SITE SENSITIVITY VERIFICATION REPORT (IN TERMS OF PART A OF THE ASSESSMENT PROTOCOLS PUBLISHED IN GN 320 ON 20 MARCH 2020)

PROPOSED NEW 132KV POWERLINE, 132KV SWITCHING STATION WITH A 33KV/132KV SUBSTATION AND RELATED INFRASTRUCTURE FOR THE AUTHORISED SUTHERLAND CLUSTER WIND ENERGY FACILITIES ON THE REMAINING EXTENT OF NOOITGEDACHT FARM 148, SUTHERLAND MAGISTERIAL DISTRICT, NORTHERN CAPE PROVINCE

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EXECUTIVE SUMMARY

South Africa Mainstream Renewable Power Developments (Pty) Ltd, is proposing the development of a short (< 2km) new 132kV powerline, 132kV switching station with a 33kV/132kV substation and related infrastructure for the authorised Sutherland Wind Energy Facility and adjoining Rietrug Wind Energy Facility, known as the Sutherland Cluster. The project area is situated on the Remaining Extent of Nooitgedagt Farm 148 in the Sutherland Magisterial District of the Northern Cape. Two separate Basic Assessment Application processes for the proposed WEF electrical infrastructure will be carried out concurrently, respectively relating to (1) the on-site 33 / 132kv substation and associated grid infrastructure (including transformer) and (2) the on-site 132kv Switching Station, 132kV power line and associated grid infrastructure. The present palaeontological Site Sensitivity Verification Report contributes to both Basic Assessments.

The electrical infrastructure project area is underlain by fluvial sediments of the upper Abrahamskraal Formation (Lower Beaufort Group, Karoo Supergroup) of Middle Permian age that are associated elsewhere with diverse continental biotas of the *Tapinocephalus* Assemblage Zone. A scatter of palaeontological sites – including skeletal material of large- and small-bodied tetrapods, poorly-preserved fossil wood and several tetrapod burrows – have recently been recorded from Nooitgedacht Farm 148 but the fossils have generally been found within mudrock facies which do not crop out at surface within the present project area. No fossils were recorded from the combined substation and powerline corridor project areas during a one-day site visit, either from the sandstone bedrocks or from the overlying unconsolidated superficial sediments (surface gravels, sands *etc*). **It is concluded that the project area is generally of LOW palaeosensitivity. The DFFE-based palaeosensitivity mapping inferring a Very High palaeosensitivity is accordingly *contested* here.** However, the potential for rare, largely unpredictable fossil sites of high scientific and / or conservation value at surface or in the subsurface cannot be entirely discounted.

Given the similar underlying geology (and hence palaeontology) in all cases, there are no preferences on palaeontological heritage grounds for either one of the two on-site 33kV/132kV substation or 132kV switching station locations for any specific powerline corridor option under consideration, all of which are of LOW palaeosensitivity.

There are no objections on palaeontological heritage grounds to the authorisation of the Sutherland WEF Cluster electrical infrastructure projects covered by the two Basic Assessment processes. Pending the discovery of significant new fossil finds before or during construction, no further specialist palaeontological studies, monitoring or mitigation are recommended for these projects.

The ECO / ESO responsible for the developments should be alerted to the possibility of scientifically important fossil remains being found on the surface or exposed by fresh excavations during construction. Should substantial fossil remains be discovered, these should be safeguarded (preferably *in situ*) and the ECO / ESO should alert the South African Heritage Resources Agency (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Phone: +27 (0)21 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za). This is so that appropriate mitigation (*e.g.* recording, sampling or collection) can be taken by a qualified palaeontologist. The Chance Fossil Finds Protocol tabulated in Appendix 2 should be incorporated into the relevant EMPrs and fully implemented during the construction phase of the electrical infrastructure developments.

1. INTRODUCTION

South Africa Mainstream Renewable Power Developments (Pty) Ltd, is proposing the development of a new 132kV powerline, 33kV/132kV substation with a 132kV switching station and related infrastructure for the authorised Sutherland Wind Energy Facility (DEA Ref:. 12/12/20/1782/2) and adjoining Rietrug Wind Energy Facility (DEA Ref:. 12/12/20/1782/1) (WEFs), known as the Sutherland Cluster. The new 132kV powerline will connect the proposed new on-site substation to the authorised electrical grid infrastructure (DEA Ref: 14/12/16/3/3/1/2077) that runs to the proposed Koring Main Transmission Substation and traverses the boundary between the Northern Cape and Western Cape Provinces. The proposed new grid connection infrastructure will be situated on the Remaining Extent of Nooitgedacht Farm 148 (Figs. 1 & 4) in the Sutherland Magisterial District of the Northern Cape. It will lie within the already authorised Rietrug WEF and Sutherland WEF sites which are located within the gazetted Komsberg REDZ and the Central Power Corridor.

According to the DFFE screening tool, the new substation, switching station and powerline project areas are of Very High palaeosensitivity (Figs. 20 & 21). In accordance with Appendix 6 of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) Environmental Impact Assessment (EIA) Regulations of 2014, a combined field-based and desktop site sensitivity verification has therefore been undertaken in order to confirm or contest the environmental sensitivity of the proposed project area as identified by the DFFE National Web-Based Environmental Screening Tool. The present palaeontological heritage Site Sensitivity Verification Report will contribute to two separate Basic Assessment Application processes for the proposed WEF electrical infrastructure which will be carried out concurrently, *viz*:

1. On site 33 / 132kv substation and associated grid infrastructure (including transformer);

2. On site 132kv Switching Station, 132kV power line and associated grid infrastructure.

Full details of the infrastructure concerned for each of the two development components are provided in Appendix 1. The purpose for undertaking separate Basic Assessment Application processes is to facilitate the transfer of responsibility of the Environmental Authorisation and EMPrs to the relevant responsible party - *i.e.* - Eskom following construction.

The independent EAP responsible for the two Basic Assessment Processes is Ms Arlene Singh of Nala Environmental Consultants (Address: Corner of Old Pretoria Main Road & Maxwell Drive, Waterfall, Johannesburg, 2090.Tel: +27 84 277 7074. E-mail: Arlene@veersgroup.com).

