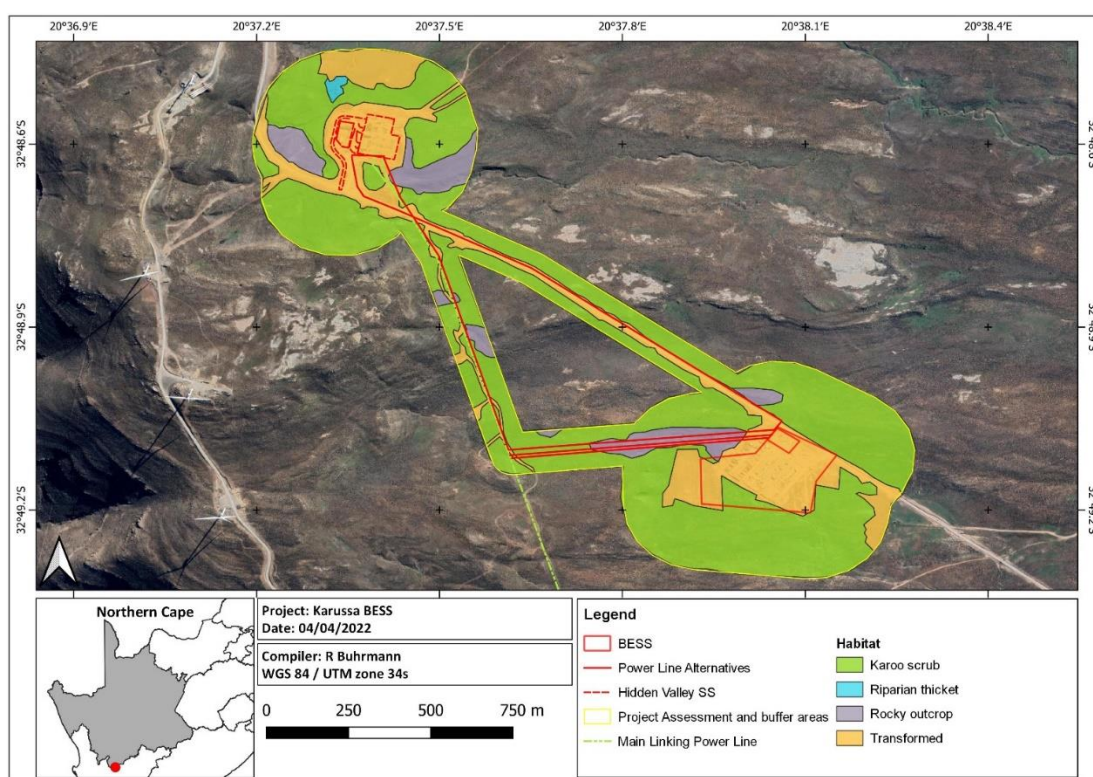


Figure 4.9: Map illustrating the habitats defined within the project area

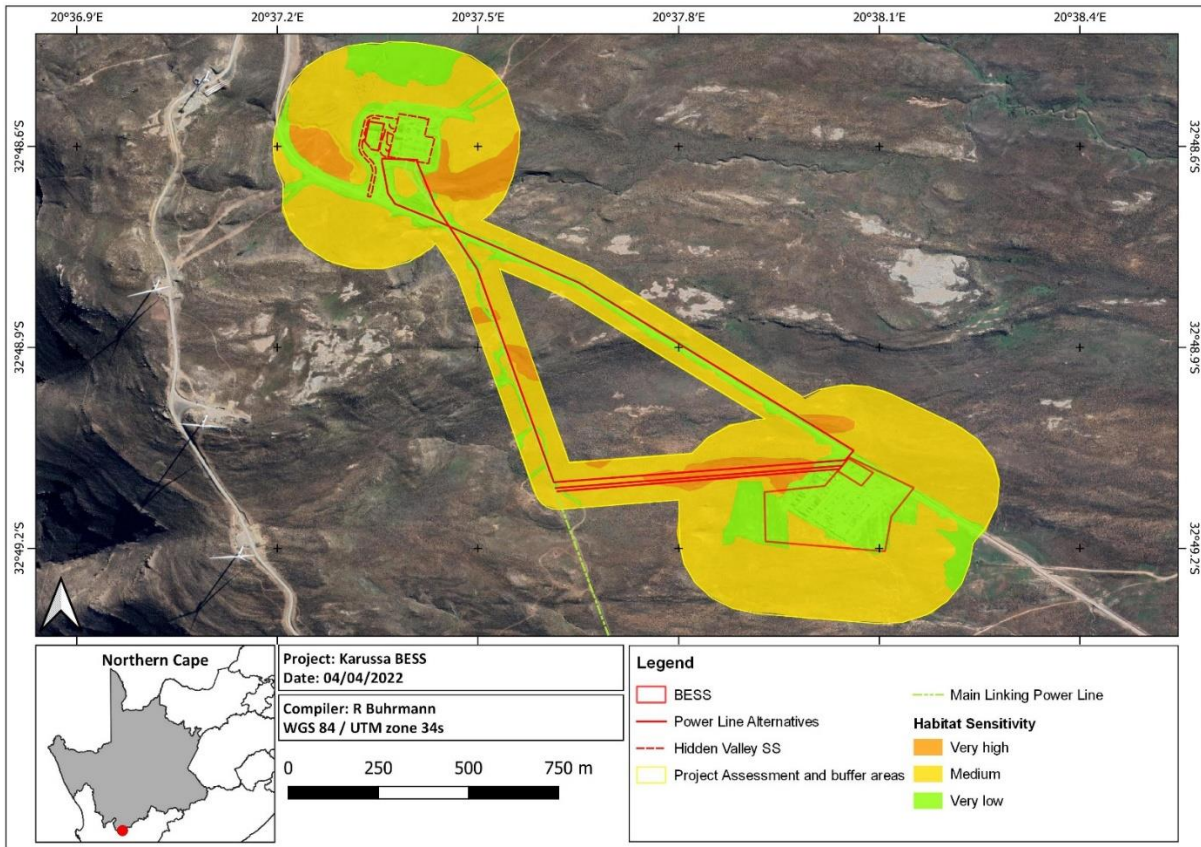


Figure 4.10: Map illustrating Site Ecological Importance (SEI) of the habitat types within the assessment area

Protected Areas

According to the protected area spatial datasets from SAPAD (2021), the proposed development does not occur within any protected area (**Figure 4.11**). The proposed development is not located within any focus area for the National Protected Area Expansion Strategy (NPAES) or IBA nor is there one in the surrounding landscape.

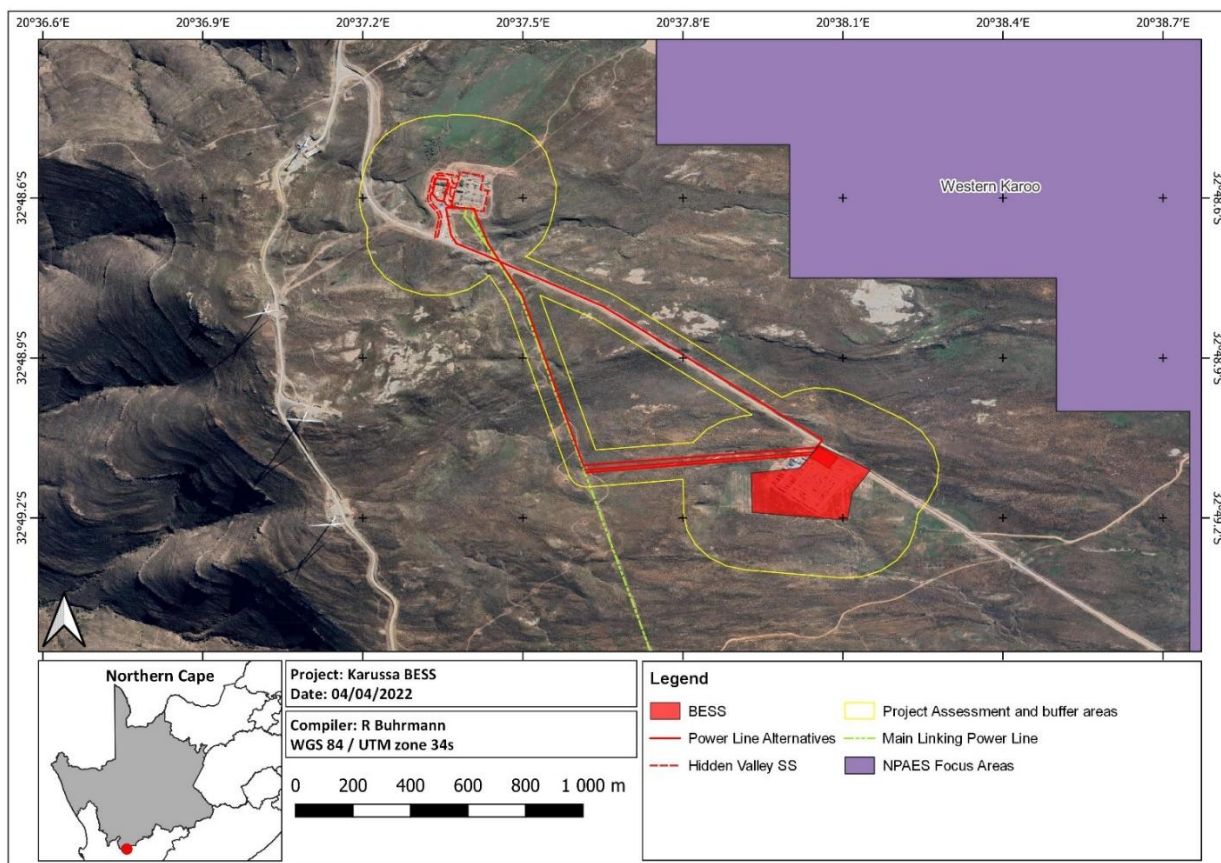


Figure 4.11: Map illustrating the location of protected areas proximal to the assessment area

Threatened Plant Species and Species of Conservation Concern (SCC)

According to the Plants of Southern Africa (POSA) database, 162 species of indigenous plants are expected to occur within the development area and surrounding landscape. The POSA database and the DFFE screening tool indicates that 19 threatened species are expected to occur within the assessment area and are provided in **Table 4.2** below. The DFFE Screening Tool report includes lists of plant SCC known or expected to occur on the proposed development footprint. Some of these SCC are sensitive to illegal harvesting.

Indigenous Flora

The list of floral species recorded within the assessment area provided in **Table 4.3**. Notably, this is not a complete list of indigenous flora within the area, but only species that were able to be recorded within the survey area within seasonality constraints and augmented by the search and rescue methodology statement for the Wind Energy Facility (Colloty 2019) and associated search and rescue reports. It should be noted that no statements confirming presence of certain species can be made for areas not previously assessed where the species was not visible and/or identifiable during the site visit. A total of 35 species, representing 11 families of floral species were recorded within the assessment area. None of the expected threatened flora species provided in **Table 4.2** below were recorded within the assessment area during the survey period.

Table 4.2 Threatened flora species that are expected to occur within the assessment area associated with proposed project area

Family	Scientific name	Conservation Status	Endemism	Habitat	Likelihood of occurrence
Crassulaceae	<i>Adromischus phillipsiae</i>	Rare	Endemic	Sheltered rock crevices in loam soil	Low
Aizoaceae	<i>Antimima pumila</i>	Data Deficient	Endemic	Western Cape	Low
Asparagaceae	<i>Asparagus mollis</i>	Vulnerable	Endemic	Dwyka tillite, known only from four locations	Low
Asteraceae	<i>Eriocephalus grandiflorus</i>	Rare	Endemic	Lower foothills in quartz patches	Medium
Iridaceae	<i>Geissorhiza karooica</i>	Near Threatened	Endemic	Succulent karoo shrubland, on coarse shale slopes	High
Iridaceae	<i>Ixia linearifolia</i>	Rare	Endemic	Rocky south-facing slopes in renosterveld	High
Iridaceae	<i>Ixia mollis</i>	Vulnerable	Endemic	Among rocks on seasonally moist south-facing sandy or clay slopes. Known only from 4 locations.	Low
Hyacinthaceae	<i>Lachenalia longituba</i>	Vulnerable	Endemic	Stony clay in seasonally wet, boggy sites that bake rock hard in summer	Low
Fabaceae	<i>Lotononis venosa</i>	Endangered	Endemic	Open karroid scrub on sandy clay alluvium.	Low
Hypoxidaceae	<i>Pauridia breviscapa</i>	Rare	Endemic	Shaded or sheltered damp, shallow loamy soils on south-facing slopes and in seepages at the base of rocks	Medium
Iridaceae	<i>Romulea eburnea</i>	Vulnerable	Endemic	Shale soils. Known only from two locations.	Medium
	Sensitive species 1107	Rare	Endemic	Shallow pans on sandstone slabs	Medium
	Sensitive species 142	Vulnerable	Endemic	Heavy clay soils	Medium

Family	Scientific name	Conservation Status	Endemism	Habitat	Likelihood of occurrence
	Sensitive species 338	Rare	Endemic	Known from less than 10 sites. Occurs in succulent karoo in shallow clay soils in seasonally damp depressions.	Low
	Sensitive species 620	Rare	Endemic	Occurring in shaded rock crevices, often on south-facing slopes	High
	Sensitive species 722	Rare	Endemic	Moist places usually associated with rocks and often under over-hanging rocks	Medium
	Sensitive species 886	Rare	Endemic	Steep or gentle slopes of a mainly southern aspect in low karroid scrub	Low
	Sensitive species 936	Rare	Endemic	Range-restricted occurring in a poorly explored area in Fynbos and succulent karoo in seasonally damp sandy loam or rocky flats in shale renosterveld.	High
Scrophulariaceae	<i>Zaluzianskya mirabilis</i>	Rare	Endemic	Gravelly ground and dry river courses	High

Table 4.3: Summary of flora species recorded within the assessment area and their respective growth form and conservation status

Family	Scientific name	Growth form	Conservation Status
	Angiospermae indet		
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Aizoaceae	<i>Antimima loganii</i>	succulent	Vulnerable
Aizoaceae	<i>Mesembryanthemum</i>	succulent	

Family	Scientific name	Growth form	Conservation Status
Aizoaceae	<i>Ruschia intricata</i>	shrub; succulent	Least Concern
Anacardiaceae	<i>Searsia longispina</i>	shrub;	Least Concern
Asparagaceae	<i>Asparagus capensis</i>	shrub	Least Concern
Asparagaceae	<i>Asparagus</i> sp. indet	shrub	
Asteraceae	Asteraceae sp. indet	shrub	
Asteraceae	Asteraceae sp. indet	shrub	
Asteraceae	<i>Berkheya rigida</i>	herb	Least Concern
Asteraceae	<i>Chrysocoma ciliata</i>	shrub	Least Concern
Asteraceae	<i>Dicerothamnus rhinocerotis</i>	shrub	Least Concern
Asteraceae	<i>Dimorphotheca cuneata</i>	shrub;	Least Concern
Asteraceae	<i>Euryops lateriflorus</i>	shrub;	Least Concern
Asteraceae	<i>Macledium spinosum</i>	Succulent	Least Concern
Asteraceae	<i>Oedera genistifolia</i>	shrub	Least Concern
Asteraceae	<i>Pentzia incana</i>	shrub	Least Concern
Asteraceae	<i>Pteronia incana</i>	shrub;	Least Concern
Asteraceae	<i>Seriphium plumosum</i>	shrub;	Least Concern
Crassulaceae	<i>Crassula deltoidea</i>	succulent	Least Concern
Crassulaceae	<i>Crassula muscosa</i>	succulent	Least Concern
Crassulaceae	<i>Crassula</i> sp. indet	succulent	
Crassulaceae	<i>Tylecodon wallichii</i>	Succulent	Least Concern
Ebenaceae	<i>Diospyros austro-africana</i>	shrub	Least Concern
Fabaceae	Fabaceae sp. indet		
Hyacinthaceae	<i>Drimia capensis</i>	geophyte;	Least Concern
Poaceae	Poaceae sp. indet	graminoid;	
Poaceae	Poaceae sp. indet	graminoid;	
Poaceae	<i>Tragus</i> sp.	graminoid;	
Santalaceae	<i>Thesium strictum</i>	succulent	Least Concern
Santalaceae	<i>Viscum capense</i>	parasite	Least Concern
Zygophyllaceae	<i>Roepera fulva</i>	shrub	

Alien and Invasive Species (AIPs)

No AIPs were recorded within the study area. Considering that the project area is located within a CBA, it is recommended that any AIPs that may colonise the area in the future be controlled by implementing an Alien Invasive Plant Management Programme in compliance with the relevant legislation. This is also pertinent to the development as invasive species are linked to enhanced fire effects and risk (Aslan & Dickson, 2020).

4.6.2. Faunal Communities

Mammals

According to the IUCN Red Data List, 15 indigenous mammal species are expected to occur within the assessment area. Of these species, two are regarded as threatened, namely the *Pelea capreolus* and the *Aonyx capensis* (Table 4.4)

Table 4.4: Threatened mammal species that are expected to occur within the assessment area

Family	Scientific name	Common name	Conservation Status	Likelihood of occurrence
Bovidae	<i>Pelea capreolus</i>	Grey Rhebok	Near Threatened	Confirmed
Mustelidae	<i>Aonyx capensis</i>	African Clawless Otter	Near Threatened	Low

Pelea capreolus (Grey Rhebok) is endemic to South Africa, Lesotho and Swaziland and occurs in rocky grassland habitats (Taylor et al. 2016). Threats include agricultural transformation and human settlement expansion. They are common in the karoo and fynbos regions in the Northern and Western Cape provinces. There is estimated to be a total population of about 18 000 with more than 30% occurring on private land (Taylor et al. 2016).

During the site visit, a total of 13 mammal species were recorded within the assessment area accounting for 47% of the expected mammal species, and six species not included on the expected mammal species list. It is considered highly likely that additional small mammal species would be recorded from the site with extensive sampling. One of the species recorded within the assessment area are regarded as SCC, namely the Grey Rhebok (**Table 4.5**).

Table 4.5: Mammal SCC recorded within the assessment area during the survey periods

Family	Scientific Name	Common Name	Conservation Status
			Regional
Bovidae	<i>Pelea capreolus</i>	Grey Rhebok	Near Threatened

Reptiles

Based on the IUCN Red List Spatial Data and Reptile Map database, ten reptile species are expected to occur within the assessment area. A single species is regarded as threatened (**Table 4.6**).

Table 4.6 Threatened reptile species that are expected to occur within the project area

Family	Scientific Name	Common Name	Conservation Status	Likelihood of Occurrence
			Regional	
Testudinidae	<i>Psammobates tentorius tentorius</i>	Karoo Tent Tortoise	Near Threatened	High

Five reptile species, representing five families were recorded within the assessment area during the survey periods (**Table 4.7**). This accounts for 50% of the total expected species. The lack of species richness was likely due to the combination of the inherent secretive nature of reptile species, and limited time available for fieldwork. It is important to note that a true representative sample requires an extensive sampling period over several surveys. The presence of suitable habitat suggests that the area supports a diverse reptile community.

Table 4.7 Summary of reptile species recorded within the assessment area during the survey period

Family	Scientific Name	Common Name	Conservation Status	
			Regional	Global
Agamidae	<i>Agama atra</i>	Southern Rock Agama	Least Concern	Least Concern

Family	Scientific Name	Common Name	Conservation Status	
			Regional	Global
Cordylidae	<i>Karusasaurus polyzonus</i>	Karoo Girdled Lizard	Least Concern	Least Concern
Lacertidae	<i>Pedioplanis lineocellata pulchella</i>	Common Sand Lizard	Least Concern	Least Concern
Testudinidae	<i>Chersina angulata</i>	Angulate Tortoise	Least Concern	Least Concern
Viperidae	<i>Bitis arietans</i>	Puff Adder	Least Concern	Least Concern

Amphibians

Based on the IUCN Red List Spatial Data and Frog Map database, three amphibian species are expected to occur within the assessment area. No species are regarded as threatened. One amphibian species was recorded during the survey period (**Table 4.8**), accounting for 33% of the expected species. The lack of species richness was attributed to the dry season of the site visit and lack of suitable habitat within the study area.

