JG AFRIKA
EXPERIENCE QUALITY INTEGRITY

KARREEBOSCH 132kV OVERHEAD POWERLINE AND 33/132kV SUBSTATION

DESKTOP GEOTECHNICAL REPORT

JULY 2022

REVISION 03

wsp

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SYNOPSIS

Desktop geotechnical investigation for the Karreebosch 132kV overhead powerline and 33/132kV substation

KEY WORDS:

Powerline, Sandstone, Shale, Foundations, Subsoil Removal, Shallow Bedrock, Resistivity.

QUALITY VERIFICATION

This report has been prepared under the controls established by a quality management system that meets the requirements of ISO 9001: 2015 which has been independently certified by DEKRA Certification.

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National Environmental Management Act, 1998 (Act No. 107 of 1998) and Environmental Impact Regulations 2014 (as amended) Requirements for Specialist Reports (Appendix 6)

Section in EIA Regulations 2014 (as amended)		Clause	Section in Report
Appendix 6	(1)	A specialist report prepared in terms of these Regulations must contain —	
	(a)	details of –	
		(i) the specialist who prepared the report; and	Verification Page
		(ii) the expertise of that specialist to compile a specialist report including a curriculum vitae.	Appendix C
	(b)	A declaration that the person is independent in a form as may be specified by the competent authority;	Appendix C
	(c)	An indication of the scope of, and the purpose for which, the report was prepared;	1
	(cA)	An indication of the quality and age of base data used for the specialist report;	4, 5, 6, 10
	(cB)	A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Table 8-1
	(d)	The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	N/A
	(e)	A description of the methodology adopted in preparing the report or carrying out the specialised process; inclusive of equipment and modelling used;	1
	(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;	Appendix A Map 1,2,3.1,3.2, 4, 5
	(g)	An indication of any areas to be avoided, including buffers;	Appendix A Map 1,2,3.1, 3.2, 4,5
	(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;	Appendix A Map 1,2,3.1, 3.2, 4,5
	(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;	3, 4, 5, 6, 7
	(k)	Any mitigation measures for inclusion in the EMPr;	8
	(l)	Any conditions for inclusion in the environmental authorization;	8
	(m)	Any monitoring requirements for inclusion in the EMPr or environmental authorization;	8
	(n)	A reasoned opinion –	
		(i) as to whether the proposed activity, activities or portions thereof should be authorized;	9
		(iA) regarding the acceptability of the proposed activity or activities; and	9
		(ii) if the opinion is that the proposed activity, activities or portions thereof should be authorized, any avoidance, management and mitigation measures	8

		that should be included in the EMPr, and where applicable, the closure plan;	
	(o)	A description of any consultation process that was undertaken during the course of preparing the specialist report;	N/A
	(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 authority.	N/A
	(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.	N/A

KARREEBOSCH 132kV OVERHEAD POWERLINE AND 33/132kV SUBSTATION

DESKTOP GEOTECHNICAL REPORT

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EXECUTIVE SUMMARY

This report presents the findings concluded from a desktop level study for the proposed Karreebosch 132kV overhead powerline and 33/132kV substation and associated infrastucture. The study area receives a relatively low mean annual precipitation of 264mm per annum, with the warmest months being January and February. Various tributaries of the Tankwa and the Wilgebos River drain the study area. The study area is underlain by rock units of the Abrahamskraal Formation (Pa) which forms part of the Beaufort Group. The Beaufort Group forms part of the greater Karoo Supergroup.

Competent founding conditions are anticipated in the relatively shallow, slightly weathered bedrock, which will have to be assessed during the detailed investigation stage prior to construction. Colluvial deposits can be anticipated along hillslopes with alluvial deposits anticipated near drainage features. Four-fold features were identified in the study area. Regional borehole data indicates relatively low aquifer yields in the range of 0.1-0.5l/s. Based upon preliminary geological and geotechnical assessments; the desktop study indicates no fatal flaws. The impact of the development from a geotechnical perspective will be restricted to the removal and displacement of soil, boulders and bedrock. Based on the impact assessment matrix undertaken for this project, from a geotechnical perspective the impact of the power line was found to be **"Negative moderate impact - The anticipated impact will have negative effects and will require mitigation."** Based on the desktop study, the site is considered suitable for the proposed construction of the Karreebosch 132kV powerline and on site 33/132kV substation.

KARREEBOSCH 132kV OVERHEAD POWERLINE AND 33/132kV SUBSTATION

DESKTOP GEOTECHNICAL REPORT

1 INTRODUCTION

This report presents the findings of a desktop level study undertaken by JG Afrika (Pty) Ltd, for the Karreebosch 132kV overhead powerline and 33/132kV substation and associated infrastructure. It is understood that a desktop level geotechnical report is required to supplement an environmental submission for a Basic Assessment (BA) report being undertaken by WSP. The project is situated north of the town of Matjiesfontein in the Karoo Hoogland Local Municipality and the Laingsburg Local Municipality. The 132kV overhead powerline will evacuate power from the authorised Karreebosch Wind Energy Facility (WEF) (EA Ref: 14/12/16/3/3/2/807/AM 3, which is currently undergoing a Part 2 EA amendment, final layout and EMPr approval process) to the national grid by connecting to the existing 400kV Komsberg substation via the existing Bon Espirange substation.

The overhead powerline will be a 132kV twin tern double circuit overhead powerline. The powerline towers will either be steel lattice or monopole structures. Pole positions will only be available once the powerline detail design has been completed by the Eskom Design Review Team (DRT). However, a 400m corridor has been assessed for approval to allow for micro siting of tower positions once the detailed design has been completed. It is anticipated that towers will be located on average 200m to 250m apart, however, longer spans may be needed due to terrain and watercourse crossings.

1.1 Scope of works

The investigation seeks to give a desktop evaluation of the proposed study site. The objectives of the study were to assess the geological and geotechnical conditions along the powerline route.

The desktop study involved a literature review and a review of topographic and geological maps. Consideration was given to, but not limited to the following from a desktop level:

- The influence of topography on site suitability;
- The envisaged geological and geotechnical influences on the competency of foundations for the construction of structures;
- Tectonic influences on overall stability, namely the presence of faulting, lineaments and preferred discontinuity orientations;
- Comments regarding likely founding conditions, geotechnical constraints, problem areas and overall site stability from a desktop level; and
- Recommendations regarding requirements for subsequent detailed geotechnical investigations.

1.2 Terms of Reference

The appointment to proceed with the investigation is based upon JG Afrika's cost estimate entitled, "*Quotation for Geotechnical Desktop Study for the Proposed Karreebosch 132kv Powerline, Western Cape*" dated the 28th of April 2021. JG Afrika received the appointment via a sub-consultancy agreement letter referenced, *4110343-D03*, via email on the 20th of July 2021.

1.3 Specialist Credentials

Ms. Subrayen is a qualified Engineering Geologist, having attained a Bachelor of Science Honours Degree in Engineering Geology, from the University of KwaZulu-Natal. She is registered as a Professional Natural Scientist (Registration No. 400066/16) with the South African Council for Natural Scientific Professions (SACNASP). Ms. Subrayen holds the position of Engineering Geologist at JG Afrika's Durban branch. She has experience in various fields of earth science and ground engineering, namely: engineering geology, geotechnical engineering, environmental geology and soil surveys. At present Ms. Subrayen specializes in conducting foundation investigations and material investigations for various structural developments as well as water quality assessments at various landfill sites in the greater Cape Town area.

1.4 Assessment Methodology

The methodology entailed a literature review and a review of topographic and geological maps. Consideration was given to the terrain, geological, hydrogeology as well as expected geotechnical constraints.

2 ASSUMPTIONS, LIMITATIONS, UNCERTAINTIES - DISCLAIMER

The interpretation of the overall geotechnical conditions across the site is based upon a review of available information on the project area. Subsurface and geotechnical conditions have been inferred at a desktop level from available information, past experience in the project area and professional judgement. The information and interpretations are given as a guideline only and there is no guarantee that the information given is totally representative of the entire area in every respect. No responsibility will be accepted for consequences arising out of the fact that actual conditions vary from those inferred. The information must be verified by the undertaking of a detailed geotechnical site investigation.

3 SITE DESCRIPTION

3.1 Locality

The site lies within the Komsberg Renewable Energy Development Zone (REDZ) and Central Strategic Transmission Corridor located within the Karoo Hoogland Local Municipality and Laingsburg Local Municipality in the Namakwa District Municipality and Central Karoo District Municipality respectively. A Locality Plan indicating the site location is presented as **Map 1** which is included in **Appendix A**.

JG Afrika has previous experience in the study area having conducted detailed geotechnical investigations for the Oya energy facility in 2020 and the Roggeveld WEF development in 2015. The Roggeveld WEF development site location overlaps the proposed Karreebosch powerline route.

JG Afrika also conducted a previous detailed geotechnical investigation for the stabilisation of the Verlatekloof Pass (2008) 25km from the study area.

3.2 Land Use and Vegetation

The proposed powerline traverses the following farm portions:

- Portion 2 and Remainder of Farm Standvastigheid No. 210;
- Farm Aprils Kraal No. 105;
- Portion 1 of Farm Bon Espirange No. 73;
- Remainder of Farm Bon Espirange No. 73;
- Remainder of Farm Ek Kraal No. 199;
- Portion 1 of Farm Ek Kraal No. 199;
- Portion 2 (Nuwe Kraal) of Farm Ek Kraal No. 199;
- Remainder of Farm Karreebosch No. 200;
- Remainder of Farm Wilgebosch Rivier No. 188;
- Portion 1 of Farm Klipsbanks Fontein No. 198;
- Remainder of Farm Klipsbanks Fontein No. 198; and
- Farm Rietfontein No. 197.

The regional biome within which the study site is located is classed as a Succulent Karoo Biome, with the presence of lowland succulent Karoo vegetation species.

A Site Plan indicating the layout of the powerline route is presented as **Map 2** which is included in **Appendix A**.

3.3 Climate

The study area is characterized by a dry climate with a “BWk” classification according to the Köppen-Geiger climate classification. Matjiesfontein receives a relatively low mean annual precipitation of 264 mm. The average lowest rainfall is received in September (14 mm) and the highest in March (27 mm), which is a seasonal variation of 14 mm.

The maximum midday temperatures for Matjiesfontein ranges from 30°C in January and February to 15.2°C in July. The minimum temperatures for Matjiesfontein ranges from 14.4°C in February to 3.8°C in July. The average temperatures vary during the year by 12.3°C. Table 3-1, summarizes the climatic conditions.

