SOUTH AFRICA MAINSTREAM RENEWABLE POWER MIERDAM (PTY) LTD

PROPOSED CONSTRUCTION AND OPERATION OF THE BATTERY ENERGY STORAGE SYSTEM (BESS) AND ASSOCIATED INFRASTRUCTURE FOR THE AUTHORISED MIERDAM PHOTOVOLTAIC (PV) SOLAR ENERGY FACILITY, LOCATED NEAR THE TOWN OF PRIESKA IN THE SIYATHEMBA LOCAL MUNICIPALITY, PIXLEY KA SEMA DISTRICT MUNICIPALITY, IN THE NORTHERN CAPE PROVINCE OF SOUTH AFRICA.

DRAFT BASIC ASSESSMENT REPORT (DBAR)

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LIST OF COMMON ABBREVIATIONS

BA	- Basic Assessment
BAR	- Basic Assessment Report
BESS	- Battery Energy Storage System
BID	- Background Information Document
CARA	- Conservation of Agricultural Resources Act (Act No. 43 of 1983)
CBA	- Critical Biodiversity Area
DBAR	- Draft Basic Assessment Report
DEFF	- Department of Environment, Forestry and Fisheries
DM	- District Municipality
DoE	- Department of Energy
DWS	- Department of Water and Sanitation
EAP	- Environmental Assessment Practitioner
ECA	- Environmental Conservation Act (ECA) (Act No. 73 of 1989)
ECO	- Environmental Control Officer
EHS	- Environmental, Health, and Safety
EIA	- Environmental Impact Assessment
EMPr	- Environmental Management Programme
EP	- Equator Principles
ERA	- The Electricity Regulation Act No. 4 of 2006
ESA	- Ecological Support Area
FBAR	- Final Basic Assessment Report
GA	- General Authorisation
GDP	- Gross Domestic Product
GHG	- Green House Gases
GIS	- Geographic Information System
GW	- Gigawatts
GWh	- Gigawatt Hours
Ha	- Hectares
HIA	- Heritage Impact Assessment
I&AP(s)	- Interested and/or Affected Party/Parties
IBA(s)	- Important Bird Area(s)
IDP	- Integrated Development Plan
IEP	- Integrated Energy Plan
IFC	- International Finance Corporation
IPP(s)	- Independent Power Producers
IRP	- Integrated Resource Plan
IUCN	- International Union for the Conservation of Nature and Natural Resources
kV	- Kilo Volt
LM	- Local Municipality
LED	- Local Economic Development
MSL	- Mean Sea Level
MW	- Megawatt
NEA	- The National Energy Act (Act No. 34 of 2008)
NEMA	- National Environmental Management Act (Act No. 107 of 1998) as amended
NEM:AQA	- National Environmental Management: Air Quality Act (Act No. of 2004) as amended
NEM:BA	- National Environmental Management: Biodiversity Act (Act No. 10 of 2004) as amended
NEM:PAA	- National Environmental Management: Protected Areas Act (Act No. 57 of 2003) as amended

NFA	- The National Forest Act (Act No. 84 of 1998) as amended
NFEPA	- National Freshwater Ecosystem Priority Areas
NHRA	- National Heritage Resources Act (Act No. 25 of 1999) as amended
NPAES	- National Protected Area Expansion Strategy
NRTA	- National Road Traffic Act (Act No. 93 of 1996) as amended
NWA	- National Water Act (Act No. 36 of 1998) as amended
OHSA	- Occupational Health and Safety Act (Act No. 85 of 1993) as amended
OoS	- Organs of State
PDP	- Provincial Development Plan
PES	- Present Ecological Status
PoS	- Plan of Study
PM	- Public Meeting
PPA	- Power Purchase Agreement
PPP	- Public Participation Process
PV	- Photovoltaic
RDP	- Rural Development Plan
REDZ	- Renewable Energy Development Zone
REIPPP	- Renewable Energy Independent Power Producer Procurement Programme
RE	- Renewable Energy
SA	- South Africa
SACAA	- South African Civil Aviation Authority
SAHRA	- South African Heritage Resources Agency
SAHRIS	- South African Heritage Resources Information System
SALA	- Subdivision of Agricultural Land Act (Act No. 70 of 1970)
SANBI	- South African National Biodiversity Institute
SDF	- Spatial Development Framework
SEF	- Solar Energy Facility
SKA	- Square Kilometre Array
SWMP	- Storm Water Management Plan
VIA	- Visual Impact Assessment
VU	- Vulnerable
WEF	- Wind Energy Facility
WMA	- Water Management Area
WUL	- Water Use License
WULA	- Water Use License Application

GLOSSARY OF TERMS

Alluvial: Resulting from the action of rivers, whereby sedimentary deposits are laid down in river channels, floodplains, lakes, depressions etc.

Archaeological resources: This includes:

i. material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years including artefacts, human and hominid remains and artificial features and structures;
ii. rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10m of such representation;
iii. wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the republic as defined in the Maritimes Zones Act, and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation;
iv. features, structures and artefacts associated with military history which are older than 75 years and the site on which they are found.

Basic Assessment Report: An assessment report compiled in accordance with Appendix A of the NEMA: EIA Regulations of 2014, as amended, to relay the information gathered and assessments undertaken during the Environmental Impact Assessment phase of a project.

Battery Energy Storage System: A technology developed for storing electric charge by using specially developed batteries. These systems complement intermittent sources of energy such as wind, tidal and solar power in an attempt to balance energy production and consumption.

Biodiversity: The diversity of genes, species and ecosystems, and the ecological and evolutionary processes that maintain that diversity.

Construction Phase: The stage of project development involving site preparation as well as all construction activities associated with the development of the project.

Cultural landscape: A representation of the combined worlds of nature and of man illustrative of the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both external and internal (World Heritage Committee, 1992).

Cultural Significance: This means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance

Cumulative Impact: In relation to an activity, cumulative impact means the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

Endemic: Restricted or exclusive to a particular geographic area and occurring nowhere else. Endemism refers to the occurrence of endemic species.

Environmental Assessment Practitioner: An independent individual with the appropriate qualifications and experience who is appointed by the Applicant to manage the Environmental Impact Assessment process.

Environmental Authorisation: An approval granted by the Competent Authority allowing the Applicant to undertake listed activities in terms of the NEMA: EIA Regulations 2014, as amended.

Environmental Impact Assessment: In relation to an application, means the process of collecting, organising, analysing, interpreting, assessing and communicating environmental and socio-economic information that is relevant to the consideration of the application.

Environmental Management Programme: A legally binding working document, which stipulates environmental and socio-economic mitigation measures which must be implemented by several responsible parties throughout the duration of the proposed project.

"Equator Principles": A financial industry benchmark for determining, assessing and managing social & environmental risk in project financing.

Fossil: Mineralised bones of animals, shellfish, plants and marine animals. A trace fossil is the track or footprint of a fossil animal that is preserved in stone or consolidated sediment.

Habitat: The area of an environment occupied by a species or group of species, due to the particular set of environmental conditions that prevail there.

Heritage: That which is inherited and forms part of the National Estate (historical places, objects, fossils as defined by the National Heritage Resources Act 25 of 1999).

Heritage Resources: This means any place or object of cultural significance, such as the caves with archaeological deposits identified close to both development sites for this study.

Impact: A change to the existing environment, either adverse or beneficial, that is directly or indirectly due to the development of the project and its associated activities.

Kilovolt (kV): a unit of electric potential equal to a thousand volts (a volt being the standard unit of electric potential. It is defined as the amount of electrical potential between two points on a conductor carrying a current of one ampere while one watt of power is dissipated between the two points).

Mitigate: The implementation of practical measures to reduce adverse impacts or enhance beneficial impacts of an action. Design or management mitigation measures are those that are intended to minimise or enhance an impact, depending on the desired effect.

"No-Go" option: The “no-go” development alternative option assumes the site remains in its current state, i.e. there is no construction of a facility and associated infrastructure in the proposed project area.

Operational Phase: The project phase following the Construction Phase, during which the development will function or be used as per the design.

Palaeontology: Any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace.

Precipitation: Any form of water, such as rain, snow, sleet, or hail that falls to the earth's surface.

PV Development Area: Area for the potential erection of PV panels within the application site

Red Data Species: All those species included in the categories of endangered, vulnerable or rare, as defined by the International Union for the Conservation of Nature and Natural Resources.

Red List: A publication that provides information on the conservation and threat status of species, based on scientific conservation assessments.

Rehabilitation: Less than full restoration of an ecosystem to its pre-disturbance condition.

Restoration: To return a site to an approximation of its condition before alteration.

Riparian: The area of land adjacent to a river or stream that is, at least periodically, influenced by flooding.

Sense of place: The unique quality or character of a place, whether natural, rural or urban. It relates to uniqueness, distinctiveness or strong identity.

Specialist study: A study into a particular aspect of the project, undertaken by a suitably qualified expert in that discipline.

Species of Special / Conservation Concern: Species that have particular ecological, economic or cultural significance, including but not limited to threatened species.

Stakeholders: All parties affected by and/or able to influence a project, often those in a position of authority and/or representing others.

Sustainable development: Sustainable development is defined as development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs. NEMA defines sustainable development as the integration of social, economic and environmental factors into planning, implementation and decision-making so as to ensure that development serves present and future generations.

Threatened Ecosystems: An ecosystem that has been classified as Critically Endangered, Endangered or Vulnerable, based on analysis of ecosystem threat status. A threatened ecosystem has lost, or is losing, vital aspects of its structure, composition or function. The Biodiversity Act makes provision for the Minister or Environmental Affairs, or a provincial MEC of Environmental Affairs, to publish a list of threatened ecosystems.

Threatened Species: A species that has been classified as Critically Endangered, Endangered or Vulnerable, based on a conservation assessment using a standard set of criteria developed by the IUCN for determining the likelihood of a species becoming extinct. A threatened species faces a high risk of extinction in the near future.

Visual Assessment Zone: The visual assessment zone or study area is assumed to encompass a zone of 10km from the outer boundary of the proposed application site.

EXECUTIVE SUMMARY

Introduction and Project Description

South Africa Mainstream Renewable Power Mierdam (Pty) Ltd (hereafter referred to as "Mainstream") is proposing the construction and operation of Battery Energy Storage System (BESS) and associated infrastructure for the authorised Mierdam PV Solar Energy Facility, located near located the town of Prieska, in the Siyathemba Local Municipality, Pixley ka Seme District in the Northern Cape Province of South Africa (DEFF Reference No 12/12/20/2320/2 dated 26 August 2020 as amended (Appendix 9)).

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The need for a BESS stems from the fact that electricity is only produced by the Renewable Energy Facility while the sun is shining, while the peak demand may not necessarily occur during the day-time. Therefore, the storage of electricity and supply thereof during peak-demand will mean that the facility is more efficient, reliable and electricity supply more constant.

The BESS will:

- Store and Integrate a greater amount of renewable energy from the Renewable Energy Facility into the electricity grid;
- This will assist with the objective to generate electricity by means of renewable energy to feed into the National Grid which will be procured under either the Renewable Energy Independent Power Producer Procurement Program (REIPPPP), other government run procurement programmes or for sale to private entities if required

The proposed up to 200MW BESS is located within Ward 4 of the Siyathemba Local Municipality, Pixley ka Seme District Municipality, in the Northern Cape Province of South Africa. To reduce electrical losses, the BESS is required to be situated in close proximity to the sub-station which was authorised as part of Mierdam PV SEF (Ref: 12/12/20/2320/23) as amended, as such alternative sites / properties other than the area immediately surrounding the approved substation have not been considered further in this application.

NEMA EIA Regulations

In terms of the Environmental Impact Assessment (EIA) Regulations (2014), as amended, promulgated in terms of the National Environmental Management Act, 1998 (NEMA), certain Listed Activities are specified for which either a Basic Assessment (GN R 327 and 324) or a full Scoping and EIA (GN R 325) is required. The following Listed Activities in Government Notice (GN) R 327 (Listing Notice 1) requiring a Basic Assessment (BA) Process are applicable to the proposed development and its alternatives:

Table 1: Listed activities in terms of the NEMA Regulations

Activity No(s):	Provide the relevant **Basic Assessment Activity(ies)** as set out in **Listing Notice 1** of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
12 (ii) (c)	The development of— (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs—	- Infrastructure associated with the BESS will be located within 32m of a watercourse.

	(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;	
14	The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80m^3 or more but not exceeding 500m^3.	- Applicable for Redox Flow Battery system, which consists of electrolyte storage tanks contained within a 2.5 m high berm wall to prevents leakage of the electrolyte chemical into the surrounding environment. Electrolyte storage tanks will need to be refilled during operation as well. The electrolyte on site will not exceed 500m^3
19	The infilling or depositing of any material of more than 10 cubic meters into, or the dredging, excavation, removal or moving of soil, sand shells, shell grit, pebbles or rock of more than 10 cubic meters from a watercourse.	- The proposed BESS and associated infrastructure will involve the infilling or depositing of any material of more than 10 cubic meters into, or the dredging, excavation, removal of material from a water course.
27	The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for— (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	- The proposed BESS will involve the clearance of more than 1ha of indigenous vegetation.
28 (ii)	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: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;	- The proposed development site for the BESS is currently zoned for agricultural land use, and the area to be developed will be larger than 1 ha.

Details of Alternatives

Site Alternatives

Limited site alternatives exist as the BESS is required to be situated in close proximity to the already authorised sub-station to reduce electrical losses. It must however be noted that the EAP and various specialists considered the proposed site of the BESS footprint adjacent to the Mierdam Substation and did not identify any environmental constraints or specific areas of high environmental sensitivity which would result in a fatal flaw in terms of its proposed location.

Activity Alternatives

The purpose of the project is to install a BESS at the Mierdam PV Substation to improve security of electricity supply and to reduce demand on electricity networks during peak loading. Activity alternatives (other than the No-Go alternative) are not considered further in the BA process.

Technology Alternatives

A battery is a device that is able to store electrical energy in the form of chemical energy and convert that energy into electricity and Mainstream are considering two BESS technology alternatives for the project namely:

- Solid State Batteries; or
- Redox Flow Batteries.

A concise Risk Assessment of both technologies (Solid State and Flow Batteries) over three (3) battery types (Lithium-Ion, Vanadium Redox Flow and Zinc Hybrid Flow) is included in **Chapter 8.**

No-go alternative

The 'no-go' alternative is the option of not constructing and operating a BESS in support of the authorised PV SEF. This alternative would result in no additional environmental impact other than that assessed during the EIA for the Mierdam PV SEF.

The 'no-go' option is an option; however, this would prevent the Mierdam PV SEF from contributing efficiently to the environmental, social and economic benefits associated with the development of the renewables sector.

Public Participation Process

A newspaper advertisement announcing the commencement of the BA process, the availability of the BAR and inviting IAPs to register on the project database was placed in the Noordwester on 06 November 2020 (see Appendix 7).

In addition to the advertisement, site notices for the BESS were placed at the entrance to the approved Mierdam Photovoltaic Photovoltaic (PV) Solar Energy Facility (SEF) on the 21st of October 2020. These posters contained brief details of the proposed project and process and the contact details of the consultant (see Appendix 7).

A register of IAPs was compiled as per Section 42 of the EIA Regulations, 2014, as amended. This includes all relevant authorities, Government Departments, the Local Municipality, the District Municipality, relevant conservation bodies and non-governmental organisations (NGO's), as well as neighbouring landowners and the surrounding community. A copy of the IAP Register is included as Appendix 7 of this report.

Methodology Used

The Environmental Impact Assessment (EIA) Methodology assists in evaluating the overall effect of a proposed activity on the environment. Determining of the significance of an environmental impact on an environmental parameter is determined through a systematic analysis.

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale (i.e. site, local, national or global), whereas intensity is defined by the severity of the impact e.g. the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

The impact assessment must take account of the nature, scale and duration of effects on the environment and whether such effects are positive (beneficial) or negative (detrimental). Each issue / impact is also assessed according to the various project stages, as follows:

- Planning;
- Construction;
- Operation; and
- Decommissioning.

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance has also been included.

The rating system is applied to the potential impact on the receiving environment and includes an objective evaluation of the possible mitigation of the impact. Impacts are then consolidated into one (1) rating. The methodology used is detailed in Section 10.

Summary of Impacts and Conclusion

Specialist Assessment	Key Findings	Impacts	Mitigation	Conclusion
Agricultural Compliance Statement	▪ The aridity of the area is a significant agricultural constraint that seriously limits the level of agricultural production (including grazing) which is possible across the site. ▪ Shallow soils on underlying rock or carbonate hardpan are a further agricultural limitation. As a result of these limitations, the study area is unsuitable for cultivation and agricultural land use is limited to grazing.	▪ loss of agricultural land use ▪ land degradation, but both are of low significance.	▪ Implementation of an effective system of storm water run-off control; ▪ maintenance of vegetation cover; ▪ stripping, stockpiling and re-spreading of topsoil.	The conclusion of this assessment is that the proposed development will not have an unacceptable negative impact on the agricultural production capability of the site. The proposed development is therefore acceptable. This is substantiated by the facts that the land is of limited agricultural potential, that the actual amount of agricultural land loss is small, and that the proposed development poses a low risk in terms of causing soil degradation. **From an agricultural impact point of view, it is recommended that the proposed development be approved.**
Hydrological Impact Assessment	▪ The site was identified as very high sensitivity by the screening tool as there are watercourses within the Mierdam property, which is a very large property. ▪ The preferred BESS site is however of low sensitivity in an aquatic and hydrological context. ▪ The proposed BESS is more than 500 m from any watercourse/wetland. ▪ Given the low water use requirement on-site and adherence to specialist recommendations, the site is of low risk of negative groundwater impacts during construction and operation. However, appropriate preventative measured need to be taken to ensure that this low risk is still minimised. ▪ The proposed location of the BESS is the best possible location on the site. ▪ The site is mostly flat, located on sparse vegetation and is a significant distance from wetlands/watercourse. This is confirmed by SiVest (2012) who's study covered the whole BESS area. ▪ 7.. ▪ 8.	▪ Increase in impervious surface reducing the infiltration/groundwater recharge; ▪ Abstraction of groundwater for construction; ▪ Abstraction of groundwater for operation; ▪ Increase in stormwater leading to an increase of peak flows entering watercourse systems; ▪ Potential oil spills/leaks during construction; and ▪ Potential for leaks from batteries leading to contamination of watercourses. ▪ Potential for leaks from batteries leading to contamination of groundwater.	▪ Use existing boreholes to abstract groundwater ▪ Ensure storm water structures promote infiltration ▪ Ensure structure is outside of 1:100 year flood event ▪ In the event of a spill, implement a spill contingency plan and monitor groundwater for 6 months if spill is not contained. ▪ Ensure appropriate storm water infrastructure is installed to dissipate flow and direct away from concentrated paths. ▪ Ensure drip trays are used under vehicles/machinery and that impervious floor surfaces are constructed to ensure chemicals and waste do not enter the sub-surface. ▪ Where practical, plant obligate wetland species or dissipation structures in drains around the BESS. ▪ Ensure drip trays are used under vehicles/machinery and erosion control measures are implemented. ▪ Ensure a spill contingency plan is put into place. ▪ Completely lined infrastructure (concrete bunded area), with the capacity to contain 120% of the total amount of chemicals stored within the BESS. ▪ Spills must be completely removed from the site. ▪ Fire extinguisher equipment installed within the BESS. ▪ Temperature of battery systems monitored continually. ▪ Ensure air circulation to prevent the buildup of chemicals. ▪ Implement the storm-water management plan and ensure appropriate water diversion systems are put in place. ▪ Compile (and adhere to) a procedure for the safe handling of battery cells. ▪ Compile an emergency response plan and implement should an emergency occur. ▪ Ensure that spill kits (if appropriate) are available on site for clean-up of spills and leaks. ▪ Drip-trays or containment measures must be placed under equipment that poses a risk when not in use. ▪ Immediately clean up spills and dispose of contaminated soil at a licensed waste disposal facility.	The proposed location of the BESS is the best possible location on the site. Impacts have been identified with proposed mitigation measures. Should these measures be adhered to, the additional BESS area would remain a low sensitivity NatureStamp hereby acknowledges that there are no fatal flaws associated with the proposed BESS and should be authorized.

			▪ Dispose of waste appropriately to prevent pollution of soil and groundwater. ▪ Install monitoring systems to detect leaks or emissions. ▪ On-site battery maintenance should be done over appropriate drip trays/containment measures and any hazardous substances must be disposed of appropriately. ▪ Record and report all fuel, oil, hydraulic fluid or electrolyte spills to the PM / Engineer / ERP so that appropriate clean-up measures can be implemented.	
Geotechnical Impact Assessment	▪ . ▪ The assessment area may be underlain by tillite, boulder shale, sandstone, siltstone, shale bedrock. Surficial alluvial deposits comprising of silty sands or sandy silts are expected to underlie the south western section of the assessment area. ▪ Some geotechnical constraints have been identified, including the presence of potentially collapsible sands and shallow bedrock.	▪ Disturbance/ displacement/ removal of soil and rock Soil ▪ Erosion due to vegetation clearing, alteration of natural drainage	▪ Design facility layout to minimise earthworks and levelling ▪ Correct topsoil and spoil management ▪ Temporary berms and drainage channels to divert surface runoff where needed ▪ Landscape and rehabilitate disturbed areas timeously (e.g. regrassing) ▪ Correct engineering design of road and site drainage ▪ Use designated access and laydown areas only to minimise disturbance to surrounding areas ▪ Maintain drainage channels ▪ Monitor for erosion and remediate and rehabilitate timeously ▪ Restore natural site topography	This desktop geotechnical specialist study was undertaken for the installation of a BESS on the authorised Mierdam Photovoltaic (PV) Energy Facility (12/12/20/2320/2). The assessment area may be underlain by tillite, boulder shale,sandstone, siltstone, shale bedrock. Surficial alluvial deposits comprising of silty sands or sandy silts are expected to underlie the south western section of the assessment area. Some geotechnical constraints have been identified, including the presence of shallow bedrock and loose/collapsible sands. These constraints may be mitigated via standard engineering design and construction measures. Shallow spread footings are considered suitable to support the structures. No fatal flaws have been identified that would render the proposed BESS site unsuitable from a geological and geotechnical perspective. The proposed BESS is assessed to have a “Negative Low impact - the anticipated impact will have negligible negative effects and will require little to no mitigation”. The recommended mitigation measures provided to minimise the impacts relate to the appropriate engineering design of earthworks and site drainage, erosion control and topsoil and spoil material management. These do not exceed civil engineering and construction best practice. Further intrusive geotechnical investigations should be undertaken to confirm the engineering recommendations provided in this report. **From a geotechnical and geological perspective, no fatal flaws, sensitivities, or areas to be avoided have been identified within or close to the BESS assessment area. It is therefore recommended that the proposed activity be authorised.**
Terrestrial Ecology Impact Assessment	▪ The study area (as described by Koch, 2012) occurs on flat and gently undulating topography. The north-eastern part of the site is characterised by grassy plains dominated by Stipagrostis species. This area scattered Boscia foetida and the tree layer is dominated by Acacia mellifera. The majority of the study area is characterised by bossieveld of low bushes of Asteraceae and patches of Rhigozum obovatum. There are also some local	Clearing of natural vegetation that is habitat for plant and animal species	The loss of vegetation is inevitable and necessary for the proposed development to take place. Sensitive areas have been identified outside the proposed BESS site. These relate to low ridges. The approved footprint will not result in losses of habitat of high sensitivity, only habitat of medium to low sensitivity. Mitigation measures primarily will relate to the protection of sensitive species and minimization of habitat loss.	**It is the opinion of the Ecologist that the overall impact of the Dwarsrug BESS, on the terrestrial biodiversity and plant species resources, is seen as acceptably low after the recommendations have been implemented and therefore, impacts can be mitigated to acceptable levels allowing for the development to be authorised**

	depressions which have developed into pans. Although these do not hold water for long, they are unique in comparison to surrounding areas. The area is used for grazing of domestic livestock, primarily sheep, and is partly degraded due to overgrazing. ▪ The site is relatively uniform with few distinct sensitive areas. There is one low ridge on site that provides important habitat different to surrounding areas. These areas are considered to be more sensitive relative to surrounding areas. The site has been classified as having a mixture of low and medium sensitivity areas. The site is relatively uniform with few distinct sensitive areas. There is one low ridge on site that provides important habitat different to surrounding areas. These areas are considered to be more sensitive relative to surrounding areas. The site has been classified as having a mixture of low and medium sensitivity areas.			
Heritage Impact Assessment	▪ The fieldwork conducted for the evaluation of the possible impact of the new BESS as part of the Mierdam 3 PV plant has revealed no heritage resources.	▪ Impact on archaeological and historical heritage resources	▪ Include heritage chance finds procedure in EMP for project development	The current study has confirmed that the impact of the BESS will be low. This finding and with the implementation of a chance finds procedure as part of the EMPr will mitigate possible impacts on unidentified heritage resources. An assessment of the final footprint of the BESS must be conducted with the final walkdown of the PV Facility infrastructure layout during the implementation of the EMPr . . In the event that heritage resources are discovered during site clearance, construction activities must stop in the vicinity, and a qualified archaeologist must be appointed to evaluate and make recommendations on mitigation measures. **The overall impact of the Mierdam BESS, on the heritage resources, is seen as acceptably low after the recommendations have been implemented and therefore, impacts can be mitigated to acceptable levels allowing for the development to be authorised.**
Paleontology Impact Assessment	▪ The surface geology of the proposed Mierdam PV BESS and associated infrastructure is underlain by Late Cenozoic Superficial Sediments, Carboniferous to Permian aged Dwyka Group and the sedimentary Vogelspruitbult Formation (Jacomynspan Group) and intrusive rocks of the Namaqua Metamorphic Province. According to the PalaeoMap on the South African Heritage Resources Information System (SAHRIS) database, the Palaeontological Sensitivity of the Late Cenozoic Superficial Sediments is high, but locally low, the Dwyka Group is moderate and the rocks of the Namaqua Metamorphic Province is zero (Almond and Pether; 2009). Usually impacts on palaeontological heritage only occur during the construction phase of the development.	▪ Loss of fossil heritage	▪ Include fossil heritage chance finds procedure in EMP for project development	It is thus considered that the proposed development is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area. It is consequently recommended that no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils. **The overall impact of the Mierdam BESS, on the paleontological resources, is seen as acceptably low after the recommendations have been implemented and therefore, impacts can be mitigated to acceptable levels allowing for the development to be authorised.**

	▪ As the Authorized Mierdam PV was originally assessed in a Palaeontological Impact Assessment and as the proposed project falls in the same area the Palaeontological Significance of the BESS and associated infrastructure is low. It is thus considered that the proposed development is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area. ▪ It is consequently recommended that no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils.			
Social Impact Assessment	▪ The BESS will be located adjacent to the approved Mierdam PV substation associated with the approved Mierdam PV. ▪ Consequently, it is most unlikely that the proposed project will result in an increase in significance of any of the impacts identified and assessed by MasterQ Research; or in any additional impacts. ▪ It is clear, however, that the project has the potential to increase the efficiency, reliability and consistency of the electricity delivered by the Meirdam PV Facility. ▪ This will in turn have a positive impacts in respect of business confidence, public health and safety and the nuisance factor associated with frequent electricity outages.	▪ Increased business confidence ▪ Reduced health and safety risks ▪ A reduction in the nuisance factors	▪ Ensure that the appropriate agreements are in place to enforce performance and availability compliance. ▪ Attach noncompliance penalties to encourage reliability of supply.	Considering all social impacts associated with the project, it is evident that the positive elements outweigh the negative and that the project carries with it significant social benefits. In addition, the project fits with international and governmental policy and legislation. **Consequently, the proposed installation of a BESS at the authorised Mierdam Solar Photovoltaic (PV) Energy Facility (12/12/20/2024/1/1) is supported at the social level and no further assessment would be required.**

Aquatic Impact Assessment	▪ The site is low sensitivity in an aquatic context. ▪ The proposed location of the BESS is the best possible location on the site. ▪ The site is flat, located on sparse vegetation and is a significant distance from wetlands/watercourse. This is confirmed by SiVEST (2012) who's study covered the whole BESS area.	▪ Clearing of vegetation ▪ Increase in Storm Water ▪ Spills/Leaks during Construction ▪ Battery Spills/Leaks during Operation ▪ Sediments and spills entering water resources ▪ Compounded impacts from surrounding development ▪	▪ Manage the invasive alien plants at any disturbed or spoil areas ▪ Ensure appropriate storm water infrastructure is installed to dissipate flow and direct away from concentrated paths. ▪ Manage the invasive alien plants around the BESS during operation ▪ Ensure drip trays are used under vehicles/machinery and that impervious floor surfaces are constructed to ensure chemicals and waste do not enter the sub-surface ▪ Where practical, plant obligate wetland species or dissipation structures in drains around the BESS. ▪ Ensure drip trays are used under vehicles/machinery and erosion control measures are implemented. ▪ Ensure a spill contingency plan is put into place. ▪ Completely lined infrastructure (concrete bunded area), with the capacity to contain 120% of the total amount of chemicals stored within the BESS. ▪ Spills must be completely removed from the site. ▪ Fire extinguisher equipment installed within the BESS. ▪ Temperature of battery systems monitored continually. ▪ Ensure air circulation to prevent the buildup of chemicals. ▪ Implement the storm-water management plan and ensure appropriate water diversion systems are put in place. ▪ Compile (and adhere to) a procedure for the safe handling of battery cells. ▪ Compile an emergency response plan and implement should an emergency occur. ▪ Ensure that spill kits (if appropriate) are available on site for clean-up of spills and leaks. ▪ Drip-trays or containment measures must be placed under equipment that poses a risk when not in use. ▪ Immediately clean up spills and dispose of contaminated soil at a licensed waste disposal facility. ▪ Dispose of waste appropriately to prevent pollution of soil and groundwater. ▪ Install monitoring systems to detect leaks or emissions. ▪ On-site battery maintenance should be done over appropriate drip trays/containment measures and any hazardous substances must be disposed of appropriately. ▪ Record and report all fuel, oil, hydraulic fluid or electrolyte ▪ spills to the PM / Engineer / ERP so that appropriate clean-up measures can be implemented.	Recent technology upgrades and enclosed nature of solid state batteries reduces the risk of contamination. Thus it is recommended that the solid state Li-ion battery be considered as the preferred choice of battery due to its lower risk in comparison to Redox flow technologies. **However, the overall impact of the Mierdam BESS, on the aquatic resources, is seen as acceptably low after the recommendations for have been implemented and therefore, impacts can be mitigated to acceptable levels allowing for the development to be authorised.**
Transport Impact Assessment	▪ The additional Traffic generated as a result of the development of BESS, will be added to the already approved access approval by SANRAL and the Environmental Authorization (EA).	▪ Increase in Traffic ▪ Increase of Incidents with pedestrians and livestock ▪ Increase in Dust from gravel roads ▪ Increase in Road Maintenance	▪ Ensure a large portion of vehicles traveling to and from the proposed development travels in the 'off peak' periods or by bus. ▪ Reduction in speed of vehicles ▪ Adequate enforcement of the law ▪ Implementation of pedestrian safety initiatives ▪ Regular maintenance of farm fences, access cattle grids	**With reference to this report, the previously approved 'Transportation Impact Assessment' and the subsequent EA. SiVEST Civil Engineering Division is of the opinion that the impacts of the BESS would be minimal and acceptable and hence the EA should be granted for this EIA process.**

		▪ New / Larger Access points	▪ Implement a road maintenance program under the auspices of the respective transport department. ▪ Enforce a maximum speed limit on the development ▪ Use of dust suppressant techniques ▪ Adequate watering by means of water bowser ▪ Adequate road signage according to the SARTSM ▪ Approval from the respective roads department	
Noise Impact Assessment	▪ This report determines, using administrative means, whether the proposed development could have any significant acoustical implications considering a questionnaire as proposed by SANS 10328:2008. ▪ As all the questions are negative, it is unlikely that the planned development will present a noise disturbance. ▪ As recommended by SANS 10328:2008, a scoping investigation and an environmental noise impact investigation will not be required.	N/A	N/A	Considering the location where the potential BESS is proposed, the proposed system would be further than 500 m from any potential NSD, with the closest NSD further than 2 km away. It is therefore the opinion of the author that there exists an insignificant 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 Mierdam BESS project be approved from a noise perspective.**

Environmental Impact Statement

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

The EAPs and specialists, through the interrogation of planning documents and, where these planning documents are not available - using best judgment, have considered the anticipated needs and interests of the broader community.