Table 4.8 Summary of amphibian species recorded within the assessment area during the survey period

Family	Scientific Name	Common Name	Conservation Status	
			Regional	Global
Bufo	<i>Vandijkophrynus garipeensis garipeensis</i>	Karoo Toad (subsp. garipeensis)	Least Concern	Least Concern

Avifauna

The SABAP2 data for the selected pentads indicate that 45 species of indigenous avifauna are expected to occur within the landscape. Of these expected species, none are regarded as threatened. Forty-four species of avifauna were recorded within the assessment area during the survey period, with none of the species regarded as being of conservation concern (**Table 4.9**). A considerable portion of the species are regarded as typical karoo species, with some species associated with human settlements.

Table 4.9 Summary of avifauna species recorded within the assessment area during the survey period

Scientific name	Common name	Conservation Status	
		Regional	Global
<i>Ardea cinerea</i>	Heron, Grey	Least Concern	Least Concern
<i>Buteo buteo</i>	Buzzard, Common	Least Concern	Least Concern
<i>Calandrella cinerea</i>	Lark, Red-capped	Least Concern	Least Concern
<i>Calendulauda albescens</i>	Lark, Karoo	Least Concern	Least Concern
<i>Cercomela sinuata</i>	Chat, Sickle-winged	Least Concern	Least Concern
<i>Charadrius tricollaris</i>	Plover, Three-banded	Least Concern	Least Concern
<i>Charadrius tricollaris</i>	Three-banded Plover	Least Concern	Least Concern
<i>Cinnyris chalybeus</i>	Sunbird, Southern Double-collared	Least Concern	Least Concern
<i>Columba livia</i>	Dove, Rock	Least Concern	Least Concern
<i>Corvus albicollis</i>	Raven, White-necked	Least Concern	Least Concern
<i>Corvus albus</i>	Crow, Pied	Least Concern	Least Concern
<i>Crithagra albogularis</i>	Canary, White-throated	Least Concern	Least Concern

Scientific name	Common name	Conservation Status	
		Regional	Global
<i>Crithagra albogularis</i>	White-throated Canary	Least Concern	Least Concern
<i>Crithagra flaviventris</i>	Canary, Yellow	Least Concern	Least Concern
<i>Crithagra flaviventris</i>	Yellow Canary	Least Concern	Least Concern
<i>Emberiza capensis</i>	Bunting, Cape	Least Concern	Least Concern
<i>Emberiza capensis</i>	Cape Bunting	Least Concern	Least Concern
<i>Falco rupicolus</i>	Kestrel, Rock	Least Concern	Least Concern
<i>Falco rupicolus</i>	Rock Kestrel	Least Concern	Least Concern
<i>Galerida magnirostris</i>	Lark, Large-billed	Least Concern	Least Concern
<i>Galerida magnirostris</i>	Large-billed Lark	Least Concern	Least Concern
<i>Hirundo albigularis</i>	Swallow, White-throated	Least Concern	Least Concern
<i>Lamprotornis bicolor</i>	Starling, Pied	Least Concern	Least Concern
<i>Lanius collaris</i>	Fiscal, Southern	Least Concern	Least Concern
<i>Melierax canorus</i>	Goshawk, Pale Chanting	Least Concern	Least Concern
<i>Mirafra apiata</i>	Lark, Cape Clapper	Least Concern	Least Concern
<i>Motacilla capensis</i>	Wagtail, Cape	Least Concern	Least Concern
<i>Myrmecocichla formicivora</i>	Chat, Ant-eating	Least Concern	Least Concern
<i>Myrmecocichla monticola</i>	Mountain Wheatear	Least Concern	Least Concern
<i>Oenanthe familiaris</i>	Chat, Familiar	Least Concern	Least Concern
<i>Oenanthe pileata</i>	Wheatear, Capped	Least Concern	Least Concern
<i>Oenanthe pileata</i>	Capped Wheatear	Least Concern	Least Concern
<i>Passer domesticus</i>	Sparrow, House	Least Concern	Least Concern
<i>Passer melanurus</i>	Sparrow, Cape	Least Concern	Least Concern
<i>Prinia maculosa</i>	Prinia, Karoo	Least Concern	Least Concern
<i>Pternistis capensis</i>	Spurfowl, Cape	Least Concern	Least Concern
<i>Ptyonoprogne fuligula</i>	Martin, Rock	Least Concern	Least Concern
<i>Streptopelia capicola</i>	Dove, Cape Turtle	Least Concern	Least Concern
<i>Tachybaptus ruficollis</i>	Grebe, Little	Least Concern	Least Concern
<i>Tadorna cana</i>	Shelduck, South African	Least Concern	Least Concern
<i>Tadorna cana</i>	South African Shelduck	Least Concern	Least Concern
<i>Telophorus zeylonus</i>	Bokmakierie	Least Concern	Least Concern
<i>Vanellus coronatus</i>	Crowned Lapwing	Least Concern	Least Concern
<i>Vanellus coronatus</i>	Lapwing, Crowned	Least Concern	Least Concern

4.7. Hydrology and aquatic features

The proposed development is not located within a Strategic Water Source Area (SWSA). The NFEPA spatial layer indicates that the wetlands do not intersect with a Ramsar site and are not within 500 m of an IUCN threatened frog point locality. A NFEPA wetland within the buffer area of one powerline route option was shown to be a rocky outcrop (**Figure 4.12**). The study area is associated with a number of non-perennial rivers (**Figure 4.13**).

Based a desktop study and site observations, two forms of watercourse were identified and delineated within the 500 m regulated area. These include an artificial wetland area and episodic drainage lines/ features

(Figure 4.14). No natural wetland systems, or even cryptic wetlands were identified for the project area. The artificial wetland has been formed due to the adjacent water/drinking station and has only been delineated for this assessment, and no further functional descriptions were undertaken. The drainage lines are classified as a river HGM type system. The drainage lines are not characterised by riparian vegetation and grasses. These systems represent bare surfaces with evidence of surface run-off. A large number of small drainage features were identified within the 500 m regulated area. Photographs of the identified features are presented in Figure 4.15.

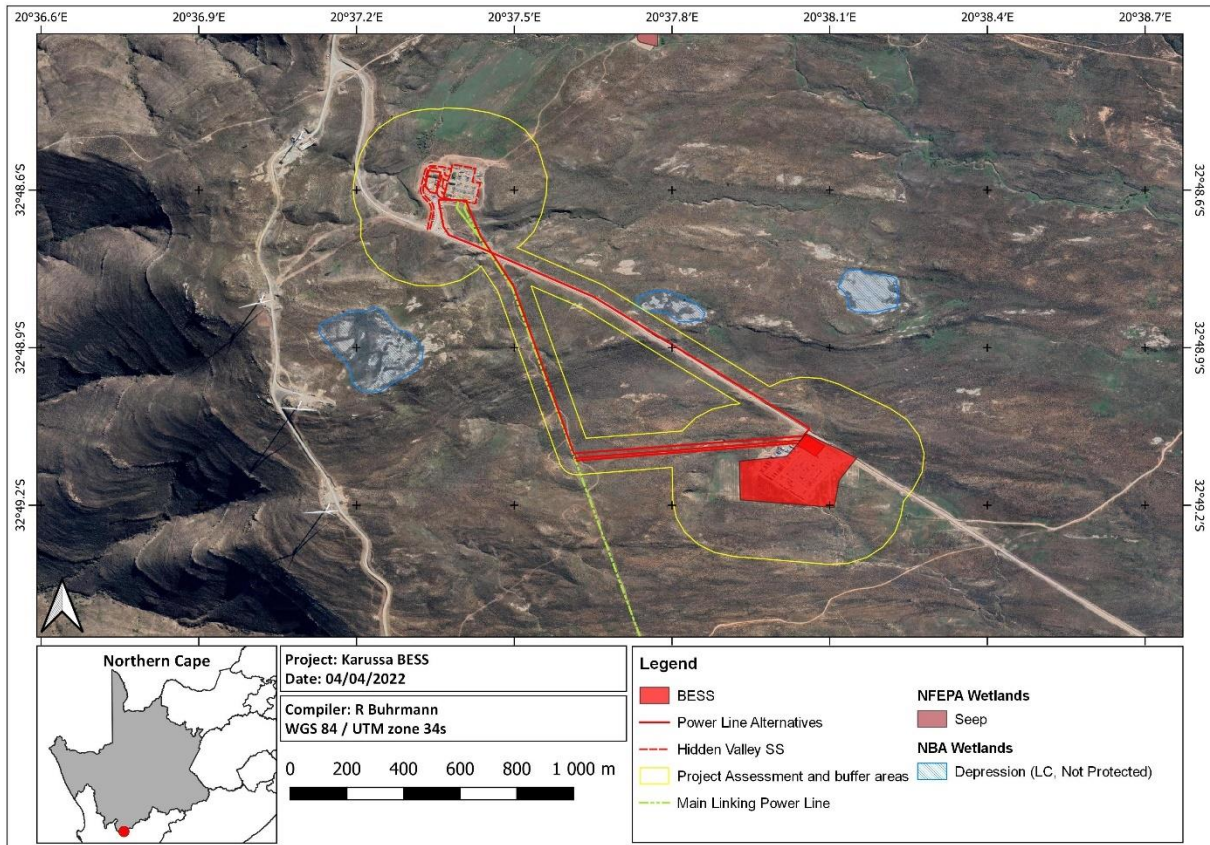


Figure 4.12: Map illustrating the NFEPA wetland and river systems associated with the assessment area

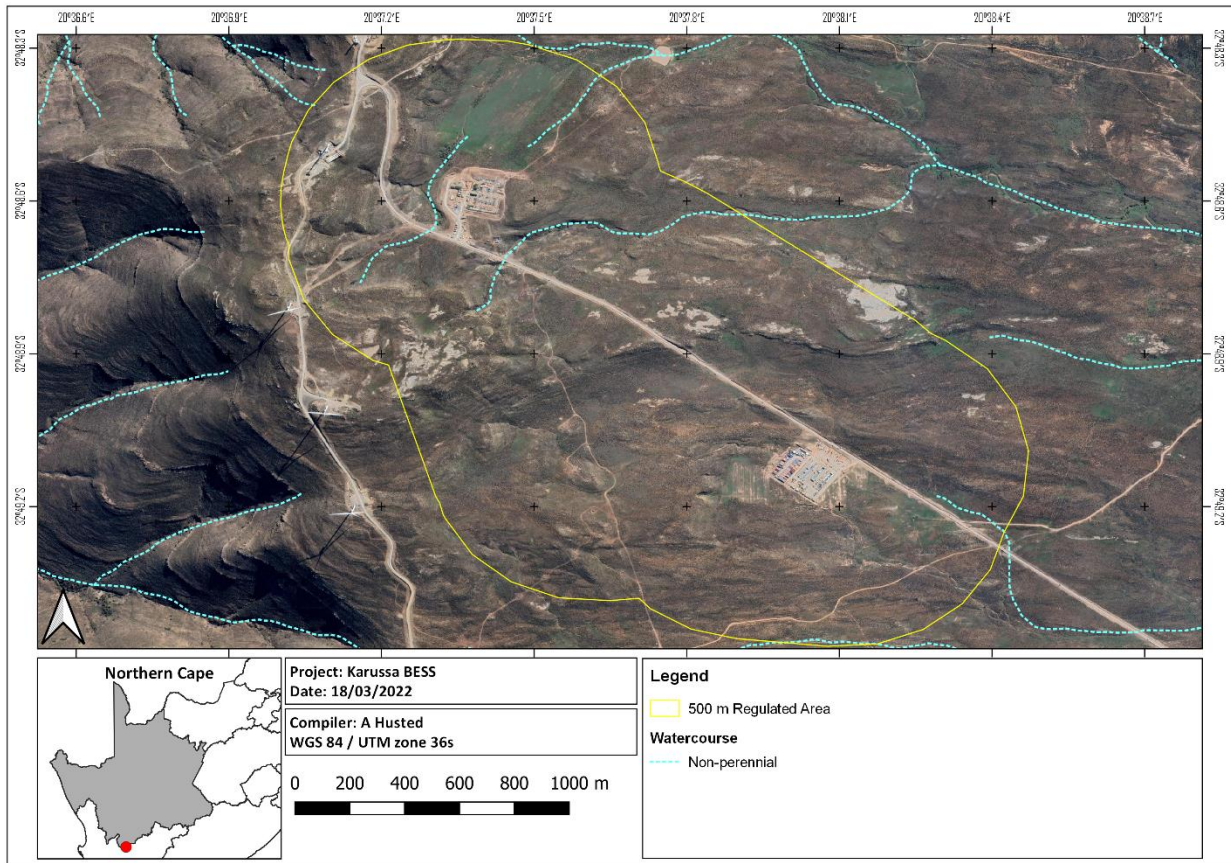


Figure 4.13: The inland water features associated with the project area

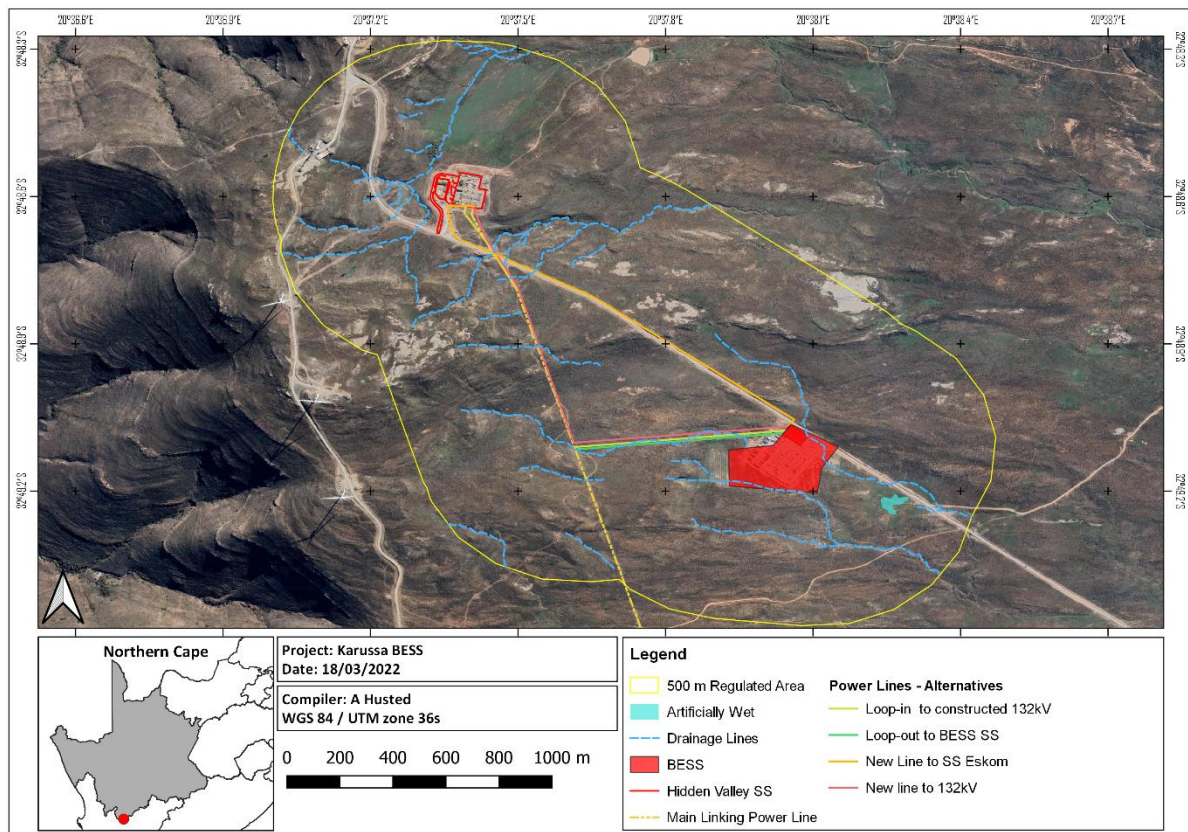


Figure 4.14: Drainage Features within the project area

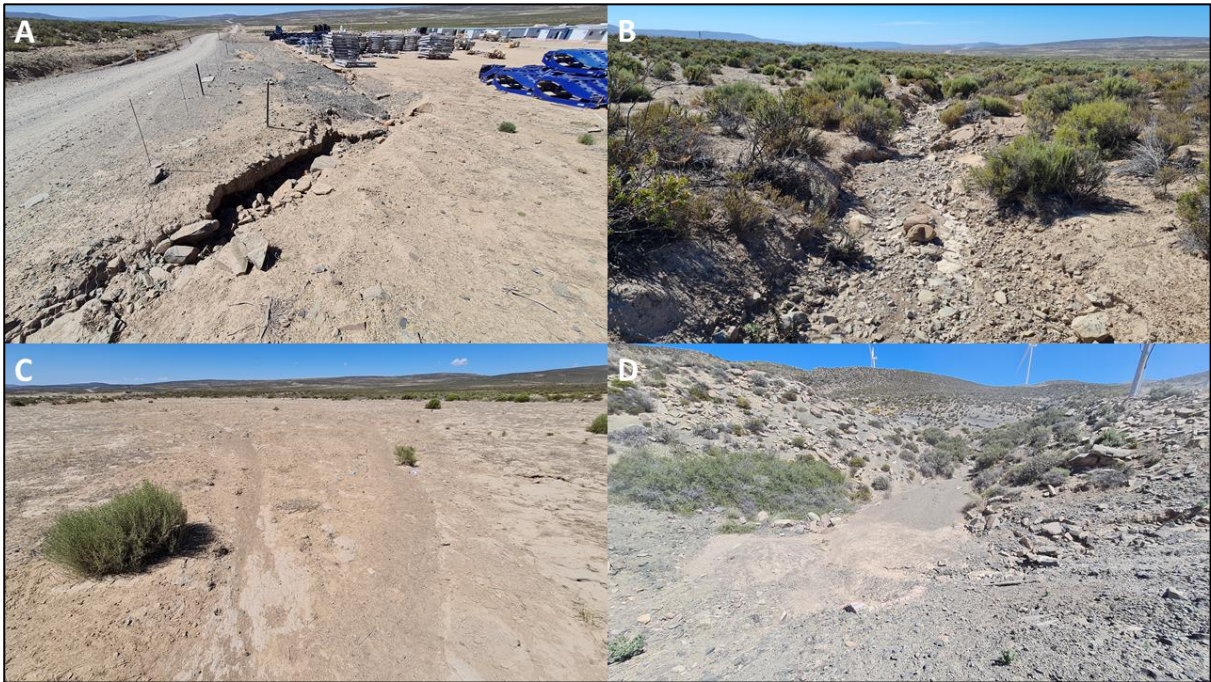


Figure 4.15: Photographs of features within the project area: A) Drainage line that has been realigned around the existing site camp, B) Drainage Line directly south of the existing site camp and therefore proposed BESS, C) Drainage feature, D) A number of drainage lines were noted within the 500 m regulated area

The following Zones of Regulation (ZoR) are applicable to the drainage line identified within the assessment area (**Figure 4.16**):

- A 32 m Zone of Regulation in accordance with the National Environmental Management Act, 1998 (Act No. 107 of 1998) should be assigned to the drainage lines; and
- A 100 m ZoR in accordance with the National Water Act, 1998 (Act No. 36 of 1998) should be assigned to the drainage lines.