Table 3-1: Summary of Climatic Conditions, Matjiesfontein (information extracted from “Climate-Data.org”)

Map No01

Months	Average Rainfall (mm)	Temperature (°C)		
		Maximum	Minimum	Average
January	16	30.1	14	21.3
February	16	30.0	14.4	21.4
March	27	27.3	12.9	19.5
April	24	23.1	10.1	16.3
May	22	19.2	7.3	12.9
June	25	15.3	4.3	9.4
July	23	15.2	3.8	9.1
August	23	16.5	4.3	10.1
September	14	19.9	6.1	12.7
October	23	23.7	8.7	15.8
November	28	25.9	10.4	17.7
December	23	28.6	12.7	20

3.4 Drainage and Topography

The study area is drained by non-perennial tributaries of Tankwa River, Wilgebos River and an unnamed River. The tributaries form dendritic drainage patterns. The Tankwa River buffers the northern and the cuts across the central part of the site. The powerline crosses an unnamed perennial river south of the site. The Wilgebos River falls outside of the Karreebosch WEF project area.

Slope aspect and drainage features for the OHPL project area are presented in **Map 3.1 and Map 3.2** which is included in **Appendix A**.

The slope gradient map indicates that the southern portion of the powerline is characterised by flat to gentle terrain (0˚–2.3˚ and 2.3˚–5.5˚ slopes). The majority of the powerline route is characterised by gentle to steep terrain (5.5˚–17.3˚ slopes). The slope gradient map indicates isolated areas of steep, mountainous terrain (>21˚ slopes) in the valleys of the study site. Spot heights indicate elevation values of 1353m above mean sea level (mamsl).

Karreebosch Substation Option 1 and Option 2 are located in areas characterised by steep terrain. Substation Option 1 is located on slopes of between 17.2˚ - 21.6˚ while Substation Option 2 is located on steeper slopes ranging from 31.5˚ - 38.1˚.

The slope aspect map further highlights the relief difference with elevation values ranging between 900-1100 mamsl in the central portion of the site.

4 GEOLOGY

According to the 1: 250 000 Geological Map (3220) of Sutherland published by the Council for Geoscience, the study area is underlain by rock units of the Abrahamskraal Formation (Pa) which forms part of the Adelaide Subgroup of the Beaufort Group. The Beaufort Group forms part of the greater Karoo Supergroup.

The Abrahamskraal Formation (Pa) is represented by grey and green mudstone, siltstone and subordinate sandstone. Thin chert beds are common on the lowermost red mudstones of the Abrahamskraal Formation.

Regional measurements indicate that the rock units dip 270° in a westerly direction, 7° in a northerly direction and 315° in a north westerly direction.

The sedimentary rocks in the area have been acted upon by numerous tectonic forces resulting in fold structures. Based upon the geology map, four fold features are located within the study area. The fold axes trend in an E-W direction and represent localized synclines and anticlines which form part of the Cape Fold Belts.
A Geological Map is presented as **Map 4** which is included in **Appendix A**.

5 HYDROGEOLOGY

The northern portion of the study area lies within the E23A catchment area which receives a mean annual precipitation of 254mm. The southern portion lies within the J11D catchment area which receives a mean annual precipitation of 240mm.

According to the 1: 3 000 000 scaled Groundwater Harvest Potential Map of South Africa, regional yields of sustainable groundwater abstraction rates, indicate that the study area lies in areas with values of 6000 - 10 000 m^3/km^2/annually and 10 000 – 15 000 m^3/km^2/annually.

Regional hydrogeological data indicate the aquifer type is classed as ‘b2’ which is a, fractured aquifer type. Regional borehole data indicate relatively low yields, estimated to be in the range of 0.1-0.5 l/s. Fractured aquifers (designation b) form as a result of discontinuities, such as faults, fractures and joints, in hard bedrock. These form the primary porosity conduits in which groundwater moves.

An extract of the regional Hydrogeological Map is presented as **Map 5** which is included in **Appendix A**.

The structural geology in the study area is conducive to the formation of high-yielding aquifer formations.

6 ENGINEERING GEOLOGY

The engineering geology refers to the engineering characteristics of natural earth material for founding structures and suitability for construction material purposes.

The study area is characterized by a Weinert N value of more than 10, meaning that the type of weathering is primarily by mechanical disintegration. Shallow residual soils are commonly granular and gravelly (Brink, 1983).

The study area is dominated by the Abrahamskraal Formation. Colluvial deposits can be anticipated along hillslopes with alluvial deposits anticipated near drainage features.

Based on previous investigations in the greater Roggeveld area, blocky, greyish-red mudstone with interbedded grey very fine to medium-grained quartzofeldspathic sandstone can be anticipated. Weathered, limestone layers of up to 1.5m in thickness may be present. Greenish-grey cherty layers, of a few centimetres to two metres thickness, may also be present in the Abrahamskraal formation. The chert and limestone layers possess potentially soluble properties.

Where material is required for the construction of roads and laydown areas, natural gravely or crushed sandstone bedrock can potentially be a suitable source. Consideration must be given to the presence of excessive pyrite and muscovite which can cause distress where sandstone is used as basecourse (Brink, 1983). In addition, where chemical stabilization is required the clay matrix of sandstones make them suitable for stabilization with lime (Brink, 1983). The occurrence, nature, material quality and quantity of sandstone and other potential construction material will have to be assessed during the detailed geotechnical investigation.

Mudrocks such as siltstone, mudstone and “mud-shales” are not considered suitable for use as construction material, due to their swelling characteristics, excessive absorption of water, poor engineering performance and lack of durability. Slope stability issues can arise in areas where closely intercalated sandstones and mudrock exist. When mudrocks slake or disintegrate the exposed sandstone layers are undercut, this can result in rockfalls (Brink, 1983). Based on previous investigations in the Roggeveld area, concave cave structures can be anticipated through erosion of the less-competent shale and mudstone bedrock beneath the hard sandstone beds when exposed to the elements.

Based on previous investigations in the Sutherland area (Verlatekloof Pass), the Abrahamskraal Formation is represented by maroon mudstone, greenish grey siltstone and olive grey sandstone. These sedimentary units are intercalated and display variable weathering, as described for the Formation.

7 GEOTECHNICAL APPRAISAL

Competent founding conditions for the powerline pylons are anticipated at relatively shallow depths in slightly weathered bedrock, which will have to be assessed during the detailed investigation stage of the project prior to construction.

Consideration can be given to the following foundation type for the pylons:

- Drilled shaft/bored piles – these foundations are suitable in areas where shallow bedrock conditions are encountered or in poor, non-cohesive soils, where helical or screw-in piles are not suitable. The advantages of drilled shafts are they can support high loads, they have minimal settlement and deformation and minimum excavation during construction.

The proposed substation sites are underlain by the Abrahamskraal Formation. The sites lie on gentle slopes of 2.3-5.5˚ likely to be underlain by shallow transported soils. The sites do not traverse any drainage features. Consideration can be given to the following foundation types for the substation:

- Normal strip footings
- Spread footings

It is important to select the correct foundation type and optimize the design, as such a detailed and comprehensive geotechnical investigation is required this will be undertaken prior to construction and upon finalisation of the layout plan. The presence of uplift and downward forces in the form of wind loads must be taken into consideration during foundation design.

8 GEOTECHNICAL IMPACT ASSESSMENT

From a preliminary geological and geotechnical assessment, no fatal flaws have been identified.

8.1 Impact of the Project on the Geological Environment

The Karoo Supergroup is known for its fossil bearing sedimentary units, the information of which has been detailed in the desktop paleo-assessment completed for the study area (Almond, 2021).

The impact of the development from a geotechnical perspective will be restricted to the removal and displacement of soil, boulders and bedrock referred to in this report as “subsoils”. The levelling of areas to create building platforms for the substation will also result in the displacement and exposure of subsoils. The potential impact of the development on the terrain and geological environment, will be the increased potential for soil erosion, caused by construction activities and the removal of vegetation. Additionally, temporary berms must be constructed, and surface water must be diverted into drainage channels. Construction must make use of existing road network and access tracks. Rehabilitation of affected areas (such as regrassing, mechanical stabilization) must be implemented. The correct engineering design and construction of gravel roads over water crossings

must be applied. Correct construction methods for foundation installations and cut to fill configurations.

All the proposed powerline routes and substation locations are considered suitable for construction provided that recommendations presented in this report are adhered to.

Based on the impact assessment matrix undertaken for this project, from a geotechnical perspective the impact of the powerline, substation and associated infrastructure was found to be **"Negative moderate impact - The anticipated impact will have negative effects and will require mitigation"**. The assessment impact assessment matrix is presented overleaf as Table 8-1. The impact assessment criteria developed by WSP is included in Appendix B.

Table 8-1: Geotechnical Impact Assessment Matrix

Project Name	Karreebosch 132kV Overhead Powerline and 33/132kV Substation																		
CONSTRUCTION																			
Impact number	**Aspect**	**Description**	**Stage**	**Character**	**Ease of Mitigation**	**Pre-Mitigation**							**Post-Mitigation**						
						(M+	**E+**	**R+**	**D)x**	**P=**	**S**	**Rating**	**(M+**	**E+**	**R+**	**D)x**	**P=**	**S**	**Rating**
Impact 1:	Subsoil Removal	Increase Soil Erosion	Construction	Negative	Moderate	3	1	3	3	5	**50**	**N3**	2	1	1	2	2	**12**	**N1**
					Significance	**N3 - Moderate**							**N1 - Very Low**						
OPERATIONAL																			
Impact number	**Receptor**	**Description**	**Stage**	**Character**	**Ease of Mitigation**	**Pre-Mitigation**							**Post-Mitigation**						
						(M+	**E+**	**R+**	**D)x**	**P=**	**S**		**(M+**	**E+**	**R+**	**D)x**	**P=**	**S**	
Impact 1:	Subsoil Removal	Increase Soil Erosion	Operational	Negative	Moderate	1	1	3	4	3	**27**	**N2**	1	1	1	4	2	**14**	**N1**
					Significance	**N2 - Low**							**N1 - Very Low**						
DECOMISSIONING																			
Impact number	**Receptor**	**Description**	**Stage**	**Character**	**Ease of Mitigation**	**Pre-Mitigation**							**Post-Mitigation**						
						(M+	**E+**	**R+**	**D)x**	**P=**	**S**		**(M+**	**E+**	**R+**	**D)x**	**P=**	**S**	
Impact 1:	Subsoil Removal	Increase Soil Erosion	Decommissioning	Negative	Moderate	4	1	3	2	4	**40**	**N3**	2	1	1	2	2	**12**	**N1**
					Significance	**N3 - Moderate**							**N1 - Very Low**						
CUMULATIVE																			
Impact number	**Receptor**	**Description**	**Stage**	**Character**	**Ease of Mitigation**	**Pre-Mitigation**							**Post-Mitigation**						
						(M+	**E+**	**R+**	**D)x**	**P=**	**S**		**(M+**	**E+**	**R+**	**D)x**	**P=**	**S**	
Impact 1:	Subsoil Removal	Increase Soil Erosion	Cumulative	Negative	Moderate	3	1	3	4	5	**55**	**N3**	1	1	1	4	2	**14**	**N1**
					Significance	**N3 - Moderate**							**N1 - Very Low**						

9 GEOTECHNICAL COMPARATIVE ASSESSMENT OF ALTERNATIVES

Design and layout alternatives were considered and assessed as part of this geotechnical report. These include alternatives for the substation and powerlines. The various alternatives, as shown in Map 2 (Appendix A) and are described below.

