Report to SiVEST

Desktop Geotechnical Specialist Study for the:

PROPOSED CONSTRUCTION AND OPERATION OF THE BATTERY ENERGY STORAGE SYSTEM (BESS) AND ASSOCIATED INFRASTRUCTURE ACTIVITIES

FOR THE AUTHORISED DROOGFONTEIN 3 SOLAR PHOTOVOLTAIC (PV) ENERGY FACILITY LOCATED NEAR KIMBERLEY IN THE SOL PLAATJE LOCAL MUNICIPALITY, FRANCIS BAARD DISTRICT MUNICIPALITY, IN THE NORTHERN CAPE PROVINCE OF SOUTH AFRICA

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PROPOSED CONSTRUCTION AND OPERATION OF THE BATTERY ENERGY STORAGE SYSTEM (BESS) AND ASSOCIATED INFRASTRUCTURE FOR THE AUTHORISED DROOGFONTEIN 3 SOLAR PHOTOVOLTAIC (PV) ENERGY FACILITY LOCATED NEAR KIMBERLEY IN THE SOL PLAATJE LOCAL MUNICIPALITY, FRANCIS BAARD DISTRICT MUNICIPALITY, IN THE NORTHERN CAPE PROVINCE OF SOUTH AFRICA

Executive Summary

This desktop geological and geotechnical specialist study assed the proposed development of a Battery Energy Storage System (BESS) and associated infrastructure for the authorised Droogfontein 3 Solar Photovoltaic (PV) Energy Facility (12/12/20/2024/1/1/AM9), located near Kimberley in the Sol Plaatje Local Municipality, Francis Baard District Municipality, in the Northern Cape Province of South Africa. The assessment area comprises of a 500 m radius around the authorised substation position.

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. No preferences for the final BESS layout within the assessment area could therefore be provided.

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 this 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 do not exceed civil engineering and construction best practice. It is recommended that the proposed activity be authorised.

NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998) AND ENVIRONMENTAL IMPACT REGULATIONS, 2014 (AS AMENDED) - REQUIREMENTS FOR SPECIALIST REPORTS (APPENDIX 6

Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6	**Section of Report**
1. (1) A specialist report prepared in terms of these Regulations must contain- a) details of- i. the specialist who prepared the report; and ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;	 1.3 Appendix B
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Appendix A
c) an indication of the scope of, and the purpose for which, the report was prepared;	1.1, 1.2
(cA) an indication of the quality and age of base data used for the specialist report;	1.4, References
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	5, 6
d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Not applicable
e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	1.4, Appendix C
f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	3, 6, 7
g) an identification of any areas to be avoided, including buffers;	None identified
h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	No sensitivities identified
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	2
j) a description of the findings and potential implications of such findings on the impact of the proposed activity, (including identified alternatives on the environment) or activities;	5,6,7
k) any mitigation measures for inclusion in the EMPr;	6.1 Table 6-1
l) any conditions for inclusion in the environmental authorisation;	6.1 Table 6-1
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	6.1 Table 6-1
n) a reasoned opinion- i. (as to) whether the proposed activity, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity or activities; and ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	6.1, 8 6.1 Table 6-1
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	Not applicable
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	None
q) any other information requested by the competent authority.	None
2) Where a government notice *gazetted* by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	Not applicable

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Tables

1. Introduction

GaGE Consulting (Pty) Ltd has been appointed by SiVEST (PTY) Ltd, on behalf of South Africa Mainstream Droogfontein PV 3 (Pty) Ltd to undertake the assessment of the development of a Battery Energy Storage System (BESS) and associated infrastructure for the authorised Droogfontein 3 Solar Photovoltaic (PV) Energy Facility (12/12/20/2024/1/1/AM9), located near Kimberley in the Sol Plaatje Local Municipality, Francis Baard District Municipality, in the Northern Cape Province of South Africa.

In terms of the Environmental Impact Assessment (EIA) Regulations, which were published on 04 December 2014 and amended on 07 April 2017 [promulgated in Government Gazette 40772 and Government Notice (GN) R326, R327, R325 and R324 on 7 April 2017], various aspects of the proposed development are considered listed activities under GNR 327 and GNR 324 which may have an impact on the environment and therefore require authorisation from the National Competent Authority (CA), namely the Department of Environment, Forestry and Fisheries (DEFF), prior to the commencement of such activities. This desktop geological and geotechnical specialist study has been commissioned to assess and verify the BESS under the applicable specialist protocols.