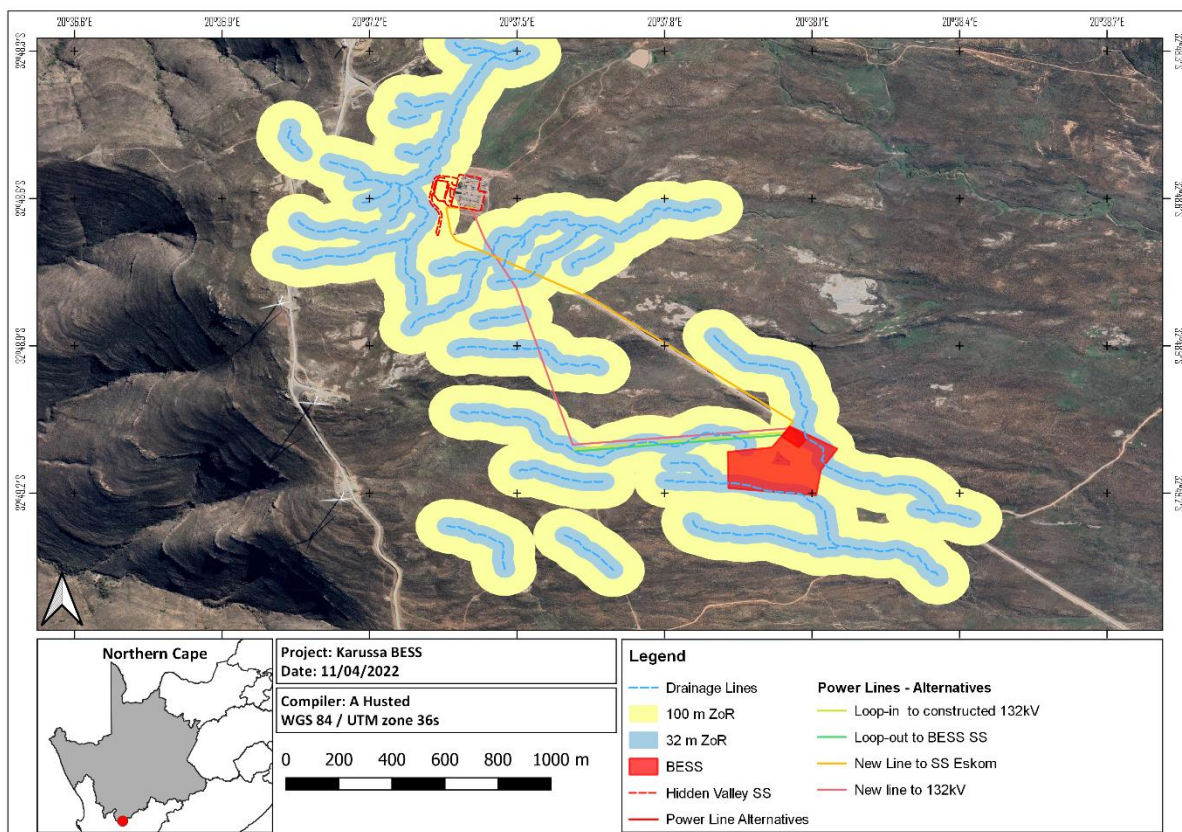


Figure 4.16: The applicable zones of regulation for the project

4.8. Heritage (including Archaeology, Palaeontology and the Cultural Landscape)

4.8.1. Archaeology and Built Environment Heritage

The study area encompasses the existing Soetwater OHL and Hidden Valley Substation which have been previously assessed for impacts to heritage resources (**Figure 4.17** to **4.20**). The development area of the approved Karusa WEF had also been assessed by a specialist archaeological assessment (Booth, 2015). In her assessment, it was concluded that no archaeological or heritage resources were identified within the proposed powerline route for the Soetwater OHL and substation.

In a recent walkdown of the area (July 2020), a stone packed feature, which could potentially be a burial site was identified within the project area. According to Booth (2020), the stone packed feature cannot be confirmed as being a grave unless systematic excavations are conducted to establish whether the area contains a burial. This mitigation measure is however least preferred. The stone packed feature may be established as being older than 30 years owing to the landowner and farm staff being unaware of its origin or existence, or older than the establishment of colonial settlements and farming activities within the area. However, the more recent-looking packing of the stones may not confirm that the feature is older than 100 years.

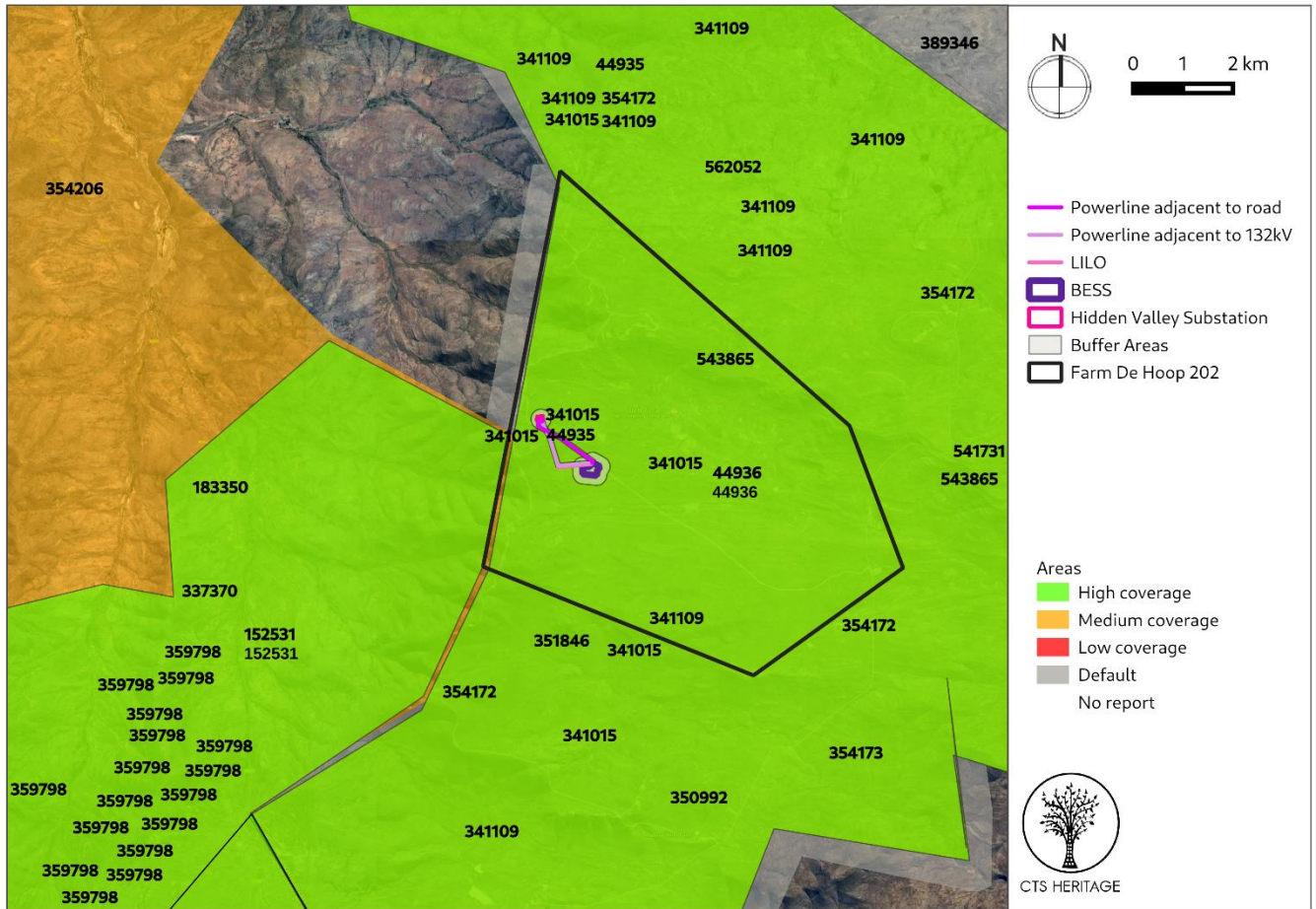


Figure 4.17: Previous HIAs Map. Previous Heritage Impact Assessments covering the proposed development area with SAHRIS NIDS indicated.

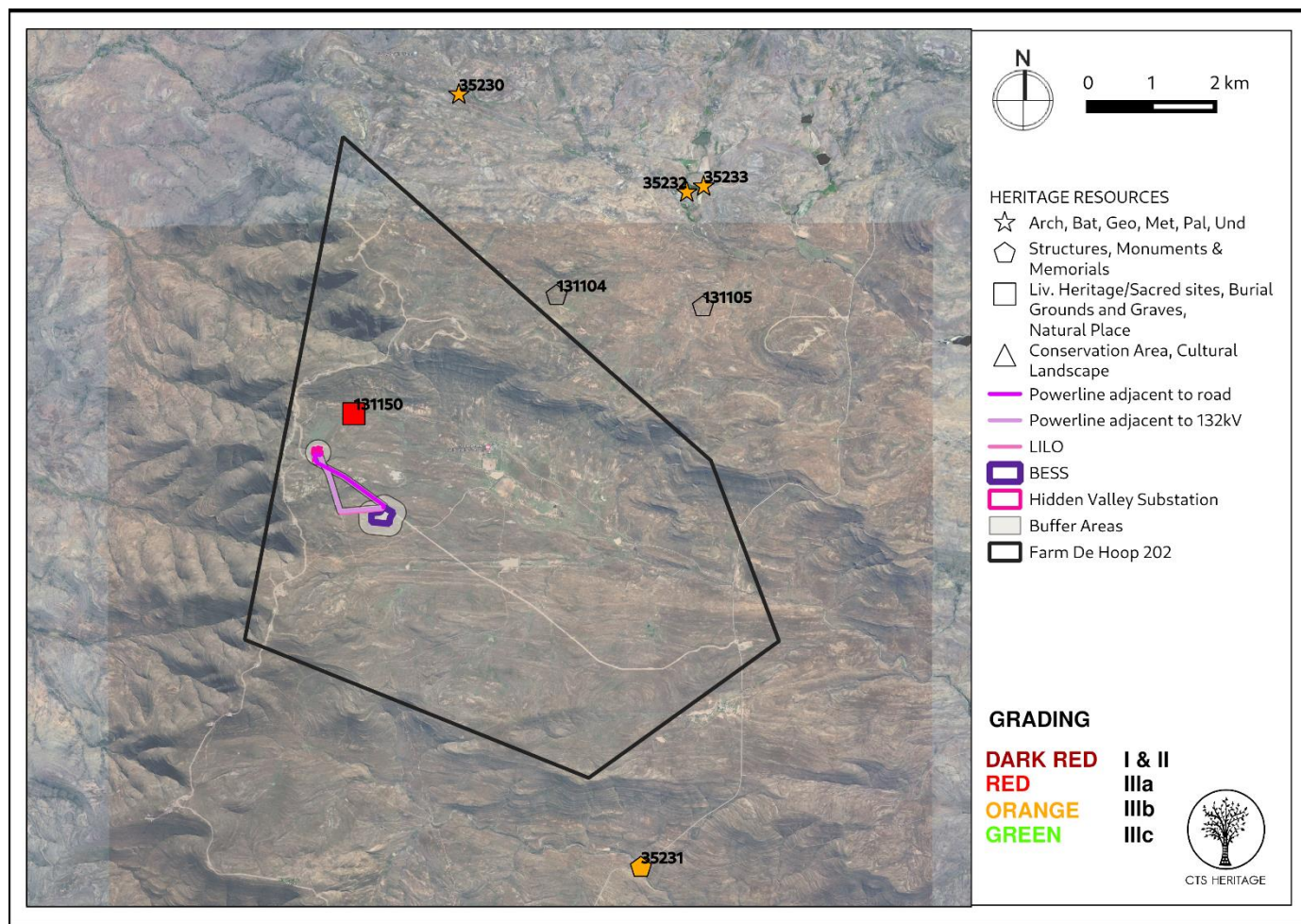


Figure 4.18: Heritage Resources previously identified within the study area

4.8.2. Palaeontology

According to the SAHRIS Fossil Sensitivity Map (**Figure 4.14**), the area proposed for development is underlain by sediments that have very high palaeontological sensitivity. The geology map of the area (**Figure 4.15**) indicates that the area is underlain by sediments of the Karoo Supergroup assigned to the Beaufort group, within the Abrahamskraal Formation of the Adelaide Subgroup (Rossouw 2012). Almond, (2015) conducted a palaeontological field assessment for the Soetwater WEF, which is relevant to the proposed project. Based on this, it was determined that scientifically important fossil remains are very scarce within the development area. According to Almond's (2016) assessment of the Soetwater OHL, the impact significance of the construction phase of the proposed electrical connection infrastructure, including the switching station complex, 132kV overhead power line, Soetwater Substation complex and ancillary developments, the area is assessed as low regarding paleontological heritage. This conclusion is also applicable to the proposed project.

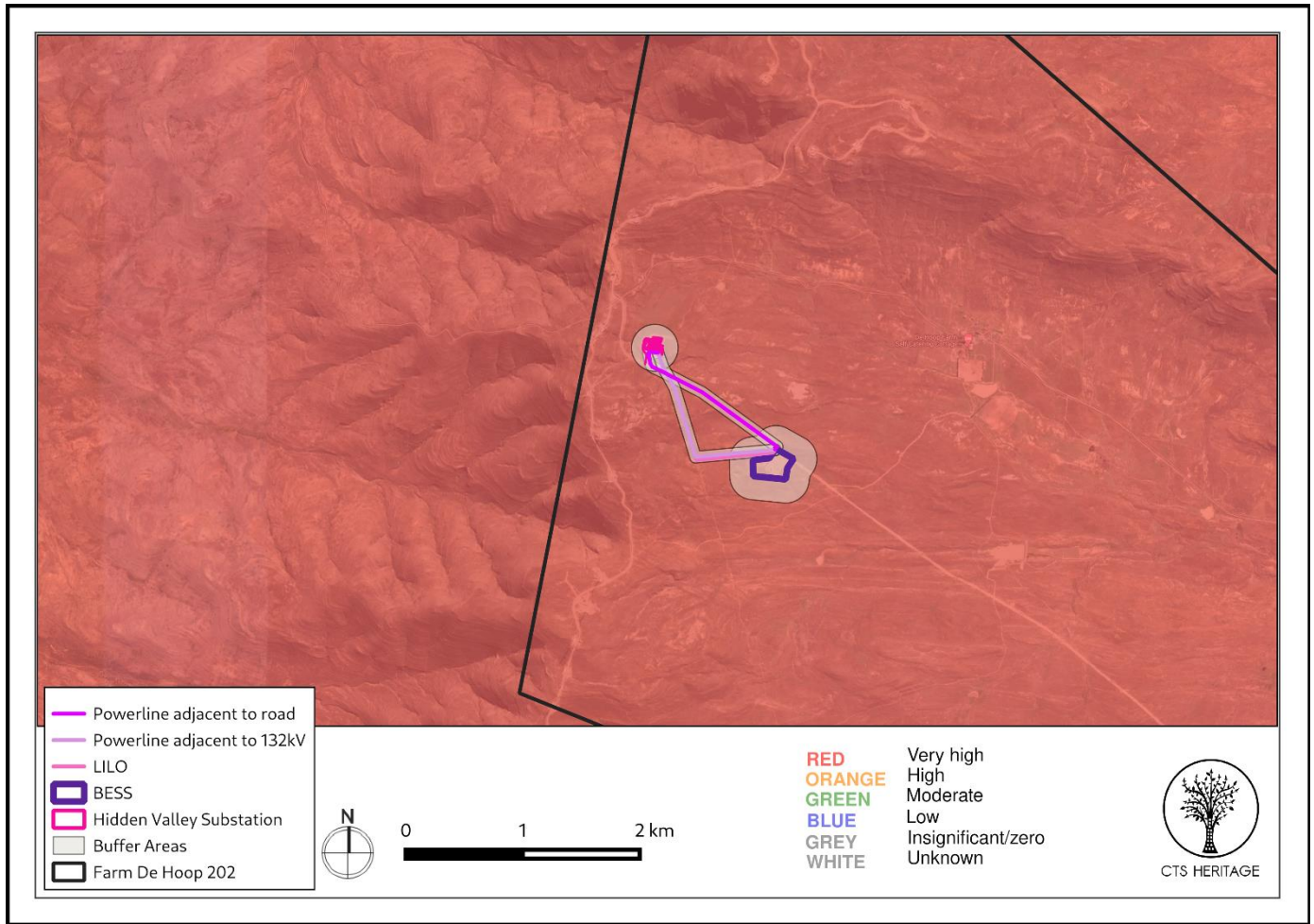


Figure 4.19: Palaeosensitivity Map indicating fossil sensitivity underlying the study area

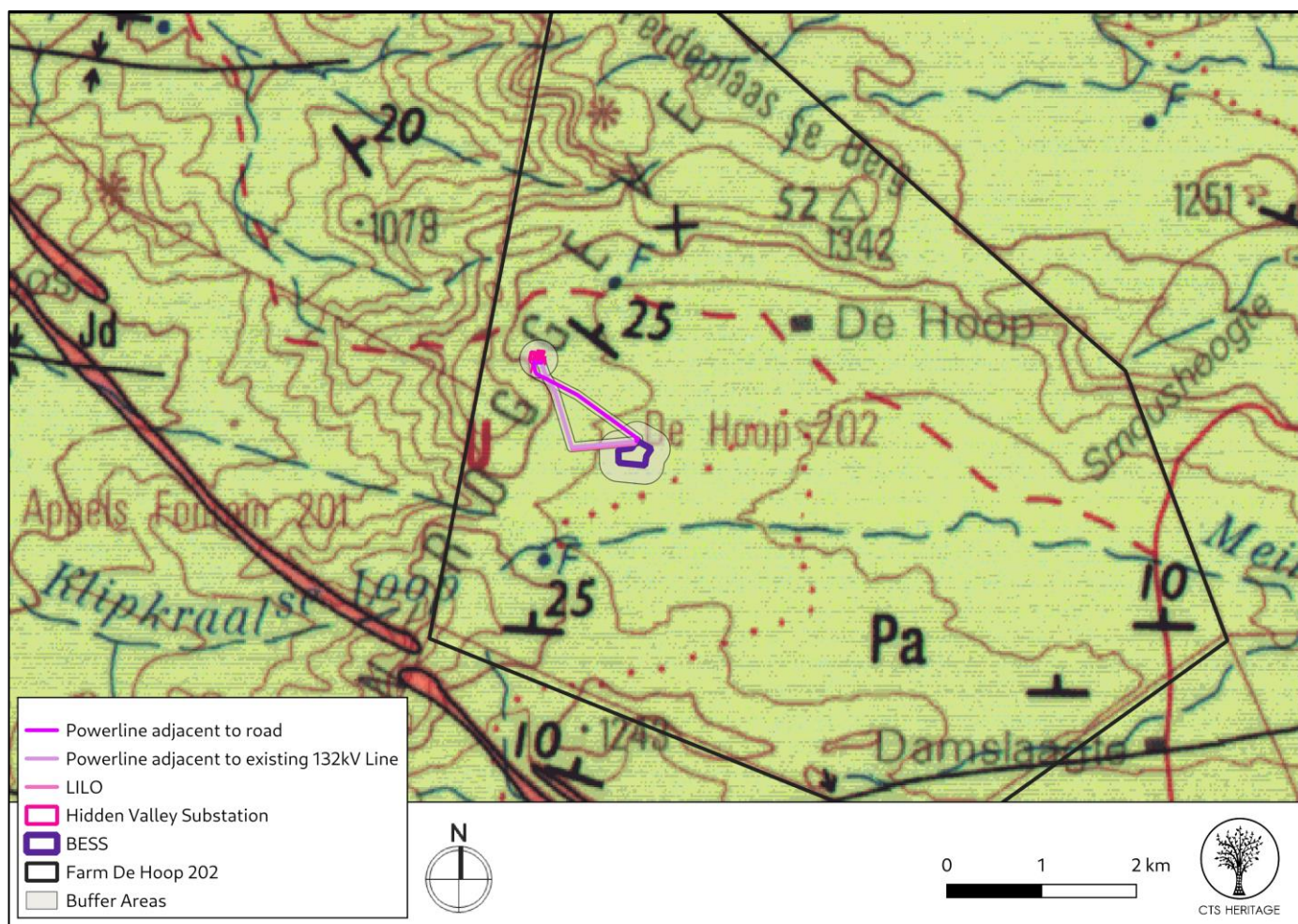


Figure 4.20: Geology Map

4.9. Noise characteristics of the surrounding project area

ENPAT1 (1998) describes the topography of the project area as having low mountains. Due to the micro nature of the study area, there are little natural features that could act as noise barriers considering practical distances at which sound may propagate.