It is an important to note that the IRP 2019 indicates that there is a short-term electricity supply gap of approximately 2 000 MW and battery storage technologies will improve energy security by optimizing energy supply and demand, reducing the need to import electricity, and reducing the need to continuously adjust generation unit output.

In addition, BESSs can provide system security by supplying energy during electricity outages, minimizing the disruption and costs associated with power cuts, amongst other benefits, such as reduction in greenhouse gas emissions, utilisation of cleaner, renewable energy alternatives and overall financial benefits.

The BA process for the proposed development has been conducted in accordance with the EIA Regulations of 2014, as amended, promulgated in terms of Chapter 5 of NEMA.

A detailed public participation process was followed during the BA process which conformed to the public consultation requirements as stipulated in the EIA Regulations of 2014, as amended, as well as the recent circular by the DEFF (dated 05 June 2020, Government Gazette 43412) (refer to Chapter 7). In addition, all issues raised by I&APs and key stakeholders will be captured in the FBAR and where possible, mitigation measures provided in the EMPr to address these concerns.

The summary of the findings emanating from the specialist studies discussed above have concluded that no fatal flaws were identified and any impacts can be mitigate to levels allowing for the development to be authorised.

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APPENDICES

1 INTRODUCTION

1.1 INTRODUCTION

South Africa Mainstream Renewable Power Mierdam (Pty) Ltd, a subsidiary of Mainstream Renewable Power Developments (Pty) Ltd, (hereafter referred to as “Mainstream”) is proposing the construction and operation of Battery Energy Storage System (BESS) and associated infrastructure for the authorised Mierdam PV Solar Energy Facility, located near located the town of Prieska, in the Siyathemba Local Municipality, Pixley ka Seme District in the Northern Cape Province of South Africa (DEFF Reference No 12/12/20/2320/2 dated 6 September 2012 as amended (Appendix 9)).

The need for a BESS stems from the fact that electricity is only produced by the Renewable Energy Facility while the sun is shining, while the peak demand may not necessarily occur during the day-time. Therefore, the storage of electricity and supply thereof during peak-demand will mean that the facility is more efficient, reliable and electricity supply more constant.

The BESS will:

- Store and Integrate a greater amount of renewable energy from the Renewable Energy Facility into the electricity grid; and
- This will assist with the objective to generate electricity by means of renewable energy to feed into the National Grid which will be procured under either the Renewable Energy Independent Power Producer Procurement Program (REIPPPP), other government run procurement programmes or for sale to private entities if required.

The proposed addition of this facility requires Environmental Authorisation (EA) from the Department of Environment, Forestry and Fisheries (DEFF) and as such is subject to a Basic Assessment (BA) process in terms of the National Environmental Management Act (NEMA): Environmental Impact Assessment (EIA) Regulations of 2014, as amended. SiVEST SA (Pty) Ltd (hereafter referred to as "SiVEST") have been appointed by Mainstream as the as the independent Environmental Assessment Practitioner (EAP) for this project.

1.2 THE PURPOSE AND CONTENT OF THIS BASIC ASSESSMENT REPORT (BAR)

In terms of the Environmental Impact Assessment (EIA) Regulations (2014), as amended, promulgated in terms of the National Environmental Management Act, 1998 (NEMA), certain Listed Activities are specified for which either a Basic Assessment (GN R 327 and 324) or a full Scoping and EIA (GN R 325) process is required to be undertaken by the Applicant. The proposed project triggers Listed Activities which require a Basic Assessment (BA) process to be undertaken in terms of the NEMA: EIA Regulations of 2014 as amended and this report has been complied in fulfilment of this requirement.

The Basic Assessment Report (BAR) documents the steps undertaken to assess the significance of impacts and determine measures to mitigate the negative impacts and enhance the benefits (or positive impacts) of the proposed project. This report presents the findings of the BA and a description of the proposed public participation process that forms part of the process.

The BAR includes an Environmental Management Programme (EMPr) which documents the management and monitoring requirements that need to be implemented during the Design, Construction and Operational Phases of the project to ensure that identified negative impacts are appropriately mitigated, and positive impacts enhanced.

The overall objectives of this BAR are to:

- Inform the members of the public and key stakeholders of the proposed project and the BA process which is being followed;
- Obtain comments on the application from Interested and Affected Parties (I&APs) and key stakeholders to ensure that all issues, concerns and queries are fully documented and addressed where necessary;
- Assess in detail the potential environmental and socio-economic impacts of the proposed project;
- Identify and document mitigation measures to address any negative impacts and enhance any positive impacts associated with the proposed project; and
- Produce a final BAR that will assist the Competent Authority (Department of Environment, Forestry and Fisheries) in making an informed decision on Environmental Authorisation for the proposed project.

This BAR has been drafted in accordance with the NEMA: EIA Regulations of 2014, as amended, and adheres to the requirements contained in Appendix 1 of GN R 326. TABLE 2 below highlights the relevant requirements and notes where in the BAR these requirements have been met.

TABLE 2: Content of a BA Report (NEMA: EIA Regulations of 2014, as amended)

2014 EIA Regulations, as amended.	Requirements for Basic Assessment Reports	Location this Basic Assessment Report
Appendix 1, Section 3 (a)	Details of –	
	(i) The EAP who prepared the report; and the expertise of the EAP; and (ii) The expertise of the EAP, including a curriculum vitae.	Section 3 & Appendix 2
Appendix 1, Section 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; (iii) Where the required information in items (i) and (ii) is not available, coordinates of the boundary of the property or properties	Section 4
Appendix 1, Section 3 (c)	A plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is – (i) A linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) On land where the property has not been defined, the coordinates within which the activity is to be undertaken.	Section 4 & Appendix 3
Appendix 1, Section 3 (d)	A description of the scope of the proposed activity, including – (i) All listed and specified activities triggered; (ii) A description of the activities to be undertaken, including associated structures and infrastructure.	Section 5
Appendix 1, Section 3 (e)	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 are to be considered in the assessment process.	Section 2
Appendix 1, Section 3 (f)	A motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location.	Section 4 and 5
Appendix 1, Section 3 (h)	A full description of the process followed to reach the proposed preferred activity, site and location within the site, including-	
	(i) Details of all alternatives considered;	Section 5
	(ii) Details of the Public Participation Process undertaken in terms of Regulation 41 of the Regulations, including copies of the supporting documents and inputs;	Section 7
	(iii) A summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;	Section 7
	(iv) The environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 10

2014 EIA Regulations, as amended.	Requirements for Basic Assessment Reports	Location this Basic Assessment Report
	(v) The impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration, and probability of the impacts, including the degree to which the impacts- (aa) Can be reversed; (bb) May cause irreplaceable loss of resources; and (cc) Can be avoided, managed, or mitigated.	Section 10 and 11
	(vi) The methodology used in deterring and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;	Section 10
	(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 geographic, physical, biological, social, economic, heritage and cultural aspects;	Section 10
	(viii) The possible mitigation measures that could be applied and level of residual risk;	Section 10
	(ix) The outcome of the site selection matrix;	Section 10
	(x) If no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and;	Section 10
	(xi) A concluding statement indicating the preferred alternatives, including preferred location of the activity.	Section 12
Appendix 1, Section 3 (i)	A full description of the process undertaken to identify, assess and rank the impacts 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.	Section 10
Appendix 1, Section 3 (j)	An assessment of each identified potentially significant impact and risk, including- (i) Cumulative impacts; (ii) The 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.	Section 10
Appendix 1, 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.	Section 12
Appendix 1, Section 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.	Section 12 Appendix 3
Appendix 1, Section 3 (m)	Based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr.	Section 11
Appendix 1, Section 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.	Section 11
Appendix 1, Section 3 (o)	A description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed;	Section 1
Appendix 1, Section 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.	Section 12
Appendix 1, Section 3 (q)	Where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required, the date on which the activity will be concluded, and the post construction monitoring requirements finalised.	Section 13
Appendix 1,	An undertaking under oath or affirmation by the EAP in relation to-	Section 12

2014 EIA Regulations, as amended.	Requirements for Basic Assessment Reports	Location this Basic Assessment Report
Section 3 (r)	(i) The correctness of the information provided in the report; (ii) The inclusion of the comments and inputs from stakeholders and interested and affected parties; (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) Any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties.	
Appendix 1, Section 3 (s)	Where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts.	-
Appendix 1, Section 3 (t)	Where applicable, any specific information required by the Competent Authority.	-
Appendix 1, Section 3 (u)	Any other matter required in terms of section 24(4) (a) and (b) of the Act.	-

1.3 ASSUMPTIONS AND LIMITATIONS

The compilation of this report has been based several assumptions and is subject to certain limitations which are documented as follows:

- It is assumed that all information provided to the EAP by the applicant was correct and accurate at the time of assessment;
- It is not always possible to involve all I&APs individually, however, every effort has been made to involve as many interested parties as possible. It is also assumed that individuals representing various associations or organisations will / have conveyed the necessary information to these associations / organisations;
- It is assumed that the information provided by the various specialists is unbiased and accurate;
- It is not possible to determine the actual degree of the impact that the proposed development will have on the immediate environment without some level of uncertainty. Actual impacts can only be determined following the commencement of construction and/or operation; and
- SiVEST undertook every effort to obtain the information (including specialist studies, BA / EIA / Scoping and EMPr Reports) for the surrounding developments. However, many of the documents are not currently publicly available. All information that could be obtained for the surrounding planned renewable energy developments was taken into account as part of the cumulative impact assessment for this project.

1.4 SPECIALIST ASSUMPTIONS AND LIMITATIONS

1.4.1 Agricultural Specialist

- The study makes the assumption that water for irrigation is not available in the study area. This is based on the assumption that a long history of farming experience in an area will result in the exploitation of viable water sources if they exist, and none have been exploited in the study area.
- There are no other specific assumptions, uncertainties or gaps in knowledge or data that affect the findings of this study.

1.4.2 Hydrology Specialist

In order to apply generalized and often rigid scientific methods or techniques to natural, dynamic environments, a number of assumptions are made. Furthermore, a number of limitations exist when assessing such complex ecological systems. The following constraints may have affected this assessment:

- As an extensive site visit has already been undertaken by SiVEST, an additional site visit was not required.
- The impacts for the site are specific to the BESS.
- The da
- tabases used may not, at times, be recent as is the nature of these databases.
- This statement assumes that the work undertaken by SiVest (2012) is unbiased and the methods adopted appropriately followed.

1.4.3 Geotechnical Specialist

The services performed by GaGE Consulting (Pty) Ltd were conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the geotechnical profession practising under similar conditions in the locality of the project. The interpretation of the site conditions is based on available information, experience in the general project area and professional judgement and is considered to provide sufficient confidence to meet the objectives of this specialist study. The nature of geotechnical engineering is such that conditions at variance with those described may be encountered on site. Engineering recommendations provided in this report are preliminary and must be confirmed through further intrusive investigations.

Third party information has been utilised in good faith.

A site visit was not undertaken

1.4.4 Terrestrial Ecologist

The following assumptions and constraints may have affected this assessment –

- As an extensive site visit has already been undertaken by SiVest, therefore an additional site visit was not required.
- The impacts for the site are specific to the BESS.
- The databases used may not be complete or up to date.
- This statement assumes that the work undertaken by SiVest (2012) is unbiased and the methods adopted appropriately followed.

1.4.5 Heritage Specialist

Not detracting in any way from the comprehensiveness of the fieldwork undertaken, it is necessary to realise that the heritage resources located during the fieldwork do not necessarily represent all the possible heritage resources present within the area. Various factors account for this, including the subterranean nature of some archaeological sites and the current dense vegetation cover. As such, should any heritage features and/or objects not included in the present inventory be located or observed, a heritage specialist must immediately be contacted.

Such observed or located heritage features and/or objects may not be disturbed or removed in any way until such time that the heritage specialist has been able to make an assessment as to the significance of the site

(or material) in question. This applies to graves and cemeteries as well. In the event that any graves or burial places are located during the development, the procedures and requirements pertaining to graves and burials will apply as set out below.

1.4.6 Paleontological Specialist

When conducting a Paleontological Impact Assessment (PIA) several factors can affect the accuracy of the assessment. The focal point of geological maps is the geology of the area and the sheet explanations were not meant to focus on palaeontological heritage. Many inaccessible regions of South Africa have not been reviewed by palaeontologists and data is generally based on aerial photographs. Locality and geological information of museums and universities databases have not been kept up to date or data collected in the past have not always been accurately documented.

Comparable Assemblage Zones in other areas are used to provide information on the existence of fossils in an area which has not yet been documented. When similar Assemblage Zones and geological formations for Desktop studies are used it is generally assumed that exposed fossil heritage is present within the footprint. A field-assessment is thus necessary to improve the accuracy of the desktop assessment.

1.4.7 Social Specialist

It is assumed that the technical information provided by the project proponent, Mierdam Solar Photovoltaic (PV) Energy Facility and the environmental consultants, SiVEST SA (Pty) Ltd, was credible and accurate at the time of compiling the report. It is also assumed that the data provided by the various specialists as used in this report are credible and accurate.

The demographic data used in this report was sourced from Statistics South Africa and is based on data gathered during Census 2011 and Community Survey, 2016. This data is somewhat outdated but where possible is supplemented with the latest Stats SA's survey data such as the Mid-year population estimates and the Quarterly Labour Force Survey. The limitation of this is that this survey data is restricted to a provincial level and does not extend to a municipal level.

No site visit was undertaken as the region was sparsely populated and where necessary relevant information could be obtained from the environmental consultants. Apart from this, the study was undertaken during the State of National Disaster declared in South Africa as a result of the COVID-19 pandemic. Accordingly, the need for social distancing and limiting unnecessary interpersonal contact and travel was respected throughout this study.

1.4.8 Surface Water Specialist

In order to apply generalized and often rigid scientific methods or techniques to natural, dynamic environments, a number of assumptions are made. Furthermore, a number of limitations exist when assessing such complex ecological systems. The following constraints may have affected this assessment:

- As an extensive site visit has already been undertaken by SiVEST, an additional site visit was not required.
- The impacts for the site are specific to the BESS.
- The databases used may not, at times, be recent as is the nature of these databases.
- This statement assumes that the work undertaken by SiVEST (2012) is unbiased and the methods adopted appropriately followed.

1.4.9 Noise Specialist

1.4.9.1 Ambient Sound Levels

- Ambient sound levels are the cumulative effects of innumerable sounds generated at various instances both far and near. High measurements may not necessarily mean that noise levels in the area are high. Similarly, a low sound level measurement will not necessarily mean that the area is always quiet, as sound levels will vary over seasons, time of the day, faunal characteristics, vegetation in the area and meteorological conditions (especially wind). This is excluding the potential effect of sounds from anthropogenic origin. It is impossible to quantify and identify the numerous sources that influenced one 10-minute measurement using the reading result at the end of the measurement. Therefore trying to define ambient sound levels using the result of one 10-minute measurement will be very inaccurate (very low confidence level in the results) for the reasons mentioned above. The more measurements that can be collected at a location the higher the confidence levels in the ambient sound level determined. The more complex the sound environment, the longer the required measurement. It is assumed that the measurement locations represent other residential dwellings in the area (similar environment), yet, in practice this can be highly erroneous as there are numerous factors that can impact on ambient sound levels, including;
    - the distance to closest trees, number and type of trees as well as the height of trees;
    - available habitat and food for birds and other animals;
    - distance to residential dwelling, type of equipment used at dwelling (compressors, air-cons);
    - general maintenance condition of house (especially during windy conditions); and
    - number and type of animals kept in the vicinity of the measurement locations.

- Determination of existing road traffic and other noise sources of significance are important (traffic counts etc.) – when close to any busy or significant roads. Traffic however is highly dependent on the time of day as well as general agricultural activities taking place during the site investigation. Traffic noise is a significant noise source, especially in urban areas and could be an important source of noise during busy periods.
- Ambient sound levels are depended not only on time of day and meteorological conditions, but also change due to seasonal differences. Ambient sound levels are generally higher in summer months when faunal activity is higher and lower during the winter due to reduced faunal activity. Winter months also coincide with lower temperatures and very stable atmospheric conditions, ideal conditions for propagation of noise. Many faunal species are more active during warmer periods than colder periods. Certain cicada species can generate noise levels up to 120 dB for mating or distress purposes, sometimes singing in synchronisation magnifying noise levels they produce from their tymbals1;
- Ambient sound levels recorded near rivers, streams, wetlands, trees and bushy areas can be high. This is due to faunal activity which can dominate the sound levels around the measurement location. This generally is still considered naturally quiet and understood and accepted as features of the natural soundscape, and in various cases sought after and pleasing;
- Considering more than one sound descriptor or equivalent can improve an acoustical assessment. Parameters such as LAMin, LAIeq, LAFeq, LCeq, LAMax, LA10, LA90 and spectral analysis forms part of the many variables that can be considered; and
- As an area develops, the increase of people will result in increased sounds. These are generally a combination of traffic noise, voices, animals and equipment (incl. TVs and radios). The result is that ambient sound levels will increase as an area matures.
- Ambient sound levels are generally linked to the developmental nature of an area, with ambient sound levels changing much faster in urban environments than in highly rural areas. Ambient sound levels therefore should be measured more frequently in urban environments. With the project located in the

Karoo where residential and urban development is minimal, ambient sound levels due to anthropogenic activities change very slow, if ever and data collected in 2012 would still be valid for this project.

1.4.9.2 Adequacy of Underlying Assumptions

- Noise experienced at a certain location is the cumulative result of innumerable sounds emitted and generated both far and close, each in a different time domain, each having a different spectral character at a different sound level. Each of these sounds are also impacted differently by surrounding vegetation, structures and meteorological conditions that result in a total cumulative noise level represented by a few numbers on a sound level meter.
- It is not the purpose of noise modelling to accurately determine a likely noise level at a certain receptor, but to calculate a noise rating level that is used to identify potential issues of concern.

1.4.9.3 Uncertainties of Information Provided

- The applicant has not identified a potential supplier for the proposed BESS and the potential sound power emission levels of the BESS are not defined. However, such systems do not have high sound power emission level and the site is therefore treated as a potential light-industrial site.

1.4.10 Transport Specialist

This study is based on the fact that the respective authorisation of the facility was received in September 2012.

Authorisation includes:
- Approval from the South African National Roads Agency Limited. (SANRAL)
- Approval from the Northern Cape Province – Department Roads & Public Works

Furthermore, the limitation of this report deals with the addition of BESS to the existing approved authorization and hence does not include the re-evaluation of the existing Transportation study.

1.5 BASIC ASSESSMENT REPORT (BAR) STRUCTURE

This BAR has been prepared in accordance with Section 19 of the Environmental Impact Assessment (EIA) Regulations, 2014 (as amended) and is structured as follows:

- **Chapter 1** Provides an introduction and background to the proposed project and outlines the purpose of this document and the assumptions and limitations applicable to the study;
- **Chapter 2** Provides a brief summary and interpretation of the relevant legislation as well as pertinent strategic planning documents and outlines the approach to the environmental process;
- **Chapter 3** Details of the EAP's staff who have contributed to the compilation of this DBAR
- **Chapter 4** Details the project location;
- **Chapter 5** Describes the location and current status of the site and provides a brief summary of the surrounding land uses as well as background to, motivation, and description of, the proposed project;
- **Chapter 6** Describes the biophysical and socio-economic characteristics of the affected environment against which potential project impacts are assessed;

- **Chapter 7** identifies potential impacts associated with the proposed development. The chapter further identifies these impacts per specialist study and discusses potential cumulative impacts per environmental issue (i.e. per specialist study). In addition, a rating of each environmental issue before and after the implementation of mitigation measures is also presented;
- **Chapter 7** Details the stakeholder engagement approach and summarises stakeholder comments that informed the impact assessment;
- **Chapter 8** Describes the specialist studies undertaken and assesses the potential impacts of the project utilising SiVEST's proven impact assessment methodology.
- **Chapter 9** provides an assessment of the report in terms of the World Bank Standards and Equator Principles. This chapter presents a checklist that ensures that the report has been compiled according to the requirements of the World Bank Standards and Equator Principles;
- **Chapter 10** Provides a description of the environmental monitoring and auditing process to be undertaken for the proposed development;
- **Chapter 11** Provides an Environmental Impact Statement (EIS), describes the need and desirability of the project, and summarises the recommendations of the BAR.
- **Chapter 12** Construction Timeframes
- **Chapter 13** EAP Undertaking
- **Chapter 14** References

2 APPLICABLE LEGISLATION, POLICIES AND/OR GUIDELINES

The subsections below provide a list of all the applicable legislation, policies and/or guidelines that are relevant to the application.

2.1 KEY LEGAL AND ADMINISTRATIVE REQUIREMENTS RELATING TO THE PROPOSED DEVELOPMENT

2.1.1 Constitution of South Africa

The Constitution of South Africa (No. 108 of 1996) provides environmental rights and includes implications for environmental management. Section 24 of the Constitution 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.'*

The Constitution is the overarching legislation for South Africa. Although it provides for certain rights and obligations, the NEMA has been promulgated in order to manage the various spheres of both the social and natural environment.

2.1.2 National Environmental Management Act (NEMA) (Act No. 107 of 1998) – NEMA EIA Requirements

The National Environmental Management Act (NEMA) (Act No. 107 of 1998) was promulgated in 1998 but has since been amended on several occasions from this date. This Act replaces parts of the Environment Conservation Act (ECA) (Act No. 73 of 1989) with exception to certain parts pertaining to Integrated Environmental Management.

The Act intends to provide for:

- co-operative environmental governance by establishing principles for decision-making on matters affecting the environment;
- institutions that will promote co-operative governance and procedures for coordinating environmental functions exercised by organs of state;
- to provide for the prohibition, restriction or control of activities which are likely to have a detrimental effect on the environment; and
- to provide for matters connected therewith.

The NEMA is the overarching legislation which governs the EIA process and environmental management in South Africa. Sections 24 and 44 of the NEMA make provision for the promulgation of regulations that identify activities which may not commence without an EA. Activities that may significantly affect the environment must be considered, investigated and assessed prior to implementation.

2.1.3 NEMA EIA Regulations, 2014 (as amended)

In terms of the Environmental Impact Assessment (EIA) Regulations (2014), as amended, promulgated in terms of the National Environmental Management Act, 1998 (NEMA), certain Listed Activities are specified for which either a Basic Assessment (GN R 327 and 324) or a full Scoping and EIA (GN R 325) is required. The following Listed Activities in Government Notice (GN) R 327 (Listing Notice 1) requiring a Basic Assessment (BA) Process are applicable to the proposed development and its alternatives:

Table 3: Listed activities in terms of the NEMA Regulations

Activity No(s):	Provide the relevant **Basic Assessment Activity(ies)** as set out in **Listing Notice 1** of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
12 (ii) (c)	The development of— (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;	- Infrastructure associated with the BESS will be located within 32m of a watercourse.
14	The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage	- Applicable for Redox Flow Battery system, which consists of electrolyte storage tanks contained within a 2.5 m high berm wall to prevents leakage of the electrolyte chemical into the surrounding environment. Electrolyte storage tanks will need to

	occurs in containers with a combined capacity of 80m^3 or more but not exceeding 500m^3.	be refilled during operation as well. The electrolyte on site will not exceed 500m^3
19	The infilling or depositing of any material of more than 10 cubic meters into, or the dredging, excavation, removal or moving of soil, sand shells, shell grit, pebbles or rock of more than 10 cubic meters from a watercourse.	- The proposed BESS and associated infrastructure will involve the infilling or depositing of any material of more than 10 cubic meters into, or the dredging, excavation, removal of material from a water course.
27	The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for— (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	- The proposed BESS will involve the clearance of more than 1ha of indigenous vegetation.
28 (ii)	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: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;	- The proposed development site for the BESS is currently zoned for agricultural land use, and the area to be developed will be larger than 1 ha.

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

This Act requires investigation to determine the impact of heritage resources when developments exceed the thresholds listed in section 38(1) of the act:

(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 5000m^2 in extent; or
(ii) involving three (3) or more existing erven or subdivisions thereof; or
(iii) involving three (3) or more erven or divisions thereof which have been consolidated within the past five (5) years; or
(iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;
(d) the re-zoning of a site exceeding 10000m^2 in extent; or
(e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority,

The proposed development would involve; (c) the development of a BESS that will change the character of more than 0.5ha and (d) the rezoning of a site that will exceed 1ha.

The law ensures community participation in the protection of national heritage resources and will involve all three (3) levels of government in the management of the country's national heritage. The South African

Heritage Resources Agency (SAHRA) will establish and maintain a national policy, strategy plans and standards for heritage resources management and will monitor the system as a whole.

A Heritage Impact Assessment (**Appendix 6**) has been conducted to explore how the proposed development may impact on heritage resources as protected by the Act. Ground truthing exercise was undertaken in October 2020 and the results have been incorporated into this BAR, as well as the updated Heritage Impact Assessment Report.

In addition, SAHRA are being consulted throughout the BA process in order to obtain comments on the proposed development from a heritage perspective. All comments received from SAHRA throughout the EIA process will be provided in **Appendix 7**.

2.1.5 National Water Act (NWA) (Act No. 36 of 1998, as amended)

The National Water Act (NWA) (Act No. 36 of 1998), as amended, was promulgated on the 20th of August 1998. This Act was created in order to ensure the protection and sustainable use of water resources (including wetlands) in South Africa. This Act is important in that it provides a framework to protect water resources against over-exploitation and to ensure that there is water for socio-economic and economic development, human needs and to meet the needs of the aquatic environment. The Act also recognises that water belongs to the whole nation for the benefit of all people.

It is important to note that water resources (including wetlands) are protected under the Act. Under the NWA, a 'water resource' includes a watercourse, surface water, estuary, or aquifer. Specifically, a watercourse is defined as (*inter alia*):

- A river or spring;
- A natural channel in which water flows regularly or intermittently; and
- A wetland, lake or dam into which, or from which, water flows.

One (1) of the main aims of the Act is the protection of water resources. 'Protection' in relation to a water resource entails:

- Maintenance of the quality of the water resource to the extent that the water use may be used in a sustainable way;
- Prevention of degradation of the water resource; and
- The rehabilitation of the water resource.

In the context of the proposed development and any potential impact on water resources, the definition of pollution and pollution prevention contained within the Act is relevant. 'Pollution', as described by the Act, is the direct or indirect alteration of the physical, chemical or biological properties of a water resource, so as to make it (*inter alia*):

- less fit for any beneficial purpose for which it may reasonably be expected to be used; or
- harmful or potentially harmful to the welfare of human beings, to any aquatic or non-aquatic organisms, or to the resource quality.

This definition of pollution is quite wide-ranging, and it applies to all types of water resources. The inclusion of physical properties of a water resource within the definition of pollution entails that any physical alterations to a water body (for example, the excavation of a wetland or changes to the morphology of a water body)

can be considered to be pollution. Activities which cause alteration of the biological properties of a watercourse (i.e. the fauna and flora contained within that watercourse) are also considered pollution.

In terms of section 19 of the Act, owners / managers / people occupying land on which any activity or process undertaken which causes / or is likely to cause pollution of a water resource must take all reasonable measures to prevent any such pollution from occurring, continuing or recurring. These measures may include measures to (*inter alia*):

- measures to cease, modify, or control any act or process causing the pollution;
- comply with any prescribed waste standard or management practice;
- contain or prevent the movement of pollutants;
- remedy the effects of the pollution; and
- remedy the effects of any disturbance to the bed and banks of a watercourse.

From a licensing perspective, according to the NWA, the following are considered 'water uses' and will require a water use license application (WULA):

a) Taking water from a water resource;
b) Storing water;
c) Impeding or diverting the flow of water in a watercourse;
d) Engaging in stream flow reduction activity contemplated in Section 36 of the NWA;
e) Engaging in a controlled activity identified as such in Section 37 (1) or declared under Section 38(1) of the NWA;
f) Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;
g) Disposing of waste in a manner which may detrimentally impact on a water resource;
h) Disposing of waste in a manner of water which contains waste from, or which has been heated in any industrial or power generation process;
i) Altering the bed, banks, course or characteristics of a watercourse;
j) Removing, discharging or disposing of water found underground if it is necessary for efficient continuation of an activity or for the safety of people; and
k) Using water for recreational purposes.

In light of the above, there are a number of activities within the NWA that are relevant to the potential impacts on rivers, streams and wetlands that may be associated with the proposed development. An Aquatic Impact Assessment (**Appendix 6**) has however been conducted to explore how the proposed development may impact on identified water resources as protected by the Act.

2.1.6 National Environmental Management: Biodiversity Act (NEM:BA) (Act No. 10 of 2004, as amended)

The overarching aim of the National Environmental Management: Biodiversity Act (NEM:BA) (Act No. 10 of 2004), within the framework of the NEMA, is to provide for:

- The management and conservation of biological diversity within South Africa, and of the components of such biological diversity;
- The use of indigenous biological resources in a sustainable manner; and
- The fair and equitable sharing among stakeholders of benefits arising from bio-prospecting involving indigenous biological resources.

In terms of this Act, the developer has a responsibility for:

- The conservation of endangered ecosystems and restriction of activities according to the categorisation of the area (not just by listed activity as specified in the EIA regulations);
- Promote the application of appropriate environmental management tools in order to ensure integrated environmental management of activities thereby ensuring that all development within the area are in line with ecological sustainable development and protection of biodiversity; and
- Limit further loss of biodiversity and conserve endangered ecosystems.

The South African National Biodiversity Institute (SANBI) was established in terms of the NEM:BA, its purpose being (*inter alia*) to report on the status of the country's biodiversity and the conservation status of all listed threatened or protected species and ecosystems.

The NEM:BA provides for a range of measures to protect ecosystems and for the protection of species that are threatened or in need of protection to ensure their survival in the wild, including a prohibition on carrying out a '*restricted activity'* involving a specimen of a listed threatened or protected species without a permit issued in terms of Chapter 7 of the Act. According to Section 57 of the Act, '*Restricted activities involving listed threatened or protected species'*:

- A person may not carry out a restricted activity involving a specimen of a listed threatened or protected species without a permit issued in terms of Chapter 7.

Such activities include any that are '*of a nature that may negatively impact on the survival of a listed threatened or protected species*'. Lists of critically endangered, endangered, vulnerable and protected species have been published and a permit system for listed species has been established.

It should be noted that a Terrestrial Ecology Impact Assessment (**Appendix 6**) has been undertaken to explore how the proposed development may impact on biodiversity as protected by the Act.