1.1. Scope and Objectives

Assess the geological and geotechnical conditions and the impacts associated with the installation of a BESS on the Droogfontein 3 Solar Photovoltaic (PV) Energy Facility (12/12/20/2024/1/1/AM9) including potential fatal flaws.

The following key considerations were taken into account during the desktop study:

- The geological and geotechnical conditions (ground conditions) and the influence thereof on the competency of founding of civil infrastructure and structures
- Site topography and influence thereof on the site stability and suitability
- The presence of geological or geomorphological features such as faults, lineaments, and unstable ground
- The presence of problem soils, geotechnical constraints, shallow groundwater conditions
- Geologically significant or sensitive features such as ridges, outcrops, and exposures

1.2. Terms of Reference

The terms of reference were provided by SiVEST to allow a consistent approach to the various specialist studies and allow enable comparison of environmental impacts, efficient review, and collation of the specialist studies into their Basic Assessment report. This study is undertaken in accordance with the requirements provided in Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6.

A detained description of the infrastructure required for the BESS including layouts of the proposed development were provided by SiVEST.

1.3. Specialist Credentials

This study has been undertaken by Steven Bok, a Professional Natural Scientist registered by the South African National Council for Natural Scientific Professions (SACNASP) registration number 400279/07 (Geological Science). Mr Bok's CV is attached in Appendix B.

1.4. Assessment Methodology

The assessment involved a review of the following information:

i) 1:250 000 Scale Geological Map 2824 KIMBERLY (Council for Geoscience,1993)
ii) Aerial photographs (Google Earth imagery, current and historical)

iii) Technical report titled "Driefontein 3 Solar PV Project Desktop Geotechnical Review" produced by Mainstream Renewable Power dated April 2012 (Version Number 0)
iv) Technical report titled "MW Concentrating Photovoltaic (CPV)/ Photovoltaic (PV) plant on the Farm Droogfontein in Kimberley, Northern Cape Province Visual Impact Assessment Report - Motivation for the Amendment of the Environmental Authorization" produced by Mainstream Renewable Power dated May 2012
v) Screening Report for Environmental Authorisation (national web based environmental screening tool)
vi) General site photographs provided by SiVEST
vii) Literature as referenced within this report

The geotechnical investigation report referenced in bullet iii provides covers an area south or the assessment area with the closest test pits located approximately 3.7 km from the proposed BESS. This area is underlain by the same stratigraphic units.

An Environmental Impact Assessment matrix was used to quantify the impacts of the project on the receiving environment (provided by SiVEST and attached as Appendix C).

2. Assumptions and Limitations

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.

3. Technical Description

3.1. Project Location

The BESS is located on the authorised Droogfontein 3 Solar Photovoltaic (PV) Energy Facility (12/12/20/2024/1/1/AM9), near Kimberley in the Sol Plaatje Local Municipality, Francis Baard District Municipality, in the Northern Cape Province of South Africa.