Based on observations made during the site visit, it was determined that the land use of the surrounding project area is predominantly agriculture. The project area has a rural character and can be described as underdeveloped and hence has a high potential to be predominantly quiet. During the site visit, ambient sound levels were elevated at times, mainly due to wind-induced noises (natural) and birds and insects (natural). Most farmers will consider this to be naturally quiet.

Typical night-time sound levels will be less than 35 dBA with daytime sound levels being less than 45 dBA (during no, or low wind conditions). Due to low anthropogenic-related development in the area, ambient sound levels measured in this area would be low in nature. Residential areas and potential noise-sensitive developments and receptors were identified (refer to **Figure 4.21**). At a distance of 1.7 km, the closest receptor is a significant distance from the closest location where the Karusa BESS may be developed.

There are currently no other noise sources of significant importance in the area. There are a number of wind turbines proposed as part of the Karusa, WEF, with construction of this facility underway. With the input data

as used, a review of the Karusa WEF noise impact (18 September 2017), the above-mentioned assessment indicated that the proposed wind farm will have a noise impact of low significance on all potential noise-sensitive developments (NSDs) in the area during both the construction and operational phases.

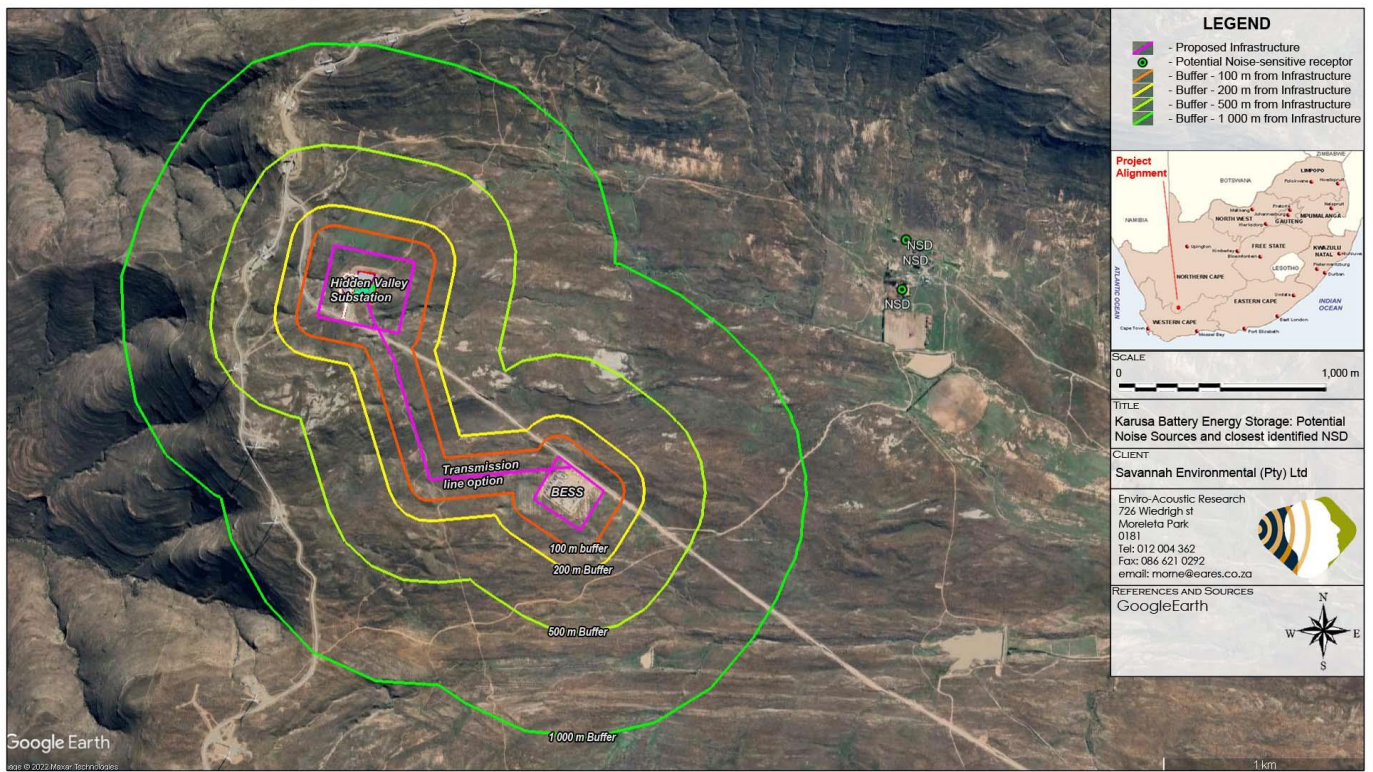


Figure 4.21: Locations of proposed BESS in relation to the identified noise-sensitive developments (receptors)

CHAPTER 5: ASSESSMENT OF DIRECT, INDIRECT AND CUMULATIVE IMPACTS

This Chapter serves to assess the significance of the potential positive and negative environmental impacts (direct, indirect and cumulative) associated with the proposed Karusa BESS and associated infrastructure. The Karusa BESS and associated infrastructure was assessed and considered through the BA process by the independent specialists and the EAP through the review of existing information, desktop evaluations and field surveys. The following was considered by the specialist studies in the assessment of this project:

- » Buffer around the BESS site of 200m
- » Power line corridor (100m) with 50m either side of centre line
- » Buffer around Hidden Valley Substation of 200m

Three alternative power line corridor alternatives were proposed for investigation as follows:

- » Alternative 1: Loop in and Loop out of the Hidden Valley-Komsberg line
- » Alternative 2: New power line to the Hidden Valley Substation following the routing of the Hidden Valley-Komsberg line
- » Alternative 3: New power line to the Hidden Valley Substation following the access road to the north of the BESS site

The option of implementing the power line either as an overhead line or underground cabling has been considered,

The proposed BESS will comprise the following phases:

- » *Pre-Construction and Construction* – will include pre-construction surveys; site preparation; establishment of access roads, laydown area; construction of BESS and power line foundations involving excavations; the transportation of components/construction equipment to site, manoeuvring and operating vehicles for uploading and installation of equipment. The construction phase for the BESS and associated infrastructure is estimated to be between 10 and 12 months.
- » *Operation* – will include use of the Karusa BESS and associated infrastructure. The operation phase of the BESS is expected to be approximately 20 years or more depending on the need for battery replacements.
- » *Decommissioning* – once the BESS and associated infrastructure has reached the end of its life cycle, it will follow a decommissioning plan and rehabilitation programme compliant with the applicable legislation at the time of decommissioning.

Potential environmental impacts associated with the pre-construction, construction and decommissioning of the BESS and associated infrastructure will include, amongst others:

- » Habitat loss
- » Loss of protected plant species
- » Loss of part of a CBA
- » Encroachment of invasive alien species in disturbed areas
- » Direct mortality of fauna

- » Emigration of fauna
- » Impact on a possible burial site
- » Impact on noise resources
- » Possible impact of soil erosion

This chapter also assesses the potential for the impacts associated with the BESS and associated infrastructure to become more significant when considered in combination with the other known or proposed energy projects within the area (refer to **Figure 5.1**). Other BESS facilities authorised in the area include a BESS at Gunstfontein Wind Farm and a BESS at the Great Karoo Wind Farm (part of the Hidden Valley/Soetwater wind energy facility). It is important to explore the potential for cumulative impacts as this will lead to a better understanding of these impacts and the potential for mitigation that may be required. The cumulative impacts that have the potential to be compounded through the development of the proposed project in proximity to other similar developments in the area include impacts such as those listed below:

- » Unacceptable loss of habitat or landscape connectivity through clearing, resulting in an impact on the conservation status of such flora, fauna or ecological functioning.
- » Unacceptable risk to fauna and impacts to nesting areas.

5.1. Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

This chapter of the BA Report includes the following information required in terms of Appendix 1: Content of the BA Report:

Requirement	Relevant Section
3(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 (aa) can be reversed, (bb) may cause irreplaceable loss of resources, and (cc) can be avoided, managed or mitigated.	The impacts and risks associated with the development of including the nature, significance, consequence, extent, duration and probability of the impacts and the degree to which the impact can be reversed and cause an irreplaceable loss of resources are included in Sections 5.2 to 5.5.
3(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	The positive and negative impacts associated with the development are included in sections 5.2 to 5.5.
3(h)(viii) the possible mitigation measures that could be applied and the level of residual risk.	The mitigation measures that can be applied to the impacts associated with the development are included in sections 5.2 to 5.5.
3(i) a full description of the process undertaken to identify, assess and rank the impacts that the activity will impose on the preferred location through the life of the activity, including (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process and (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.	A description of all environmental impacts identified for the development during the BA process, and the extent to which the impact significance can be reduced through the implementation of the recommended mitigation measures provided by the specialists are included in sections 5.2 to 5.5.
3(j) an assessment of each identified potentially significant impact and risk, including (i) cumulative impacts, (ii) the	An assessment of each impact associated with the development, including the nature and significance,

Requirement	Relevant Section
<p>nature, significance and consequences of the impact and risk, (iii) the extent and duration of the impact and risk, (iv) the probability of the impact and risk occurring, (v) the degree to which the impact and risk can be reversed, (vi) the degree to which the impact and risk may cause irreplaceable loss of resources and, (vii) the degree to which the impact and risk can be avoided, managed or mitigated.</p>	<p>the extent and duration, the probability, the reversibility, and the potential loss of irreplaceable resources, as well as the degree to which the significance of the impacts can be mitigated are included in sections 5.2 to 5.5.</p>
<p>3(j)(i) an assessment of each identified potentially significant impact and risk, including cumulative impacts.</p>	<p>The cumulative impacts associated with the construction of the BESS are included and assessed within this chapter.</p>
<p>3(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.</p>	<p>Mitigation measures recommended by the various specialists for the reduction of the impact significance are included in sections 5.2 to 5.5.</p>

5.2 Assessment of Impacts on Soils, Land Types and Agriculture Potential

The baseline findings and the sensitivities as per the Department of Agriculture, Forestry and Fisheries (DAFF, 2017) national raster file concur with one another. It therefore is the specialist's opinion that the land capability and land potential of the resources in the regulated area is characterised by "Low" to "Moderate" sensitivities (**figure 5.2**). The regulated area referred to is that recommended from the DFFE screening tool report. As a result, only a compliance statement was required to be completed. The results of the agricultural compliance statement indicate that the most sensitive soil form, the Oakleaf soil is present throughout the project area. This soil form is associated with a land potential of L6 and is therefore defined as having very restricted potential. No severe impacts regarding the proposed development have been identified (refer to **Appendix E** for more details).

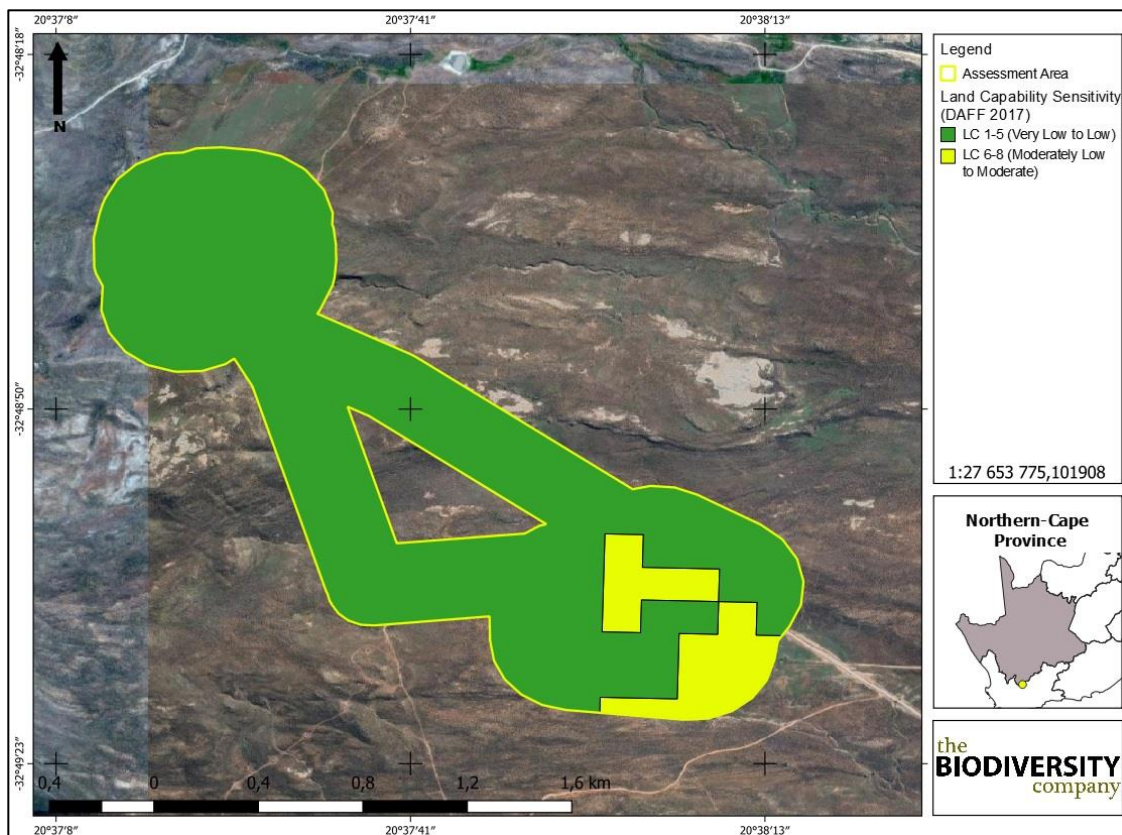


Figure 5.2: Map illustrates the land capability classification of the assessment area

5.2.1. Comparison of Grid Connection Alternatives

No preference in terms of the alternatives for the power line was identified by the specialist as a result of the low impact expected. Therefore, the decision on which option to use should be based on engineering, maintenance and cost considerations.

5.2.1. Implications of Project Implementation

The assessment area is not associated with any arable soils, due to the type of soil present as well as the climate, which in itself limits crop production significantly. The land capabilities associated with the regulated

area as identified by the DFFE screening tool report, are only suitable for grazing, which corresponds with the current land use.

It is the specialist's opinion that the proposed development will have no impacts on the agricultural production ability of the land. Additionally, the proposed activities will not result in the segregation of any high production agricultural land. Therefore, the proposed development may be favourably considered.

5.3 Assessment of Potential Impacts on Ecology (Fauna & Flora)

The construction of the BESS and associated infrastructure will have an impact on the ecological resources identified within the development area. These resources include vegetation, protected and listed plant species; fauna; habitat; conservation and broad-scale ecological processes.

Alternative routing of the grid connection has been assessed including three possible routes, 2 aligned adjacent to one another across greenfields and the other lies adjacent to the existing WEF access road. In addition, both overhead and underground options were assessed.

Table 5.1: Summary of potential impacts to biodiversity associated with the proposed activity (including both underground and overhead powerlines).

Main Impact	Project Activities	Secondary Impacts Anticipated
Loss of karoo scrub habitat	<ul style="list-style-type: none"> » Direct loss as a result of construction and operation of the proposed kV line » Secondary impacts associated with noise, dust and influx of alien invasive plants into these areas 	<ul style="list-style-type: none"> » Habitat fragmentation. » Loss of ecosystem services. » Emigration of fauna species including SCC.
Loss of rocky outcrop habitat	<ul style="list-style-type: none"> » Direct loss as a result of construction and operation of the proposed kV line » Secondary impacts associated with noise, dust and influx of alien invasive plants into these areas 	<ul style="list-style-type: none"> » Habitat fragmentation. » Loss of ecosystem services. » Emigration of fauna species including SCC.
Loss of riparian thicket habitat	<ul style="list-style-type: none"> » Secondary impacts associated with noise, dust and influx of alien invasive plants into these areas 	<ul style="list-style-type: none"> » Loss of ecosystem services
Degradation of surrounding highly sensitive habitats.	<ul style="list-style-type: none"> » Prevention of fires or incorrect fire regimes. » Removal of vegetation. » Improper solid waste disposal » Dust precipitation. » Spilling of hazardous chemicals from machinery. » Illegal hunting in sensitive areas. 	<ul style="list-style-type: none"> » Loss of flora and fauna including SCC. » Increased potential for soil erosion. » Habitat fragmentation. » Increased potential for establishment of invasive alien vegetation.
Encroachment of invasive alien species in disturbed areas.	<ul style="list-style-type: none"> » Vegetation removal. » Soil disturbance » Vehicles potentially spreading seed. 	<ul style="list-style-type: none"> » Habitat loss for native flora & fauna (including SCC). » Alteration of fauna assemblages due to habitat modification.

Main Impact	Project Activities	Secondary Impacts Anticipated
Direct mortality of fauna.	<ul style="list-style-type: none"> » Preparation of soil with heavy machinery » Intentional killing of fauna for food (hunting) or persecution (especially with regards to herpetofauna). » Pollution of water resources due to spilling of hazardous chemicals from heavy machinery during construction. 	<ul style="list-style-type: none"> » Loss of ecosystem services.
Emigration of fauna	<ul style="list-style-type: none"> » Disturbance from construction activities. » Loss of habitat and degradation of surrounding habitats. 	<ul style="list-style-type: none"> » Reduced population of SCC » Loss of ecosystem services.

A summary of the ecological impacts identified and the significance thereof for the proposed development are included below. Refer to **Appendix D** for more detail.

5.3.1. Identification of Impacts

Considering the anthropogenic activities and influences within the landscape, several negative impacts to biodiversity were observed within the assessment area. The current proposed layout of the activity will result in the irreplaceable loss of part of the CBA and a loss of protected plant species. Other impacts that are likely to occur include:

- » Destruction, further loss and fragmentation of habitats, ecosystems and vegetation communities,
- » Introduction of alien species, especially plants;
- » Destruction of protected plant species;
- » Displacement of the faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, dust, vibration and poaching);
- » Collection of eggs, nest destruction and poaching.

According to the screening tool, the proposed area of development has a very high terrestrial biodiversity sensitivity as the area falls within a CBA. The natural habitats that are found within the assessment area possess a high level of SEI as detailed in Chapter 4 and Appendix D. This is due to the combination of their functional integrity and conservation importance.

During the survey period, one near threatened mammal species was recorded. Based on the habitat present, there is also a high likelihood of select species of conservation concern (SCC) occurring within the assessment area. Several plant SCC that are provincially protected were recorded in the study area. Permits will be required for the trimming, removal or relocation of any such species from the from the Department of Environment and Nature Conservation, Kimberly (Northern Cape Province).

The karoo scrub and rocky outcrop ecosystems were still natural to largely natural based on the diversity of species recorded, and the habitat physiognomy. The current natural ecosystems provide important ecosystem services including water regulation and pollination. However, certain areas are degraded due

to overgrazing and erosion but are nevertheless functional. The findings of the field survey are therefore congruent with the screening tool.

Based on a combination of desktop and in-field delineation, two forms of a watercourse were identified and delineated within the 500 m as stated in GN 509 of 2016 applied. These include an artificial wetland system and episodic drainage lines/ features. No natural wetland systems or even cryptic wetlands were identified for the project area. The drainage lines are not characterised by riparian vegetation and grasses, these systems represent bare surfaces with evidence of surface run-off. A 15 m buffer width was recommended for the project area (all drainage features) for the construction and operational phases. The buffered areas and drainage features have been allocated as a medium sensitivity.

5.3.2. Assessment of Potential Impacts

Construction phase impacts

Impacts to biodiversity associated with the proposed construction phase Loss of vegetation within the development footprint (Construction of Substation – already constructed).