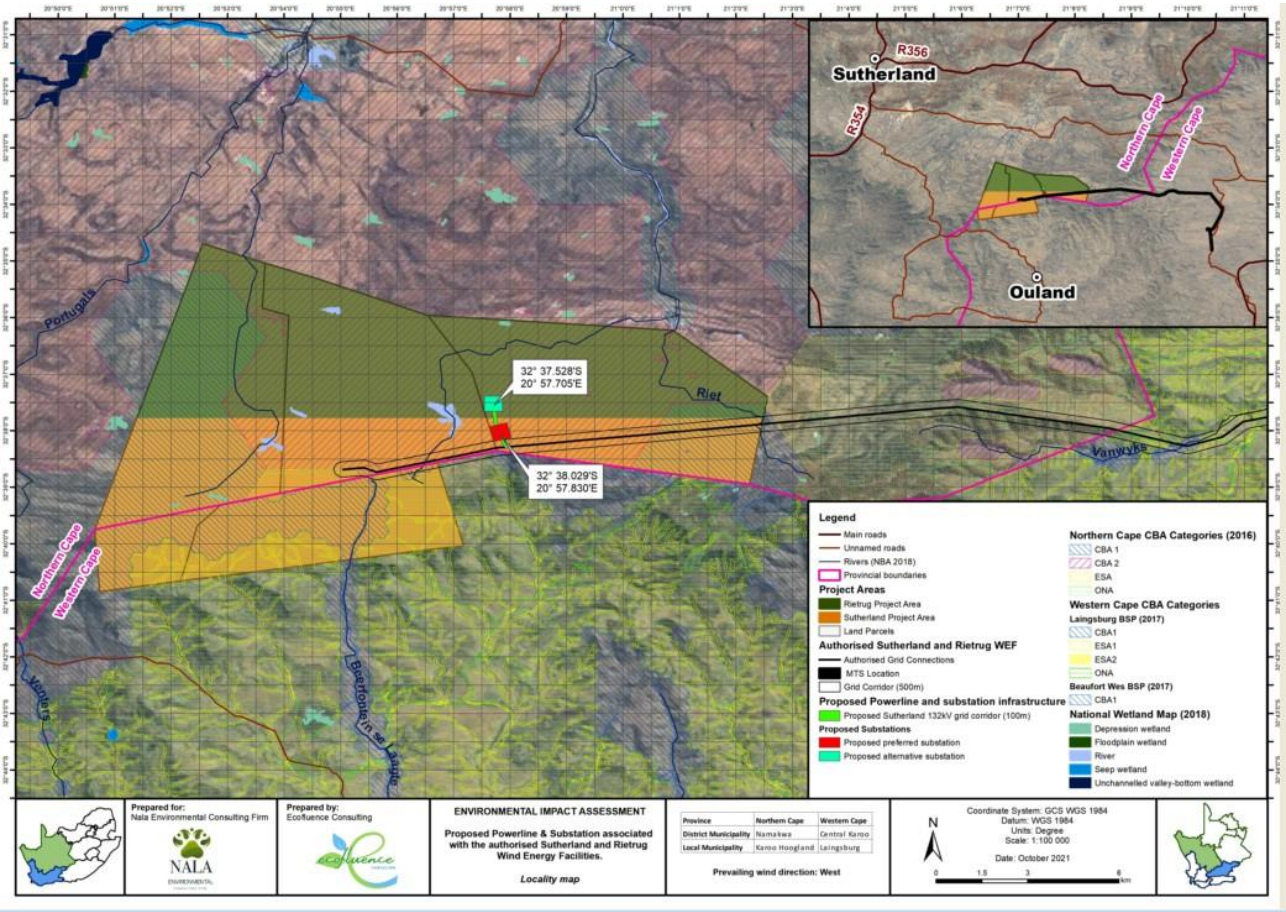

Figure 1: Map showing the location of the new Sutherland WEF Cluster on-site 33kV/132ksubstation, switching station alternatives and powerline project area (pale blue and red polygons), situated close to the Komsberg Escarpment on the Remaining Extent of Nooitgedacht Farm 148, Sutherland Magisterial District, Northern Cape. The adjoining Rietrug WEF and Sutherland WEF project areas are shown in grey-green and orange respectively (Image provided by Nala Environmental Consultants).

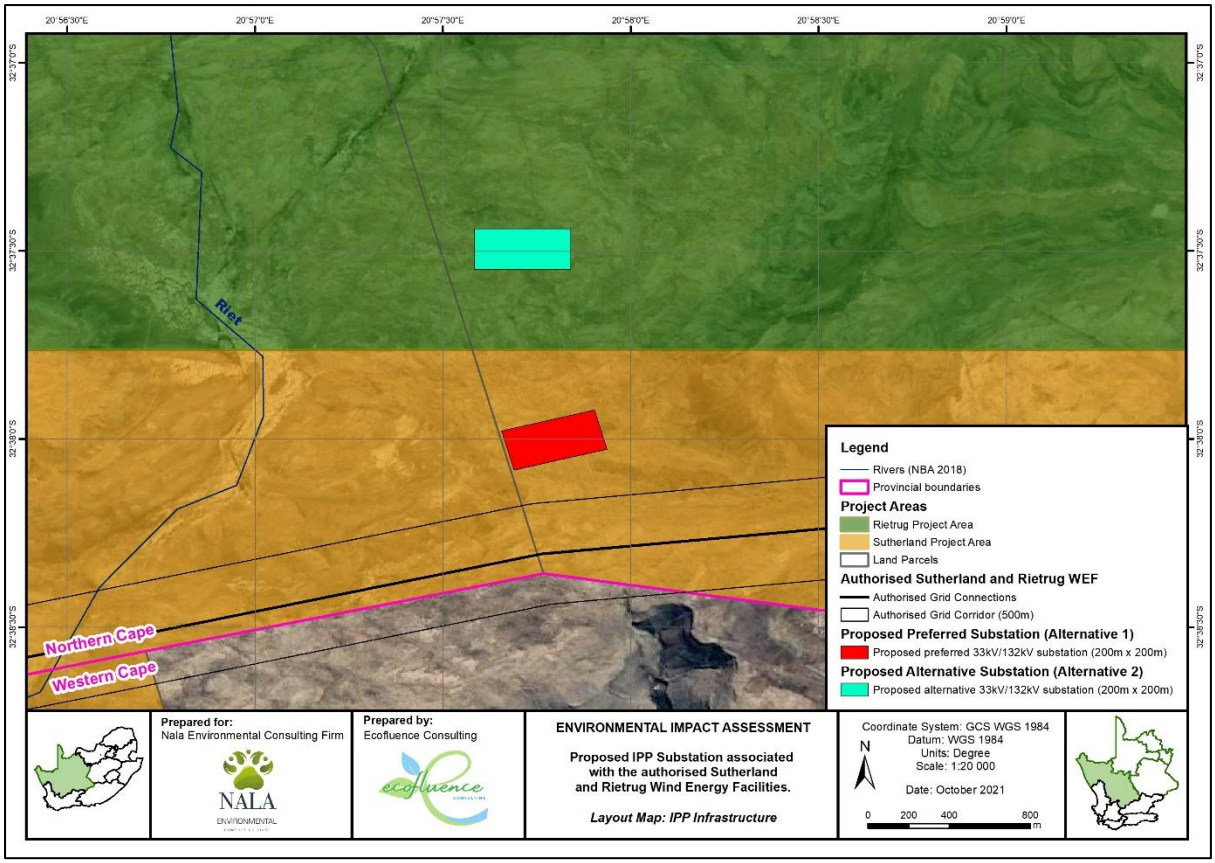

Figure 2: Proposed 33kV/132kV substation alternatives (IPP infrastructure). The substation footprint will house the Battery Energy Storage System (BESS), O&M Building and Laydown Area

