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PART 2 ENVIRONMENTAL AUTHORISATION (EA) AMENDMENT PROCESS FOR THE KUDUSBERG WIND ENERGY FACILITY (WEF) NEAR SUTHERLAND, WESTERN AND NORTHERN CAPE PROVINCES- PALAEOLOGICAL IMPACT ASSESSMENT

1 BACKGROUND

**Information Provided by SiVEST Environmental Division*

Kudusberg Wind Farm (Pty) Ltd (hereafter referred to as “Kudusberg Wind Farm”) was issued with an Environmental Authorisation (EA) for the proposed construction of the 325MW Kudusberg Wind Energy Facility (WEF) and associated infrastructure, between Matjiesfontein and Sutherland in the Western and Northern Cape Provinces. The EA was granted on 25 March 2019 (DEFF Reference No.: 14/12/16/3/3/1/1976), and subsequently amended on 04 April 2019 to correct a minor naming error (14/12/16/3/3/1/1976/AM1).

The layout for the authorised Kudusberg WEF is presented in **Figure 1** below.

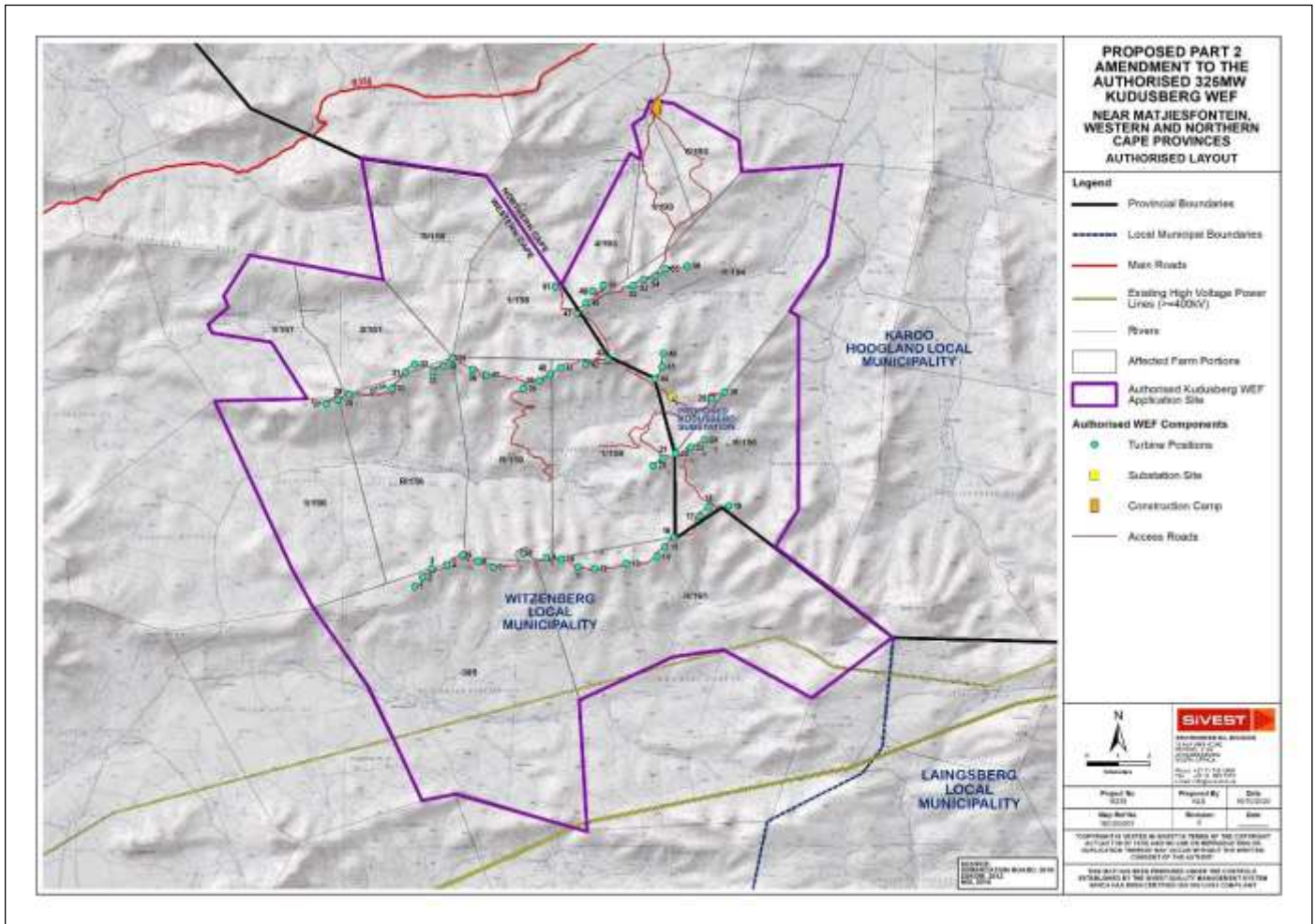


Figure 1: Layout map for authorised Kudusberg WEF (14/12/16/3/3/1/1976/AM1)

Kudusberg Wind Farm is now proposing to submit a Part 2 EA Amendment Application to split the authorised Kudusberg WEF (14/12/16/3/3/1/1976/AM1) into two (2) separate smaller WEF projects, namely the Kudusberg WEF and Oya WEF, which will result in a number of technical and administrative changes detailed below in **Table 1**. The split is being proposed to allow the projects to be suitable for numerous opportunities such as either the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), Risk Mitigation Independent Power Producer Procurement Programme (RMIPPPP), other government run procurement programmes that may arise or for sale to private entities, if enabled and/or required in the drive for energy security in South

Africa.

