

# HERITAGE IMPACT ASSESSMENT

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

## **Proposed Development of the Tango 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:

Tango Wind Energy Facility

### 2. Location:

Portion 1 of Farm Klipstavel 72

### 3. Locality Plan:

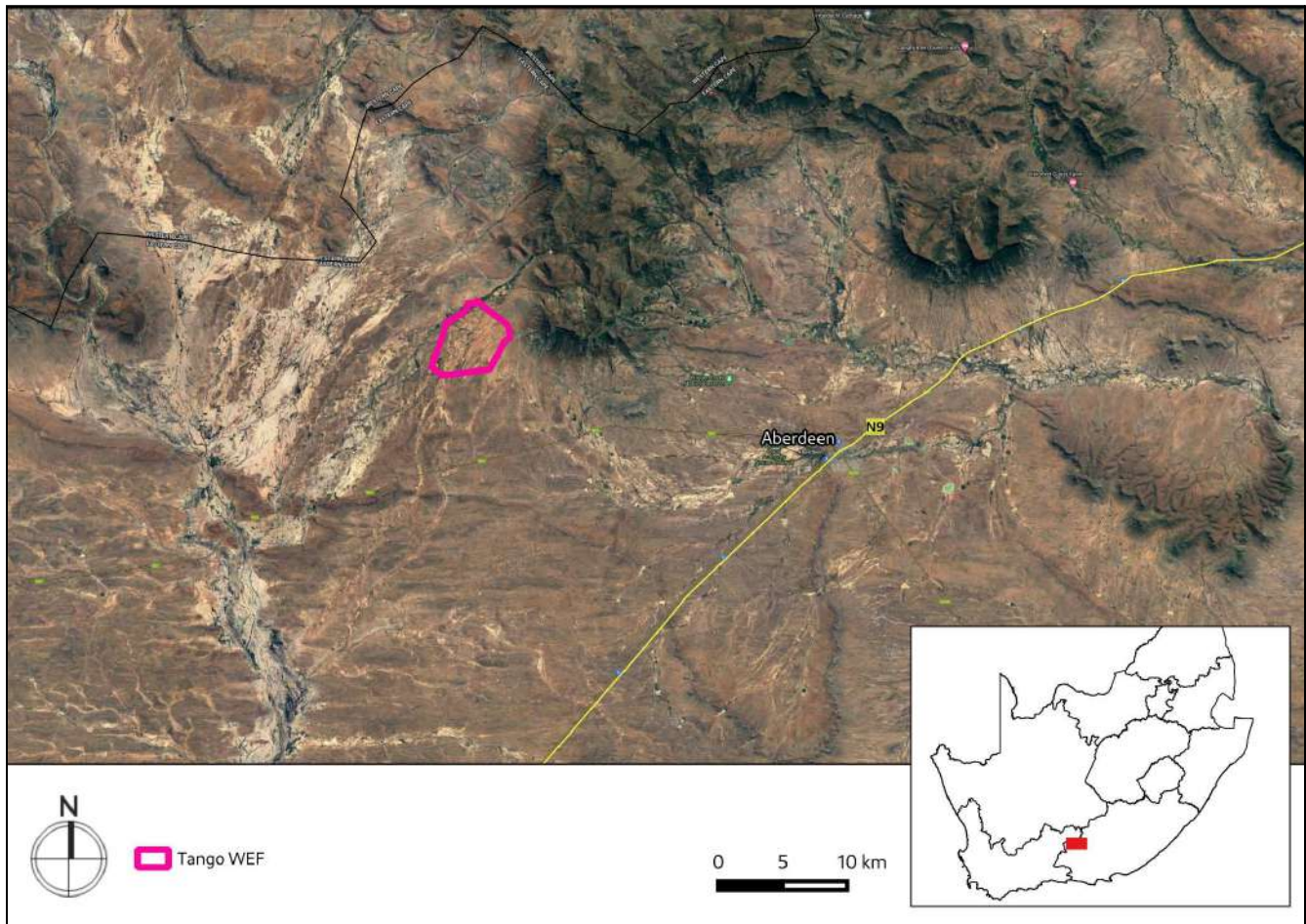


Figure A: Location of the proposed development area of Tango WEF relative to Aberdeen



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#### 4. Description of Proposed Development:

**FE Tango (Pty) Ltd** is proposing the development of a wind energy facility and associated infrastructure on a site located approximately 20km 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 1 of Farm Klipstavel 72. The project is known as the FE Tango Wind Energy Facility. The project is planned as part of a cluster of renewable energy projects, which includes a second facility, FE Kudu Wind Energy Facility, located approximately 20km to the west of the site.

#### 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 Murraysburg Road, change in topography and the landmark qualities of the Wolwekop providing a threshold condition.
  - The Murraysburg Road and 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.



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- 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

No significant archaeological or cultural landscape heritage resources were identified within the area proposed for development.

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

**Table B: Palaeontological observations made during the field assessment for the proposed development**

POINT ID	Description	Co-ordinates		Grading	Mitigation
370	Portion 1 of Farm Klipstavel 72. Extensive area of greyish surface gravels (wacke, dolerite etc) with rare reworked blocks of pale silicified wood showing well-preserved seasonal growth lines. Proposed Field Rating IIIC. No mitigation recommended.	-32.408641	23.753921	IIIC	NA
383	Portion 1 of Farm Klipstavel 72. Thick sandy alluvium exposed in banks of deeply-incised, narrow drainage line showing numerous vertical pale structures – possibly calcretized rhizoliths (root traces). Proposed Field Rating IIIC. No mitigation recommended.	-32.394122	23.76505	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.



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***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 Tango WEF 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



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### **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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## 1. INTRODUCTION

### 1.1 Background Information on Project

**FE Tango (Pty) Ltd** is proposing the development of a wind energy facility and associated infrastructure on a site located approximately 20km 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 1 of Farm Klipstavel 72. The project is known as the FE Tango Wind Energy Facility. The project is planned as part of a cluster of renewable energy projects, which includes a second facility, FE Kudu Wind Energy Facility, located approximately 20km to the west 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 Tango Wind Energy Facility will have a contracted capacity of up to 150MW and comprise wind turbines with a capacity of up to 7.5MW each. The project has a preferred project site of approximately ~2 250ha. Access to the site will be via an existing road off of the nearby R61. The FE Tango Wind Energy Facility project site is proposed to accommodate the following infrastructure:

- » Up to 18 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<sup>1</sup>.
- » 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.

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<sup>1</sup> The intention is for internal project cabling to follow the internal roads.