2.1.7 National Environmental Management: Protected Areas Act (NEM: PAA) (Act No. 57 of 2003, as amended)

The overarching aim of the National Environmental Management: Protected Areas Act (NEM: PAA) (Act No. 57 of 2003, as amended), within the framework of NEMA, is to:

- provide for the declaration and management of protected areas;
- provide for co-operative governance in the declaration and management of protected areas;
- affect a national system of protected areas in South Africa as part of a strategy to manage and conserve its biodiversity;
- provide for a representative network of protected areas on state land, private land and communal land;
- promote sustainable utilisation of protected areas for the benefit of people, in a manner that would preserve the ecological character of such areas;
- promote participation of local communities in the management of protected areas, where appropriate; and
- provide for the continued existence of South African National Parks.

The proposed development falls **outside** of any formally protected areas and outside of the areas earmarked as part of the National Protected Areas Expansion Strategy (NPAES).

2.1.8 Conservation of Agricultural Resources Act (CARA) (Act No. 43 of 1983)

The Conservation of Agricultural Resources Act (CARA) (Act No. 43 of 1983) controls the utilisation of natural agricultural resources in South Africa. The Act promotes the conservation of soil, water sources and vegetation as well as the combating weeds and invader plants.

The primary objective of the Act is to conserve natural agricultural resources by:

- maintaining the production potential of land;
- combating and preventing erosion and weakening or destruction of the water resources;
- protecting vegetation; and
- combating weeds and invaders plants.

Rehabilitation after disturbance to agricultural land is managed by this Act. The CARA is relevant to the proposed development as the construction of a BESS may impact on agricultural resources and vegetation on the site. The Act prohibits the spreading of weeds and prescribes control measures that need to be complied with in order to achieve this. As such, measures will need to be taken to protect agricultural resources and prevent weeds and exotic plants from invading the site as a result of the proposed development.

An Agricultural and Soils Compliance Statement (**Appendix 6**) has been compiled to explore how the proposed development may impact on the agricultural production potential of the proposed site. According to this assessment, no application is required in terms of the CARA. The EIA process covers the required aspects of this.

2.1.9 Subdivision of Agricultural Land Act (SALA) (Act No. 70 of 1970, as amended)

The Subdivision of Agricultural Land Act (SALA) (Act No. 70 of 1970, as amended) controls the subdivision of all agricultural land in South Africa; prohibiting certain actions pertaining to agricultural land. Under the Act, the owner of agricultural land is required to obtain consent from the Minister of Agriculture in order to subdivide agricultural land. This Act thus requires that an application for the solar PV development be approved by the Department of Agriculture, Forestry and Fisheries (DAFF). Despite the name of the Act, it does not apply only to subdivision, and its purpose is to ensure productive use of agriculturally zoned land. Therefore, even if land is not being subdivided or leased, the SALA approval is required to develop agriculturally zoned land for non-agricultural purposes.

The purpose of the Act is to prevent uneconomic farming units from being created and degradation of prime agricultural land. To achieve this purpose, the Act also regulates leasing and selling of agricultural land as well as registration of servitudes.

The Act is of relevance to the proposed development as any portion of land within the study area that is zoned for agricultural purposes that will need to be leased for a period exceeding ten (10) years, will be regulated by this Act. The Act 70 of 1970 consent is separate from the EIA and needs to be applied for and obtained after the EIA.

2.1.10 National Road Traffic Act (NRTA) (Act No. 93 of 1996, as amended)

The National Road Traffic Act (NRTA) (Act No. 93 of 1996, as amended) provides for all road traffic matters and is applied uniformly throughout South Africa. The Act enforces the necessity of registering and licensing motor vehicles. It also stipulates requirements regarding fitness of drivers and vehicles as well as making provision for the transportation of dangerous goods.

All the requirements stipulated in the NRTA will need to be complied with during the construction and operational phases of the proposed BESS.

2.1.11 Civil Aviation Act (CAA) (Act No. 13 of 2009)

The Civil Aviation Act (CAA) (Act No. 13 of 2009) controls and regulates aviation within South Africa. It provides for the establishment of a South African Civil Aviation Authority (SACAA) and independent Aviation Safety Investigation Board in compliance with Annexure 13 of the Chicago Convention. It gives effect to various conventions related to aircraft offences, civil aviation safety and security, and provides for additional measures directed at more effective control of the safety and security of aircrafts, airports and matters connected thereto.

Although the Act is not directly relevant to the proposed development, it should be considered as the establishment of the BESS may impact on aviation and air traffic safety if located directly within aircraft flight paths.

Air Traffic and Navigation Services Company Limited (ATNS) and the SACAA are being consulted throughout the BA process and the required approvals will be obtained, if necessary.

2.1.12 Northern Cape Nature Conservation Act (Act No. 9 of 2009)

The Northern Cape Nature Conservation Act (Act No. 9 of 2009) and the Nature and Environmental Conservation Ordinance 19 of 1974 are of relevance to the Northern Cape Province. These are developed to protect both animal and plant species within the province. These may be species which are under threat or which are already considered to be endangered. The provincial environmental authorities are responsible for the issuing of permits in terms of this legislation.

Northern Cape Nature Conservation Act (Act No. 9 of 2009) provides for the sustainable utilisation of wild 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 authorisations. Amongst other regulations, the following may apply to the current project:

- Boundary fences may not be altered in such a way as to prevent wild animals from freely moving onto or off of a property;
- Aquatic habitats may not be destroyed or damaged;
- The owner of the land upon which an invasive species is found (plant or animal) must take the necessary steps to eradicate or destroy such species.

The Act provides lists of protected species for the Province. According to Northern Cape Nature Conservation officials, a permit is required for the removal of any species on this list.

A Terrestrial Ecology Compliance Statement (**Appendix 6**) has however been conducted to explore how the proposed development may impact on biodiversity as protected by the Act. In addition, the relevant provincial environmental authority (namely the Northern Cape Department of Environment and Nature Conservation – NC DENC) as well as the DEFF's Biodiversity Conservation Department are being consulted throughout the EIA process.

2.1.13 Additional Relevant Legislation

- Occupational Health and Safety Act (OHSA) (Act No. 85 of 1993);
- Road Safety Act (Act No. 93 of 1996);
- National Road Traffic Regulations Act (Act No. 22 of 2000);
- National Environmental Management: Air Quality Act (NEM:AQA) (Act No. 39 of 2004);
- National Environmental Management: Waste Act (NEM:WA) (Act No. 59 of 2008, as amended);
- Development Facilitation (Act No. 67 of 1995);
- The Hazardous Substances Act (Act No. 15 of 1973);
- Water Services Act (Act No. 108 of 1998);
- Electricity Regulation Act (ERA) (Act No. 4 of 2006, as amended);
- Municipal Systems Act (Act No. 32 of 2000);
- Mineral and Petroleum Resource Development Act (Act No. 28 of 2002, as amended); and
- Northern Cape Planning and Development Act (Act No. 7 of 1998).

2.2 KEY DEVELOPMENT STRATEGIES AND GUIDELINES

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

- Spatial Planning and Land Use Management Act 16 of 2013 (SPLUMA);
- The Northern Cape Provincial Spatial Development Framework (SDF);
- Renewable Energy Independent Power Producer Procurement Program (REIPPPP);
- Department of Energy (DoE) White Paper on Renewable Energy, 2003;
- The Northern Cape Provincial Spatial Development Framework (SDF);
- Convention on Biodiversity (CBD);
- National Environmental Management Act (NEMA) (Act No. 107 of 1998);
- National Heritage Resources Act (NHRA) (Act No. 25 of 1999); and
- Mineral and Petroleum Resources Development Act (MPRDA) (Act No. 28 of 2002).

2.3 SPATIAL PLANNING AND LAND USE MANAGEMENT ACT 16 OF 2013 (SPLUMA)

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

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

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

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

2.3.1 Integrated Development Plans (IDP) (2019/2020)

An Integrated Development Plan (IDP) is defined in the Local Government: Municipal Systems Act (Act No. 32 of 2000), as an inclusive and strategic plan that:

- Links, integrates and co-ordinates plans and takes into account proposals for the development of the municipality;
- Aligns the resources and capacity of the municipality with the implementation of the plan;
- Forms the policy framework on which annual budgets must be based; and
- Is compatible with national and provincial development plans and planning requirements binding on the municipality in terms of legislation.

Considering the nature and location of the proposed development, there is a clear fit with international, national, provincial and local, at both district and municipal levels, policy and legislation. The IDP for the Pixley ka Seme District Municipality is aligned with the National Development Plan, which has identified various central development challenges.

In September 2015 the world's governments signed a historic agreement to eradicate poverty, improve the living standards and well-being of all people, promote peace and more inclusive societies and reverse the trend of environmental degradation. The 2030 Agenda for Sustainable Development commits to promoting development in a balanced way—economically, socially and environmentally—in all countries of the world, leaving no one behind and paying special attention to those people who are poorest or most excluded. It contains 17 Sustainable Development Goals with associated targets to assess progress.

The 17 goals, ranging from alleviating poverty and reducing inequality through job creation and economic growth, as well as ensuring access to affordable, reliable, sustainable and modern energy for all, are in many ways interrelated and cross-cutting in nature. The role of Pixley ka Seme DM in the electricity distribution industry, including consideration of renewable energy, reticulation, and municipal debt and tariff structures will be critical.

In his 2020 State of the Nation Address, President Cyril Rhamaposa announced government are taking the following measures to rapidly and significantly increase generation capacity outside of Eskom:

- A Section 34 Ministerial Determination will be issued shortly to give effect to the Integrated Resource Plan 2019, enabling the development of additional grid capacity from renewable energy, natural gas, hydro power, battery storage and coal.
- We will initiate the procurement of emergency power from projects that can deliver electricity into the grid within 3 to 12 months from approval.
- The National Energy Regulator will continue to register small scale distributed generation for own use of under 1 MW, for which no licence is required.
- The National Energy Regulator will ensure that all applications by commercial and industrial users to produce electricity for own use above 1MW are processed within the prescribed 120 days. It should be noted that there is now no limit to installed capacity above 1MW.

- We will open bid window 5 of the renewable energy IPP and work with producers to accelerate the completion of window 4 projects.
- We will negotiate supplementary power purchase agreements to acquire additional capacity from existing wind and solar plants.
- We will also put in place measures to enable municipalities in good financial standing to procure their own power from independent power producers.

The proposed BESS is located within the Siyathemba Local Municipality and Pixley ka Seme District Municipality. On a municipal level, wide support is evident across the affected municipalities. It should also be noted that as part of one (1) of the IDP's objectives, namely Objective 5: Environmental sustainability and resilience, at least 20 000MW of renewable energy should be contracted by 2030. In addition, it is noted that the municipality has favourable conditions for renewable energy generation, a factor which gives it a possible competitive advantage from an economic perspective. The economy is also characterised by the potential of renewable energy resource generation. In terms of possible opportunities within the municipality, it has been identified that there is a possibility to allow investment in renewable energy resource generation.

the Pixley ka Seme District Municipality as well as the Siyathemba Local Municipality spatial development frameworks do not suggest any potential conflicts between the planned spatial development visions and the proposed BESS. In addition, the site where the proposed development will be constructed is not located near any settlement or significant tourist attraction that might be sensitive to the environmental effects of the proposed development. Although the proposed development is located within relatively close proximity to small patches of agricultural land, it is not expected to affect these areas significantly and the current agricultural activities can thus continue.

After considering the reviewed documentation, the proposed development is in alignment with national, provincial and local objectives, plans and strategies relating to socio-economic development of the areas under analysis. There were no fatal flaws or contraventions identified as all spheres of government prioritise the development of RE projects. The proposed development fits well with the plans to diversify the provincial, district and local economies through investment in RE projects.

It can be suggested that the proposed development does not conflict with any of the identified developmental priorities of the local governments in question but is also in alignment with the identified means to stimulate the local economy. Policy decisions taken in the next decade will largely determine the dimension of the impact of climate change. Local government is in the front line of implementation and service delivery, and thus needs to pursue adequate mitigation and adaptation strategies which should include participation from the public sector, the private sector and NGOs. Therefore, it is evident that the proposed development is aligned with the goals of the municipal IDPs in the study area.

2.3.2 Renewable Energy Independent Power Producer Procurement Program (REIPPPP)

The objective of this section is to provide an overview of the processes in the country and within Eskom relating to Independent Power Producers (IPPs). It is important that certain enabling policies, rules and regulations are in place to provide certainty and transparency in the introduction of IPPs.

National Process

In August 2009, the DoE gazetted the Electricity Regulations on New Generation Capacity under the ERA. The New Generation Regulations establish rules and guidelines that are applicable to the undertaking of an IPP Bid Programme and the procurement of an IPP for new generation capacity. They also facilitate the fair treatment and non-discrimination between IPPs and the buyer of the energy.

In terms of the New Generation Regulations, the IRP developed by the DoE sets out the new generation capacity requirement per technology, taking energy efficiency and the demand-side management projects into account. This required, new generation capacity must be met through the technologies and projects listed in the IRP and all IPP procurement programmes will be executed in accordance with the specified capacities and technologies listed in the IRP.

A decision that additional capacity be provided by an IPP must be made with the concurrence of the Minister of Finance. Once such a decision is made, a procurement process needs to be embarked upon to procure that capacity in a fair, equitable and transparent process.

The New Generation Regulations set out the procurement process. The stages within a bid programme are prescribed as follows:

i. Request for Qualifications;
ii. Request for Proposals; and
iii. Negotiation with the preferred bidder(s).

A successful bidder will be awarded a Power Purchase Agreement (PPA) subject to signature by the Regulator, namely Eskom.

2.3.3 Department of Energy (DoE) White Paper on Renewable Energy, 2003

The DoE gazetted its White Paper on Renewable Energy in 2003 and introduced it as a '*policy that envisages a range of measures to bring about integration of renewable energies into the mainstream energy economy*.' At that time, the national target was fixed at 10 000GWh (0.8Mtoe) renewable energy contribution to final energy consumption by 2013. The White Paper proposed that this would be produced mainly from biomass, wind, solar and small-scale hydropower. It went on to recommend that this renewable energy should to be utilised for power generation and non-electric technologies such as solar water heating and biofuels. Since the White Paper was gazetted, South Africa's primary and secondary energy requirements have remained heavily fossil-fuel dependent, both in terms of indigenous coal production and use, as well as the use of imported oil resources. Alongside this, the projected electricity demand of the country has led the National utility Eskom, to embark upon an intensive build programme to secure South Africa's longer-term energy needs, together with an adequate reserve margin.

2.3.4 The Northern Cape Provincial Spatial Development Framework (SDF)

Energy is one (1) of the primary objectives addressed in the SDF. Their energy objectives include promoting the development of renewable energy supply schemes. Large-scale renewable energy supply schemes are strategically important for increasing the diversity of domestic energy supplies and avoiding energy imports while minimising detrimental environmental impacts. The development of the energy sector holds huge benefit for the Northern Cape which would have significant multipliers in the local economy. It is important that innovative planning be undertaken to provide the necessary infrastructure and associated amenities to accommodate the industry in an efficient manner. Therefore, in order to ensure the sustainability of the current and future economic sectors and to maximise synergies, it is imperative that industrial development be undertaken in a manner that promotes the principles of environmental integrity, human wellbeing and economic efficiency.

2.3.5 Convention on Biodiversity (CBD)

South Africa became a signatory to the United Nations Convention on Biological Diversity (CBD) in 1993, which was ratified in 1995. The CBD requires signatory states to implement objectives of the Convention, which are the conservation of biodiversity; the sustainable use of biological resources and the fair and equitable sharing of benefits arising from the use of genetic resources. According to Article 14(a) of the CBD, each Contracting Party, as far as possible and as appropriate, must introduce appropriate procedures, such as environmental impact assessments of its proposed projects that are likely to have significant adverse effects on biological diversity, to avoid or minimize these effects and, where appropriate, to allow for public participation in such procedures.

2.3.6 Heritage

The identification, evaluation and assessment of any cultural heritage site, artefact or find in the South African context is required and governed by the following legislation:

- National Environmental Management Act (NEMA) (Act No. 107 of 1998);
- National Heritage Resources Act (NHRA) (Act No. 25 of 1999); and
- Mineral and Petroleum Resources Development Act (MPRDA) (Act No. 28 of 2002).

The following sections in each Act refer directly to the identification, evaluation and assessment of cultural heritage resources.

- National Environmental Management Act (NEMA) (Act No. 107 of 1998)
  - Basic Environmental Assessment (BEA) – Section (23)(2)(d);
  - Environmental Scoping Report (ESR) –Section (29)(1)(d);
  - Environmental Impact Assessment (EIA) – Section (32)(2)(d); and
  - Environmental Management Plan (EMP) – Section (34)(b).
- National Heritage Resources Act (NHRA) (Act No. 25 of 1999)
  - Protection of Heritage Resources – Sections 34 to 36; and
  - Heritage Resources Management – Section 38.
- Mineral and Petroleum Resources Development Act (MPRDA) Act 28 of 2002
  - Section 39(3).

The NHRA stipulates that cultural heritage resources may not be disturbed without authorisation from the relevant heritage authority. Section 34(1) of the NHRA states that, '*no person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority…*' The NHRA is utilised as the basis for the identification, evaluation and management of heritage resources and in the case of Cultural Resource Management (CRM) those resources specifically impacted on by development as stipulated in Section 38 of the NHRA. This study falls under s38(8) and requires comment from the relevant heritage resources authority.

3 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

SiVEST have been appointed by Mierdam (Pty) Ltd as the Environmental Assessment Practitioner (EAP) for the proposed construction and operation of a Battery Energy Storage System (BESS) and associated infrastructure at the approved Mierdam (PV) Solar Energy facility, located near the town of Prieska, in the

Siyathemba Local Municipality, Pixley ka Seme District Municipality, in the Northern Cape Province of South Africa.

Details of the EAP's staff who have contributed to the compilation of this BAR are detailed in TABLE 4 below and their Curriculum Vitae (CV) are attached in Appendix 2.

TABLE 4: Details of the EAP

Name & Role	Qualifications & Professional affiliations	Experience at environmental assessments	Contact details
Mr J. Richardson Environmental Scientist & Assessment Practitioner	B.Sc. Hons Environmental Management, IAIAsa	13 years	SiVEST (Pty) Ltd Tel: (033) 347 1600 Email: johnr@sivest.co.za
Mrs L Scott-Shaw Environmental Scientist & Assessment Practitioner	B.Sc. (Hons) Ecological Science, IAIAsa	7.5 years	SiVEST (Pty) Ltd Tel: (033) 347 1600 Email: liandras@sivest.co.za
Mr S Jacobs Environmental Scientist & Assessment Practitioner	B.Sc. (Hons) Environmental Sciences	5 years	SiVEST (Pty) Ltd Tel: (033) 347 1600 Email: stephanj@sivest.co.za

4 LOCATION OF THE ACTIVITY

The proposed up to 200MW BESS is located within Ward 4 of the Siyathemba Local Municipality, Pixley ka Seme District Municipality, in the Northern Cape Province of South Africa. To reduce electrical losses, the BESS is required to be situated in close proximity to the sub-station which was authorised as part of Mierdam PV SEF (Ref: 12/12/20/2320/2) as amended (Appendix 9)), as such alternative sites / properties other than the area immediately surrounding the approved substation have not been considered further in this application.

The application site is approximately 43 kilometres south west of Prieska in a rural part of the Northern Cape and is approximately 2 hectares in extent. The site is located on the Remainder of Kaffirs Kolk No. 118 and the 21-digit Surveyor General (SG) code for the property is C06000000000011800001. The aforementioned property is 12 853 hectares in size.

TABLE 5: Summary of the application site for the proposed up to 200MW BESS

DISTRICT MUNICIPALITY	LOCAL MUNICIPALITY & WARD
PIXLEY KA SEME DISTRICT MUNICIPALITY	SIYATHEMBA LOCAL MUNICIPALITY, WARD 4
PROPERTY DESCRIPTION	**21-DIGIT SURVEYOR GENERAL (SG) CODE**
Remainder of Kaffirs Kolk No. 118	C06000000000011800001
PROPERTY SIZE (ha)	**DEVELOPMENT FOOTPRINT (ha)**

2859.395 ha	2 ha
CENTRE POINT COORDINATES of Development Site (DD MM SS.sss)	
S30° 3' 32.739"	E22° 19' 42.426"
PICTURES OF THE SITE	
	
	

The proposed development location is shown in the locality maps (FIGURE 2 & FIGURE 2) below.

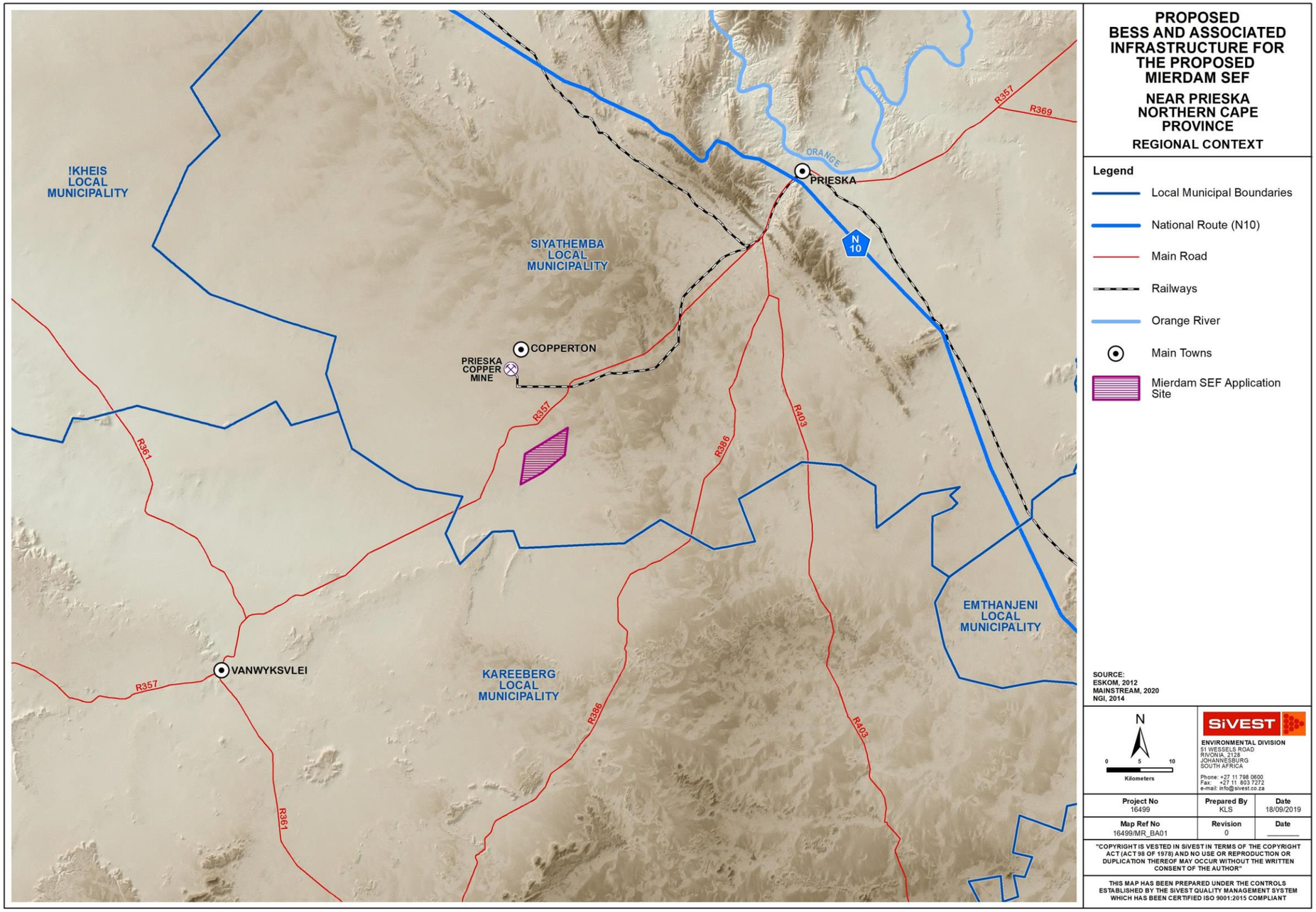

FIGURE 1: Regional Locality Map

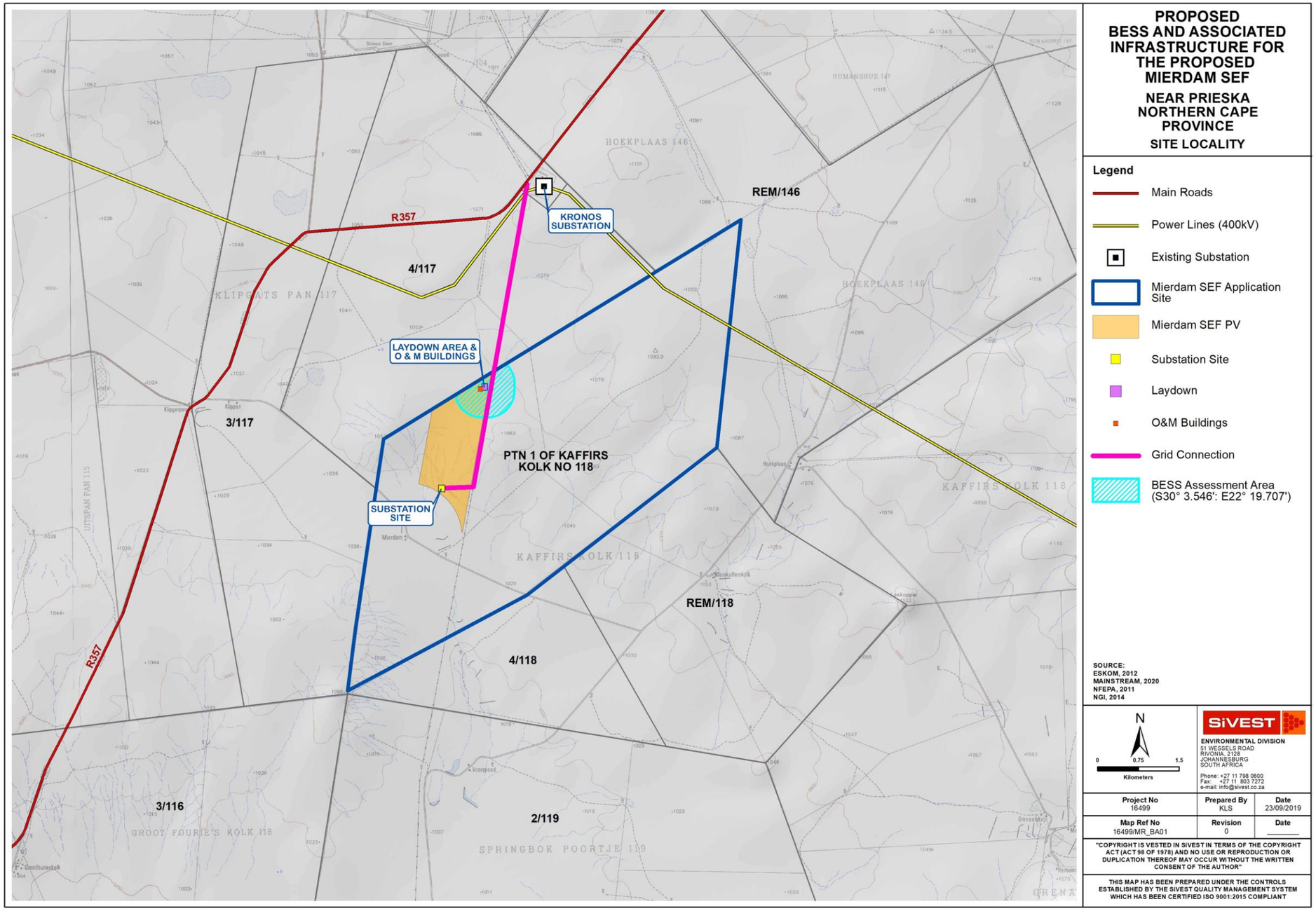

FIGURE 2: Locality Map

5 PROJECT DETAILS

5.1 NEED AND DESIRABILITY

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

It is an important requirement in this BA Process to review the need and desirability of the proposed development. The IRP 2019 indicates that there is a short-term electricity supply gap of approximately 2 000 MW between 2019 and 2022. Battery storage technologies are widely used because they improve energy security by optimizing energy supply and demand, reducing the need to import electricity, and reducing the need to continuously adjust generation unit output. In addition, BESSs can provide system security by supplying energy during electricity outages, minimizing the disruption and costs associated with power cuts. Another reason for the rising popularity of BESSs is that they can enable the integration of more renewables in the energy mix. BESSs can decrease the requirement for investment in new conventional generation capacity, resulting in financial savings and reduced emissions from electricity generation. Using storage systems also means fewer and cheaper electricity transmission and distribution system upgrades are required

5.2 APPLICANTS NEED AND MOTIVATION FOR THE PROPOSED PROJECT

Miainstream is proposing the construction and operation of Battery Energy Storage System (BESS) and associated infrastructure for the authorised Mierdam PV SEF (Ref: 12/12/20/2320/2/AM3) as amended, located near Prieska in the Siyathemba Local Municipality, Pixley ka Seme District Municipality, in the Northern Cape Province of South Africa.

The need for a BESS stems from the fact that electricity is only produced by the PV Facility while the sun is shining, while the peak demand may not necessarily occur during the day-time. Therefore, the storage of electricity and supply thereof during peak-demand will mean that the facility is more efficient, reliable and electricity supply more constant.

The BESS will:

- Store and integrate a greater amount of renewable energy from the PV Facility into the electricity grid; and
- This will assist with the objective to generate electricity by means of renewable energy to feed into the National Grid which will be procured under either the Renewable Energy Independent Power Producer Procurement Program (REIPPPP), other government run procurement programmes or for sale to private entities if required.

5.3 GENERAL DESCRIPTION OF THE PROJECT AREA AND SURROUNDING LAND USES

The topography in the wider study area around the site is characterised by a mix of very flat plains (typical of much of the Karoo), as well as areas of slightly more undulating relief, including some low ridges on the farm Platsjambok and a number of isolated low koppies. This generally flat relief engenders wide vistas, especially from higher-lying ground.

The natural vegetation comprises of very low scrub vegetation due to the natural aridity of the area. Vegetation on the plains typically comprises of very low shrubs, being very small in size in areas of stony ground and being slightly higher (to around 500mm) in areas of sandier soils. Only in very limited areas on the study site, including along some ephemeral drainage lines, and along some of the low ridges and koppies in the area does the slightly larger vegetation occur. In these areas, black thorn shrubs (*Acacia mellifera*) of up to 2-3m in height occur sparsely, especially on rocky ground. In certain areas, man has had an impact on the natural vegetation, especially around farmsteads, where over many years tall trees and other typical garden vegetation have been established. Around certain farmsteads, little 'plantations' of prickly pear cacti have been established. In areas where this artificial vegetation has been established, the vegetation can be effective in blocking views.

Due to the highly arid nature of the area's climate, livestock rearing (of sheep) is the predominant rural land use in the wider area. As such the natural vegetation has been retained across the vast majority of the study area, and the landscapes have retained a very mostly natural character, as described in more detail below.

The nature of the climate and corresponding land use which entails that stocking densities are low has resulted in relatively large farm properties across the area. Thus the area has a very low density of rural settlement, with only a handful of scattered farmsteads occurring across the area.

Built form in the parts of the study area where livestock rearing occurs is thus limited to isolated farmsteads, gravel access roads, ancillary farm buildings, telephone lines, fences and the remnants of old workers' dwellings.

In some parts of the study area, a greater human influence is visible, in the form of mining infrastructure and electricity transmission infrastructure. Close to Copperton (to the west of the development site), the infrastructure associated with a now-defunct mine still exists, with the headgear, as well as an old slimes dams being prominent landmarks. Current mining is present to the east of the development site along the R386 road where salt is being mined from a large salt pan. As indicated in the overall study area orientation map above, there are a number of large power lines that bisect the site, and two large substations (Kronos and Cuprum) occur with a density of high steel structures.