Following the split, the northern section of the authorised WEF will become the Oya WEF (**Figure 2**), while the southern section of the authorised WEF will remain known as the Kudusberg WEF (authorised under 14/12/16/3/3/1/1976/AM1) (**Table 1**) (**Figure 3**). In addition to the split, the final layout for the Oya WEF is being submitted which has been informed by detailed specialist walk-throughs and on-site micro-siting as per condition 29 of the Kudusberg EA¹.

The respective layouts for the proposed Kudusberg WEF (southern section of the authorised WEF) and Oya WEF (northern section of the authorised WEF) are presented in **Figure 2** and **Figure 3** below.

¹ Condition 29 of Kudusberg EA [DEFF Ref: 14/12/16/3/3/1/1976/AM1 – Page 15 of EA (page 17 of full document)]: *the final placement of turbines must follow a micro siting procedure involving a walk-through and identification of any sensitive areas by ecological, avifaunal, bat, surface water and heritage specialists.*

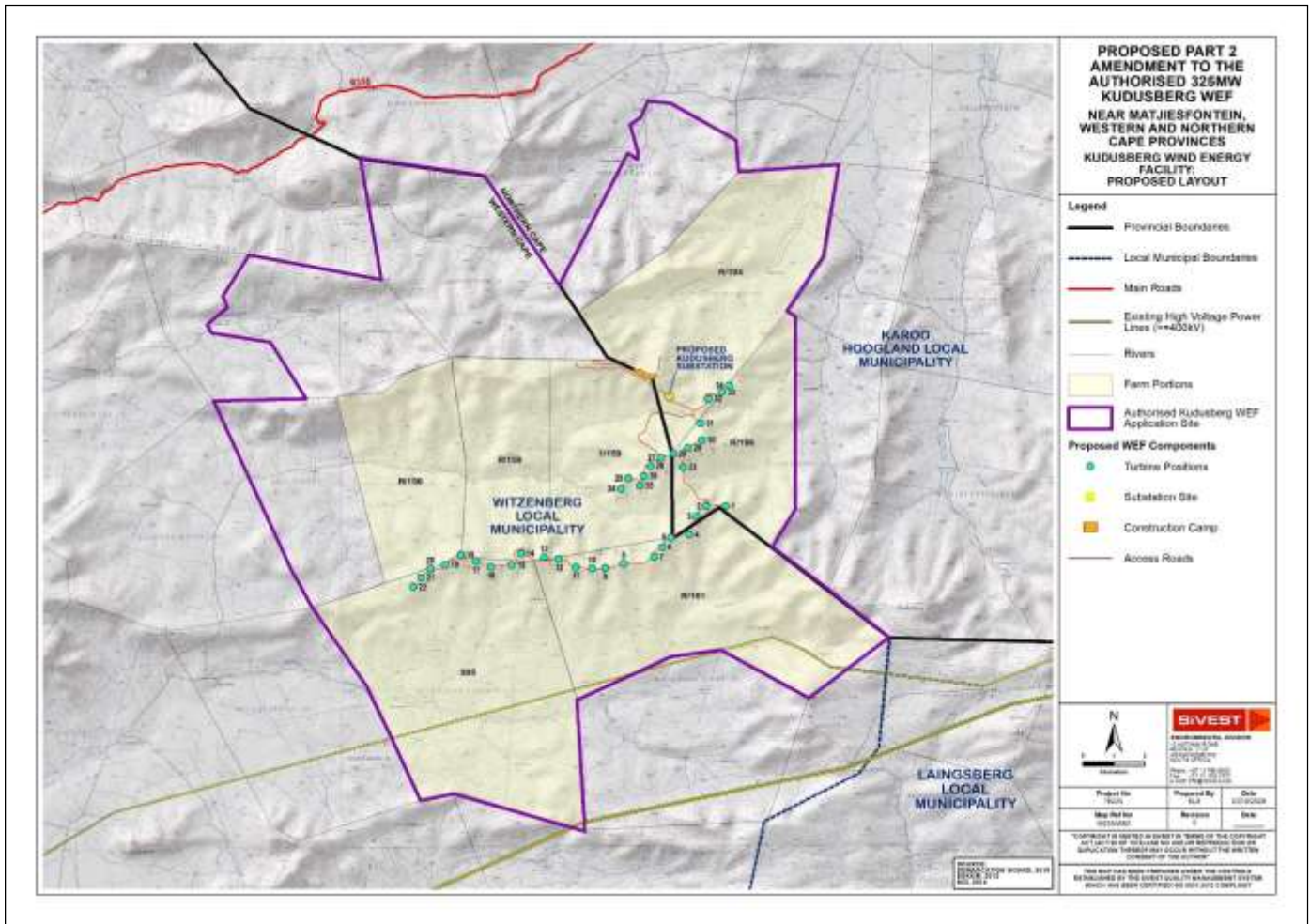


Figure 3. Layout map for proposed Kudusberg WEF (southern section of the authorised WEF)

Furthermore, the approved EMPr authorised as part of the Kudusberg EA is being amended to each WEF and to incorporate the final layout for the Oya WEF, management plans and the walk-throughs.