Impact Nature: Loss of vegetation within the development footprint		
Destruction, further loss and fragmentation of the habitats, ecosystems and vegetation community, including protected species.		
	Without mitigation	With mitigation
Extent	Moderate (3)	Very low (1)
Duration	Permanent (5)	Short term (2)
Magnitude	High (8)	Minor (2)
Probability	Highly probable (4)	Probable (3)
Significance	High (64)	Low (15)
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes, although this impact cannot be well mitigated as the loss of vegetation is unavoidable.	
Mitigation: See Biodiversity Management Outcomes included in Section 5.3.3.		
Residual Impacts: The loss of currently intact vegetation is an unavoidable consequence of the project and cannot be entirely mitigated. The residual impact would however be low.		

Impacts to biodiversity associated with the proposed construction phase Loss of vegetation within the development footprint (Construction of Kv line – Option A - Overhead).

Impact Nature: Loss of vegetation within the development footprint		
Destruction, further loss and fragmentation of the habitats, ecosystems and vegetation community, including protected species.		
	Without mitigation	With mitigation
Extent	Moderate (3)	Very low (1)
Duration	Permanent (5)	Short term (2)
Magnitude	Moderate (6)	Minor (2)

Probability	Highly probable (4)	Probable (3)
Significance	Medium	Low
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes, although this impact cannot be well mitigated as the loss of vegetation is unavoidable.	
Mitigation: See Biodiversity Management Outcomes included in Section 5.3.3.		
Residual Impacts: The loss of currently intact vegetation is an unavoidable consequence of the project and cannot be entirely mitigated. The residual impact would however be low.		

Impacts to biodiversity associated with the proposed construction phase Loss of vegetation within the development footprint (Construction of Kv line – Option A - Underground).

Impact Nature: Loss of vegetation within the development footprint		
Destruction, further loss and fragmentation of the habitats, ecosystems and vegetation community, including protected species.		
	Without mitigation	With mitigation
Extent	Moderate (3)	Very low (1)
Duration	Permanent (5)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Probable (3)
Significance	Medium	Low
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes, although this impact cannot be well mitigated as the loss of vegetation is unavoidable.	
Mitigation: See Biodiversity Management Outcomes included in Section 5.3.3.		
Residual Impacts: The loss of currently intact vegetation is an unavoidable consequence of the project and cannot be entirely mitigated. The residual impact would however be low.		

Impacts to biodiversity associated with the proposed construction phase Loss of vegetation within the development footprint (Construction of Kv line – Option B - Overhead).

Impact Nature: Loss of vegetation within the development footprint		
Destruction, further loss and fragmentation of the habitats, ecosystems and vegetation community, including protected species.		
	Without mitigation	With mitigation
Extent	Moderate (3)	Very low (1)
Duration	Permanent (5)	Short term (2)
Magnitude	High (6)	Minor (2)
Probability	Highly probable (4)	Probable (3)
Significance	High	Low
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High

Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes, although this impact cannot be well mitigated as the loss of vegetation is unavoidable.	
Mitigation: See Biodiversity Management Outcomes included in Section 5.3.3.		
Residual Impacts: The loss of currently intact vegetation is an unavoidable consequence of the project and cannot be entirely mitigated. The residual impact would however be low.		

Impacts to biodiversity associated with the proposed construction phase Loss of vegetation within the development footprint (Construction of Kv line – Option B - Underground).

Impact Nature: Loss of vegetation within the development footprint		
Destruction, further loss and fragmentation of the habitats, ecosystems and vegetation community, including protected species.		
	Without mitigation	With mitigation
Extent	Moderate (3)	Very low (1)
Duration	Permanent (5)	Short term (2)
Magnitude	High (8)	Minor (2)
Probability	Highly probable (4)	Probable (3)
Significance	High	Low
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes, although this impact cannot be well mitigated as the loss of vegetation is unavoidable.	
Mitigation: See Biodiversity Management Outcomes included in Section 5.3.3.		
Residual Impacts: The loss of currently intact vegetation is an unavoidable consequence of the project and cannot be entirely mitigated. The residual impact would however be low.		

Impacts to biodiversity associated with the proposed construction phase Loss of vegetation within the development footprint (Construction of Kv line – Option C - Overhead).

Impact Nature: Loss of vegetation within the development footprint		
Destruction, further loss and fragmentation of the habitats, ecosystems and vegetation community, including protected species.		
	Without mitigation	With mitigation
Extent	Moderate (3)	Very low (1)
Duration	Permanent (5)	Short term (2)
Magnitude	High (8)	Minor (2)
Probability	Highly probable (4)	Probable (3)
Significance	High	Low
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes, although this impact cannot be well mitigated as the loss of vegetation is unavoidable.	

Mitigation: See Biodiversity Management Outcomes included in Section 5.3.3.
Residual Impacts: The loss of currently intact vegetation is an unavoidable consequence of the project and cannot be entirely mitigated. The residual impact would however be low.

Impacts to biodiversity associated with the proposed construction phase Loss of vegetation within the development footprint (Construction of Kv line – Option C - Underground).

Impact Nature: Loss of vegetation within the development footprint		
Destruction, further loss and fragmentation of the habitats, ecosystems and vegetation community, including protected species.		
	Without mitigation	With mitigation
Extent	Moderate (3)	Very low (1)
Duration	Permanent (5)	Short term (2)
Magnitude	High (8)	Minor (2)
Probability	Highly probable (4)	Probable (3)
Significance	High	Low
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes, although this impact cannot be well mitigated as the loss of vegetation is unavoidable.	
Mitigation: See Biodiversity Management Outcomes included in Section 5.3.3.		
Residual Impacts: The loss of currently intact vegetation is an unavoidable consequence of the project and cannot be entirely mitigated. The residual impact would however be low.		

Impacts to biodiversity associated with the proposed construction phase: Introduction of alien species, especially plants (Construction of all infrastructure, all options).

Impact Nature: Introduction of alien species, especially plants		
Degradation and loss of surrounding natural vegetation arising from construction activities and dust precipitation		
	Without mitigation	With mitigation
Extent	High (4)	Low (2)
Duration	Long term (4)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	Medium (56)	Low (12)
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: See Biodiversity Management Outcomes included in Section 5.3.3.		
Residual Impacts: Long-term broad scale IAP infestation if not mitigated.		

Impacts to biodiversity associated with the proposed construction phase: Destruction of Protected Plant Species (Construction of the BESS)

Impact Nature: Destruction of protected plant species		
Loss of protected plant species, these are mainly provincially protected species		
	Without mitigation	With mitigation
Extent	Moderate (3)	Very low (1)
Duration	Permanent (5)	Short term (2)
Magnitude	High (8)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	High (64)	Low (10)
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	The plant SCCs require a permit for relocation.	
Mitigation: See Biodiversity Management Outcomes included in Section 5.3.3.		
Residual Impacts: The loss of some of the protected species are unavoidable.		

Impacts to biodiversity associated with the proposed construction phase: Destruction of Protected Plant Species (Construction of the Substation – already Constructed)

Impact Nature: Destruction of protected plant species		
Loss of protected plant species, these are mainly provincially protected species		
	Without mitigation	With mitigation
Extent	Moderate (3)	Very Low (1)
Duration	Permanent (5)	Short term (2)
Magnitude	High (8)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	Medium (84)	Low (10)
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes, to some extent. Noise and disturbance cannot be well mitigated. Impacts on fauna due to human presence, such as vehicle collisions, poaching, and persecution can be mitigated.	
Mitigation: See Biodiversity Management Outcomes included in Section 5.3.3.		
Residual Impacts: The loss of some of the protected species are unavoidable.		

Impacts to biodiversity associated with the proposed construction phase: Destruction of Protected Plant Species (Construction of the Kv Line - Option A - Overhead)

Impact Nature: Destruction of protected plant species		
Loss of protected plant species, these are mainly provincially protected species		
	Without mitigation	With mitigation
Extent	Moderate (3)	Very Low (1)
Duration	Permanent (5)	Short term (2)
Magnitude	High (8)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	Medium	Low
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes, to some extent. Noise and disturbance cannot be well mitigated. Impacts on fauna due to human presence, such as vehicle collisions, poaching, and persecution can be mitigated.	
Mitigation: See Biodiversity Management Outcomes included in Section 5.3.3.		
Residual Impacts: The loss of some of the protected species are unavoidable.		

Impacts to biodiversity associated with the proposed construction phase: Destruction of Protected Plant Species (Construction of the Kv Line - Option A - Underground)

Impact Nature: Destruction of protected plant species		
Loss of protected plant species, these are mainly provincially protected species		
	Without mitigation	With mitigation
Extent	Moderate (3)	Very Low (1)
Duration	Permanent (5)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	Medium	Low
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	The plant SCCs require a permit for relocation.	
Mitigation: See Biodiversity Management Outcomes included in Section 5.3.3.		
Residual Impacts: The loss of some of the protected species are unavoidable.		

Impacts to biodiversity associated with the proposed construction phase: Destruction of Protected Plant Species (Construction of the Kv Line - Option B - Overhead)

Impact Nature: Destruction of protected plant species		
Loss of protected plant species, these are mainly provincially protected species		
	Without mitigation	With mitigation
Extent	Moderate (3)	Very Low (1)
Duration	Permanent (5)	Short term (2)
Magnitude	High (8)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	High	Low
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	The plant SCCs require a permit for relocation.	
Mitigation: See Biodiversity Management Outcomes included in Section 5.3.3.		
Residual Impacts: The loss of some of the protected species are unavoidable.		

Impacts to biodiversity associated with the proposed construction phase: Destruction of Protected Plant Species (Construction of the Kv Line - Option B - Underground)

Impact Nature: Destruction of protected plant species		
Loss of protected plant species, these are mainly provincially protected species		
	Without mitigation	With mitigation
Extent	Moderate (3)	Very Low (1)
Duration	Permanent (5)	Short term (2)
Magnitude	High (8)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	High	Low
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	The plant SCCs require a permit for relocation.	
Mitigation: See Biodiversity Management Outcomes included in Section 5.3.3.		
Residual Impacts: The loss of some of the protected species are unavoidable.		

Impacts to biodiversity associated with the proposed construction phase: Destruction of Protected Plant Species (Construction of the Kv Line - Option C - Overhead)

Impact Nature: Destruction of protected plant species		
Loss of protected plant species, these are mainly provincially protected species		
	Without mitigation	With mitigation
Extent	Moderate (3)	Very Low (1)
Duration	Permanent (5)	Short term (2)

Magnitude	High (8)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	High	Low
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	The plant SCCs require a permit for relocation.	
Mitigation: See Biodiversity Management Outcomes included in Section 5.3.3.		
Residual Impacts: The loss of some of the protected species are unavoidable.		

Impacts to biodiversity associated with the proposed construction phase: Destruction of Protected Plant Species (Construction of the Kv Line - Option C - Underground)

Impact Nature: Destruction of protected plant species		
Loss of protected plant species, these are mainly provincially protected species		
	Without mitigation	With mitigation
Extent	Moderate (3)	Very Low (1)
Duration	Permanent (5)	Short term (2)
Magnitude	High (8)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	High	Low
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	The plant SCCs require a permit for relocation.	
Mitigation: See Biodiversity Management Outcomes included in Section 5.3.3.		
Residual Impacts: The loss of some of the protected species are unavoidable.		

Impacts to biodiversity associated with the proposed construction phase: Displacement of faunal community (Construction of all infrastructure, all options)

Impact Nature: Displacement of faunal community due to habitat loss, direct mortalities and disturbance		
Construction activity will likely lead to direct mortality of fauna due to earthworks, vehicle collisions, accidental hazardous chemical spills and persecution. Disturbance due to dust and noise pollution and vibration may disrupt behaviour.		
	Without mitigation	With mitigation
Extent	Moderate (3)	Low (2)
Duration	Moderate term (3)	Very short term (1)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	Medium (48)	Low (10)
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No

Can impacts be mitigated?	Yes, to some extent. Noise and disturbance cannot be well mitigated. Impacts on fauna due to human presence, such as vehicle collisions, poaching, and persecution can be mitigated.
Mitigation:	See Biodiversity Management Outcomes included in Section 5.3.3.
Residual Impacts:	It is probable that some individuals of susceptible species will be lost to construction-related activities despite mitigation. However, this is not likely to impact the viability of the local population of any fauna species.

Impacts to biodiversity associated with the proposed construction phase: Collection of eggs, nest destruction and poaching (Construction of all infrastructure, all options).

Nature: Collection of eggs, nest destruction and poaching		
	Without mitigation	With mitigation
Extent	High (4)	Low (2)
Duration	Permanent (5)	Short term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Highly probable (4)	Improbable (2)
Significance	Medium (60)	Low (16)
Status (positive or negative)	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
<ul style="list-style-type: none"> All personnel should undergo environmental induction with regards to avifauna and in particular awareness about not harming, collecting or hunting terrestrial species (e.g. guineafowl, francolin), and owls, which are often persecuted out of superstition. Signs must be put up stating that should any person be found poaching any species they will be fined. Construction must take place in the winter months as much is feasible. 		
Residual Impacts:		
There is a possibility that the eggs to be poached could be that of an SCC with decreasing numbers		

Operational Phase Impacts

Impacts to biodiversity associated with the proposed operational phase: Continued fragmentation and degradation of habitats and ecosystems (Operation of all infrastructure, all options).

Impact Nature: Continued fragmentation and degradation of habitats and ecosystems		
Disturbance created during the construction phase will leave the project area vulnerable to erosion and IAP encroachment.		
	Without Mitigation	With Mitigation
Extent	Moderate (3)	Low (2)
Duration	Long term (4)	Very short term (1)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	Medium (52)	Low (10)
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Yes	No

Can impacts be mitigated?	Yes, with proper management and avoidance, this impact can be mitigated to a low level.
Mitigation: See Biodiversity Management Outcomes included in Section 5.3.3.	
Residual Impacts There is still some potential for erosion and IAP encroachment even with the implementation of control measures. Impacts will however be low with the implementation of control measures.	

Impacts to biodiversity associated with the proposed operational phase: Spread of alone and/or invasive species (Operation of all infrastructure, all options).

Impact Nature: Spread of alien and/or invasive species		
Degradation and loss of surrounding natural vegetation		
	Without mitigation	With mitigation
Extent	High (4)	Low (2)
Duration	Long term (4)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	Medium (56)	Low (12)
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: See Biodiversity Management Outcomes included in Section 5.3.3.		
Residual Impacts: Long term broad scale IAP infestation if not mitigated.		

Impacts to biodiversity associated with the proposed operational phase: Ongoing displacement and direct mortalities of faunal community (Operation of BESS)

Impact Nature: Ongoing displacement and direct mortalities of faunal community (including SCC) due to disturbance (road collisions, collisions with substation, noise, light, dust, vibration)		
The operation and maintenance of the proposed development may lead to disturbance or persecution of fauna in the vicinity of the development.		
	Without Mitigation	With Mitigation
Extent	Moderate (3)	Low (2)
Duration	Long term (4)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	Medium (39)	Low (12)
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: See Biodiversity Management Outcomes included in Section 5.3.3.		

Residual Impacts:

- » Disturbance from maintenance activities will occur albeit at a low and infrequent level.
- » Less migratory species will be found in the area.
- » Road killings are still a possibility.
- » Migratory routes of fauna will change, fauna and flora species composition will change.

Impacts to biodiversity associated with the proposed operational phase: Ongoing displacement and direct mortalities of faunal community (Operation of Substation)

Impact Nature: Ongoing displacement and direct mortalities of faunal community (including SCC) due to disturbance (road collisions, collisions with substation, noise, light, dust, vibration)

The operation and maintenance of the proposed development may lead to disturbance or persecution of fauna in the vicinity of the development.

	Without Mitigation	With Mitigation
Extent	Moderate (3)	Low (2)
Duration	Long term (4)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	Medium (39)	Low (12)
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

See Biodiversity Management Outcomes included in Section 5.3.3.

Residual Impacts

- » Disturbance from maintenance activities will occur albeit at a low and infrequent level.
- » Less migratory species will be found in the area.
- » Road killings are still a possibility.
- » Migratory routes of fauna will change, fauna and flora species composition will change.

Impacts to biodiversity associated with the proposed operational phase: Ongoing displacement and direct mortalities of faunal community (Operation of kV line – Option A – Overhead)

Impact Nature: Ongoing displacement and direct mortalities of faunal community (including SCC) due to disturbance (road collisions, collisions with substation, noise, light, dust, vibration)

The operation and maintenance of the proposed development may lead to disturbance or persecution of fauna in the vicinity of the development.

	Without Mitigation	With Mitigation
Extent	Moderate (3)	Low (2)
Duration	Long term (4)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	Medium (39)	Low (12)
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

See Biodiversity Management Outcomes included in Section 5.3.3.

Residual Impacts

- » Disturbance from maintenance activities will occur albeit at a low and infrequent level.
- » Less migratory species will be found in the area.
- » Road killings are still a possibility.
- » Migratory routes of fauna will change, fauna and flora species composition will change.

Impacts to biodiversity associated with the proposed operational phase: Ongoing displacement and direct mortalities of faunal community (Operation of kV line – Option B – Overhead)

Impact Nature: Ongoing displacement and direct mortalities of faunal community (including SCC) due to disturbance (road collisions, collisions with substation, noise, light, dust, vibration)

The operation and maintenance of the proposed development may lead to disturbance or persecution of fauna in the vicinity of the development.

	Without Mitigation	With Mitigation
Extent	Moderate (3)	Low (2)
Duration	Long term (4)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	Medium (39)	Low (12)
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

See Biodiversity Management Outcomes included in Section 5.3.3.

Residual Impacts

- » Disturbance from maintenance activities will occur albeit at a low and infrequent level.
- » Less migratory species will be found in the area.
- » Road killings are still a possibility.
- » Migratory routes of fauna will change, fauna and flora species composition will change.

Impacts to biodiversity associated with the proposed operational phase: Ongoing displacement and direct mortalities of faunal community (Operation of kV line – Option C – Overhead)

Impact Nature: Ongoing displacement and direct mortalities of faunal community (including SCC) due to disturbance (road collisions, collisions with substation, noise, light, dust, vibration)

The operation and maintenance of the proposed development may lead to disturbance or persecution of fauna in the vicinity of the development.

	Without Mitigation	With Mitigation
Extent	Moderate (3)	Low (2)
Duration	Long term (4)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	Medium (39)	Low (12)
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

See Biodiversity Management Outcomes included in Section 5.3.3.

Residual Impacts

- » Disturbance from maintenance activities will occur albeit at a low and infrequent level.
- » Less migratory species will be found in the area.
- » Road killings are still a possibility.
- » Migratory routes of fauna will change, fauna and flora species composition will change.

Impacts to biodiversity associated with the proposed operational phase: Collisions with powerlines, connection lines and fences (Operation of BESS, Substation and Kv lines – Options A, B and C – Overhead)

Nature: Collisions with powerlines and connection lines and fences		
The powerlines and connections create a collision risk † avifauna.		
	Without mitigation	With mitigation
Extent	High (4)	High (4)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	Moderate (6)
Probability	Highly probable (4)	Probable (3)
Significance	High (64)	Medium (42)
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
<ul style="list-style-type: none"> • Infrastructure should be consolidated where possible in order to minimise the amount of ground and air space used. This would involve using existing/approved pylons and associated infrastructure for the kV lines. • Powerlines must be marked with industry standard (at the time of construction) bird flight diverters. • Fencing mitigations: <ul style="list-style-type: none"> • Top 2 strands must be smooth wire • Routinely retention loose wires • Minimum 30cm between wires • Place markers on fences 		
Residual Impacts:		
Some collisions of avifauna might still occur regardless of mitigation		

Impacts to biodiversity associated with the proposed operational phase: Electrocution by Powerline (Operation of Kv line – Options A, B and C – Overhead)

Nature: Electrocution by powerline		
	Without mitigation	With mitigation
Extent	High (4)	High (4)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	Moderate (6)
Probability	Highly probable (4)	Improbable (2)
Significance	High (64)	Low (28)
Status (positive or negative)	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
<ul style="list-style-type: none"> • Perches (if in accordance with Eskom standards) should be placed on pylons to allow for avifauna to perch on the pylons in positions safe from electrocution. 		