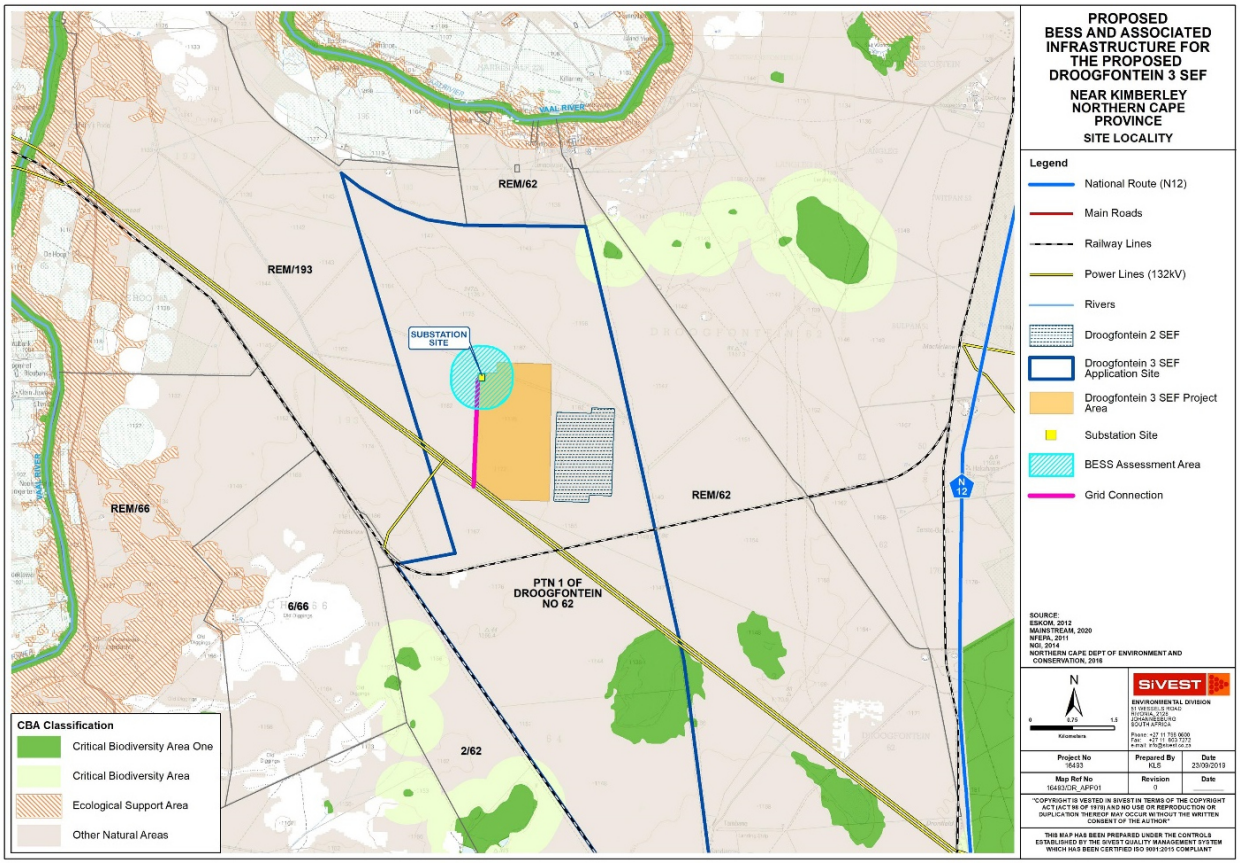

Figure 3-1 BESS is located on the authorised Droogfontein 3 Solar Photovoltaic (PV) Energy Facility

3.2. Project Description

South Africa Mainstream Droogfontein PV 3 (Pty) Ltd is proposing the construction and operation of a BESS and associated infrastructure for the authorised Droogfontein 3 Solar Photovoltaic (PV) Energy Facility (12/12/20/2024/1/1/AM9). 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 Droogfontein PV BESS will be located adjacent to the approved Droogfontein PV substation associated with the approved Droogfontein PV. To reduce electrical losses the BESS must be in close proximity to the on-site 33/132kV substation. A ~5ha study site has been established around the approved substation (500m zone) to allow for the micrositing / specialist guidance regarding placement can be made.

3.2.1. Alternatives

No site alternatives for this proposed development were considered as the placement of the proposed BESS is dependent on the location of the Droogfontein 3 Solar Photovoltaic (PV) Energy Facility (12/12/20/2024/1/1/AM9).

Technology alternatives are limited to battery types, namely Redox flow batteries and Solid State Batteries. No other activity alternatives are being considered.

The BESS alternatives are:

BESS Specifications	
BESS Footprint	Up to 2Ha
BESS Capacity	200MWh
BESS Technology	Lithium Ion
BESS Type Alternative- Solid State Batteries	Containerised systems assembled within shipping containers and delivered to the project site. Dimensions are approximately 17 m long x 3.5 m wide x 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 'no-go' alternative is the option of not constructing and operating a BESS in support of the authorised Renewable Energy (RE) facility. This alternative would result in no additional environmental impact other than that assessed during the EIA for the RE facility

The 'no-go' option is an option; however, this would prevent the Droogfontein PV 3 Solar Energy Facility from contributing to the environmental, social and economic benefits associated with the development of the renewables sector.