5.4 PROJECT ALTERNATIVES CONSIDERED

As per GNR 326, Appendix 1(2)(b), alternatives for the proposed development are to be identified and considered. Chapter 1 of the EIA Regulations provides an interpretation of the word "alternatives", which is to mean "*in relation to a proposed activity, different means of meeting the general purpose and requirements of the activity, which may include alternatives to the -*

a) Property on which or location where the activity is proposed to be undertaken;
b) Type of activity to be undertaken;

c) Design or layout of the activity;
d) Technology to be in the activity; or
e) Operational aspects of the activity; and
f) The option of not implementing the activity."

Not all categories of alternatives are applicable to this specific project and the alternatives which have been considered in this BAR are highlighted below.

5.4.1 Site Alternatives

Limited site alternatives exist as the BESS is required to be situated in close proximity to the already authorised sub-station to reduce electrical losses. It must however be noted that the EAP and various specialists considered the proposed site of the BESS footprint adjacent to the Mierdam Substation and did not identify any environmental constraints or specific areas of high environmental sensitivity which would result in a fatal flaw in terms of its proposed location.

5.4.2 Activity Alternatives

The purpose of the project is to install a BESS at the Mierdam PV Substation to improve security of electricity supply and to reduce demand on electricity networks during peak loading. Activity alternatives (other than the No-Go alternative) are not considered further in the BA process.

5.4.3 Technology Alternatives

A battery is a device that is able to store electrical energy in the form of chemical energy and convert that energy into electricity and Mainstream are considering two BESS technology alternatives for the project namely:

- Solid State Batteries; or
- Redox Flow Batteries.

A concise Risk Assessment of both technologies (Solid State and Flow Batteries) over three (3) battery types (Lithium-Ion, Vanadium Redox Flow and Zinc Hybrid Flow) are included in **Chapter 8.**

5.1.1.1 Solid State Batteries

These energy storage units come in a range of containerised systems with size categories from 500 KWh to 4 MW. The total footprint area required for the containerised systems to accommodate up to 200MW project with this type of battery is approximately 1 ha. A system up to 200MW would have a footprint of up to 2 ha. The figure below provides a visual representation the difference between conventional battery system and the solid state battery as well as the advantages of using the solid state battery technology.

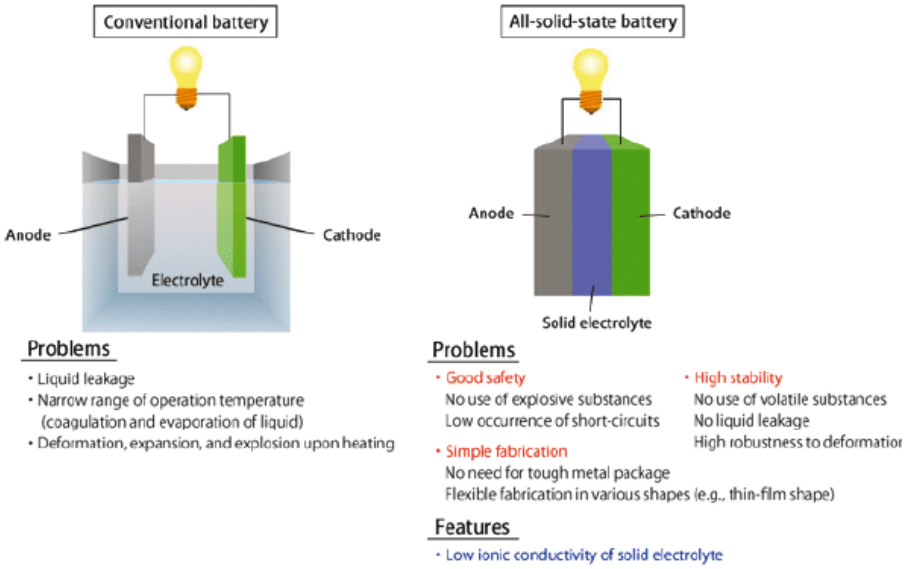

FIGURE 3: Battery comparison

Solid state batteries consist of multiple battery cells that collectively form modules. Each cell contains an anode, cathode and a solid electrolyte. Modules are usually assembled within shipping containers and delivered to the project site. Multiple containers will be required. The container unit dimensions are approximately 17 m long, 3.5 m wide, and 4 m high. Containers will be placed on a raised concrete plinth (30 cm) and may be stacked on top of each other to a maximum height of approximately 15 m. Additional instrumentation, including inverters and temperature control equipment, may be positioned between the battery containers. The typical layout of such a facility is presented below.

FIGURE 4: Example of a Solid State battery facility layout

5.1.1.2 Redox Flow Batteries

Flow-battery technologies are also being considered as an alternative for power smoothing purposes. For this technology, energy is stored as an electrolyte in the flow cells. Options include Sodium polysulfide/bromine (PSB) flow batteries, Vanadium Redox (VRB) flow batteries, and Zinc-Bromine (ZNBR) flow batteries which would be contained in small bunded areas. Redox Flow Batteries (RFB) generally consist of two half-cells containing liquid electrolyte systems. Once supplied with electrical energy a reduction-oxidation (redox) reaction between ions of the two electrolytes, separated by a membrane, charge the electrodes with energy (anode [-] and cathode [+]). Energy discharge from a RFB is achieved by a reversed redox reaction between ions resulting in the potential for electrical energy to be drawn from the electrodes. The footprint of a RFB system is approximately 150 x 100 m, with a height of 15 m. The system consists of two electrolyte storage tanks that are contained within a 2.5 m high berm wall which prevents leakage of the electrolyte chemical into the surrounding environment. A conceptual layout of a RFB system is presented in the figure below.

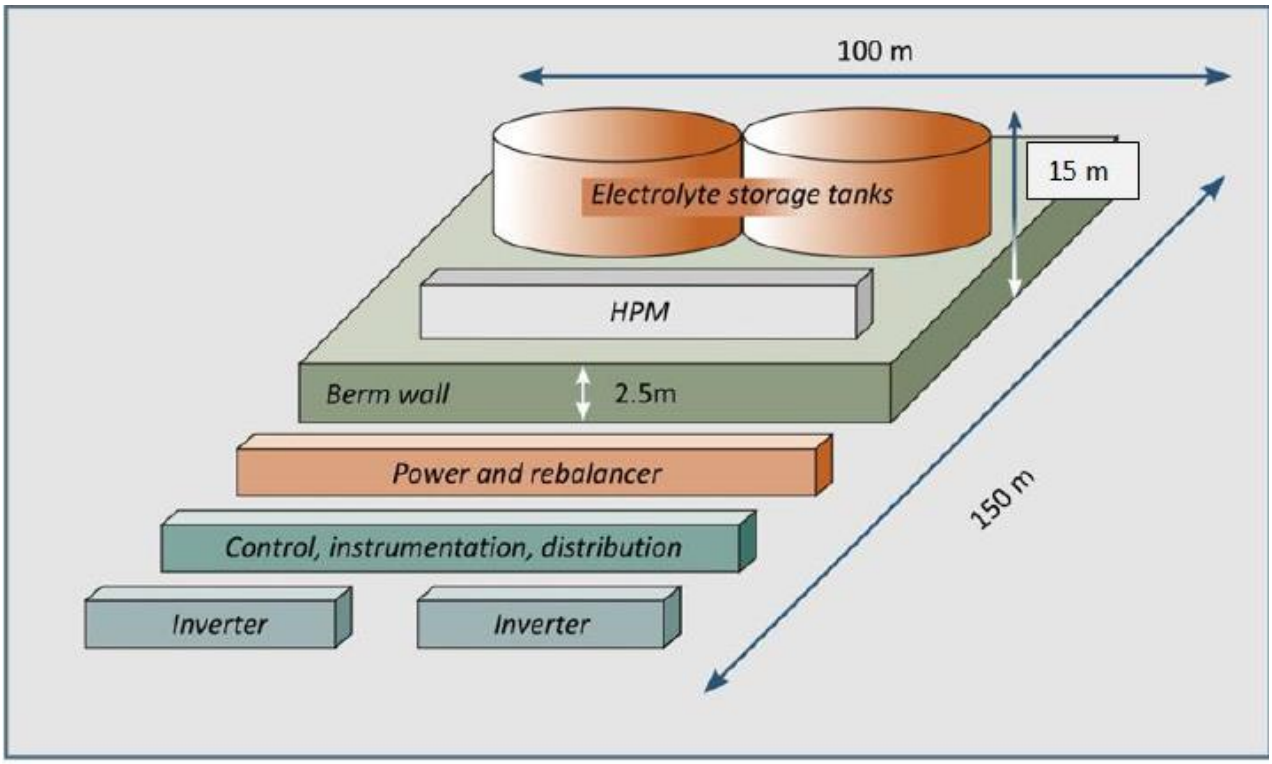

FIGURE 5: Conceptual layout of a Redox Flow Battery facility

5.4.4 No-go alternative

The 'no-go' alternative is the option of not constructing and operating a BESS in support of the authorised PV SEF. This alternative would result in no additional environmental impact other than that assessed during the EIA for the Mierdam PV SEF.

The 'no-go' option is an option; however, this would prevent the Mierdam PV SEF from contributing efficiently to the environmental, social and economic benefits associated with the development of the renewables sector.

5.5 APPLICABLE LISTED ACTIVITIES

In terms of the Environmental Impact Assessment (EIA) Regulations (2014), dated 7 April 2017, promulgated in terms of the National Environmental Management Act, 1998 (NEMA), certain Listed Activities are specified for which either a Basic Assessment (GN R 327 and 324) or a full Scoping and EIA (GN R 325) is required.

The following Listed Activities contained within in Government Notice (GN) R 327 (Listing Notice 1) requiring a Basic Assessment (BA) Process are applicable to the proposed establishment of the BESS:

5.5.1 Listed Activities applicable to the proposed BESS

The following Listed Activities contained within in Government Notice (GN) Regulation 327 (Listing Notice 1) of the NEMA: EIA Regulations of 2014, as amended, requiring a Basic Assessment (BA) process are applicable, and thus have been applied for in this application:

TABLE 6: Listed activities applied for in terms of the NEMA: EIA Regulations of 2014, as amended.

Activity No(s):	Provide the relevant **Basic Assessment Activity(ies)** as set out in **Listing Notice 1** of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
12 (ii) (c)	The development of— (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;	- Infrastructure associated with the BESS will be located within 32m of a watercourse.
14	The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80m^3 or more but not exceeding 500m^3.	- Applicable for Redox Flow Battery system, which consists of electrolyte storage tanks contained within a 2.5 m high berm wall to prevents leakage of the electrolyte chemical into the surrounding environment. Electrolyte storage tanks will need to be refilled during operation as well. The electrolyte on site will not exceed 500m^3
19	The infilling or depositing of any material of more than 10 cubic meters into, or the dredging, excavation, removal or moving of soil, sand shells, shell grit, pebbles or rock of more than 10 cubic meters from a watercourse.	- The proposed BESS and associated infrastructure will involve the infilling or depositing of any material of more than 10 cubic meters into, or the dredging, excavation, removal of material from a water course.
27	The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for— (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	- The proposed BESS will involve the clearance of more than 1ha of indigenous vegetation.

Activity No(s):	Provide the relevant **Basic Assessment Activity(ies)** as set out in **Listing Notice 1** of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
28 (ii)	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: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;	- The proposed development site for the BESS is currently zoned as for agriculture, and the area to be developed will be larger than 1 ha.

6 DESCRIPTION OF THE BASELINE ENVIRONMENT

6.1 CLIMATE

The study area has an arid continental climate with a summer rainfall regime i.e. most of the rainfall is confined to summer and early autumn. Mean Annual Precipitation (MAP) is approximately 242 mm of rain per year, with most of it occurring during autumn, with the highest amount being received in March and the lowest in July. The Mean Annual Precipitation (MAP) is approximately 205 mm per year. Prieska typically experiences hot days and cold nights with the average summer temperature of approximately 33 °C and the average winter night time temperatures of approximately 1 °C.

6.2 TOPOGRAPHY

The study area is characterised by flat and gently sloping topography with an average gradient of less than 10%. The area is flat and thus the topography is not a limiting factor for either agricultural or the proposed development.

6.3 VEGETATION

The vegetation types on the site are described as Bushmanland Basin Shrubland and the Bushmanland Arid Grassland. These fall within the Nama Karoo Biome.

The Bushmanland Basin Shrubland vegetation type is characterised by low shrubs species which include: *Aptosimum spinescens*, *Hermannia spinosa*, *Pentzia spinescens, Zygophyllum microphyllum* and *Aptosimum elongatum*. It is considered to be Least Threatened and none of it is conserved in statutory conservation areas (Mucina, *et al,* (2006).

The Bushmanland Arid Grassland vegetation type is characterised by graminoids such as *Aristida adscensionis, A. Congesta* and *Eragrostis nindensis*; small trees such as *Acacia mellifera*, and *Boscia foetida*; tall shrubs namely *Lycium cinereum, rhigozum trichotomum* and *Cadaba aphylla* as well as low shrubs such as *Aptosimum spinescens, Hermannia spinosa* and *pentzia spinescens*.

6.4 GEOLOGY

The bedrock comprises of tillite, boulder shale, sandstone, siltstone, shale of the Dwyka Group and is overlain in the southern section by surficial alluvial deposits, inferred to comprise of silty sands or sandy silts. A shallow bedrock profile is anticipated over the section underlain by the Dwyka Group while a slightly deeper profile is expected beneath the southern section.

6.5 HYDROLOGY

The topography within and surrounding the site is characterised by generally flat land with an average gradient of less than 10%, as well as some slightly more undulating relief in the form of low ridges and koppies to the south-east. Although no priority river or stream systems are located on the site, several drainage lines prevail in the western half of the study area and seven wetlands have been identified. The size and number of wetlands relative to the size of the proposed study area is however, small and few respectively.

6.6 CULTURAL, HISTORICAL AND ARCHAEOLOGICAL RESOURCES

The surface geology of the proposed Mierdam PV BESS and associated infrastructure is underlain by Late Cenozoic Superficial Sediments, Carboniferous to Permian aged Dwyka Group and the sedimentary Vogelspruitbult Formation (Jacomynspan Group) and intrusive rocks of the Namaqua Metamorphic Province. According to the PalaeoMap on the South African Heritage Resources Information System (SAHRIS) database, the Palaeontological Sensitivity of the Late Cenozoic Superficial Sediments is high, but locally low, the Dwyka Group is moderate and the rocks of the Namaqua Metamorphic Province is zero (Almond and Pether; 2009).

6.7 CURRENT LAND USE

The property is located in a cattle farming agricultural region. The site has never been cultivated and has only ever been used for grazing.

6.8 SPECIALIST STUDIES

6.8.1 Agricultural Compliance Statement

The key findings of the site sensitivity verification and agricultural compliance statement are as follows::

- The aridity of the area is a significant agricultural constraint that seriously limits the level of agricultural production (including grazing) which is possible across the site.
- Shallow soils on underlying rock or carbonate hardpan are a further agricultural limitation.
- As a result of these limitations, the study area is unsuitable for cultivation and agricultural land use is limited to grazing.
- Two potential negative agricultural impacts were identified, loss of agricultural land use and land degradation, but both are of low significance.
- The recommended mitigation measures are implementation of an effective system of storm water run-off control; maintenance of vegetation cover; and stripping, stockpiling and re-spreading of topsoil.
- The conclusion of this assessment is that the proposed development will not have an unacceptable negative impact on the agricultural production capability of the site. The proposed development is therefore acceptable. This is substantiated by the facts that the land is of limited agricultural potential,

that the actual amount of agricultural land loss is small, and that the proposed development poses a low risk in terms of causing soil degradation.

- From an agricultural impact point of view, it is recommended that the proposed development be approved.

6.8.2 Hydrology Impact Assessment

Through the impact assessment, the risks identified during construction have the highest impact although it would still be considered to be of low risk. The construction and operation phase associated impacts of the access roads, PV modules, substation, maintenance building and power lines have already been approved by the respective authorities. Therefore, the addition of the BESS to the existing proposed development will have a minimal impact as it falls within the original developable area and is relatively small. The location of the proposed BESS has been strategically placed to be situated away from watercourses. There is a risk of groundwater contamination in the event of leaks from the batteries. However, if solid state batteries are used, this risk will be reduced

6.8.3 Geotechnical Impact Assessment

The desktop geological and geotechnical specialist study assessed the proposed development of a BESS and associated infrastructure:

- The topography is flat to gentle and no potentially unstable conditions were identified.
- There are no apparent drainage or erosional features. The study area has a dry to arid climate. The bedrock comprises of andesite lavas and is overlain by deposits of aeolian sands (Kalahari sands).
- A shallow bedrock profile is anticipated over the northern section and a deeper aeolian sand and calcrete profile is expected beneath the southern section.
- Founding conditions will be adequate for the proposed infrastructure, although engineering mitigation will be required to address the potentially collapsible sands and shallow bedrock.
- No rock outcrop, faults, lineaments or other geological features were identified and the lithology is not fossiliferous.
- No fatal flaws have been identified that would render the proposed BESS site unsuitable from a geological and geotechnical perspective. No geologically or geotechnically sensitive areas were identified within or near the assessment area. There are no specific geological preferences for the siting of the BESS within the assessment area.
- The proposed BESS is assessed to have a “Negative Low impact - the anticipated impact will have negligible negative effects and will require little to no mitigation” from a geological and geotechnical viewpoint.
- The mitigation measures provided in the geotechnical report to minimise the impacts relate to the appropriate engineering design of earthworks and site drainage, erosion control and topsoil and spoil material management. These requirements do not exceed civil engineering and construction best practice and it has therefore been recommended that the proposed activity be authorised from a geotechnical perspective.

6.8.4 Terrestrial Compliance Statement

Through the site verification, background investigation and impact assessment, the following are confirmed by the specialist:

1. The site is **low sensitivity** in a plant species context. Although indicated as high sensitivity from a terrestrial biodiversity perspective, this is not reflected in the patterns seen on site.
2. The proposed location of the BESS is optimal on the site.

3. The site is relatively flat, located on sparse vegetation and is a significant distance from any sensitive ecological feature. This is confirmed by Koch (2012) who's study covered the whole BESS area.
4. Impacts have been identified with proposed mitigation measures. Should these measures be adhered to, the additional BESS area would remain a low sensitivity.
5. A list of conditions has been provided that should be included in the EMPr. Where relevant, additional measures unrelated to terrestrial biodiversity systems should be extended from the original EMPr.
6. Since the inception of the project, there have been no visible impacts from the existing PV areas, indicating that the impact of this activity is low and that the EMPr has been adhered to.
7. Although potential spillage from batteries has been noted, the recent technology upgrades and enclosed nature of solid-state batteries further reduces the risk of contamination.

6.8.5 Heritage Impact Assessment

The fieldwork conducted for the evaluation of the possible impact of the BESS as part of the Mierdam PV project has revealed no heritage resources:

- The current study undertaken for this specific BESS application has confirmed that the impact of the BESS will be low, and with the implementation of a chance finds procedure as part of the EMPr, will mitigate possible impacts on any unidentified heritage resources.
- An assessment of the final footprint of the BESS must be conducted with the final walkdown of the PV Facility infrastructure layout during the implementation of the EMPr .
- The calculated impact as summarised in Section 7 of this report (found Appendix 6 of this BAR) confirms the low negative impact rating pre-and post-mitigation.
- In the event that heritage resources are discovered during site clearance, construction activities must stop in the vicinity, and a qualified archaeologist must be appointed to evaluate and make recommendations on mitigation measures.
- The overall impact of the Mierdam BESS, on the heritage resources, is seen as acceptably low after the recommendations of the specialist have been implemented and therefore, impacts can be mitigated to acceptable levels allowing for the development to be authorised from a heritage perspective

6.8.6 Paleontological Impact Assessment

The planned development is primarily underlain by the Dwyka Group as well as small areas of alluvium and Late Cenozoic Superficial Sediments and intrusive rocks of the Namaqua Metamorphic Province. According to the PalaeoMap on the South African Heritage Resources Information System (SAHRIS) database, the Palaeontological Sensitivity of the Late Cenozoic Superficial Sediments is low but locally high, the Dwyka Group is moderate and the Intrusive rocks of the Namaqua Metamorphic Province is zero. Generally, the impacts on palaeontological heritage only happen during the construction phase of the development.

As the Authorized Mierdam PV was originally assessed in a Palaeontological Impact Assessment and as the proposed project falls in the same surveyed area the Palaeontological Significance of the BESS and associated infrastructure is low. It is thus considered that the proposed development is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area. It is consequently recommended that no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils.

If fossil remains are discovered during any phase of construction, either on the surface or exposed by excavations the Chance Find Protocol must be implemented by the Environmental Control Officer (ECO) in charge of these developments. These discoveries ought to be protected (if possible, in situ) and the ECO must report to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape

Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that correct mitigation (recording and collection) can be carry out by a paleontologist.

Cumulative impacts on the proposed development will be medium as the area around Prieska and Copperton has 3 solar energy farms

6.8.7 Social Impact Assessment

The project will have significant social benefits at a regional, and probably also at a national level. The project aims to install and operate a BESS that will store energy collected via the renewable energy facility during off-peak periods, making it available during periods of high demand.

It is unlikely that the project will result in any additional negative social impacts over both the construction and operational phases. The scale of the project is also small and therefore it is also most unlikely that it will result in any additional negative cumulative social impacts within the immediate area. Considering all social impacts associated with the project, it is evident that the positive elements outweigh the negative and that the project carries with it significant social benefits. Also, the project fits with international and governmental policy and legislation.

6.8.8 Surface Water Compliance Statement

Through the site verification, background investigation and impact assessment process, the following has been confirmed by the specialist:

- The site was identified as very high sensitivity by the screening tool as there are watercourses within the Mierdam property, which is a very large property.
- The preferred BESS site is however of low sensitivity in an aquatic context.
- The proposed BESS is more than 500 m from any watercourse/wetland.
- The proposed location of the BESS is the best possible location on the site.
- The site is mostly flat, located on sparse vegetation and is a significant distance from wetlands/watercourse. This is confirmed by SiVest (2012) who's study covered the whole BESS area.
- Impacts have been identified with proposed mitigation measures. Should these measures be adhered to, the additional BESS area would remain a low sensitivity.
- A list of conditions has been provided that should be included in the EMPr. Where relevant, additional measures unrelated to aquatic systems should be extended from the original EMPr.
- For nearby solar energy facilities, there have been no visible impacts from the existing PV areas, indicating that the impact of this activity is low and that the EMPr has been adhered to in such cases.
- Although potential spillage from batteries has been noted, the recent technology upgrades and enclosed nature of solid state batteries further reduces the risk of contamination

6.8.9 Noise Impact Assessment

This report determines, using administrative means, whether the proposed development could have any significant acoustical implications considering a questionnaire as proposed by SANS 10328:2008.

As all the questions are negative, it is unlikely that the planned development will present a noise disturbance. As recommended by SANS 10328:2008, a scoping investigation and an environmental noise impact investigation will not be required.

Considering the location where the potential BESS is proposed, the proposed system would be further than 500 m from any potential receptor, with the closest receptor further than 2 km away..

It is therefore the opinion of the author that there exists a low potential for a noise impact and that no further Scoping or other acoustical studies would be required for the proposed system. 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 Mierdam BESS project be approved from a noise perspective.

6.8.10 Transport Impact Assessment

The assessment found that the additional Traffic generated as a result of the development of BESS, will be added to the already approved access approval by SANRAL and the Environmental Authorization (EA).

The addition of the BESS to the existing traffic generated from the proposed development will have a minimal impact on the already approved development traffic. Furthermore, the area is not classified by the Site Environmental Sensitivity screening tool for having a major impact on Traffic and hence has not been indicated as a sensitive area for the BESS development.

7 PUBLIC PARTICIPATION

Public participation is the cornerstone of any EIA process. The principles of NEMA as well as the EIA Regulations, 2014 (as amended), govern the EIA process, including public participation. These include provision of sufficient and transparent information on an on-going basis to Interested and/or Affected Parties (I&APs) and key stakeholders, such as Organs of State (OoS) / authorities, to allow them to comment, and ensuring the participation of previously disadvantaged people, women and the youth.

To fulfil the necessary public participation required as part of the BA Process, the following methods of stakeholder engagement were undertaken by the EAP, as outlined below.

7.1 COMPLIANCE WITH REGULATIONS AND SUBSEQUENT CIRCULARS

In light of the country wide restriction enforced in terms of Government Gazette 43096 which has resulted in the entire country being placed in a national state of disaster and limits on the movement and gatherings of people in an effort to curb the spread CoVID-19, the public participation process has been amended and adjusted in light of these restrictions. In response, SiVEST has formulated a unique Public Participation process which is as closely related to the requirements of Regulations 39 to 44 of the Environmental Impact Assessment (EIA) Regulations, 2014, as amended, (GNR 326) as possible[1].

As a result, **alternative means** of undertaking the required stakeholder engagement were designed and implemented by SiVEST to ensure that all I&APs were afforded reasonable opportunity to engage meaningfully. As such, SiVEST proposed the following amendments to the public participation process, described in more detail below. This Public Participation plan was submitted to DEFF and was approved **Appendix 9**.

FIGURE 6 below provides an overview of the tools that were 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.

[1]General Notice issued by the DEFF on 24 March 2020, as well as Government Notice No. 650 issued by the DEFF on 05 June 2020

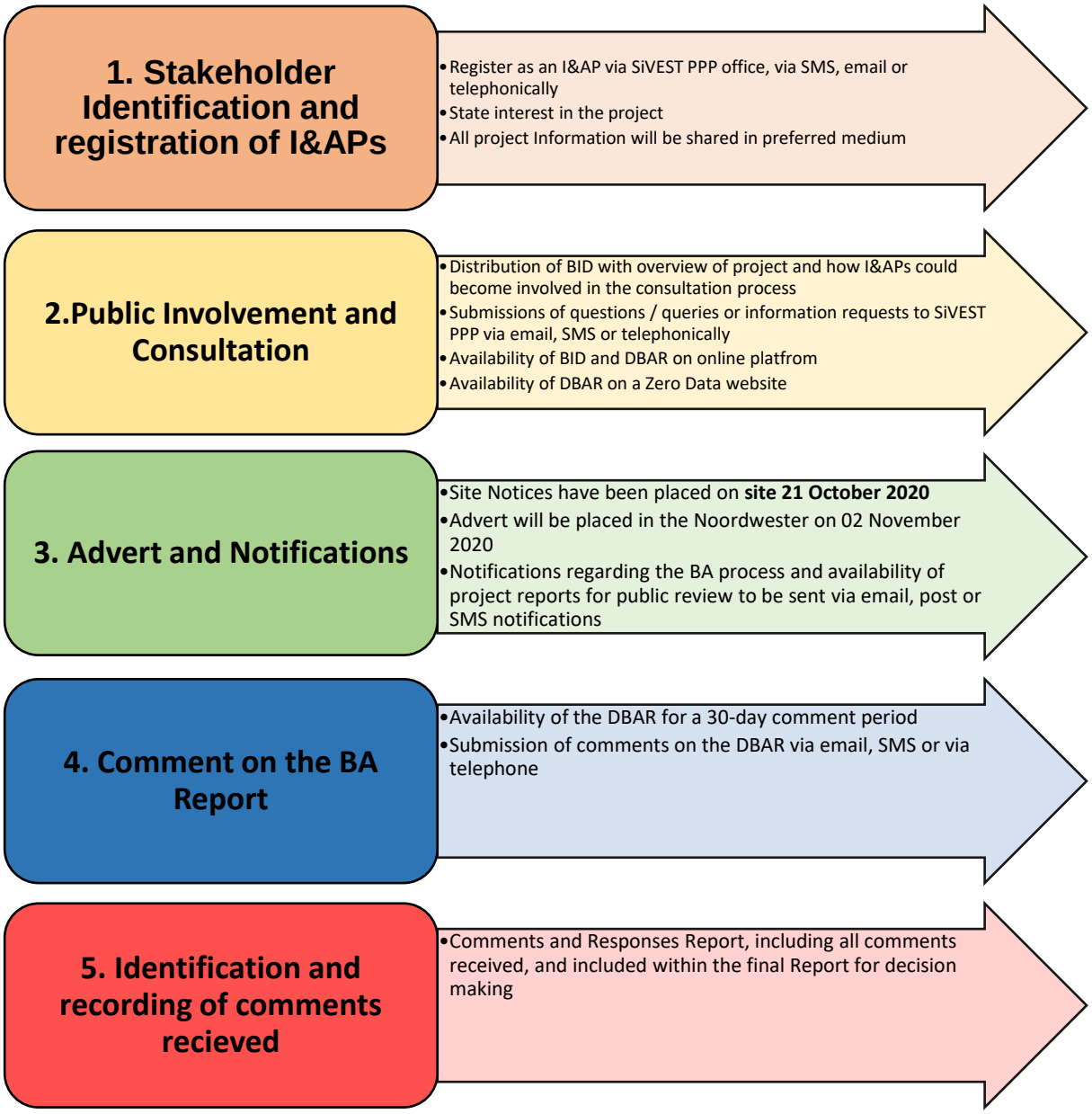

FIGURE 6: Schematic illustration of PPP tools

7.2 NEWSPAPER ADVERTISEMENT AND SITE NOTICES

A newspaper advertisement announcing the commencement of the BA process, the availability of the BAR and inviting IAPs to register on the project database was placed in the Noordwester on 02 November 2020 (see Appendix 7).

In addition to the advertisement, site notices for the BESS were placed at the entrance to the approved Mierdam Photovoltaic (PV) Solar Energy Facility (SEF) on the 21st of October 2020. These posters contained brief details of the proposed project and process and the contact details of the consultant (see Appendix 7).

7.3 WRITTEN NOTIFICATION TO AUTHORITIES AND LANDOWNERS

7.3.1 Interested and Affected Parties (IAPs)

A register of IAPs was compiled as per Section 42 of the EIA Regulations, 2014, as amended. This includes all relevant authorities, Government Departments, the Local Municipality, the District Municipality, relevant conservation bodies and non-governmental organisations (NGO's), as well as neighbouring landowners and the surrounding community. A copy of the IAP Register is included as Appendix 7 of this report.

7.3.2 Landowner Consent and Notification

Regulation 39 (1) of the EIA Regulations, 2014 (as amended), states that "if the proponent is not the owner or person in control of the land on which the activity is to be undertaken, the proponent must, before applying for an environmental authorisation in respect of such activity, obtain the written consent of the landowner or person in control of the land to undertake such activity on that land".

Regulation 39 (2) of the 2014 NEMA EIA Regulations, 2014 (as amended), further states that "sub-regulation (1) does not apply in respect of: (a) linear activities; (b) activities constituting, or activities directly related to prospecting or exploration of a mineral and petroleum resource or extraction and primary processing of a mineral or petroleum resource; and (c) strategic integrated projects as contemplated in the Infrastructure Development Act, 2014".

The proposed BESS is a non-linear activity, and landowner consent is therefore required for the following land portion:

TABLE 7: Land portions where consents for the BA process to occur was obtained.

PROJECT	FARM PORTION	SG 21 DIGIT CODE
MIERDAM PV	PORTION 1 OF KAFFIRS KOLK NO 118	C06000000000011800001

Landowner Consent Forms have been obtained for the landowners of the above-mentioned farm portions and adjacent landowners were notified of the proposed development, Landowner consent forms and notifications have been included in Appendix 7.