<ul style="list-style-type: none"> • Ensure that monitoring is sufficiently frequent (preferably monthly for the first year, followed by quarterly thereafter) to detect electrocutions reliably and that any areas where electrocutions occurred are repaired as soon as possible. • During the first year of operation, quarterly reports summarizing interim findings should be compiled by the owner of the powerlines and submitted to BirdLife South Africa. If the findings indicate that electrocutions have not occurred or are minimal with no red-listed species, an annual report can be submitted.
<p>Residual Impacts: Electrocutions might still occur regardless of mitigations</p>

Cumulative impacts

Cumulative Impacts to biodiversity associated with the proposed project

The development of the proposed infrastructure will contribute to cumulative habitat loss, thereby impacting ecological processes in the region.		
	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	Moderate (3)	Moderate (3)
Duration	Short term (2)	Short term (2)
Magnitude	Low (4)	Moderate (6)
Probability	Probable (3)	Probable (3)
Significance	Low (27)	Medium (33)
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	
<p>Mitigation: Should the vegetation be removed, the impact cannot be mitigated.</p>		
<p>Residual Impacts: Will result in the loss of:</p> <ul style="list-style-type: none"> • Less migratory species will be found in the area. • Road killings are still a possibility. • Migratory routes of fauna will change. • Fauna and flora species composition will change. 		

5.3.3 Biodiversity Management Outcomes

Management Outcome: Vegetation and Habitats				
Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
All development areas must be clearly demarcated. No development is to occur in areas possessing 'Very High' SEI. Only the 'High' SEI areas that have been authorised for development could be intruded into. These areas can be spanned, as long as no infrastructure, including construction phase access tracks are to be constructed or used. These areas must remain out of bounds.	Life of operation	Project Manager	Infringement into these areas	Ongoing
Areas of indigenous vegetation outside of the direct project footprint, should under no circumstances be fragmented or disturbed further.	Life of operation	Project Manager	Natural Areas (Karoo scrub, Rocky outcrops and Riparian thicket)	Ongoing
All activities must make use of existing roads and tracks as far as practically and feasibly possible. .	Life of operation	Project Manager	Roads and paths used	Ongoing
Apply for a permit to relocate protected plant species into the on-site relocation areas already used for transplantation of rescued plants or if not available, then to similar habitat recommended by a specialist.	Construction	Project Manager	Relocation/destruction of protected plant species	Ongoing
All laydown areas, chemical toilets etc. should be restricted to 'Very Low' SEI areas. Any materials may not be stored for extended periods of time and must be removed from the project area once the construction phase has been concluded. Use of re-usable/recyclable materials are recommended.	Construction	Project Manager Foreman	Laydown areas and material storage & placement.	Ongoing
Progressive rehabilitation of areas that have been cleared of invasive plants will enable topsoil to be returned more rapidly, thus ensuring more recruitment from the existing seedbank. Any	Life of operation	Project Manager	Site footprint rehabilitation	During Phase

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
woody material removed can be shredded and used in conjunction with the topsoil to augment soil moisture and prevent further erosion.				
Areas that have been disturbed but will not undergo development must be revegetated with indigenous vegetation.	Life of operation	Project Manager	Rehabilitated areas	Ongoing
A spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use.	Life of operation	Project Manager Contractors Foreman	Spill events, Vehicles dripping.	Ongoing
Eroded areas must be rehabilitated using the appropriate techniques and re-vegetated using indigenous flora.	Life of operation	Project Manager	Erosion area	Annually

Management Outcome: Fauna

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
A qualified environmental control officer must be on site when construction begins to identify fauna species that will be directly disturbed and to relocate protected fauna/flora that are found during the construction activities. The area must be walked through prior to construction to ensure no faunal species remain in the habitat and get killed. Should animals not move out of the area on their own relevant specialists must be contacted to advise on how the species can be relocated.	Construction	Project Manager Contractor	Presence of any fauna	Ongoing
Noise must be kept to an absolute minimum during the evenings and at night to minimize all possible disturbances to amphibian species and nocturnal mammals.	Construction	Project Manager Contractor Foreman	Noise levels	Ongoing
No trapping, killing, or poisoning of any wildlife is to be allowed	Life of operation	Project Manager Contractor	Evidence of trapping or carcasses	Ongoing
The duration of the construction should be minimized to as short term as possible, to reduce the period of disturbance on fauna	Construction Phase	Project Manager Contractor	Construction	Ongoing

Management Outcome: Invasive Alien Plants

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas thereby causing further encroachment of invasive species.	Construction	Project Manager Contractor	Footprint Area	Bi-annually (twice a year)

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
An Invasive Alien Plant control programme must be implemented to control the encroachment of invasive plant species. It is essential that invasives be removed from areas that have been categorised as possessing a 'High' or 'Very High' SEI.	Life of Operation	Project Manager Contractor	Footprint Area	Bi-annually (twice a year)

Management Outcome: Dust Pollution

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all areas of construction. This includes wetting of exposed soft soil surfaces.	Life of operation	Project Manager Contractor	Dustfall	As per the air quality report and the dust monitoring program.

Management Outcome: Waste management

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
Waste management must be a priority and all waste must be collected and stored effectively. All solid waste collected shall be disposed of at a licensed disposal facility	Life of operation	Project Manager Contractor	Waste Removal	Weekly
Portable toilets must be pumped dry to ensure the system does not degrade over time and spill into the surrounding area.	Life of operation	Health and Safety Officer Contractor	Number of toilets per staff member. Waste levels	Daily
Where a registered disposal facility is not available close to the project area, the Contractor shall provide a method statement with regard to waste	Life of operation	Project Manager Health and Safety Officer Contractor	Collection/handling of the waste.	Ongoing

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
management. Under no circumstances may domestic waste be burned on site				
Refuse bins will be emptied and secured. Temporary storage of domestic waste shall be in covered waste skips. Domestic waste storage must be cleared at least monthly. Recycling is encouraged.	Life of operation	Project Manager Health and Safety Officer Contractor	Management of bins and collection of waste	Ongoing

Management Outcome: Environmental Awareness Training

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
All personnel to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. Discussions are required on sensitive environmental receptors within the project area to inform contractors and site staff of the presence of species, their identification, conservation status and importance, biology, habitat requirements and management requirements within the Environmental Authorisation and the EMPr.	Life of operation	Project Manager Health and Safety Officer Contractor Environmental Officer	Compliance to the training.	As needed

5.3.4 Comparison of Power Line Alternatives

Based on the provided options for the proposed 132kV line:

- 1) Options A
 - a. Overhead
 - b. Underground
- 2) Option B
 - a. Overhead
 - b. Underground
- 3) Option c
 - a. Overhead
 - b. Underground

The option with the least impacts is Option A, adjacent to the existing constructed road. Use of this option would reduce further fragmentation as well as limiting loss of biodiversity and SCC to one area. The Overhead option would decrease the impacts to vegetation and allow for the avoidance of no-go areas (one such area is present along Alternative 1) however, this would have a greater impact on avifauna. The underground option will increase impacts to flora but decrease impacts to avifauna. Both are considered to have equal impacts overall and the decision on which option to use should be based on engineering, maintenance and cost considerations.

Regarding the overhead or underground options, either is feasible from a freshwater ecology perspective.

5.3.5 Implications for Project Implementation

From the findings of the ecological impact assessment, the main impacts expected from the proposed activity are the loss of CBA areas, degradation and further fragmentation of surrounding natural habitats, the direct mortality of faunal species and the emigration of fauna SCC due to disturbance. Considering this information, the proposed development will result in the destruction of some functional habitats. Due to the presence of non-perennial watercourses within the 500 m regulatory area, a risk assessment was completed in line with Section 21 (c) and (i) of the National Water Act, 1998, (Act 36 of 1998). Regarding the overhead or underground options, there are expected low post-mitigation risks, and a General Authorisation is permissible for the development.

It is the opinion of the specialist that the proposed activities can go ahead provided areas of high SEI are avoided, and control of introduced alien invasive plants, as well as erosion mitigation is implemented. All Biodiversity Management Objectives provided in the specialist report contained in Appendix D and mitigation measures provided in other supporting specialist reports must be implemented.

5.4 Assessment of Impacts on Heritage (including archaeological and palaeontological resources)

The significance of the negative impact on heritage, including archaeological, built environment and palaeontological resources expected within the proposed development area have been assessed (refer to **Appendix F** for more details).

5.4.1. Results of the Heritage and Palaeontological Impact Assessment

Archaeology and Built Environment

In a recent walkdown of the proposed development area (July, 2020), a stone packed feature with possible burial characteristics was identified (refer to **Figure 5.3**). The specialists are of the opinion that it is highly unlikely to be a burial site and it is more than likely another historical beacon similar to one identified on a neighbouring farm.

Whilst the feature cannot be confirmed as being a grave unless excavations are carried out, Booth (2020) has made the following recommendations, which have been endorsed and added to by SAHRA (September 2020):

- » The stone packed feature should be fenced with an entry gate and clearly demarcated prior to the commencement of construction activities for the establishment of Pylon No.5. As per SAHRA's recommendations (26 May 2014), the fence should be placed 5 metres away from the perimeter of the graves and that no development is allowed within 30 metres of the fence line surrounding the graves. However, it is acceptable that the relocation of Pylon No. 5 be shifted 15 m south to allow for a 5 m buffer between the stone packed feature and the fence and therefore allow a 10 m buffer between the fence and tower, taking into consideration the limiting factors mentioned above.
- » General fencing materials such as mesh fencing may be used, approximately 1.2 m in height, and treated wooden droppers as the corner posts, approximately 5 cm in width, or similar alternative materials.
- » The environmental control officers (ECOs) must liaise with the archaeologist regarding the fencing materials being used for the erection of the fence and the planned area for the establishment of the fence. This must be done during the erection and completion of the fence.
- » At this point, it is not necessary for the archaeologist to be on-site during the construction of the fence and pylon if the ECO keeps in contact with the archaeologist, as in recommendation 3.

Based on the information available, the area proposed for development has been previously thoroughly surveyed for archaeological heritage and has been found to have an overall low archaeological sensitivity. It is recommended that no further assessment of impact to heritage resources is warranted.

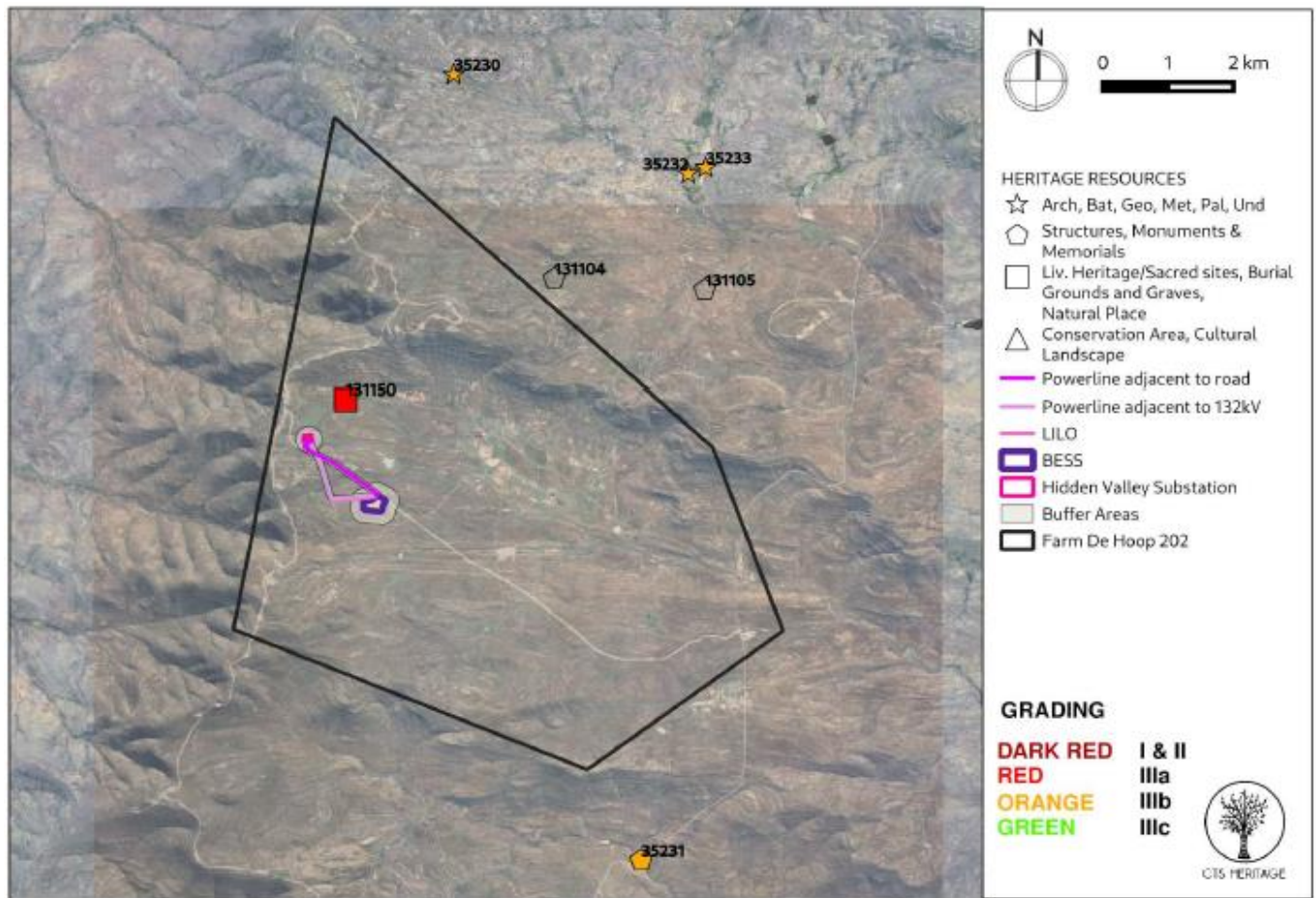


Figure 5.3: Heritage Resources previously identified within the study area

Palaeontology

Based on desktop studies and field surveys done for the proposed development area, it can be concluded that the proposed development will unlikely have a significant negative impact on palaeontological resources within the area, however, it is recommended that the Chance Fossil Finds Procedure be implemented during excavation activities.

5.4.2. Assessment of Potential Impacts

Construction Phase

Nature: Significant archaeological, built environment and palaeontological heritage resources may be impacted by the construction phase of the proposed development		
	Archaeology	Palaeontology
Extent	Local (1)	Local (1)
Duration	High (5)	High (5)
Magnitude	Low (1)	Low (1)
Probability	Low (1)	Low (1)
Significance	Low (7)	Low (7)
Status (positive or negative)	Neutral	Neutral
Reversibility	Irreversible	Irreversible
Irreplaceable loss of resources?	Possible	Possible

Can impacts be mitigated?	Yes
Mitigation:	
<ul style="list-style-type: none"> » A person must be trained as a site monitor to report any archaeological sites found during the development. Construction managers/foremen and/or the Environmental Control Officer (ECO) should be informed before construction starts on the possible types of heritage sites and cultural material they may encounter and the procedures to follow when they find sites. The attached Chance Fossil Finds Procedure must be noted for inclusion into the EMPR to be adhered to in construction and excavation phases of development. » Any substantial fossil remains (e.g. vertebrate bones and teeth, shells) encountered during excavation should be reported to SAHRA for possible mitigation by a professional palaeontologist The contact details of SAHRA is as follows: <ul style="list-style-type: none"> - 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa - Phone: +27 (0)21 462 4502. - Fax: +27 (0)21 462 4509 - Web: www.sahra.org.za). 	
Residual Impacts:	
<ul style="list-style-type: none"> » If concentrations of historical and pre-colonial archaeological heritage material and/or human remains (including graves and burials) are uncovered during construction, all work must cease immediately and be reported to the South African Heritage Resources Agency (SAHRA) so that systematic and professional investigation/excavation can be undertaken. Phase 2 mitigation in the form of test-pitting/sampling or systematic excavations and collections of the pre-colonial shell middens and associated artefacts will then be conducted to establish the contextual status of the sites and possibly remove the archaeological deposit before development activities continue » Should substantial fossil remains such as vertebrate bones and teeth, plant-rich fossil lenses, fossil wood or dense fossil burrow assemblages be exposed during construction, the responsible ECO/EO/Environmental Representative should safeguard these, preferably in situ, and alert SAHRA, i.e. The South African Heritage Resources Authority, as soon as possible (Contact details: Mr P. Hine P.O. Box 4637, Cape Town 8000. Tel: 021 462 4502. Email: cscheermeyer@sahra.org.za) so that appropriate action can be taken by a professional palaeontologist, at the Proponent's expense. Mitigation would normally involve the scientific recording and judicious sampling or collection of fossil material as well as associated geological data (e.g. stratigraphy, sedimentology, taphonomy) by a suitably qualified palaeontologist. 	

5.4.3. Comparison of Power Line Alternatives

No preference in terms of the alternatives for the grid connection was identified by the specialist as a result of the low impact expected. Therefore, the decision on which option to use should be based on engineering, maintenance and cost considerations.

5.4.4. Implications for Project Implementation

Based on the results of the previous heritage studies completed for the broader site, and the heritage screening undertaken for the proposed BESS and associated infrastructure it is considered by the specialist that it is unlikely that the proposed development will negatively impact significant archaeological and built environment and palaeontological heritage, as long as the recommendations are implemented.

5.5. Assessment of Noise Impacts

The BESS facility generates low levels of noise relating to the climate control system. Considering the potential development zone, this BESS would be further than 1 000 m from the closest identified noise-sensitive developments (NSDs) at any location within this proposed area. At an estimated noise level of less than 60dB, this is an insignificant noise and this noise will be inaudible at a distance further than 200 m from such

a BESS. The sound will be inaudible at the closest NSD. **Figure 5.4** illustrates the output defining the potential sensitivities around the proposed development, highlighting that the proposed BESS would be located in an area with a low sensitivity to noise.

5.5.1. Comparison of Power Line Alternatives

As no noise is associated with the power line, no assessment of impacts in this regard was undertaken. Therefore, no statement regarding preference of alternatives was provided.

5.5.2. Implications of Project Implementation

The noise from the climate control system of the BESS is significantly less than the noise that will be generated by the proposed Karusa WEF, and noise from the climate control system will not cumulatively add to the noise of the WEF.

It is therefore the opinion of the specialist that there is no potential for a noise impact and that no further Scoping or other acoustical studies would be required for the proposed BESS. No specific mitigation measures regarding noise or additional noise measurements are recommended. No additional conditions regarding noise are recommended for inclusion in the EMPr. It is therefore recommended that the Karusa BESS project be approved.