The above-mentioned alternatives (including 'no-go' alternative) will all be assessed by the appointed specialists as part of the BA process. All the above-mentioned location alternatives will be informed by the identified environmental sensitive and/or 'no-go' areas (i.e. status quo). The respective alternatives being considered as part of the BA process for the proposed development will also be comparatively assessed.

4. Legal Requirement and Guidelines

The desktop study was undertaken according to the guidelines provided by The South African Institution of Civil Engineering Site Investigation (SAICE) Code of Practice published by The Geotechnical Division of SAICE, 2010.

This report has been prepared to meet the requirements for a specialist report as provided in Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6.

5. Description of the Receiving Environment

The following description of the receiving environment is relevant to assessing the geological and geotechnical impacts.

5.1. Climate

Climate plays a fundamental role in rock weathering and soil development. The effect of climate on the weathering processes (i.e. soil formation) in a particular area can be determined from the climatic N-value, defined by Weinert (1980). A climatic

N-Value of 5 or less implies a water surplus and the dominant mode of weathering is chemical decomposition. These climatic conditions are favourable for the development of a deep residual soil profile. Where the climatic N-value is greater than 5, mechanical disintegration is the predominant mode of rock weathering. In these drier areas residual soils are typically shallow.

Weinert's climatic N-value for the site is approximately 10. This implies a dry bordering on arid climate and a shallow residual soil profile with shallow bedrock can be anticipated (unless covered with transported soils). This climate is conducive to the formation of pedogenic calcrete.

5.2. Topography and Drainage

The assessment area is located in an elevated area and the topography is flat to gentle. There are no drainage features on or near the site and the nearest major drainage feature is the Orange River, approximately 4 km north of the proposed BESS. No signs of erosional features are visible from the aerial photography.

The natural topography and drainage do not appear to have been impacted by any previous activities.

5.3. Bedrock Geology

According to the 1:1250 000 scale geological map 2824 KIMBERLY, the bedrock geology beneath the Droogfontein PV 3 Solar Energy Facility comprises of basaltic andesite lavas of the Allanridge Formation (designated ***Ra***), which is the upper-most formation of the Ventersdorp Supergroup. The Ventersdorp Supergroup is a volcano-sedimentary sequence which contains the most widespread sequence of volcanic rocks in southern Africa (Johnson, *et.al.* 2006)

The bedrock is overlain by extensive deposits of aeolian sands, described as "Sand: red and grey aeolian dune sand" on the geological map (designated ***Qs***). While these deposits blanket the bedrock over a large proportion of the general area, the Allanridge Formation is shown to occur sporadically over the Droogfontein project area, including the north eastern portion of the BESS assessment area.

A number of Kimberlite pipes, often associated with kimberlite fissures are illustrated to the west, east and north of the assessment area. These features should not influence the site.

Rock outcrop is not evident from the aerial photography.

No faults, lineaments or other geological features are illustrated on the geological map or are visible from aerial photography.

The volcanic rocks are not fossiliferous.

No mining activities have taken place on or close to the BESS assessment area.

An extract from the 1:250 000 scale geological map 2824 KIMBERLY is provided below with the BESS assessment area shown in red.