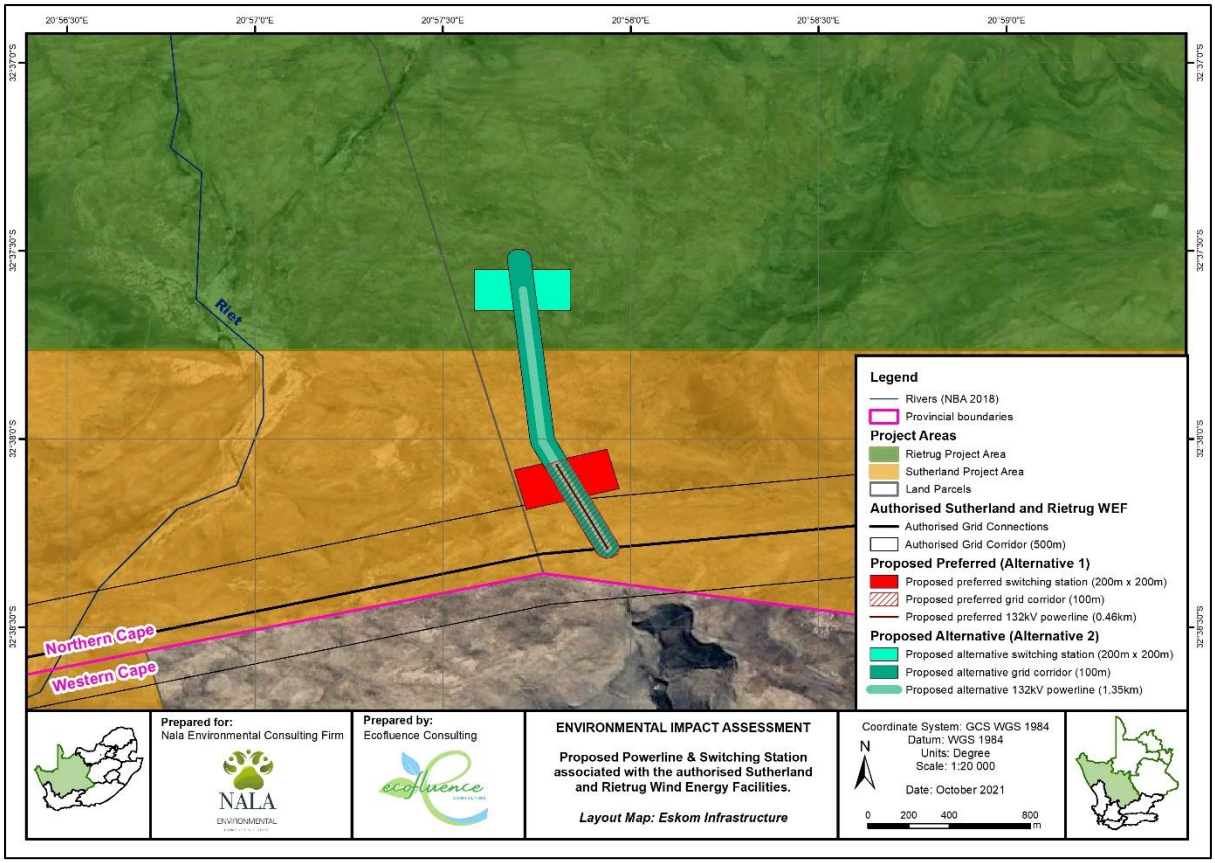

Figure 3. Proposed 132kV substation and 132kV powerline alternatives (proposed Eskom infrastructure)

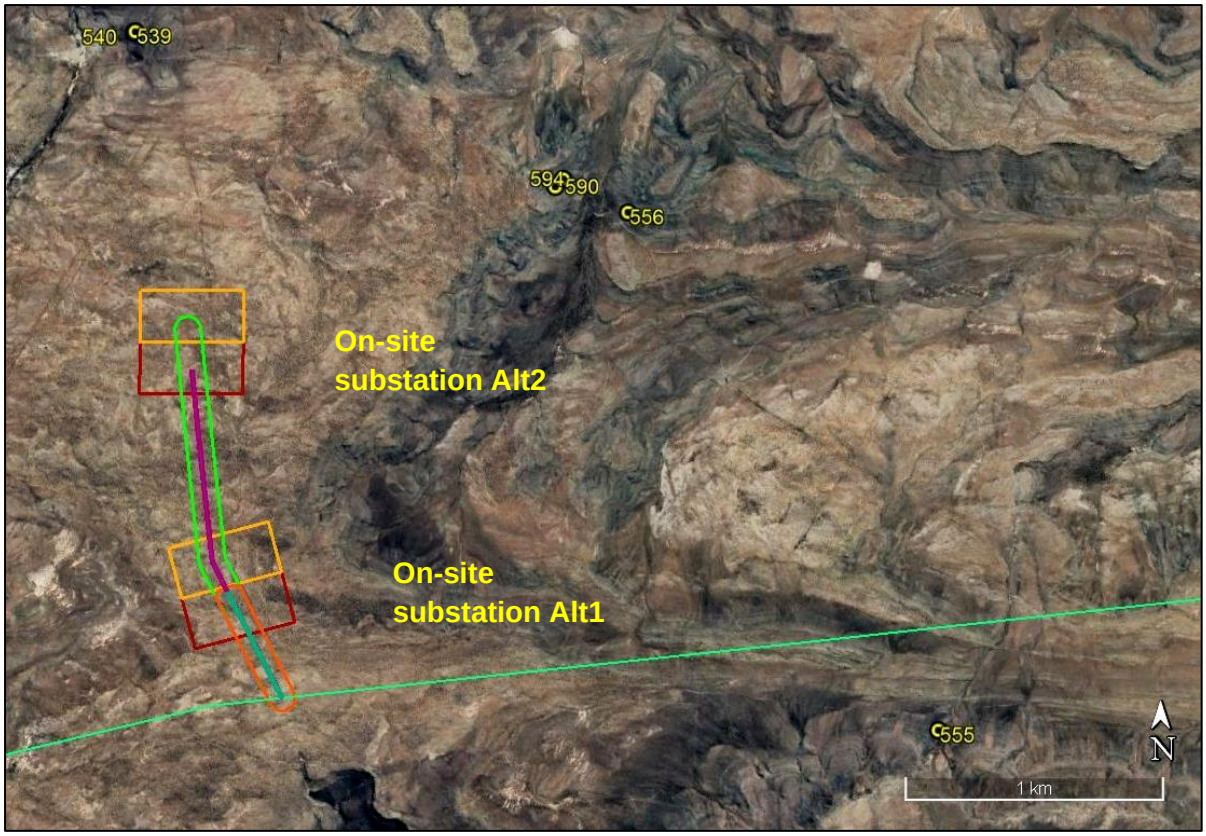

Figure 4: Google Earth© satellite image of the Sutherland WEF Cluster electrical infrastructure project area on the Remaining Extent of Nooitgedacht Farm 148 near Sutherland. Two site options for the on-site substation are indicated, within each of which an Eskom switching station component (brown) and IPP 33kV / 132 kV component (orange) are differentiated. Associated 132 kV powerline corridor options are shown in orange (Alt1, preferred) and green (Alt2). The numbered yellow circles are fossil sites recorded on Nooitgedacht Farm 148 during the recent and previous palaeontological site visits.

2. DATA SOURCES

The palaeontological heritage site sensitivity verification report for the proposed Sutherland WEF Cluster electrical infrastructure is based on:

- Detailed project descriptions, maps, kmz files, screening reports and other relevant background documentation provided by Nala Environmental Consultants.

- A desktop review of (a) 1:50 000 scale topographic map 3220DB Komsberg and the 1:250 000 scale topographic map 3220 Sutherland, (b) Google Earth© satellite imagery, (c) published geological and palaeontological literature, including 1:250 000 geological maps (sheet 3220 Sutherland geological and metallogenic sheets) and the relevant sheet explanations (Theron 1983, Cole & Vorster 1999), as well as (d) previous desktop and field-based fossil heritage (PIA) assessments for the Sutherland WEF Cluster projects (Almond 2017, 2019, 2021).

- A one day field survey of representative rock exposures within the electrical infrastructure project area and the vicinity by the author on 18 October 2021. The season of the site visit had no substantial influence on the field study.

3. GEOLOGICAL CONTEXT

The project area for the Sutherland WEF Cluster electrical infrastructure comprises low relief, gently undulating, rocky to sandy and gravelly terrain of the Roggeveld Plateau at elevations of *c*. 1600-1620 m amsl. It is situated close to slight elevated edge of Bontberg Escarpment – a sector of the Great Escarpment of southern Africa - and features scattered low ridges and outcrops of bare to bouldery sandstone, vegetated by sparse to dense, low karroid shrubby vegetation and grasses (Figs. 6 & 7).

The geology of the Roggeveld region to the southeast of Sutherland region is outlined on the 1: 250 000 scale geology sheet 3220 Sutherland (Theron 1983) (Fig. 5) as well as on the updated 1: 250 000 Sutherland metallogenic map that includes important new stratigraphic detail for the Lower Beaufort Group succession (Cole & Vorster 1999). The study area is entirely underlain by Middle Permian continental sediments of the **Lower Beaufort Group** (Adelaide Subgroup, Karoo Supergroup), and in particular the **Abrahamskraal Formation** (Pa) at the base of the Lower Beaufort Group succession (Johnson *et al.* 2006, Day & Rubidge 2014, Cole *et al.* 2016). According to the most recent geological mapping, the project area is underlain by the sandstone-dominated **Moordenaars Member** situated towards the top of the Abrahamskraal succession; the overlying, mudrock-dominated Karelskraal Member caps Boesmankop to the southeast. A series of W-E trending anticlines and synclines fold the Karoo Supergroup bedrocks in this region, as clearly shown on satellite images and the geological maps. No Karoo dolerite or younger (Cretaceous) intrusions are mapped within the present study region. The Beaufort Group bedrocks within the study area are extensively overlain by unconsolidated Late Caenozoic **superficial deposits** such as eluvial gravels and various sandy to gravelly soils.