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

<b>Project Name</b>	FE Tango Wind Energy Facility
<b>Location</b>	Portion 1 of Farm Klipstavel 72
<b>Applicant</b>	FE Tango (Pty) Ltd
<b>Contracted capacity</b>	Up to 150MW (turbines up to 7.5MW in capacity)
<b>Number of turbines</b>	Up to 18 turbines
<b>Turbine hub height</b>	Up to 164m
<b>Turbine top tip height</b>	Up to 250m
<b>Rotor swept area</b>	up to 21m <sup>2</sup>
<b>Capacity of on-site substation</b>	132kV
<b>Area occupied by the on-site substation</b>	~ 2ha in extent
<b>Underground cabling</b>	Underground cabling, with a capacity of 33kV, will be installed to connect the turbines to the on-site facility substation.
<b>Battery Energy Storage System (BESS)</b>	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.
<b>Operation and maintenance (O&amp;M) buildings</b>	~ 1ha in extent
<b>Balance of plant area</b>	Temporary laydown areas with an extent up to 6ha. Temporary warehouse of 1 ha Temporary site camp establishment and concrete batching plants of 1 ha.
<b>Access and internal roads - Main road</b>	Main access road to the site and between project components with a width up to 8m and a servitude of 13.5m.
<b>Access and internal roads - internal network</b>	Road network between project components with a width up to 8m
<b>Turbine hardstand footprint</b>	For each turbine the following will be relevant: ~up to 7500m <sup>2</sup> for the turbine hardstand area
<b>Turbine foundation footprint</b>	~ 1000m <sup>2</sup> 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.



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## 1.2 Description of Property and Affected Environment

The proposed Tango WEF lies to the south of the Kambdebooberge 35km 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 Vlakte), 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.



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- 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 Murraysburg connects to the R61 just west of the topographical landmark of Wolwekop. A secondary route to Nelspoort connects 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 Camdeboo 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.



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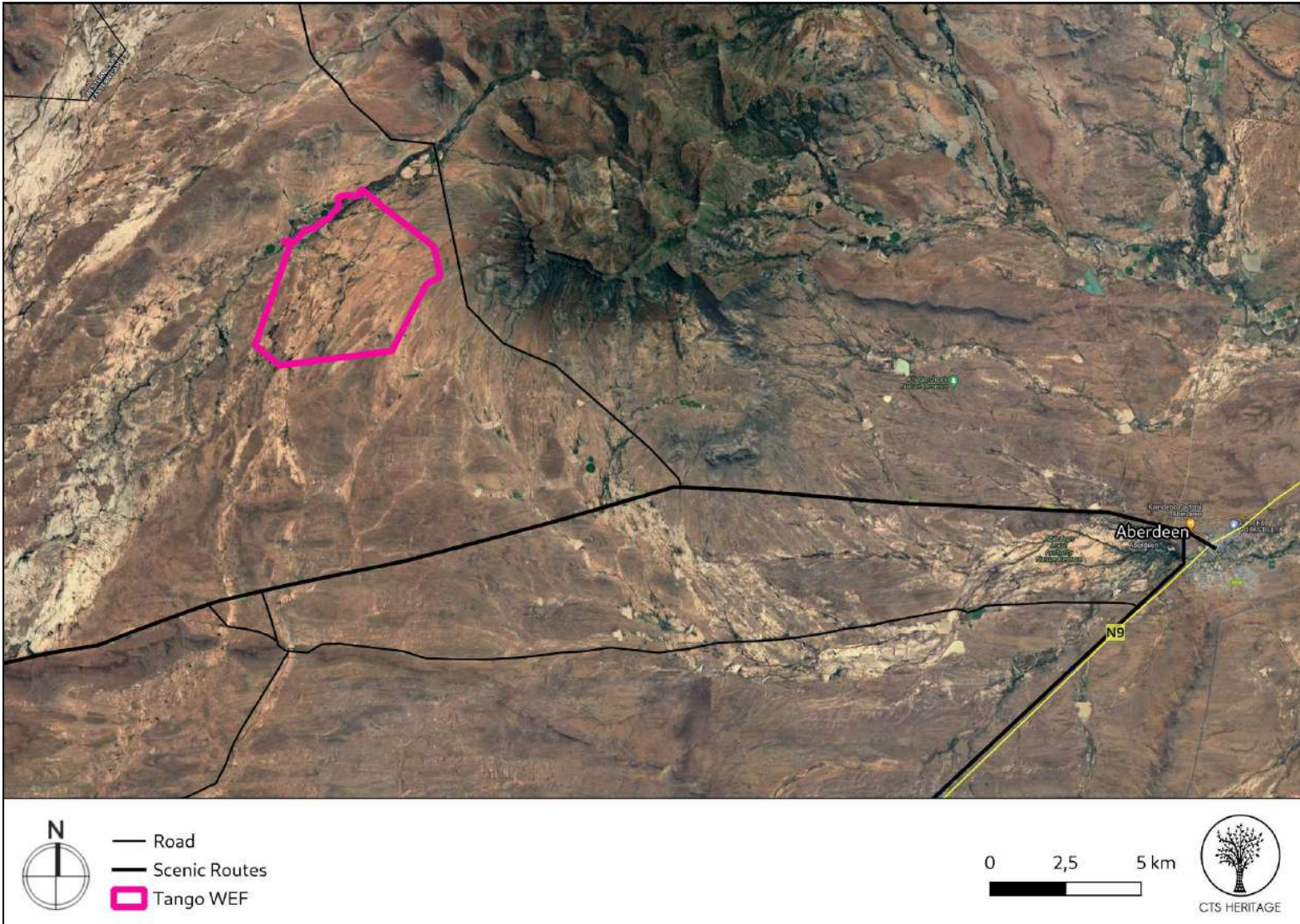


Figure 1.1: Proposed development area of Tango WEF

Cedar Tower Services (Pty) Ltd t/a CTS Heritage  
@Bon Espirance 238 Queens Road, Simons Town  
Email [info@ctsheritage.com](mailto:info@ctsheritage.com) Web <http://www.ctsheritage.com>



