HERITAGE IMPACT ASSESSMENT

In terms of Section 38(8) of the NHRA for the

Proposed Development of the Kudu Wind Energy Facility near Aberdeen in the Eastern Cape

Prepared by CTS Heritage

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For

Savannah Environmental

August 2023

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EXECUTIVE SUMMARY

1. Site Name:

Kudu Wind Energy Facility

2. Location:

Portion 2 of Farm Oorlogspoort 85

3. Locality Plan:

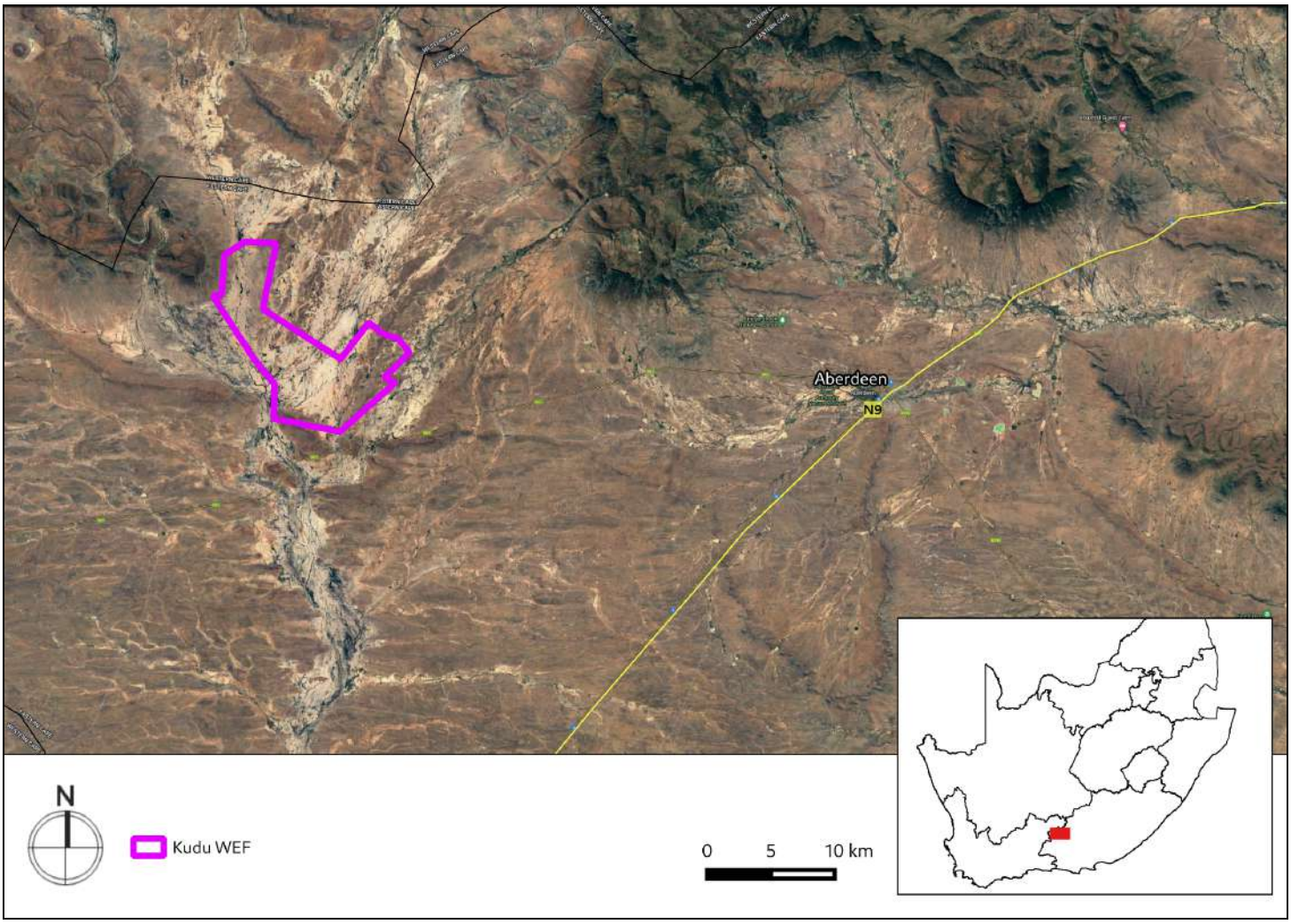

Figure A: Location of the proposed development area of Kudu WEF relative to Aberdeen

4. Description of Proposed Development:

FE Kudu (Pty) Ltd is proposing the development of a wind energy facility and associated infrastructure on a site located approximately 40km west of Aberdeen in the Eastern Cape Province. The project is located within the Dr Beyers Naude Local Municipality and the greater Sarah Baartman District Municipality. The project site comprises a single affected property, Portion 2 of Farm Oorlogspoort 85. The project is known as the FE Kudu Wind Energy Facility. The project is planned as part of a cluster of renewable energy projects, which includes a second wind energy facility with a capacity of up to 240MW (FE Tango Wind Energy Facility), located approximately 20km east of the FE Kudu Wind Energy Facility.

5. Heritage Resources Identified:

Various Landscape Elements of Cultural Value have been identified within the area proposed for development:

- Topographical Features
    - A sense of topographical containment to the north, east and west of the project area.
    - Wolwekop peak situated just north of the R61 near the Murraysburg secondary road. This is a distinctive landmark feature. It is recommended that the nearest turbine be located more than 2.5km from this peak.
    - Camdeboo Mountains and the “Sleeping Giant” formation framing the long views northwards.
    - The Oorlogspoortberg framing views westwards.
- Water courses and infrastructure
    - A network of periodical water courses traversing the project area and informing the pattern of settlement.
    - Dams, wind pumps and water furrows.
- Planting Patterns
    - Clumps of trees typically founds around homesteads as shelter from the sun/wind and as place-making elements.
- Scenic and historic routes
    - The R61 as a regional linkage route of some scenic value with dramatic views towards the mountain backdrop to the north. A 1km no-development buffer on either side of this road is recommended.
    - The combination of the intersection of the R61 and the Murraysberg Road, change in topography and the landmark qualities of the Wolwekop providing a threshold condition.
    - The MurraysburgRoadand Nelspoort Road of local historical scenic value
- Settlements
    - Aberdeen town of suggested Grade IIIA heritage value and situated approximately 35 km east of the proposed WEF.

- A number of farmsteads and stone kraals situated within or adjacent to the proposed WEF of mostly Grade IIIC heritage value and in some instances of suggested Grade IIIB heritage value. A 500m no-development buffer is recommended for these sites.
- Oorlogspoortfarmstead of suggested Grade II heritage value in terms of its evidence of historical layering dating to the 19th century, possibly earlier, and its distinctive landscape setting.
- The collection of graves on the farm Kalgat and their association with the South African War of suggested Grade IIIA heritage value

In terms of the heritage resources identified in the archaeological field assessment, see Table A below.

Table A: Resources identified during the field assessment development area

POINT	Description	Type	Density/ m^2	Period	Co-ordinates		Grading	Mitigation
001	Rooidraai farm. "Karoo Secret" Cottage, early 20th century with corrugated iron roof, more modern stoep added later	Structure	Historic	n/a	-32.488176	23.550344	IIIC	No impact anticipated
062	Rooidraai main werf, mostly modern additions but early 20th century buildings present, lots of labourers' cottages.	Structure	Historic, Modern		-32.487224	23.54628	IIIC	No impact anticipated

In terms of the heritage resources identified in the palaeontological field assessment, see Table B below.

Table B: Palaeontological observations made during the field assessment for the proposed Grid Connection Infrastructure

POINT ID	Description	Co-ordinates		Grading	Mitigation
306	Portion 2 of Farm Oorlogspoort 85. Sparse blocks of colour-banded petrified wood within eluvial surface gravels. Proposed Field Rating IIIC. No mitigation recommended.	-32.498458	23.606089	IIIC	NA
331	Portion 2 of Farm Oorlogspoort 85. Isolated block of colour-banded petrified wood within band of relict "High Level" alluvial gravels. Proposed Field Rating IIIC. No mitigation recommended.	-32.446002	23.619753	IIIC	NA
332	Portion 2 of Farm Oorlogspoort 85. Dense surface scatter of cobbly eluvial to alluvial gravels with occasional reworked blocks of poorly-preserved silicified wood showing amorphous structure (possibly partially decomposed before silicification). Proposed Field Rating IIIC. No mitigation recommended.	-32.450711	23.616316	IIIC	NA
333	Portion 2 of Farm Oorlogspoort 85. Dense surface scatter of cobbly eluvial to alluvial gravels with occasional reworked blocks of poorly-preserved silicified wood showing amorphous structure (possibly partially decomposed before silicification). Proposed Field Rating IIIC. No mitigation recommended.	-32.451702	23.616341	IIIC	NA
335	Portion 2 of Farm Oorlogspoort 85. Sheet-washed eluvial surface gravels within pan-like brak-koll in sandy vlaktes with occasional small blocks of well-preserved, cherty, grey-green petrified wood. Proposed Field Rating IIIC. No mitigation recommended.	-32.485734	23.591707	IIIC	NA
343	Portion 2 of Farm Oorlogspoort 85. Patch of dark greyish, pebbly surface gravels with occasional small blocks of poorly-preserved, reworked petrified wood. Proposed Field Rating IIIC. No mitigation recommended.	-32.455503	23.563173	IIIC	NA
351	Portion 2 of Farm Oorlogspoort 85. Surface colluvial to eluvial gravels mantling	-32.390249	23.507883	IIIC	NA

	eastern footslopes of Oorlogspoortberge with sparse blocks of poorly-preserved silicified wood downwasted from channel sandstone package upslope to the west. Proposed Field Rating IIIC. No mitigation recommended.				
353	Portion 2 of Farm Oorlogspoort 85. Mudclast breccias at base of thin package of yellowish-brown channel wackes (uppermost Abrahamskraal Fm or basal Poortjie Member, Teekloof Fm) containing abundant rusty-brown moulds of reworked woody plant axes. Proposed Field Rating IIIC. No mitigation recommended.	-32.390722	23.50385	IIIC	NA
354	Portion 2 of Farm Oorlogspoort 85. Surface colluvial to eluvial gravels mantling eastern footslopes of Oorlogspoortberge with sparse blocks of poorly-preserved silicified wood downwasted from channel sandstone package upslope to the west. Proposed Field Rating IIIC. No mitigation recommended.	-32.392891	23.504234	IIIC	NA
355	Portion 2 of Farm Oorlogspoort 85. Locally abundant blocks of poorly-preserved silicified wood weathered-out from channel sandstone package just above. Proposed Field Rating IIIC. No mitigation recommended.	-32.392969	23.504141	IIIC	NA

6. Anticipated Impacts on Heritage Resources:

The site forms part of an intact cultural landscape representative of the Central Plateau of the Great Karoo possessing heritage value for historical, aesthetic, architectural, social and scientific reasons. Based on the desktop mapping and assessment of potential heritage resources and receptors, and subsequent fieldwork, the principle of a WEF in the proposed location is acceptable from a cultural landscape perspective. There are no red flags, which identify the project to be a fatal flaw from a cultural landscape perspective.

At a regional scale, the project is located to the south of the Great Escarpment, to the west of the distinctive Camdeboo Plains and at considerable distance from the cluster of Nature Reserves around Graaff Reinet. The site possesses a number of landscape elements contributing to a composite cultural landscape including topographical features, open plains, water features, historic scenic routes and farmsteads. Various buffers are recommended in order to mitigate anticipated negative impacts to these significant cultural landscape elements. ***No structures or cultural landscape elements of significance are located within the area proposed for development and the optimised layout observes the recommended buffer areas and mitigation measures.***

There are limited impacts anticipated to archaeological and palaeontological heritage from this proposed development and as such, the principle of a renewable energy facility in this location is supported from a heritage perspective provided that the infrastructure is located in areas able to tolerate the impact of the high degree of change from a cultural landscape perspective.

7. Recommendations:

Based on the outcomes of this report, it is not anticipated that the proposed development of the Kudu Wind Energy Facility will negatively impact on significant heritage resources on condition that the following recommendations are implemented:

- The attached Chance Fossil Finds Procedure must be implemented for the duration of construction activities

- Although all possible care has been taken to identify sites of cultural importance during the investigation of the study area, it is always possible that hidden or subsurface sites could be overlooked during the assessment. If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils, burials or other categories of heritage resources are found during the proposed development, work must cease in the vicinity of the find and ECPHRA must be alerted immediately to determine an appropriate way forward.

8. Author/s and Date:

Jenna Lavin

August 2023

Details of Specialist who prepared the HIA

Jenna Lavin, an archaeologist with an MSc in Archaeology and Palaeoenvironments, heads up the heritage division of the organisation since 2016, and has a wealth of experience in the heritage management sector. Jenna's previous position as the Assistant Director for Policy, Research and Planning at Heritage Western Cape has provided her with an in-depth understanding of national and international heritage legislation. Prior to joining CTS Heritage, her 8 years of experience at various heritage authorities in South Africa means that she has dealt extensively with permitting, policy formulation, compliance and heritage management at national and provincial level and has also been heavily involved in rolling out training on SAHRIS to the Provincial Heritage Resources Authorities and local authorities.

Jenna is a member of the Association of Professional Heritage Practitioners (APHP), and is also an active member of the International Committee on Monuments and Sites (ICOMOS) as well as the International Committee on Archaeological Heritage Management (ICAHM). In addition, Jenna has been a member of the Association of Southern African Professional Archaeologists (ASAPA) since 2009.

Since 2016, Jenna has drafted over 250 Screening and Heritage Impact Assessments throughout South Africa.

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CONTENTS

APPENDICES

1. INTRODUCTION

1.1 Background Information on Project

FE Kudu (Pty) Ltd is proposing the development of a wind energy facility and associated infrastructure on a site located approximately 40km west of Aberdeen in the Eastern Cape Province. The project is located within the Dr Beyers Naude Local Municipality and the greater Sarah Baartman District Municipality. The project site comprises a single affected property, Portion 2 of Farm Oorlogspoort 85. The project is known as the FE Kudu Wind Energy Facility. The project is planned as part of a cluster of renewable energy projects, which includes a second facility, FE Tango Wind Energy Facility, located approximately 20km to the east of the site.

The entire extent of the site falls within the Beaufort West Renewable Energy Development Zones (i.e. REDZ Focus Area 11). The undertaking of a basic assessment process for the project is in-line with the requirements stated in GNR 114 of 16 February 2018.