The table below provides details regarding the landowners / occupiers (affected and adjacent) who have been contacted and/or notified with regards to the BA process, as well as the method in which the landowners / occupiers were contacted.

TABLE 8: Details regarding the landowners / occupiers (affected and adjacent) who have been contacted and/or notified with regards to the BA

Landowners (Affected and Adjacent)				Occupier Details Requested	Method of Contact				Date	Follow-up
Landowner (Affected or Adjacent)	ERF	Farm Name	Contact Name		Phone	Email	SMS	Registered Post		
Affected Landowner	118	Mierdam (REM of Kaffirs Kolk)	Cornelus Louw Viljoen	□	□	□	□		09-11-2020	SiVEST sent the landowners / occupiers notifications on 09 November, 11 November and 12 November 2020 respectively, during the Public Participation period.
Adjacent Landowner	3/117	Klipgats Pan	Helena Francina Rudolph	□	□	□	□		11-11-2020	
Adjacent Landowner	4/117	Klipgats Pan	Josina Jemima Bernard	□	□		□		12-11-2020	
Adjacent Landowner	RE/146	Hoek Plaas	Hendrik Gideon Human	□	□		□		12-11-2020	

7.3.3 Notification of BAR for Public Comment

A notification letter for the Basic Assessment Process was compiled and circulated to all identified IAPs by sms, email, and post where required on the 10th November 2020. The purpose of the notification letter was to notify IAPs of the Basic Assessment process. Furthermore, the notification letter invited comments from IAPs on the draft Basic Assessment Report. A copy of the Notification Letter is included as Appendix 7 of this report.

Digital copies of the draft BAR are available for public review at the following venue:

VENUE	ADDRESS	OPENING HOURS	CONTACT
Prieska Police Station	c Stewart St, Prieska	10:00 - 13:00 13:45 - 16:30	053 353 5305

The report can also be downloaded from the following Data Free Portal website http://enviroenergy.sivest.co.za/download/16499BA whereby all registered I&APs can download the document at no cost during the 30- day comment and review period.

Electronic copies (CD/flash drive/dropbox link) of the DBAR will also be distributed on written request.

All issues, comments and concerns raised will be captured in the Comments and Response Report (C&RR), which will be included in the final BAR submitted to the DEFF for a decision on Environmental Authorisation. The C&RR will provide a summary of the issues and concerns raised, as well as any responses provided to I&APs and key stakeholders. A detailed C&RR will be included in Appendix 7 of the FBAR.

7.3.4 Review of the Draft Basic Assessment Report (DBAR) by Organs of State (OoS) / Key Stakeholders

In terms of section 40 (2) of the EIA Regulations, 2014 (as amended), public participation must include consultation with all OoS which have jurisdiction in respect of the activity to which the application relates.

The Table below includes all the OoS who were e-mailed the DBAR and sent electronic copies of the full report, including all appendices as well as the method in which they were notified. Telephonic follow-up will be undertaken throughout the 30-day DBAR comment and review period in order to provide them with ample opportunity to comment on the application.

BASIC ASSESSMENT (BA) FOR THE PROPOSED CONSTRUCTION AND OPERATION OF THE BATTERY ENERGY STORAGE SYSTEM (BESS) AND ASSOCIATED INFRASTRUCTURE FOR THE PROPOSED MIERDAM PV SOLAR ENERGY FACILITY NEAR PRIESKA IN THE NORTHERN CAPE PROVINCE						
BASIC ASSESSMENT I&AP Database						
November 2020						
First Name	**Last Name**	**Company**	**Department**	**Email Address**	**Method of Communication**	
					Email	**SMS**
RC	Adams	Siyathemba Local Municipality				
L	Adams	Siyathemba Local Municpality				
Carolyn	Ah Shene-Verdoorn	Birdlife South Africa		advocacy@birdlife.org.za	√	√
Tania	Anderson	WESSA: Northern Cape		spothil@gmail.com	√	√
Timothy	Andrews	Northern Cape : Department of Heritage		ratha.timothy@gmail.com	√	
Paul	Avenant	Department of Agriculture, Forestry & Fisheries		paula@daff.gov.za	√	
Johan	Badenhorst	Siyathemba Local Municipality	Technical Services	johannb@siyathemba.gov.za	√	
Chris	Bellingham			bellingham@juwi.co.za	√	√
Danie & Jomima	Bernard	FARM: KLIPGATS PAN		huisdanie@telkomsa.net	√	√
Jemima Josina	Bernard	KLIPGATS PAN 117 PTN 4				√
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Amanda	Bester	Telkom (SA) Ltd	WMS: Wayleave Management	WayleaCR@telkom.co.za	√	√

Thoko	Buthelezi	Dept of Agriculture, Forestry & Fisheries	Directorate Land Use and Soil Management	ThokoB@daff.gov.za	√	
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Wynand	Human	Farm: Plat Sjambok		humanwj@gmail.com	√	√
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			Operating Unit			
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Brave	Leballo	Transnet Freight Rail		Brave.Leballo@transnet.net	√	√
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Kelly	Tucker	SiVEST Environmental		kellyt@sivest.co.za	√	√
Lillian	Valacia	Siyathemba Local Municipality				
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P	Van Wyk	Siyathemba Local Municipality				√
Nicolene	Venter	SiVEST Environmental		iafrica@icon.co.za	√	√
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Keith	Woolf	Alkantpan (Division of Armscor Defence Institutes (Pty) Ltd)		KeithW@alkantpan.co.za	√	√
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8 RISK MATRIX ASSOCIATED WITH THE BESS TECHNOLOGY ALTERNATIVES

The BESS battery alternative technologies considered for the proposed BESS are as follows:

1. Li-ion (lithium ion) Battery Technology
2. Vanadium Redox Flow Battery Technology
3. Zinc-hybrid (Zinc-Bromine (ZNBR)) Flow Battery Technology

Although Li-ion technology is currently the most widely used and assessed battery storage technology available, all three battery technologies will be assessed so as not to limit the developer in the future should the technology of certain battery types advance.

Each battery technology has potential risks associated with the battery technology type. The Table below outlines the technology associated with each battery as well as the capability to mitigate the risk, based on practical and applicable technology solutions.

TABLE 9: Risks and Design Mitigation Measures associated with each Battery Technology.

Risk	Mitigation
Li-ion battery technology	
Temperature fluctuations Temperature fluctuations in the Kimberley area (minimum temperatures of below 0°C and maximum temperatures of over 25°C) mean that the batteries may be at risk of being damaged due to instability of temperatures. Resultant impacts could include fire, or permanent structural damage to the batteries.	The design of the Li-ion system includes: ▪ Insulated containers ▪ High powered HVAC (Heating, Ventilation and Air-Conditioning) System, monitored centrally ▪ Multiple temperature sensors for both the cells and air temperature ▪ Automated shut down mechanism if temperatures get too high ▪ Containers sealed and douse in case of fire to prevent the spread ▪ Battery management system to prevent overuse and maintain good battery condition
Fire and dangerous chemicals The volatility of the battery system, prior to any mitigation, could result in significant fire danger. In addition to this, there is a risk associated with the chemicals contained within the actual battery storage system itself.	The design of the Li-ion system includes: ▪ Fire detection and suppressant systems ▪ Gas level monitoring for several different gases (related to degradation of the batteries that increases risk of fire) ▪ Heat sensors ▪ Battery condition monitoring

	▪ Dousing mechanism for emergency cooling and fire suppression ▪ Density limits in the containers ▪ Spacing limits between containers
Vanadium redox flow battery technology	
<u>Dangerous chemicals and gases</u> Due to the use of aqueous electrolytes, the fire risk of VRFB systems is much lower than with other technologies. Overcharging the battery does not lead to fire but to a reduction in battery performance and aging of the stacks. Thermal runaway as with lithium-ion batteries is excluded. In addition to its corrosive character, the vanadium electrolyte solution is classified as toxic and hazardous to groundwater. The electrolyte is used in a closed system and vanadium can escape solely through electrolyte leaks. In spite of the measures described above, there will always be a small amount of hydrogen produced during charging at high states of charge, which is a safety risk due to the possible explosive reaction with atmospheric oxygen. The amount is extremely small, but must be taken into account when installing the battery.	The design of the VRFBs includes: ▪ Battery condition monitoring ▪ Fire detection and suppressant systems ▪ Leak detection and monitoring system ▪ A secondary containment to prevent the escape of vanadium solution into the environment during operation (storage and refilling when required). The VRFBs will be placed within a 2.5 m high berm wall. ▪ Hydrogen gas is discharged from the negative tank into the environment through a simple pipe and the battery room or container is well ventilated and flushed with fresh air to prevent any build-up of hydrogen gas. ▪ A Major Hazards Risk Assessment must be undertaken prior to construction (should VRFBs be used), and the recommendations of the assessment implemented.
Zinc-hybrid (zinc-bromine) flow battery technology	
Bromine is a highly toxic material through inhalation and absorption. Maintaining a stable amine complex with the bromine is key to system safety. In addition, repeated plating of metals in general is difficult due to the formation of “rough” surfaces (dendrite formation) that can puncture the separator.	The design of the ZNBRs includes: ▪ Active cooling systems are provided by system manufacturers to maintain stability of the bromine-amine complex when ambient temperatures may exceed 95°F. ▪ Special cell design and operating modes (pulsed discharge during charge) are required to achieve uniform plating and reliable operation.

Based on the appropriate design mitigation measures outlined above, the risks associated with each Battery technology can be adequately mitigated

9 ENVIRONMENTAL MONITORING AND AUDITING

The Environmental Management Programme (EMPr) becomes a tool by which compliance on the proposed site can be measured against. In order to utilise this tool, environmental monitoring needs to take place with regular audits against the EMPr to ensure that all aspects are attended to.

Environmental monitoring establishes benchmarks to judge the nature and magnitude of potential environmental and social impacts.

Some of the key parameters for monitoring and auditing of the proposed development include the following *inter alia*:

- Impacts to Agriculture and Soils;
- Impacts on Hydrology;
- Impacts on Geotechnical aspects;
- Impacts on Terrestrial Ecology;
- Impacts on heritage resources, including archaeology, paleontology and the cultural landscape
- Positive and negative socio-economic impacts;
- Impact on Surface Water;
- Impacts on Noise; and
- Impacts on Transport systems.

Based on the outcomes of the impact assessment process concluded in Section 10 a Draft EMPr is included in **Appendix 8**. However, it should be noted that a Final EMPr will be submitted to the DEFF for review and approval prior to construction commencing.

A monitoring programme will be implemented for the duration of the lifecycle of the proposed development.

This programme will include:

- Monthly Audits During the Construction Phase;
- According to the EMPr, EA and permit conditions which will be conducted by the Environmental Control Officer (ECO). These audits can be conducted randomly and do not require prior arrangement with the project manager;
- Compilation of an audit report with a rating of the compliance with the EMPr. This report will be submitted to the relevant authorities;
- Annual Audits conducted during the Operational Phase; and
- Undertaken by the ECO.

The environmental monitoring program will operate throughout the pre-construction, construction, and operation phases. It will consist of a number of activities, each with a specific purpose with key indicators and criteria for significance assessment.

9.1 PLANNING AND DESIGN PHASE

- Ensures that the design of the facility responds to the identified environmental constraints and opportunities;
- Ensures that pre-construction activities are undertaken in accordance with all relevant legislative requirements;
- Ensures that adequate regard has been taken of identified environmental sensitivities, as well as any landowner and community concerns and that these are appropriately addressed through design and planning (where applicable);

- Enables the construction activities to be undertaken without significant disruption to other land uses and activities in the area; and
- Ensures that the best environmental options are selected for the facility.

9.2 CONSTRUCTION PHASE

- Ensures that construction activities are properly managed in respect of environmental aspects and impacts;
- Enables construction activities to be undertaken without significant disruption to other land uses and activities in the area, in particular concerning noise impacts, farming practices, traffic and road use, and effects on local residents;
- Minimises the impact on the indigenous natural vegetation, protected tree species, and habitats of ecological value;
- Minimises impacts on fauna using the site; and
- Minimises the impact on heritage sites, should they be uncovered.

9.3 OPERATION PHASE

- Ensures that operational activities are properly managed in respect of environmental aspects and impacts;
- Enables the operation activities to be undertaken without significant disruption to other land uses in the area, in particular with regard to farming practices, traffic and road use, and effects on local residents; and
- Minimises impacts on fauna.

9.4 DECOMMISSIONING PHASE

At the end of the operational phase of the proposed development, the proposed development might need to be decommissioned. The aim of the decommissioning phase would be to return the site to its original pre-construction condition. In the unlikely event that decommissioning is required (i.e. PPA not renewed, facility becoming outdated or the land being required for other purposes), the decommissioning phase will be undertaken in line with the EMPr and the requirements in the NEMA Regulations.

Most of the components of the BESS are considered to be reusable or recyclable. In the event of the proposed development being decommissioned, the components will be reused and recycled (where possible) or disposed of (where necessary) in accordance with the relevant regulatory requirements. Certain components may also be traded or sold as there is an active second-hand market for certain components. It must be noted that the decommissioning phase of the proposed development will also create skilled and unskilled employment opportunities.

Monitoring should be undertaken at a number of levels (FIGURE 7FIGURE 7). Firstly, it should be undertaken by the Contractor at work sites during construction, under the direction and guidance of the Supervision Consultant who is responsible for reporting the monitoring to the implementing agencies. It is not the Contractor's responsibility to monitor land acquisition and compensation issues. It is recommended that the Contractor employ local full time qualified environmental inspectors for the duration of the Contract. The Supervision Consultant should include the services of an independent environmental and monitoring specialist on a part-time basis as part of their team.

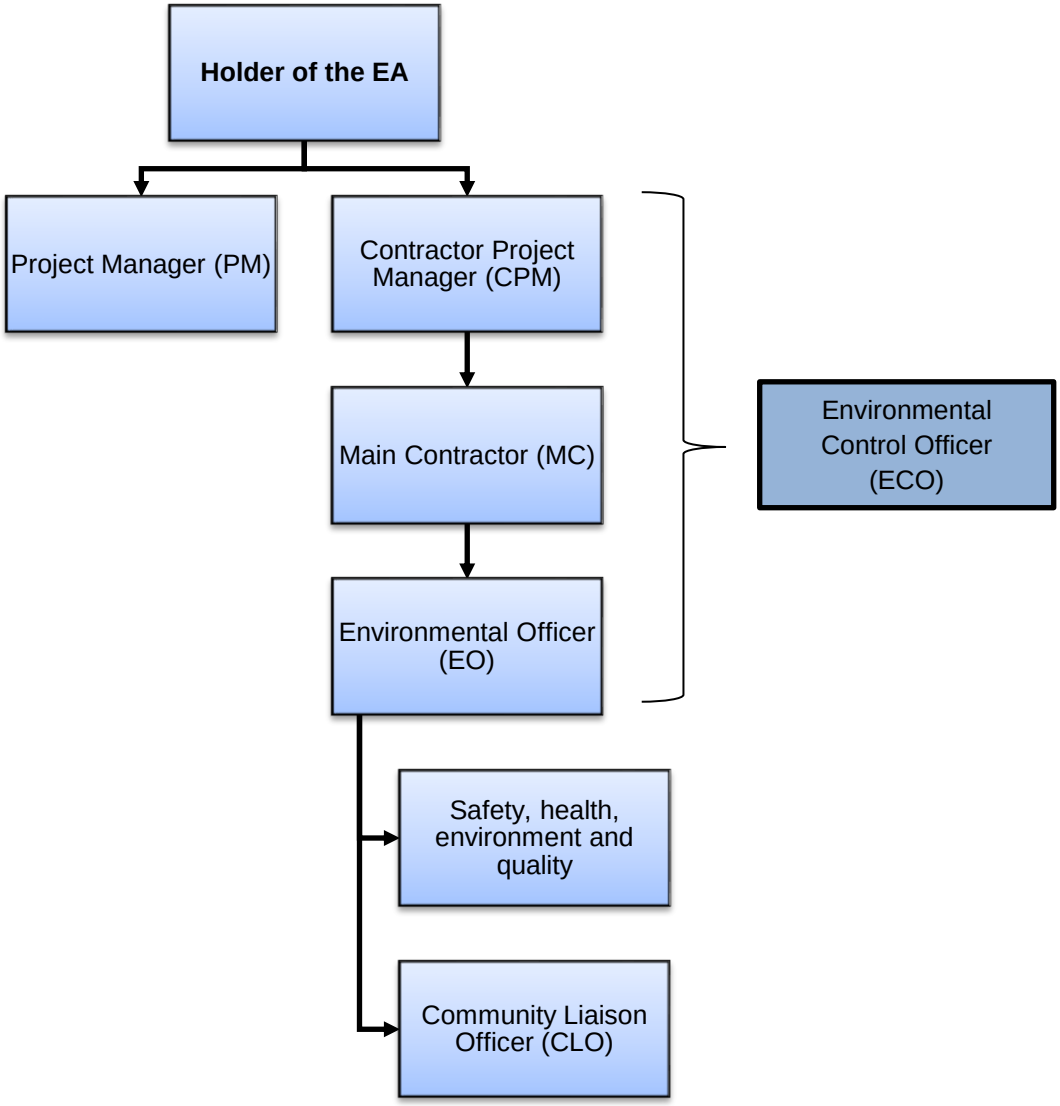


FIGURE 7: Organogram indicating the organisational structure

Environmental monitoring is also an essential component of project implementation. It facilitates and ensures the follow-up of the implementation of the proposed mitigation measure, as they are required. It helps to anticipate possible environmental hazards and/or detect unpredicted impacts over time.

Periodic on-going monitoring will be required during the life of the proposed development and the level can be determined once the proposed development is operational.

10 IMPACT ASSESSMENT AND MITIGATION MEASURES

10.1 IMPACT ASSESSMENT METHODOLOGY

The Environmental Impact Assessment (EIA) Methodology assists in evaluating the overall effect of a proposed activity on the environment. Determining of the significance of an environmental impact on an environmental parameter is determined through a systematic analysis.

10.1.1 Determination of Significance of Impacts

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale (i.e. site, local, national or global), whereas intensity is defined by the severity of the impact e.g. the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in Table 10.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

10.1.2 Impact Rating System

The impact assessment must take account of the nature, scale and duration of effects on the environment and whether such effects are positive (beneficial) or negative (detrimental). Each issue / impact is also assessed according to the various project stages, as follows:

- Planning;
- Construction;
- Operation; and
- Decommissioning.

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance has also been included.

10.1.3 Rating System Used to Classify Impacts

The rating system is applied to the potential impact on the receiving environment and includes an objective evaluation of the possible mitigation of the impact. Impacts have been consolidated into one (1) rating. In assessing the significance of each issue the following criteria (including an allocated point system) is used:

Table 10: Rating of impacts criteria

ENVIRONMENTAL PARAMETER
A brief description of the environmental aspect likely to be affected by the proposed activity (e.g. Surface Water).
ISSUE / IMPACT / ENVIRONMENTAL EFFECT / NATURE
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity (e.g. oil spill in surface water).

EXTENT (E)		
This is defined as the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment of a project in terms of further defining the determined.		
1	Site	The impact will only affect the site
2	Local/district	Will affect the local area or district
3	Province/region	Will affect the entire province or region
4	International and National	Will affect the entire country
PROBABILITY (P)		
This describes the chance of occurrence of an impact		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
REVERSIBILITY (R)		
This describes the degree to which an impact on an environmental parameter can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES (L)		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource.	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
DURATION (D)		
This describes the duration of the impacts on the environmental parameter. Duration indicates the lifetime of the impact as a result of the proposed activity.		
1	Short term	The impact and its effects will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase (0 – 1 years), or the impact and its effects will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).

2	Medium term	The impact and its effects will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered transient (Indefinite).
INTENSITY / MAGNITUDE (I / M)		
Describes the severity of an impact (i.e. whether the impact has the ability to alter the functionality or quality of a system permanently or temporarily).		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/ component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired (system collapse). Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
SIGNIFICANCE (S)		
Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. This describes the significance of the impact on the environmental parameter. The calculation of the significance of an impact uses the following formula: **Significance = (Extent + probability + reversibility + irreplaceability + duration) x magnitude/intensity.** The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.		
Points	**Impact Significance Rating**	**Description**
5 to 23	Negative Low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
5 to 23	Positive Low impact	The anticipated impact will have minor positive effects.

24 to 42	Negative Medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
24 to 42	Positive Medium impact	The anticipated impact will have moderate positive effects.
43 to 61	Negative High impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
43 to 61	Positive High impact	The anticipated impact will have significant positive effects.
62 to 80	Negative Very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
62 to 80	Positive Very high impact	The anticipated impact will have highly significant positive effects.

10.2 IMPACTS IDENTIFIED

Specialist studies have been conducted in terms of the stipulations contained within Appendix 6 of the EIA Regulations, 2014 (as amended). In addition, the relevant specialist Protocols as published in Government Notice No. 648 of 10 May 2019 were also followed, where required (https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols).

As previously mentioned, the following specialist assessments were conducted as part of the BA process in order to identify and assess the issues associated with the proposed development:

- Desktop-Agriculture Compliance statement[2];
- Hydrology Impact Assessment;
- Geotechnical Impact Assessment;
- Terrestrial Ecology Compliance Assessment[3];
- Heritage Impact Assessment;
- Paleontology Impact Assessment;
- Socio-Economic Impact Assessment;
- Aquatic Impact Assessment[4];
- Transportation Impact Assessment;
- Noise Impact Assessment.

These above-mentioned specialist assessments have been undertaken to identify and assess issues. These assessments were also undertaken to inform the impact assessment of the proposed development. It should be noted that the specialists assessed the entire application site as part of their respective assessments and also focused on specific impacts of the proposed BESS infrastructure in detail.

2 Protocol for the specialist assessment and minimum report content requirements of environmental impacts on agricultural resources by onshore wind and/or solar photovoltaic energy generation facilities where the electricity output is 20 megawatts or more, gazetted on 20 March 2020 (Sections 24(5)(A) and (H) and 44 of NEMA, 1998).

3 Protocol for the assessment and reporting of environmental impacts on Terrestrial biodiversity gazetted on 20 March 2020 (Sections 24(5)(A) and (H) and 44 of NEMA, 1998).

4 Protocol for the assessment and reporting of environmental impacts on aquatic biodiversity gazetted on 20 March 2020 (Sections 24(5)(A) and (H) and 44 of NEMA, 1998).

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

Further to the findings of the Screening Tool, the EAP has identified that BESS technologies have potential human health impacts. The EAP has assessed the Impacts in the Table below and in **Chapter 10.3 - Impact Assessment.**

A battery risk assessment has been included in Chapter 8 above.

The specialists have provided recommendations for the management of impacts, and the EAP has assessed these recommendations. For the sake of brevity, only key mitigation measures are presented in impact rating tables (Section 10.3), with a collective summary of all recommended mitigation measures for the proposed construction and operation of the project are provided in TABLE 11.

TABLE 11: Impacts identified by the EAP and Specialists and associated mitigation measures

Impact	Description	Mitigation
Agricultural	• Loss of agricultural land use, agricultural land directly occupied by the development infrastructure will become unavailable for agricultural use. • Soil degradation through erosion; topsoil loss; and hydrocarbon contamination.	• Soil erosion prevention measures must be implemented such as gabions, sand bags etc. whilst energy dissipaters should be constructed at any surface water outflow points. • The site must be monitored weekly for any signs of off-site siltation; • All areas impacted by earth-moving activities must be re-shaped post-construction to ensure natural flow of runoff and to prevent ponding; • All exposed earth must be rehabilitated promptly with suitable vegetation to stabilise the soil; • Any exposed earth must be rehabilitated promptly with suitable vegetation to protect the soil. • Any contaminated soil associated with construction activities must be contained in separate areas or receptacles such as water-proof drums; • Design an effective system of storm water run-off control, where it is required -that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points and it must prevent any potential down slope erosion. • Topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re spreading during rehabilitation. • During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.
Hydrology	• Change in impervious surface preventing infiltration and harvesting of rainwater/groundwater abstraction • Increase in Storm Water • General spills/Leaks • Battery Spills/Leaks during Operation	• The development must recycle water on site and reuse it for plant maintenance but stay within catchment limits. • The development must follow suitable contamination measures to ensure no contamination occurs. • Storm water structures should promote infiltration to ensure the recharge of the groundwater aquifer. • Existing boreholes should be used in order to not over utilize groundwater resources. • The mitigation measures required relates to the development and implementation of an adequate storm water management plan to be designed by an appropriate engineer.

Impact	Description	Mitigation
		• The engineer should account for both natural run-off (that which can be released into the natural landscape with no detrimental effect) and excess artificial run-off generated by the proposed BESS development structures. • Attenuation dams and evaporation ponds are examples that can contain storm water run-off. Other structures that may be considered are semi-permeable surfaces that can absorb artificial run-off but releases a certain amount into the landscape. Energy dissipating structures can also be used. • Such structures can reduce the amount and rate of excess run-off generated by the proposed development entering wetlands and thereby prevent the onset of erosion. • The development must stay outside of the 1:100 year flood extent. • All vehicles will need to be checked for leakage before and after entering the construction area. • Areas where fuels are either kept or transferred will need to be bunded so as to contain spillage. • Cement mixing sites will also need to be strategically positioned and bunded to prevent spillage. • Ablution facilities must be provided to prevent workers urinating near or in the wetlands. • Ablution facilities must be positioned at least 100metres away from the wetland areas and buffer zones. • Soakaways must be located away from any active boreholes. • BESS component oils/chemicals mitigation measures - Standard measures are typically accommodated in the design of the BESS to ensure that should an accidental spillage occur, it would not pollute the surrounding soils or any runoff from the BESS. • Solid State Batteries are unlikely to leak, as they are housed in containers that accommodate spills. • Should contaminated water leak from the batteries, this would typically be removed from the site, and would be recycled off-site as part of the remediation process. • It is important that such design-related mitigation measures be incorporated into the BESS design to minimise the risk of any oil/chemical spillage being transported off the site. • Implement the storm-water management plan and ensure appropriate water diversion systems are put in place. • Compile (and adhere to) a procedure for the safe handling of battery cells.

Impact	Description	Mitigation
		• Compile an emergency response plan and implement should an emergency occur. • Ensure that spill kits (if appropriate) are available on site for clean-up of spills and leaks. • Drip-trays or containment measures must be placed under equipment that poses a risk when not in use. • Immediately clean up spills and dispose of contaminated soil at a licensed waste disposal facility. • Dispose of waste appropriately to prevent pollution of soil and groundwater. • Install monitoring systems to detect leaks or emissions. • On-site battery maintenance should be done over appropriate drip trays/containment measures and any hazardous substances must be disposed of appropriately. • Record and report all fuel, oil, hydraulic fluid or electrolyte spills to the PM / Engineer / ERP so that appropriate clean-up measures can be implemented.
Geotechnical	• Disturbance/ displacement/ removal of soil and rock • Soil Erosion	• Design facility layout to minimise earthworks and levelling; • Soil erosion prevention measures must be implemented such as gabions, sand bags etc. whilst energy dissipaters should be constructed at any surface water outflow points. • The sites must be monitored weekly for any signs of off-site siltation; • All areas impacted by earth-moving activities must be re-shaped post-construction to ensure natural flow of runoff and to prevent ponding; • All exposed earth must be rehabilitated promptly with suitable vegetation to stabilise the soil; • Any exposed earth must be rehabilitated promptly with suitable vegetation to protect the soil. • Design an effective system of storm water run-off control, where it is required -that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points and it must prevent any potential down slope erosion. • Topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re spreading during rehabilitation. • During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.

Impact	Description	Mitigation
Terrestrial Ecology: Vegetation and fauna	• Disturbance of the site may lead to encroachment of alien plant species on-site and to the surrounding areas; • Increase in alien invasive species, therefore a possible loss in biodiversity; • Utilisation of natural resources • Reduction in biodiversity	• Vegetation to be removed as it becomes necessary rather than removal of all vegetation throughout the site in one step. • Removal or disturbance of any TOPs, Red Data listed or Provincially protected species may only be done after obtaining permits from relevant authorities. • A DENC permit is required for any animal and plant search-and-rescue. • Materials must not be delivered to the site prematurely if possible, which could result in additional areas being cleared or affected. • Identify sensitive fauna and flora prior to construction works and demarcate these areas; • Site personnel must undergo Environmental Training and be educated on keeping any vegetation and faunal disturbance to a minimum; • Poaching or harvesting of indigenous flora / fauna is strictly forbidden; • Alien plant encroachment must be monitored and prevented as outlined in the EMPr; • All exposed earth must be rehabilitated promptly with suitable vegetation to protect the soil. • Repair of any erosion scars which have developed must be undertaken as soon as they are identified; • All natural areas outside of the project footprint impacted during construction must be rehabilitated with locally indigenous species typical of the representative botanical unit. Seeds from surrounding seed banks can be used for re-seeding. • Rehabilitation must take place in a phased approach as soon as possible. • Rehabilitation must be executed in such a manner that surface run-off will not cause erosion of disturbed areas. • All plants outside of the construction footprint must be left undisturbed. Species of special concern must be clearly marked and recorded electronically with GPS coordinates. • The construction area must be well demarcated where this is viable and no construction activities must be allowed outside of this demarcated footprint • Vegetation removal must be phased in order to reduce impact of construction. • Strict and regular auditing of the construction process to ensure containment of the construction and laydown areas.

Impact	Description	Mitigation
		• Soils must be kept free of petrochemical solutions that must be kept on site during construction. Spillage can result in a loss of soil functionality thus limiting the re-establishment of flora. • Alien vegetation on the site will need to be controlled. • The contractor must be responsible for implementing a programme of weed and exotic species control (particularly in areas where soil has been disturbed); and grassing of any remaining stockpiles to prevent weed invasion. • No trapping or snaring of fauna on the construction site. • No faunal species are to be harmed by maintenance staff during any routine maintenance at the development. • No animals are to be kept as pets except those owned by the landowners. • Any trenches that are required for cabling etc., must not be left open for extended periods as fauna such as tortoises will fall in and become trapped. Any open trenches must be checked regularly for trapped fauna • No dogs or other pets must be allowed on site, except those confined to landowners' dwellings. • Night driving must be strictly limited and, where absolutely required, lower speed limits should apply for night driving. • Personnel on site must undergo environmental induction training, including the need to abide by speed limits, the increased risk of collisions with wild animals on roads in rural areas. • The illegal collection, hunting or harvesting of any animals at the site must be strictly forbidden • Mitigation measures primarily will relate to the protection of sensitive species and habitats, appropriate rehabilitation, and observation of buffer zones.
Heritage	• Impact on archaeological and historical heritage resources • Unidentified heritage structures, beyond the already surveyed portions of the property	• Include heritage chance finds procedure in EMPr for project development • The Heritage Act requires that all operations exposing archaeological and historical residues must cease immediately pending an evaluation by the heritage authorities. • Should any features of heritage significance be identified then all construction activities at the location must stop pending approval from the SAHRA. • Any heritage features of significance identified during the operational phase will require formal mitigation or where possible accommodate such resources.