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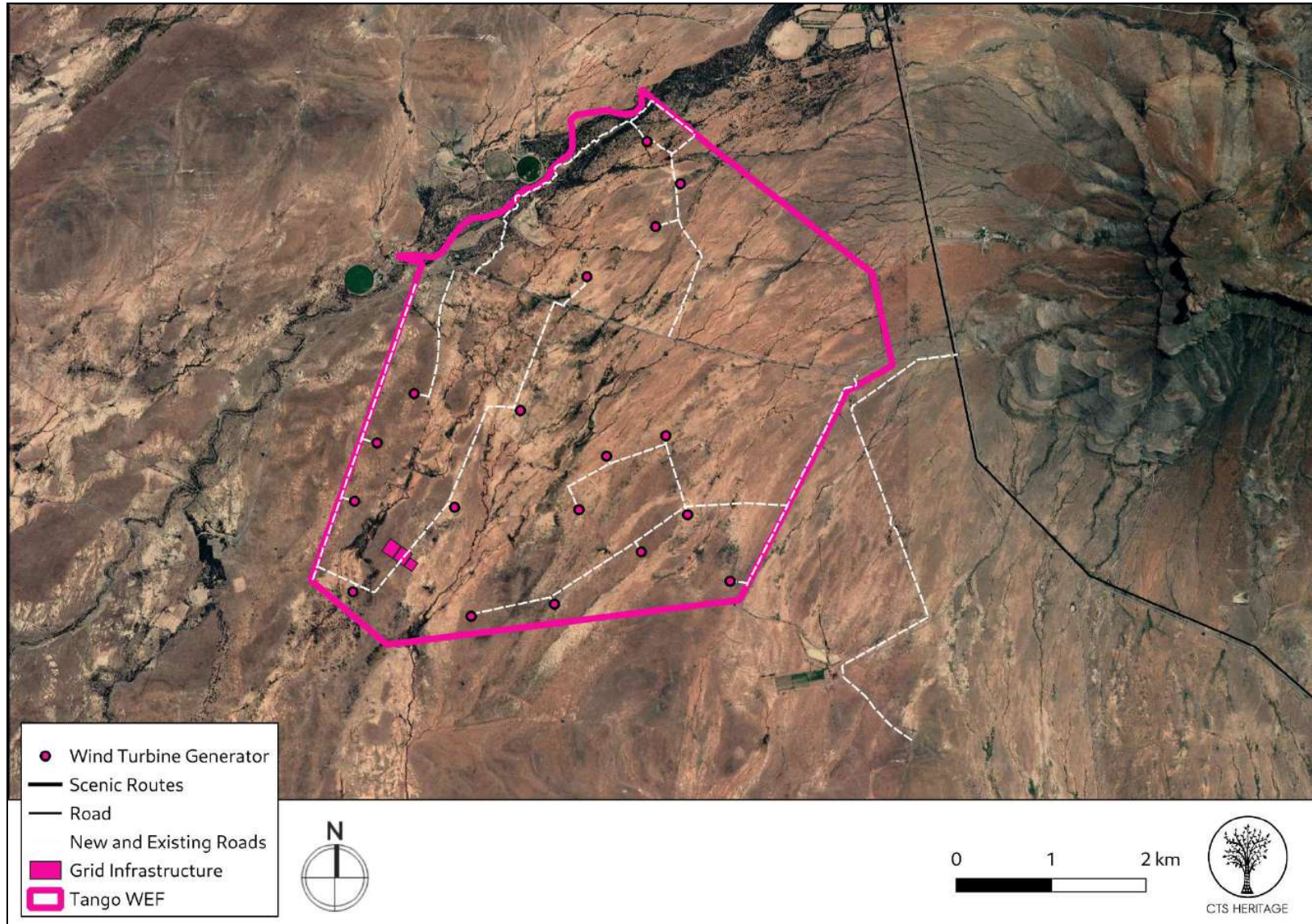


Figure 1.2: Proposed development layout of Tango WEF

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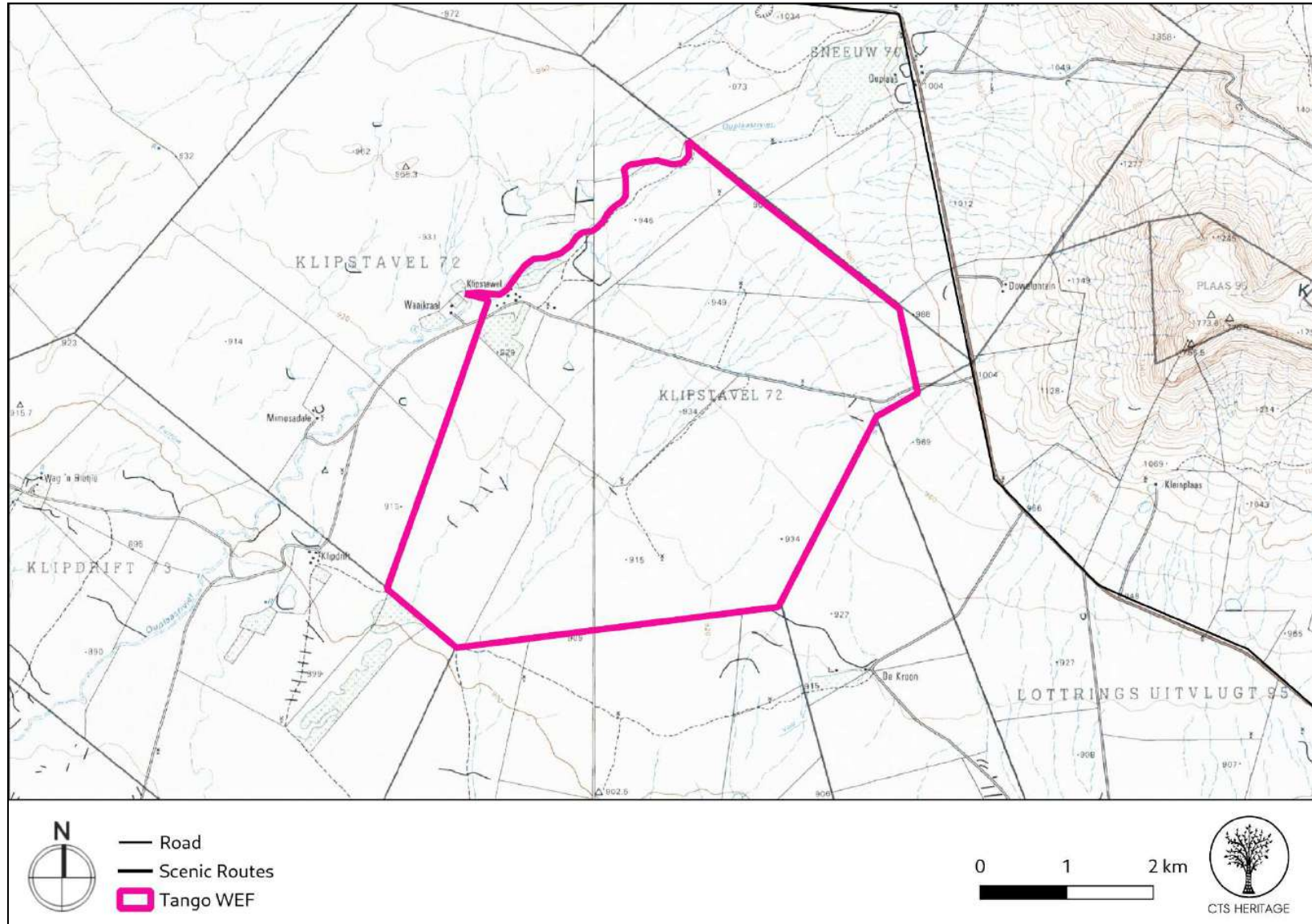


Figure 1.3: The proposed development area of the Tango WEF Facility on an extract from the 1:50 000 topo map

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## 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 this work are reported on in Appendix 3. The maps in Appendix 3 reflect an early development layout.
- 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.



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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.





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- 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:

$$S = (E + D + M) \times P$$

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).



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### **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)**

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.



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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 parallel 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 it is crossed by the “road to Aberdeen”.
- Neighbouring Koppieskraal 157 was also surveyed in 1869 and granted to JS Pienaar in 1876. The diagram shows a house and dam.
- The Kraayrivier Outspan 150, noted in early surveys as a public outspan 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.



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- 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



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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



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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 *v/aktes* 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 Cenozoic 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 Cenozoic alluvium, with a Very High Sensitivity associated with a few, small areas featuring Beaufort Group bedrock exposure (Figure 2). Palaeontological



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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.”