The Kudu Wind Energy Facility will have a contracted capacity of up to 600MW and comprise wind turbines with a capacity of up to 7.5MW each. The project has a preferred project site of approximately ~9 170ha. Access to the site will be via an existing road off of the nearby R61. The FE Kudu Wind Energy Facility project site is proposed to accommodate the following infrastructure:

» Up to 80 wind turbines, turbine foundations and turbine hardstands
» An on-site substation hub incorporating:
  - A132kV on-site facility substation
  - Switchyard with collector infrastructure
  - Battery Energy Storage System (BESS)
  - Operation and Maintenance buildings
» A balance of plant area incorporating:
  - Temporary laydown areas
  - A construction camp laydown and temporary concrete batching plant
» Power lines internal to the wind farm, trenched and located adjacent to internal access roads, where feasible[1].
» Access roads to the site and between project components with a width up to 8m for primary access routes.

A technically viable development footprint was proposed by the developer and assessed as part of the studies.

[1] The intention is for internal project cabling to follow the internal roads.

Table 1: The details of the project is as follows:

Project Name	FE Kudu Wind Energy Facility
Location	Portion 2 of Farm Oorlogspoort 85
Applicant	FE Kudu (Pty) Ltd
Contracted capacity	Up to 600MW (turbines up to 7.5MW in capacity)
Number of turbines	Up to 80 turbines[2]
Turbine hub height	Up to 164m
Turbine top tip height	Up to 250m
Rotor swept area	up to 21m^2
Capacity of on-site substation	132kV
Area occupied by the on-site substation	~ 2ha in extent
Underground cabling	Underground cabling, with a capacity of 33kV, will be installed to connect the turbines to the on-site facility substation.
Battery Energy Storage System (BESS)	Solid state battery technology (e.g. Lithium-ion technology) as a preferred technology. BESS will be housed in containers approximately 20m long, 3m wide, and 5m high with an approximate footprint of up to 5ha.
Operation and maintenance (O&M) buildings	~ 1ha in extent
Balance of plant area	Temporary laydown areas with an extent up to 6ha. Temporary warehouse of 1ha Temporary site camp establishment and concrete batching plants of 1ha.
Access and internal roads – Main road	Main access road to the site and between project components with a width up to 8m and a servitude of 13.5m.
Access and internal roads – internal network	Road network between project components with a width up to 8m
Turbine hardstand	~up to 7500m^2 per turbine
Turbine foundation	~ 1000m^2 per turbine

The project is intended to provide electricity to the national grid through the Department of Mineral Resource and Energy's (DMRE) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme or other public or private off-taker programmes.

[2] 40 north turbines, and 40 south turbines

1.2 Description of Property and Affected Environment

The proposed Kudu WEF lies to the south of the Kambdebooberge 40km west of the town of Aberdeen. The tarred R61 main road forms the northern boundary and links the area to Beaufort West 140km away in a northwesterly direction from the study area. The majority of the turbines have been positioned in a grid alignment running southwest to northeast to take advantage of the predominant winds sweeping through the open and level ground over which the WEF is proposed. The recent 7 year-long drought impacted the sheep farming activities heavily in this area and a number of ruined farms are being managed centrally as they have no longer been viable to farm as separate businesses. Jeep tracks and a few well constructed gravel roads connect the farms and many of the WEF access roads have been planned along these existing routes. Small-scale crop agriculture is also present and clustered along the water courses growing fodder for the stock farming production in the area.

The vegetation observed during the survey had been severely degraded by the multi-year drought and what was left for sheep to graze. At least one small scale wild game enclosure was also found. The vegetation is sparse and falls within the Karoo biome of succulents and shrubs. The WEF is one of many renewable energy projects proposed in the area around Aberdeen as it has reliable winds, abundant sun exposure and direct access to the national grid which passes directly through the study area.

The area proposed for development is characterised as follows in the Cultural Landscape Assessment completed for this project (Winter, 2023);

- Mountains: The project area is topographically contained to the north, east and west. Vast plains are bound in the south by the Witberg Mountains (peak 1427m) of the Cape Fold Belt and bound to the north by the Great Escarpment. This includes the Sneeuberg Mountains, which lie north of Graaff-Reinet between Beaufort West and Cradock running roughly east west for 48 km.The south-west sector of the Sneeuberg includes the Camdeboo Mountains with the“Sleeping Giant” (1777m) defining the project area to the east. Wolwekop is a local topographical landmark to the east of the intersection of the R61 and the Murraysburg Road. The Oorlogspoortberg contains the project area to the west
- Plains: Colloquially, the plains area has several names, which describe loosely identified geographic areas such as the Camdeboo south of Graaff-Reinet and the Koup (Die Vlaktes), west of Aberdeen towards Beaufort West.
- Water: This is an arid, semi-desert region with a low annual rainfall of 100-200mm. This has dictated low growing karroid shrub vegetation and sparse habitation. The occasional heavy water flow resulting from early summer storms is collected in dams; supply is augmented by ground water extraction. The Kariega River lying west of the site feeds the Biervlei Dam north of Willowmore, used for flood water retention.
- The Fonteinbos Nature Reserve (1500ha): West of Aberdeen on the seasonal Kraai River, which extends

west through the proposed development site. A perennial spring in the reserve, “Die Oog”, supplies drinking water and irrigation for Aberdeen agriculture, and is managed through spring-fed water furrows.

- Agriculture: Predominantly small livestock farming including Merino and Dorper sheep and Angora goat farming, and some game farming activities. The recent 7 year-long drought has impacted farming activities heavily in this area and a number of ruined farms are being managed centrally as they have no longer been viable to farm as separate businesses.
- Routes: The development site lies to the north of the R61. This route connects Beaufort West and Aberdeen, loosely following an early wagon route to Graaff-Reinet. A secondary route to Murrarysburg connects to the R61 just west of the topographical landmark of Wolwekop. A secondary route to Nelspoortconnects to the R61 just west of the Kariega River crossing.
- Settlement patterns: A limited settlement footprint with a dispersed pattern of farmsteads and stone kraals, and the historical town of Aberdeen being the only major urban settlement within the local area situated at the intersection of the R61 and N9, and approximately 35km to the east of the proposed WEF. A number of the farmsteads investigated within the site of the proposed WEF and in close proximity thereof are abandoned and in a ruinous state, probably due to the recent 7 year drought severely impacting the agricultural economy of the area.
- Aberdeen: Situated approximately 35km from the proposed WEF. It is a textbook example of a Karoo grid kerkdorp dating to the mid-19th century. It lies on the Kraay Rivier with the primary source of water supplied from the nearby perennial spring. The town has a noteworthy collection of flat roofed Karoo-type houses and turn of the 20th century villas associated with the merino-sheep boom. In addition to numerous distinctive streetscapes and townscape qualities, the street plan accommodates an octagonal block occupied by the Dutch Reformed Church and situated on an axis with Church, Market and Andries Pretorius Streets. The church steeple is visible from a 25 km distance. The setting of the town within the vast open plains of the Cambedoo is in contrast to the dramatic mountain backdrop of the Camdeboo Mountains to the north. Local topographical conditions shield views from the town towards the proposed WEF.