Only one (1) overhead powerline route is technically feasible for the section of the proposed powerline directly preceding the existing Bon Espirange substation (Route 3) and for the section connecting the Bon Espirange substation to the Komsberg substation (Bon Espirange to Komsberg Route), which is approximately 9.2 km in length. **No alternatives can therefore be provided for these two sections of the overhead powerline.**

Six (6) overhead powerline route alternatives (Options 1A, 1B, 1C, 2A, 2B and 2C) are proposed between the Karreebosch WEF onsite 33/132kV substation (with substation alternatives: Option 1 and Option 2) and Route 3 preceding the existing Bon Espirange Substation. As noted above, all of the six overhead powerline route alternatives follow the same routing from their point of convergence on Remainder of farm Ek Kraal No.199, approximately 3.1 km before the Bon Espirange substation, to the Komsberg substation situated on Portion 2 of Farm Standvastigheid No. 210. These alternatives are described below:

Overhead Powerline Route Option 1

Three (3) overhead powerline route alternatives are being considered for the link between Substation Option 1 and the Bon Espirange Substation and Komsberg Substation:

- Option 1A (approximately 14.51 km in length in its entirety from Substation Option 1 to the Komsberg Substation);
- Option 1B (approximately 17.28 km in length in its entirety from Substation Option 1 to the Komsberg Substation); and
- Option 1C (approximately 13.91 km in length in its entirety from Substation Option 1 to the Komsberg Substation).

Overhead Powerline Route Option 2

Three (3 No.) overhead powerline corridor route alternatives were considered for the link between Substation Option 2 and the Bon Espirange Substation and Komsberg Substation:

- Option 2A (approximately 20.47 km in length in its entirety from Substation Option 2 to the Komsberg Substation);
- Option 2B (approximately 16.63 km in length in its entirety from Substation Option 2 to the Komsberg Substation); and

- Option 2C (approximately 20.52 km in length in its entirety from Substation Option 2 to the Komsberg Substation).

Alternatives 1A-C feed out of Substation Option 1 proposed in the south-central portion of the Farm Klipbanksfontein 198/1. Alternatives 2A-C feed out of Substation Option 2 proposed in the south-eastern corner of Wilgebosch Rivier 188/RE.

Karreebosch Powerline Bon Espirange to Komsberg (Route 3)

One (1) powerline alternative and the Bon Espirange and Komsberg Substations were considered by the EAP and specialists.

This assessment is based on a comparative assessment criteria, which is given in Table 9-1, with the full assessment presented in Table 9-2.

Table 9-1: Comparative Assessment Criteria

PREFERRED	The alternative will result in a low impact / reduce the impact / result in a positive impact
FAVOURABLE	The impact will be relatively insignificant
LEAST PREFERRED	The alternative will result in a high impact / increase the impact
NO PREFERENCE	The alternative will result in equal impacts

A desktop level comparative assessment is presented in Table 9-2.

Table 9-2: Geotechnical Comparative Assessment of Alternatives

Alternative	Preference	Reasons (incl. potential issues)
SUBSTATION OPTION 1, POWERLINE (PL) OPTION 1		
PL option 1A	**PREFERRED**	• All areas are underlain by the Abramskraal Formation. All options are envisaged to have similar geotechnical characteristics. • PL option 1A traverses three drainage features on a gentle descent to the substation. There is less likely to be slope stability issues. • PL option 1B traverses 31.5°, 26.2˚ and 21.6° slopes on a steep descent to the substation. There is likely to be, unstable transported soils, with potential slope stability issues. • PL option 1C traverses 31.5° and 26.2˚ slopes on a steep descent to the substation. There is likely to be unstable transported soils, with potential slope stability issues.
PL option 1B	**NO PREFERENCE**	
PL option 1C	**NO PREFERENCE**	
Substation option 1	**NO PREFERENCE**	• All areas are underlain by the Abramskraal Formation. All options are envisaged to have similar geotechnical characteristics.

Alternative	Preference	Reasons (incl. potential issues)
		• Substation option 1 lies on a shallow dipping slope of 5.5°. Close to an existing gravel road for serviceability. Minor earthworks might be required to create a level platform.
SUBSTATION OPTION 2, POWERLINE (PL) OPTION 2		
PL option 2A	**FAVOURABLE**	• All areas are underlain by the Abramskraal Formation. All options are envisaged to have similar geotechnical characteristics. • PL option 2A traverses multiple drainage features on the ascent to the substation. Traversing a range of slopes ranging between 5.5° to 26.2˚ slopes. There is likely to be, unstable transported soils, with potential slope stability issues with serviceability constraints. • PL option 2B has a steep topographic descent over the initial segment and also traverses multiple drainage features. The frequency of slope gradient changes appears to less than option 2B. Slope angles ranged between 5.5° to 26.2˚. As such there is likely to be, unstable transported soils, with potential slope stability issues with serviceability constraints. • PL option 2C traverses gentler 5.5° and 9.2˚ slopes on a gentle ascend to the substation. There is less likely to be potential slope stability issues.
PL option 2B	**NO PREFERENCE**	
PL option 2C	**PREFERRED**	
Substation option 2	**NO PREFERENCE**	• All areas are underlain by the Abramskraal Formation. All options are envisaged to have similar geotechnical characteristics. • Substation option 2 lies on a shallow dipping slope of 5.5°. Minor earthworks might be required to create a level platform.
BON ESPIRANGE TO KOMSBERG SUBSTATION AND POWERLINE OPTION (ROUTE 3)		
Bon Espirange to Komsberg substation and powerline option	**NO PREFERENCE**	• The substations and powerline are underlain by lithologies of the Abramskraal Formation. Geotechnical characteristics are likely to be similar at both substation sites and along the powerline route. • Both substations lie on shallow dipping slopes of 5.5° and minor earthworks might be required to create a level platform. • The powerline traverses a range of slopes ranging from 2.3° to 26.2° slopes. There is a likelihood of potential instability created by the presence of transported soils along this route as well as serviceability constrains in certain areas.

No fatal geotechnical constraints have been identified, which rendered a powerline alternative or substation site to be non-suitable. Preferences are given in the table above for informative purposes.

Construction activities on steeply inclined slopes will require additional earthworks, longer access routes in comparison to lower topographic areas.

Slope stability issues can arise in steeply inclined terrain which will require retention structures and advanced foundations. Mountainous terrain will require earthworks to create level platforms for structures. None of the alternatives are considered fatally flawed provided the recommendations presented in this report are adhered to.

10 CONCLUSIONS AND RECOMMENDATIONS

The foregoing report presents the findings concluded from a desktop study undertaken for the Karreebosch 132kV overhead powerline and 33/132kV substation. The powerline route is anticipated to be underlain by shallow bedrock conditions.

The impact of the powerline was found to be "**Negative moderate impact - The anticipated impact will have negative effects and will require mitigation."** '

In summary for powerline (PL) Option 1 which links substation 1 to the Komsberg Substation, incorporating options 1A, 1B & 1C. PL option 1A is *preferred,* with PL options 1B and 1C having *no preference*.

In summary for PL option 2 which links Substation 2 to the Komsberg Substation, incorporating options 2A, 2B, 2C. PL option 2C is *preferred,* with PL option 2B having *no preference* and PL option 2B considered *favourable*.

In summary the Bon Espirange to Komsberg substation and powerline option which is connected by an approximately 9.2km powerline has *preference* as there is only a single route.

Additionally, there is not preference between Substation Option 1 and Substation Option 2.

No fatal geotechnical constraints, which rendered a powerline alternative or substation site to be non-suitable, have been identified during this desktop study. Conclusions presented in this report will have to be more accurately confirmed during the detailed geotechnical investigation phase.

It recommended that a detailed geotechnical investigation be undertaken during the detailed design phase of the project. The detailed geotechnical investigation must entail the following:

- Profiling and sampling of exploratory trial pits to determine founding conditions for the pylons.
- Thermal resistivity and electrical resistivity geophysical testing for electrical design and ground earthing requirements.
- Groundwater sampling of existing boreholes to establish a baseline of the groundwater quality for construction purposes.

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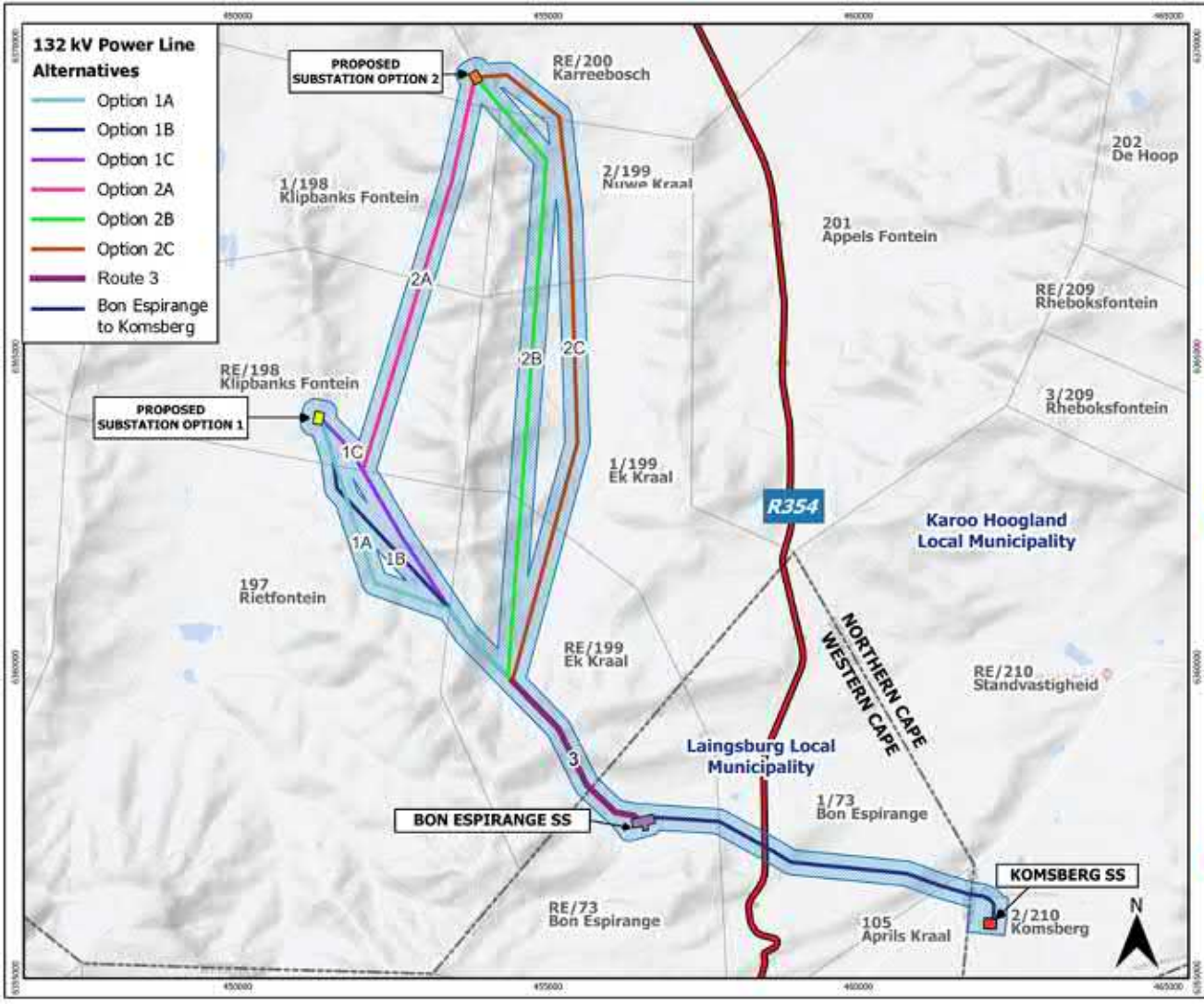
Map No. 01