The geology of the rock units concerned in this portion of the Roggeveld Plateau have been described and illustrated, with extensive references, in previous PIA reports by the author (*cf* Almond 2017, 2019, 2021), to which the interested reader is directed. Representative exposures of the main rock units encountered within, as well as on the periphery of, the Sutherland WEF Cluster electrical infrastructure project area are illustrated below in Figures 8 to 18 with explanatory figure legends. The Moordenaars Member sandstones here are pale brown to yellowish brown, well-sorted, medium-grained and often friable. Scattered emergent exposures of channel sandstone within the project area show well-developed joint sets, corestone weathering, local development of karstic weathering features (crocodile-skin weathering, case hardening *etc*), exfoliation as well as lichen etching; many surfaces are patinated by living lichens. Jointed sandstone domes and floors are mantled with rounded corestones or scabby, platy sandstone clasts. Better bedrock sections on the periphery of the project area expose tabular-bedded channel sandstones, variously with horizontal, flaggy bedding or low-angle tabular cross sets. No good exposures of mudrock facies of the Mordenaars Member are seen within the project are itself. Dark grey-green to purple-brown mudrocks with horizons of ferruginous carbonate pedocrete concretions (palaeosols) and thin, ferruginised calcrete and mudflake breccio-conglomerates are visible in dissected terrain at lower elevations some 0.5 to 1.0 km to the east and northeast of the project area as well as in the steep slopes of Great Escarpment.

The Beaufort Group sandstone bedrocks within the project area are largely mantled by unconsolidated Late Caenozoic superficial deposits. These comprise eluvial (downwasted) gravels composed of sandstone corestones (up to boulder-sized, sometimes split by frost action or thermoclastis), coffee-brown ferruginised sandstone, vein quartz and ferricrete glaebules and also locally by loose quartz sands that have been reworked into low dunes by aeolian processes.

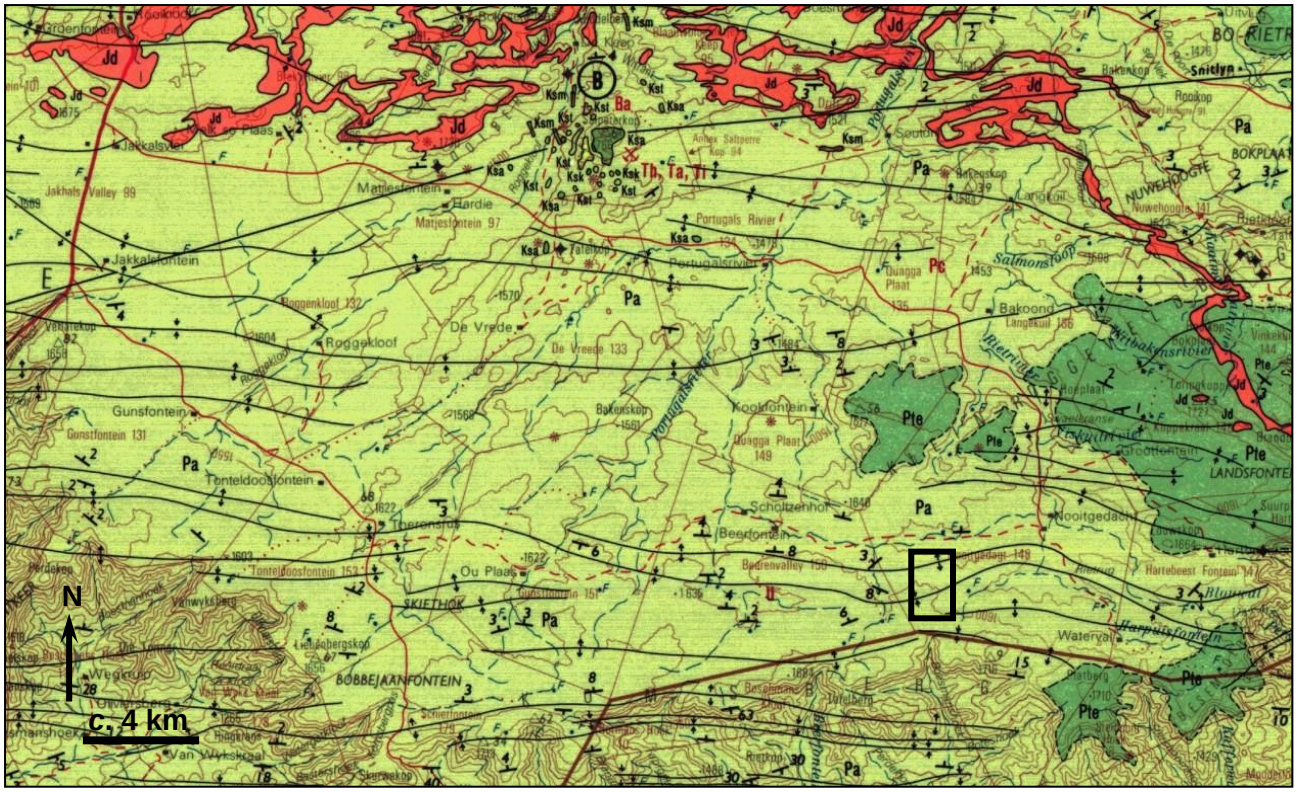

Figure 5: Extract from 1: 250 000 geological sheet 3220 Sutherland (Council for Geoscience, Pretoria) showing the approximate location of the Sutherland WEF Cluster electrical infrastructure project area (small black rectangle) to the north of the Great Escarpment in the Roggeveld Plateau region to the southeast of Sutherland. No historical fossil sites are mapped here. The main bedrock units represented in the broader study region include:
Pa (pale green) = Abrahamskraal Formation (Lower Beaufort Group) – Moordenarskaroo and Karelskraal Members
Pte (dark green) = Teekloof Formation (Lower Beaufort Group) – Poortjie Member
Jd (red) = Karoo Dolerite Suite
***N.B.* Late Caenozoic superficial deposits that are not mapped at 1: 250 000 scale also occur here, including alluvium, colluvium, eluvial surface gravels, sandy to gravelly soils and calcrete.**

Figure 6: Typical gently sloping, rocky terrain with scattered blocks and low outcrops of Moordenaars Member channel sandstone, looking due SE towards Boesmankop.