The following amendments are proposed for each of the two (2) WEF mentioned above:

Table 1: Proposed Amendments

Aspect to be amended	Authorised	Proposed Amendment	
		Oya WEF	Kudusberg WEF
Administrative Aspects			
Amend the holder of the EA's	Kudusberg Wind Farm (Pty) Ltd	Oya Energy (Pty) Ltd	Kudusberg Wind Farm (Pty) Ltd
Amend the name of the WEFs	Kudusberg Wind Energy Facility	Oya Wind Energy Facility	Kudusberg Wind Energy Facility
Contact Details	kudusberg@g7energies.com	oya@g7energies.com	kudusberg@g7energies.com
Extend the validity of the EA	This activity must commence within a period of five (05) years from the date of issue of this environmental authorization.	This activity must commence within a period of five (05) years from the date of issue of this amended environmental authorization.	This activity must commence within a period of five (05) years from the date of issue of this amended environmental authorization.
Location of Activity and SG codes	Western Cape 1. Portion 1 of 156 Gats Rivier Farm: C01900000000015600001 2. Portion 3 of 156 Gats River Farm: C01900000000015600002 3. Remainder of 156 Gats Rivier Farm: C01900000000015600000 4. Portion 1 of 157 Riet Fontein Farm: C01900000000015700001 5. Portion 1 of 158 Amandelbloom Farm: C01900000000015800001 6. Remainder of 158 Amandelboom Farm: C01900000000015800000	Western Cape 1. Portion 1 of the Farm Gats Rivier No 156: C01900000000015600001 2. Portion 2 of the Farm Gats Rivier No 156: C01900000000015600002 3. Remainder of the Farm Gats Rivier No 156: C01900000000015600000 4. Portion 1 of the Farm Riet Fontein No 157: C01900000000015700001 5. Portion 2 of the Farm Riet Fontein No 157: C01900000000015700002 6. Portion 1 of the Farm Amandelbloom No 158: C01900000000015800001	Western Cape 1. Portion 1 of the Farm Gats Rivier No 156: C01900000000015600001 2. Remainder of the Farm Gats Rivier No 156: C01900000000015600000 3. Portion 1 of the Farm Oliviers Berg No 159; C01900000000015900001 4. Remainder of the Farm Oliviers Berg No 159: C01900000000015900000 5. Klipbanks Fontein No 395: C01900000000039500000

Aspect to be amended	Authorised	Proposed Amendment	
		Oya WEF	Kudusberg WEF
	7. Portion 1 of 159 Oliviers Berg Farm: C01900000000015900001 8. Remainder of 159 Oliviers Berg Farm: C01900000000015900000 9. Portion 2 of 157 Riet Fontein Farm: C01900000000015700002 10. Remainder of 161 Muishond Rivier Farm: C01900000000016100000 11. Remainder of 395 Klipbanks Fontein Farm: C01900000000019500000 Northern Cape 12. Portion 4 of 193 Urias Gat Farm: C07200000000019300004 13. Portion 6 of 193 Urias Gat Farm: C07200000000019300006 14. Remainder of 193 Urias Gat Farm: C07200000000019300000 15. Remainder of 194 Matjes Fontein Farm: C07200000000019400000 16. Remainder of 196 Karree Kloof Farm: C07200000000019600000 Properties affected by public road:	7. Remainder of the Farm Amandelboom No 158: C01900000000015800000 8. Portion 1 of the Farm Oliviers Berg No 159: C01900000000015900001 9. Remainder of the Farm Oliviers Berg No 159: C01900000000015900000 Northern Cape 10. Portion 4 of the Farm Urias Gat No 193: C07200000000019300004 11. Portion 6 of the Farm Urias Gat No 193: C07200000000019300006 12. Remainder of the Farm Urias Gat No 193: C07200000000019300000 13. Remainder of the Farm Matjies Fontein No 194: C07200000000019400000 14. Portion 5 of the Farm Urias Gat No 193: C07200000000019300005 Properties affected by access road: 15. Zeekoegat Farm No 169: C07200000000016900000 16. Portion 1 of the Farm Roodeheuvel No 170: C07200000000017000001 17. Remainder of the Farm Roodeheuvel No 170: C07200000000017000000	6. Remainder of the Farm Muishond Rivier No 159: C01900000000016100000 Northern Cape 7. Remainder of the Farm Karee Kloof No 196: C07200000000019600000 8. Remainder of the Farm Matjes Fontein No 194: C07200000000019400000 Properties affected by public road: 9. Zeekoegat Farm No 169: C07200000000016900000 10. Portion 1 of the Farm Roodeheuvel No 170: C07200000000017000001 11. Remainder of the Farm Roodeheuvel No 170: C07200000000017000000 12. Remainder of the Farm Wind Heuvel No 190: C07200000000019000000 13. Portion 1 of the Farm Wind Heuvel No 190: C07200000000019000001 14. Portion 5 of the Farm Urias Gat No 193: C07200000000019300005 15. Remainder of the Farm Vinke Kuil No 171: C07200000000017100000