Appendix A: Figures



PROPOSED CONSTRUCTION OF THE KARREEBOSCH 132kV POWER LINE

Legend

- Provincial Boundaries
- Property Boundaries
- Provincial Road
- Power Line Assessment Corridor

Eskom Infrastructure

- Komsberg SS
- Bon Espirange SS

Proposed Electrical Infrastructure

- Substation Option 1
- Substation Option 2

Scale: 1:80,000

0 0.7 1.4 2.1 2.8 km

Date: 29-6-2022	Project: KBosch
Coordinate System: WG 21	
Drawn:	CS
Approved:	CC
Map No.: 01	Revision: 4

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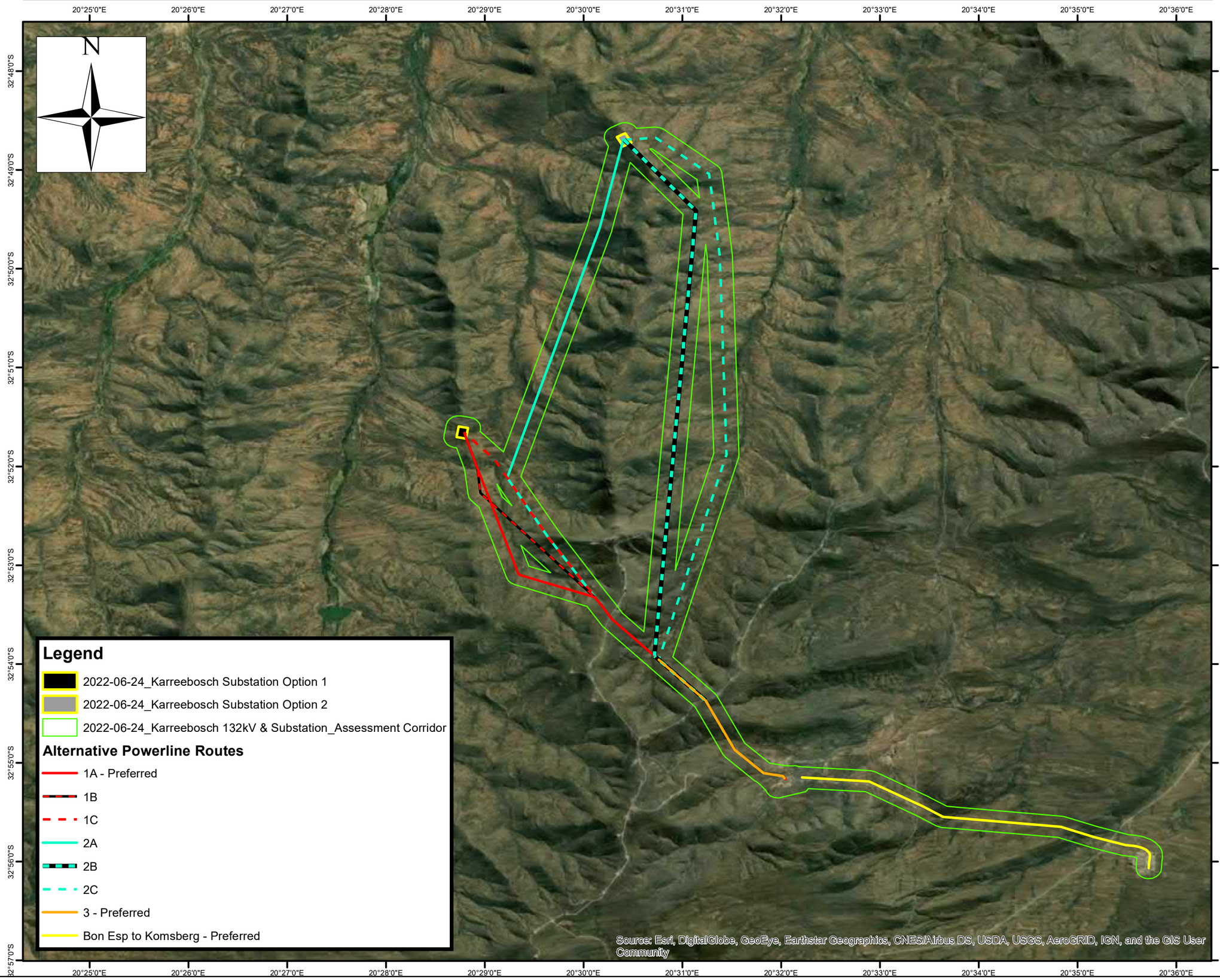
KAREEBOSCH 132KV POWERLINE GEOTECHNICAL DESKTOP STUDY: SITE MAP



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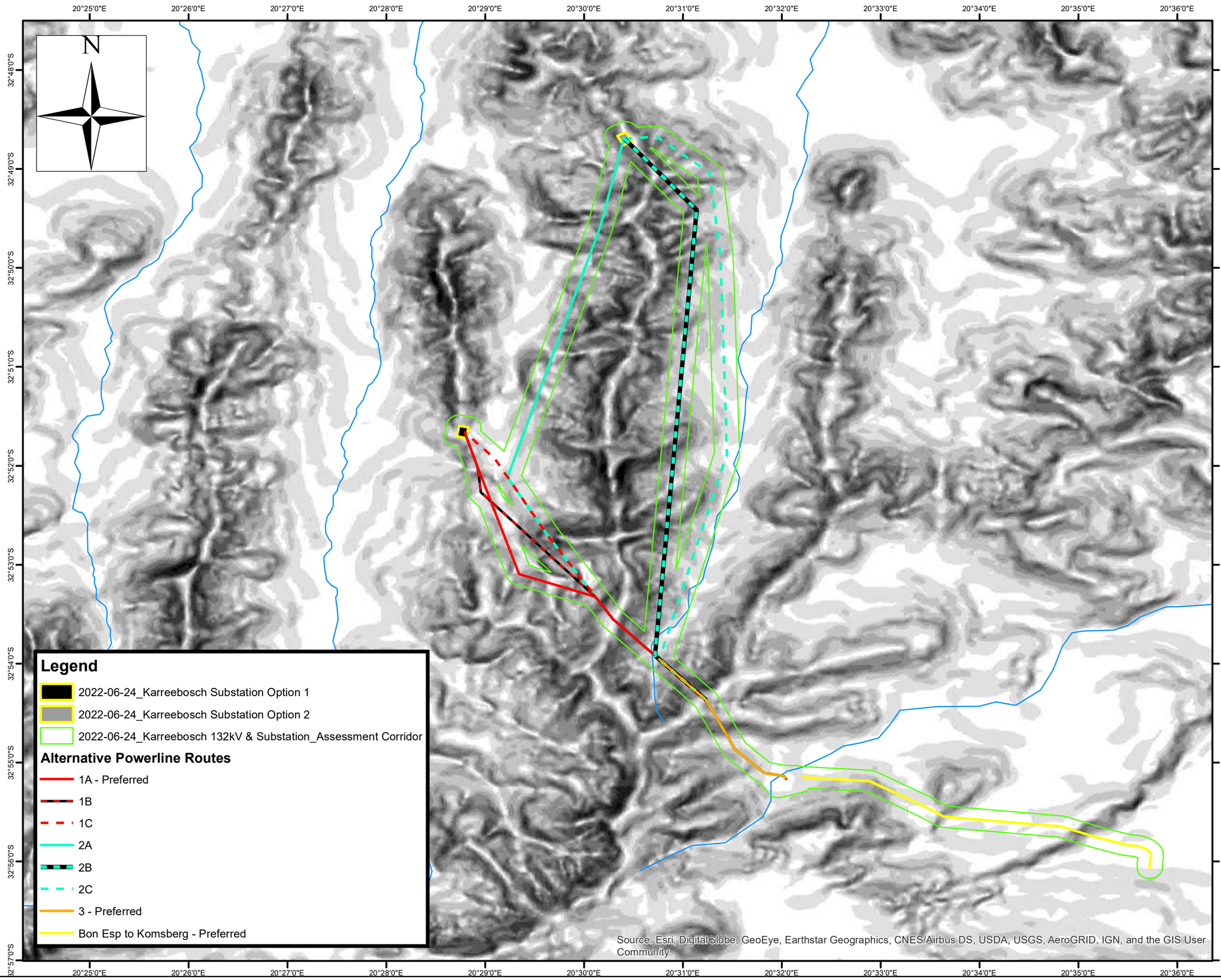
Kilometers
0 1 2 4

Map No.: 2

Scale (A3): 1:68 821

Designed and detailed under the controls established by our quality management system that meet the requirements of ISO 9001:2000 which has been independently certified by DEKRA Certification under certificate number 90906882.