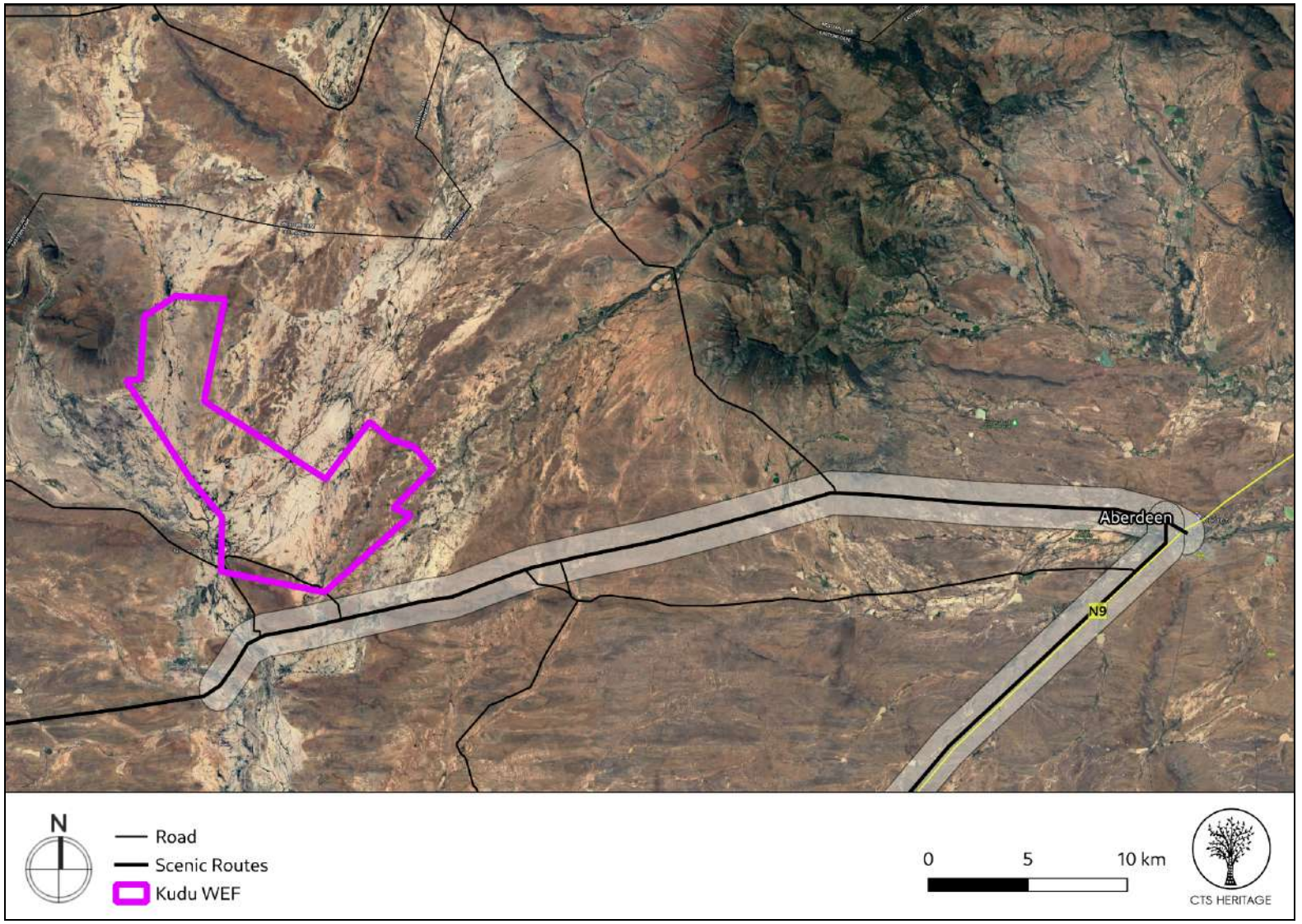

Figure 1.1: Proposed development area of Kudu WEF

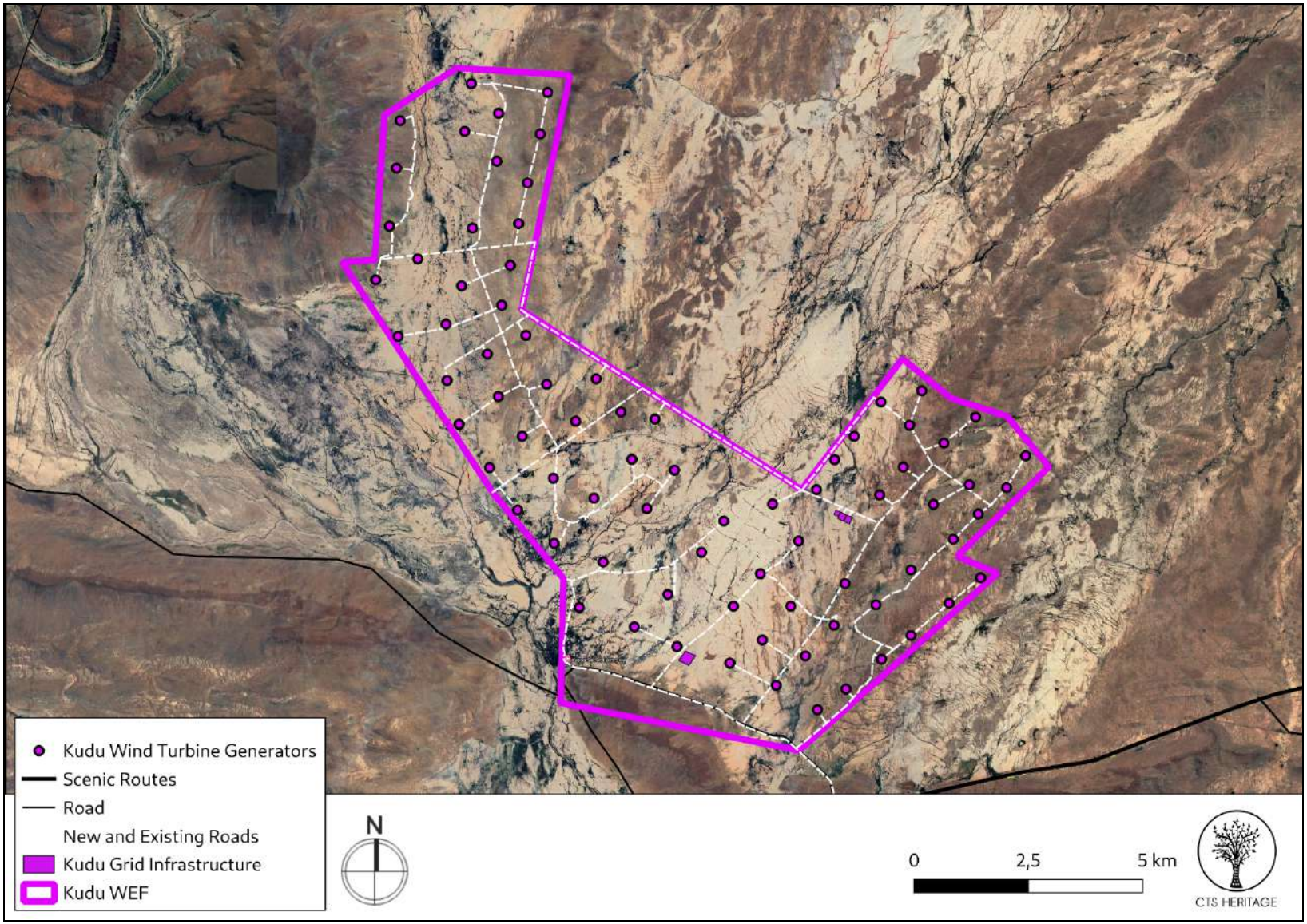

Figure 1.2: Proposed development layout of Kudu WEF

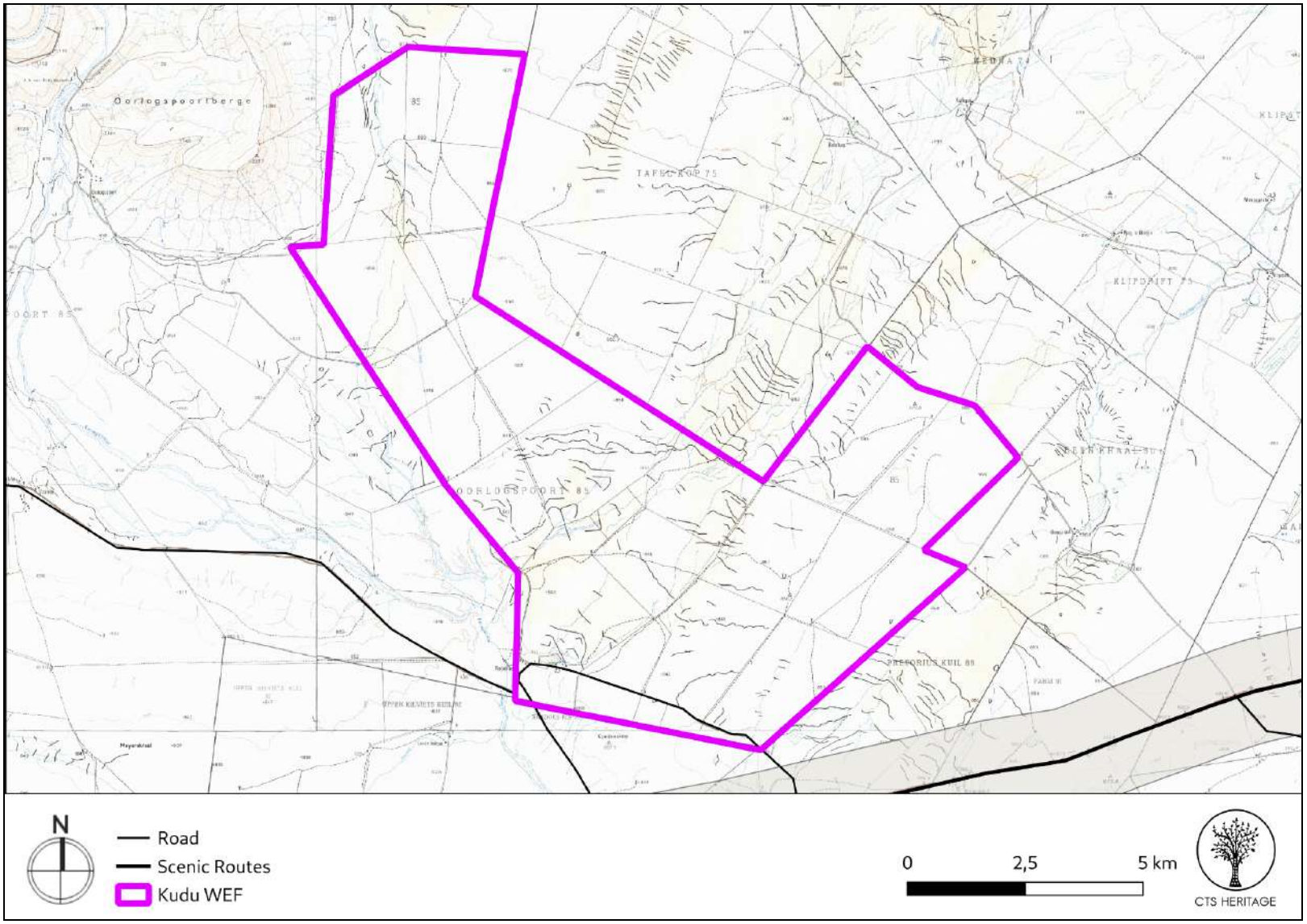

Figure 1.3: The proposed development area of the Kudu WEF Facility on an extract from the 1:50 000 topo map

2. METHODOLOGY

2.1 Purpose of HIA

The purpose of this Heritage Impact Assessment (HIA) is to satisfy the requirements of section 38(8), and therefore section 38(3) of the National Heritage Resources Act (Act 25 of 1999).

2.2 Summary of steps followed

- A Desktop Study was conducted of relevant reports previously written (please see the reference list for the age and nature of the reports used)
- An archaeologist conducted an assessment of archaeological resources likely to be disturbed by the proposed development. The archaeologist conducted his site visit from 20 to 24 June 2023. The results of this work are reported on in Appendix 1. The maps in Appendix 1 reflect an early development layout.
- A palaeontologist conducted an assessment of palaeontological resources likely to be disturbed by the proposed development. The palaeontologist conducted his site visit in from 20 to 24 June 2023. The results of this work are reported on in Appendix 2. The maps in Appendix 1 reflect an early development layout.
- A cultural landscape assessment was conducted that covers the proposed development area with fieldwork completed in July 2023.
- The results of the above assessments were incorporated into this HIA and their findings have been assessed relative to the final development layout in this report.
- The identified resources were assessed to evaluate their heritage significance and impacts to these resources were assessed.

2.3 Assumptions and uncertainties

- The *significance* of the sites and artefacts is determined by means of their historical, social, aesthetic, technological and scientific value in relation to their uniqueness, condition of preservation and research potential. It must be kept in mind that the various aspects are not mutually exclusive, and that the evaluation of any site is done with reference to any number of these.

- It should be noted that archaeological and palaeontological deposits often occur below ground level. Should artefacts or skeletal material be revealed at the site during construction, such activities should be halted, and it would be required that the heritage consultants are notified for an investigation and evaluation of the find(s) to take place.

However, despite this, sufficient time and expertise was allocated to provide an accurate assessment of the heritage sensitivity of the area.

2.4 Constraints & Limitations

The ground was level with very few changes in elevation spread across the study area. No rock shelters or natural outcrops of dolerite boulders were found and the vegetation posed no challenges in terms of survey visibility as the ground was sparsely vegetated. This study was also one of many recently conducted in the area and it was therefore possible to augment observations made from overlapping projects.

The experience of the heritage practitioner, and observations made during the study, allow us to predict with some accuracy the archaeological sensitivity of the receiving environment.

The optimised facility layout of the Tango WEF was only provided in August 2023, well after fieldwork for the project was completed in June and July 2023. As such, the specialist assessments (archaeology, palaeontology and cultural landscape) have not considered this turbine layout in their specialist assessments, but have considered an earlier iteration of the proposed facility layout with a greater number of turbines (See Appendix 1, 2 and 3). The optimised facility layout is, however, considered in this report, and the assessment, conclusions and recommendations are relevant to the current facility layout.

2.5 Savannah Impact Assessment Methodology

Direct, indirect and cumulative impacts of the issues identified through the Scoping study, as well as all other issues identified in the EIA phase were assessed in terms of the following criteria:

- The nature, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- The extent, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high).
- The duration, wherein it will be indicated whether:
    - The lifetime of the impact will be of a very short duration (0 – 1 years) – assigned a score of 1.
    - The lifetime of the impact will be of a short duration (2 – 5 years) – assigned a score of 2.
    - Medium-term (5 – 15 years) – assigned a score of 3.
    - Long term (> 15 years) – assigned a score of 4.
    - Permanent – assigned a score of 5.

- The consequences (magnitude), quantified on a scale from 0 – 10, where 0 is small and will have no effect on the environment, 2 is minor and will not result in an impact on processes, 4 is low and will cause a slight impact on processes, 6 is moderate and will result in processes continuing but in a modified way, 8 is high (processes are altered to the extent that they temporarily cease), and 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- The probability of occurrence, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale of 1 – 5, where 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but low likelihood), 3 is probable (distinct possibility), 4 is highly probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).
- The significance, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high.
- The status, which will be described as either positive, negative or neutral.
- The degree to which the impact can be reversed.
- The degree to which the impact may cause irreplaceable loss of resources.
- The degree to which the impact can be mitigated.

The significance is calculated by combining the criteria in the following formula:

S = (E + D + M) x P

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

The significance weightings for each potential impact are as follows:

- < 30 points: Low (i.e. where this impact would not have a direct influence on the decision to develop in the area).
- 30 – 60 points: Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated).
- > 60 points: High (i.e. where the impact must have an influence on the decision process to develop in the area).

3. HISTORY AND EVOLUTION OF THE SITE AND CONTEXT

3.1 Desktop Assessment

Background:

The area proposed for the Kudu Wind Energy Facility Projects is located approximately 40km west of Aberdeen in the Eastern Cape, and is located within the identified Beaufort West REDZ. With its numerous examples of Victorian architecture, it is one of the architectural conservation areas of the Karoo. The town is some 55 km south-west of Graaff-Reinet, 155 km east-south-east of Beaufort West and 32 km south of the Camdeboo Mountains. Laid out on the farm Brakkefontein as a settlement of the Dutch Reformed Church in 1856, it became a municipality in 1858. It is named after Aberdeen in Scotland, birthplace of the Reverend Andrew Murray of Graaff-Reinet, relieving minister. Aberdeen is filled with examples of Victorian architecture, and the Steeple of the Dutch Reformed Church, with its 50 metre Tower, is the highest in South Africa. There is a Local Authority Nature Reserve found here, as well as The Fonteinbos Nature Reserve which is both beautiful and functional, as its natural spring (Die Oog) supplies the entire town and its agricultural sector with its water.

Historic settlement and the Cultural Landscape (Winter et al. 2021, Appendix 3)

The name Karoo has its roots in the Khoe word meaning “place of great dryness”. The archaeology shows the area as well-used on a seasonal and nomadic basis with water sources providing sites suited to the needs of hunter-gather San people and pastoralist-herder Khoe people (Anderson 1985: 8). The name Camdeboo (Qamdobowa in isiXhosa) is thought to have evolved from a phonetically similar Khoe word possibly meaning “green hollow” to describe the plains after seasonal rain storms.

The late 18th century frontier of the colony was edged by two vast administrative regions, the District of Stellenbosch (1679) and the District of Graaff-Reinet (1786). European settlement came slowly to the central Karoo, with the push north by trekboere taking place in the mid- to late-1700s. Like the Khoe, their lifestyle was semi-nomadic, following transhumance routes and taking temporary ownership of land through a system of renewable permits for loan farms. This was a period of uneasy co- habitation between the trekboere, and the San, Khoe and Xhosa alienated from their preferred grazing to the south and east. Further expansion was fiercely opposed by the San, who resisted alienation from water sources, until they were forcibly suppressed in the 1790s.

British colonial rule from 1806 brought a new landownership policy of perpetual quitrent, imposing “settled agriculture”. This dispossessed Khoe, Xhosa and many of the poorer trekboere who were unable to fit the legal system and were pushed beyond the Great Escarpment or subjugated to a life of labour. Wealthy farming burghers, merchants and government officials took over land suitable to sheep farming (Anderson 1985, Guelke Shell 1992). The 1820s to 1860s shows a steady pattern of Karoo land grants, with the later ones in more remote areas often formalising the rights of a pre-existing land user.

Aberdeen town was established on the farm Brakkefontein, which had been a fairly early grant for the area, signed over in 1817 by the British Governor Lord Charles Somerset. In 1855 the farm was bought by the Graaff-Reinet Dutch Reform church to provide for its congregation, growing as result of the Marino wool export boom which began in the 1840s. Work began on the Cape Gothic-style Dutch Reform church in 1855 (completed in 1907). Built to seat 2000, it is notable for the unusual height of its steeple, over 50m, which acts as a landmark in the mostly flat landscape. The Methodist church was completed in 1883 and is a simple stone rectangular building, with buttresses and arch top windows. The bell tower is topped with a belfry of cast iron lace-work.

The invention of the ground water pump, the “wind mill” (late 1880s) allowed year-round access to water for irrigation and stock, and becoming an identifying feature of the Karoo landscape. By the 1900s the area was well established for wool, mohair and tobacco production.

The South African War (1899-1902) had a negative social impact on Aberdeen area, pitting families aligned with the Colonial government against those with Boer Republic sympathies, with 139 “Cape Rebels” recorded. However, it was not a significant military base nor the site of major battles and little tangible evidence remains.

Provisional research suggests that the farms affected by the proposed development fall into the mid-19th century period of quitrent grants. In all cases, it is possible that the farm was in use prior to the grant, and may have had early structures for shelter/habitation and animal management. However, it is probable that permanent habitation followed later once water management systems, such as the ground water wind pumps, were readily available.

Surveyor annotations on the early survey diagrams for the affected farms indicate roads, water features, houses and dams. Cadastral meeting points are occasionally identified by “bush”, indicating the rarity of taller vegetation clusters and their capacity to serve as landmark features.

- Doornpoort 93, a very large tract of land granted in 1865 to James Roberts who subsequently purchased it. It was subdivided in the mid-20thC. An 1861 survey shows the historic route running par- allel and south of the R61 from Aberdeen towards Beaufort West.
- Kraanvogelkuil surveyed 1869 was granted to JP Pienaar in 1874. The survey diagram notes that is it crossed by the “road to Aberdeen”.
- Neighbouring Koppieskraal 157 was also surveyed in 1869 and grant- ed to JS Pienaar in 1876. The diagram shows a house and dam.
- The Kraayrivier Outspan 150, noted in early surveys as a public out- span on the periodical Kraay River and shown as having a bushy patch, moved into the private ownership of Jacob Johannes Weideman and sons in 1893. This reflects the late 19thC improved road systems and means of transport, reducing the need for outspan places.

- Kraairivier 149 was granted at the same time to Weideman and sons.
- The settlement of Pretoriuskuil on Farm 91 adjacent to the N61 may include early settlement fabric.

Archaeology

Recently, a number of heritage assessments have been completed within close proximity to the area proposed for development (Figure 2a). According to Nilssen (2014, SAHRIS NID 504763), "The Karoo houses a long and rich archaeological record dating from the earliest stages of Stone Age technology that are over a million years old, to the historic period that consists of the last few hundred years of human occupation (see Nilssen 2011 and references therein). Archaeological sites include caves and rock shelters, open air artefact scatters, rock engravings and historic structures with their associated cultural materials." According to the ACO (2013, SAHRIS NID 503074), "Because of the scarcity of caves and shelters, more than 90% of Karoo archaeological sites are open sites of stone artefacts, ostrich eggshell fragments and occasionally, pottery. Bone remains are rarely preserved. Artefacts of both the Early and Middle Stone Age are widespread and may generally be described as an ancient litter that occurs at a low frequency across the landscape. Where definable scatters of Early and Middle Stone Age material occur, they are considered to be significant heritage sites.

More intensive occupation of the Karoo started around 13 000 years ago during the Later Stone Age, which is essentially the heritage of Khoisan groups who lived throughout the region. The legacy of the San includes numerous open sites while traces of their presence can also be found in most large rock shelters, often in the form of rock art. They frequently settled a short distance from permanent water sources (springs or waterholes) and made use of natural shelters such as rock outcrops or large boulders or even large bushes. In the Great Karoo, natural elevated features such as dolerite dykes and ridges played a significant role in San settlement patterns" and as such, this broader area is renowned for its well-preserved rock art and other artefacts from this time, including rock engravings and rock gongs. It is likely that similar archaeological heritage exists within the areas proposed for development and as such, impact to these resources must be assessed.