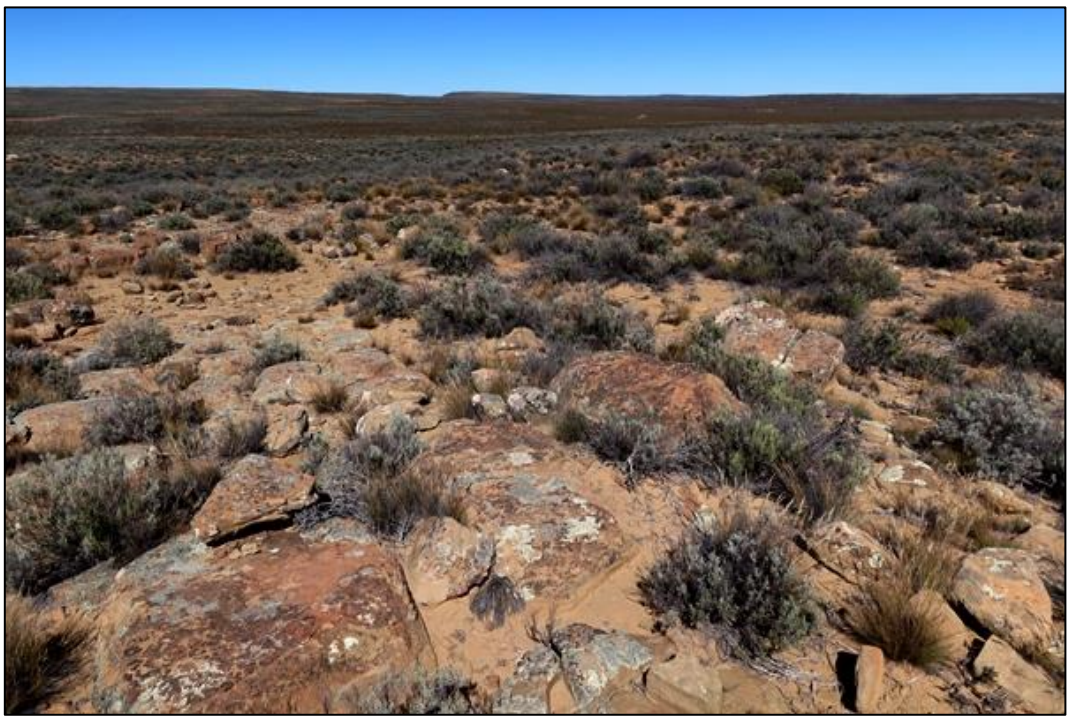

Figure 7: Rocky sandstone outcrop area with gently-sloping, gravelly *vlaktes* and karroid *bossieveld* beyond, viewed towards the elevated, dissected edge of the Bontberg Escarpment on the skyline.

Figure 8: Typical thinly- and horizontally-bedded tabular channel sandstone of the Moordenaars Member, seen here outside the project area (Hammer = 30 cm).

Figure 9: Low-angle, tabular cross sets within Moordenaars Member channel sandstones, here indicating palaeocurrents towards the southeast (Hammer = 30 cm).

Figure 10: Domal exposure of thick-bedded, resistant channel sandstone with well-developed, widely spaced joints.

Figure 11: Spalling-off or exfoliation of the sandstone surface, probably due to frost action / ice-wedging, to reveal fresh bedrock beneath (Hammer = 30 cm).

Figure 12: Crocodile-skin tessellation of sandstone surfaces due to karstic (solution) weathering (Hammer = 30 cm).

Figure 13: Typical patchwork of irregular, superficial depressions and ridges generated by biological weathering of sandstone by lichens (Scale in cm and mm).

Figure 14: Splitting of large, boulder-sized, subrounded corestones of sandstone caused by ice wedging, thermoclastis or even lightning strikes. Note extensive patination by lichens.

Figure 15: Eluvial mantle of subrounded, cobble-to boulder-sized sandstone corestones overlying a rocky or sandy surface.

Figure 16: Area of sandstone bedrock covered by spalled-off platy clasts of weathered, ferruginised sandstone.

Figure 17: Thin, unconsolidated sandy soils with sparse gravels cover large portions of the project area. They are probably of mixed eluvial, alluvial and aeolian origin.

Figure 18: Hackly-weathering, purple-brown overbank mudrocks of the Moordenaars Member underlying the channel sandstones that are represented within the project area. Such mudrock exposures, not represented at surface within the project area itself, contain pedocrete nodule horizons and intraclast breccias that are an important target for palaeontological recording.

4. PALAEONTOLOGICAL HERITAGE

The palaeontology of the Roggeveld Plateau region in the vicinity of the Sutherland WEF Cluster project area has been outlined with extensive references in recent PIA reports by Almond (2017, 2019, 2021). Fossil biotas represented within the project area are referred to the late Middle Permian (Capitanian) ***Tapinocephalus* Assemblage Zone** (AZ) (Rubidge 1995, Smith *et al.* 2012, Day & Rubidge 2020). More specifically, the upper part of the Abrahamskraal succession, including the Moordenaars and Karelskraal Members, is characterised by fossil biotas of the recently defined ***Diictodon – Styracocephalus* Subzone** which extends into the lower part of the Poortjie Member and has an estimated age of 262-260 Ma, *i.e.* late Capitanian (Day & Rubidge 2020). Impoverishment of fossil assemblages, notably with few dinocephalians, within the upper part of the subzone (largely above the Moordenaars Member) are associated with the catastrophic, global end-Capitanian ecological crisis and Mass Extinction Event (*cf* Day *et al.* 2015).

No historical fossil sites are indicated in the project area on the published 1: 250 000 geological map (Fig. 5). A sparse scatter of fossil sites have been mapped within mudrock facies of the Moordenaars and Karelskraal Members of the Abrahamskraal Formation on Nooitgedacht Farm 148 by Almond (2012) as well as during the recent site visit (See numbered localities on satellite map in Figure 4; Figs. 19 to 21 show some of the more recently recorded material). These Middle Permian fossils comprise weathered-out concentrations of large tetrapod (dinocephalian / pareiasaur) postcranial material, often highly weathered and sun-cracked, a fragmentary skull of a small dicynodont, unidentifiable disarticulated rolled bones and poorly-preserved fossil wood within ferruginised floodplain pond breccias as well as several tetrapod burrow casts. However, none of these sites lies within or close to the present project area where fossiliferous mudrocks are not exposed at surface.

No fossil remains were recorded within the present electrical infrastructure project area during the recent site visit, either within the Abrahamskraal Formation bedrocks or from the overlying superficial sediments. It is concluded that the project area is of LOW palaeosensitivity overall but the possibility of rare fossil sites of scientific or conservation importance here, at surface or in the subsurface, cannot be completely discounted.

Figure 19: Example of disarticulated, fragmentary fossil bones of a large-bodied tetrapod (dinocephalian or pareiasaur) encountered at surface in the Moordenaars Member outcrop area, in this case *c*. 1.4 km ENE of the present project area, Farm Nooitgedagt 148 (32 37 13.1 S, 20 58 37 E) (Scale in cm).

Figure 20: Blocks of ferruginous floodplain pond or channel breccia containing rusty-brown moulds of fossil wood from the same locality as the previous figure (scale in cm).

Figure 21: Float blocks of ferruginous floodplain pond breccia containing fragmentary reworked fossil bones (pale grey), Farm Nooitgedagt 148 (32 37 11.7 S, 20 58 38.8 E) (Scale in cm). This sort of fossil material is usually unidentifiable and of limited scientific value.

5. SITE SENSITIVITY VERIFICATION

Site sensitivity maps for palaeontological heritage prepared by Nala Environmental Consulting using the DFFE National Web-Based Environmental Screening Tool suggest that the Sutherland WEF Cluster electrical infrastructure project area is largely of Very High Palaeosensitivity (Figs. 22-25).

Based on several previous desktop and field-based PIA studies in the Sutherland Cluster project area (Almond 2017, 2019, 2021), as well as the recent one-day site visit when no fossils were recorded within the project area, it is concluded that this is generally of LOW palaeosensitivity. The DFFE-based palaeosensitivity mapping is accordingly *contested* here. However, the potential for rare, largely unpredictable fossil sites of high scientific and / or conservation value at surface or in the subsurface cannot be entirely discounted.

Figure 22. Palaeontological sensitivity map for the alternative 33kV/132kV on-site substation alternatives for the Sutherland Cluster on-site substation project areas (blue dotted polygons), abstracted from the DFFE Screening Report prepared by Nala Environmental Consulting. The substation project areas are designated Very High Sensitivity here, based on the presence of potentially fossiliferous Beaufort Group bedrocks. This sensitivity mapping is contested in this report.