Impact	Description	Mitigation
		• A management plan for the heritage resources needs then to be compiled and approved for implementation during construction and operations. • A chance finds protocol must be developed that includes the process of work stoppage, site protection, evaluation and informing Northern Cape Heritage Resources Authority and SAHRA of such finds and a final process of mitigation implementation.
Palaeontology	• Impact on palaeontological resources • Unidentified palaeontological resources	• Significant fossil finds must be reported to Northern Cape Heritage Resources Authority for recording and sampling by a professional palaeontologist. • Significant chance find procedure must be followed: o When a chance find is made the person must instantly stop all work near the find. o The site must be secured to protect it from any additional damage o The finder of the fossil heritage must immediately report the find to his/her direct supervisor, according to the reporting protocols instituted by the Holder of the EA. The supervisor must in turn report the find to his/her manager and the ECO. The ECO must report the find to the relevant authorities and a relevant palaeontologist. o The applicant must appoint a relevant palaeontologist to investigate and access the chance find and site. o Both ECO and palaeontologist must ensure that accurate records and documentation are kept. The documentation must start with the initial chance find report, including records of all actions taken, persons involved and contacted, comments received and findings. o These documents will be necessary to request authorisations and permits from the relevant Authorities to continue with the work on site. o The reports and all other documents must be submitted to Northern Cape Heritage Resources Authority by the palaeontologist. o The report must include recommendations for additional specialist work if necessary, or request approval to continue with the development. o Once the required approvals have been issued, the development may proceed The ECO must close out the chance find procedure and ensure that any requirements issued by the Competent Authority are added to the operational management plan (Where required). • Demarcate heritage sites / find spots / colonial structures / grave sites identified during this study as no-go areas;

Impact	Description	Mitigation
		• Demarcate and fence during construction any heritage resources within 100 meters of construction activities; • Monitor heritage sites / find spots / colonial structures / grave sites areas if construction is going to take place through or in close proximity to them. • A management plan for the heritage resources must be compiled and approved for implementation during construction.
Socio-Economic	• Creation of job opportunities for skilled personnel (e.g. engineers, specialists etc.) and non-skilled personnel (e.g. labourers); • Skills development of the local community through employment opportunities; • Possible economic benefits to local suppliers of building materials as goods and services may be purchased from these entities during the construction phase.	• All contact with the affected parties must be courteous at all times. The rights of the affected parties must be respected at all times. • Ensure that the expectations (rules) of the farmers regarding access to farms are understood and effectively adhered to. • Installation of an electronic number plate reader at the entrance to the BESS Facility. • Establish a local skills desk to identify the skills set of the local residents available for the operation phase of the BESS. • Up-skill construction workers with aptitude to maintain the BESS facility. • Wherever feasible, local residents should be recruited to fill semi and unskilled jobs; • Women should be given equal employment opportunities and encouraged to apply for positions; • A skills transfer plan should be put in place at an early stage and workers should be given the opportunity to develop skills which they can use to secure jobs elsewhere post-construction. • A procurement policy promoting the use of local business should, where possible, be put in place to be applied throughout the construction phase. • Communicate the benefits associated with renewable energy to the broader community; • Ensure that all affected land owners and tourist associations are regularly consulted; • A Grievance Mechanism should be put in place and all grievances must be dealt with in a transparent manner; • The mitigation measures recommended in the Heritage and Palaeontology Impact Assessment must be followed. • Work closely with the appropriate municipal structures in regard to establishing a social responsibility programme. • Establish a social responsibility programme either in line with the BID guidelines or equivalent;

Impact	Description	Mitigation
		• Work closely with the appropriate municipal structures in regard to establishing a social responsibility programme; • Damage to infrastructure supporting surrounding communities must not be tolerated and any damage must be rectified immediately by the Contractor. A record of all damage and remedial actions must be kept on site. • Ensure that an onsite HIV infections policy is in place and that construction workers have easy access to condoms; • Expose workers to a health and HIV/AIDS awareness educational program; • Extend the HIV/AIDS program into the community with specific focus on schools and youth clubs. • Communicate the limitation of opportunities created by the project through Community leaders and Ward Councillors; • Draw up a recruitment policy in conjunction with the Community Leaders and Ward Councillors of the area and ensure compliance with this policy. • Ensure that, at all times, people have access to their properties as well as to social facilities • Ensure that construction workers are clearly identifiable. All workers should carry identification cards and wear identifiable clothing; • Fence off construction site (if feasible) and control access to these sites; • Appoint an independent, and preferably local, security company to monitor the site; • Encourage local people to report any suspicious activity associated with the construction sites through the establishment of a community liaison forum; • Prevent loitering within the vicinity of the construction camp as well as the construction site.
Surface water	• Clearing of natural vegetation forming part of surface water catchment areas; • Increase in stormwater leading to an increase of peak flows entering riparian / wetland systems; • Potential oil spills/leaks during construction; • Potential for leaks from batteries leading to contamination of watercourses / wetlands; and • Contamination of ground and surface water and soil.	• Soil erosion prevention measures must be implemented such as gabions, sand bags etc. whilst energy dissipaters should be constructed at any surface water outflow points. • All areas impacted by earth-moving activities must be re-shaped post-construction to ensure natural flow of runoff and to prevent ponding. • All exposed earth must be rehabilitated promptly with suitable vegetation to stabilise the soil. • Any exposed earth must be rehabilitated promptly with suitable vegetation to protect the soil.

Impact	Description	Mitigation
		• Any contaminated soil associated with construction activities must be contained in separate areas or receptacles such as water-proof drums. • Repair of any erosion scars which have developed must be undertaken as soon as they are identified; • Design an effective system of storm water run-off control, where it is required -that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points and it must prevent any potential down slope erosion. • The sites must be monitored weekly for any signs of off-site siltation; • All construction machinery and equipment must be regularly serviced and maintained to keep noise, dust and possible leaks to a minimum, as per the requirements of the EMPr; • An appropriate number of toilets (1 toilet for every 20 workers) must be provided for labourers during the Construction Phase. These must be maintained in a satisfactory condition and a minimum of 100m away from any water resources and outside of the 1:100 year floodline,
Traffic	• Increase in construction vehicles in the area; • Excessively slow or fast moving construction vehicles on the surrounding roads may cause accidents; and • If not properly maintained, increased road use on existing surrounding road infrastructure, for access purposes by construction personnel, may cause damage to the existing infrastructure.	• The contractor must meet safety requirements under all circumstances. All equipment transported must be clearly labelled as to their potential hazards according to specifications. All the required safety labelling on the containers and trucks used must be in place. • Care for the safety and security of community members crossing access roads must receive priority at all times. • Ensure that roadworthy and safety standards are implemented at all times for all construction vehicles. • Management strategies for dust suppression to be implemented and dust generating activities to be suspended during periods of strong winds. • Limit the number of vehicles and trucks travelling to and from the construction site, where possible. • Unless there are water shortages, ensure that dust suppression techniques are implemented on all access roads; in all areas where vegetation clearing has taken place; on all soil stockpiles. • Where necessary suitable measures must be taken to rehabilitate damaged areas.

Impact	Description	Mitigation
		• Contractors must ensure that access roads are maintained in good condition by attending to potholes, corrugations and storm water damages as soon as these develop. • If necessary, staff must be employed to clean surfaced roads adjacent to construction sites where materials have spilt. • The main routes on the site must be clearly signposted and printed delivery maps must be issued to all suppliers and Sub-Contractors. • Construction routes and required access roads must be clearly defined at the commencement of construction • A route study is to be undertaken as part of the final traffic transportation plan to confirm the most appropriate route to site. • Recommendations of the Stormwater Management Plan must be implemented on all access roads • All equipment moved onto site or off site during a project is subject to the legal requirements. • The Contractor must ensure that all the necessary precautions against damage to the environment and injury to persons are taken in the event of an accident. • Stagger component delivery to site. • Regular maintenance of gravel roads must be undertaken by the Contractor during the construction phase, and by Client/Facility Manager during the operational phase. • Access of all construction and material delivery vehicles must be strictly controlled, especially during wet weather to avoid compaction and damage to the topsoil structure. • Damping down of the un-surfaced roads must be implemented to reduce dust and nuisance. • In cases where severe water restrictions are imposed, other measures like the use of wetting agents such as chemical stabilisation or “hydromulch”, must be considered.
Noise	• Disruption to receptors through increased activity and noise in the area.	• The construction phase must aim to adhere to the relevant noise regulations and limit noise to within standard working hours in order to reduce disturbance of dwellings in close proximity to the development. • The construction crew must abide by the local by-laws (if applicable) regarding noise. • Ensure that noise as a component is included in the induction of employees and contractors, and how their activities and actions can impact on residents in the area (reverse alarms and reversing close to dwellings, driving fast past residential dwellings

Impact	Description	Mitigation
		at night, maintenance of equipment). All contractors and employees must receive this induction. • Construction site yards, workshops, concrete batching plants, and other noisy fixed facilities must be located well away from noise sensitive areas. Once the proposed final layouts are made available by the contractor(s), the sites must be evaluated in detail and specific measures designed into the system. • Truck traffic must be routed away from noise sensitive areas, where possible. • Noisy operations must be combined so that they occur where possible at the same time. • Construction workers to wear necessary ear protection gear. • Noise from labourers must be controlled. • The contractor must take measures to discourage labourers from loitering in the area and causing noise disturbance. Where possible labour must be transported to and from the site by the contractor or his Sub-Contractors by the contractors own transport. • Implementation of enclosure and cladding of processing plants. • When working in very close proximity to potentially sensitive receptors, coordinate the working time with periods when the receptors are not at home where possible. An example would be to work within the 08:00 to 17:00 time-slot to minimize the significance of the impact because: • Where possible construction work must be undertaken during normal working hours (07H00 – 17H00), from Monday to Saturday; If agreements can be reached (in writing) with all the surrounding (within a 500m distance) potentially sensitive receptors, these working hours can be extended. • The Holder of the EA must investigate any reasonable and valid noise complaint if registered by a receptor staying within 2000m from location where construction activities are taking place. • When any noise complaints are received, noise monitoring must be conducted at the complainant, followed by feedback regarding noise levels measured, an if necessary appropriate mitigation. • Reduce the noise impact during the construction phase by: • Using the smallest/quietest equipment for the particular purpose. Ensuring that equipment is well-maintained and fitted with the correct and appropriate noise abatement measures.

Impact	Description	Mitigation
Human Health Impacts	• Potential dust generation from soil stripping, vehicle traffic on the access roads and motor vehicle fumes will have an impact on air quality; • Dust will be created during the Construction Phase, which may impact on surrounding local community members • Human fatalities / injuries caused by battery fires / explosions.	• Road dampening must be undertaken as and when required to prevent excess dust during construction; • Road surface stabilisers can also be implemented to supress dust during construction; • Management strategies for dust suppression to be implemented and dust generating activities to be suspended during periods of strong winds. • Rehabilitation must take place in a phased approach as soon as possible. • Compile an Emergency Response Plan and ensure that this is located on site at all times and that all personal are familiar with the procedures. • Ensure that emergency procedures (in relation to fire, spills, contamination of the ground, accidents to employees, use of hazardous substances, etc.) are established prior to commencing operation. • Make all emergency procedures available, including responsible personnel, contact details of emergency services, etc. to all the relevant personnel. Clearly demarcate emergency procedures at the relevant locations around the site. • Provide suitable emergency and safety signage on site, and demarcate any areas which may pose a safety risk (including hazardous substances.). • Ensure that no fires are permitted on or adjacent to site except in areas designated for this purpose. Any such designated areas should be situated as far as possible from vegetated areas, e.g. flammable material stores any other high fire risk, or environmentally sensitive areas. • Ensure that no smoking is permitted. • Ensure that sufficient fire-fighting equipment is available on site. • Ensure that all personnel on site are aware of the location of firefighting equipment on the site and how the equipment is operated. • Liaise with the local fire-firefighting department with regards to emergency procedures.
Air quality	• Potential dust generation from soil stripping, vehicle traffic on the access roads and motor vehicle fumes will have an impact on air quality; • Dust will be created during the Construction Phase, which may impact on surrounding local community members.	• All construction machinery and equipment must be regularly serviced and maintained to keep noise, dust and possible leaks to a minimum, as per the requirements of the EMPr; • Road dampening must be undertaken as and when required to prevent excess dust during construction; • Road surface stabilisers can also be implemented to supress dust during construction.
Waste	• There is potential for the site and surrounding areas to become polluted	• All waste generated on-site during construction must be adequately managed. Separation and recycling of different waste materials is supported;

Impact	Description	Mitigation
	if construction activities are not properly managed (e.g. oil / hazardous substance spills, litter from personnel on-site, sewage from ablutions etc.); and • Waste generation could be created from the following: - Solid waste - plastics, metal, wood, concrete, stone, asphalt; - Chemical waste- petrochemicals, resins and paints; and - Sewage as may be generated by employees.	• All solid wastes must be disposed of at an appropriately registered landfill site and records maintained to confirm safe disposal; • Adequate scavenger-proof refuse disposal containers must be supplied to control solid waste on-site; • It must be ensured that existing waste disposal facilities in the area are able to accommodate the increased waste generated from the proposed construction; • Chemical waste must be stored in appropriate containers and disposed of at an appropriately licensed disposal facility; • Portable sanitation facilities must be erected for construction personnel. Use of these facilities must be enforced (these facilities must be kept clean so that they are a desired alternative to the surrounding vegetation). These facilities must also be monitored and serviced regularly and located more than 100m away from any natural water resources so as to prevent contamination of the water resource. • The construction site must be inspected for litter on a daily basis. Extra care must be taken on windy days. • Soil that is contaminated with, e.g. cement, petrochemicals or paint, must be disposed of at a registered waste disposal site. • It must be ensured that all hazardous contaminants are stored in designated areas that are sign-posted, lined with an appropriate barrier and bunded to 110% of the volumes of liquid being stored to prevent the bio-physical contamination of the environment (ground and surface water and soil contamination). Hazardous substance storage must not take place within 100m of a wetland/watercourse or within the 1:100 year floodline; and • Any significant spills on-site must be reported to the relevant Authority (e.g. Department of Water and Sanitation / Municipality etc.) and must be remediated as per the EMPr. • All waybills and disposal slips (e.g. safe disposal certificates, waste manifests) must be retained for a minimum period of five (5) years for the disposal activities associated with the construction and decommissioning of the proposed facility, per regulation 8(1) of the NEM:WA, 2008 Waste Classification and Management Regulations published in GN No. R. 634 of 23 August 2013. • All hazardous waste materials, if present, must be carefully stored as advised by the ECO, and then disposed of off-site at a licensed landfill site, where practical. • Contaminants to be stored safely to avoid spillage.

Impact	Description	Mitigation
		• Machinery must be properly maintained to keep oil leaks in check • All necessary precaution measures must be taken to prevent soil or surface water pollution from hazardous materials used during construction and any spills must immediately be cleaned up and all affected areas rehabilitated • Depending on the nature and extent of the spill, contaminated soil must be either excavated or treated on-site. • Excavation of contaminated soil must involve careful removal of soil using appropriate tools/machinery to storage containers until treated or disposed of at a licensed hazardous landfill site. • The ECO must determine the precise method of treatment for polluted soil. This could involve the application of soil absorbent materials as well as oil-digestive powders to the contaminated soil. • If a spill occurs on an impermeable surface such as cement or concrete, the surface spill must be contained using oil absorbent material. • If necessary, oil absorbent sheets or pads must be attached to leaky machinery or infrastructure. • Materials used for the remediation of petrochemical spills must be used according to product specifications and guidance for use. • Contaminated remediation materials must be carefully removed from the area of the spill so as to prevent further release of petrochemicals to the environment, and stored in adequate containers until appropriate disposal.
Occupational Health Safety	• Electrical Safety • Chemical Safety • Safety of workers • Machinery maintenance • Fire safety	• Implementation of safety measures, work procedures and first aid must be implemented on site. This must include the provision of first aid facilities, and the training of a number of employees to carry out first aid procedures. • Workers must be thoroughly trained in using potentially dangerous equipment. • Contractors must ensure that all equipment is maintained in a safe operating condition. • A safety officer must be appointed. • A record of health and safety incidents must be kept on site. • Any health and safety incidents must be reported to the Project Manager immediately. • Workers have the right to refuse work in unsafe conditions. • A record must be kept of drugs administered or precautions taken and the time and dates when this was done. This can then be used as evidence in court should any claims be instituted against the Holder of the EA or the Contractor.

Impact	Description	Mitigation
		• Material stockpiles or stacks must be stable and well secured to avoid collapse and possible injury to site workers / local residents. • All sources of hazardous energy or hazardous substances must have written procedures for isolation, identifying how the system, plant or equipment can be made and kept safe. • Use must be made of reflective markings on structures, traffic junctions, and other areas with a potential for accidents. • Safety barriers must be installed in high risk locations. • Personal Protective Equipment (PPE) must be made available to all construction staff and must be compulsory. Hard hats and safety shoes must be worn at all times and other PPE worn where necessary i.e. dust masks, ear plugs etc. • No person is to enter the site without the necessary PPE. • All equipment used for construction must be in good working order with up to date maintenance records. • MSDS and other standards exist to ensure proper storage of hazardous substances. • Lithium ion batteries require battery management systems to monitor and protect cells from overcharging • Large ESS systems should be designed with appropriate fire detection and suppression systems. • Fire detection and suppressant systems • Gas level monitoring for several different gases (related to degradation of the batteries that increases risk of fire) • Heat sensors • Battery condition monitoring systems • Dousing mechanism for emergency cooling and fire suppression • Density limits in the containers • Spacing limits between containers • Insulated containers • High powered HVAC (Heating, Ventilation and Air-Conditioning) System, monitored centrally • Multiple temperature sensors for both the cells and air temperature • Automated shut down mechanism if temperatures get too high

Impact	Description	Mitigation
		• Containers sealed and douse in case of fire to prevent the spread • Battery management system to prevent overuse and maintain good battery condition
Security	• Crime • Alcohol and drug abuse • Loitering • Access control • Fire arms	• A security company must be employed to guard the construction site and monitor access. • Site access must be controlled via a boom and gatehouse, with security staff stationed at access booms during construction. • Labour must be transported to and from the site to discourage loitering in adjacent areas and a possible increase in crime or disturbance. • Unsocial activities such as consumption or illegal selling of alcohol, drug utilisation or selling and prostitution on site must be prohibited. Disciplinary or criminal action must be taken against any persons found to be engaged in such activities. • Only pre-approved staff must be permitted to stay in the staff accommodation where staff accommodation is provided. • The construction camp site must be fenced, where necessary to prevent any loss or injury to persons during the construction phase. • No alcohol / drugs to be present on site. • A security company must be employed to guard the construction site and monitor access. • Site access must be controlled via a boom and gatehouse, with security staff stationed at access booms during construction. • Labour must be transported to and from the site to discourage loitering in adjacent areas and a possible increase in crime or disturbance. • Unsocial activities such as consumption or illegal selling of alcohol, drug utilisation or selling and prostitution on site must be prohibited. Disciplinary or criminal action must be taken against any persons found to be engaged in such activities. • Only pre-approved staff must be permitted to stay in the staff accommodation where staff accommodation is provided. • The construction camp site must be fenced, where necessary to prevent any loss or injury to persons during the construction phase.

10.3 IMPACT ASSESSMENT

Some Specialist assessments were informed by the DEA Screening Tool as being compliance statements due to the outcome of the Site Verification Reports undertaken by specialists where **Low Impacts** were recorded, as such their findings are described below. (It should be noted that as part of the Protocol as published in Government Notice No. 648 of 10 May 2019, these specialists were not required to formally rate impacts).

Those specialists, whose studies were informed by the DEA Screening Tool as following the Appendix 6 of the EIA Regulations have indicated Impacts according to the SiVEST Impact Rating Methodology. These impact ratings are Tabulated below.

10.3.1 Agricultural Impacts (Compliance Statement)

An Agricultural Compliance Statement is not required to formally rate agricultural impacts. It is only required to indicate whether or not the proposed development will have an unacceptable impact on the agricultural production capability of the site. It must provide a substantiated statement on the acceptability, or not, of the proposed development and a recommendation on the approval, or not of the proposed development.

As noted above, the significance of an agricultural impact is a direct function of the degree to which that impact will affect current or potential future agricultural production, and it is on this basis that impacts have been assessed in this report.

The conclusion of this assessment is that the proposed development will not have an unacceptable negative impact on the agricultural production capability of the site. The proposed development is therefore acceptable. This is substantiated by the following points:

- The fact that the proposed site is on land of limited agricultural potential that is only viable for grazing.
- The agricultural footprint of the proposed project is very small in relation to the available grazing land on and surrounding the site.
- The proposed development poses a low risk in terms of causing soil degradation, which can be adequately and fairly easily managed by mitigation management actions. In addition, the degradation risk is only to land of low agricultural value, and the significance of the impact is therefore low.

The conclusion of the assessment was that the proposed development will not have an unacceptable negative impact on the agricultural production capability of the site. The proposed development is therefore acceptable. Refer to section of the Desktop Agricultural and Soils Impact Assessment Report (Appendix 6A).

10.3.2 Terrestrial Ecology Impacts (Compliance Statement)

It is the opinion of the Ecologist that the overall impact of the Mierdam BESS, on the terrestrial biodiversity and plant species resources, is seen as acceptably low after the recommendations have been implemented and therefore, impacts can be mitigated to acceptable levels allowing for the development to be authorised.

10.3.3 Noise Impacts

The Noise specialist determined that the planned development will not present a noise disturbance. As recommended by SANS 10328:2008, a scoping investigation and an environmental noise impact investigation will not be required.

Considering the location where the BESS is proposed, the system is further than 500 m from any potential receptor, with the closest receptor being located further than 2 km from the site.

It is therefore the opinion of the author that there exists a low potential for a noise impact and that no further Scoping or other acoustical studies would be required for the proposed system. 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 Mierdam BESS project be approved from a noise perspective.

10.3.4 Geotechnical Impacts

No Planning and Design Phase, Cumulative and No-Go impacts were identified by the specialist.

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION/MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Construction Phase																				
Disturbance/ displacement/ removal of soil and rock	Ground disturbance during platform earthworks, road subgrade preparation, trenching	1	4	2	2	3	1	12	-	Low	1) Design facility layout to minimise earthworks and levelling based on high resolution ground contour information 2) Correct topsoil and spoil management	1	4	2	1	3	1	11	-	Low
Soil Erosion	Increased erosion due to vegetation clearing, alteration of natural drainage	1	4	2	2	2	1	11	-	Low	1) Temporary berms and drainage channels to divert surface runoff where needed 2) Landscape and rehabilitate disturbed areas timeously (e.g. regrassing) 3) Correct engineering design of road and site drainage	1	2	1	1	2	1	7	-	Low

											4) Use designated access and laydown areas only to minimise disturbance to surrounding areas									
Operational Phase																				
Soil Erosion	Increased erosion due to alteration of natural drainage	1	2	1	1	2	1	7	-	Low	1) Maintain drainage channels 2) Monitor for erosion and remediate and rehabilitate timeously	1	1	1	1	2	1	6	-	Low
Decommissioning Phase																				
Disturbance/ displacement/ removal of soil and rock	Ground disturbance during platform earthworks, road rehabilitation, removal of subsurface infrastructure	1	4	2	2	2	1	11	-	Low	1) Restore natural site topography 2) Landscape and rehabilitate disturbed areas timeously (e.g. regrassing)	1	4	2	1	2	1	10	-	Low
Soil Erosion	Increased erosion due to ground disturbance during rehabilitation activities	1	2	2	2	2	1	9	-	Low	1) Temporary berms and drainage channels to divert surface runoff where needed 2) Restore natural site topography 3) Use designated access and laydown areas only to minimise disturbance to surrounding areas	1	1	1	1	2	1	6	-	Low

Cumulative																				
Disturbance/ displacement/ removal of soil and rock	No cumulative effect																			
Soil Erosion																				

From a geotechnical and geological perspective, no fatal flaws, sensitivities, or areas to be avoided have been identified within or close to the BESS assessment area. It is therefore recommended that the proposed activity be authorised.

10.3.5 Hydrology Impacts

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S
Construction Phase																				
Surface and groundwater Water Quantity	Change in impervious surface preventing infiltration and harvesting of rainwater/groundwater abstraction	1	3	2	2	2	4	-	40	Low	o The development must recycle water on site and reuse it for plant maintenance but stay within catchment limits. o The development must follow suitable contamination measures to ensure no contamination occurs.	1	3	2	2	2	3	-	30	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S
											o Storm water structures should promote infiltration to ensure the recharge of the groundwater aquifer. o Existing boreholes should be used in order to not over utilize groundwater resources.									
Flood Hydrology / Storm Water	Increase in Storm Water	1	2	1	1	3	3	-	24	Low	o The mitigation measures required relates to the development and implementation of an adequate storm water management plan to be designed by an appropriate engineer.	1	2	1	1	3	1	-	8	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S
											o The engineer should account for both natural run-off (that which can be released into the natural landscape with no detrimental effect) and excess artificial run-off generated by the proposed BESS development structures. o Attenuation dams and evaporation ponds are examples that can contain storm water run-off. Other structures that may be considered are semi-permeable surfaces that can absorb artificial run-off but releases a certain amount into the landscape. Energy dissipating structures can also be used.									

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S
											o Such structures can reduce the amount and rate of excess run-off generated by the proposed development entering wetlands and thereby prevent the onset of erosion. o The development must stay outside of the 1:100 year flood extent.									
Surface and Groundwater Water Quality	General spills/Leaks	1	2	3	3	3	3	-	36	Low	o All vehicles will need to be checked for leakage before and after entering the construction area. o Areas where fuels are either kept or transferred will need to be bunded so as to contain spillage. o Cement mixing sites will also need to be strategically positioned and bunded to prevent spillage.	1	1	1	1	3	1	-	7	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S
											o Ablution facilities must be provided to prevent workers urinating near or in the wetlands. o Ablution facilities must be positioned at least 100metres away from the wetland areas and buffer zones. o Soakaways must be located away from any active boreholes.									
Operational Phase –Solid State Li-Ion																				
Surface Water Quality	Battery Spills/Leaks during Operation	1	2	3	3	4	3	-	39	Low	o BESS component oils/chemicals mitigation measures - Standard measures are typically accommodated in the design of the BESS to ensure that should an accidental spillage occur, it would not pollute the surrounding soils or any runoff from the BESS.	1	2	1	1	3	1	-	8	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S
											o Solid State Batteries are unlikely to leak, as they are housed in containers that accommodate spills. o Should contaminated water leak from the batteries, this would typically be removed from the site, and would be recycled off-site as part of the remediation process. o It is important that such design-related mitigation measures be incorporated into the BESS design to minimise the risk of any oil/chemical spillage being transported off the site.									

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S
											o Implement the storm-water management plan and ensure appropriate water diversion systems are put in place. o Compile (and adhere to) a procedure for the safe handling of battery cells. o Compile an emergency response plan and implement should an emergency occur. o Ensure that spill kits (if appropriate) are available on site for clean-up of spills and leaks. o Drip-trays or containment measures must be placed under equipment that poses a risk when not in use.									

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S
											o Immediately clean up spills and dispose of contaminated soil at a licensed waste disposal facility. o Dispose of waste appropriately to prevent pollution of soil and groundwater. o Install monitoring systems to detect leaks or emissions. o On-site battery maintenance should be done over appropriate drip trays/containment measures and any hazardous substances must be disposed of appropriately.									

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S
											o Record and report all fuel, oil, hydraulic fluid or electrolyte spills to the PM / Engineer / ERP so that appropriate clean-up measures can be implemented.									
Operational Phase – Redox Flow																				
Surface Water Quality	Battery Spills/Leaks during Operation	2	2	4	2	4	3	-	42	Low	o BESS component oils/chemicals mitigation measures - Standard measures are typically accommodated in the design of the BESS to ensure that should an accidental spillage occur, it would not pollute the surrounding soils or any runoff from the BESS. o Flow batteries are typically housed within a concrete bund that would accommodate spills within the footprint of the BESS.	2	2	4	1	1	1	-	10	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S
											o Should contaminated water leak from the batteries, this would typically be removed from the site, and would be recycled off-site as part of the remediation process. o It is important that such design-related mitigation measures be incorporated into the BESS design to minimise the risk of any oil/chemical spillage being transported off the site. o Implement the storm-water management plan and ensure appropriate water diversion systems are put in place. o Compile (and adhere to) a procedure for the safe handling of battery cells.									

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S
											o Compile an emergency response plan and implement should an emergency occur. o Ensure that spill kits (if appropriate) are available on site for clean-up of spills and leaks. o Drip-trays or containment measures must be placed under equipment that poses a risk when not in use. o Immediately clean up spills and dispose of contaminated soil at a licensed waste disposal facility. o Dispose of waste appropriately to prevent pollution of soil and groundwater.									

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S
											o Install monitoring systems to detect leaks or emissions. o On-site battery maintenance should be done over appropriate drip trays/containment measures and any hazardous substances must be disposed of appropriately. o Record and report all fuel, oil, hydraulic fluid or electrolyte spills to the PM / Engineer / ERP so that appropriate clean-up measures can be implemented.									
Decommissioning Phase																				
Water Quality / Hydrology	Sediments and spills entering water resources	1	1	4	1	3	1	-	10	Low	o All vehicles will need to be checked for leakage before and after entering the construction area.	1	1	4	1	3	1	-	10	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S
											o Areas where fuels are either kept or transferred will need to be bunded so as to contain spillage. o Ablution facilities must be provided to prevent workers urinating near or in the wetlands. o Ablution facilities must be positioned at least 100metres away from the wetland areas and buffer zones. o Revegetation must occur immediately following the decommission.									
Cumulative																				

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S
Water Quality / Hydrology	Compounded impacts from surrounding development	2	2	2	1	3	1	-	10	Low	o The mitigation measures required relates to the development and implementation of an adequate storm water management plan/structures to be designed by an appropriate engineer. o Such structures can reduce the amount and rate of excess run-off generated by the proposed development entering wetlands and thereby prevent the onset of erosion downstream.	2	1	2	1	2	1	-	8	Low
No-go options																				
Water Quality / Hydrology	N/A	/	/	/	/	/	/	/	/	Low	o The No-Go alternative entails no change to the status quo.	/	/	/	/	/	/	/	/	Low

10.3.6 Heritage Impacts

The overall impact of the Mierdam BESS, on the heritage resources, is seen as acceptably low after the recommendations have been implemented and therefore, impacts can be mitigated to acceptable levels allowing for the development to be authorised.