KAREEBOSCH 132KV POWERLINE GEOTECHNICAL DESKTOP STUDY: SLOPE MAP



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Legend

Perennial_Watercourses

Slope %

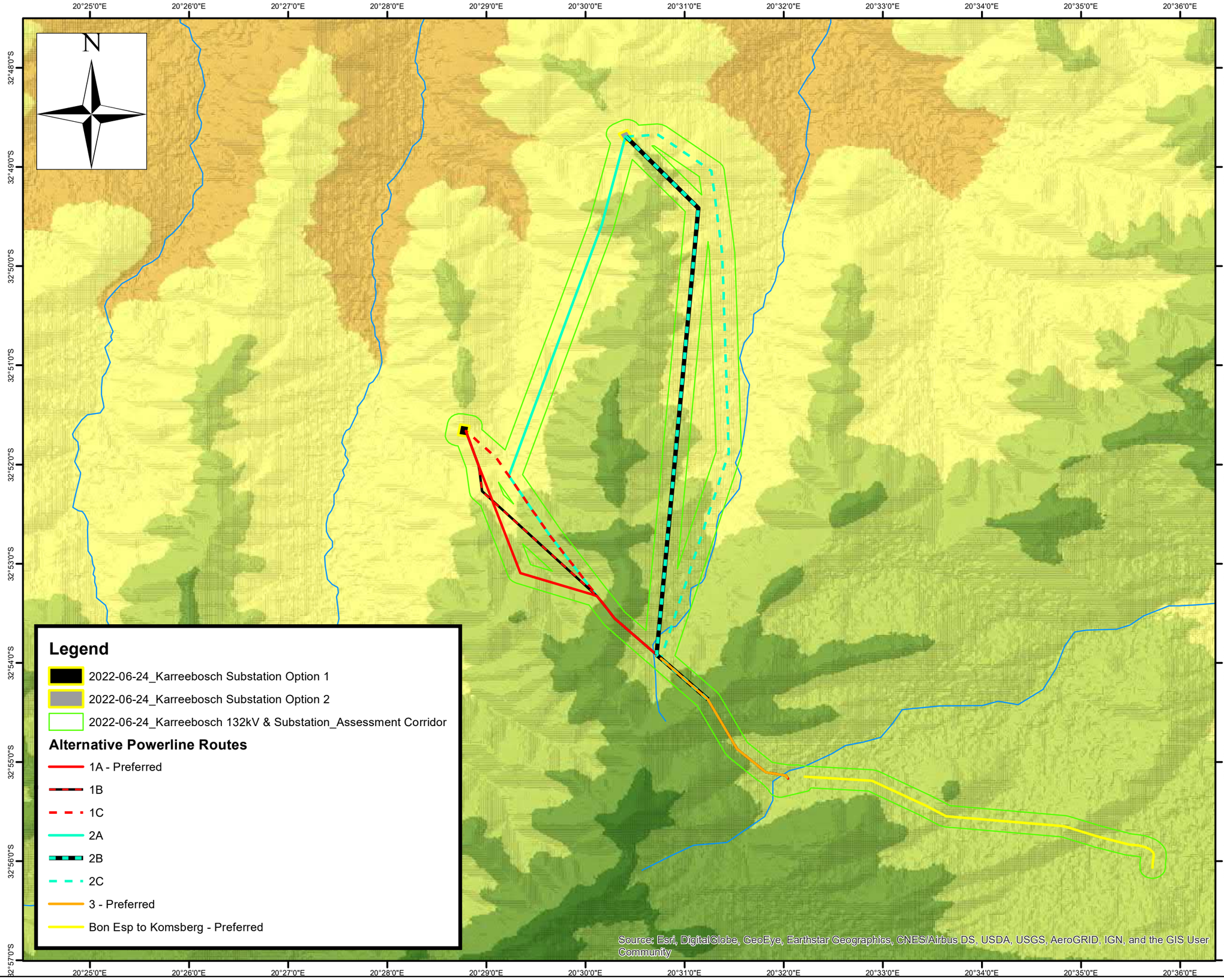
- ≤2.3
- ≤5.5
- ≤9.2
- ≤13.1
- ≤17.2
- ≤21.6
- ≤26.2
- ≤31.5
- ≤38.1
- ≤58.6

Kilometers

0 1 2 4

Map No.:	Scale (A3):
3.1	1:68 821

KAREEBOSCH 132KV POWERLINE GEOTECHNICAL DESKTOP STUDY: ELEVATION MAP



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Legend

Perennial_Watercourses

Elevation

- 368 - 380
- 380 - 542
- 542 - 704
- 704 - 866
- 866 - 1 028
- 1 028 - 1 191
- 1 191 - 1 353
- 1 353 - 1 515
- 1 515 - 1 677

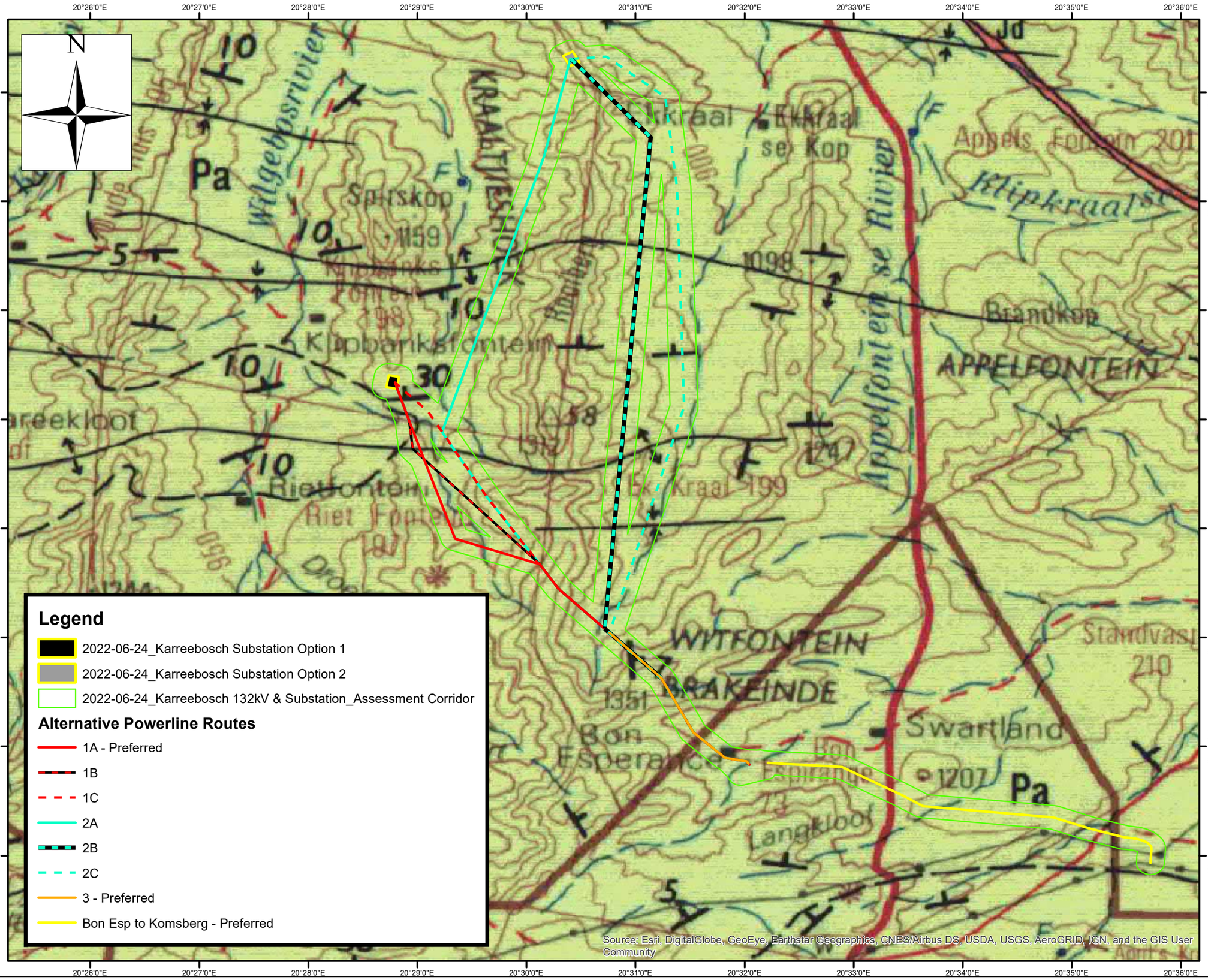
Kilometers

0 1 2 4

Map No.: 3.2

Scale (A3): 1:68 821

KAREEBOSCH 132KV POWERLINE GEOTECHNICAL DESKTOP STUDY: GEOLOGY MAP



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Geology Map Legend:

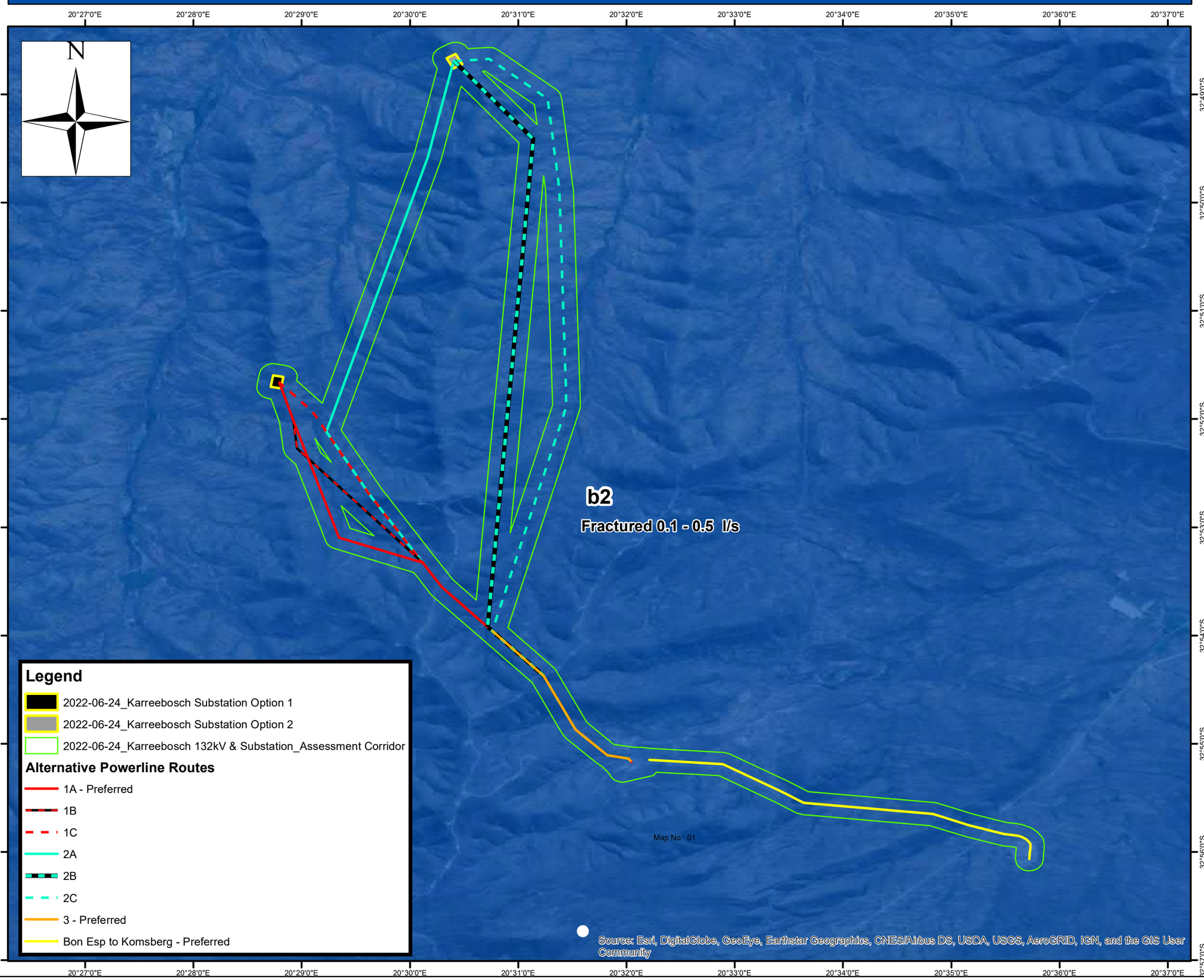
Pa - Mudstone, siltstone, sandstone, thin cherty beds (lowermost red mudstone)