A Heritage Impact Assessment was completed in 2013 for the proposed Aberdeen WEF located east of the area proposed for development (Booth and Sanker, SAHRIS NID 251161). The findings of this assessment therefore provide an indication of the kinds of heritage resources likely to be present within this proposed development area. Booth and Sanker (2013) noted that "Surface scatters of predominantly Middle Stone Age stone artefacts were observed over most of the area proposed for the development, these included isolated as well as dense occurrences. Eight areas / sites have been identified that comprise relatively dense scatters of stone artefacts over large areas with several micro-sites within the demarcated sites. It was observed that denser distributions of stone artefacts occurred in the north and central areas of the study area, filtering out towards the south. No associated archaeological material or organic remains were documented with the stone artefact surface scatters.

An historical stonewalling farmstead complex is situated adjacent to one of the proposed access roads. The complex comprised the remains of the house and two kraals.Packed stones were identified in the south-central area. The packed stone may resemble a kraal that has now collapsed. Fragments of glass and pottery were found within this area, as well as a No. 2 Musket Eley bullet casing associated with the Second Anglo-Boer War."

In 2022 and 2023, CTS Heritage has completed Heritage Impact Assessments for the proposed Aberdeen WEF Cluster and the proposed Kariega WEF Cluster. Both facilities border on the area proposed for the Kudu WEF. The findings of the assessments completed by CTS Heritage largely correlate with the findings of other assessments completed in the vicinity such as the findings of the Booth and Sanker (2013, SAHRIS NID 251161). The observations noted include high numbers of quarried stone artefacts predominantly from the Middle Stone Age and Later Stone Age period which is consistent with observations on neighbouring farms through impact assessments and research surveys. The majority of the lithic material identified was determined to be of low significance (not conservation-worthy), and the impact of the destruction of these resources was determined to be inconsequential. The findings of the completed assessments conclude that, despite the high number of observations of artefacts, these resources are common and representative of similar scatters across widespread areas of the Karoo. Despite the very high numbers of observations made, the archaeological material is ubiquitous across the entire area and in general, the results of this assessment indicate that the archaeological sensitivity of the development area is low. All of the resources identified by Booth and Sanker (2013) as well as CTS Heritage (2022, 2023) have been mapped relative to the proposed development in Figure 3.

Palaeontology

According to the SAHRIS Palaeosensitivity Map (Figure 4a), the area proposed for development is underlain by sediments of very high paleontological sensitivity. According to the extract from the Council for GeoSciences Map 3122 for Victoria West, the development area is underlain by the Abrahamskraal and Teekloof Formations, both of the Adelaide Subgroup of the Beaufort Group of sediments. According to the SAHRIS Fossil Heritage Browser and the Palaeotechnic Report for the Western Cape (Almond and Pether, 2008), the Beaufort Group sediments are known to preserve diverse terrestrial and freshwater tetrapods of *Tapinocephalus* to *Lystrosaurus* Biozones (amphibians, true reptiles, synapsids – especially therapsids), palaeoniscoid fish, freshwater bivalves, trace fossils (including tetrapod trackways) and sparse vascular plants (*Glossopteris* Flora, including petrified wood).

A Palaeontological Impact Assessment was completed in 2014 for the proposed Aberdeen WEF located immediately north of the area proposed for development (Almond, SAHRIS NID 251166). The findings of this assessment therefore provide an indication of the kinds of palaeontological resources likely to be present within this proposed development area. Almond (2014) noted that "The entire wind farm study area is underlain at depth by fluvial sediments assigned to the lowermost part of the Teekloof Formation (Lower Beaufort Group) that are of

Late Permian age (*c.* 260 million years old). The mudstone-rich succession of the Hoedemaker Member represented here is associated with moderately diverse fossil biotas of the *Tropidostoma* Assemblage Zone that include a range of mammal-like reptiles, true reptiles, fish, amphibians as well as plants and trace fossils. To the author's knowledge there are no previously identified fossil vertebrate finds within the study area, although a small lizard-like specimen was apparently found (probably preserved within a palaeocalcrete nodule) among surface gravels along its northern margin (Mnr Loots, pers. comm., Nov. 2014). The only fossil material recorded during the present field assessment comprises sparse blocks of well-preserved silicified wood that occur widely among surface gravels through much of the study area. Most of the fossil wood specimens have probably been downwasted from channel sandstones within the Hoedemaker Member itself, but some cherty fossil wood clasts may have been introduced from elsewhere within fluvial gravels. The general lack of fossil records in the Aberdeen *vlaktes* may well be due, in large part, to very low levels of bedrock exposure in this low-relief area, as well as due to local development of cleavage, near-surface calcrete veining and weathering. It is concluded that, while there is a significant chance that fossil vertebrate remains will be disturbed, destroyed or sealed-in by the proposed wind energy facility development, these are best mitigated by applying a chance find procedure. The operational and decommissioning phases of the wind farm are unlikely to involve further adverse impacts on local palaeontological heritage, however."

In a palaeontological comment drafted by Almond (June 2023), it is noted that "recent palaeontological fieldwork by the Evolutionary Studies Institute, Wits University (Day & Rubidge 2020), as well as palaeontological heritage assessments for neighbouring solar and WEF project areas (Almond 2022a, 2022b, 2023) have yielded sporadic vertebrate fossils of the Tapinocephalus Assemblage Zone in the region (e.g. Oorlogspoortberge), suggesting that the Lower Beaufort succession here is somewhat older, probably spanning the Abrahamskraal Formation / Teekloof Formation contact (Figure 3). Satellite imagery indicates that occasional patches and stringers of potentially fossiliferous bedrocks are present within the WEF project areas but are very sparse, mainly concentrated along incised drainage lines and on gullied hillslopes. Bedrock exposure levels are generally very low due to the thick prisms of Late Caenozoic alluvial gravels and sands extending from the Great Escarpment Zone to the north. These younger superficial deposits are largely unfossiliferous, apart from locally common blocks of well- to poorly-preserved petrified wood reworked from the bedrocks beneath.

Provisional palaeosensitivity mapping by the DFFE Screening Tool suggests that the majority of both WEF project areas is of Low Palaeosensitivity, corresponding to the Late Caenozoic alluvium, with a Very High Sensitivity associated with a few, small areas featuring Beaufort Group bedrock exposure (Figure 2). Palaeontological surveys of similar terrain in neighbouring WEF project areas (Almond 2022, 2023) suggest that, in practice, fossils of scientific and conservation value are likely to be very rare at or near-surface in the latter areas due to weathering as well as thermal metamorphism by dolerite intrusions."

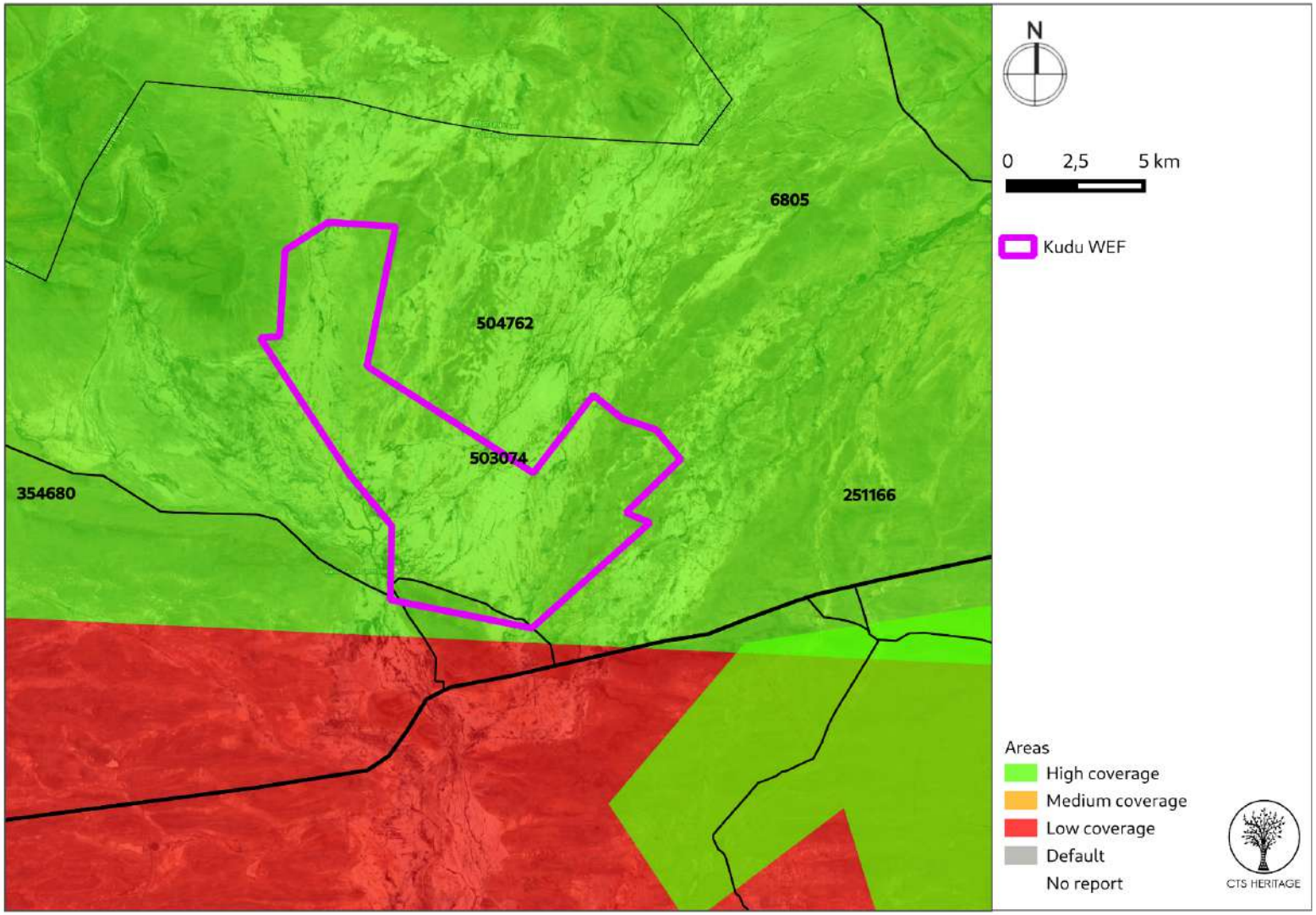

Figure 2.1: Spatialisation of heritage assessments conducted in proximity to the proposed development of Kudu WEF