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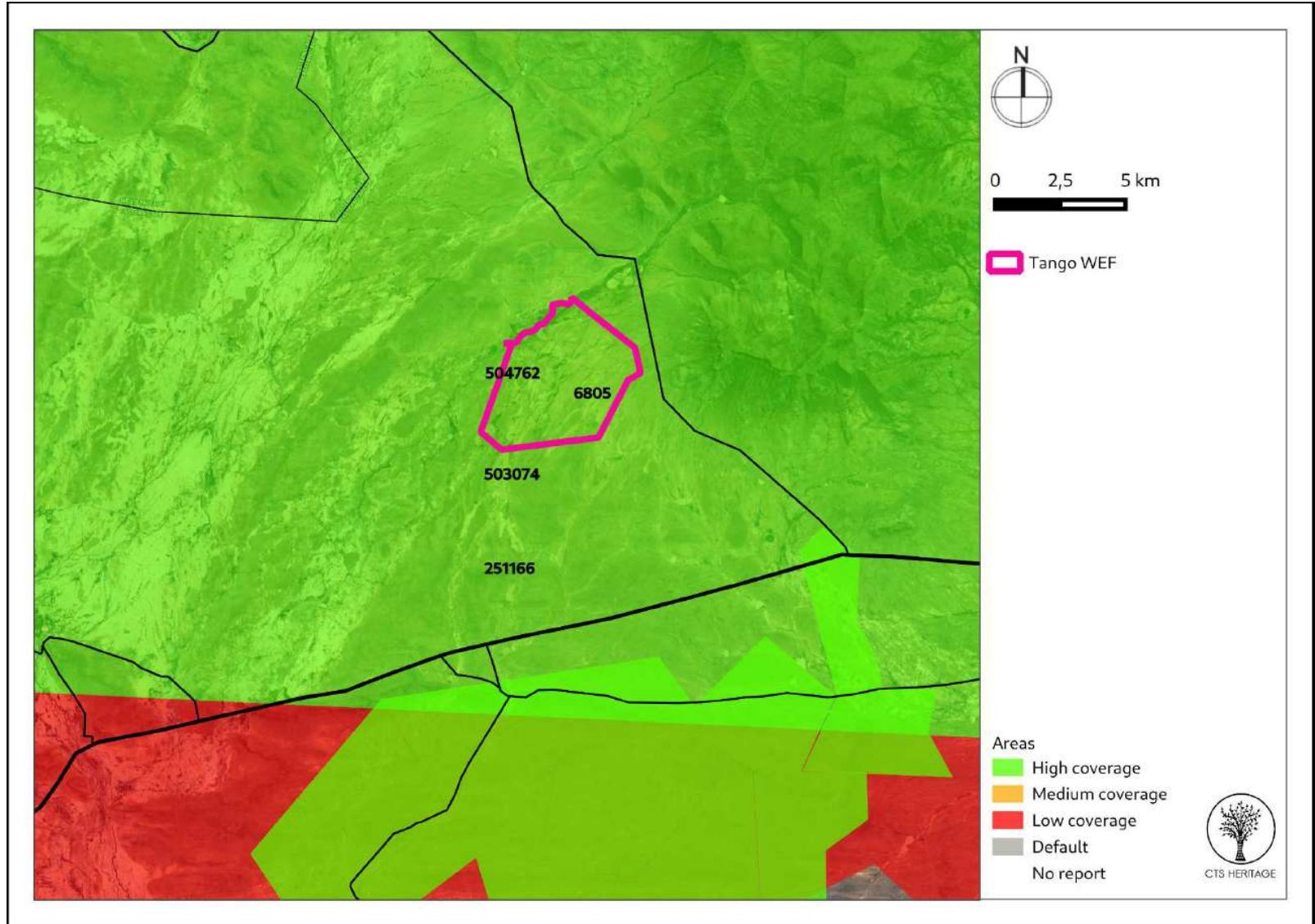


Figure 2.1: Spatialisation of heritage assessments conducted in proximity to the proposed development of Tango WEF





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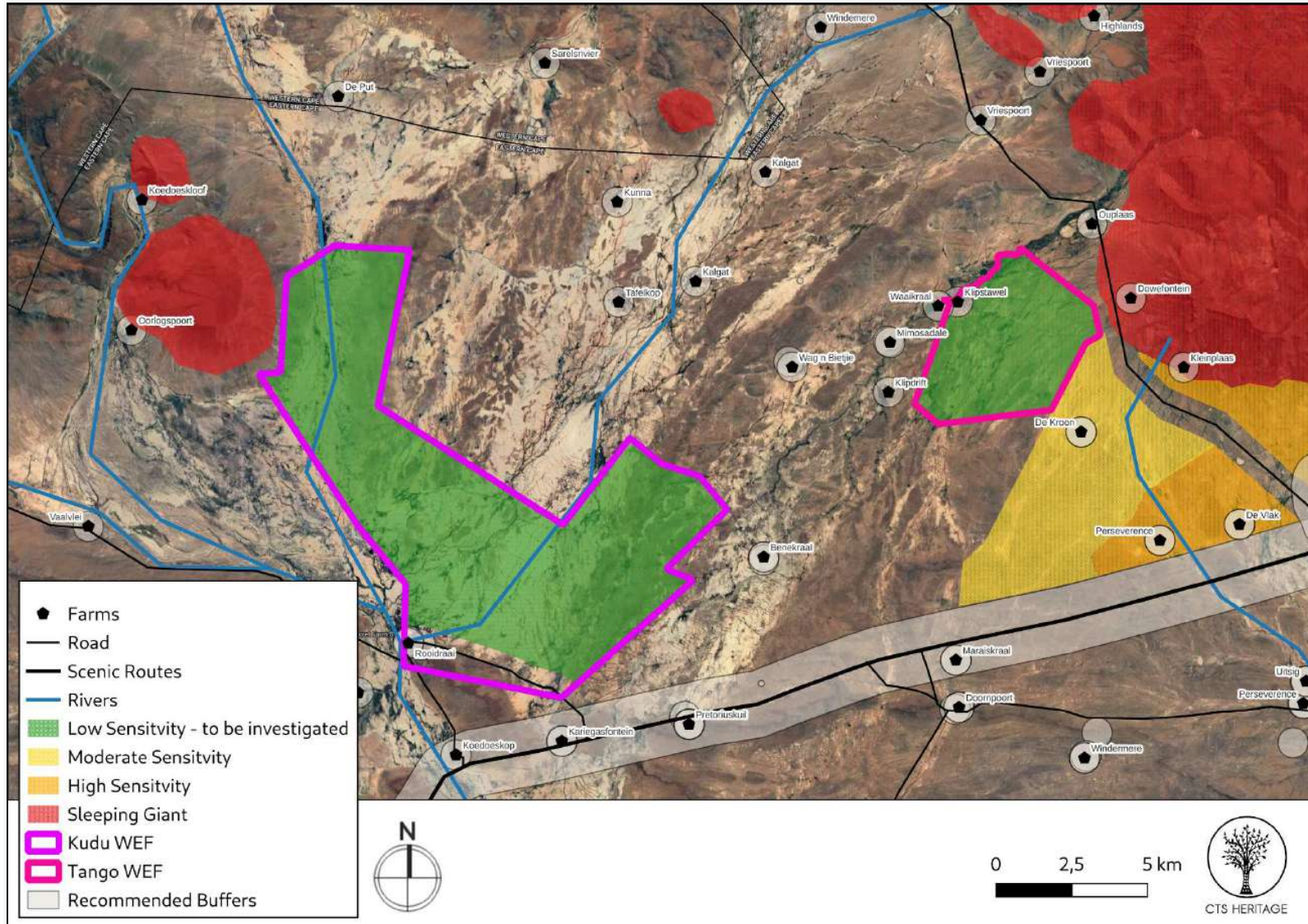