Pko - Sandstone, Siltstone and Shale

Kilometers
0 0.75 1.5 3

Map No.:	Scale (A3):
4	1:62 500

KAREEBOSCH 132KV POWERLINE GEOTECHNICAL DESKTOP STUDY: GEOHYDROLOGICAL MAP



Legend

- 2022-06-24_Karreebosch Substation Option 1
- 2022-06-24_Karreebosch Substation Option 2
- 2022-06-24_Karreebosch 132kV & Substation_Assessment Corridor

Alternative Powerline Routes

- 1A - Preferred
- 1B
- 1C
- 2A
- 2B
- 2C
- 3 - Preferred
- Bon Esp to Komsberg - Preferred

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Kilometers
0 0.75 1.5 3

Map No.:	Scale (A3):
5	1:62 500

Appendix B: WSP's Impact Assessment Methodology

BASIC ASSESSMENT PROCESS

OBJECTIVES OF THE BASIC ASSESSMENT PROCESS AS PER THE PROCEDURAL FRAMEWORK

As defined in Appendix 1 of the EIA Regulations, 2014 (as amended), the objective of the impact assessment process is to, through a consultative process:

- Determine the policy and legislative context within which the proposed activity is located and how the activity complies with and responds to the policy and legislative context;
- Identify the alternatives considered, including the activity, location, and technology alternatives;
- Describe the need and desirability of the proposed alternatives;
- Through the undertaking of an impact and risk assessment process, inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage, and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on these aspects to determine—
    - The nature, significance, consequence, extent, duration, and probability of the impacts occurring to; and
    - The degree to which these impacts—
        - Can be reversed;
        - May cause irreplaceable loss of resources; and
        - Can be avoided, managed, or mitigated.
- Through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to–
    - Identify and motivate a preferred site, activity and technology alternative;
    - Identify suitable measures to avoid, manage or mitigate identified impacts; and
    - Identify residual risks that need to be managed and monitored.

BASELINE ENVIRONMENTAL ASSESSMENT

The description of the environmental attributes of the project area was compiled through a combination of desktop reviews and site investigations. Desktop reviews made use of available information including existing reports, aerial imagery, and mapping.

IMPACT ASSESSMENT METHODOLOGY

ASSESSMENT OF IMPACTS AND MITIGATION

The assessment of impacts and mitigation evaluates the likely extent and significance of the potential impacts on identified receptors and resources against defined assessment criteria, to develop and describe measures that will be taken to avoid, minimise or compensate for any adverse environmental impacts, to enhance positive impacts, and to report the significance of residual impacts that occur following mitigation.

The key objectives of the risk assessment methodology are to identify any additional potential environmental issues and associated impacts likely to arise from the proposed project, and to propose a significance ranking. Issues / aspects will be reviewed and ranked against a series of significance criteria to identify and record interactions between activities and aspects, and

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resources and receptors to provide a detailed discussion of impacts. The assessment considers direct[1], indirect[2], secondary[3] as well as cumulative[4] impacts.

A standard risk assessment methodology is used for the ranking of the identified environmental impacts pre-and post-mitigation (i.e. residual impact). The significance of environmental aspects is determined and ranked by considering the criteria[5] presented in **Table 1**.

Table 1: Impact Assessment Criteria and Scoring System

CRITERIA	SCORE 1	SCORE 2	SCORE 3	SCORE 4	SCORE 5
Impact Magnitude (M) The degree of alteration of the affected environmental receptor	Very low: No impact on processes	Low: Slight impact on processes	Medium: Processes continue but in a modified way	High: Processes temporarily cease	Very High: Permanent cessation of processes
Impact Extent (E) The geographical extent of the impact on a given environmental receptor	Site: Site only	Local: Inside activity area	Regional: Outside activity area	National: National scope or level	International: Across borders or boundaries
Impact Reversibility (R) The ability of the environmental receptor to rehabilitate or restore after the activity has caused environmental change	Reversible: Recovery without rehabilitation		Recoverable: Recovery with rehabilitation		Irreversible: Not possible despite action
Impact Duration (D) The length of permanence of the impact on the environmental receptor	Immediate: On impact	Short term: 0-5 years	Medium term: 5-15 years	Long term: Project life	Permanent: Indefinite
Probability of Occurrence (P) The likelihood of an impact occurring in the absence of pertinent environmental management measures or mitigation	Improbable	Low Probability	Probable	Highly Probability	Definite
Significance (S) is determined by combining the above criteria in the following formula:	$[S = (E + D + R + M) \times P]$ $Significance = (Extent + Duration + Reversibility + Magnitude) \times Probability$				
IMPACT SIGNIFICANCE RATING					
Total Score	0 – 30		31 to 60		61 – 100
Environmental Significance Rating (Negative (-))	**Low (-)**		**Moderate (-)**		**High (-)**
Environmental Significance Rating (Positive (+))	**Low (+)**		**Moderate (+)**		**High (+)**

IMPACT MITIGATION

The impact significance without mitigation measures will be assessed with the design controls in place. Impacts without mitigation measures in place are not representative of the proposed development's actual extent of impact and are included to

[1] Impacts that arise directly from activities that form an integral part of the Project.
[2] Impacts that arise indirectly from activities not explicitly forming part of the Project.
[3] Secondary or induced impacts caused by a change in the Project environment.
[4] Impacts are those impacts arising from the combination of multiple impacts from existing projects, the Project and/or future projects.
[5] The definitions given are for guidance only, and not all the definitions will apply to all the environmental receptors and resources being assessed. Impact significance was assessed with and without mitigation measures in place.

facilitate understanding of how and why mitigation measures were identified. The residual impact is what remains following the application of mitigation and management measures and is thus the final level of impact associated with the development. Residual impacts also serve as the focus of management and monitoring activities during Project implementation to verify that actual impacts are the same as those predicted in this report.

The mitigation measures chosen are based on the mitigation sequence/hierarchy which allows for consideration of five (5) different levels, which include avoid/prevent, minimise, rehabilitate/restore, offset and no-go in that order. The idea is that when project impacts are considered, the first option should be to avoid or prevent the impacts from occurring in the first place if possible, however, this is not always feasible. If this is not attainable, the impacts can be allowed, however they must be minimised as far as possible by considering reducing the footprint of the development for example so that little damage is encountered. If impacts are unavoidable, the next goal is to rehabilitate or restore the areas impacted back to their original form after project completion. Offsets are then considered if all the other measures described above fail to remedy high/significant residual negative impacts. If no offsets can be achieved on a potential impact, which results in full destruction of any ecosystem for example, the no-go option is considered so that another activity or location is considered in place of the original plan.

The mitigation sequence/hierarchy is shown in **Figure 0-1** below.

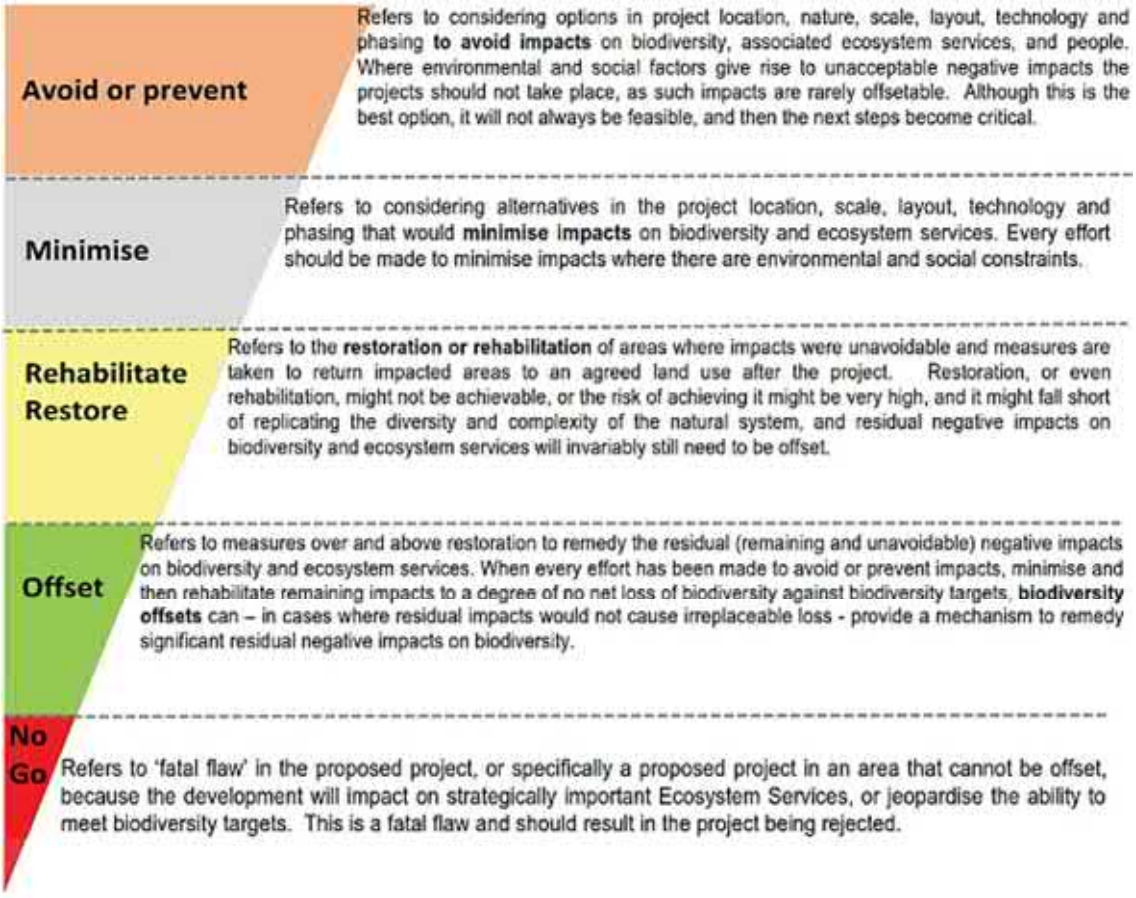

Figure 0-1: Mitigation Sequence/Hierarchy

1 ENVIRONMENTAL IMPACT ASSESSMENT

This Chapter identifies the perceived environmental and social effects associated with the proposed Project. The assessment methodology is outlined above. The issues identified stem from those aspects presented in the baseline assessment as well as project description provided. The impact assessment will be based on the preferred alternative at all project phases. This section only assesses the preferred option along with the no-go section. The mitigation hierarchy criteria for each mitigation measure are indicated in brackets after each measure indicated.

Furthermore, the decommissioning assessment will be considered as part of the decommissioning process that will be subject to a separate authorisation and impact assessment process. The impact assessment in this section encompasses the geographical, physical, biological, social, economic, heritage and cultural aspects in accordance with Appendix 1 of GNR 326.