Aspect to be amended	Authorised	Proposed Amendment	
		Oya WEF	Kudusberg WEF
	17. 169 Zeekoegat Farm: C07200000000016900000 18. Portion 1 of 170 Roodeheuvel Farm: C07200000000017000001 19. Remainder of 170 Roodeheuvel Farm: C07200000000017000000 20. Remainder of 190 Wind Heuvel Farm: C07200000000019000000 21. Portion 1 of 190 Wind Heuvel Farm: C07200000000019000001 22. Portion 5 of 193 Urias Gat Farm: C07200000000019300005 23. Remainder of 171 Vinke Kuil Farm: C07200000000017100000 24. Alkant Re/220 Farm: C07200000000022000000 25. Portion 1 of 174 Lange Huis Farm: C07200000000017400001	18. Remainder of the Farm Wind Heuvel No 190: C07200000000019000000 19. Portion 1 of the Farm Wind Heuvel No 190: C07200000000019000001 20. Portion 5 of the Farm Urias Gat No 193: C07200000000019300005 21. Remainder of the Farm Vinke Kuil No 171: C07200000000017100000 22. Alkant Farm No 220: C07200000000022000000 23. Portion 1 of the Farm Lange Huis No 174: C07200000000017400001	16. The Farm Alkant No 220: C07200000000022000000 17. Portion 1 of the Farm Lange Huis No 174: C07200000000017400001
Technical Aspects			
Overall Capacity	325 MW	86 MW	239 MW
Number of turbines	56	20	36
Hub height	Up to 140 m	92 m above the foundation	No Change i.e. up to 140 m
Rotor diameter	Up to 180 m	150 m	No Change i.e. up to 180 m
Blade length	Up to 90 m	75 m	No Change i.e. up to 90 m

Aspect to be amended	Authorised	Proposed Amendment	
		Oya WEF	Kudusberg WEF
Wind Measuring Lattice Masts	Up to 4 x 140 m high depending the final hub height	2 x met masts (same as hub height)	2 x up to 140 m high depending the final hub height
Layout	-	Layout submitted for final approval.	Final layout to be submitted prior to the start of construction
EMPr	The EMPr submitted as part of the Application for EA is hereby approved.	Approve Final EMPr	To be submitted based on final approval of layout.

2 INTRODUCTION

This comment letter has been conducted by Mrs Elize Butler. She has conducted approximately 300 palaeontological impact assessments for developments in the Free State, KwaZulu-Natal, Eastern, Central, and Northern Cape, Northwest, Gauteng, Limpopo, and Mpumalanga. She has an MSc (*cum laude*) in Zoology (specializing in Palaeontology) from the University of the Free State, South Africa and has been working in Palaeontology for more than twenty-five years. She has experience in locating, collecting, and curating fossils, including exploration field trips in search of new localities in the Karoo Basin. She has been a member of the Palaeontological Society of South Africa (PSSA) since 2006 and has been conducting PIAs since 2014.

The original Palaeontological impact assessment for the Kudusberg WEF was conducted by Dr J.E. Almond and is referenced below.

ALMOND, J.E., 2018. Basic Assessment for the Proposed Development of the 325MW Kudusberg Wind Energy Facility and associated infrastructure, between Matjiesfontein and Sutherland in the Western and Northern Cape Provinces.

The present amendment letter must be read in conjunction with the original PIA report by Dr John Almond mentioned above.

3 PROJECT DESCRIPTION

The authorised Kudusberg WEF [325 megawatt (MW)] is located about 45km south-west of Sutherland in the Northern and Western Cape Provinces (**Figure 1**) and falls completely within the Renewable Energy Zone (REDZ) 2 (namely Komsberg REDZ), Gazetted in February 2018 by the Minister of Environmental Affairs (GN 114). The WEF is in the Witzenberg and Karoo Hoogland Local Municipalities, in the Namakwa District and Cape Winelands Municipalities, respectively.