Figure 2.2. Overview. Cultural Landscape Sensitivity

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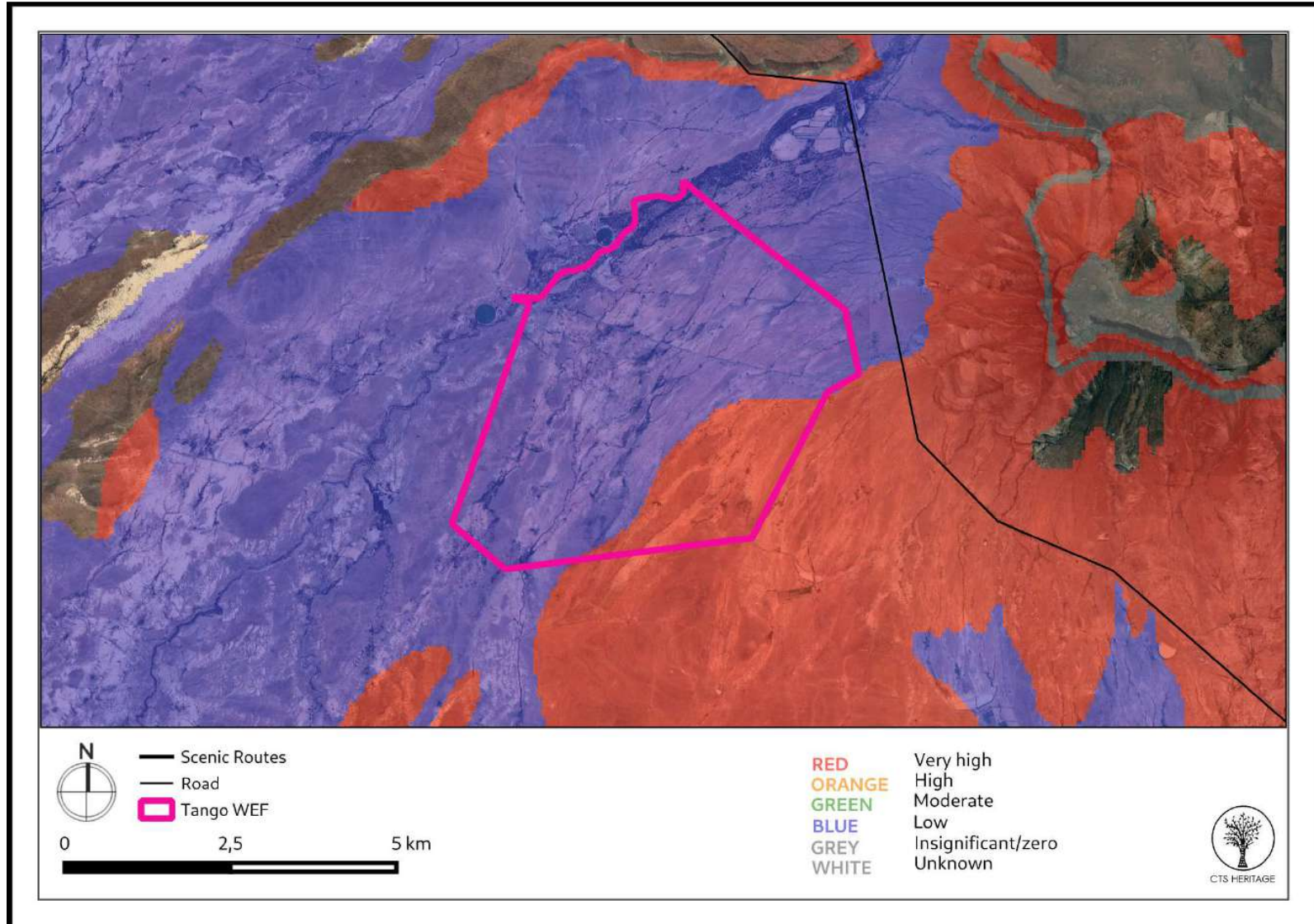


Figure 3.1: Palaeontological sensitivity of the proposed development area of Tango WEF

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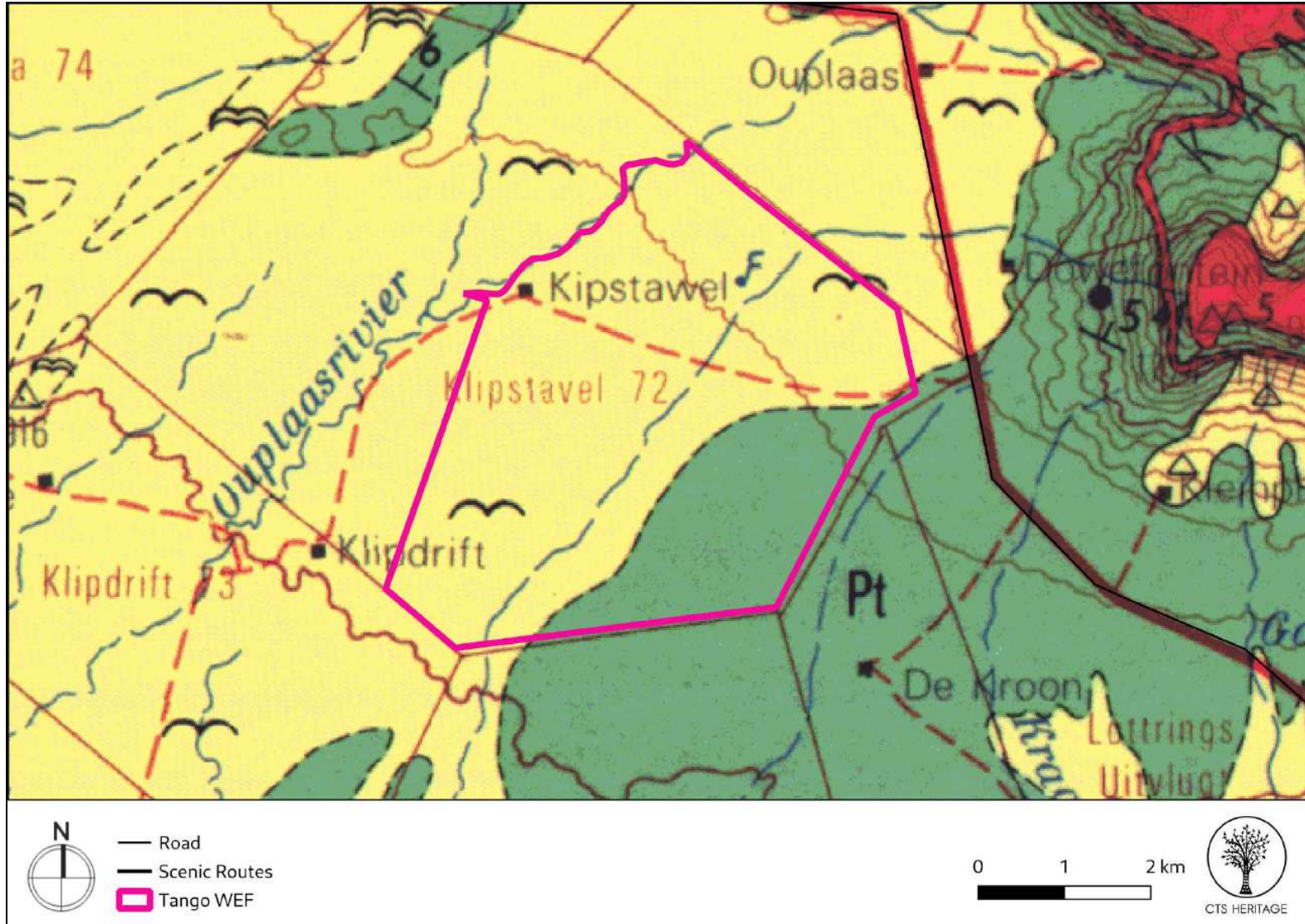