An example of how the impact assessment methodology is applied is provided below:

1.1 AIR QUALITY

1.1.1 CONSTRUCTION PHASE

DUST AND PARTICULATE MATTER

The National Dust Control Regulations (GNR 827) prescribe general measures for the control of dust in both residential and non-residential areas and will be applicable during construction of the OHPL. **Table 2** provides the acceptable dust fall rates as prescribed by GNR 827.

Table 2: Acceptable dust fall rates (GNR 827)

RESTRICTION AREAS	DUST FALL RATE (D) ($mg/m^2/day$ – 30 DAYS AVERAGE)	PERMITTED FREQUENCY OF EXCEEDING DUST FALL RATE
Residential area	D < 600	Two within a year, not sequential months
Non-residential area	600 < D < 1200	Two within a year, not sequential months

During the construction phase, dust and vehicular emissions (carbon monoxide (CO), hydrocarbons, particulate matter (PM) and nitrogen oxides (NO_x) will be released as a result of vegetation clearing activities, transportation of equipment and materials to site, and the installation thereof, all of which involves the movement of large plant and trucks along unpaved roads and exposing of soils. The emissions will, however, have short-term impacts on the immediate surrounding areas that can be easily mitigated and thus the authorisation of such emissions will not be required. All construction phase air quality impacts will be minimised with the implementation of dust control measures contained within the EMPr.

The impact of the construction phase on the generation of dust and particulate matter (PM) is shown in **Table 3** below.

Table 3: Construction Impact on Generation of Dust and PM

Potential Impact	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
GENERATION OF DUST AND PM									
Without Mitigation	2	2	3	1	4	**32**	**Moderate**	(-)	High
With Mitigation	1	1	3	1	3	**18**	**Low**	(-)	High

Potential Impact	Magnitude	Extent	Reversibility	Duration	Probability	Significance	Character	Confidence
GENERATION OF DUST AND PM								
Mitigation and Management Measures	— Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all roads and soil/material stockpiles especially. This includes wetting of exposed soft soil surfaces and not conducting activities during high wind periods which will increase the likelihood of dust being generated; — All stockpiles (if any) must be restricted to designated areas and may not exceed a height of two (2) metres; — Ensure that all vehicles, machines and equipment are adequately maintained to minimise emissions; — It is recommended that the clearing of vegetation from the site should be selective, be kept to the minimum feasible area, and be undertaken just before construction so as to minimise erosion and dust potential; — All materials transported to, or from, site must be transported in such a manner that they do not fly or fall off the vehicle. This may necessitate covering or wetting friable materials. — Enforcing of speed limits. Reducing the dust generated by the listed activities above, putting up signs to enforce speed limit in access roads. — No burning of waste, such as plastic bags, cement bags and litter is permitted; and — All issues/complaints must be recorded in the complaints register.							

1.1.2 OPERATIONAL PHASE

There are no anticipated air quality impacts during the operational phase as maintenance activities will occur as and when required and will be extremely short term.

CUMULATIVE IMPACT ASSESSMENT

Although the BA process is essential to assessing and managing the environmental and social impacts of individual projects, it often may be insufficient for identifying and managing incremental impacts on areas or resources used or directly affected by a given development from other existing, planned, or reasonably defined developments at the time the risks and impacts are identified.

IFC PS 1 recognizes that, in some instances, cumulative effects need to be considered in the identification and management of environmental and social impacts and risks. For private sector management of cumulative impacts, IFC considers good practice to be two pronged:

- effective application of and adherence to the mitigation hierarchy in environmental and social management of the specific contributions by the project to the expected cumulative impacts; and
- best efforts to engage in, enhance, and/or contribute to a multi-stakeholder, collaborative approach to implementing management actions that are beyond the capacity of an individual project proponent.

Even though Performance Standard 1 does not expressly require, or put the sole onus on, private sector clients to undertake a cumulative impact assessment (CIA), in paragraph 11 it states that the impact and risk identification process "*will take into account the findings and conclusions of related and applicable plans, studies, or assessments prepared by relevant government authorities or other parties that are directly related to the project and its area of influence*" including "*master economic development plans, country or regional plans, feasibility studies, alternatives analyses, and cumulative, regional, sectoral, or strategic environmental assessments where relevant.*"

Cumulative impacts are those that result from the successive, incremental, and/or combined effects of an action, project, or activity when added to other existing, planned, and/or reasonably anticipated future ones. For practical reasons, the identification and management of cumulative impacts are limited to those effects generally recognized as important on the basis of scientific concerns and/or concerns of affected communities (IFC).

Evaluation of potential cumulative impacts is an integral element of an impact assessment. In reference to the scope for an impact assessment, IFC's Performance Standards specify that "*Risks and impacts will be analysed in the context of the project's area of influence. This area of influence encompasses…areas potentially impacted by cumulative impacts from further planned development of the project, any existing project or condition, and other project-related developments that are realistically defined at the time the Social and Environmental Assessment is undertaken; and (iv) areas potentially affected by impacts from unplanned but predictable developments caused by the project that may occur later or at a different location."*

A cumulative impact assessment is the process of (a) analysing the potential impacts and risks of proposed developments in the context of the potential effects of other human activities and natural environmental and social external drivers on the chosen Valued Environmental and Social Components (VECs) over time, and (b) proposing concrete measures to avoid, reduce, or mitigate such cumulative impacts and risk to the extent possible (IFC).

Cumulative impacts with existing and planned facilities may occur during construction and operation of the proposed project. While one project may not have a significant negative impact on sensitive resources or receptors, the collective impact of the projects may increase the severity of the potential impacts.

SURROUNDING AREA

The project area and surrounding areas have been earmarked for renewable energy development. The South African government gazetted[6] eight (8) areas earmarked for renewable energy development in South Africa. These areas are known as Renewable Energy Development Zones (REDZ) and this project falls within the Komsberg REDZ. The purpose of the REDZ is to cluster development of renewable energy facilities in order to streamline the grid expansion for South Africa i.e. connect zones to one another as opposed to a wide scatter of projects. It is therefore not surprising that there are a number of environmental authorisations (EA) issued for wind energy facilities (either issued or in process) in the area surrounding the proposed project site. It is important to note that the existence of an approved EA does not directly equate to actual 'development'.

The surrounding projects, except for the Preferred Bidders, are still subject to the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) bidding process or subject to securing an off taker of electricity through an alternative

[6] Government Notice 114 of 16 February 2018

process. Some of the surrounding proposed WEFs secured EAs several years ago but have not obtained Preferred Bidder status and as such have not been developed.

These existing surrounding projects of varying approval status have been detailed in the table and figure below. Given the site's location within the Komsberg REDZ, it is considered to be located within the renewable energy hub that is developing in this focus area.

All specialists must consider the cumulative impact of these projects in their statements / assessments prepared to inform this assessment.

Table 4: Renewable energy applications within 30km of the Karreebosch WEF and Powerline

LABEL	DFFE REFERENCE	PROJECT TITLE	STATUS
1	12/12/20/1782/1/AM5	140MW Rietrug Wind Energy Facility near Sutherland, Northern Cape Province.	Preferred Bidder Round 5
2	12/12/20/1782/2/AM6	140MW Sutherland 1 Wind Energy Facility near Sutherland, Northern Cape and Western Cape Provinces.	Preferred Bidder Round 5
3	12/12/20/1782/3/AM3	140 MW Sutherland 2 Wind Energy Facility near Sutherland, Northern Cape Provinces.	Preferred Bidder Round 5
4	12/12/20/1783/1/AM5	150MW Perdekraal Site 1 Wind Energy Facility, Western Cape Province.	Approved
5	12/12/20/1783/2/AM5	147MW Perdekraal Site 2 Wind Energy Facility, Western Cape Province.	Preferred Bidder Round 4, Operational
6	12/12/20/1988/1/AM6	140MW Roggeveld Phase 1 Wind Farm, North of Matjiesfontein, Northern Cape and Western Cape Provinces.	Preferred Bidder Round 4, Operational
7	12/12/20/2370/1/AM6	140 MW Karusa Wind Energy Facility,Phase 1, Karoo Hoogland Municipality, Northern Cape Province.	Preferred Bidder Round 4, Operational
8	12/12/20/2370/2/AM6	140MW Soetwater Wind Farm Phase 2, Karoo Hoogland Municipality, Northern Cape Province.	Preferred Bidder Round 4, Operational
9	12/12/20/2370/3/AM5	140MW Great Karoo Wind Energy Facility Phase 3, Karoo Hoogland Municipality, Northern Cape Province.	Approved
10	14/1/1/16/3/3/1/2318	310MW Pienaarspoort Wind Energy Facility Phase 1, Witzenberg local Municipality, Western Cape Province.	Approved
11	14/12/16/3/3/1/2441	360MW Pienaarspoort Wind Energy Facility Phase 1, Witzenberg local Municipality, Western Cape Province.	Approved
12	14/12/16/3/3/1/1976/1/AM3	226MW Kudusberg Wind Energy Facility between Matjiesfontein and Sutherland in Western and Northern Cape Provinces.	Approved
13	14/12/16/3/3/1115	325WM Rondekop Wind Energy Facility between Matjiesfontein and Sutherland in Western and Northern Cape Provinces	Approved
14	14/12/16/3/3/1/1977/AM3	183MW Rietkloof Wind Energy Facility near Matjiesfontein in the Western Cape Province.	Preferred Bidder Round 5
15	14/12/16/3/3/1/2542	200 MW Esizayo Wind Energy Facility Expansion near Laingsburg, Western Cape.	In Process

16	14/12/16/3/3/2/2009/AM1	Oya Energy Facility	Preferred Bidder Risk Mitigation Independent Power Producer Procurement Programme (RMIPPPP)
17	14/12/16/3/3/2/826	140MW Gunsfontein Wind Energy Facility Karoo Hoogland Municipality, Northern Cape Province.	Approved
18	14/12/16/3/3/2/856 /AM4	275MW Komsberg West near Laingsburg, Western Cape Provinces	Approved
19	14/12/16/3/3/2/857/AM4	275 Komsberg East near Laingsburg, Western Cape Provinces.	Approved
20	14/12/16/3/3/2/900/AM2	140MW Brandvalley Wind Energy Facility, WITHIN THE Laingsburg and Witzenberg Local Municipalities in the Western and Northern Cape Province.	Preferred Bidder Round 5
21	14/12/16/3/3/2/962/AM1	140MW Maralla East Wind Energy Facility, Namakwa and Central Karoo District Municipalities, Western and Northern Cape Provinces.	Approved
22	14/12/16/3/3/2/963/AM1	140Maralla West Wind Energy Facility, Karoo Hoogland local Municipality, Northern Cape Province.	Approved
23	14/12/16/3/3/2/967/AM3	140MW Esizayo Wind Farm, Laingsburg Local Municipality Western Cape Province.	Approved
24	12/12/20/2235	10MW Inca Photovoltaic Facility near Sutherland, Northern Cape Province.	Approved