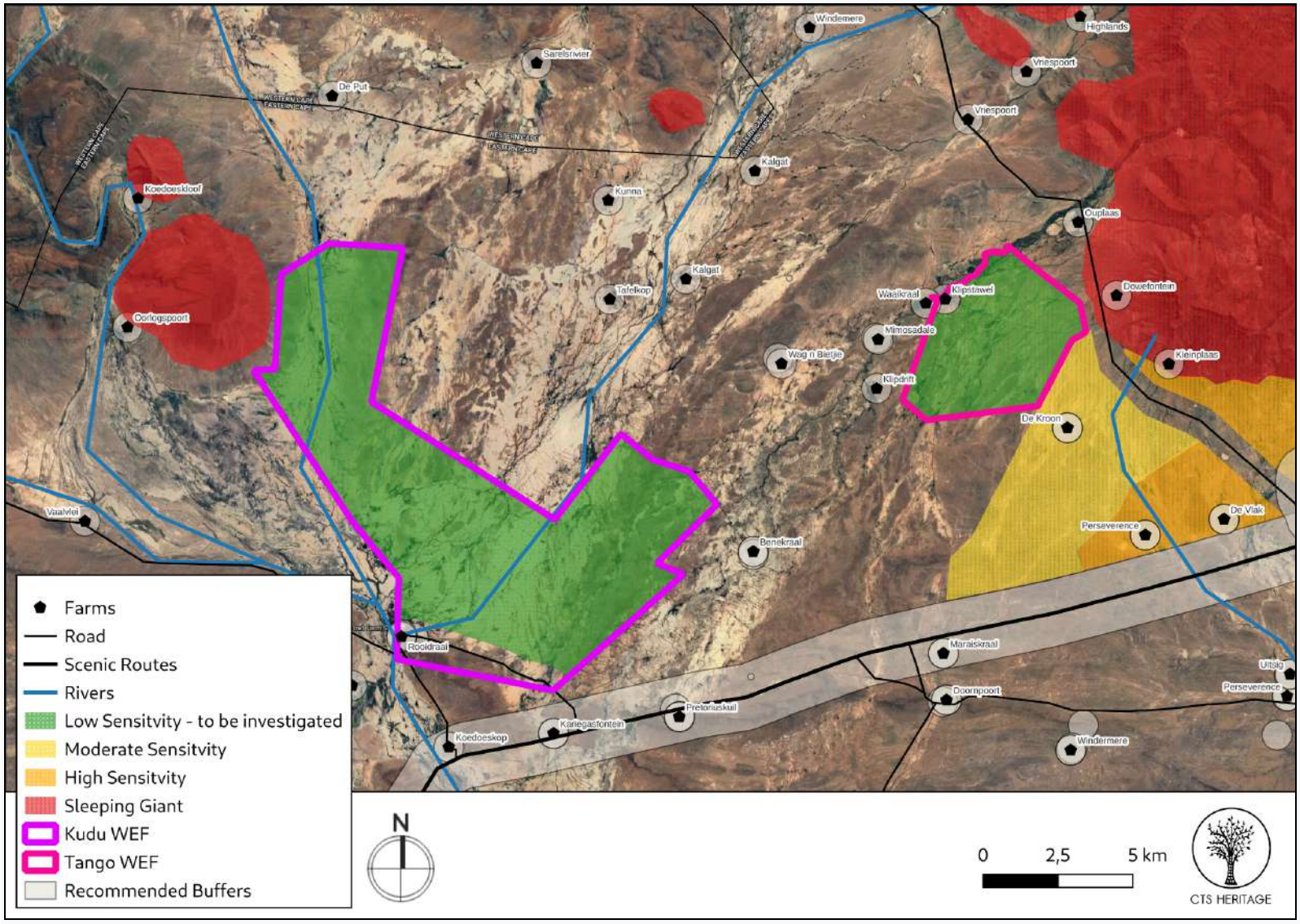

Figure 2.2. Overview. Cultural Landscape Sensitivity

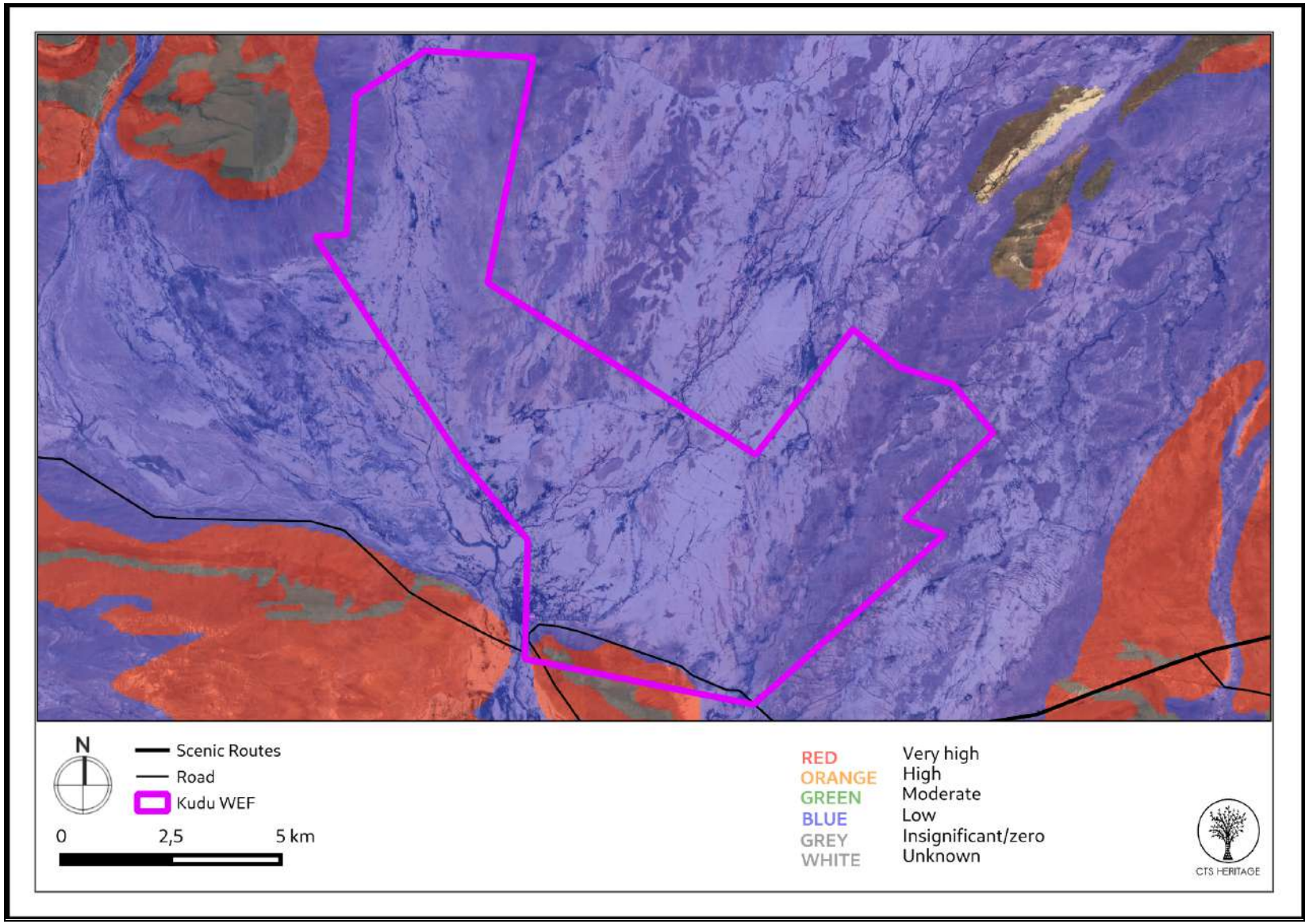

Figure 3.1: Palaeontological sensitivity of the proposed development area of Kudu WEF

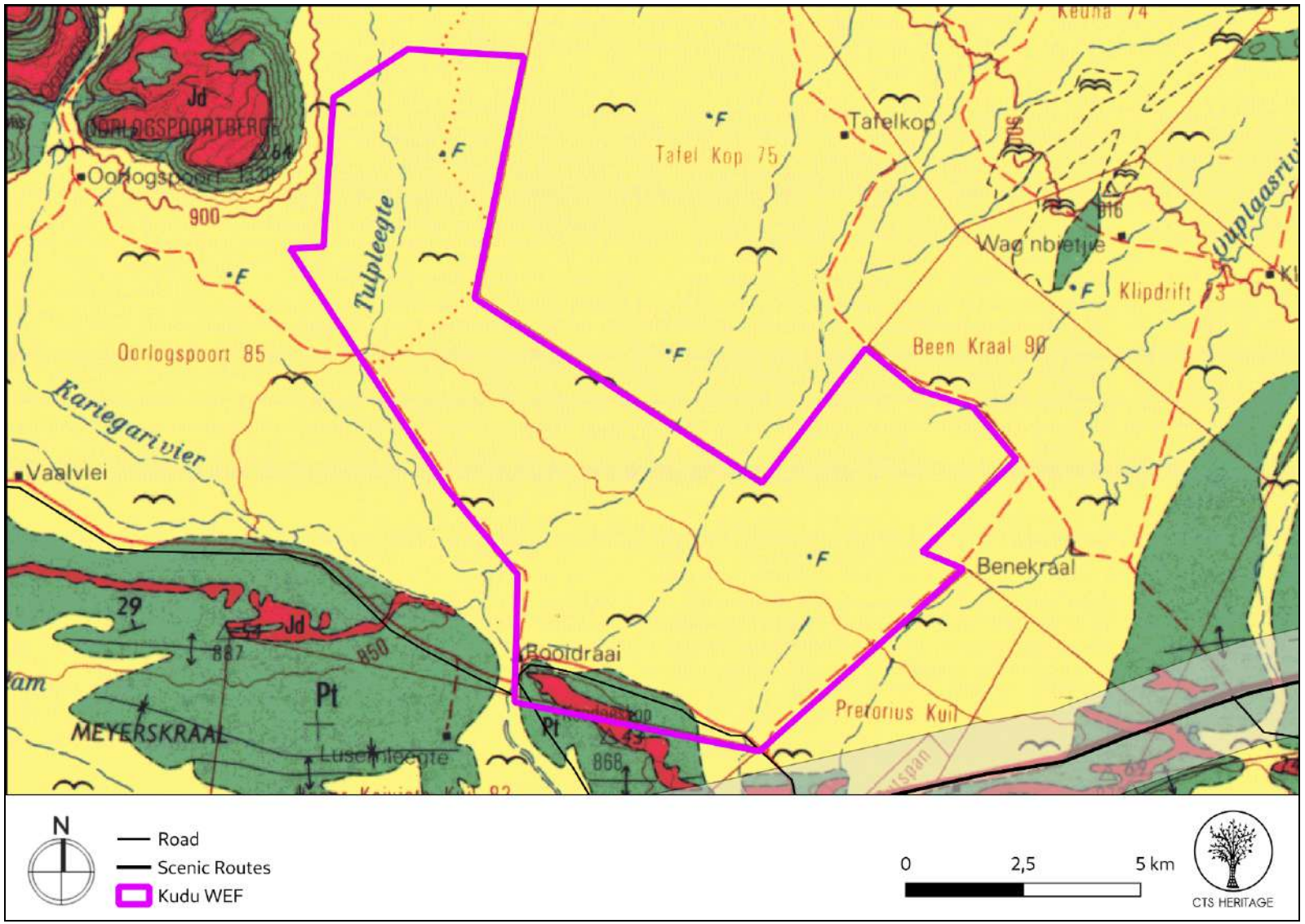

Figure 3.2: Geology Map. Extract from the CGS 3222 Beaufort West Map indicating that the development area for the WEF development is underlain by sediments of Pt: Poortjie Member of the Teekloof Formation of the Adelaide Subgroup and Jd: Jurassic Dolerite as well as Qc: Quaternary Sands for Kudu WEF

4. IDENTIFICATION OF HERITAGE RESOURCES

4.1 Summary of findings of Specialist Reports

Cultural Landscape and the Built Environment (Winter et al. 2023, Appendix 3)

The concept of cultural landscape gives spatial and temporal expression to the processes and products of the interaction between people and the environment. It may thus be conceived as a particular configuration of topography, geology, vegetation, land use and settlement pattern and associations which establishes some coherence of natural and cultural processes.

The overall landscape of the study area is a vast, open, barren, largely featureless plain. It lies to the west of an area of high scenic value framed to the north by the south-west sector of the Camdeboo Mountains, notably the Sleeping Giant. The R61 and N9 are regional linkage routes traversing a representative Karoo landscape and having some scenic heritage value in terms of its sense of remoteness.

The Camdeboo Plains and mountain backdrop, with its core lying east of the proposed development area, is of high local historical, aesthetic architectural and social significance. Of particular heritage significance is the town of Aberdeen, which is worthy of Grade IIIA heritage status in terms of the following:

- Historical value dating to the mid-19th century and including its local role in the South African War.
- Architectural and aesthetic value in terms of its street pattern, streetscape and townscape, concentration of conservation worthy buildings, and its relationship with its setting, notably its mountain backdrop to the north.
- Cultural landscape value as providing a focal and destination point within a vast open flat landscape and at the intersection of two regional routes.

The cultural landscape to the west of Aberdeen and forming part of the landscape affected by the proposed WEF has historical value in terms of forming part of a pattern of land grants dating to the mid-19th century. Natural features and patterns of use over time contribute to its landscape character (watercourses, topographical features, routes, farmsteads, stone kraals). While the landscape itself is not worthy of formal protection in terms of the NHRA, it possesses conservation-worthy landscape elements for aesthetic (visual, place making) and historical reasons.

Archaeology (Appendix 1)

The historic to modern farming use of the landscape has contributed to the built environment pattern of settlement in the area with typical Karoo werfs, many now ruined, dotting the landscape. A number of farm dams have been made in the past by using earthmoving equipment to push up dirt banks along the watercourses. Nearly 60 additional observations were made of various archaeological sites falling within the Kudu WEF area.

Two areas previously recorded during the Kariega WEF study identified ruins and built environment heritage located near the northeastern end of the Kudu WEF associated with a stock kraal settlement on the way to the Benekraal werf as well as the Rooidraai werf near the southern end of the development area noted earlier. No impacts on these built environment heritage resources are anticipated but are noted as part of the broader assessment of heritage resources in the region.

Given the lack of natural rock shelters on the landscape and absence of dolerite boulders favoured by rock engravers during the Later Stone Age, the vast majority of the observations consisted of open air scatters of Middle and Later Stone Age artefact scatters. The vast majority of the archaeological sites recorded consisted of Middle Stone Age open site scatters of tools made of hornfels and siltstone which are abundant and easily sourced within the local area. The Later Stone Age scatters tended to contain high quality hornfels that appeared to be introduced into the area and were far less patinated and weathered than the extensive MSA material. Artefacts were seen throughout the study site and areas within the floodplain of the Kariegarivier containing less visible surface material are likely to hold buried archaeological material. The modern dirt furrows and sand banks created in the 1950s have no doubt contributed substantially to the build up of sediment burying many of these scatters.

Palaeontology (Appendix 2)

The Kudu WEF project area on the northern margins of the Aberdeen *Vlaktes* are underlain at depth by potentially fossiliferous continental (fluvial / lacustrine) bedrocks of the Lower Beaufort Group (Adelaide Subgroup). These bedrocks probably belong largely or entirely to the Middle Permian Abrahamskraal Formation rather than the Late Permian Teekloof Formation as currently mapped. However, basal channel sandstones of the Poortjie Member (Teekloof Formation) might extend into the NW edges of the Kudu WEF project area on the lower footslopes of the Oorlogspoortberge. There are no historical records of fossil vertebrates from the project area; this is probably largely due to the extremely poor levels of bedrock exposure found here. Fragmentary remains of large dinocephalians have recently been recorded from the Aberdeen *Vlaktes* just to the south as well as from the slopes of the Oorlogskloofberge to the west. During the recent 3-day palaeontological field visit no occurrences of fossil vertebrates were recorded.

A background scatter of petrified (silicified) wood blocks reworked from the Lower Beaufort Group bedrocks occurs within surface gravels of eluvial and alluvial origin in several sectors of the Kudu WEF project area. Locally abundant, ferruginised moulds and poorly-preserved petrified wood occurs in association with channel sandstone basal conglomerates on the NW margins of the Kudu WEF project area (Oorlogspoortberge eastern footslopes). Most of the fossil wood material is poorly preserved and of very limited scientific value. Mitigation of the recorded

fossil wood sites is not recommended here, given the abundance and widespread occurrence of better-preserved material regionally in the northern Aberdeen *vlaktes* and the fact that the material is not *in situ*.

Most of the low-relief terrain within the WEF project area is covered by a thin to thick blanket of Late Caenozoic superficial deposits, including alluvial gravels and sands, eluvial and colluvial surface gravels, calcrete hard pans, pan sediments and gravelly to sandy soils. Apart from reworked fossil wood blocks and Late Caenozoic calcretised plant root casts of widespread occurrence and limited palaeontological interest, no fossils of Caenozoic age have been recorded within these younger sediments.

4.2 Heritage Resources identified

Various Landscape Elements of Cultural Value have been identified within the area proposed for development:

- Topographical Features
    - A sense of topographical containment to the north, east and west of the project area.
    - Wolwekop peak situated just north of the R61 near the Murraysburg secondary road. This is a distinctive landmark feature. It is recommended that the nearest turbine be located more than 2.5km from this peak.
    - Camdeboo Mountains and the “Sleeping Giant” formation framing the long views northwards.
    - The Oorlogspoortberg framing views westwards.
- Water courses and infrastructure
    - A network of periodical water courses traversing the project area and informing the pattern of settlement.
    - Dams, wind pumps and water furrows.
- Planting Patterns
    - Clumps of trees typically founds around homesteads as shelter from the sun/wind and as place-making elements.
- Scenic and historic routes
    - The R61 as a regional linkage route of some scenic value with dramatic views towards the mountain backdrop to the north. A 1km no-development buffer on either side of this road is recommended.
    - The combination of the intersection of the R61 and the Murraysberg Road, change in topography and the landmark qualities of the Wolwekop providing a threshold condition.
    - The MurraysburgRoadand Nelspoort Road of local historical scenic value
- Settlements
    - Aberdeen town of suggested Grade IIIA heritage value and situated approximately 35 km east of the proposed WEF.

- A number of farmsteads and stone kraals situated within or adjacent to the proposed WEF of mostly Grade IIIC heritage value and in some instances of suggested Grade IIIB heritage value. A 500m no-development buffer is recommended for these sites.
- Oorlogspoortfarmstead of suggested Grade II heritage value in terms of its evidence of historical layering dating to the 19th century, possibly earlier, and its distinctive landscape setting.
- The collection of graves on the farm Kalgat and their association with the South African War of suggested Grade IIIA heritage value

In terms of the heritage resources identified in the archaeological field assessment, see Table 2 below. Sites 001 and 062 are graded IIIC. Sites 001 and 062 are located well away from the proposed development footprint and no impact is anticipated.

Table 2: Artefacts identified during the field assessment development area

POINT	Description	Type	Density/ m^2	Period	Co-ordinates		Grading	Mitigation
001	Rooidraai farm. "Karoo Secret" Cottage, early 20th century with corrugated iron roof, more modern stoep added later	Structure	Historic	n/a	-32.488176	23.550344	IIIC	No impact anticipated
062	Rooidraai main werf, mostly modern additions but early 20th century buildings present, lots of labourers' cottages.	Structure	Historic, Modern		-32.487224	23.54628	IIIC	No impact anticipated

Figure 6.1: Observation 001 and 062

In terms of the heritage resources identified in the palaeontological field assessment, see Table 3 below.