Figure 3.2: Geology Map. Extract from the CGS 3222 Beaufort West Map indicating that the development area for the WEF development is underlain by sediments of Pt: Poortjie Member of the Teekloof Formation of the Adelaide Subgroup and Jd: Jurassic Dolerite as well as Qc: Quaternary Sands for Tango WEF



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## 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 non-perennial stream (Ouplaasrivier) runs roughly northeast to southwest along the western side of the study site and all the werfs cluster around this source of sporadic water. A few small patches of land have been tilled and irrigated to provide feed for stock farming while the rest of the ground has been left to grazing. A small area



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has been transformed by creating sand banks using heavy earthmoving equipment and this was commonly done in the 1950s as has been noted in our assessments of the surrounding farms. Most of the active farms have many modern buildings with some older fabric dating to the early 20th century.

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. The terrain starts to gently rise slightly as one moves towards the slopes of the Sleeping Giant and this results in changes in soil depth and water availability where a few thicker stands of thorn trees and grassland were found outside of the Ouplaasrivier. For the most part, however, the level terrain is covered in patchy shrubland with many deflated areas holding dispersed archaeological material spread thinly across a wide area.

### ***Palaeontology (Appendix 2)***

The Tango WEF project area on the northern margins of the Aberdeen *Vlakte* 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. 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 *Vlakte* 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 Tango WEF project area. Most of the fossil wood material is poorly preserved and of very limited scientific value. Only one, fairly well-preserved block of Palaeozoic petrified wood, was recorded within the Tango project area. 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 *vlakte* 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 Cenozoic 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 Cenozoic



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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 Murraysburg Road, change in topography and the landmark qualities of the Wolwekop providing a threshold condition.
  - The Murraysburg Road and 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.



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- The collection of graves on the farm Kalgat and their association with the South African War of suggested Grade IIIA heritage value

No significant archaeological or cultural landscape heritage resources were identified within the area proposed for development.

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

**Table 2: Palaeontological observations made during the field assessment for the proposed WEF**

POINT ID	Description	Co-ordinates		Grading	Mitigation
<b>370</b>	Portion 1 of Farm Klipstavel 72. Extensive area of greyish surface gravels (wacke, dolerite etc) with rare reworked blocks of pale silicified wood showing well-preserved seasonal growth lines. Proposed Field Rating IIIC. No mitigation recommended.	-32.408641	23.753921	IIIC	NA
<b>383</b>	Portion 1 of Farm Klipstavel 72. Thick sandy alluvium exposed in banks of deeply-incised, narrow drainage line showing numerous vertical pale structures – possibly calcretized rhizoliths (root traces). Proposed Field Rating IIIC. No mitigation recommended.	-32.394122	23.76505	IIIC	NA



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### 4.3 Mapping and spatialisation of heritage resources