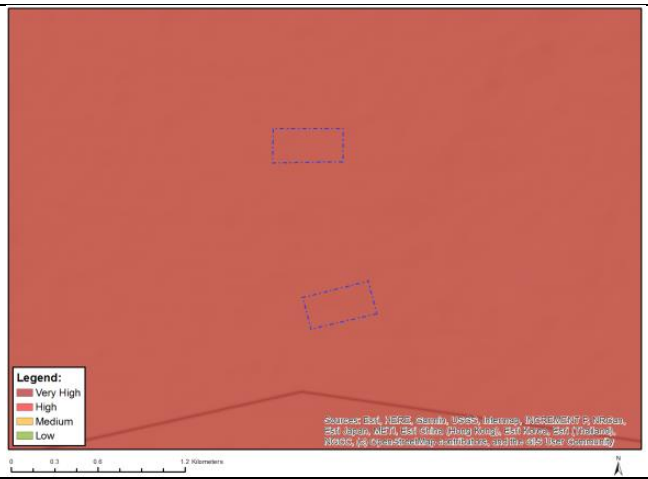

Figure 23. Palaeontological sensitivity map for the alternative 132kV switching station in-site alternatives for the Sutherland Cluster on-site substation project areas (blue dotted polygons), abstracted from the DFFE Screening Report prepared by Nala Environmental Consulting. The substation project areas are designated Very High Sensitivity here, based on the presence of potentially fossiliferous Beaufort Group bedrocks. This sensitivity mapping is contested in this report.

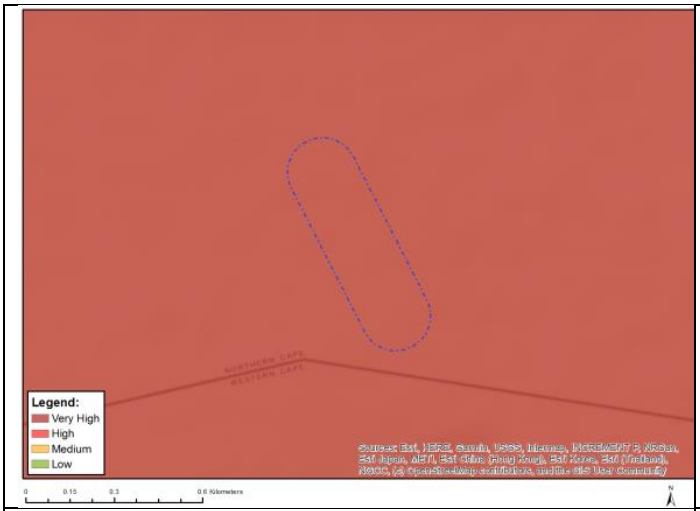

Figure 24: Palaeontological sensitivity map for the combined Sutherland Cluster 132 kV powerline corridor alternative 1 (preferred) project area (blue dotted polygon), abstracted from the DFFE Screening Report prepared by Nala Environmental Consulting. The powerline project area is designated Very High Sensitivity here, based on the presence of potentially fossiliferous Beaufort Group bedrocks. This sensitivity mapping is contested in this report.

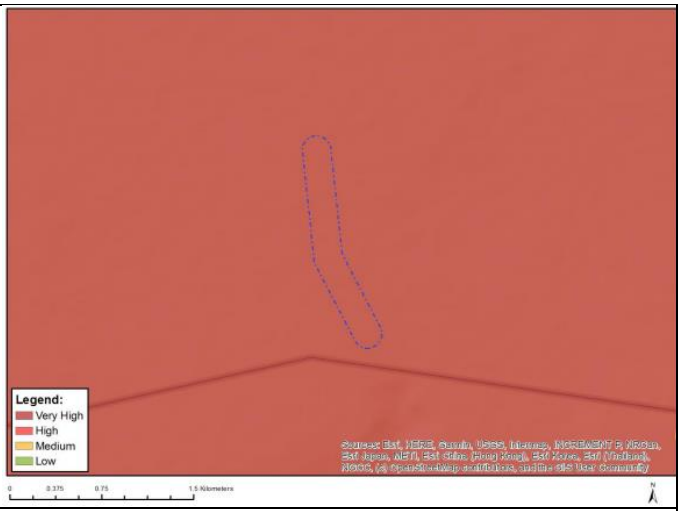

Figure 25: Palaeontological sensitivity map for the combined Sutherland Cluster 132 kV powerline corridor alternative 2 project area (blue dotted polygon), abstracted from the DFFE Screening Report prepared by Nala Environmental Consulting. The powerline project area is designated Very High Sensitivity here, based on the presence of potentially fossiliferous Beaufort Group bedrocks. This sensitivity mapping is contested in this report.

6. CONCLUSIONS

The Sutherland WEF Cluster electrical infrastructure project area is underlain by fluvial sediments of the Abrahamskraal Formation (Mordenaars Member) that are known to contain important Middle Permian fossils of the *Tapinocephalus* Assemblage Zone in the Main Karoo Basin. No fossils were recorded from the combined substation and powerline corridor project areas during a one-day site visit, either from the sandstone bedrocks or the overlying unconsolidated superficial sediments (surface gravels, sands *etc*). It is concluded that the project area is generally of LOW palaeosensitivity. **The DFFE-based palaeosensitivity mapping inferring a Very High palaeosensitivity is accordingly *contested* here**. However, the potential for rare, largely unpredictable fossil sites of high scientific and / or conservation value at surface or in the subsurface cannot be entirely discounted.

Given the similar underlying geology (and hence palaeontology) in all cases, there are no preferences on palaeontological heritage grounds for either one of the two 33kV/132kV on-site substation or 132kV switching station locations of for any specific powerline corridor option under consideration, all of which are of LOW palaeosensitivity.

Bprojects covered by the two Basic Assessment processes. Pending the discovery of significant new fossil finds before or during construction, no further specialist palaeontological studies, monitoring or mitigation are recommended for these projects.

The ECO / ESO responsible for the developments should be alerted to the possibility of scientifically important fossil remains being found on the surface or exposed by fresh excavations during construction. Should substantial fossil remains be discovered, these should be safeguarded (preferably *in situ*) and the ECO / ESO should alert the South African Heritage Resources Agency (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Phone: +27 (0)21 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za). This is so that appropriate mitigation (*e.g.* recording, sampling or collection) can be taken by a qualified palaeontologist. The Chance Fossil Finds Protocol tabulated in Appendix 2 should be incorporated into the relevant EMPrs and fully implemented during the construction phase of the electrical infrastructure developments.

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8. JOHN ALMOND SHORT CV

Dr John Almond has an Honours Degree in Natural Sciences (Zoology) as well as a PhD in Palaeontology from the University of Cambridge, UK. He has been awarded post-doctoral research fellowships at Cambridge University and the University of Tübingen in Germany, and has carried out palaeontological research in Europe, North America, the Middle East as well as North and South Africa and Madagascar. For eight years he was a scientific officer (palaeontologist) for the Geological Survey / Council for Geoscience in the RSA. His current palaeontological research focuses on fossil record of the Precambrian - Cambrian boundary and the Cape Supergroup of South Africa. He has recently written palaeontological reviews for several 1: 250 000 geological maps published by the Council for Geoscience and has contributed educational material on fossils and evolution for new school textbooks in the RSA.

Since 2002 Dr Almond has also carried out numerous palaeontological impact assessments for developments and conservation areas in the Western, Eastern and Northern Cape, Limpopo, Northwest Province, Mpumalanga, Gauteng, KwaZulu-Natal and the Free State under the aegis of his Cape Town-based company *Natura Viva* cc. He has served as a member of the Archaeology, Palaeontology and Meteorites Committee for Heritage Western Cape (HWC) and an advisor on palaeontological conservation and management issues for the Palaeontological Society of South Africa (PSSA), HWC and SAHRA. He is currently compiling technical reports on the provincial palaeontological heritage of Western, Northern and Eastern Cape for SAHRA and HWC. Dr Almond is an accredited member of PSSA and APHP (Association of Professional Heritage Practitioners – Western Cape).

Declaration of Independence

I, John E. Almond, declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed development project, application or appeal in respect of which I was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of my performing such work.