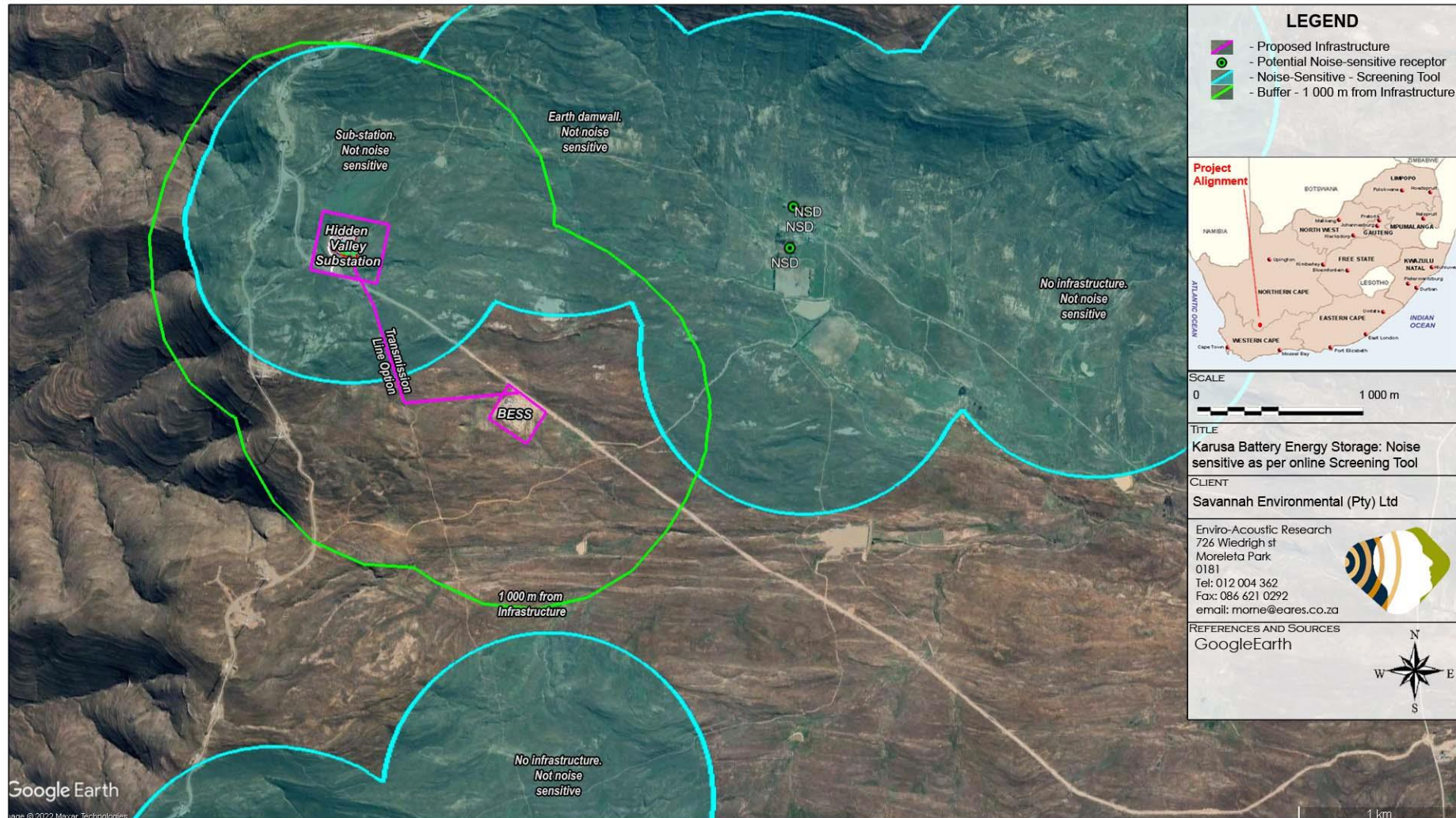


Figure 5.4: Illustration showing that the proposed area of development is associated with low noise sensitivity

5.6 Risks Associated with the Battery Energy Storage System

A Battery Energy Storage Systems (BESS) will allow for energy storage for an extended period. The general purpose and utilisation of the BESS will be to save and store excess electrical output from the facility as it is generated, allowing for a timed release to the national grid when the capacity is required the most and the provision of ancillary services to ensure reliable operation of power networks during normal operation and contingency events. The BESS will be contained within insulated containers on site and will connect to the on-site MV/HV facility substation via underground MV cabling and via overhead or underground HV power line to be connected to the existing Hidden Valley Substation.

The risks associated with battery technologies are generally well understood and researched. The primary risks relate to fire hazards and the potential for a condition known as 'thermal runaway'. Thermal runaway occurs in situations where an increase in temperature changes the conditions in a way that causes a further increase in temperature, often leading to a destructive result. The risks detailed in the table overleaf considers only the risks associated with on-site use of battery energy storage system.

Possible risks associated with the construction and operation of the BESS from a technical perspective are limited to health and safety aspects during the project life cycle of the BESS. Mitigation measures have been included within the project EMPr (refer to **Appendix H** and **Appendix I**).

The BESS will be compliant with all local laws and regulations such as NFPA 855 (Standard for the Installation of Stationary Energy Storage Systems), NFPA 68 (Standard on Explosion protection by deflagration) and NFPA 69 (Standard on explosion prevention systems, as well as health and safety requirements governing battery facilities. Over and above that, they will comply with international standards such as UN 38.3 (Transportation Testing for Lithium Batteries), UL 1642 (Standard for Safety – Lithium-ion Batteries), EN 14491 (European Standards for Dust Explosion Venting Protective Systems), and IEC 62619 (Secondary cells and batteries containing alkaline or other non-acid electrolytes Safety requirements for secondary lithium cells and batteries, for use in industrial applications). Furthermore, the battery facility will also conform to standards such as UL 1973 (Batteries for Use in Stationary Applications) and IEC 62619-2017 including thermal runaway non-propagation and safety zone region operation limits and a failure mode analysis. The design will be compliant with UL 9540 (Energy Storage Systems and Equipment) which defines the safety requirements for battery installation in industrial and grid connected applications.

Table 5.2 Risks associated with on-site use of battery energy storage system

Nature of Risk	Likelihood	Impact	Mitigation / Management of Risk
<p>1. <u>Mechanical breakdown/ Exposure to high temperatures</u></p> <ul style="list-style-type: none"> » Incidents where the batteries are broken or exposed to temperature above room temperature could lead to overheating as well as fires which can affect infrastructure components of the IESS. » Leakages of substances contained within the battery cells (should they not be assembled off-site). 	<p>Low</p>	<ul style="list-style-type: none"> » Fires, electrocutions and spillage of toxic substances into the surrounding environment. » Spillage of hazardous substances into the surrounding environment. » Soil contamination – leachate from spillages which could lead to an impact of the productivity of soil forms in affected areas. » Water Pollution – spillages into surrounding watercourses as well as groundwater. » Health impacts – on the surrounding communities, particularly those relying on watercourses (i.e. rivers, streams, etc) as a primary source of water. 	<p>Operators are trained and competent to operate the BESS. Training should include the discussion of the following:</p> <ul style="list-style-type: none"> * 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. <ul style="list-style-type: none"> » Training records should be kept on file and be made available during audits. » Battery supplier user manuals safety specifications and Material Safety Data Sheets (MSDS) are filed on site at all times. » Compile method statements for approval by the Technical/SHEQ Manager for the operation and management and replacement of the battery units / electrolyte for the duration of the project life cycle. Method statements should be kept on site at all times. » Compile an emergency response plan for implementation in the event of a spill or leakage. » Provide signage on site specifying the types of batteries in use and the risk of exposure to hazardous material and electric shock. Signage should also specify how electrical and chemical fires should be dealt with by first responders, and the potential risks to first responders (e.g. the inhalation of toxic fumes, etc.). » Firefighting equipment should readily be available at the IESS area and within the site. » Lithium-ion batteries must have battery management systems (containment, automatic alarms and shut-off systems) to monitor and protect cells from overcharging or damaging conditions. » Maintain strict access control to the BESS area. » Ensure all maintenance contractors / staff are familiar with the supplier's specifications. » Undertake daily risk assessment prior to the commencement of daily tasks at the BESS. This should consider any aspects which

Nature of Risk	Likelihood	Impact	Mitigation / Management of Risk
			<p>could result in fire or spillage, and appropriate actions should be taken to prevent these.</p> <ul style="list-style-type: none"> » Standard Operating Procedures (SOPs) should be made available by the Supplier to ensure that the batteries are handled in accordance with required best practices. » Spill kits must be made available to address any incidents associated with the flow of chemicals from the batteries into the surrounding environment. » Any spills must be cleaned up immediately and contaminated absorbents and materials or soil disposed of at a licensed hazardous waste disposal facility. » The assembly of the batteries on-site should be avoided as far as possible. Activities on-site for the BESS should only be limited to the placement of the container wherein the batteries are placed. » Undertake periodic inspections on the BESS to ensure issues are identified timeously and addressed with the supplier where relevant. » The applicant in consultation with the supplier must compile and implement a Leak and Detection Monitoring Programme during the project life cycle of the BESS. » Batteries must be strictly maintained by the supplier or suitably qualified persons for the duration of the project life cycle. No unauthorised personnel should be allowed to maintain the BESS.
<p>2. <u>Generation of hazardous waste</u></p> <ul style="list-style-type: none"> » The incorrect disposal of the batteries and the associated components could have an adverse impact 	Medium	<ul style="list-style-type: none"> » Spillage of hazardous substances into the surrounding environment. » Soil contamination – leachate from the disposed batteries into the soil, which could lead to an impact of the productivity of soil forms in affected areas. » Water pollution – leachate from the disposed batteries spilling into surrounding watercourses as well as groundwater. 	<ul style="list-style-type: none"> » Damaged and used batteries must be removed from site by the supplier or any other suitably qualified professional for recycling or appropriate disposal. » The applicant should obtain a cradle to grave battery management plan from the supplier during the planning and design phase of the system. The plan must be kept on site and adhered to.

Nature of Risk	Likelihood	Impact	Mitigation / Management of Risk
on the environment.		» Health impacts – on the surrounding communities, particularly those relying on watercourses (i.e. rivers, streams, etc) as a primary source of water.	

5.7 Assessment of the 'Do Nothing' Alternative

The "do-nothing" alternative (i.e. no-go alternative) is the option of not constructing the proposed Karusa BESS. Should this alternative be selected, there would be no direct environmental impacts within the designated BESS footprint. The implementation of the 'do-nothing' alternative will result in the opportunity to store electricity for evacuation to the national grid at times when it is required will be lost. In addition, there will be no potential to contribute to the identified requirement for energy storage as per the IRP at this site.

To ensure a positive environmental impact, the environmental benefits of the BESS must outweigh the potential negative impacts.

Based on the outcomes of the specialist studies undertaken (as outlined in this chapter of the report), it can be concluded that limited environmental costs can be anticipated at a local and site-specific level, and are considered acceptable provided the mitigation measures as outlined in the BA Report and EMPs (**Appendix H and Appendix I**) are implemented and adhered to. These environmental costs could include:

- » A loss of biodiversity, flora and fauna; the destruction, further loss and fragmentation of habitats, ecosystems and vegetation communities; the encroachment of alien species especially plants; the destruction of protected plant species; the displacement of faunal species as a result of habitat loss, direct mortalities and disturbance; and the collection of eggs, nest destruction and poaching. Impacts in this regard have been minimised through the placement of the infrastructure within previously disturbed areas on the site.
- » The destruction of a possible burial site. Impacts in this regard can be avoided through the careful placement of infrastructure.

These costs are expected at a local level and can be effectively mitigated and managed.

Several positive impacts are associated with the establishment and operation of the BESS and associated infrastructure in the proximity of the Karusa Wind Farm. These include but are not limited to:

- » The ability to support the integration of stored energy into the electricity grid and operate at optimal levels. The BESS will be utilised to store energy produced by the regional renewable generators at times when surplus energy is produced (i.e. at times when production exceeds demand), where previously these facilities would be running at a lower efficiency to supply that reduced demand, with a potential of unused energy being lost (load levelling).
- » Increased energy production from the potential future renewable generators and extension of the production time thereof by releasing stored energy that may otherwise have been lost, at times of high demand or poor generation. This reduces the dependence of conventional inefficient energy generation technologies that would be utilised during peak times and defers the need to construct additional power generation facilities with a footprint and environmental impact larger than that of the BESS to provide electricity in the hours during which electricity can be supplied to the grid from the BESS. This reduces the potential for cumulative impacts on the environment associated with the construction of additional power generation facilities.
- » Storage of energy allows for a reduced dependence on fossil fuel based peaking plants. The benefits of this scenario relates to reduced use of non-renewable resources and net emissions, and the associated reduced environmental impacts.

- » Employment opportunities: Substantial employment opportunities will be provided by the BESS during its construction, and less so during operation, as a result of the required maintenance and control of the BESS. Local people will be properly trained and utilised. This will contribute to addressing issues related to unemployment in the region.

These benefits will occur at a regional and national level and are expected to outweigh the negative impacts.

As detailed above, the 'do-nothing' alternative will result in lost opportunities and will conserve only a minor (~6ha) portion of vegetation and habitat within the broader Karusa BESS footprint. The 'do-nothing' alternative is therefore not considered to have a significant benefit when compared to the implementation of the proposed BESS, and is therefore not considered as a preferred alternative and not proposed to be implemented for the development of the facility.

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

Enel Green Power South Africa (Pty) Ltd proposes the construction and operation of a Battery Energy Storage System (BESS) and associated infrastructure ~45km south of the town of Sutherland along the R354 and 47km north west of the town of Laingsburg along the R323 in the Northern Cape Province. The project will be located on Farm De Hoop 202 within the Karoo Hoogland Local Municipality which lies within the jurisdiction of the Namakwa District Municipality. The BESS will store and supply dispatchable energy as and when required by the off-taker.

The proposed project as assessed in this report will include the following infrastructure:

- » A BESS with a capacity of up to 2 000 MWh, inside containers with a footprint of up to 6ha in extent and a maximum height of 3m. Both lithium-ion and Redox-flow technology are being considered for the project, depending on which is most feasible at the time of implementation.
- » Access roads to the BESS (10m in width, approximately 70m long) branching off of the existing roads, and internal roads (up to 8m wide) to be located within the total BESS footprint area.
- » 33kV MV cabling between the BESS and the MV/HV substation and up to 132kV HV cabling to the HV substation
- » Fencing around the BESS for increased security measures.
- » Up to 132kV overhead or underground power line to be connected to the existing Hidden Valley Substation.
- » Temporary laydown area to be located within the BESS footprint.
- » Firebreak to be located within the BESS footprint.
- » A Substation with a maximum height of - HV bus-bar up to 10 m max and an HV Building up to 4 m max

The general purpose and utilisation of a BESS is to save and store excess electrical output as it is generated, allowing for a timed release of electricity to the grid when the capacity is required the most and the provision of ancillary services to ensure reliable operation of power networks during normal operation and contingency events. BESS systems therefore provide flexibility and reliability services for the efficient operation of the electricity grid. The BESS will be utilised to store energy produced by the regional renewable generators at times when surplus energy is produced (i.e. at times when production exceeds demand), where previously these facilities would be running at a lower efficiency to supply that reduced demand, with a potential of unused energy being lost (load levelling).

The following has been considered within the Basic Assessment process for this project (refer to **Figure 6.1**):

- » Buffer around the BESS site of 200m
- » Power line corridor (100m) with 50m either side of centre line
- » Buffer around Hidden Valley Substation of 200m

Three alternative grid connection alternatives were proposed for investigation as follows:

- » Alternative 1: Loop in and Loop out of the Hidden Valley-Komsberg line
- » Alternative 2: New power line to the Hidden Valley Substation following the routing of the Hidden Valley-Komsberg line
- » Alternative 3: New power line to the Hidden Valley Substation following the access road to the north of the BESS site

The option of implementing the power line either as an overhead line or underground cabling has been considered,

Two types of battery storage systems and technologies were detailed in this Basic Assessment Report. As detailed in Chapter 2, while there are significant differences in how these systems operate, their design and functions are closely related. As such, the issues and impacts associated with the various technologies are cross-cutting and common to both technologies. It is important to note that while both types of technologies are being offered, no preferred technology selection is currently possible given the fast pace of development and steady price decreases of the BESS technologies in general. In addition, should appropriate controls and mitigation measures be implemented, no discernible environmental preference is evident between these technologies and thus both are being put forward for authorisation with equal preference. Should the development be authorised, it is thus requested that both technology options (lithium-ion and redox-flow) be authorised for development on the understanding that further investigation into the specific technologies available at the time of being awarded preferred bidder status will allow for one of the two to be selected and ultimately developed.

A summary of the recommendations and conclusions for the proposed development as determined through the BA process is provided in this Chapter.

6.1. Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

This chapter of the BA Report includes the following information required in terms of Appendix 1: Content of the BA Report:

Requirement	Relevant Section
3(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	A summary of the findings of the specialist studies undertaken for the project has been included in section 6.2 .
3(l) an environmental impact statement which contains (i) a summary of the key findings of the environmental impact assessment, (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives.	An environmental impact statement containing the key findings of the environmental impacts of the project has been included as section 6.4 . Sensitive environmental features located within the study area and development area, overlain with the proposed development footprint have been identified and are shown in Figure 6.1 . A summary of the positive and negative impacts associated with the project has been included in section 6.2 .
h (xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity.	A concluding statement indicating the preferred alternatives and the preferred location of the activity is included in section 6.4 and 6.5 .
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.	All conditions required to be included in the Environmental Authorisation of the BESS have been included in section 6.5 .
3(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.	A reasoned opinion as to whether the BESS should be authorised has been included in section 6.5 .

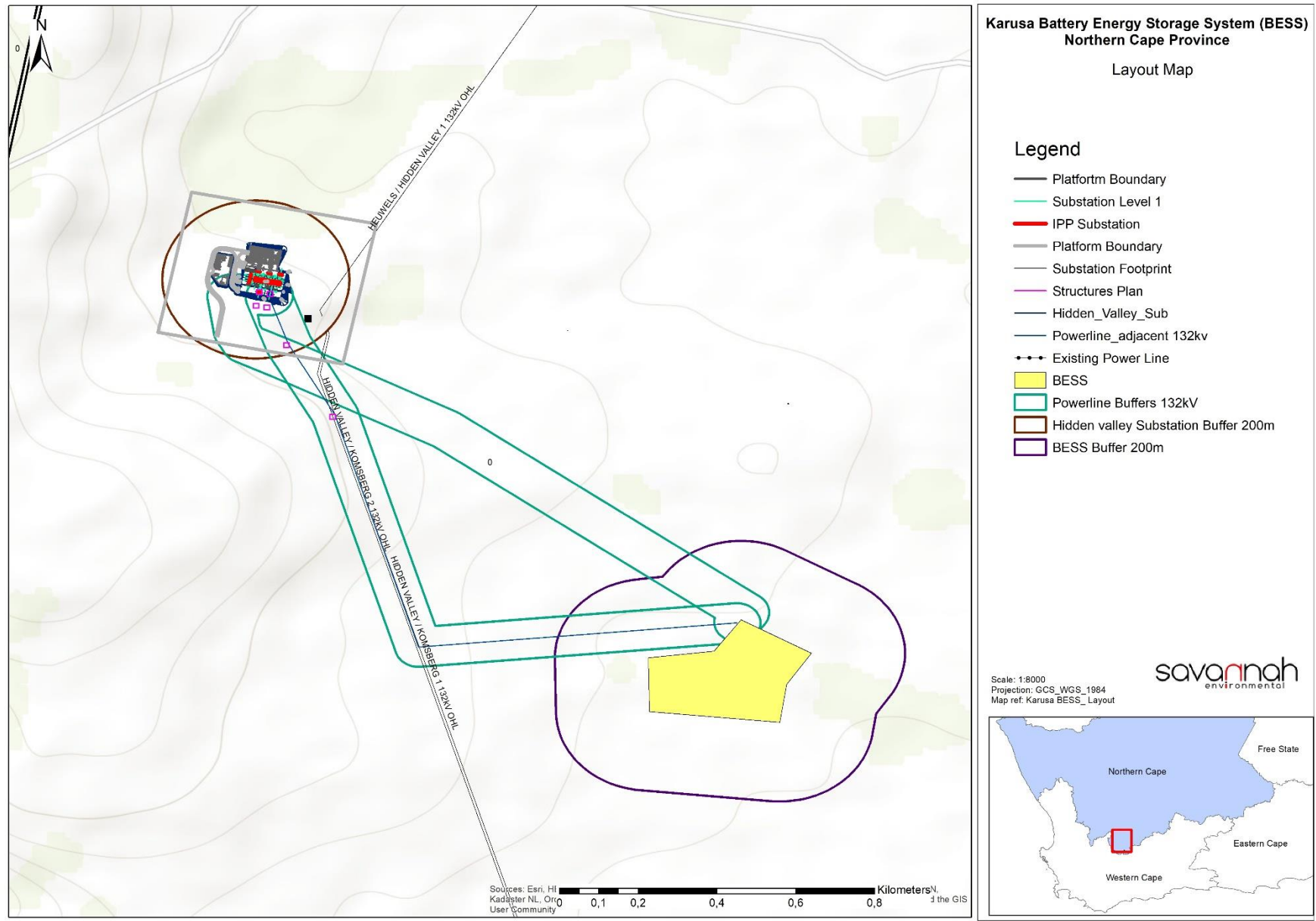


Figure 6.1: Layout Map for the proposed BESS and associated infrastructure

6.2. Evaluation of the Proposed Karusa BESS

The preceding chapters of this BA Report together with the specialist studies contained within **Appendices D-G** provide a detailed assessment of the potential impacts that may result from the development of the Karusa BESS and associated infrastructure. This chapter concludes the environmental assessment of the BESS by providing a summary of the results and conclusions of the assessment. In doing so, it draws on the information gathered as part of the BA process, the knowledge gained by the environmental specialists and the Environmental Assessment Practitioner (EAP) and presents a combined and informed opinion of the environmental impacts associated with the development.