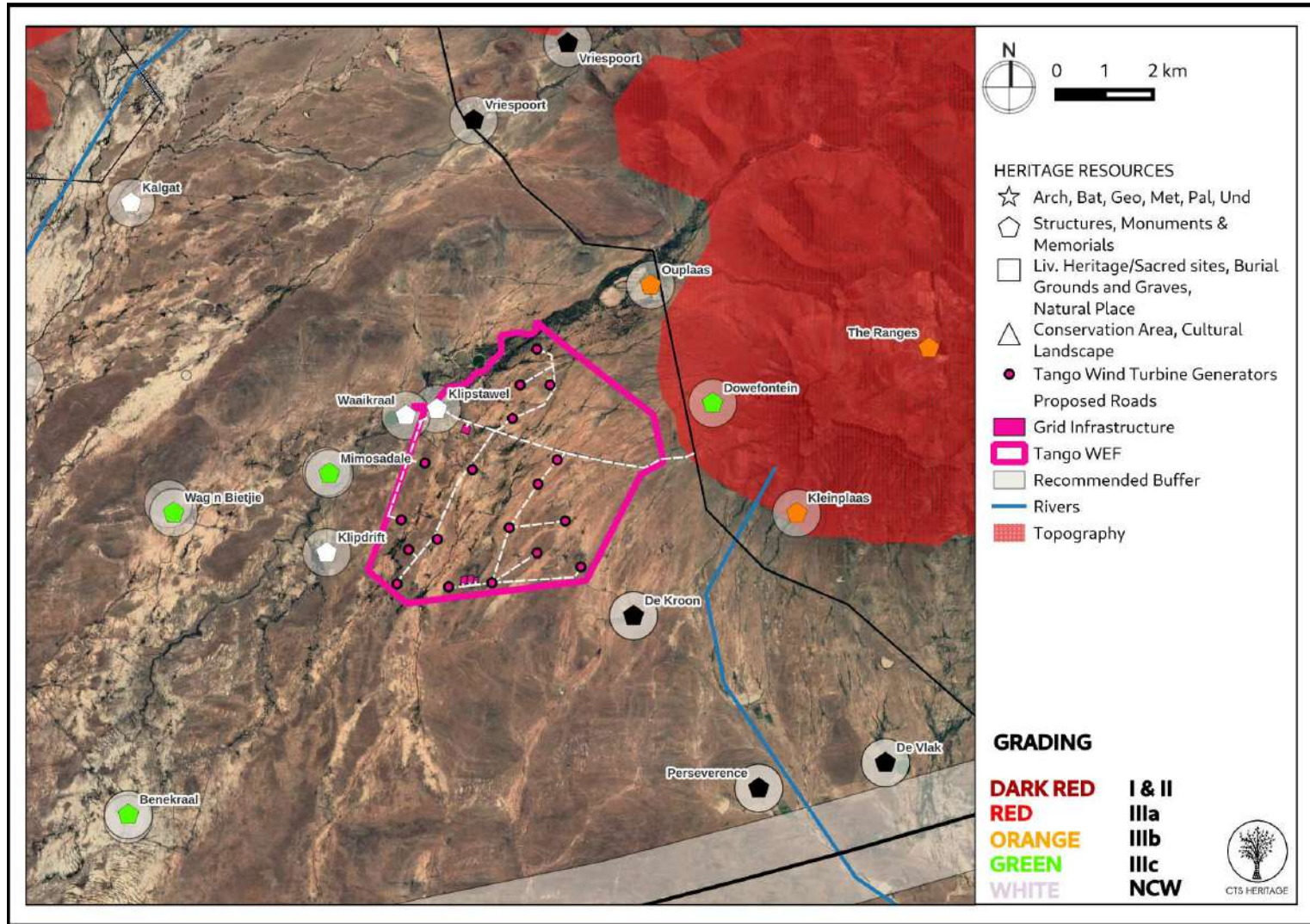


Figure 6.1: Map of landscape elements within the proposed development area

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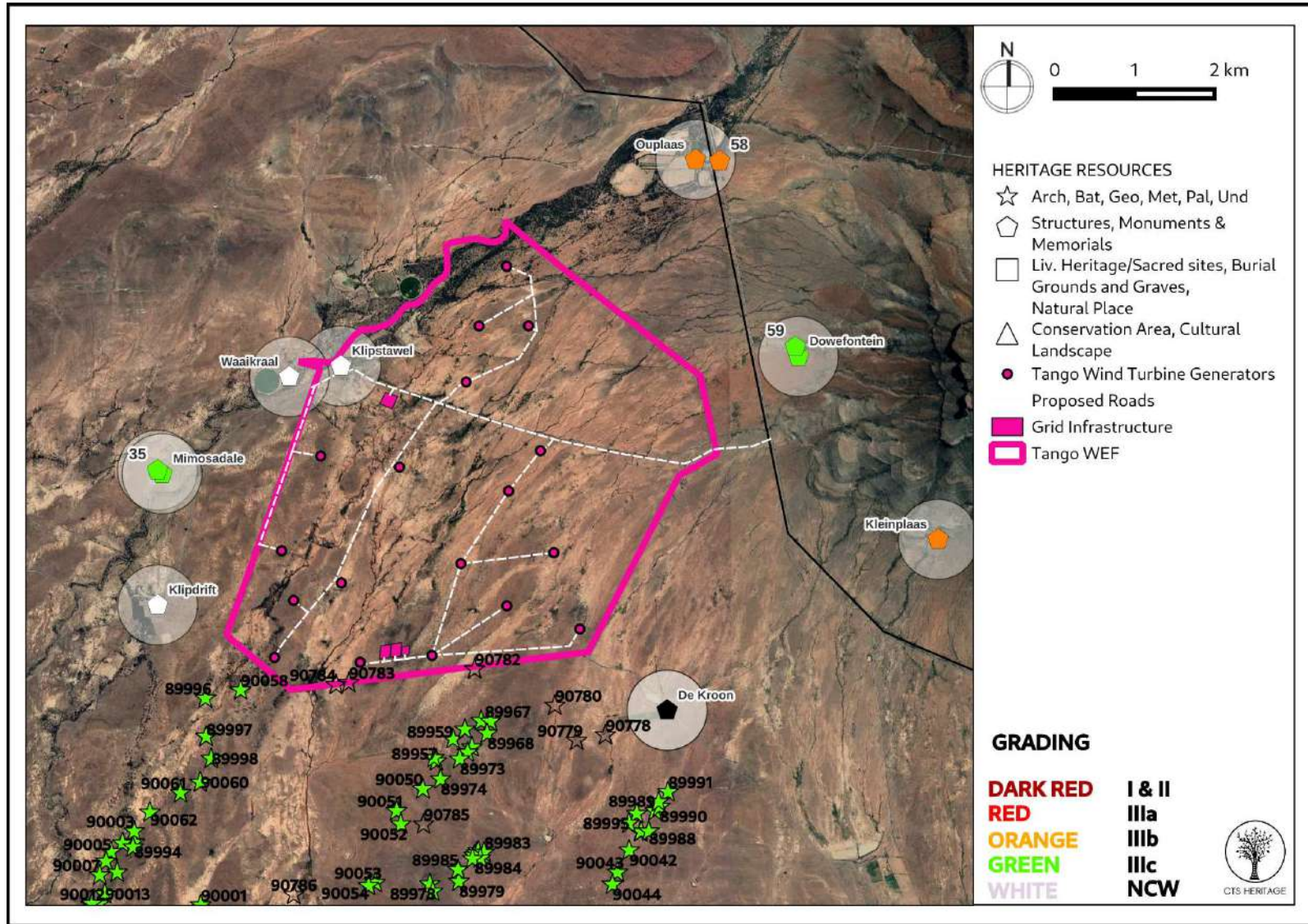


Figure 6.2: Map of archaeological heritage resources within the proposed development area

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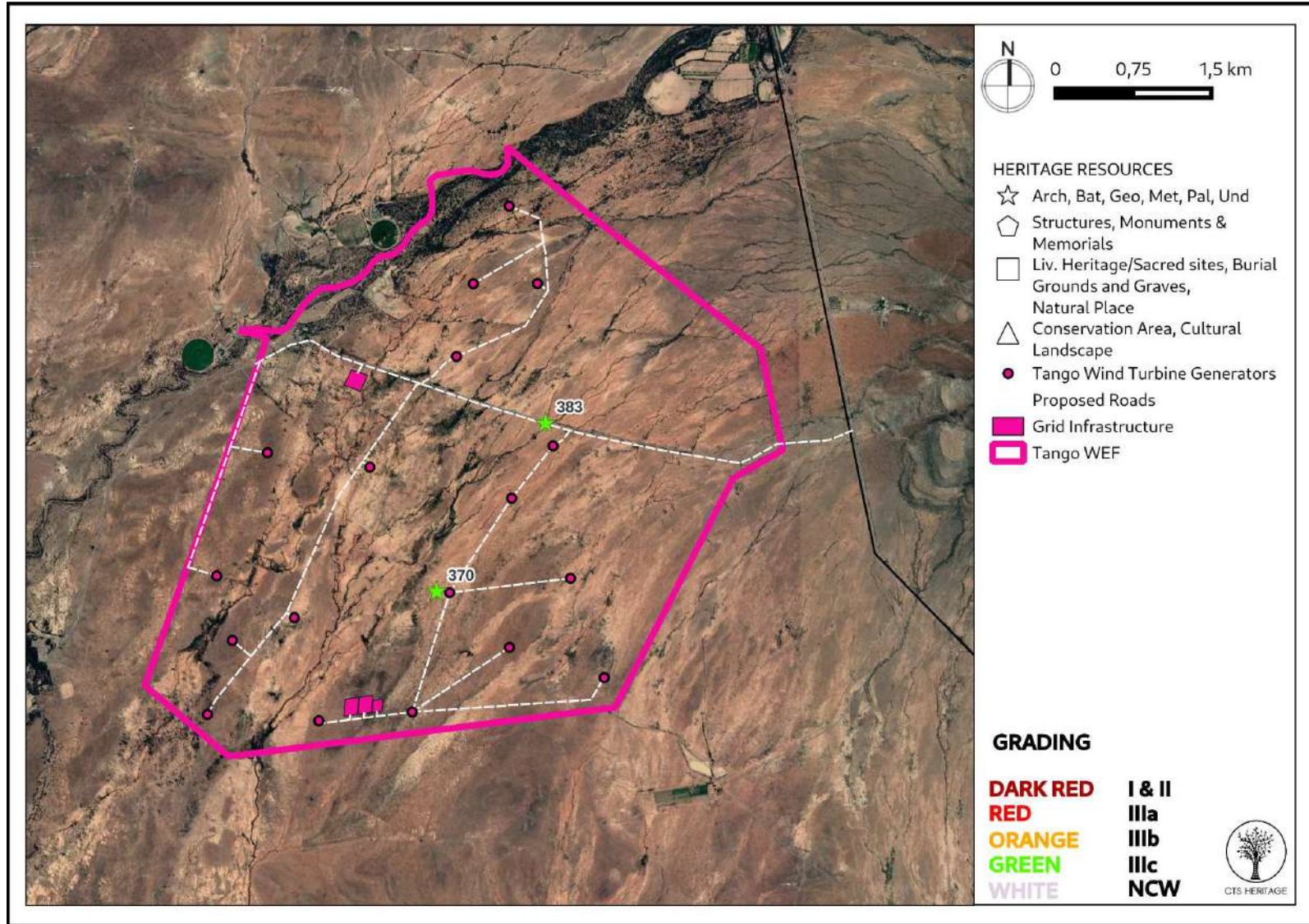