Dr John E. Almond
Palaeontologist
***Natura Viva* cc**

APPENDIX 1: DETAILED PROJECT DESCRIPTION (provided by Nala Environmental Consultants)

South Africa Mainstream Renewable Power Developments (Pty) Ltd, is proposing the development of a new 132kV powerline, 132kV substation and related infrastructure for the authorised Sutherland (DEA Ref:. 12/12/20/1782/2) and Rietrug (DEA Ref:. 12/12/20/1782/1) Wind Energy Facilities (WEFs) known as the Sutherland Cluster. The new 132kV powerline will connect the proposed new substation to the authorised electrical grid infrastructure (DEA Ref:. 14/12/16/3/3/1/2077) that runs to the proposed Koring Main Transmission Substation located between the Northern Cape and Western Cape Provinces. The proposed new grid connection infrastructure will be situated within the already authorised Rietrug WEF and Sutherland WEF sites, which is located within the Komsberg REDZ and the Central Power Corridor.

Two Basic Assessment Application processes will be carried out and run concurrently:

1. On site 33 / 132kv substation and associated grid infrastructure (including transformer);
2. On site 132kv Switching Station, 132kV power line and associated grid infrastructure.

The purpose for undertaking separate Basic Assessment Application processes is to facilitate the transfer of responsibility of the Environmental Authorisation and EMPrs to the relevant responsible party following construction i.e. Eskom

Infrastructure associated with the IPP is as follows:

- 33kV underground Powerline that will connect to the IPP portion of the onsite 33kV/132kV substation;
- A 33kV/132kV IPP substation that will contain transformers for voltage step up from low voltage (33kV) to medium voltage (132kV);
- This 132kV substation will have a footprint of 200m x 200m
- The IPP Portion of the substation footprint will include :
    - A Battery Energy Storage System (BESS) with a footprint of 2ha in extent with an export capacity of approximately 500KWh and a total storage capacity of 100MW.
    - A laydown area with a footprint of 100m x 100m in extent;
    - An O&M Building with a footprint of 100m x 100m in extent

Infrastructure	Details
Double circuit powerline	33kV Powerline to the IPP Portion of the substation.
Powerline capacity	33kV
Powerline corridor width	A 100m wide grid connection corridor is being assessed within which the grid connection infrastructure will be constructed and operated.
Powerline servitude	36m
IPP 33kV/132kV Substation Alternative 1 Alternative 2	The IPP portion of the 132kV substation will have a footprint of 200m x 200m in extent. Alternative 1 (Preferred) – The substation will be located within the authorised Sutherland WEF. Alternative 2 – The substation will be located within the authorised Rietrug WEF.
Battery Energy Storage Infrastructure (BESS)	The BESS will be located within the substation footprint and have a footprint of 2ha. The BESS technology will consist of Lithium Ion Batteries with an export capacity of approximately 500KWh and a total storage capacity of 100MW.
O&M Building	The O&M Building will be located within the footprint of the substation and will have a footprint 100m x 100m in extent.
Laydown area	The laydown area will be located within the footprint of the substation and will have a footprint of 100m x 100m.

Infrastructure associated with the Eskom Portion are as follows:

- A 132kV Switching Station (Eskom portion of the onsite ss) with a footprint of 200m x 200m.
- A new 132kV powerline that will be located on Remaining Extent of Nooitgedacht Farm 148.
- The length of the proposed powerline is approximately 0,46km - 1,35km long based on the alternatives with a 100m assessment corridor.
- The proposed new 132kV powerline will connect the onsite substation to the authorised electrical grid infrastructure that connects to the Koring Main Transmission Substation in the Western Cape Province.
- Development of access tracks up to 4m wide within the powerline corridor to enable construction and maintenance activities.

Infrastructure	Details
Double circuit powerline	132kV Powerline from the Switching Station to the authorised grid connection infrastructure.
Powerline capacity	132kV
Powerline corridor width	A 100m wide grid connection corridor is being assessed within which the grid connection infrastructure will be constructed and operated.
132kV Powerline length (alternative 1- Preferred)	0,46km – the powerline will start at the proposed 132kV switching station (alternative 1) located within the authorised Sutherland WEF within a 100m assessment corridor and traverse in a southerly direction connecting to the authorised grid connection for the Sutherland Cluster.
132kVPowerline length (alternative 2)	1,35km – the powerline will start at the proposed 132kV switching station (alternative 2) located within the authorised Rietrug WEF within a 100m assessment corridor and traverse in a southerly direction through the authorised Sutherland WEF and connect to the authorised grid connection for the Sutherland Cluster.
Powerline servitude	36m
Tower Height	32m
132kV switching station Alternative 1 (Preferred) Alternative 2	The switching station will have a footprint of 200m x 200m in extent. Alternative 1 (Preferred) – The proposed switching station will be located within the authorised Sutherland WEF. Alternative 2 - – The proposed switching station will be located within the authorised Rietrug WEF.
Access Roads	Access tracks up to 4m wide will be required along the corridor of the 132kV powerline

Alternatives for Basic Assessment report 1:

1) IPP Portion (33kV underground PL, IPP Portion of 33kV/132kV Substation, BESS, Laydown Area & O&M Building):

Preferred Alternative:

- 33Kv underground powerline will connect the wind energy facilities to the IPP portion of the 33kV/132kV substation.
- 132kV IPP Substation Alternative 1 (Preferred Alternative):
  - A 33kV/132kV IPP Portion of the substation is proposed to be located within the authorised Sutherland WEF site. The substation footprint is approximately 200m x 200m and will house the O&M Buildings, Laydown area and BESS infrastructure. The proposed location of the IPP portion of the 33kV/ 132kV substation will allow for the Direct Current (DC) power from the authorised Rietrug Wind Farm (12-12-20-1782-1) and Sutherland Wind Farm (12-12-20-1782-2) will be converted into Alternating Current (AC) power in the inverters and the voltage will be stepped up to medium voltage in the inverter transformers. As the location of the 33kV/132kV IPP substation is located within the authorised Sutherland WEF site, it avoids environmentally sensitive areas, provides suitable terrain and is deemed as technically feasible from an engineering perspective. Therefore this alternative has been selected as the preferred alternative.

Alternative 2:

- 33kV underground Powerline will connect the wind energy facility to the IPP portion of the 33kV/132kV substation.
- 132KV IPP Substation Alternative 2:
    - The proposed IPP portion of the 33kv/132kV substation is proposed to be located within the authorised Riertrug WEF site. The substation footprint is approximately 200m x 200m and will house the O&M Buildings, laydown area and BESS infrastructure. The proposed location of the IPP portion of the 33kV/ 132kV substation will allow for the Direct Current (DC) power from the authorised Rietrug Wind Farm (12-12-20-1782-1) and Sutherland Wind Farm (12-12-20-1782-2) will be converted into Alternating Current (AC) power in the inverters and the voltage will be stepped up to medium voltage in the inverter transformers. As the location of the proposed substation is within the authorised Rietrug WEF site it allows for the avoidance of sensitive environmental areas.