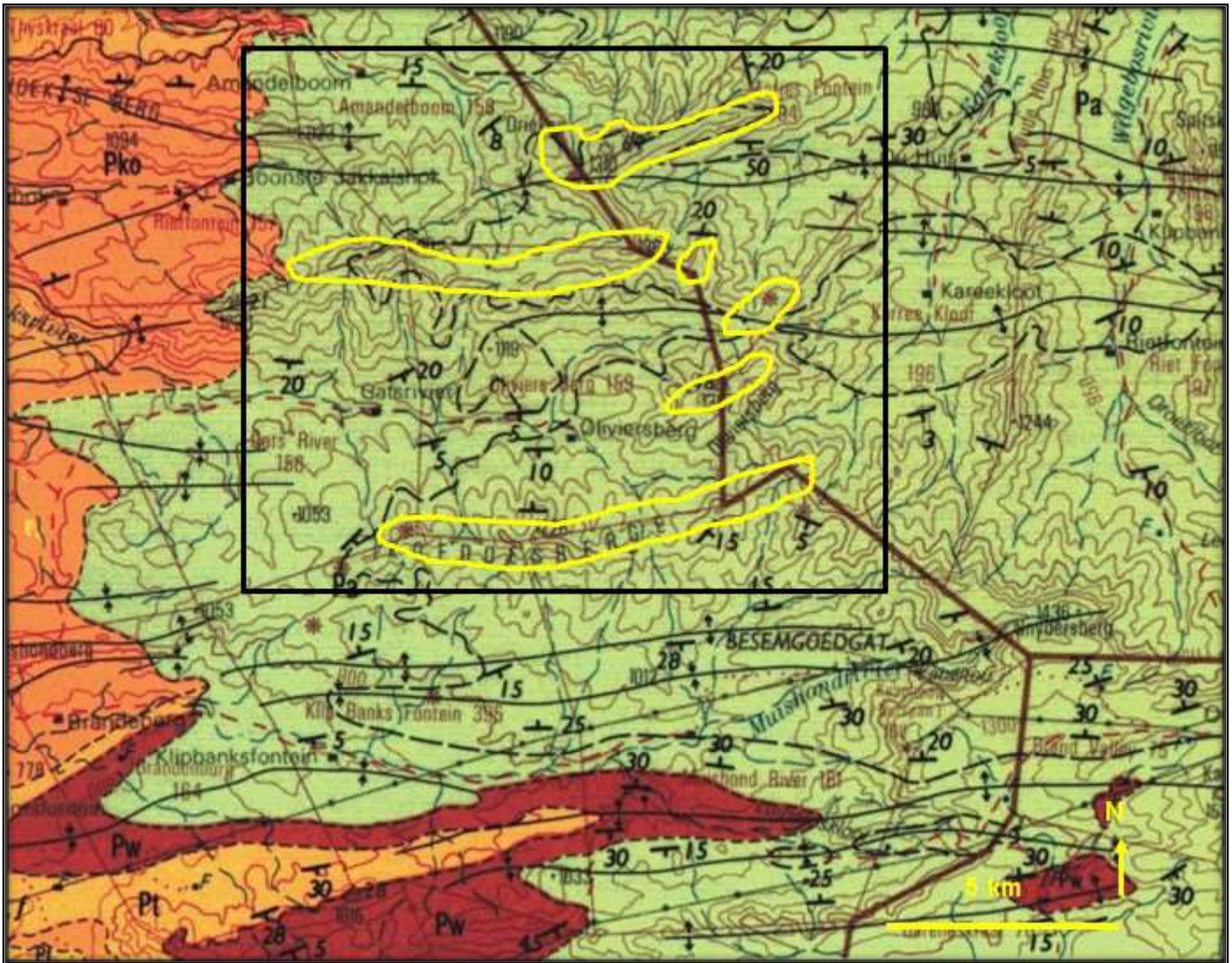


Figure 4. Extract from 1: 250 000 3220 Sutherland Geological Map (Council of Geosciences) indicating the estimated location of the core project area for the authorized Kudusberg WEF. Modified from Almond (2018).

In his report, John Almond (2018) stated that the 325MW Kudusberg WEF is underlain by the Middle Permian continental sediments of the Abrahamskraal Formation (Lower Beaufort Group, Karoo Supergroup) (Figure 2). The Palaeontological Sensitivity of this Formation is generally considered to be high (SAHRA Palaeotechnical Report for the Northern Cape, SAHRIS website, Komsberg REDZ in

SEA for Wind & Solar Photovoltaic Energy in South Africa, CSIR 2015). He conducted a field assessment of the development area and found that the bedrocks of the Middle Permian Beaufort Group are mostly unfossiliferous. However, some outcrops not in the development footprint did contain plant debris or low-diversity invertebrate trace fossils. Several other Palaeontological Impact Assessments in the same area also found that the Middle Permian Beaufort Group in this area were mostly unfossiliferous.

John Almond (2018) found that from a palaeontological perspective the overall impact significance of the construction phase of the proposed wind energy facility is calculated to be VERY LOW (negative), before and after mitigation. However, he did recommend palaeontological monitoring and mitigation although he did not identify sensitive no-go areas within the proposed development footprint. A protocol for finds were included in the report.

Kudusberg Wind Farm plan to submit a Part 2 EA Amendment Application to split the authorised Kudusberg WEF (14/12/16/3/3/1/1976/AM1) into two (2) separate smaller WEF projects, namely the Kudusberg WEF (**Figure 2**) and Oya WEF (**Figure 3**). The southern portion of the authorised WEF will remain known as the Kudusberg WEF (authorised under 14/12/16/3/3/1/1976/AM1) (**Table 1**) while the northern section of the authorised WEF will become the Oya WEF.

The geology of the proposed new Kudusberg WEF (southern portion of the authorised WEF) is presented in **Figure 5** below.