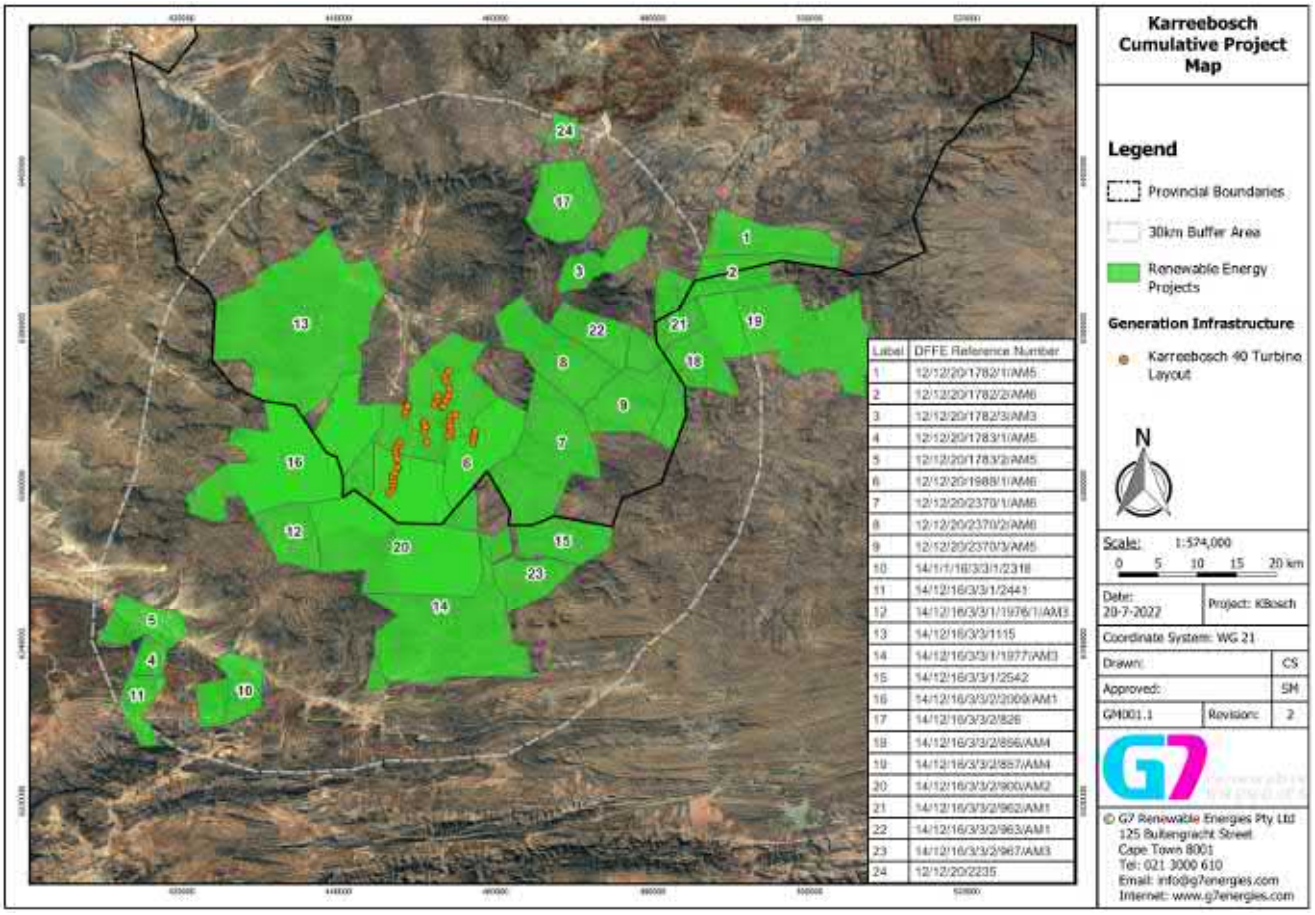

Figure 0-1: Renewable energy projects within a 30km radius of the Karreebosch WEF

Appendix C: Specialist's CV and Declaration of Interest

PRIANTHA SUBRAYEN

Profession	*Engineering Geologist*
Position in Firm	*Engineering Geologist*
Area of Specialisation	*Engineering Geology*
Qualifications	*Pr.Sci.Nat., BSc (Hons) (Environmental and Engineering Geology)*
Years of Experience	*6 Years*
Years with Firm	*3 Years*

SUMMARY OF EXPERIENCE

Priantha is a professionally registered natural scientist with the South African Council for Natural Scientific Professions. She currently occupies the position of Engineering Geologist with JG Afrika and has 6 years of experience in the Geotechnical Engineering field. She currently has a BSc Honours in Engineering Geology from the University of KwaZulu-Natal.

Previously a part of the Geotechnical division at JG Afrika, Priantha has since branched into the fields of Geohydrology, Water Quality Analysis, Water Use License Applications (WULAs) and Geographical Information Systems (GIS), and is now a part of the Geohydrology division based in Durban. Experience has also been obtained in compilation of contract documentation, cost estimates and tender compilation.

Apart from her numerous projects in South Africa, Priantha also has working experience in Africa.

PROFESSIONAL REGISTRATIONS & INSTITUTE MEMBERSHIPS

Pr.Sci.Nat - South African Council for Natural Scientific Professions (Registration No. 400006/16).

EDUCATION

2010 – BSc (Geological Sciences) – University of KwaZulu-Natal
2011 – BSc (Hons) (Environmental and Engineering Geology) – University of KwaZulu-Natal

SPECIFIC EXPERIENCE

JG Afrika (Pty) Ltd (Previously Jeffares & Green (Pty) Ltd): Groundwater

2022 (Current)
Position – Engineering Geologist/ Geohydrologist

City of Cape Town – Water Quality interpretation at City of Cape Town Landfill Sites. Client: City of Cape Town.

JG Afrika (Pty) Ltd (Previously Jeffares & Green (Pty) Ltd): Geotechnical

2013 - 2016
Position – Engineering Geologist

Lesotho Highlands Phase II Water Project – Information database management, site data analysis, interpretation and compilation, reporting. Client: Lesotho Highlands Development Authority.

Geotechnical Investigations (Quarry Rock Mass Ratings Determination – Afrimat Quarries) – Slope stability and rock quality assessments at various Afrimat Quarries in KwaZulu-Natal. Client: Afrimat.

Geotechnical Investigations (Single Storey Structures) – A determination of the appropriate founding depth and foundation type for single storey structures. These included residential developments, multi-purpose buildings and poultry farm sheds. Client: Various.

Geotechnical Investigations (Irrigation Schemes and Related Infrastructure) – Shallow site investigations to determine the suitability of a site for various irrigation scheme infrastructure, including pipes, reservoirs and pump stations. Client: Various.

Geotechnical Investigations (Industrial Developments) – Shallow geotechnical investigations for small and large scale industrial developments, to determine the founding depths and appropriate foundation types for various heavily loaded industrial structures. Client: Various.

Geotechnical Investigations (Cemetery Site Selection) – Shallow geotechnical investigations to determine site suitability for the development of a cemetery and related infrastructure. Client: Msunduzi Municipality.

Geotechnical Investigations (Roads and Related Infrastructure) – Road centreline investigations for the upgrade of lightly to moderately trafficked roads, borrow pit evaluation and bridge and culvert foundation assessments. Client: Naidu Consulting (Pty) Ltd.

Geotechnical Investigations (Low-Cost Housing Developments) – Shallow geotechnical investigations and NHBRC site classifications for numerous low-cost housing developments within South Africa. Client: various.

SRK Consulting (Pty) Ltd

2012 - 2013
Position – Junior Engineering Geologist

Geotechnical Investigations (Multi- Storey Structures) – Small scale, deep geotechnical investigations for multi-storey buildings in Pietermaritzburg. Client: Msunduzi Municipality.

Geotechnical Investigations (Roads and Related Infrastructure) – Road centreline investigations, borrow pit evaluation and culvert and over-topping structure founding condition inspections. Client: Naidu Consulting (Pty) Ltd.

Geotechnical Investigations (Low-Cost Housing Developments) – Shallow geotechnical investigations and site classifications for numerous low-cost housing developments within South Africa. Client: various.

Geotechnical Investigations (Heavily Loaded Structures -Vopak Tank Storage Farm) – Deep geotechnical investigations to determine the suitability of the site and founding conditions for tank storage reservoirs within the Richards Bay Port: Vopak.

Mutamba Titanium Dioxide Feedstock Project – CPT Monitoring and evaluation, mineral resource estimation and orebody modelling. Client: RioTinto.

CONTINUED PROFESSIONAL DEVELOPMENT

Courses

2012 - LeapFrog Geo
2013 - SAIEG Soil, Rock and Chip Logging
2014 - Kaytech Engineered Fabrics - Introduction to Geosynthetics

PERSONAL DETAILS

Nationality – South African
Date of Birth – 1989-12-20
Domicile – Durban, South Africa

Languages
English – Excellent

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

	(For official use only)
File Reference Number:	
NEAS Reference Number:	DEA/EIA/
Date Received:	

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

PROJECT TITLE

Karreebosch 132kV Overhead Powerline and 33/132kV Substation

Kindly note the following:

1. This form must always be used for applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting where this Department is the Competent Authority.
2. This form is current as ofR 01 September 2018. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at https://www.environment.gov.za/documents/forms.
3. A copy of this form containing original signatures must be appended to all Draft and Final Reports submitted to the department for consideration.
4. All documentation delivered to the physical address contained in this form must be delivered during the official Departmental Officer Hours which is visible on the Departmental gate.
5. All EIA related documents (includes application forms, reports or any EIA related submissions) that are faxed; emailed; delivered to Security or placed in the Departmental Tender Box will not be accepted, only hardcopy submissions are accepted.

Departmental Details

Postal address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Private Bag X447
Pretoria
0001

Physical address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Environment House
473 Steve Biko Road
Arcadia

Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:
Email: EIAAdmin@environment.gov.za

1. SPECIALIST INFORMATION

Specialist Company Name:	JG Afrika (Pty) Ltd			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	1	Percentage Procurement recognition	
Specialist name:	Priantha Subrayen			
Specialist Qualifications:	BSc Hons Geological Sciences (Engineering Geology)			
Professional affiliation/registration:	Pr.Sci. Nat (Registration Number 400066/16)			
Physical address:	1St Floor, Block C, One The Boulevard, Westway Office Park, Westvillle, Durban, 3629			
Postal address:	P.O Box 2726, Westway Office Park, Westville, Durban			
Postal code:	3635	Cell:		
Telephone:	031 275 5500	Fax:	031 265 8255	
E-mail:	SubrayenP@jgafrika.com			

2. DECLARATION BY THE SPECIALIST

I, _____Priantha Subrayen_____, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the Specialist

JG Afrika (Pty) Ltd

Name of Company:

15 July 2022

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, Priantha Subrayen, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist

JG Afrika (Pty) Ltd

Name of Company

15 July 2022

Date

Signature of the Commissioner of Oaths

COMMISSIONER OF OATHS
DAWN JANET BURGIN
9718/2 (R/O) KZN (PIETERMARITZBURG)
6 PIN OAK AVENUE, HILTON

15 July 2022

Date