Co-ordinates for Basic Assessment report 1 (33kV underground PL, 33kV/132kV Substation , Laydown area, O&M Building, BESS):

33kV/132kV Substation (Alternative 1)- preferred alternative

Corner Co-ordinates	Latitude	Longitude
Corner 1	32°37'58.74"S	20°57'39.35"E
Corner 2	32°37'55.47"S	20°57'54.13"E
Corner 3	32°38'1.64"S	20°57'56.17"E
Corner 4	32°38'4.91"S	20°57'41.34"E

33kV/132kV Substation (Alternative 2)

Corner Co-ordinates	Latitude	Longitude
Corner 1	32°37'26.54"S	20°57'35.12"E
Corner 2	32°37'26.58"S	20°57'50.34"E
Corner 3	32°37'32.92"S	20°57'50.40"E
Corner 4	32°37'32.90"S	20°57'35.10"E

Alternatives for the Basic Assessment Report 2:

2) 132kV Switching Station, 132kV Powerline and Access Road

132kV Powerline Alternative 1 (Preferred Alternative):

- The proposed 132kV double circuit power line will be located within the authorised Sutherland Wind Energy Facility site and will start at the proposed 132kV Switching Station alternative 1 (preferred substation alternative) and traverse in southerly direction for 0,46km before joining the authorised electrical grid infrastructure located to the south of the Sutherland WEF site that will allow for evacuation of electricity to the national grid. The design of the power line is required to conform to Eskom's technical standards as it will form part of the national electricity supply network and must therefore be in-line with the existing network systems, technology and infrastructure. The 100m wide grid connection corridor assessed within this BA process represents a technically feasible area for construction of the power line and allows for the avoidance of identified environmental sensitivities as much as possible through the appropriate placement of the power line footprint and servitude within this corridor. As this powerline alternative will only traverse a distance of 0,46km and serves as the shortest and most direct route to the authorised grid infrastructure, it is favoured as the preferred alternative from an environmental and engineering perspective.

132kV Powerline Alternative 2:

- The proposed 132kV double circuit powerline will traverse within both the authorised Rietrug Wind Energy Facility and the Sutherland Wind Energy Facility sites. The 132kV powerline will start at the proposed 132kV Switching Station (alternative 2) located within the authorised Rietrug Wind Energy Facility site and traverse in a southerly direction through the Sutherland Wind Energy Facility site to the authorised electrical grid infrastructure located to the south of Sutherland WEF site. The length of powerline alternative 2 is approximately 1,35km long. The design of powerline alternative 2 is in line with Eskoms technical standards and as it falls within the authorised wind energy facility sites allows for avoidance of identified environmental sensitivites as far as possible through the placement of the powerline footrprint within the 100m corridor. The powerline route traverses approximately 1,35km which is longer and more expensive to construct.

132kV Switching Station Alternative 1 (Preferred Alternative):

- The 132kV Switching Station is proposed to be located within the authorised Sutherland WEF site. The substation footprint is approximately 200m x 200m. The proposed location of the 132kV Switching Station will allow for the evacuation of electricity generated from the WEF via the new proposed 132kV powerline (alternative 1) to the authorised electrical grid connection infrastructure for the Sutherland Cluster of WEF (DEA Ref:. 14-12-16-3-3-1-2077). As the location of 132kV Switching Station is located within the authorised Sutherland WEF site avoids environmentally sensitivee areas and provides suitable terrain is deemed as technically feasible.Therefore, this alternative has been selected as the preferred alternative. The location of Alternative 1 Switching Station is favoured as it will also shorten the length of the 132kV powerline required to connect to the authorised electrical grid infrastructure therefore reducing the footprint and impacts on the surrounding environment.

132kV Switching Station Alternative 2:

- The 132kV Switching Station is proposed to be located within the authorised Riertrug WEF site. The substation footprint is approximately 200m x 200m. The proposed location of the 132kV Switching Station will allow for the evacuation of electricity generated from the WEF via the new proposed 132kV powerline (alternative 2) to the authorised electrical grid connection infrastructure for the Sutherland Cluster of WEF. (DEA Ref:. 14-12-16-3-3-1-2077). As the location of the proposed substation is within the authorised Rietrug WEF site it

allows for the avoidance of sensitive environmental areas. As the 132kV Switching Station (Alternative 2) is linked to powerline alternative 2, a longer powerline corridor will need to be developed (1,46km) resulting in an increased footprint.

Co-ordinates of the proposed new grid connection infrastructure

132kV Powerline co-ordinates (Alternative 1) preferred alternative:

	Latitude	Longitude
Start (Alternative 1 substation)	32°38'4.10"S	20°57'48.14"E
End	32°38'17.48"S	20°57'56.28"E

132kV Powerline co-ordinates (Alternative 2):

	Latitude	Longitude
Start (Alternative 2 substation)	32°37'36.43"S	20°57'42.78"E
Middle	32°38'0.51"S	20°57'45.92"E
End	32°38'17.48"S	20°57'56.28"E

132kV Switching Station (Eskom portion) (Alternative 1)- preferred alternative

Corner Co-ordinates	Latitude	Longitude
Corner 1	32°38'5.04"S	20°57'41.42"E
Corner 2	32°38'1.69"S	20°57'56.13"E
Corner 3	32°38'7.92"S	20°57'58.10"E
Corner 4	32°38'11.19"S	20°57'43.31"E

132kV Switching Station (Eskom portion) (Alternative 2)

Corner Co-ordinates	Latitude	Longitude
Corner 1	32°37'33.08"S	20°57'35.07"E
Corner 2	32°37'33.00"S	20°57'50.36"E
Corner 3	32°37'39.37"S	20°57'50.33"E
Corner 4	32°37'39.40"S	20°57'35.10"E

<table>
<tr><th colspan="3">Appendix 2: Sutherland WEF Cluster: on-site substation, 132 kV powerline and associated electrical infrastructure</th></tr>
<tr><td>Province & region:</td><td colspan="2">Northern Cape: Sutherland Magisterial District</td></tr>
<tr><td>Responsible Heritage Resources Agency</td><td colspan="2">SAHRA: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Phone: +27 (0)21 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za</td></tr>
<tr><td>Rock unit(s)</td><td colspan="2">Abrahamskraal Formation (Lower Beaufort Group), Late Caenozoic alluvium / eluvium / soils.</td></tr>
<tr><td>Potential fossils</td><td colspan="2">Fossil vertebrate bones, teeth, trace fossils, trackways, petrified wood, plant-rich beds in the Lower Beaufort Group bedrocks.
Fossil mammal bones, teeth, horn cores, freshwater molluscs, plant material, trace fossils in Late Caenozoic sediments.</td></tr>
<tr><td rowspan="5">ECO protocol</td><td colspan="2">1. Once alerted to fossil occurrence(s): alert site foreman, stop work in area immediately (N.B. safety first!), safeguard site with security tape / fence / sand bags if necessary.</td></tr>
<tr><td colspan="2">2. Record key data while fossil remains are still in situ:
• Accurate geographic location – describe and mark on site map / 1: 50 000 map / satellite image / aerial photo
• Context – describe position of fossils within stratigraphy (rock layering), depth below surface
• Photograph fossil(s) in situ with scale, from different angles, including images showing context (e.g. rock layering)</td></tr>
<tr><td>3. If feasible to leave fossils in situ:
• Alert Heritage Resources Agency and project palaeontologist (if any who will advise on any necessary mitigation
• Ensure fossil site remains safeguarded until clearance is given by the Heritage Resources Agency for work to resume</td><td>3. If not feasible to leave fossils in situ (emergency procedure only):
• Carefully remove fossils, as far as possible still enclosed within the original sedimentary matrix (e.g. entire block of fossiliferous rock)
• Photograph fossils against a plain, level background, with scale
• Carefully wrap fossils in several layers of newspaper / tissue paper / plastic bags
• Safeguard fossils together with locality and collection data (including collector and date) in a box in a safe place for examination by a palaeontologist
• Alert Heritage Resources Agency and project palaeontologist (if any) who will advise on any necessary mitigation</td></tr>
<tr><td colspan="2">4. If required by Heritage Resources Agency, ensure that a suitably-qualified specialist palaeontologist is appointed as soon as possible by the developer.</td></tr>
<tr><td colspan="2">5. Implement any further mitigation measures proposed by the palaeontologist and Heritage Resources Agency</td></tr>
<tr><td>Specialist palaeontologist</td><td colspan="2">Record, describe and judiciously sample fossil remains together with relevant contextual data (stratigraphy / sedimentology / taphonomy). Ensure that fossils are curated in an approved repository (e.g. museum / university / Council for Geoscience collection) together with full collection data. Submit Palaeontological Mitigation report to Heritage Resources Agency. Adhere to best international practice for palaeontological fieldwork and Heritage Resources Agency minimum standards.</td></tr>
</table>