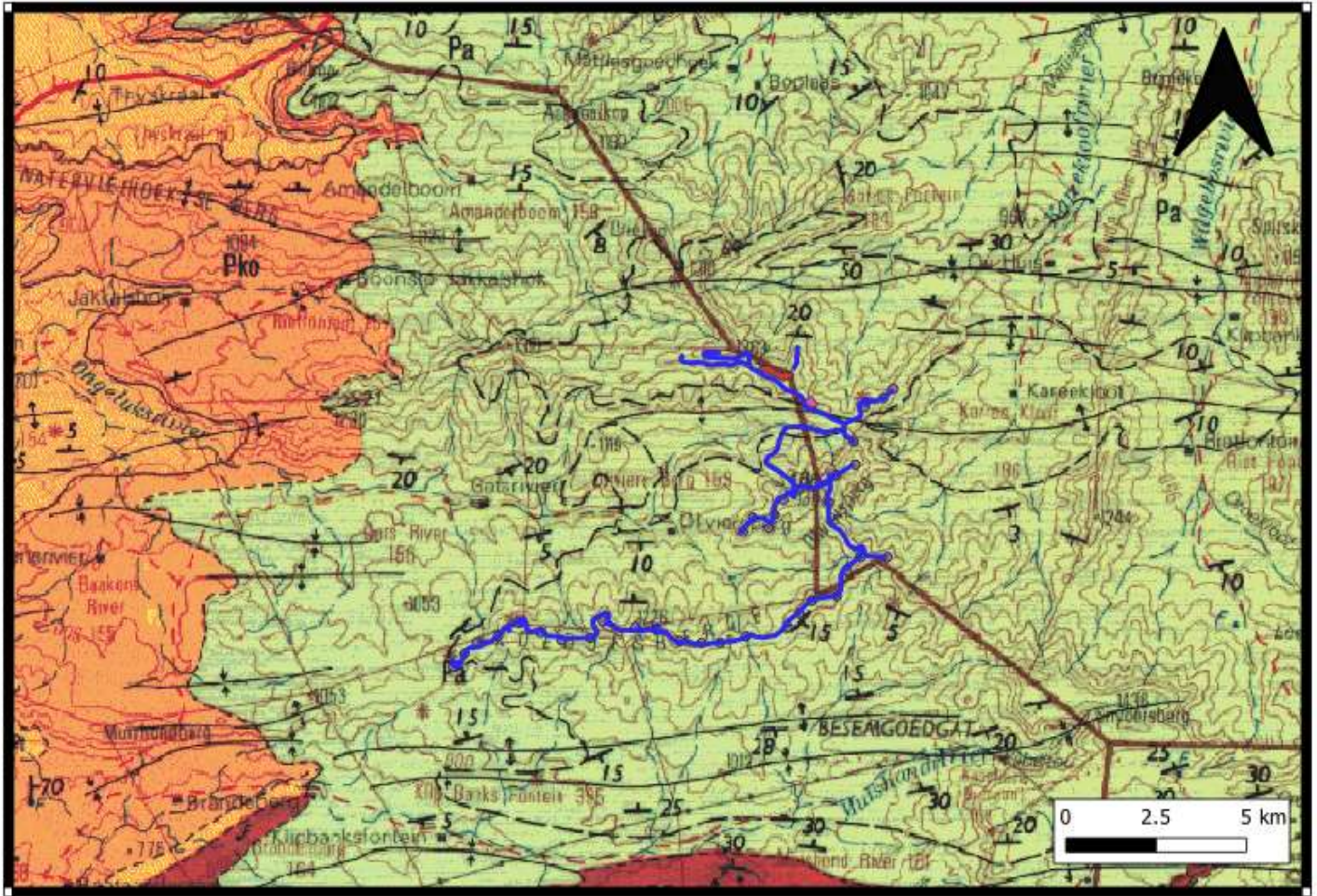


Figure 5. Extract of the 3220 Sutherland Geological Map (Council of Geosciences (1983; Almond and Pether 2008, SAHRIS website) indicating the geology of the proposed new Kudusberg WEF.

According to the 1:250 000 3220 Sutherland Geological map (Council for Geosciences) the proposed new Kudusberg WEF development is also underlain by the Middle Permian continental sediments of the Abrahamskraal Formation (Lower Beaufort Group, Adelaide Subgroup, Karoo Supergroup) (Pa, pale green) as well as Late Cenozoic superficial deposits that are present (but not mapped at 1: 250 000 scale). The Geology of the new proposed Kudusberg WEF is the same as that of the authorized Kudusberg WEF.

The geology of the proposed new Oya WEF (northern portion of the authorised WEF) is presented in **Figure 6** below.