Table 3: Palaeontological observations made during the field assessment for the proposed WEF

POINT ID	Description	Co-ordinates		Grading	Mitigation
306	Portion 2 of Farm Oorlogspoort 85. Sparse blocks of colour-banded petrified wood within eluvial surface gravels. Proposed Field Rating IIIC. No mitigation recommended.	-32.498458	23.606089	IIIC	NA
331	Portion 2 of Farm Oorlogspoort 85. Isolated block of colour-banded petrified wood within band of relict "High Level" alluvial gravels. Proposed Field Rating IIIC. No mitigation recommended.	-32.446002	23.619753	IIIC	NA
332	Portion 2 of Farm Oorlogspoort 85. Dense surface scatter of cobbly eluvial to alluvial gravels with occasional reworked blocks of poorly-preserved silicified wood showing amorphous structure (possibly partially decomposed before silicification). Proposed Field Rating IIIC. No mitigation recommended.	-32.450711	23.616316	IIIC	NA
333	Portion 2 of Farm Oorlogspoort 85. Dense surface scatter of cobbly eluvial to alluvial gravels with occasional reworked blocks of poorly-preserved silicified wood showing amorphous structure (possibly partially decomposed before silicification). Proposed Field Rating IIIC. No mitigation recommended.	-32.451702	23.616341	IIIC	NA
335	Portion 2 of Farm Oorlogspoort 85. Sheet-washed eluvial surface gravels within pan-like brak-koll in sandy vlaktes with occasional small blocks of well-preserved, cherty, grey-green petrified wood. Proposed Field Rating IIIC. No mitigation recommended.	-32.485734	23.591707	IIIC	NA
343	Portion 2 of Farm Oorlogspoort 85. Patch of dark greyish, pebbly surface gravels with occasional small blocks of poorly-preserved, reworked petrified wood. Proposed Field Rating IIIC. No mitigation recommended.	-32.455503	23.563173	IIIC	NA
351	Portion 2 of Farm Oorlogspoort 85. Surface colluvial to eluvial gravels mantling eastern footslopes of Oorlogspoortberge with sparse blocks of poorly-preserved silicified wood downwasted from channel sandstone package upslope to the west. Proposed Field Rating IIIC. No mitigation recommended.	-32.390249	23.507883	IIIC	NA
353	Portion 2 of Farm Oorlogspoort 85. Mudclast breccias at base of thin package of yellowish-brown channel wackes (uppermost Abrahamskraal Fm or basal Poortjie Member, Teekloof Fm) containing abundant rusty-brown moulds of reworked woody plant axes. Proposed Field Rating IIIC. No mitigation recommended.	-32.390722	23.50385	IIIC	NA
354	Portion 2 of Farm Oorlogspoort 85. Surface colluvial to eluvial gravels mantling eastern footslopes of Oorlogspoortberge with sparse blocks of poorly-preserved silicified wood downwasted from channel sandstone package upslope to the west. Proposed Field Rating IIIC. No mitigation recommended.	-32.392891	23.504234	IIIC	NA
355	Portion 2 of Farm Oorlogspoort 85. Locally abundant blocks of poorly-preserved silicified wood weathered-out from channel sandstone package just above. Proposed Field Rating IIIC. No mitigation recommended.	-32.392969	23.504141	IIIC	NA

4.3 Mapping and spatialisation of heritage resources

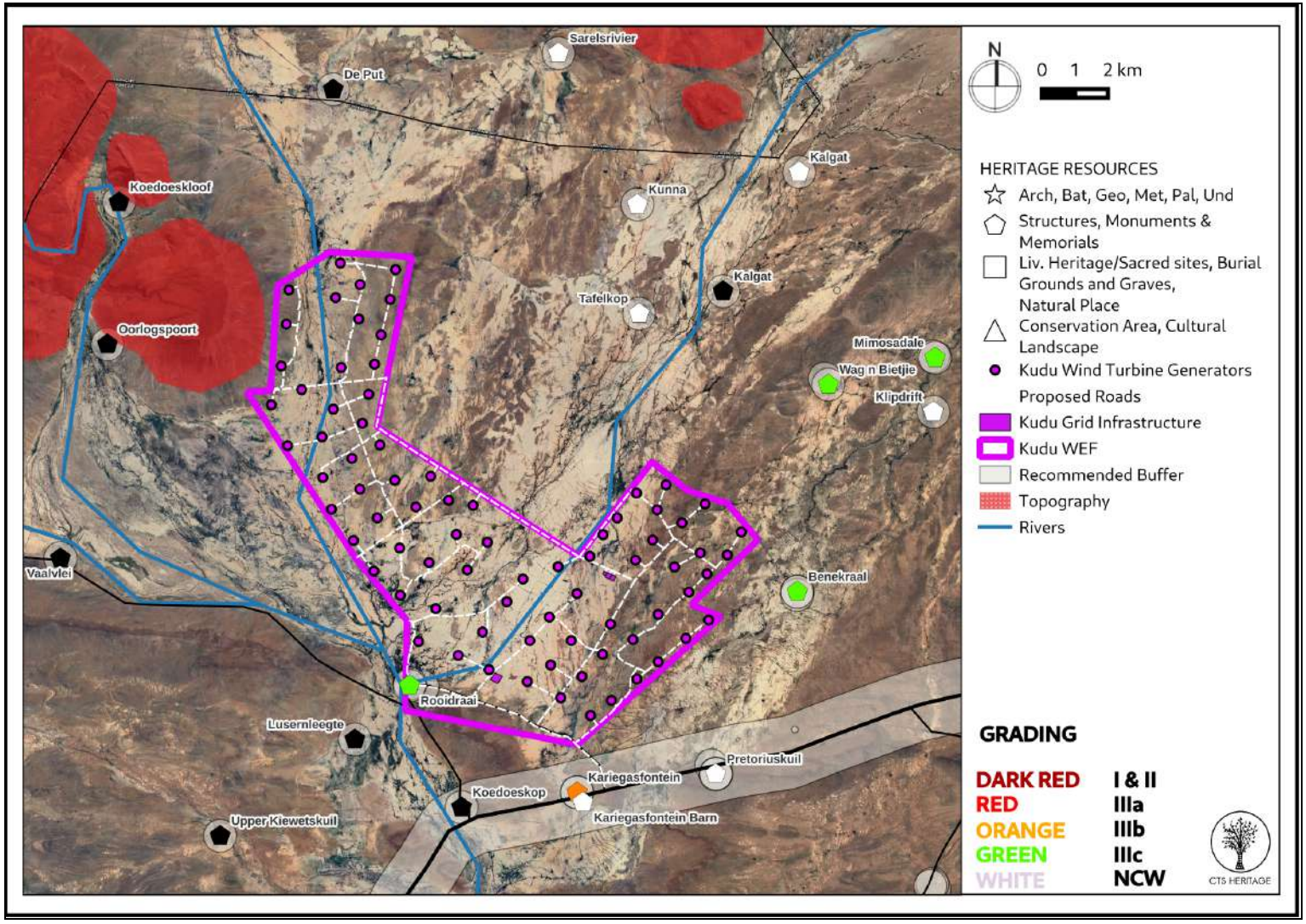

Figure 6.1: Map of landscape elements within the proposed development area

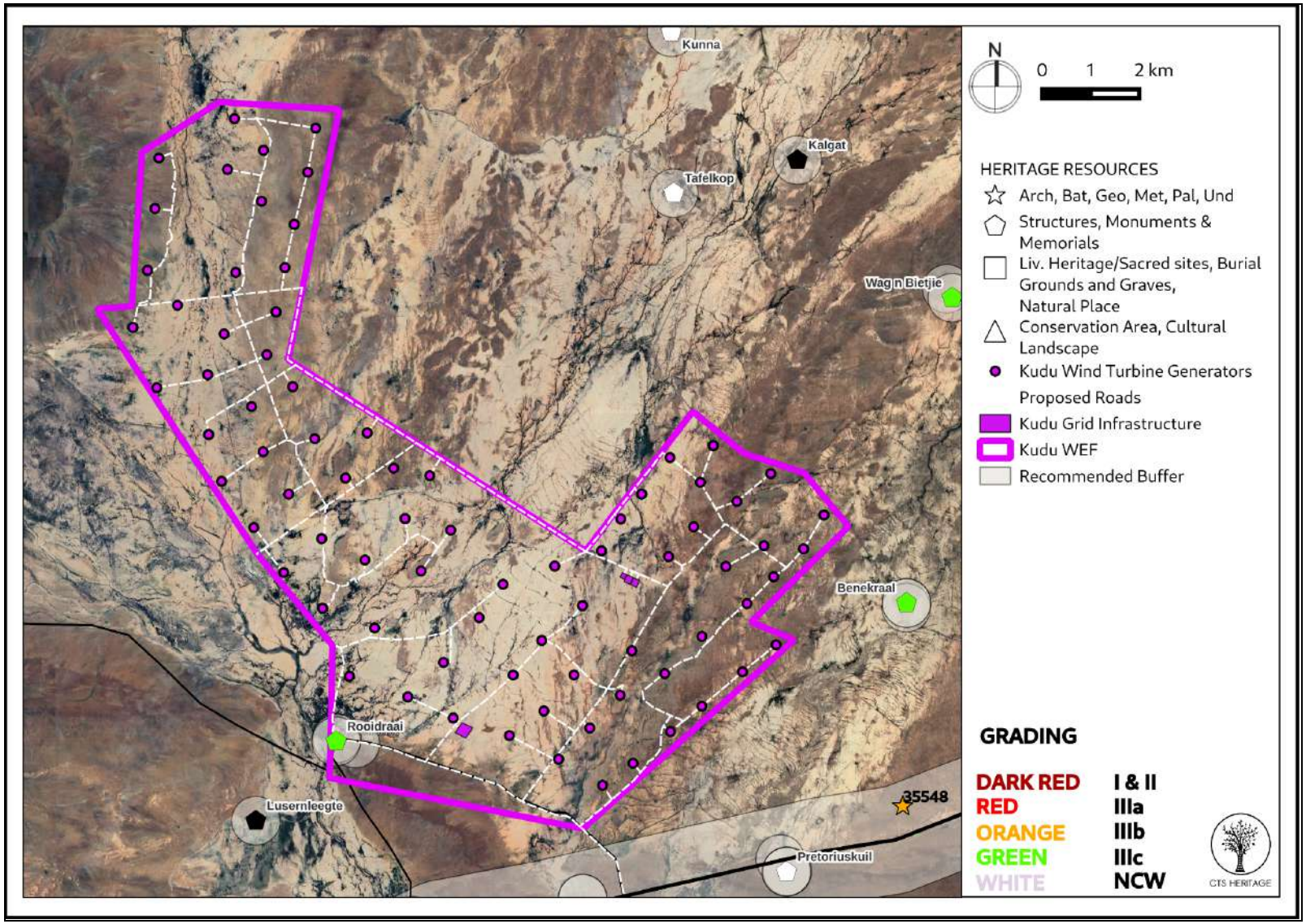

Figure 6.2: Map of archaeological heritage resources within the proposed development area

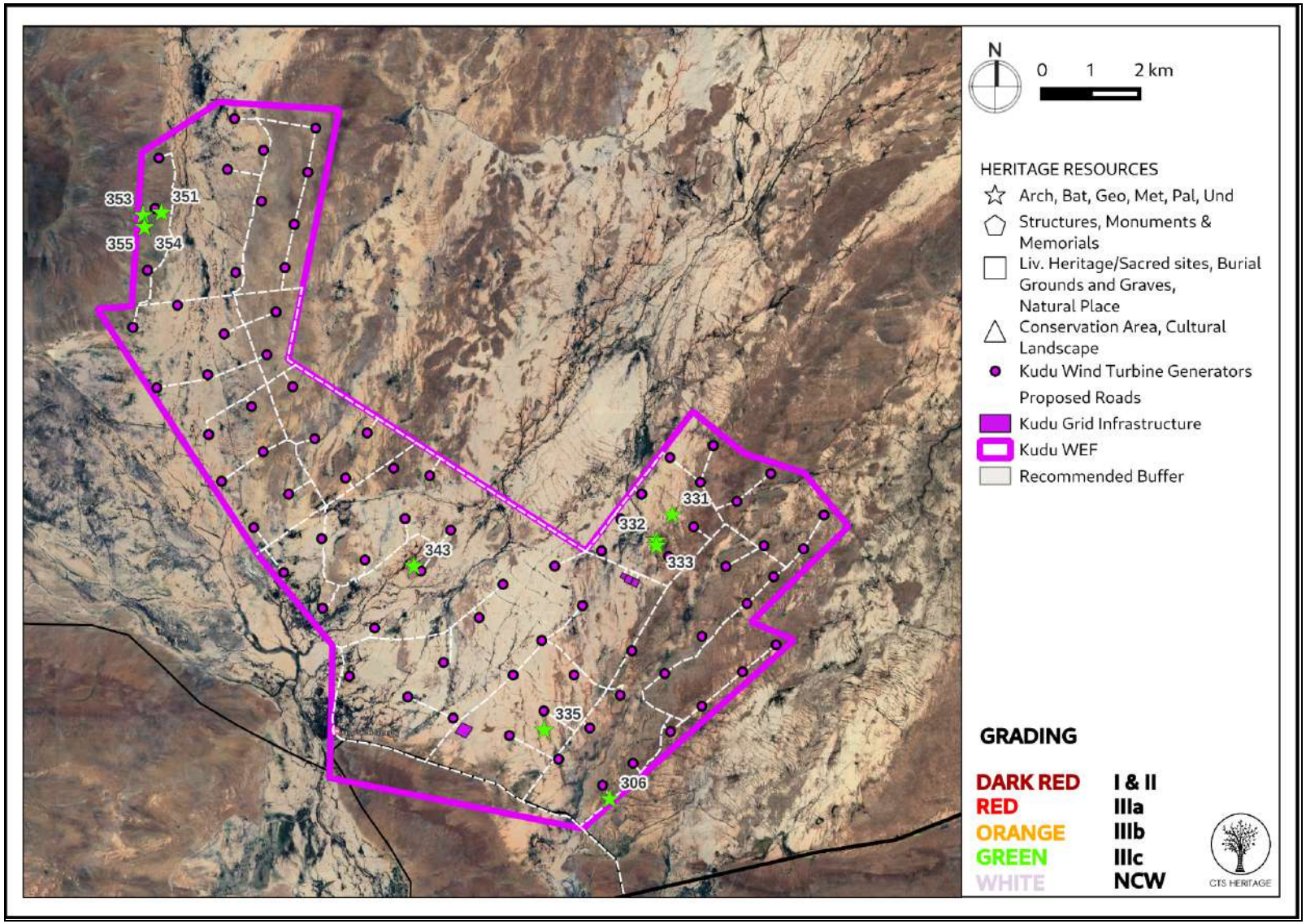

Figure 6.3: Map of palaeontological heritage resources within the proposed development area

5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

5.1 Assessment of impact to Heritage Resources

5.1.1 Cultural Landscape

WEF Turbine placement - position ("where"):

The indicators are to be aligned with the visual sensitivity analysis and to include the following:

- Setback from the N9 and the R61 by at least 1km on either side.
- Avoid steep or elevated topography, ridgelines or koppies, with a no development buffer of at least 2.5km from Wolwekop
- Setback from graded resources and farmstead settlements IIIB and IIIC, by 500m.
- Setback from farmsteads forming part of the settlement pattern by at least 500m
- Concentrate placement in proximity to the existing infrastructure.