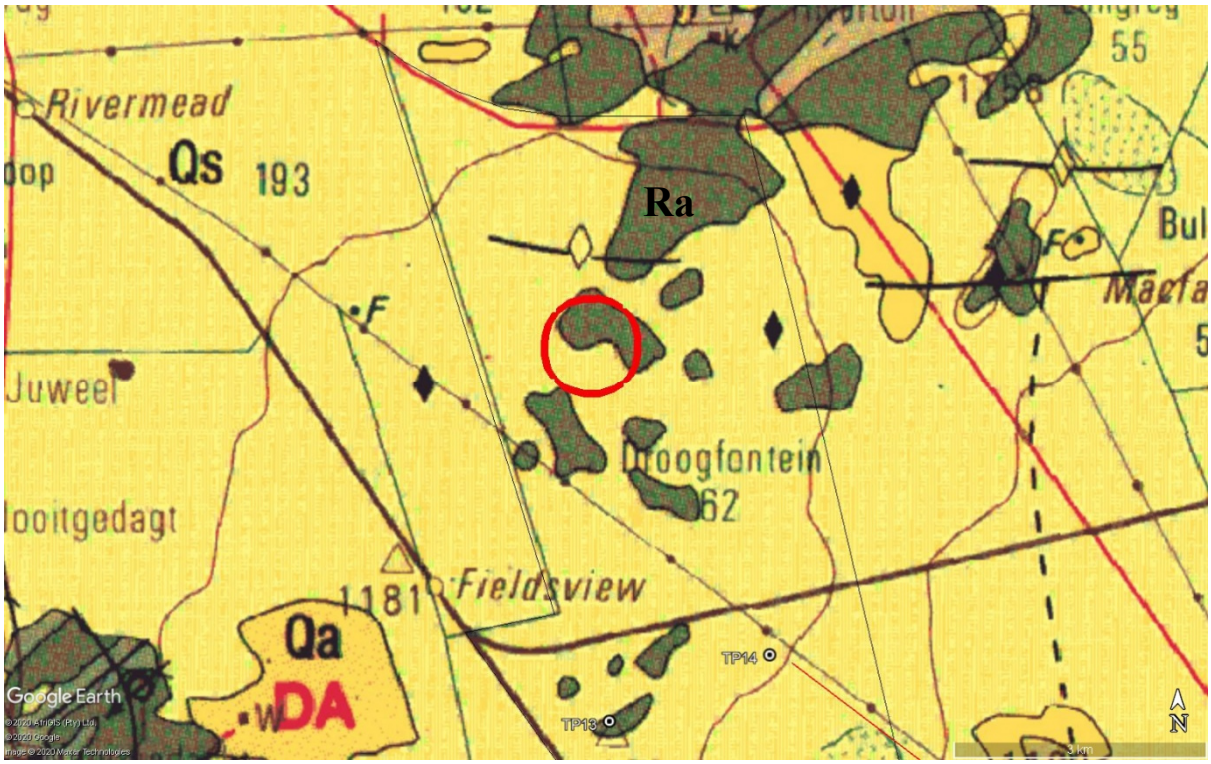

Figure 5-1 Extract of 1:150 000 scale Geological Map 2824 KIMBERLY

5.4. Engineering Geology

Andesites are basic igneous rocks and are prone to chemical decomposition, a process largely governed by the climatic conditions. Brink (1979) characterises the engineering characteristics of the Ventersdorp Supergroup lavas into three climate zones. The site falls within the driest "Semi-arid Zone" were sound lava outcrops predominate and residual soils are thin and often densely cemented with calcrete. Spheroidal weathering forms hard boulder corestones within the soil profile or upper weathered rock zone. A thin soil profile and shallow bedrock is therefore anticipated beneath sections of the assessment area underlain by the Allanridge Formation. Review of the Mainstream Renewable Power geotechnical report indicates that shallow refusal of the TLB occurred (0.50 m depth) at a location shown on the geological map to be underlain by the Allanridge Formation. This supports the assessment of a shallow bedrock provided above.

Aeolian deposits, formed by redistribution of predominantly sand-sized particles by wind, overlie the bedrock over much of the project area. These are colloquially known as Kalahari sands. The sands are typically medium to fine grained sands with combined silt and clay contents of less than 35 %. The Mainstream Renewable Power geotechnical report found that the aeolian sands extent to depths of greater than 3 m in many areas and were described as "loose" in consistency sometimes becoming "medium dense" with depth. Pedogenic calcrete occurs sporadically at depths of between 1.0 to 2.5 m.

The aeolian deposits are known to be potentially collapsible. Soils with a collapsible structure have an open-voided texture with individual grains being separated or weakly bonded by bridging material such as clay, iron oxides, calcium or other bridges (Brink, 1985). While these soils have a high to moderate strength and can withstand fairly large loads under low soil moisture conditions, an increasing moisture content can weaken the bridging materials. Increasing the soil moisture content under load can cause a decrease in the soil volume, resulting in large settlements with no increase in the applied stress. This can lead to sudden settlements beneath foundations and structures.