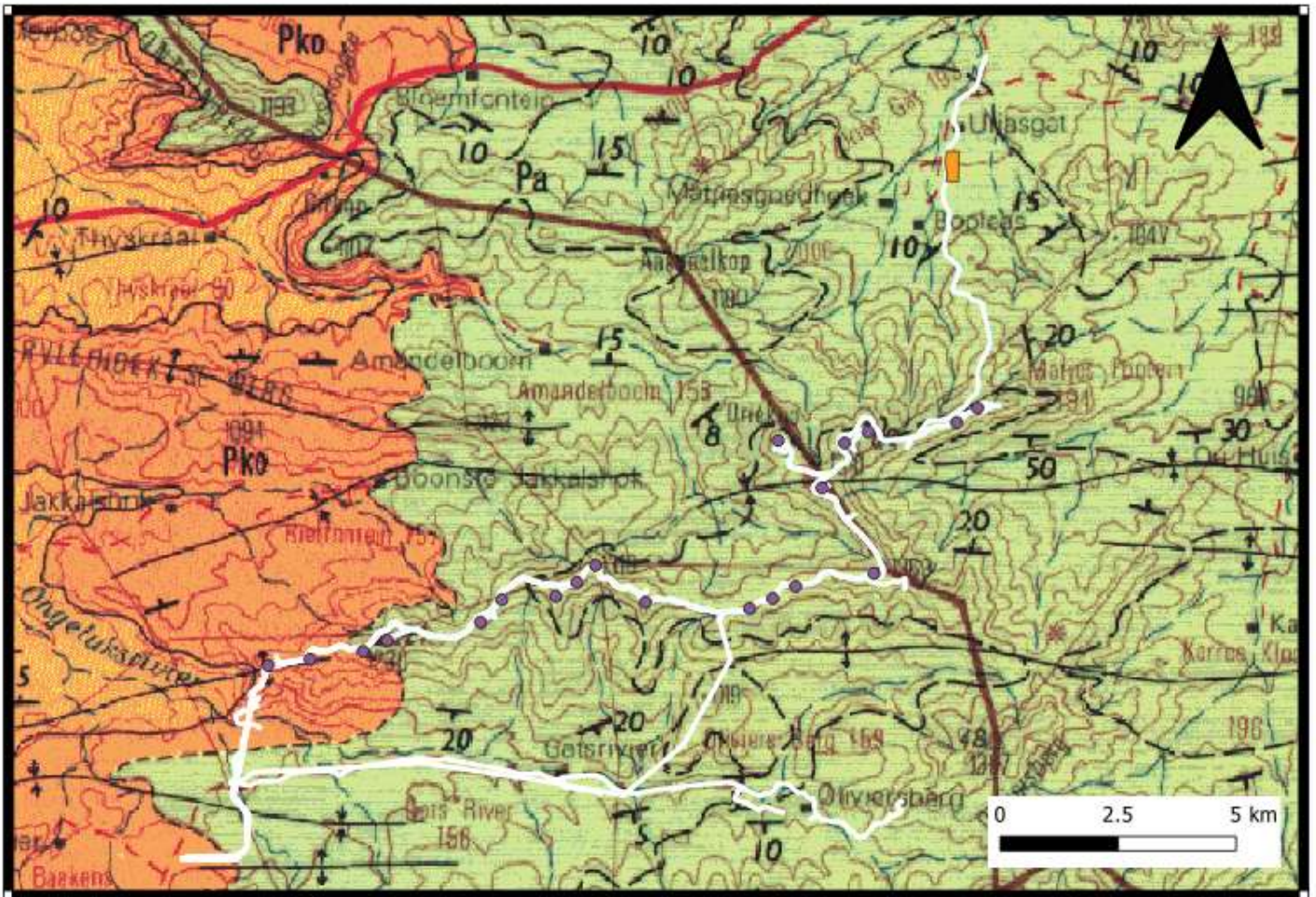


Figure 6. Extract of the 3220 Sutherland Geological Map (Council of Geosciences) indicating the geology of the proposed new Oya WEF.

The proposed new Oya WEF is underlain by the Middle Permian continental sediments of the Abrahamskraal Formation (Lower Beaufort Group, Adelaide Subgroup, Karoo Supergroup) (Pa, pale

green), the Waterford Formation (Pko, orange) as well as Late Caenozoic superficial deposits that are present (but not mapped at 1: 250 000 scale).

The upper, sandstone-rich portion of the Ecca Group along the north-western margin of the Main Karoo Basin is assigned to the Middle Permian Waterford Formation. These beds are mapped as the Koedoesberg Formation (Pko) on the Williston 1: 250 000 sheet and the Carnarvon Formation (Pc) on the associating Sakrivier, Britstown and Victoria West sheets.

The arenaceous Waterford Formation comprises of alternating very fine-grained, lithofeldspathic sandstone and mudrock or clastic rhythmite units. Fine- to medium-grained sandstone, siltstone, shale and rhythmite is present in this Formation. The lower part of the Formation is characterized by upward-coarsening cycles of sediments, which are capped by extensive sheet-like sandstones and alternating chaotic, slump and slide deposits. The upper portion of the Formation consists of sandstone (± 8 m thick), siltstone, ball-and-pillow layers and channel-fill deposits.

John Almond (2008) described the fossils of the Waterford Formation in the Loeriesfontein sheet area. This Formation is known for its Glossopteris Flora and petrified wood. Permineralised silica "*Dadoxylon*" (also known as fossil logs) with seasonal growth rings present as well as at least two genera of gymnospermous woods. Various trace fossils are present in this formation and include scratch marks, scratch burrows, and possible limb impressions of large temnospondyl amphibians. Almond (2018) described the Waterford Formation in this area as generally unfossiliferous except for trace fossils. **However**, isolated blocks and exceptional logs of well-preserved petrified wood has been recorded from the Waterford Formation in the Rietkloof WEF area. These fossils are of "**high scientific and conservation value**" and he recommended a site visit to establish firsthand if these treasures were present.

According to the PalaeoMap of the South African Heritage Resources Information System (SAHRIS) (Almond and Pether 2008, SAHRIS website; <https://sahrisgeo.openheritage.org.za>) the

Palaeontological Sensitivity of the Waterford Formation is moderate, while that of the Abrahamskraal Formation is very high. The Late Cenozoic superficial sediments has a Low Palaeontological Sensitivity.

4 METHODOLOGY

The Methodology used for this letter is not the same as was used for the original 325MW Kudusberg WEF report (CSIR, 2018). Therefore, new Impact Tables were compiled by using SiVEST Impact Tables.

Impact Summary

A summary of the results of the impact assessment undertaken for the original 235MW Kudusberg WEF in comparison with the results of the impact assessment undertaken for the new proposed Kudusberg and Oya WEFs is presented below.