Turbine placement - principles ("how"):

The following general principles apply to the turbine layout:

- Avoid an orthogonal pattern in favour or a more organic pattern.
- Turbines should be clustered or read as single elements in the landscape, as opposed to being aligned in a row in visual spatial proximity of each other.
- Avoid continuous or unbroken swathes of infrastructural interventions, especially as viewed from scenic routes
- Avoid a stacking effect of the alignment of turbines, especially as viewed from scenic routes. A staggered setback line is preferable.

Based on the desktop mapping and assessment of potential heritage resources and receptors, and subsequent fieldwork, the principle of a WEF in the proposed location is acceptable from a cultural landscape perspective. There are no red flags, which identify the project to be a fatal flaw from a cultural landscape perspective.

At a regional scale, the project is located to the south of the Great Escarpment, to the west of the distinctive Camdeboo Plains and at considerable distance from the cluster of Nature Reserves around Graaff Reinet.

At the local scale, the project is generally located away from major scenic topographical features and beyond 35km from the town of Aberdeen and beyond 10km from the Fonteinbos Nature Reserve. At a local and site scales, the following sensitive heritage receptors have been identified:

- Historical farmsteads (Grade IIIB and IIIC)
- The scenic qualities of the R61
- The Murraysburg Road and east-west historical access route

- Wolwekop as a distinctive topographical feature adjacent to the R61 and the Eastern footslopes of the Oorlogspoort

No structures or cultural landscape elements of significance are located within the area proposed for development and the optimised layout observes the recommended buffer areas and mitigation measures.

In terms of the heritage resources identified in the heritage field assessment, Sites 001 and 062 are graded IIIC. Sites 001 and 062 are located well away from the proposed development footprint and no impact is anticipated.

Table 4: Impact table for Cultural Landscape Heritage Resources impacted by the Kudu WEF

NATURE: The broader context of the area proposed for development has cultural significance that may be impacted by the proposed development				
		Before Mitigation		**After Mitigation**
MAGNITUDE	**H (8)**	The cultural value of the pristine Karoo Landscape is very high and the location of the proposed development will impact this significance	**H (8)**	The cultural value of the pristine Karoo Landscape is very high and the location of the proposed development will impact this significance
DURATION	**H (4)**	Where manifest, the impact will be long term - for the duration of the grid infrastructure lifetime	**H (4)**	Where manifest, the impact will be long term - for the duration of the grid infrastructure lifetime
EXTENT	**H (5)**	Regional	**H (5)**	Regional
PROBABILITY	**L (2)**	It is extremely unlikely that any significant cultural landscape resources will be impacted	**L (2)**	It is extremely unlikely that any significant cultural landscape resources will be impacted
SIGNIFICANCE	**M**	(8+4+5)x2=34	**M**	(8+4+5)x2=34
STATUS		Neutral		Neutral
REVERSIBILITY	**L**	Any impacts to heritage resources that do occur are reversible once the infrastructure is removed	**L**	Any impacts to heritage resources that do occur are reversible once the infrastructure is removed
IRREPLACEABLE LOSS OF RESOURCES?	**L**	Unlikely	**L**	Unlikely
CAN IMPACTS BE MITIGATED		NA		
MITIGATION: The following mitigation measures were identified in the SSV process and are adhered to in the Optimised Layout - Setback from the N9 and the R61 by at least 1km on either side. - Avoid steep or elevated topography, ridgelines or koppies, with a no development buffer of at least 2.5km from Wolwekop - Setback from graded resources and farmstead settlements IIIB and IIIC, by 500m. - Setback from farmsteads forming part of the settlement pattern by at least 500m				
RESIDUAL RISK: NA				

5.1.2 Archaeology

The proposed development will not have a substantial negative impact on most of the archaeological resources identified within the proposed development area for the renewable energy facilities. The majority of the lithic material identified is of low significance (not conservation-worthy), and even though the resources may be destroyed during construction, the impact is inconsequential. No mitigation is required for archaeological material recorded in the footprint areas of the proposed development.

Despite the high number of observations of artefacts in the broader area, these resources are common and representative of similar scatters across widespread areas of the Karoo. This archaeological material is ubiquitous across the entire area and in general, is considered to be Not Conservation-Worthy. The results of this assessment indicate that the archaeological sensitivity of the development area is actually LOW.

Table 5: Impact table for Archaeological Heritage Resources impacted by the Kudu WEF

NATURE: The area proposed for development is known to conserve heritage resources of archaeological significance that may be impacted by the proposed development				
		Before Mitigation		**After Mitigation**
MAGNITUDE	**M (5)**	Some significant archaeological resources were identified within the broader area	**M (5)**	Some significant archaeological resources were identified within the broader area
DURATION	**H (5)**	Where manifest, the impact will be permanent.	**H (5)**	Where manifest, the impact will be permanent.
EXTENT	**L (1)**	Localised within the site boundary	**L (1)**	Localised within the site boundary
PROBABILITY	**L (2)**	It is unlikely that any significant archaeological resources will be impacted	**L (1)**	It is extremely unlikely that any significant archaeological resources will be impacted
SIGNIFICANCE	**M**	(5+5+1)x2=22	**L**	(5+5+1)x1=11
STATUS		Neutral		Neutral
REVERSIBILITY	**L**	Any impacts to heritage resources that do occur are irreversible	**L**	Any impacts to heritage resources that do occur are irreversible
IRREPLACEABLE LOSS OF RESOURCES?	**L**	Unlikely	**L**	Unlikely
CAN IMPACTS BE MITIGATED		Yes		
MITIGATION: Should any significant archaeological resources be uncovered during the course of the construction phase, work must cease in the area of the find and ECPHRA must be contacted regarding an appropriate way forward.				
RESIDUAL RISK: Should any significant archaeological resources be impacted (however unlikely) residual impacts may occur, including a negative impact due to the loss of potentially scientific cultural resources				

5.1.3 Palaeontology

Given the rarity of significant vertebrate and other fossil finds and the very low surface exposure levels of Lower Beaufort Group bedrocks within the Kudu WEF project area due to the widespread alluvial cover, the overall palaeosensitivity of both project areas is assessed as LOW. The provisional Medium to Very High Palaeosensitivity mapped here by the DFFE Screening Tool is accordingly *contested*. The potential for occasional fossil vertebrate sites of Very High palaeosensitivity cannot be entirely excluded, however. The distribution of such sites is largely unpredictable and they are best mitigated through a Chance Fossil Finds protocol. The impact significance of the proposed Kudu WEF development on local palaeontological heritage resources is assessed as LOW. The projects are not fatally flawed and there are no objections on palaeontological heritage grounds to their authorization. This assessment applies equally to all infrastructure components and layout options currently under consideration. Pending the discovery of new fossil sites in the Pre-Construction or Construction Phase, micro-siting of infrastructure (*e.g.* wind turbines, access roads) in relation to known fossil sites is not considered necessary.

Table 6: Impact table for Palaeontological Heritage Resources impacted by the Kudu WEF

NATURE: The area proposed for development is known to conserve heritage resources of palaeontological significance that may be impacted by the proposed development				
		Before Mitigation		**After Mitigation**
MAGNITUDE	**H (8)**	No highly significant palaeontological resources were identified within the development area, however the geology underlying the development area is very sensitive for impacts to significant fossils	**H (8)**	No highly significant palaeontological resources were identified within the development area, however the geology underlying the development area is very sensitive for impacts to significant fossils
DURATION	**H (5)**	Where manifest, the impact will be permanent.	**H (5)**	Where manifest, the impact will be permanent.
EXTENT	**L (1)**	Localised within the site boundary	**L (1)**	Localised within the site boundary
PROBABILITY	**H (5)**	It is extremely likely that significant palaeontological resources will be negatively impacted	**L (1)**	It is extremely unlikely that any significant paleontological resources will be negatively impacted
SIGNIFICANCE	**H**	(1+5+8)x5=70	**L**	(1+5+8)x1=14
STATUS		Neutral		Neutral
REVERSIBILITY	**L**	Any impacts to heritage resources that do occur are irreversible	**L**	Any impacts to heritage resources that do occur are irreversible
IRREPLACEABLE LOSS OF RESOURCES?	**H**	Likely	**L**	Unlikely
CAN IMPACTS BE MITIGATED		Yes		
MITIGATION: The attached Chance Fossil Finds Procedure must be implemented for the duration of construction activities				
RESIDUAL RISK: Should any significant palaeontological resources be impacted residual impacts may occur, including a negative impact due to the loss of potentially scientific cultural resources				

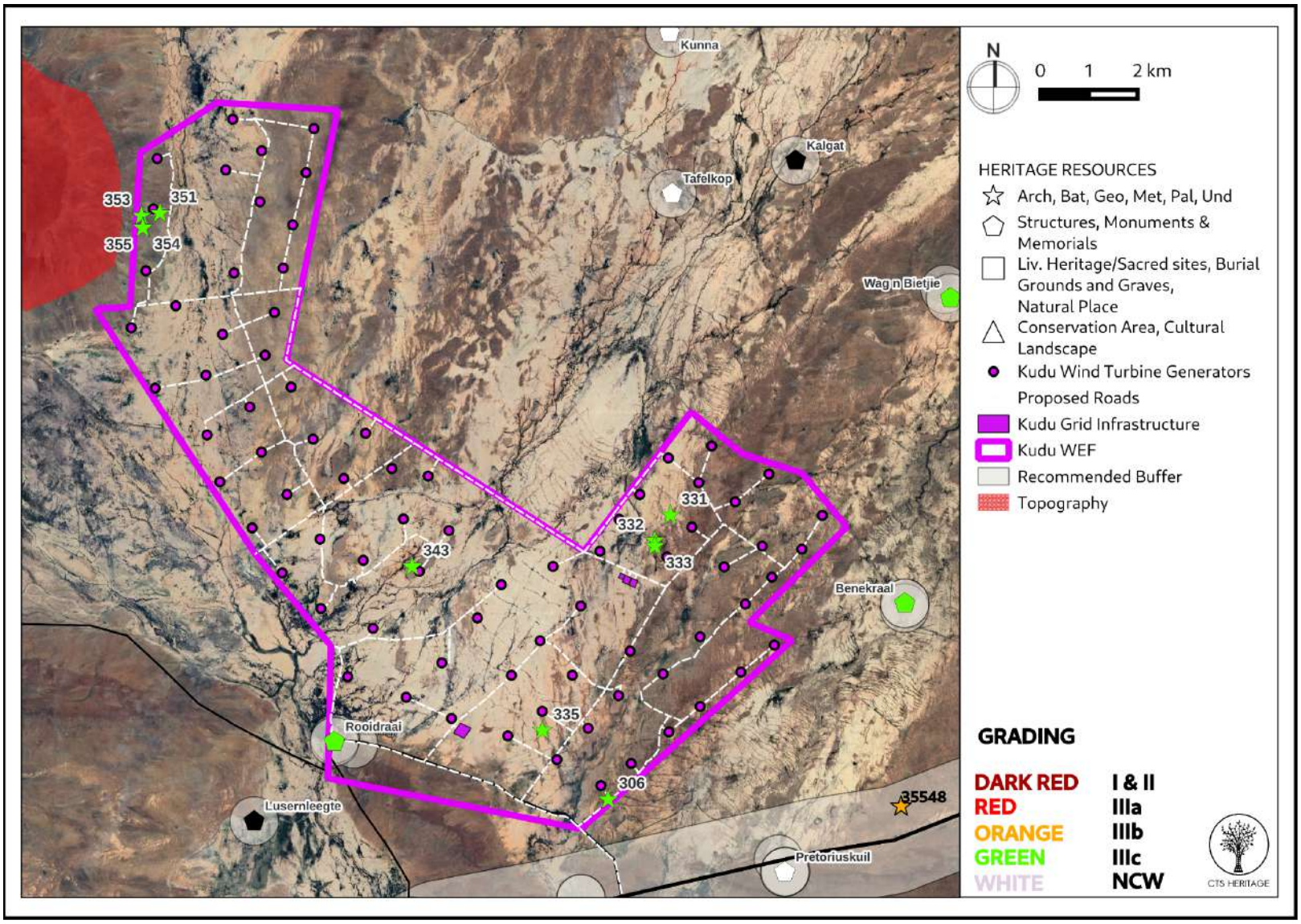

Figure 8: Map indicating the recommended mitigation measures discussed in Section 5.1

5.2 Sustainable Social and Economic Benefit

Construction Phase:

Potential positive impacts

- Creation of employment and business opportunities, and the opportunity for skills development and on-site training.

The construction phase will extend over a period of approximately 24-30 months and create in the region of 250-300 employment opportunities. Members from the local communities in Aberdeen and Graff Reinet may potentially qualify for low skilled and semi-skilled and some skilled employment opportunities. Most of these employment opportunities will accrue to Historically Disadvantaged (HD) members of the community. Given relatively high local unemployment levels and limited job opportunities in the area, this will represent a significant, if localised, social benefit. The total wage bill will be in the region of R 150 million (2023 Rand values). A percentage of the wage bill will be spent in the local economy which will also create opportunities for local businesses in the local towns in the area and the DBNLM. The capital expenditure associated with the construction phase will be approximately R 6 billion (2023 Rand value). This will create opportunities for local companies and the regional and local economy. Due the lack of diversification in the local economy the potential for local companies is likely to be limited. The majority of benefits are therefore likely to accrue to contractors and engineering companies based outside the DBNLM. The local service sector will also benefit from the construction phase. The potential opportunities would be linked to accommodation, catering, cleaning, transport, and security, etc. associated with the construction workers on the site.

Operation Phase:

Potential positive impacts

1. Establishment of infrastructure to improve energy security and support renewable sector.
2. Creation of employment opportunities.
3. Benefits for local landowners.
4. Benefits associated with socio-economic contributions to community development.

The proposed project will supplement South Africa's energy and assist to improve energy security. In addition, it will also reduce the country's reliance on coal as an energy source. This represents a positive social benefit.

As such, on condition that the recommendations outlined below are implemented, the anticipated socio-economic benefits outweigh negative impacts to heritage resources.