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	STATUS (+/-)	TOTAL	S		E	P	R	L	D	I / M	STATUS (+/-)	TOTAL	S
Construction Phase																				
Heritage resources	Impact on archaeological and historical heritage resources	1	1	4	1	3	1	-	10	Low	1.Include heritage chance finds procedure in EMP for project development	1	1	4	1	3	1	-	10	Low
Operational Phase																				
Heritage resources	Impact on archaeological and historical heritage resources	1	2	4	4	4	1	-	15	Low	1.Include heritage chance finds procedure in EMP for project development	1	1	4	4	4	1	-	14	Low
Decommissioning Phase																				
Heritage resources	Impact on archaeological and historical heritage resources	1	2	4	4	4	1	-	15	Low	1.Include heritage chance finds procedure in EMP for project development	1	1	4	4	4	1	-	14	Low
Cumulative																				
Heritage resources	Impact on archaeological and historical heritage resources	1	2	4	4	4	1	-	15	Low	1.Include heritage chance finds procedure in EMP for project development	1	1	4	4	4	1	-	14	Low
No-go options																				
Impact on archaeological and historical heritage resources	In the event that the BESS will not be implemented and operational	1	2	4	4	4	1	+	15	Low	None	1	2	4	4	4	1	+	15	Low

10.3.7 Paleontological Impacts

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Construction Phase																				
Loss of fossil heritage		2	4	4	4	4	3	54	-	Medium	Chance find Protocol	2	4	4	4	4	1	18	-	Low
Operational Phase																				
Loss of fossil heritage		2	4	4	4	4	3	54	-	Medium	Chance find Protocol	2	4	4	4	4	1	18	-	Low
Decommissioning Phase																				
Loss of fossil heritage		2	4	4	4	4	3	54	-	Medium	Chance find Protocol	2	4	4	4	4	1	18	-	Low
Cumulative																				
Loss of fossil heritage		2	4	4	4	4	3	54	-	Medium	Chance find Protocol	2	4	4	4	4	1	18	-	Low
No Go Option																				
Loss of fossil heritage		2	4	4	4	4	1	18	+	Low	None	2	4	4	4	4	1	18	+	Low

10.3.8 Surface Water Impacts (Compliance Statement)

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S
Construction Phase																				
Surface and groundwater Water Quantity	Change in impervious surface preventing infiltration and harvesting of rainwater/groundwater abstraction	1	3	2	2	2	4	-	40	Low	o The development must recycle water on site and reuse it for plant maintenance but stay within catchment limits. o The development must follow suitable contamination measures to ensure no contamination occurs. o Storm water structures should promote infiltration to ensure the recharge of the groundwater aquifer. o Existing boreholes should be used in order to not over utilize groundwater resources.	1	3	2	2	2	3	-	30	Low
Flood Hydrology / Storm Water	Increase in Storm Water	1	2	1	1	3	3	-	24	Low	o The mitigation measures required relates to the development and implementation of an	1	2	1	1	3	1	-	8	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S
											adequate storm water management plan to be designed by an appropriate engineer. o The engineer should account for both natural run-off (that which can be released into the natural landscape with no detrimental effect) and excess artificial run-off generated by the proposed BESS development structures. o Attenuation dams and evaporation ponds are examples that can contain storm water run-off. Other structures that may be considered are semi-permeable surfaces that can absorb artificial run-off but releases a certain amount into the landscape. Energy dissipating structures can also be used.									

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S
											o Such structures can reduce the amount and rate of excess run-off generated by the proposed development entering wetlands and thereby prevent the onset of erosion. o The development must stay outside of the 1:100 year flood extent.									
Surface and Groundwater Water Quality	General spills/Leaks	1	2	3	3	3	3	-	36	Low	o All vehicles will need to be checked for leakage before and after entering the construction area. o Areas where fuels are either kept or transferred will need to be bunded so as to contain spillage. o Cement mixing sites will also need to be strategically positioned and bunded to prevent spillage. o Ablution facilities must be provided to prevent workers	1	1	1	1	3	1	-	7	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S
											urinating near or in the wetlands. o Ablution facilities must be positioned at least 100metres away from the wetland areas and buffer zones. o Soakaways must be located away from any active boreholes.									
Operational Phase –Solid State Li-Ion																				
Surface Water Quality	Battery Spills/Leaks during Operation	1	2	3	3	4	3	-	39	Low	o BESS component oils/chemicals mitigation measures - Standard measures are typically accommodated in the design of the BESS to ensure that should an accidental spillage occur, it would not pollute the surrounding soils or any runoff from the BESS. o Solid State Batteries are unlikely to leak, as they are housed in containers that accommodate spills.	1	2	1	1	3	1	-	8	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S
											o Should contaminated water leak from the batteries, this would typically be removed from the site, and would be recycled off-site as part of the remediation process. o It is important that such design-related mitigation measures be incorporated into the BESS design to minimise the risk of any oil/chemical spillage being transported off the site. o Implement the storm-water management plan and ensure appropriate water diversion systems are put in place. o Compile (and adhere to) a procedure for the safe handling of battery cells. o Compile an emergency response plan and implement									

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S
											should an emergency occur.									
											o Ensure that spill kits (if appropriate) are available on site for clean-up of spills and leaks.									
											o Drip-trays or containment measures must be placed under equipment that poses a risk when not in use.									
											o Immediately clean up spills and dispose of contaminated soil at a licensed waste disposal facility.									
											o Dispose of waste appropriately to prevent pollution of soil and groundwater.									
											o Install monitoring systems to detect leaks or emissions.									
											o On-site battery maintenance should be done over appropriate drip trays/containment measures and any hazardous substances									

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S
											must be disposed of appropriately. o Record and report all fuel, oil, hydraulic fluid or electrolyte spills to the PM / Engineer / ERP so that appropriate clean-up measures can be implemented.									
Operational Phase – Redox Flow																				
Surface Water Quality	Battery Spills/Leaks during Operation	2	2	4	2	4	3	-	42	Low	o BESS component oils/chemicals mitigation measures - Standard measures are typically accommodated in the design of the BESS to ensure that should an accidental spillage occur, it would not pollute the surrounding soils or any runoff from the BESS. o Flow batteries are typically housed within a concrete bund that would accommodate spills within the footprint of the BESS.	2	2	4	1	1	1	-	10	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S
											o Should contaminated water leak from the batteries, this would typically be removed from the site, and would be recycled off-site as part of the remediation process. o It is important that such design-related mitigation measures be incorporated into the BESS design to minimise the risk of any oil/chemical spillage being transported off the site. o Implement the storm-water management plan and ensure appropriate water diversion systems are put in place. o Compile (and adhere to) a procedure for the safe handling of battery cells. o Compile an emergency response plan and implement									

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S
											should an emergency occur.									
											o Ensure that spill kits (if appropriate) are available on site for clean-up of spills and leaks.									
											o Drip-trays or containment measures must be placed under equipment that poses a risk when not in use.									
											o Immediately clean up spills and dispose of contaminated soil at a licensed waste disposal facility.									
											o Dispose of waste appropriately to prevent pollution of soil and groundwater.									
											o Install monitoring systems to detect leaks or emissions.									
											o On-site battery maintenance should be done over appropriate drip trays/containment measures and any hazardous substances									

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S
											must be disposed of appropriately. o Record and report all fuel, oil, hydraulic fluid or electrolyte spills to the PM / Engineer / ERP so that appropriate clean-up measures can be implemented.									
Decommissioning Phase																				
Water Quality / Hydrology	Sediments and spills entering water resources	1	1	4	1	3	1	-	10	Low	o All vehicles will need to be checked for leakage before and after entering the construction area. o Areas where fuels are either kept or transferred will need to be bunded so as to contain spillage. o Ablution facilities must be provided to prevent workers urinating near or in the wetlands. o Ablution facilities must be positioned at least 100metres away from the wetland areas and buffer zones.	1	1	4	1	3	1	-	10	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S
											o Revegetation must occur immediately following the decommission.									
Cumulative																				
Water Quality / Hydrology	Compounded impacts from surrounding development	2	2	2	1	3	1	-	10	Low	o The mitigation measures required relates to the development and implementation of an adequate storm water management plan/structures to be designed by an appropriate engineer. o Such structures can reduce the amount and rate of excess run-off generated by the proposed development entering wetlands and thereby prevent the onset of erosion downstream.	2	1	2	1	2	1	-	8	Low
No-go options																				
Water Quality / Hydrology	N/A	/	/	/	/	/	/	/	/	Low	o The No-Go alternative entails no change to the status quo.	/	/	/	/	/	/	/	/	Low

The overall impact of the Mierdam BESS, on the aquatic resources, is seen as acceptably low after the recommendations have been implemented and therefore, impacts can be mitigated to acceptable levels allowing for the development to be authorised.

10.3.9 Transport Impacts

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Construction Phase																				
Additional Traffic Generation	Increase in Traffic	2	3	1	2	1	2	18	-	Low	• Ensure a large portion of vehicles traveling to and from the proposed development travels in the 'off peak' periods or by bus.	2	3	1	2	1	2	18	-	Low
	Increase of Incidents with pedestrians and livestock	2	4	2	4	1	2	26	-	Medium	• Reduction in speed of vehicles • Adequate enforcement of the law • Implementation of pedestrian safety initiatives • Regular maintenance of farm fences, access cattle grids	2	3	2	4	1	1	12	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
	Increase in Dust from gravel roads	2	3	2	2	1	2	20	-	Low	• Reduction in speed of the vehicles • Use of dust suppressant techniques • Implement a road maintenance program under the auspices of the respective transport department	2	3	2	2	1	2	20	-	Low
	Increase in Road Maintenance	2	3	2	2	2	2	22	-	Low	• Implement a road maintenance program under the auspices of the respective transport department.	2	3	2	2	2	2	22	-	Low
Internal Access Roads	Increase in Dust from gravel roads	1	4	1	1	1	2	16	-	Low	• Enforce a maximum speed limit on the development • Use of dust suppressant techniques • Adequate watering by means of water bowser	1	3	1	1	1	2	14	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
	New / Larger Access points	1	4	1	2	1	1	9	-	Low	• Adequate road signage according to the SARTSM • Approval from the respective roads department	1	4	1	2	1	1	9	-	Low
Operational Phase																				
Additional Traffic Generation	Increase in Traffic	2	3	1	2	3	1	11	-	Low	• Ensure a large portion of vehicles traveling to and from the proposed development travels in the 'off peak' periods or by bus.	2	3	1	2	3	1	11	-	Low
	Increase of Incidents with pedestrians and livestock	2	4	2	4	3	1	15	-	Low	• Reduction in speed of vehicles • Adequate enforcement of the law • Implementation of pedestrian safety initiatives • Regular maintenance of farm fences, access cattle grids	2	3	2	4	3	1	14	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
	Increase in Dust from gravel roads	2	3	2	2	3	1	12	-	Low	• Reduction in speed of the vehicles • Use of dust suppressant techniques • Implement a road maintenance program under the auspices of the respective transport department.	2	3	2	2	3	1	12	-	Low
	Increase in Road Maintenance	2	3	2	2	3	1	12	-	Low	• Reduction in speed of the vehicles • Use of dust suppressant techniques • Implement a road maintenance program under the auspices of the respective transport department.	2	3	2	2	3	1	12	-	Low
Internal Access Roads	New / Larger Access points	2	3	1	2	3	1	11	-	Low	• Adequate road signage according to the SARTSM	2	3	1	2	3	1	11	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Decommissioning Phase																				
Additional Traffic Generation	Increase in Traffic	2	3	1	2	1	2	18	-	Low	• Ensure a large portion of vehicles traveling to and from the proposed development travels in the 'off peak' periods or by bus.	2	3	1	2	1	2	18	-	Low
	Increase of Incidents with pedestrians and livestock	2	4	2	4	1	2	26	-	Medium	• Reduction in speed of vehicles • Adequate enforcement of the law • Implementation of pedestrian safety initiatives • Regular maintenance of farm fences, access cattle grids	2	3	2	4	1	1	12	-	Low
	Increase in Dust from gravel roads	2	3	2	2	1	2	20	-	Low	• Reduction in speed of the vehicles • Use of dust suppressant techniques	2	3	2	2	1	2	20	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
											• Implement a road maintenance program under the auspices of the respective transport department.									
	Increase in Road Maintenance	2	3	2	2	2	2	22	-	Low	• Implement a road maintenance program under the auspices of the respective transport department.	2	2	2	2	2	2	20	-	Low
Internal Access Roads	Increase in Dust from gravel roads	1	3	1	1	1	2	14	-	Low	• Enforce a maximum speed limit on the development • Use of dust suppressant techniques • Adequate watering by means of water bowser	1	3	1	1	1	2	14	-	Low
	New / Larger Access points	1	4	1	2	1	1	9	-	Low	• Adequate road signage according to the SARTSM	1	4	1	2	1	1	9	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
											• Approval from the respective roads department									
Cumulative Phase																				
Additional Traffic Generation	Increase in Traffic	2	3	1	2	1	4	36	-	Low	• Ensure a large portion of vehicles traveling to and from the proposed development travels in the 'off peak' periods or by bus. • Coordination between all developers in the area	2	3	1	2	1	2	18	-	Low
	Increase of Incidents with pedestrians and livestock	2	4	2	4	1	4	52	-	High	• Reduction in speed of vehicles • Adequate enforcement of the law • Implementation of pedestrian safety initiatives • Regular maintenance of farm fences, access cattle grids	2	3	2	4	1	2	24	-	Medium

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
											• Coordination between all developers in the area									
	Increase in Dust from gravel roads	2	3	2	2	1	4	40	-	Medium	• Reduction in speed of the vehicles • Use of dust suppressant techniques • Implement a road maintenance program under the auspices of the respective transport department. • Construction of an on-site batching • Coordination between all developers in the area	2	3	2	2	1	2	20	-	Low
	Increase in Road Maintenance	2	3	2	2	2	2	22	-	Low	• Implement a road maintenance program under the auspices of the respective transport department.	2	3	2	2	2	2	22	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
											• Coordination between all developers in the area									
Internal Access Roads	Increase in Dust from gravel roads	1	4	1	1	1	3	24	-	Medium	• Enforce a maximum speed limit on the development • Use of dust suppressant techniques • Adequate watering by means of water bowser	1	3	1	1	1	2	14	-	Low
	New / Larger Access points	1	4	1	2	1	2	18	-	Low	• Adequate road signage according to the SARTSM • Approval from the respective roads department	1	4	1	2	1	1	9	-	Low

10.3.10 Human Health Impacts

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S
Construction Phase																				
Human Health	Pollutant concentrations during construction	1	1	4	1	3	1	-	10	Low	1. Limit and phase vegetation clearance and the construction footprint to what is essential. 2. Limit vehicle speeds to 40 km/h on unconsolidated and non-vegetated areas. 3. Avoid clearing of vegetation until necessary (i.e. just before earthworks). 4. Reduce airborne dust through e.g. dampening dust-generating areas, roads and stockpiles with water.	1	1	4	1	3	1	-	10	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S
											5. Utilise screens in high dust-generating areas. 6. Use high quality (low sulphur) diesel for construction vehicles / equipment where practical. 7. Maintain all machinery, vehicles, vessels and other equipment in good working order to minimise exhaust fumes									
Operational Phase –Solid State Li-Ion																				
Human Health	Human fatalities / injuries caused by battery fires / explosions.	1	2	4	4	4	4	-	60	High	1. Compile an Emergency Response Plan and ensure that this is located on site at all times and that all personal are	1	1	4	4	4	1	-	14	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S
											familiar with the procedures.									
											2. Ensure that emergency procedures (in relation to fire, spills, contamination of the ground, accidents to employees, use of hazardous substances, etc.) are established prior to commencing operation.									

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S
											3. Make all emergency procedures available, including responsible personnel, contact details of emergency services, etc. to all the relevant personnel. Clearly demarcate emergency procedures at the relevant locations around the site.									
											4. Provide suitable emergency and safety signage on site, and demarcate any areas which may pose a safety risk (including hazardous substances.).									
											5. Ensure that no fires are permitted on or									

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S
											adjacent to site except in areas designated for this purpose. Any such designated areas should be situated as far as possible from vegetated areas, e.g. flammable material stores any other high fire risk, or environmentally sensitive areas.									
											6. Ensure that no smoking is permitted.									
											7. Ensure that sufficient fire-fighting equipment is available on site.									
											8. Ensure that all personnel on site are aware of the location of firefighting equipment on the site and how the									

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S
											equipment is operated. 9. Liaise with the local fire-firefighting department with regards to emergency procedures.									
Operational Phase – Redox Flow																				
Human Health	Human fatalities / injuries caused by battery fires / explosions.	1	2	4	4	4	4	-	60	High	1. Compile an Emergency Response Plan and ensure that this is located on site at all times and that all personal are familiar with the procedures. 2. Ensure that emergency procedures (in relation to fire, spills, contamination of the ground, accidents to employees, use of	1	1	4	4	4	1	-	14	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S
											hazardous substances, etc.) are established prior to commencing operation.									
											3. Make all emergency procedures available, including responsible personnel, contact details of emergency services, etc. to all the relevant personnel. Clearly demarcate emergency procedures at the relevant locations around the site.									
											4. Provide suitable emergency and safety signage on site, and demarcate any areas which may pose a safety risk									

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S
											(including hazardous substances.).									
											5. Ensure that no fires are permitted on or adjacent to site except in areas designated for this purpose. Any such designated areas should be situated as far as possible from vegetated areas, e.g. flammable material stores any other high fire risk, or environmentally sensitive areas.									
											6. Ensure that no smoking is permitted.									
											7. Ensure that sufficient fire-fighting equipment is available on site.									
											8. Ensure that all personnel on									

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S
											site are aware of the location of firefighting equipment on the site and how the equipment is operated. 9. Liaise with the local fire-firefighting department with regards to emergency procedures.									
Decommissioning Phase																				
Human Health	Pollutant concentrations during construction	1	1	4	1	3	1	-	10	Low	1. Limit and phase vegetation clearance and the construction footprint to what is essential. 2. Limit vehicle speeds to 40 km/h on unconsolidated and non-vegetated areas. 3. Avoid clearing of vegetation until	1	1	4	1	3	1	-	10	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S
											necessary (i.e. just before earthworks).									
											4. Reduce airborne dust through e.g. dampening dust-generating areas, roads and stockpiles with water.									
											5. Utilise screens in high dust-generating areas.									
											6. Use high quality (low sulphur) diesel for construction vehicles / equipment where practical.									
											7. Maintain all machinery, vehicles, vessels and other equipment in good working order to minimise exhaust fumes									

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S		E	P	R	L	D	I / M	STATUS (+ OR -)	TOTAL	S
Cumulative																				
Human Health	In the event that the BESS will not be implemented and operational	1	2	4	4	4	1	+	15	Low	None	1	2	4	4	4	1	+	15	Low
No-go options																				
Human Health	No pollutants	1	1	1	1	1	1	+		Low		1	1	1	1	1	1	+		Low

10.4 CUMULATIVE ASSESSMENT

The area has seen a notable interest from developers of various renewable energy developments, which could be associated with the energy resource potential found in the region, proximity to the grid access and its evacuation capacity, as well as other factors. Such developments, whether already approved or only proposed, need to be considered as they have the potential to create cumulative impacts, whether positive or negative, if implemented. The potential cumulative impact of the proposed BESS in combination with other renewable energy facilities in the area has been identified and assessed per environmental aspect and mitigation measures will be identified to address the cumulative impact, where possible. Cumulative impacts were also rated as part of the impact rating system and used to determine the significance of the impacts (refer to **Section 10.3** above).

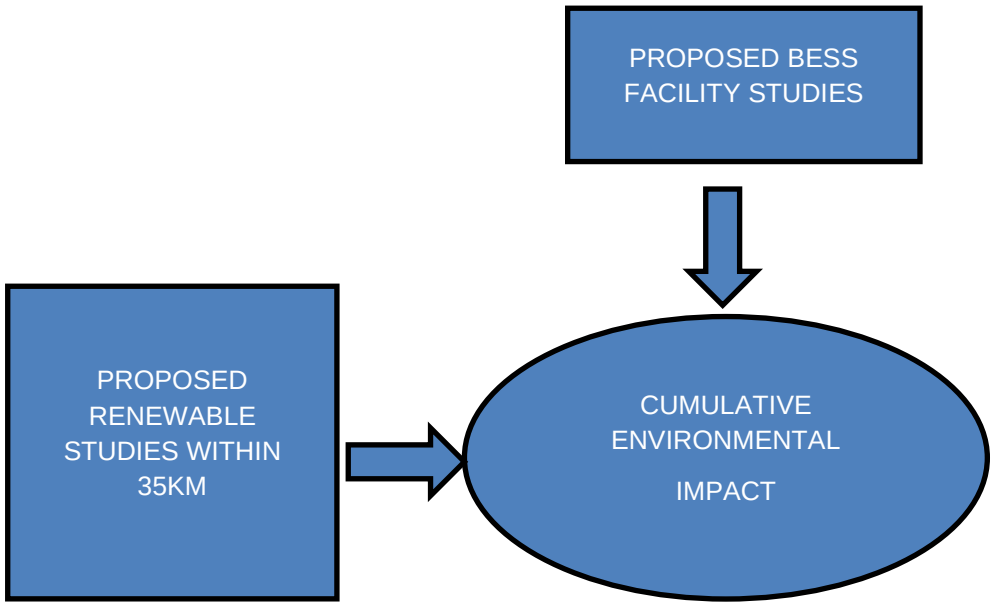


FIGURE 8: Cumulative Impact Organogram

As part of the cumulative impact assessment, literature reviews of other specialist assessments / studies which were undertaken (where possible) for the other renewable energy developments (both wind and solar) proposed within a 35km radius of the proposed Mierdam BESS application site (Figure 9) were undertaken by the respective specialists in order to ascertain any additional cumulative impacts that should be taken into consideration. A fair amount of information was available and was provided to the respective specialists to assess and incorporate into their respective assessment reports, where applicable. TABLE 12 below highlights the renewable energy developments that are being proposed and/or which are approved within a 35km radius of the proposed Mierdam BESS application site, as well as the various stages of the

development. Their location relative to the proposed development under review is illustrated in

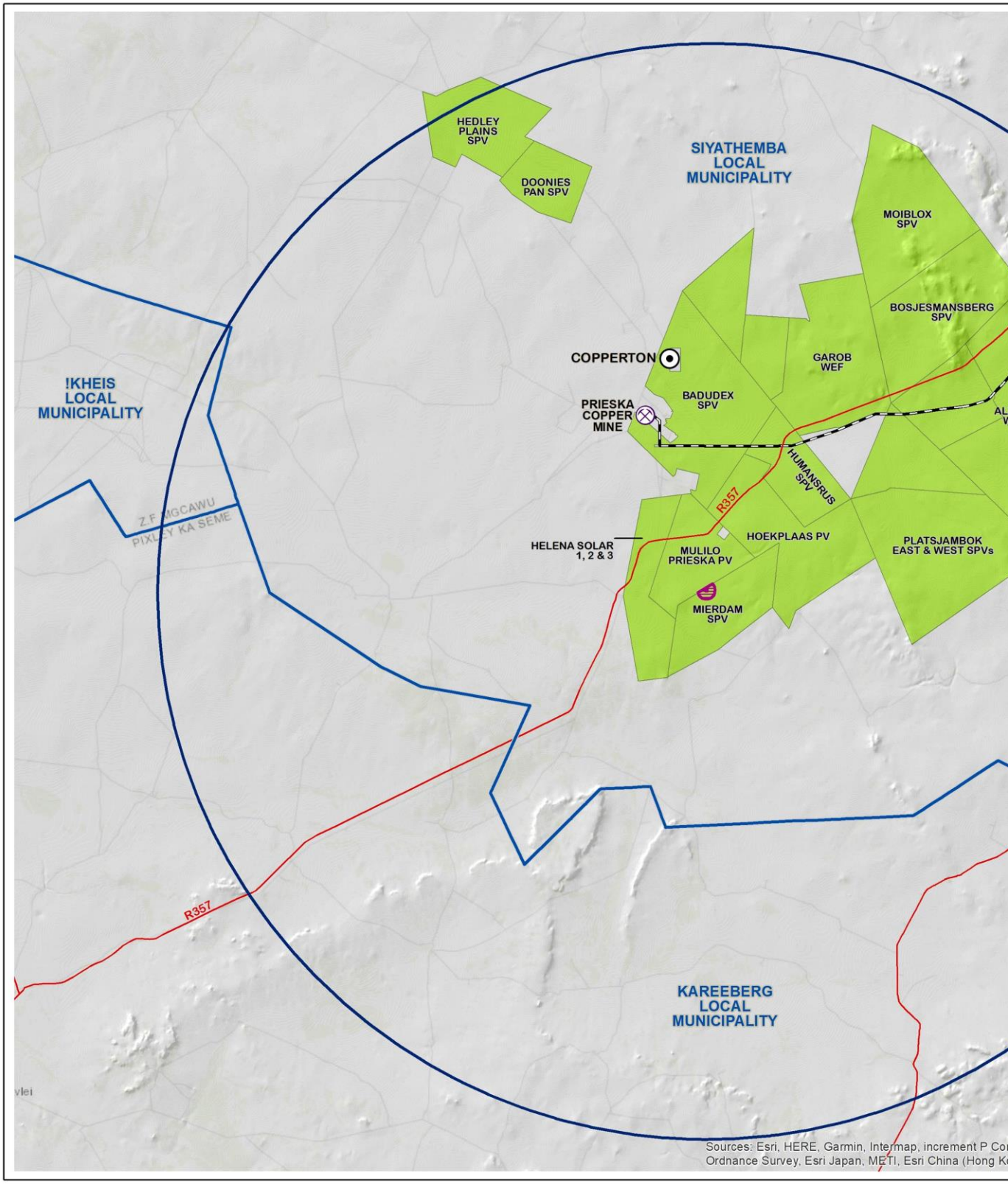


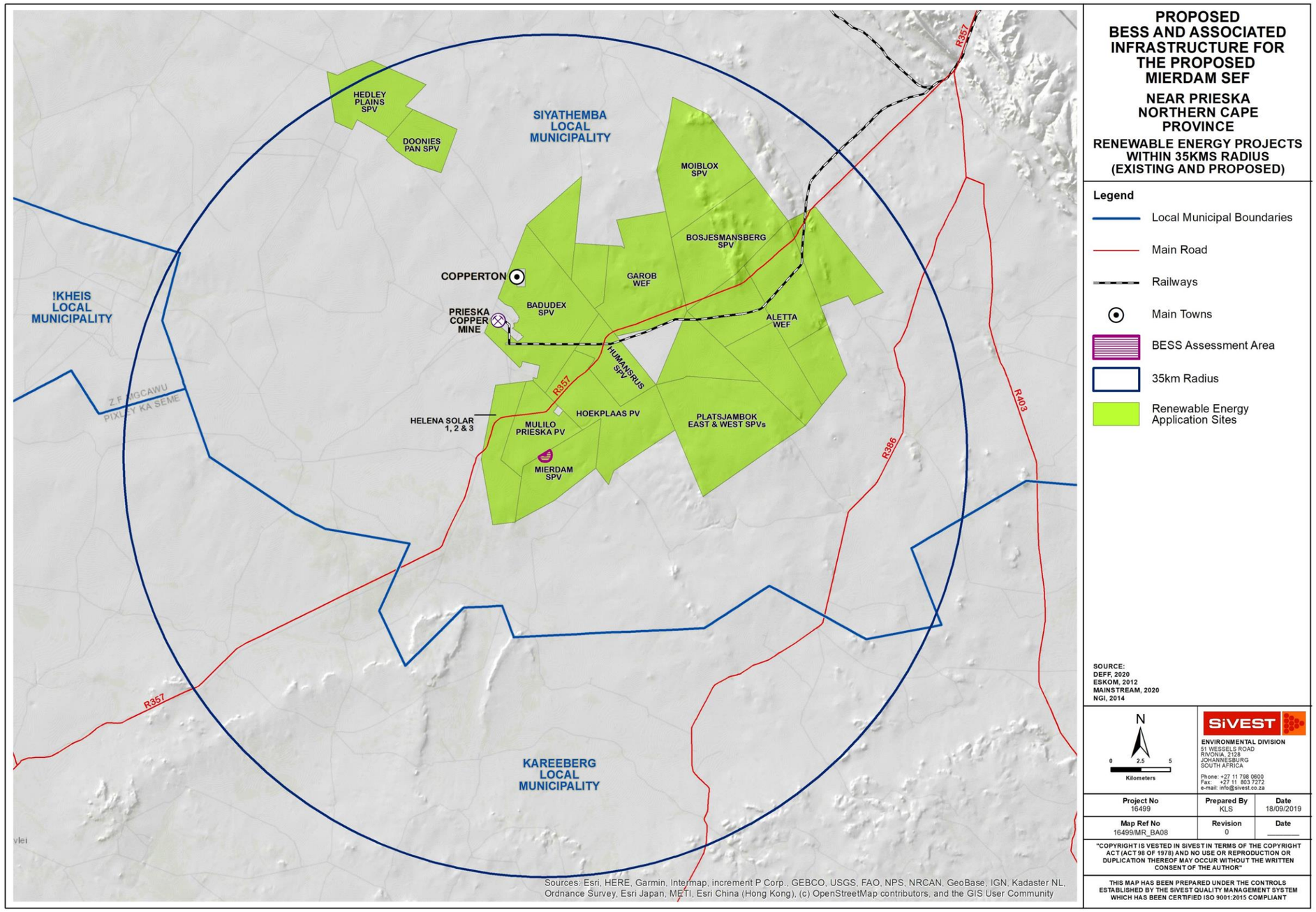
FIGURE 9.

It should be noted that there is no confirmation of BESS on these sites and such discretion was used in assuming that BESS are indeed included.

TABLE 12: Renewable energy developments identified within a 35km radius of the proposed BESS application site

Development	Current status of EIA/development	Proponent	Technology	Capacity	Farm details
Helena Solar 1	EA issued	BioTherm Energy (Pty) Ltd	Solar PV	75MW	Portion 3 of the farm Klipgats Pan No 117
Helena Solar 2	EA issued	BioTherm Energy (Pty) Ltd	Solar PV	75MW	Portion 3 of the farm Klipgats Pan No 117
Helena Solar 3	EA issued	BioTherm Energy (Pty) Ltd	Solar PV	75MW	Portion 3 of the farm Klipgats Pan No 117
Mierdam Solar PV Facility	EA issued	South Africa Mainstream Renewable Power Mierdam (Pty) Ltd	Solar PV	75MW	Portion 1 of the Farm Kaffirs Kolk No. 118
Platsjambok East and West Solar PV Facilities	EA issued	South Africa Mainstream Renewable Power Mierdam (Pty) Ltd	Solar PV	75MW	Remainder of the Farm Platsjambok 102
The Badudex Solar Project	Environmental Impact Assessment (EIA) underway	Badudex (Pty) Ltd	Solar PV	75MW	Portion 1 of the Farm Volgelstruis Bult No 104
Mulilo Prieska PV	In operation	Mulilo Prieska PV (Pty) Ltd	Solar PV	75MW	Portion 4 of the Farm Klipgats Pan No. 117
The Moiblox Solar Project	Environmental Impact Assessment (EIA) underway	Moiblox (Pty) Ltd	Solar PV	75MW	Remainder of the Farm Bosjesmansberg
Garob Wind Energy Facility Project	EA issued	Garob Wind Farm (Pty) Ltd	Wind	140mw	Portion 5 of the Farm Nelspoortje No. 103
Aletta WEF	EA issued	BioTherm Energy (Pty) Ltd	Wind	140MW	Re of Farm Uitzigt 69 Portions 1, 2, 3 and Re of Farm Drielings Pan 101
Humansrus Solar PV Energy Facility	EA issued	Humansrus Solar PV Energy Facility 1 (Pty) Ltd	Solar PV	75MW	Remainder the Farm Humansrus No. 147
Hedley Plains PV Facility	Environmental Impact Assessment (EIA) underway	NK Energie (Pty) Ltd	Solar PV	Unknown	Ptn 3 of Farm Hedley Plains A 64
Doonies Pan PV Facility	Environmental Impact Assessment (EIA) underway	NK Energie (Pty) Ltd	Solar PV	Unknown	Ptn 5 of Farm Doonies Pan 106

Hoekplaas PV Facility	Approved	Mulilo Renewable Energy (Pty) Ltd	Solar PV	75MW x 10 projects	Remainder of Farm Hoekplaas
Bosjesmans-berg Solar Energy Facility	Approved	Networx Renewables (Pty) Ltd	Solar PV	300MW	Ptn 1 of Farm Bosjesmansberg 67
Mulilo Sonnedix Prieska PV	EA issued	Mulilo Renewable Energy (Pty) Ltd s	Solar PV	75MW	Remainder of the Farm Hoekplaas No. 146



PROPOSED BESS AND ASSOCIATED INFRASTRUCTURE FOR THE PROPOSED MIERDAM SEF

NEAR PRIESKA NORTHERN CAPE PROVINCE

RENEWABLE ENERGY PROJECTS WITHIN 35KMS RADIUS (EXISTING AND PROPOSED)

Legend

- Local Municipal Boundaries
- Main Road
- Railways
- Main Towns
- BESS Assessment Area
- 35km Radius
- Renewable Energy Application Sites

SOURCE:
DEFF, 2020
ESKOM, 2012
MAINSTREAM, 2020
NGI, 2014

N

0 2.5 5
Kilometers

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Project No	Prepared By	Date
16499	KLS	18/09/2019
Map Ref No	**Revision**	**Date**
16499/MR_BA08	0	

THIS MAP HAS BEEN PREPARED UNDER THE CONTROLS ESTABLISHED BY THE SiVEST QUALITY MANAGEMENT SYSTEM WHICH HAS BEEN CERTIFIED ISO 9001:2015 COMPLIANT

FIGURE 9: Map showing other proposed renewable energy developments within 35km

11 ASSESSMENT IN TERMS OF EQUATOR PRINCIPLES

The Equator Principles (EPs) are a financial industry benchmark for determining, assessing and managing social and environmental risk in project financing. Several banks, exchanges and organisations worldwide have adopted the EPs as requirements to be undertaken for project funding on application and approval. Furthermore, certain funding institutions have not formally adopted the EPs, but require clients to be compliant with them in order to qualify for loans. The EPs are summarised below:

Principle 1: Review and Categorisation

When a project is proposed for financing subject to adherence to EPs, the Equator Principles Funding Institution ("EPFI") will categorise the project based on the magnitude of its potential environmental and social impacts and risks.