	Before Mitigation									After mitigation								
	Nature	Extent	Probability	Duration	Magnitude	Reversibility	Irreplaceable Loss	Cummulative impacts	Significance	Nature	Extent	Probability	Duration	Magnitude	Reversibility	Irreplaceable Loss	Cummulative impacts	Significance
<i>Original 325MW Kudusberg WEF</i>	Loss of fossil Heritage	1	3	4	1	4	4	4	20	Loss of fossil Heritage	1	3	4	1	4	4	4	20
<i>New proposed Kudusberg WEF</i>	Loss of fossil Heritage	1	3	4	1	4	4	4	20	Loss of fossil Heritage	1	3	4	1	4	4	4	20
<i>New Oya WEF</i>	Loss of fossil Heritage	1	3	4	4	4	4	4	80	Loss of fossil Heritage	1	3	4	1	4	4	4	20

Loss of fossil heritage will have a negative impact. Only the affected properties (WEF localities) will be affected by the proposed development. The expected duration of the impact is assessed as potentially permanent. In the absence of mitigation procedures, the damage or destruction of any palaeontological materials will be permanent. Impacts on palaeontological heritage during the construction phase could potentially occur and are regarded as having a high probability. The significance of the impact occurring will be high before mitigation and Low after mitigation.

As the geology of the Authorized and New Kudusberg WEF is the same there will be no differences on the Impacts affecting these two WEFs. The Significance for these two WEFs will be the same. However, the New Proposed Oya WEF is underlain by the Waterford Formation (Ecca Group) additionally to the Abrahamskraal Formation (Lower Beaufort Group, Adelaide Subgroup, Karoo Supergroup). Pre-mitigation the Impact significance on fossil heritage of the new proposed Oya WEF will be high (see summary of impacts).

4.1 National Heritage Resources Act (25 of 1999) (NHRA)

Cultural Heritage in South Africa, includes all heritage resources, is protected by the National Heritage Resources Act (Act 25 of 1999) (NHRA). Heritage resources as defined in Section 3 of the Act include **“all objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens”**.

Palaeontological heritage is unique and non-renewable and is protected by the NHRA. Palaeontological resources may not be unearthed, broken moved, or destroyed by any development without prior assessment and without a permit from the relevant heritage resources authority as per section 35 of the NHRA.

This Palaeontological Impact Assessment was undertaken as part of this proposed amendment and adheres to the conditions of the Act. According to **Section 38 (1)** of the NHRA, a HIA is required to assess any potential impacts to palaeontological heritage within the development footprint where:

- the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
- the construction of a bridge or similar structure exceeding 50m in length;
- any development or other activity which will change the character of a site—
 - a. (exceeding 5 000 m² in extent; or

- b. involving three or more existing erven or subdivisions thereof; or
- c. involving three or more erven or divisions thereof which have been consolidated within the past five years; or
- d. the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority
- e. the re-zoning of a site exceeding 10 000m² in extent;
- or any other category of development provided for in regulations by SAHRA or a Provincial heritage resources authority.

5 SPECIALIST COMMENT

The Geology of the authorized Kudusberg WEF, proposed New Kudusberg WEF and proposed New Oya WEF is as follows:

- The authorized Kudusberg WEF is underlain by the Middle Permian continental sediments of the Abrahamskraal Formation (Lower Beaufort Group, Karoo Supergroup) as well as Late Caenozoic superficial deposits that are present but not mapped at 1: 250 000 scale.
- The proposed new Kudusberg WEF development is underlain by the Middle Permian continental sediments of the Abrahamskraal Formation (Lower Beaufort Group, Karoo Supergroup) as well as Late Caenozoic superficial deposits that are present (not mapped at 1: 250 000 scale).
- The proposed new Oya WEF is underlain by the Middle Permian continental sediments of the Abrahamskraal Formation (Lower Beaufort Group, Karoo Supergroup), the Waterford Formation (formerly known as Koedoesberg or Carnarvon Formation in this area)) as well as Late Caenozoic superficial deposits that are present (not mapped at 1: 250 000 scale).

As the geology of the Authorized and New Kudusberg WEF is the same, there will be no differences on the Impacts affecting these two WEFs. However, the New Proposed Oya WEF is underlain by the Waterford Formation (Ecca Group) additionally to the Abrahamskraal Formation (Lower Beaufort Group, Adelaide Subgroup, Karoo Supergroup). The Impact on palaeontological heritage will thus be higher for the Oya WEF.

A Palaeontological and Archaeological walkdown has recently been conducted assessing the heritage of the Oya WEF (Lavin, 2020) and is referenced below.

Lavin, J., 2020. Archaeological and Palaeontological Walkdown Report for the Part 2 Environmental Authorisation (EA) Amendment Process for the proposed 325MW Kudusberg Wind Energy Facility and associated infrastructure, between Matjiesfontein and Sutherland in the Western and Northern Cape Provinces

No fossiliferous outcrops were identified during the walkdown and thus a low overall Palaeontological significance was allocated to the site.

From a Palaeontological perspective there will be no advantages or disadvantages of the proposed split.

6 CONCLUSION

The overall impact rating reflected in the Palaeontological Impact Assessment report for the authorised Kudusberg WEF between Matjiesfontein and Sutherland in the Northern Cape Province dated 28 October 2018 (Almond, 2018) will not change as:

- 1) the geology of the authorised Kudusberg WEF and proposed new Kudusberg WEF is the same;
and
- 2) A recent palaeontological walkdown of the Oya WEF allocated a low overall Palaeontological significance to the site as no fossils were recovered.

Yours sincerely



Elize Butler