No environmental fatal flaws were identified in the detailed specialist studies conducted, and no impacts of unacceptable or high significance are expected to occur with the implementation of the recommended mitigation measures. These measures include, amongst others, the avoidance of sensitive features as identified by the specialists.

Impacts identified to be associated with the proposed project and considered within this report include:

- » Impact on soils and agricultural potential;
- » Impacts on ecology (including flora, fauna, avifauna and freshwater resources);
- » Impact on heritage resources
- » Impacts on noise resources

6.2.1. Impacts on Soil and Agricultural Potential

One main low sensitivity soil form was identified within the assessment area, namely the Oakleaf soil form. The land capability sensitivities (DAFF, 2017) indicate land capabilities with "Low" and "Moderate" sensitivities, which correlates with the findings from the baseline assessment. This sensitivity was confirmed by the specialist on site.

The assessment area is not associated with any arable soils, due to the type of soil as well as the climate, which in itself limits crop production significantly. The land capabilities associated with the regulated area are only suitable for grazing, which corresponds with the current land use.

It is the specialist's opinion that the proposed developments will have no impacts on the agricultural production ability of the land. Additionally, the proposed activities will not result in the segregation of any high production agricultural land. Therefore, the proposed development may be favourably considered. From an agricultural potential perspective, the overhead power line is preferred, however either alternative is acceptable.

6.2.2. Impacts on Ecology

The completion of a comprehensive desktop study, in conjunction with the results from the field survey, suggest there is a medium-high confidence in the information provided within the ecological assessment undertaken for the project. The survey ensured that there was suitable ground-truth coverage of the open-spaces or natural habitats, and ecosystems were assessed to obtain a general species (fauna and flora) overview and the major current impacts were observed.

The assessment area was identified with the screening as possessing a Very High sensitivity within a Terrestrial Biodiversity context, with the area and surrounding landscape regarded as part of a CBA. Presently, there are natural habitats within the assessment area that possess a High SEI. This is due to the combination of their functional integrity and conservation importance.

One (1) NT mammal species was recorded during the survey period. Based on the habitat present, there is also a high likelihood of select SCC occurring within the assessment area. Several plant Species of Conservation Concern that are provincially protected were recorded from the study area. Permits will be required for the trimming, removal or relocation of any such species from the provincial authorities.

The karoo scrub and rocky outcrop ecosystems were still natural to largely natural based on the diversity of species recorded, and the habitat physiognomy. The current natural ecosystems provide important ecosystem services including water regulation and pollination. However, certain areas are degraded due to overgrazing and erosion were still nevertheless functional. The findings of the field survey are therefore congruent with the screening tool.

Areas of rocky outcrops delineated as assigned an SEI of "Very High" sensitivity are considered no go areas. These may be spanned by overhead powerlines but no construction infrastructure is to be placed in these areas, including access tracks. Personnel are not to use these areas for any reason.

Based on the provided options for the proposed kV line:

1. Options A
 - a) Overhead
 - b) Underground
2. Option B
 - a) Overhead
 - b) Underground
3. Option C
 - a) Overhead
 - b) Underground

The option with the least impacts is Option A, adjacent to the existing constructed road. Use of this option would reduce further fragmentation as well as limiting loss of biodiversity and SCC to one area. The Overhead option would decrease the impacts to vegetation and allow for the avoidance of no-go areas (one such area is present along Option A) however, this would have a greater impact on avifauna. The underground option will increase impacts to flora but decrease impacts to avifauna. Both are considered to have equal impacts overall and the decision on which option to use should be based on engineering, maintenance and cost considerations.

Based on a combination of desktop and in-field delineation, two (2) potential forms of a watercourse were identified and delineated within the 500 m regulated area applied. These include an artificial wetland system and episodic drainage lines/ features. No natural wetland systems were identified for the project area. The drainage lines are not characterised by riparian vegetation and grasses, these systems represent bare surfaces with evidence of surface run-off.

A 15 m buffer width was recommended for the project area (all drainage features) for the construction and operational phases. The buffered areas and drainage features have been allocated as a medium sensitivity.

An impact statement is required as per the NEMA regulations with regards to the proposed development. The main impacts on ecology expected from the proposed activity are the loss of CBA areas, degradation and further fragmentation of surrounding natural habitats, the direct mortality of fauna species and the emigration of fauna SCC due to disturbance. Impacts are expected to be of low to moderate significance following the implementation of mitigation measures.

Considering the above-mentioned information, the proposed development will result in the destruction of some functional habitats. It is the opinion of the specialist that the proposed activities can go ahead provided areas of high SEI are avoided, and control of introduced alien invasive plants, as well as erosion mitigation is implemented. All Biodiversity Management Objectives provided in the specialist report included in Appendix D and mitigation measures provided in other supporting specialist reports must be implemented.

Due to the presence of non-perennial watercourses within the 500 m regulatory area, a risk assessment was completed in line with Section 21 (c) and (i) of the National Water Act, 1998, (Act 36 of 1998). Regarding the overhead or underground options, there are expected low post-mitigation risks, and a General Authorisation is permissible for the development.

6.2.3 Impacts on Heritage Resources (including archaeology and palaeontology)

Based on the existing heritage information available for the proposed development in addition to the fieldwork conducted by Booth (2012, 2015, 2020), CTS Heritage (2021) and Almond (2015, 2016), it is unlikely that the proposed development will negatively impact on significant heritage resources. There is no heritage objection to the proposed development and no preferred alternative from a heritage perspective. Furthermore, due to the number of Renewable Energy Facility projects in the immediate vicinity of this development that have already been granted Environmental Authorisation (EA, Figure 5), and due to the existing Soetwater OHL in the vicinity of the development, it is likely that this project will have low levels of cumulative impact significance for Heritage (archaeology, palaeontology and cultural landscape). That being said, due to the general heritage sensitivity of the broader context, it is recommended that:

- » If concentrations of historical and pre-colonial archaeological heritage material and/or human remains (including graves and burials) are uncovered during construction, all work in the vicinity must cease immediately and be reported to the South African Heritage Resources Agency (SAHRA) so that systematic and professional investigation/excavation can be undertaken. Phase 2 mitigation in the form of test-pitting/sampling or systematic excavations and collections of the pre-colonial shell middens and associated artefacts will then be conducted to establish the contextual status of the sites and possibly remove the archaeological deposit before development activities continue.
- » A person must be trained as a site monitor to report any archaeological sites found during the development. Construction managers/foremen and/or the Environmental Control Officer (ECO) should be informed before construction starts on the possible types of heritage sites and cultural material they may encounter and the procedures to follow when they find sites. The attached Chance Fossil Finds Procedure must be noted for inclusion into the EMPR to be adhered to in construction and excavation phases of development.
- » Should substantial fossil remains such as vertebrate bones and teeth, plant-rich fossil lenses, fossil wood or dense fossil burrow assemblages be exposed during construction,

the responsible ECO/EO/Environmental Representative should safeguard these, preferably in situ, and alert SAHRA, i.e. The South African Heritage Resources Authority, as soon as possible (Contact details: Mr P. Hine P.O. Box 4637, Cape Town 8000. Tel: 021 462 4502. Email: phine@sahra.org.za) so that appropriate action can be taken by a professional palaeontologist, at the Proponent's expense. Mitigation would normally involve the scientific recording and judicious sampling or collection of fossil material as well as associated geological data (e.g. stratigraphy, sedimentology, taphonomy) by a suitably qualified palaeontologist.

6.2.4. Noise Impacts

The BESS facility generates low levels of noise relating to the climate control system. Considering the potential development zone, this BESS would be further than 1 000 m from the closest identified NSD at any location within this proposed area. At an estimated noise level of less than 60 dB, this is an insignificant noise and this noise will be inaudible at a distance further than 200 m from such a BESS. The sound will be inaudible at the closest NSD. The noise from the climate control system of the BESS is significantly less than the noise that will be generated by the proposed Karusa WEF, and noise from the climate control system will not cumulatively add to the noise of the WEF. The power line was not considered within this assessment as no noise is expected to be associated with this infrastructure.

It is therefore the opinion of the specialist that there exists no potential for a noise impact and that no further Scoping or other acoustical studies would be required for the proposed BESS and associated infrastructure. No specific mitigation measures regarding noise or additional noise measurements are recommended. No additional conditions regarding noise are recommended for inclusion in the EMPr. It is therefore recommended that the Karusa BESS project be approved.

6.2.5. Assessment of Cumulative Impacts

The Karusa BESS development is located within the authorised footprint of the Karusa Wind Farm. Based on the specialist cumulative assessments and findings regarding the development of the BESS (refer to **Chapter 5** and specialist reports contained within **Appendix D - G**) and its small contribution to the overall impact within the surrounding area, it can be concluded that there are no cumulative impacts or risks identified as unacceptable with the development of the BESS. In addition, no impacts that will result in whole-scale change are expected as a result of the BESS. Considering all aspects, cumulative impacts associated with the BESS have been assessed to be acceptable, with no unacceptable loss or risk are expected.

6.2.6. Comparative Assessment of the Grid Connection Alternatives

As stated previously, three grid connection alternative corridors were assessed within this BA process, with both overhead and underground cabling an option. The table below provides a summary of the comparative assessment of these alternatives as provided by the specialists.

Field of study	Alternative 1	Alternative 2	Alternative 3
Soils	Acceptable No preference	Acceptable No preference	Acceptable No preference
Ecology	Preferred (either overhead or underground)	Less preferred but acceptable	Less preferred but acceptable
Heritage	Acceptable	Acceptable	Acceptable

Field of study	Alternative 1	Alternative 2	Alternative 3
	No preference	No preference	No preference
Noise	Acceptable No preference	Acceptable No preference	Acceptable No preference

From the above table it can be concluded that Alternative 1 (i.e. adjacent to the existing constructed road) is the overall preferred alternative for implementation, although all alternatives are considered acceptable provided that identified sensitive areas are avoided. The Overhead option would decrease the impacts to vegetation and allow for the avoidance of no-go areas (one such area is present along Alternative 1) however, this would have a greater impact on avifauna. The underground option will increase impacts to flora but decrease impacts to avifauna. Both are considered to have equal impacts overall and the decision on which option to use should be based on engineering, maintenance and cost considerations.

Although all options assessed are considered acceptable, the preferred alternative is that located within the corridor adjacent to the existing constructed road (i.e. Alternative 1).

The Final powerline routing and preference (either underground or overhead) and final EMPr must be submitted to DFFE for approval prior to construction.

6.3. Sensitivity Analysis

As part of the specialist investigations undertaken for the BESS and associated infrastructure, the sensitivity ratings in the DFFE screening tool report were confirmed. Specific environmental features and areas were identified which will be impacted by the construction of the proposed project. The current condition of the features identified informed the sensitivity of the environmental features and the capacity for disturbance and change associated with the proposed development. The sensitive features identified specifically relate to ecology and heritage resources. These are illustrated in **Figure 6.1** and are detailed below:

- » The entire study area is assigned a **Very High** terrestrial sensitivity by the DFFE screening tool. The very high sensitivity is attributed to the presence of a CBA 1 and the presence of two (2) forms of a watercourse within the delineated 500 m area. These include an artificial wetland system and episodic drainage lines/ features.
- » The plant species theme was assigned a **Medium Sensitivity** by the DFFE screening tool and specialist studies. This is due to the fact that 19 threatened species are expected to occur within the assessment area.
- » Specialist studies and the DFFE screening tool confirmed that the assessment area is associated with a **Very High** palaeontological sensitivity, due to the presence of a possible burial site.
- » Agriculture is associated with **Low** and **Medium Sensitivities** as the assessment area has a land potential of 6.

6.4. Overall Conclusion (Impact Statement)

The construction and operation of the Karusa BESS and associated infrastructure has been proposed by Enel Green Power South Africa (Pty) Ltd. The purpose of the BESS is to store excess electrical output as and when required by the off-taker. The assessment of the proposed BESS was undertaken by independent specialists and their findings have informed the results of this BA Report.

The specialist findings have indicated that there are no environmental fatal flaws associated with the development of the BESS provided that the recommended mitigation measures are implemented. The BESS is considered suitable for development, provided areas of sensitivity as determined by the specialists and detailed in section 6.3 of this report are considered and recommended mitigation implemented. Positive impacts of the BESS and associated infrastructure are expected to occur at a national and regional level and are to outweigh the negative impacts, which are expected to occur at a local level and can be minimised through the careful placement of infrastructure. All impacts associated with the BESS and associated infrastructure can be mitigated to acceptable levels. During the final design phase, infrastructure can be located anywhere within the buffer areas assessed apart from those areas identified as being of very high sensitivity (no-go).

6.5. Overall Recommendation

Considering the findings of the independent specialist studies, the impacts identified, as well as the potential to further minimise the impacts identified to acceptable levels through mitigation, it is the reasoned opinion of the Environmental Assessment Practitioner (EAP) that the development of the BESS and associated infrastructure is acceptable within the landscape and can reasonably be authorised. Infrastructure to be authorised includes the following:

- » A BESS with a capacity of up to 2 000 MWh, inside containers with a footprint of up to 6ha in extent and a maximum height of 3m. Both lithium-ion and Redox-flow technology are being considered for the project, depending on which is most feasible at the time of implementation.
- » Access roads to the BESS (10m in width, approximately 70m long) branching off of the existing roads, and internal roads (up to 8m wide) to be located within the total BESS footprint area.
- » 33kV MV cabling between the BESS and the MV/HV substation and up to 132kV HV cabling to the HV substation.
- » Fencing around the BESS for increased security measures.
- » Up to 132kV power line (either overhead or underground) to be connected to the existing Hidden Valley Substation. **Although all options assessed are considered acceptable, the preferred alternative is that located within the corridor adjacent to the existing constructed road (i.e. Alternative 1).**
- » Temporary laydown area to be located within the BESS footprint.
- » Firebreak to be located within the BESS footprint.
- » A Substation with a maximum height of - HV bus-bar up to 10 m max and an HV Building up to 4 m max.

The recommended validity period for the environmental authorisation is 10 years.

The following key conditions would be required to be included within the environmental authorisation issued for the Karusa BESS:

- » All mitigation measures detailed within this BA Report, as well as the specialist reports contained within **Appendices D to G**, must be implemented.
- » The EMPr's as contained within **Appendix H** and **Appendix I** of this BA Report should form part of the contract with the Contractors appointed to construct and maintain the BESS and associated infrastructure in order to ensure compliance with environmental specifications and management measures. The implementation of the EMPr for all life cycle phases of the infrastructure is considered key in achieving the appropriate environmental management standards as detailed for this project.

- » Areas of very high sensitivity must be demarcated as No-Go areas (i.e., Rocky outcrops and drainage lines) and avoided by all infrastructure as per the relevant specialist recommendations.
- » The project footprint must be minimised and must remain within the demarcated development area to avoid impacts on episodic drainage lines and SCCs in the surrounding areas.
- » Following the final design of the BESS and associated infrastructure, a final layout must be submitted to DFFE for review and approval prior to commencing with construction once the route and grid connection is confirmed.
- » A pre-construction walk-through of the final BESS and associated infrastructure footprint by an ecologist to survey for species of conservation concern (SCC) that would be affected and that can be translocated must be undertaken prior to the commencement of the construction phase. Permits from the relevant national and provincial authorities, i.e., CapeNature and the Department of Forestry, Fisheries, and the Environment (DFFE), and the the Department of Environment and Nature Conservation, Kimberly (Northern Cape Province) must be obtained before the individual species of concern are disturbed.
- » A chance find procedure must be implemented in the event that archaeological or palaeontological resources are found during the construction of the BESS and associated infrastructure. In the case where the proposed development activities bring these materials to the surface, work must cease and SAHRA must be contacted immediately.
- » Obtain all other environmental permits for the project, as required.

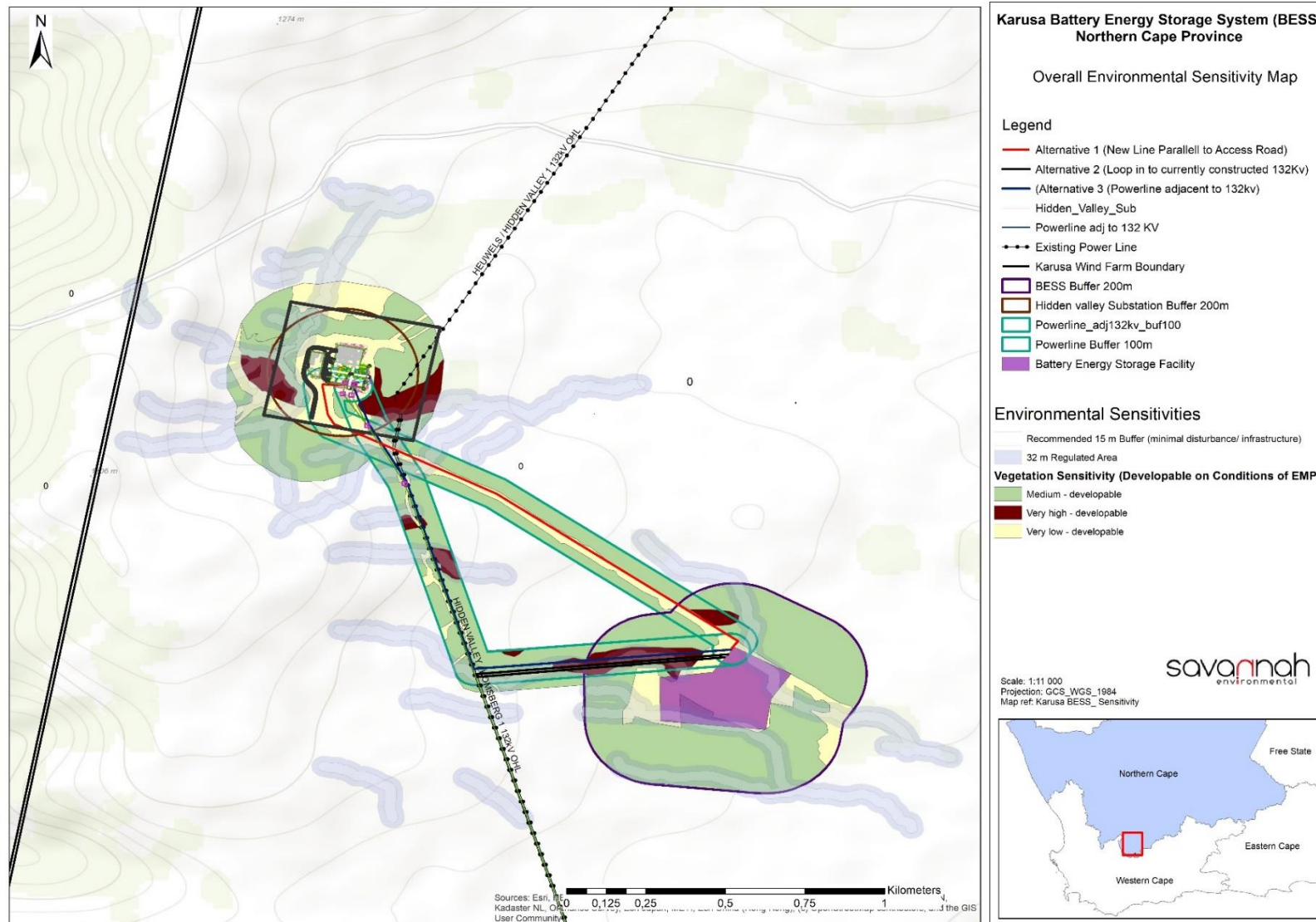


Figure 6.2: Overall Sensitivity Map

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