Principle 2: Environmental and Social Assessment

For each project assessed as being either Category A or Category B, the client / borrower must conduct a Social and Environmental Assessment ("Assessment") process to address the relevant impacts and risks of the proposed project. The Assessment should also propose mitigation and management measures relevant and appropriate to the nature and scale of the proposed project. This BA meets this requirement.

Principle 3: Applicable Environmental and Social Standards

The Assessment will refer to the applicable IFC Performance Standards and applicable Industry Specific Environmental, Health, and Safety (EHS) Guidelines.

Principle 4: Environmental and Social Management System and Equator Principles Action Plan

The client / borrower must prepare an Environmental and Social Management System (ESMS). Further, an Environmental and Social Management Plan (ESMP) must be prepared by the client to address issues raised in the Assessment process and incorporate actions required to comply with the applicable standards. Where applicable standards are not met to the EPFI's satisfaction, the client and the EPFI will agree to an Equator Principles Action Plan to outline gaps and commitments. The EMPr meets this requirement.

Principle 5: Stakeholder Engagement

For all Category A and Category B Projects, the EPFI will require the client to demonstrate effective Stakeholder Engagement as an on-going process in a structured and culturally appropriate manner with Affected Communities and, where relevant, Other Stakeholders. For projects with potentially significant adverse impacts on Affected Communities, the client will conduct an Informed Consultation and Participation process. The client will tailor its consultation process to the risks and impacts of the Project; the Project's phase of development; the language preferences of the Affected Communities; their decision-making processes; and the needs of disadvantaged and vulnerable groups.

Principle 6: Grievance Mechanism

The EPFI will require the client, as part of the ESMS, to establish a grievance mechanism designed to receive and facilitate resolution of concerns and grievances about the project's environmental and social performance. The grievance mechanism is required to be scaled to the risks and impacts of the Project and have Affected Communities as its primary user. It will seek to resolve concerns promptly, using an understandable and transparent consultative process that is culturally appropriate, readily accessible, at no cost, and without retribution to the party that originated the issue or concern. The mechanism should not impede access to judicial or administrative remedies.

Principle 7: Independent Review

For all Category A projects and, as appropriate, for Category B projects, an independent social or environmental expert not directly associated with the borrower must review the Assessment, AP and consultation process documentation in order to assist the EPFIs due diligence and assess EPs compliance.

Principle 8: Covenants

An important strength of the EPs is the incorporation of covenants linked to compliance. For all projects, the client will covenant in the financing documentation to comply with all relevant host country environmental and social laws, regulations and permits in all material respects. For Category A and B projects, the client / borrower will covenant in financing documentation:

- To comply with the ESMPs and EPs AP (where applicable) during the construction and operation of the Project in all material respects;
- To provide periodic reports in a format agreed with the EPFI (with the frequency of these reports proportionate to the severity of impacts, or as required by law, but not less than annually), prepared by in-house staff or third-party experts, that i) document compliance with the ESMPs and EPs AP (where applicable), and ii) provide representation of compliance with relevant local, state and host country environmental and social laws, regulations and permits; and
- To decommission the facilities, where applicable and appropriate, in accordance with an agreed decommissioning plan.

Principle 9: Independent Monitoring and Reporting

To ensure on-going monitoring and reporting over the life of the loan, EPFIs will, for all Category A projects, and as appropriate, for Category B projects, require appointment of an independent environmental and/or social expert, or require that the borrower to retain qualified and experienced external experts to verify its monitoring information, which would be shared with EPFIs.

Principle 10: Reporting and Transparency

For all Category A and, as appropriate, Category B Projects:

- The client will ensure that, at a minimum, a summary of the ESIA is accessible and available online.
- The client will publicly report GHG emission levels (combined Scope 1 and Scope 2 Emissions) during the operational phase for Projects emitting over 100,000 tonnes of CO2 equivalent annually.

Although this report is not written in terms of the EPs, it fully acknowledges that EPs will need to be complied with should funding for the proposed development be required from a development financial institution. In general, the following documentation will need to be considered in that regard:

- The “Equator Principles” 2013
- International Finance Corporations Performance Standards on Social and Environment, IFC, January 2012, namely:
    - Performance Standard 1: Social and Environmental Assessment and Management Systems
    - Performance Standard 2: Labour and Working Conditions
    - Performance Standard 3: Pollution Prevention and Abatement
    - Performance Standard 4: Community Health, Safety and Security
    - Performance Standard 5: Land Acquisition and Involuntary Resettlement
    - Performance Standard 6: Biodiversity Conservation and Sustainable Natural Resource Management
    - Performance Standard 7: Indigenous Peoples
    - Performance Standard 8: Cultural Heritage
- International Finance Corporation – World Bank Guidelines, General EHS Guidelines 2007.

EHS Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice. These EHS Guidelines are applied as required by the World Bank’s respective

policies and standards. These General EHS Guidelines are designed to be used together with the relevant Industry Sector EHS Guidelines which provide guidance to users on EHS issues in specific industry sectors. The EHS Guidelines contain the performance levels and measures that are generally considered to be achievable in new facilities by existing technology at reasonable costs.

11.1 ASSESSMENT RESULTS

This section details the current compliance level with which the proposed development meets with the EPs and the related Performance Standards which are outlined below.

The coding key is as follows:

Compliance Level			
Clear			
Not assessed / determined	Not compliant	Partially compliant	Compliant

Table 13: Compliance level of proposed development in terms of EPs and related performance standards

Principles	**Compliance Level**	**Reference**
General, Performance Standard 1 Environmental & Social Reporting		
1. Baseline Information		Refer to **section 6** – Description of the receiving environment
2. Alternatives (Assessment of alternatives)		Refer to **section 5.3**
3. Impacts and risks		Refer to **section 9**
4. Global impacts	N/A	N/A
5. Legal requirements		Refer to **section 2** for legal requirements and guidelines
6. Transboundary	N/A	N/A
7. Disadvantaged / vulnerable groups		Addressed in **Appendix 6** as part of the Socio-economic Impact Assessment. This has also been addressed as part of the EMPr (**Appendix 8**)
8. Third party		Addressed in **Appendix 6** as part of the Socio-economic Impact Assessment.
9. Mitigation measures		Addressed in **section 9**, as well as part of specialist assessments (**Appendix 6**). Also addressed as part of the EMPr (**Appendix 8**)
10. Documentation process		Refer to **section 1**, **section 4** and **section 8**
11. Action Plans		Partially addressed in **section 12**. No major Action Plans required as mostly generic mitigation measures have been required
12. Organisational capacity		Refer to **Appendix 1**
13. Training		Refer to **Appendix 1**

Principles	Compliance Level	Reference
14. Grievance mechanism		Refer to **Appendix 1**. The applicant will commit to full compliance with this standard when financial closure has been reached. The applicant is fully aware of the implications of this standard and this information will be made available in due course as part of the development planning for the project.
15. Report content		Refer to **section 1**
Performance Standard 2, Labour & Working Conditions		
1. Human Resource Policy		Refer to **Appendix 1**. The applicant will commit to full compliance with this standard when financial closure has been reached. The applicant is fully aware of the implications of this standard and this information will be made available in due course as part of the development planning for the project.
2. Working relationship		Refer to **Appendix 1**
3. Working conditions with and terms of employment		Refer to **Appendix 1**
4. Workers organisation		Refer to **Appendix 1**
5. Non-discrimination and equal opportunities		Refer to **Appendix 1**. Partly addressed in **section 7** as part of the Social Impact Assessment (**Appendix 6I**). This issue has also been addressed as part of the EMPr (**Appendix 8**)
6. Grievance mechanism		Refer to **Appendix 1**. Addressed as part of the EMPr (**Appendix 8**)
7. Occupational Health and Safety		Refer to **Appendix 1**. Addressed as part of the EMPr (**Appendix 8**)
8. Non-employee workers		Refer to **Appendix 1**. Addressed as part of the EMPr (**Appendix 8**)
9. Supply Chain		Refer to **Appendix 1**. Addressed as part of the EMPr (**Appendix 8**)
10. Labour Assessment Component of a Social and Environmental Assessment		Refer to **Appendix 1**. Addressed as part of the EMPr (**Appendix 8**)
Performance Standard 3, Pollution		
1. Pollution Prevention, Resource Conservation and Energy Efficiency		Refer to EMPr in **Appendix 8**
2. Wastes		Refer to EMPr in **Appendix 8**
3. Hazardous material		Refer to EMPr in **Appendix 8**
4. Dangerous substances		Refer to EMPr in **Appendix 8**

Principles	Compliance Level	Reference
5. Emergency preparedness and response		Refer to EMPr in **Appendix 8**. The applicant will commit to full compliance with this standard when financial closure has been reached. The applicant is fully aware of the implications of this standard and this information will be made available in due course as part of the development planning for the project
6. Technical guidance – ambient considerations		Refer to **Appendix 1**
7. Greenhouse gas emissions		N/A. No greenhouse gas emissions will result from the proposed development apart from the manufacturing of the solar PV components and limited emissions during construction phase
Performance Standard 4, Health & Safety		
1. Hazardous materials safety		Refer to EMPr in **Appendix 8**
2. Environmental and natural resource issues		Refer to **section 7**
3. Emergency preparedness and response		Refer to EMPr in **Appendix 8**. The applicant will commit to full compliance with this standard when financial closure has been reached. The applicant is fully aware of the implications of this standard and this information will be made available in due course as part of the development planning for the project
Performance Standard 5, Land Acquisition		Refer to **section 5** and **section 6**. Project needs and desirability and the background of the receiving environment are discussed
Performance Standard 6, Biodiversity		Refer to **Section 10.3** which summarises the findings from the Terrestrial Ecology Impact Assessment
Performance Standard 7, Indigenous People		Refer to **section 10.3** which summarises the findings Social Impact Assessment
Performance Standard 8, Cultural Heritage		Refer to **sections 10.3**

It is important to note that most of the issues listed per performance standard in the table above will only be addressed during the pre-construction and construction phase of the proposed development.

12 ENVIRONMENTAL IMPACT STATEMENT, CONCLUSIONS AND RECOMMENDATIONS

The EIA Regulations, 2014 prescribe the required content of a BAR, including, *inter alia*, the Environmental Impact Statement which is presented in the subsections below.

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

The EIA Regulations of 2014, as amended, require that the need and desirability are considered and evaluated against the principles of sustainability. This requires investigation of the effect of the project on social, economic and ecological systems; and places emphasis on consideration of a project's justification. Various means for assessing the needs have been investigated in assessing the proposed projects need and desirability in the context of both the greater community, as well in the context of the proponent.

The EAPs and specialists, through the interrogation of planning documents (Section 2) and, where these planning documents are not available - using best judgment, have considered the anticipated needs and interests of the broader community.

It is an important to note that the IRP 2019 indicates that there is a short-term electricity supply gap of approximately 2 000 MW and battery storage technologies will improve energy security by optimizing energy supply and demand, reducing the need to import electricity, and reducing the need to continuously adjust generation unit output.

In addition, BESSs can provide system security by supplying energy during electricity outages, minimizing the disruption and costs associated with power cuts, amongst other benefits, such as reduction in greenhouse gas emissions, utilisation of cleaner, renewable energy alternatives and overall financial benefits.

The BA process for the proposed development has been conducted in accordance with the EIA Regulations of 2014, as amended, promulgated in terms of Chapter 5 of NEMA.

A detailed public participation process was followed during the BA process which conformed to the public consultation requirements as stipulated in the EIA Regulations of 2014, as amended, as well as the recent circular by the DEFF (dated 05 June 2020, Government Gazette 43412) (refer to **Chapter 7**). In addition, all issues raised by I&APs and key stakeholders will be captured in the FBAR and where possible, mitigation measures provided in the EMPr to address these concerns.

A summary of the findings for each identified environmental impact evaluated in the context of the proposed development (both biophysical and social) is provided in the Table below.

TABLE 14: A summary of the findings for each identified environmental impact evaluated in the context of the proposed development (both biophysical and social)

Specialist Assessment	Key Findings	Impacts	Mitigation	Conclusion
Agricultural Compliance Statement	▪ The aridity of the area is a significant agricultural constraint that seriously limits the level of agricultural production (including grazing) which is possible across the site. ▪ Shallow soils on underlying rock or carbonate hardpan are a further agricultural limitation. As a result of these limitations, the study area is unsuitable for cultivation and agricultural land use is limited to grazing.	▪ loss of agricultural land use ▪ land degradation, but both are of low significance.	▪ Implementation of an effective system of storm water run-off control; ▪ maintenance of vegetation cover; ▪ stripping, stockpiling and re-spreading of topsoil.	The conclusion of this assessment is that the proposed development will not have an unacceptable negative impact on the agricultural production capability of the site. The proposed development is therefore acceptable. This is substantiated by the facts that the land is of limited agricultural potential, that the actual amount of agricultural land loss is small, and that the proposed development poses a low risk in terms of causing soil degradation. **From an agricultural impact point of view, it is recommended that the proposed development be approved.**
Hydrological Impact Assessment	▪ The site was identified as very high sensitivity by the screening tool as there are watercourses within the Mierdam property, which is a very large property. ▪ The preferred BESS site is however of low sensitivity in an aquatic and hydrological context. ▪ The proposed BESS is more than 500 m from any watercourse/wetland. ▪ Given the low water use requirement on-site and adherence to specialist recommendations, the site is of low risk of negative groundwater impacts during construction and operation. However, appropriate preventative measured need to be taken to ensure that this low risk is still minimised. ▪ The proposed location of the BESS is the best possible location on the site. ▪ The site is mostly flat, located on sparse vegetation and is a significant distance from wetlands/watercourse. This is confirmed by SiVest (2012) who's study covered the whole BESS area. ▪ 7.. ▪ 8.	▪ Increase in impervious surface reducing the infiltration/groundwater recharge; ▪ Abstraction of groundwater for construction; ▪ Abstraction of groundwater for operation; ▪ Increase in stormwater leading to an increase of peak flows entering watercourse systems; ▪ Potential oil spills/leaks during construction; and ▪ Potential for leaks from batteries leading to contamination of watercourses. ▪ Potential for leaks from batteries leading to contamination of groundwater.	▪ Use existing boreholes to abstract groundwater ▪ Ensure storm water structures promote infiltration ▪ Ensure structure is outside of 1:100 year flood event ▪ In the event of a spill, implement a spill contingency plan and monitor groundwater for 6 months if spill is not contained. ▪ Ensure appropriate storm water infrastructure is installed to dissipate flow and direct away from concentrated paths. ▪ Ensure drip trays are used under vehicles/machinery and that impervious floor surfaces are constructed to ensure chemicals and waste do not enter the sub-surface. ▪ Where practical, plant obligate wetland species or dissipation structures in drains around the BESS. ▪ Ensure drip trays are used under vehicles/machinery and erosion control measures are implemented. ▪ Ensure a spill contingency plan is put into place. ▪ Completely lined infrastructure (concrete bunded area), with the capacity to contain 120% of the total amount of chemicals stored within the BESS. ▪ Spills must be completely removed from the site. ▪ Fire extinguisher equipment installed within the BESS. ▪ Temperature of battery systems monitored continually. ▪ Ensure air circulation to prevent the buildup of chemicals. ▪ Implement the storm-water management plan and ensure appropriate water diversion systems are put in place. ▪ Compile (and adhere to) a procedure for the safe handling of battery cells. ▪ Compile an emergency response plan and implement should an emergency occur. ▪ Ensure that spill kits (if appropriate) are available on site for clean-up of spills and leaks. ▪ Drip-trays or containment measures must be placed under equipment that poses a risk when not in use. ▪ Immediately clean up spills and dispose of contaminated soil at a licensed waste disposal facility. ▪ Dispose of waste appropriately to prevent pollution of soil and groundwater. ▪ Install monitoring systems to detect leaks or emissions.	The proposed location of the BESS is the best possible location on the site. Impacts have been identified with proposed mitigation measures. Should these measures be adhered to, the additional BESS area would remain a low sensitivity NatureStamp hereby acknowledges that there are no fatal flaws associated with the proposed BESS and should be authorized.

			▪ On-site battery maintenance should be done over appropriate drip trays/containment measures and any hazardous substances must be disposed of appropriately. ▪ Record and report all fuel, oil, hydraulic fluid or electrolyte spills to the PM / Engineer / ERP so that appropriate clean-up measures can be implemented.	
Geotechnical Impact Assessment	▪ . ▪ The assessment area may be underlain by tillite, boulder shale, sandstone, siltstone, shale bedrock. Surficial alluvial deposits comprising of silty sands or sandy silts are expected to underlie the south western section of the assessment area. ▪ Some geotechnical constraints have been identified, including the presence of potentially collapsible sands and shallow bedrock.	▪ Disturbance/ displacement/ removal of soil and rock Soil ▪ Erosion due to vegetation clearing, alteration of natural drainage	▪ Design facility layout to minimise earthworks and levelling ▪ Correct topsoil and spoil management ▪ Temporary berms and drainage channels to divert surface runoff where needed ▪ Landscape and rehabilitate disturbed areas timeously (e.g. regrassing) ▪ Correct engineering design of road and site drainage ▪ Use designated access and laydown areas only to minimise disturbance to surrounding areas ▪ Maintain drainage channels ▪ Monitor for erosion and remediate and rehabilitate timeously ▪ Restore natural site topography	This desktop geotechnical specialist study was undertaken for the installation of a BESS on the authorised Mierdam Photovoltaic (PV) Energy Facility (12/12/20/2320/2). The assessment area may be underlain by tillite, boulder shale,sandstone, siltstone, shale bedrock. Surficial alluvial deposits comprising of silty sands or sandy silts are expected to underlie the south western section of the assessment area. Some geotechnical constraints have been identified, including the presence of shallow bedrock and loose/collapsible sands. These constraints may be mitigated via standard engineering design and construction measures. Shallow spread footings are considered suitable to support the structures. No fatal flaws have been identified that would render the proposed BESS site unsuitable from a geological and geotechnical perspective. The proposed BESS is assessed to have a “Negative Low impact - the anticipated impact will have negligible negative effects and will require little to no mitigation”. The recommended mitigation measures provided to minimise the impacts relate to the appropriate engineering design of earthworks and site drainage, erosion control and topsoil and spoil material management. These do not exceed civil engineering and construction best practice. Further intrusive geotechnical investigations should be undertaken to confirm the engineering recommendations provided in this report. **From a geotechnical and geological perspective, no fatal flaws, sensitivities, or areas to be avoided have been identified within or close to the BESS assessment area. It is therefore recommended that the proposed activity be authorised.**
Terrestrial Ecology Impact Assessment	▪ The study area (as described by Koch, 2012) occurs on flat and gently undulating topography. The north-eastern part of the site is characterised by grassy plains dominated by Stipagrostis species. This area scattered Boscia foetida and the tree layer is dominated by Acacia mellifera. The majority of the study area is characterised by bossieveld of low bushes of Asteraceae and patches of Rhigozum obovatum. There are also some local depressions which have developed into pans. Although these do not hold water for long, they are unique in comparison to surrounding areas. The area is used for grazing of domestic livestock, primarily sheep, and is partly degraded due to overgrazing.	Clearing of natural vegetation that is habitat for plant and animal species	The loss of vegetation is inevitable and necessary for the proposed development to take place. Sensitive areas have been identified outside the proposed BESS site. These relate to low ridges. The approved footprint will not result in losses of habitat of high sensitivity, only habitat of medium to low sensitivity. Mitigation measures primarily will relate to the protection of sensitive species and minimization of habitat loss.	**It is the opinion of the Ecologist that the overall impact of the Dwarsrug BESS, on the terrestrial biodiversity and plant species resources, is seen as acceptably low after the recommendations have been implemented and therefore, impacts can be mitigated to acceptable levels allowing for the development to be authorised**

	▪ The site is relatively uniform with few distinct sensitive areas. There is one low ridge on site that provides important habitat different to surrounding areas. These areas are considered to be more sensitive relative to surrounding areas. The site has been classified as having a mixture of low and medium sensitivity areas. The site is relatively uniform with few distinct sensitive areas. There is one low ridge on site that provides important habitat different to surrounding areas. These areas are considered to be more sensitive relative to surrounding areas. The site has been classified as having a mixture of low and medium sensitivity areas.			
Heritage Impact Assessment	▪ The fieldwork conducted for the evaluation of the possible impact of the new BESS as part of the Mierdam 3 PV plant has revealed no heritage resources.	▪ Impact on archaeological and historical heritage resources	▪ Include heritage chance finds procedure in EMP for project development	The current study has confirmed that the impact of the BESS will be low. This finding and with the implementation of a chance finds procedure as part of the EMPr will mitigate possible impacts on unidentified heritage resources. An assessment of the final footprint of the BESS must be conducted with the final walkdown of the PV Facility infrastructure layout during the implementation of the EMPr . . In the event that heritage resources are discovered during site clearance, construction activities must stop in the vicinity, and a qualified archaeologist must be appointed to evaluate and make recommendations on mitigation measures. **The overall impact of the Mierdam BESS, on the heritage resources, is seen as acceptably low after the recommendations have been implemented and therefore, impacts can be mitigated to acceptable levels allowing for the development to be authorised.**
Paleontology Impact Assessment	▪ The surface geology of the proposed Mierdam PV BESS and associated infrastructure is underlain by Late Cenozoic Superficial Sediments, Carboniferous to Permian aged Dwyka Group and the sedimentary Vogelspruitbult Formation (Jacomynspan Group) and intrusive rocks of the Namaqua Metamorphic Province. According to the PalaeoMap on the South African Heritage Resources Information System (SAHRIS) database, the Palaeontological Sensitivity of the Late Cenozoic Superficial Sediments is high, but locally low, the Dwyka Group is moderate and the rocks of the Namaqua Metamorphic Province is zero (Almond and Pether; 2009). Usually impacts on palaeontological heritage only occur during the construction phase of the development. ▪ As the Authorized Mierdam PV was originally assessed in a Palaeontological Impact Assessment and as the proposed project falls in the same area the Palaeontological Significance of the BESS and associated infrastructure is low. It is thus considered that the proposed development is deemed appropriate and	▪ Loss of fossil heritage	▪ Include fossil heritage chance finds procedure in EMP for project development	It is thus considered that the proposed development is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area. It is consequently recommended that no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils. **The overall impact of the Mierdam BESS, on the paleontological resources, is seen as acceptably low after the recommendations have been implemented and therefore, impacts can be mitigated to acceptable levels allowing for the development to be authorised.**

	feasible and will not lead to detrimental impacts on the palaeontological resources of the area. ▪ It is consequently recommended that no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils.			
Social Impact Assessment	▪ The BESS will be located adjacent to the approved Mierdam PV substation associated with the approved Mierdam PV. ▪ Consequently, it is most unlikely that the proposed project will result in an increase in significance of any of the impacts identified and assessed by MasterQ Research; or in any additional impacts. ▪ It is clear, however, that the project has the potential to increase the efficiency, reliability and consistency of the electricity delivered by the Meirdam PV Facility. ▪ This will in turn have a positive impacts in respect of business confidence, public health and safety and the nuisance factor associated with frequent electricity outages.	▪ Increased business confidence ▪ Reduced health and safety risks ▪ A reduction in the nuisance factors	▪ Ensure that the appropriate agreements are in place to enforce performance and availability compliance. ▪ Attach noncompliance penalties to encourage reliability of supply.	Considering all social impacts associated with the project, it is evident that the positive elements outweigh the negative and that the project carries with it significant social benefits. In addition, the project fits with international and governmental policy and legislation. **Consequently, the proposed installation of a BESS at the authorised Mierdam Solar Photovoltaic (PV) Energy Facility (12/12/20/2024/1/1) is supported at the social level and no further assessment would be required.**

Aquatic Impact Assessment	▪ The site is low sensitivity in an aquatic context. ▪ The proposed location of the BESS is the best possible location on the site. ▪ The site is flat, located on sparse vegetation and is a significant distance from wetlands/watercourse. This is confirmed by SiVEST (2012) who's study covered the whole BESS area.	▪ Clearing of vegetation ▪ Increase in Storm Water ▪ Spills/Leaks during Construction ▪ Battery Spills/Leaks during Operation ▪ Sediments and spills entering water resources ▪ Compounded impacts from surrounding development ▪	▪ Manage the invasive alien plants at any disturbed or spoil areas ▪ Ensure appropriate storm water infrastructure is installed to dissipate flow and direct away from concentrated paths. ▪ Manage the invasive alien plants around the BESS during operation ▪ Ensure drip trays are used under vehicles/machinery and that impervious floor surfaces are constructed to ensure chemicals and waste do not enter the sub-surface ▪ Where practical, plant obligate wetland species or dissipation structures in drains around the BESS. ▪ Ensure drip trays are used under vehicles/machinery and erosion control measures are implemented. ▪ Ensure a spill contingency plan is put into place. ▪ Completely lined infrastructure (concrete bunded area), with the capacity to contain 120% of the total amount of chemicals stored within the BESS. ▪ Spills must be completely removed from the site. ▪ Fire extinguisher equipment installed within the BESS. ▪ Temperature of battery systems monitored continually. ▪ Ensure air circulation to prevent the buildup of chemicals. ▪ Implement the storm-water management plan and ensure appropriate water diversion systems are put in place. ▪ Compile (and adhere to) a procedure for the safe handling of battery cells. ▪ Compile an emergency response plan and implement should an emergency occur. ▪ Ensure that spill kits (if appropriate) are available on site for clean-up of spills and leaks. ▪ Drip-trays or containment measures must be placed under equipment that poses a risk when not in use. ▪ Immediately clean up spills and dispose of contaminated soil at a licensed waste disposal facility. ▪ Dispose of waste appropriately to prevent pollution of soil and groundwater. ▪ Install monitoring systems to detect leaks or emissions. ▪ On-site battery maintenance should be done over appropriate drip trays/containment measures and any hazardous substances must be disposed of appropriately. ▪ Record and report all fuel, oil, hydraulic fluid or electrolyte ▪ spills to the PM / Engineer / ERP so that appropriate clean-up measures can be implemented.	Recent technology upgrades and enclosed nature of solid state batteries reduces the risk of contamination. Thus it is recommended that the solid state Li-ion battery be considered as the preferred choice of battery due to its lower risk in comparison to Redox flow technologies. **However, the overall impact of the Mierdam BESS, on the aquatic resources, is seen as acceptably low after the recommendations for have been implemented and therefore, impacts can be mitigated to acceptable levels allowing for the development to be authorised.**
Transport Impact Assessment	▪ The additional Traffic generated as a result of the development of BESS, will be added to the already approved access approval by SANRAL and the Environmental Authorization (EA).	▪ Increase in Traffic ▪ Increase of Incidents with pedestrians and livestock ▪ Increase in Dust from gravel roads ▪ Increase in Road Maintenance ▪ New / Larger Access points	▪ Ensure a large portion of vehicles traveling to and from the proposed development travels in the 'off peak' periods or by bus. ▪ Reduction in speed of vehicles ▪ Adequate enforcement of the law ▪ Implementation of pedestrian safety initiatives ▪ Regular maintenance of farm fences, access cattle grids ▪ Implement a road maintenance program under the auspices of the respective transport department. ▪ Enforce a maximum speed limit on the development ▪ Use of dust suppressant techniques	**With reference to this report, the previously approved 'Transportation Impact Assessment' and the subsequent EA. SiVEST Civil Engineering Division is of the opinion that the impacts of the BESS would be minimal and acceptable and hence the EA should be granted for this EIA process.**

			▪ Adequate watering by means of water bowser ▪ Adequate road signage according to the SARTSM ▪ Approval from the respective roads department	
Noise Impact Assessment	▪ This report determines, using administrative means, whether the proposed development could have any significant acoustical implications considering a questionnaire as proposed by SANS 10328:2008. ▪ As all the questions are negative, it is unlikely that the planned development will present a noise disturbance. ▪ As recommended by SANS 10328:2008, a scoping investigation and an environmental noise impact investigation will not be required.	N/A	N/A	Considering the location where the potential BESS is proposed, the proposed system would be further than 500 m from any potential NSD, with the closest NSD further than 2 km away. It is therefore the opinion of the author that there exists an insignificant 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 Mierdam BESS project be approved from a noise perspective.**

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

Furthermore, it is the opinion of the EAP that based on the findings of the BA, that the proposed development of either BESS technology alterntive should be granted a positive decision on EA and be allowed to proceed to construction phase, provided the following conditions are adhered to:

- All feasible and practical mitigation measures recommended by the various specialists must be incorporated into the Environmental Management Programme (EMPr) and implemented, where applicable;
- Where applicable, monitoring should be undertaken to evaluate the success of the mitigation measures recommended by the various specialists.
- The final layout must be submitted to the DEFF for approval prior to commencing with the activity.

SiVEST, as the EAP, is therefore of the view that:

- The site location and project description can be authorised based on the findings of the suite of specialist assessments;
- Overall, Solid State Lithium-Ion and Redox Flow technology BESS's have both been identified as environmentally acceptable alternatives with inconsequential differences in overall impact significance.
- The Aquatic specialist favoured Lithion Ion technology however, expressed both technology impacts were acceptably low when mitigation measure are in place, and will not result in significant impacts, provided that the recommended mitigation measures are implemented and the placement of these sites avoids the identified sensitive and 'no-go' areas;
- A cumulative impact assessment of similar developments in the area was undertaken by the respective specialists. Based on their findings, the cumulative impacts associated with the proposed development can be kept low after the implementation of mitigation measures and no fatal flaws have been identified. The cumulative impacts associated with the proposed facility are therefore deemed to be acceptable.
- Through the implementation of mitigation measures, together with adequate compliance monitoring, auditing and enforcement thereof by an appointed independent Environmental Control Officer (ECO) and the Competent Authority, the potential detrimental impacts associated with the proposed development can be mitigated to acceptable levels.

13 CONSTRUCTION TIMEFRAMES

Construction and implementation timeframes of the proposed BESS were not available to the EAP at the time of writing. As such it is it is requested that the Environmental Authorisation for construction, if issued by the Competent Authority, be valid for a period of 10 years from the date of signature.

14 UNDERTAKING

SiVEST SA (Pty) Ltd hereby confirms that, to the best of our knowledge, the information provided in this report was correct at the time of compilation. Information included in this report was based on the information which was provided to SiVEST SA (Pty) Ltd by the Applicant and various specialist assessment reports.

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