5.3 Proposed development alternatives

The following alternatives have been considered for the duration of the impact assessment phase.

Table 6: Alternatives considered by the project team

Nature of Alternatives Considered	Description of the Alternative relating to the FE Kudu Wind Energy Facility
Site-specific and Layout Alternatives	A preferred project site (affected property) has been identified for the development of the FE Kudu Wind Energy Facility due to site specific characteristics such as the wind resource, land availability, topographical considerations and environmental features. The project site is ~9170ha in extent which is considered to be sufficient for the development of a wind farm with a contracted capacity of up to 625MW. The location of the project site within a REDZ (as determined by the Minister of Forestry, Fisheries and the Environment) has also been a significant determination for site site-specific identification. A single specific layout alternative has also been identified. This technically feasible layout was provided by the developer for assessment, which included the placement of the turbine positions. This layout has been assessed by the specialists and within the BA process..
Activity Alternatives	Only the development of a renewable energy facility is considered by FE Kudu Wind Energy Facility. Due to the location of the project site and the suitability of the wind resource, only the development of a wind farm is considered feasible considering the natural resources available to the area and the current land-use activities undertaken within the project site (i.e. agriculture activities).
Technology Alternatives	An on-site wind measurement campaign and other technical characteristics that were assessed found the project site to be well suited to the establishment of a wind energy facility. The use of wind turbines for the generation of electricity is considered to be the most efficient technology for the project site for the generation of up to 625MW. It should be noted that various wind turbine options are being considered (these are not considered alternatives), as well as a range of alternative turbine technologies available for commercial-scale wind energy facilities, and that the technology is constantly evolving.
'Do-nothing' Alternative	This is the option to not construct the FE Kudu Wind Energy Facility. No impacts (positive or negative) are expected to occur on the social and environmental sensitive features or aspects located within or within the surrounding areas of the project site. The opportunities associated with the development of the facility for the Aberdeen area and other surrounding towns will not be realized.

5.4 Cumulative Impacts

At this stage, there is the potential for the cumulative impact of proposed renewable energy facilities to negatively impact the cultural landscape due to a change in the landscape character from natural wilderness to semi-industrial. This project falls within a REDZ area and it is noted that it is preferable to have renewable energy facility development clustered in an area such as a REDZ.

The exact extent of cumulative impacts is uncertain as the approval status of one of the adjacent projects has not yet been clarified. Refer to Figure 8. However, based on the extent of the proposed Aberdeen WEF cluster and the extent of the known approved WEF to the north, the cumulative visual impact of combined projects will be high. However, this cumulative impact does not represent a fatal flaw from a cultural landscape perspective.

To address concerns about the cumulative impact of RE facilities within the greater Karoo region, a cautious approach is required in terms of assessing the desirability of such development from a cultural landscape perspective. The proposed site is located adjacent to an existing infrastructural corridor associated with the national grid, which suggests a level of suitability of RE facilities which can link in with the grid. Notwithstanding the existing infrastructure, the placement of RE facilities, and WE turbines, must take cognisance of the very high visual impact on a relatively intact and representative cultural landscape, and the extremely limited ability to visually screen this infrastructural development, particularly in the case of the wind turbines.

To this end, a no development buffer of 1km is recommended on either side of the R61.

Figure 8 indicates the location ofKudu and Tango WEF in relation to a number of other WEF projects, either approved or in progress. While the cumulative visual impacts of these projects will be high, this does not represent a fatal flaw from a cultural landscape perspective.

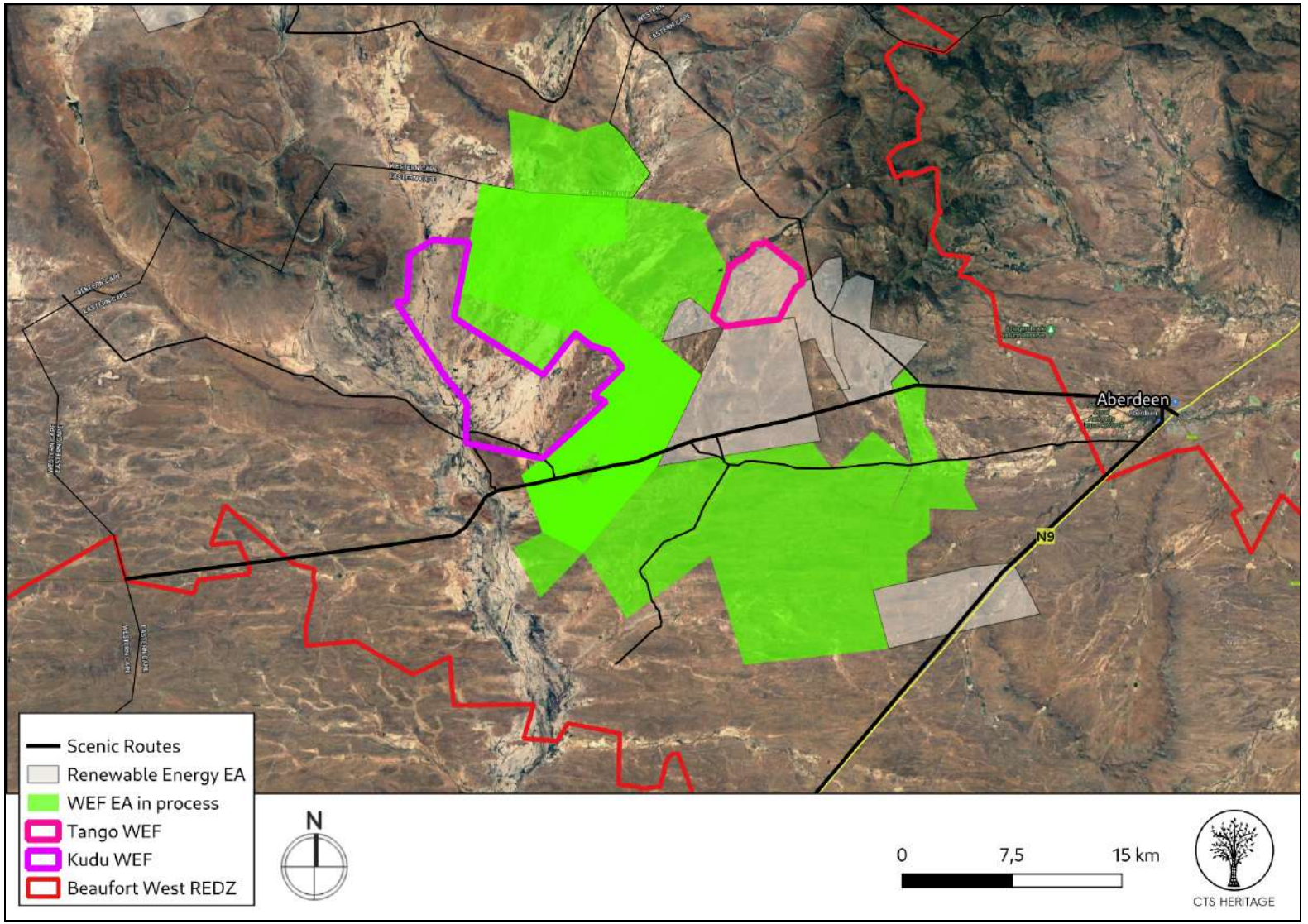

Figure 8: Approved REFs with Environmental Authorisation and the Beaufort West REDZ relative to the proposed development

Table 7: Cumulative Impact table for Heritage Resources impacted by the Kudu WEF

Nature: The broader context of the area proposed for development has cultural significance that may be impacted by the proposed development				
		Overall impact of the proposed project considered in isolation		**Cumulative impact of the project and other projects in the area**
Extent	5	Regional	5	Regional
Duration	4	Where manifest, the impact will be long term - for the duration of the grid infrastructure lifetime	4	Where manifest, the impact will be long term - for the duration of the grid infrastructure lifetime
Magnitude	6	The cultural value of the pristine Karoo Landscape is very high and the location of the proposed development will impact this significance	8	The cultural value of the pristine Karoo Landscape is very high and the location of the proposed developments collectively will impact this significance
Probability	4	It is extremely likely that a significant cultural landscape resources will be impacted	4	It is extremely likely that significant cultural landscape resources will be impacted
Significance	**60**	**MEDIUM**	**68**	**HIGH**
Status (positive or negative)		Negative		Negative
Reversibility		High		Low
Irreplaceable loss of resources?		Yes		Yes
Can impacts be mitigated?		Yes		Yes
Confidence in findings: High.				
Mitigation relevant to all proposed projects: Setback from the N9 and the R61 by at least 1km on either side. Avoid steep or elevated topography, ridgelines or koppies, with a no development buffer of at least 2.5km from Wolwekop Setback from graded resources and farmstead settlements IIIB and IIIC, by 500m. Setback from farmsteads forming part of the settlement pattern by at least 500m				

5.5 Site Verification

According to the DFFE Screening Tool analysis, the development area has Very High levels of sensitivity for impacts to palaeontological heritage and High levels of sensitivity for impacts to archaeological and cultural heritage resources. The results of this assessment in terms of site sensitivity are summarised below:

- The cultural value of the pristine Karoo Landscape is very high and the location of the proposed development will impact this significance (HIGH)
- Some significant archaeological resources were identified within the development area (MODERATE)
- No highly significant palaeontological resources were identified within the development area, however the geology underlying the development area is very sensitive for impacts to significant fossils (LOW)

As per the findings of this assessment, and its supporting documentation, the outcome of the sensitivity verification disputes the results of the DFFE Screening Tool for Palaeontology - this should be LOW - and disputes the results of the screening tool for archaeology and cultural heritage - this should be considered to be HIGH. This evidence is provided in the body of this report and in the appendices (Appendix 1, 2 and 3).

6. RESULTS OF PUBLIC CONSULTATION

As this application is made in terms of NEMA, the public consultation on the HIA will take place with the broader public consultation process required for the Environmental Impact Assessment process and will be managed by the lead environmental consultants on the project.

7. CONCLUSION

The site forms part of an intact cultural landscape representative of the Central Plateau of the Great Karoo possessing heritage value for historical, aesthetic, architectural, social and scientific reasons. Based on the desktop mapping and assessment of potential heritage resources and receptors, and subsequent fieldwork, the principle of a WEF in the proposed location is acceptable from a cultural landscape perspective. There are no red flags, which identify the project to be a fatal flaw from a cultural landscape perspective.

At a regional scale, the project is located to the south of the Great Escarpment, to the west of the distinctive Camdeboo Plains and at considerable distance from the cluster of Nature Reserves around Graaff Reinet. The site possesses a number of landscape elements contributing to a composite cultural landscape including topographical features, open plains, water features, historic scenic routes and farmsteads. Various buffers are recommended in order to mitigate anticipated negative impacts to these significant cultural landscape elements. ***No structures or cultural landscape elements of significance are located within the area proposed for development and the optimised layout observes the recommended buffer areas and mitigation measures.***

There are limited impacts anticipated to archaeological and palaeontological heritage from this proposed development and as such, the principle of a renewable energy facility in this location is supported from a heritage perspective provided that the infrastructure is located in areas able to tolerate the impact of the high degree of change from a cultural landscape perspective.

8. RECOMMENDATIONS

Based on the outcomes of this report, it is not anticipated that the proposed development of the Kudu Wind Energy Facility will negatively impact on significant heritage resources on condition that the following recommendations are implemented:

- The attached Chance Fossil Finds Procedure must be implemented for the duration of construction activities
- Although all possible care has been taken to identify sites of cultural importance during the investigation of the study area, it is always possible that hidden or subsurface sites could be overlooked during the assessment. If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils, burials or other categories of heritage resources are found during the proposed

development, work must cease in the vicinity of the find and ECPHRA must be alerted immediately to determine an appropriate way forward.

9. INPUTS INTO THE EMPr

OBJECTIVE: Conservation of significant archaeological and palaeontological cultural heritage resources

Project component/s	Construction activities
Potential Impact	Destruction of significant archaeological and palaeontological buried heritage
Activity/risk source	Excavation associated with construction
Mitigation: Target/Objective	Conservation of significant resources

Mitigation: Action/control	Responsibility	Timeframe
If any evidence of archaeological or palaeontological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils, burials or other categories of heritage resources are found during the proposed development, work must cease in the vicinity of the find and SAHRA must be alerted immediately to determine an appropriate way forward	ECO	Daily

Performance Indicator	No unplanned impact or unplanned impact halted within 4 hours
Monitoring	Written correspondence with relevant heritage authority regarding and minutes of relevant meetings

10. REFERENCES

Heritage Impact Assessments				
Nid	**Report Type**	**Author/s**	**Date**	**Title**
251161	AIA Phase 1	Celeste Booth, Sholeen Shanker	25/03/2013	A PHASE 1 ARCHAEOLOGICAL IMPACT ASSESSMENT FOR THE PROPOSED 200MW ESKOM WIND ENERGY FACILITY, NEAR ABERDEEN, CAMDEBOO LOCAL MUNICIPALITY, EASTERN CAPE PROVINCE.
251166	Palaeontological Specialist Reports	John E Almond	31/12/2014	PALAEONTOLOGICAL IMPACT ASSESSMENT FOR THE PROPOSED ABERDEEN 200 MW WIND FARM, CAMDEBOO LOCAL MUNICIPALITY, EASTERN CAPE.
354680	HIA Phase 1	Lita Webley, David Halkett	30/11/2015	Heritage Impact Assessment: Proposed Uranium Mining and Associated infrastructure on portions of the farm Quaggasfontein and Ryst Kuil near Beaufort West in the Western Cape and De Pannen near Aberdeen in the Eastern Cape
354681	AIA Phase 1	Lita Webley	30/11/2015	Archaeological Impact Assessment: Proposed uranium mining and associated infrastructure on portions of the farms Quaggasfontein and Ryst Kuil near Beaufort West in the Western Cape and De Pannen near Aberdeen in the Eastern Cape
354683	PIA Phase 1	Bruce Rubidge	24/04/2008	Palaeontological study of the Rystkuil channel
6805	AIA Phase 1	Len van Schalkwyk, Elizabeth Wahl	01/09/2007	Heritage Impact Assessment of Gamma Grassridge Power Line Corridors and Substation, Eastern, Western and Northern Cape Provinces, South Africa
7852	AIA Phase 1	J Kinahan	03/10/2008	Archaeological Baseline Survey of the Proposed Ryst Kuil Uranium Project

Lavin, Winter, Almond (2022). Heritage Impact Assessment for the proposed development of the Poortjie Cluster of Renewable Energy Facilities near Nelspoort, Western Cape. Section 38(8) HIA submitted to HWC. Unpublished.

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APPENDICES

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APPENDIX 1: Archaeological Assessment (2023)

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APPENDIX 2: Palaeontological Assessment (2023)

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APPENDIX 3: Cultural Landscape Assessment (2023)

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APPENDIX 4: Heritage Screening Assessment and SSV

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APPENDIX 5: Chance Fossil Finds Procedure