5.5. Desktop Geotechnical Appraisal

Based on the desktop study, the proposed BESS assessment area may be divided into two Ground Units where similar geotechnical conditions are anticipated. These correspond to areas underlain lavas of the Allanridge Formation and those

underlain by aeolian sands. The boundary of the two zones is approximate only and will need to be confirmed on site through intrusive investigations.

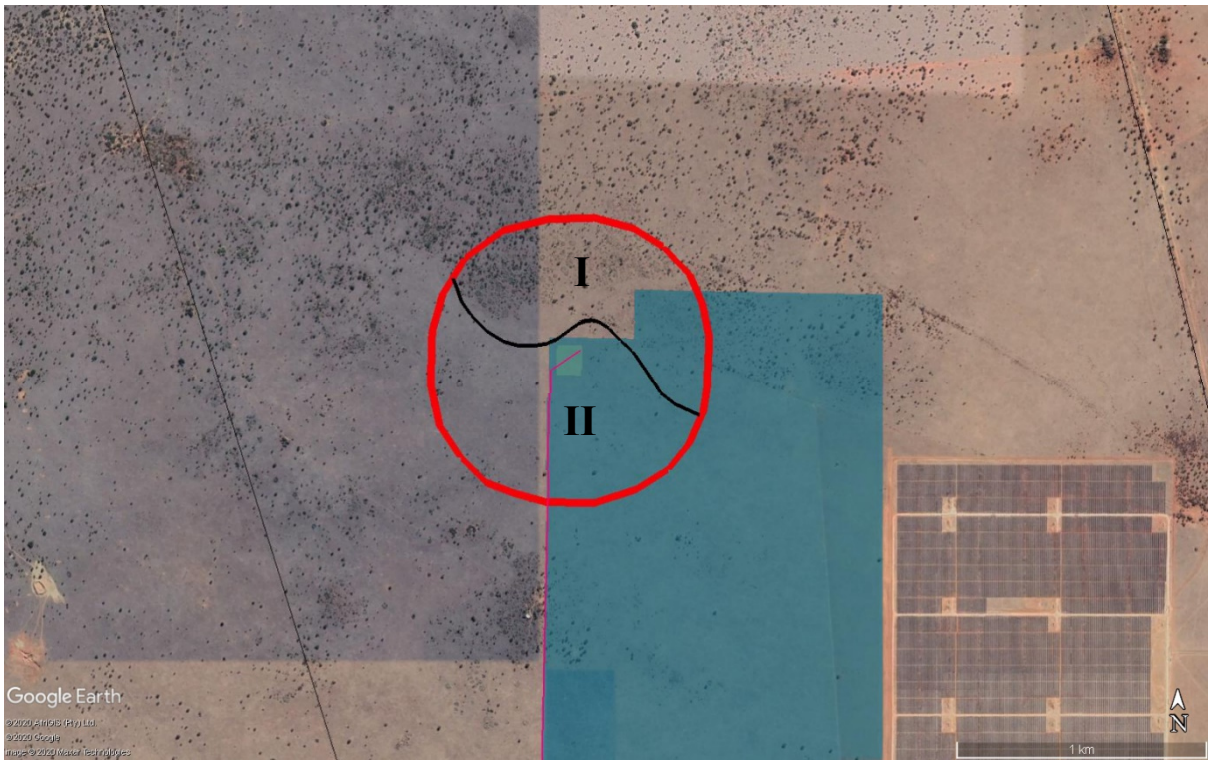

Figure 5-2 Inferred Ground Units

Both ground units are considered suitable for the development of the BESS infrastructure, from a geotechnical viewpoint, provided that standard engineering design and construction measures are implemented to mitigate the identified geotechnical constraints. No distinct preference between either zone could be provided from this study.

The anticipated geotechnical constraints and mitigation measures are summarised in Table 2-1.

Table 5-1 Summary of Geotechnical Conditions

Ground Unit	Geology	Geotechnical Conditions / Constraints	Impacts on Engineering Design and Construction
I	Andesite	• Shallow bedrock • Thin soil cover • Hard excavation conditions • Boulders	• Hard excavation conditions for trenching / earthworks • Good founding conditions for structures at shallow depths • Conventional shallow foundations suitable • Conventional subgrade preparation for roads
II	Aeolian Sands	• Loose sandy soils • Potentially collapsible soils • Moderate to thick soil cover • Moderate to deep bedrock	• Limit bearing pressures beneath structures • Soil improvement below footings / roads • Pre-collapse (heavy compaction) • Deep spread footings • Soft excavation conditions • Unstable trench sidewalls – shoring/battering required

6. Identification and Assessment of Impacts

No fatal flaws have been identified that would render the proposed BESS site unsuitable from a geological and geotechnical perspective.

The BESS is containerised and the impact of the activity on the geological environment is limited to topsoil stripping, excavations for plinth foundations, trenching, the construction of access roads and associated light infrastructure. Bulk earthworks, where required for the construction of platforms and access roads, may be a significant impact.

6.1. Impact of the Project on the Geological Environment

The main impact of the BESS development from a geological perspective is the displacement and possible removal of soil and rock materials. These activities will predominantly take place during the construction phase. The degree of disturbance is largely dependent on the topography of the project site and the nature of the proposed infrastructure. Steep slopes are unfavourable as these require bulk earthworks to create working platforms and access roads. Earthworks on steep slopes increases the risk of soil movements or slope failure.

The risk of soil erosion is also increased during construction activities, by the removal of vegetation and by possible disturbance to the natural surface drainage environment. These activities may prevent infiltration of rainwater, increase surface runoff and cause concentration of surface water flow. Erosion will increase the disturbance and displacement of soils and the impact may extend beyond the infrastructure footprint/s over time.

The effects of BESS development on the geological environment was evaluated using an Environmental Impact Assessment (EIA) Methodology, provided by SiVEST, which aids in determining the significance of an environmental impact on an environmental parameter through a systematic analysis. The EIA methodology is attached as Appendix C.

Based on the impact significance ratings presented in Table 6-1, the development of the proposed BESS on the Droogfontein 3 Solar Photovoltaic (PV) Energy Facility, from a geological and geotechnical perspective, will be “Negative Low impact”.

The topography of the site is gentle and significant earthworks are not anticipated. The soils and topography do not render the site particularly susceptible to soil erosion. No ridges or rock outcrops which may be of geological importance were identified.

Table 6-1 Impact Assessment Methodology Matrix

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																				
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 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	3	2	2	2	1	10	-	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 4) Use designated access and laydown areas only to minimise	1	2	1	1	2	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	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
											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

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
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 Soil Erosion	No cumulative effect																			

7. Comparative Assessment of Alternatives

Layout alternatives which subsequently informed the area for the potential construction of the proposed substation and subsequent BESS assessment area were identified and comparatively assessed as part of the BA process undertaken in 2016.

No geologically or geotechnically sensitive areas were identified within or near the assessment area. No preferences for the final BESS layout within the assessment area are therefore provided.

8. Conclusion and Summary

8.1. Summary of Findings

This desktop geotechnical specialist study was undertaken for the installation of a BESS on the Droogfontein 3 Solar Photovoltaic (PV) Energy Facility. The assessment area is underlain by unconsolidated aeolian sands and andesite bedrock. Some geotechnical constraints have been identified, including the presence of potentially collapsible sands and shallow bedrock. These constraints may be mitigated via standard engineering design and construction measures. Shallow spread footings are suitable to support the structures, provided soil improvement is undertaken in areas underlain by collapsible sands.

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.

8.2. Impact Statement and Conclusion

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.

References

Brink, A.B.A. Engineering Geology of Southern Africa, The First 2000 Million Years of Geological Time, Volume 1 . Building Publications, 1985

Brink, A.B.A. Engineering Geology of Southern Africa, Post-Gondwana Deposits, Volume 4 . Building Publications, 1985.

Johnson, M.R. Anhaeusser, C.R. Thomas, R.J. The Geology of South Africa. Council for Geoscience, 2006.

Appendix A. Specialist Declaration of Interest and Undertaking Under Oath

Appendix B. Specialist CV

Appendix C. Environmental Impact Assessment (EIA) Methodology