Figure 6.3: Map of palaeontological heritage resources within the proposed development area

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## **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 of 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



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- 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.***

**Table 3: Impact table for Cultural Landscape Heritage Resources impacted by the Tango WEF Optimised Layout**

<b>NATURE:</b> The broader context of the area proposed for development has cultural significance that may be impacted by the proposed development				
		<b>Before Mitigation</b>		<b>After Mitigation</b>
<b>MAGNITUDE</b>	<b>H (8)</b>	The cultural value of the pristine Karoo Landscape is very high and the location of the proposed development will impact this significance	<b>H (8)</b>	The cultural value of the pristine Karoo Landscape is very high and the location of the proposed development will impact this significance
<b>DURATION</b>	<b>H (4)</b>	Where manifest, the impact will be long term - for the duration of the grid infrastructure lifetime	<b>H (4)</b>	Where manifest, the impact will be long term - for the duration of the grid infrastructure lifetime
<b>EXTENT</b>	<b>H (5)</b>	Regional	<b>H (5)</b>	Regional
<b>PROBABILITY</b>	<b>L (2)</b>	It is extremely unlikely that any significant cultural landscape resources will be impacted	<b>L (2)</b>	It is extremely unlikely that any significant cultural landscape resources will be impacted
<b>SIGNIFICANCE</b>	<b>M</b>	$(8+4+5) \times 2 = 34$	<b>M</b>	$(8+4+5) \times 2 = 34$
<b>STATUS</b>		Neutral		Neutral
<b>REVERSIBILITY</b>	<b>L</b>	Any impacts to heritage resources that do occur are reversible once the infrastructure is removed	<b>L</b>	Any impacts to heritage resources that do occur are reversible once the infrastructure is removed
<b>IRREPLACEABLE LOSS OF RESOURCES?</b>	<b>L</b>	Unlikely	<b>L</b>	Unlikely
<b>CAN IMPACTS BE MITIGATED</b>		NA		
<b>MITIGATION:</b>				
The following mitigation measures were identified in the SSV process and are adhered to in the Optimised Layout				
<ul style="list-style-type: none"> <li>- Setback from the N9 and the R61 by at least 1km on either side.</li> <li>- Avoid steep or elevated topography, ridgelines or koppies, with a no development buffer of at least 2.5km from Wolwekop</li> <li>- Setback from graded resources and farmstead settlements IIIB and IIIC, by 500m.</li> <li>- Setback from farmsteads forming part of the settlement pattern by at least 500m</li> </ul>				
<b>RESIDUAL RISK:</b>				
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 4: Impact table for Archaeological Heritage Resources impacted by the Tango WEF**

<b>NATURE:</b> The area proposed for development is known to conserve heritage resources of archaeological significance that may be impacted by the proposed development				
		<b>Before Mitigation</b>		<b>After Mitigation</b>
<b>MAGNITUDE</b>	<b>M (5)</b>	Some significant archaeological resources were identified within the broader area	<b>M (5)</b>	Some significant archaeological resources were identified within the broader area
<b>DURATION</b>	<b>H (5)</b>	Where manifest, the impact will be permanent.	<b>H (5)</b>	Where manifest, the impact will be permanent.
<b>EXTENT</b>	<b>L (1)</b>	Localised within the site boundary	<b>L (1)</b>	Localised within the site boundary
<b>PROBABILITY</b>	<b>L (2)</b>	It is unlikely that any significant archaeological resources will be impacted	<b>L (1)</b>	It is extremely unlikely that any significant archaeological resources will be impacted
<b>SIGNIFICANCE</b>	<b>M</b>	$(5+5+1) \times 2 = 22$	<b>L</b>	$(5+5+1) \times 1 = 11$
<b>STATUS</b>		Neutral		Neutral
<b>REVERSIBILITY</b>	<b>L</b>	Any impacts to heritage resources that do occur are irreversible	<b>L</b>	Any impacts to heritage resources that do occur are irreversible
<b>IRREPLACEABLE LOSS OF RESOURCES?</b>	<b>L</b>	Unlikely	<b>L</b>	Unlikely
<b>CAN IMPACTS BE MITIGATED</b>		Yes		
<b>MITIGATION:</b> 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.				
<b>RESIDUAL RISK:</b> 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 Tango WEF project area due to the widespread alluvial cover, the overall palaeosensitivity of the project development area 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 Tango 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 5: Impact table for Palaeontological Heritage Resources impacted by the Tango WEF**

<b>NATURE:</b> The area proposed for development is known to conserve heritage resources of palaeontological significance that may be impacted by the proposed development				
		<b>Before Mitigation</b>		<b>After Mitigation</b>
<b>MAGNITUDE</b>	<b>H (8)</b>	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	<b>H (8)</b>	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
<b>DURATION</b>	<b>H (5)</b>	Where manifest, the impact will be permanent.	<b>H (5)</b>	Where manifest, the impact will be permanent.
<b>EXTENT</b>	<b>L (1)</b>	Localised within the site boundary	<b>L (1)</b>	Localised within the site boundary
<b>PROBABILITY</b>	<b>H (5)</b>	It is extremely likely that significant palaeontological resources will be negatively impacted	<b>L (1)</b>	It is extremely unlikely that any significant paleontological resources will be negatively impacted
<b>SIGNIFICANCE</b>	<b>H</b>	$(1+5+8) \times 5 = 70$	<b>L</b>	$(1+5+8) \times 1 = 14$
<b>STATUS</b>		Neutral		Neutral
<b>REVERSIBILITY</b>	<b>L</b>	Any impacts to heritage resources that do occur are irreversible	<b>L</b>	Any impacts to heritage resources that do occur are irreversible
<b>IRREPLACEABLE LOSS OF RESOURCES?</b>	<b>H</b>	Likely	<b>L</b>	Unlikely
<b>CAN IMPACTS BE MITIGATED</b>		Yes		
<b>MITIGATION:</b> The attached Chance Fossil Finds Procedure must be implemented for the duration of construction activities				
<b>RESIDUAL RISK:</b> Should any significant palaeontological resources be impacted, residual impacts may occur, including a negative impact due to the loss of potentially scientific cultural resources				



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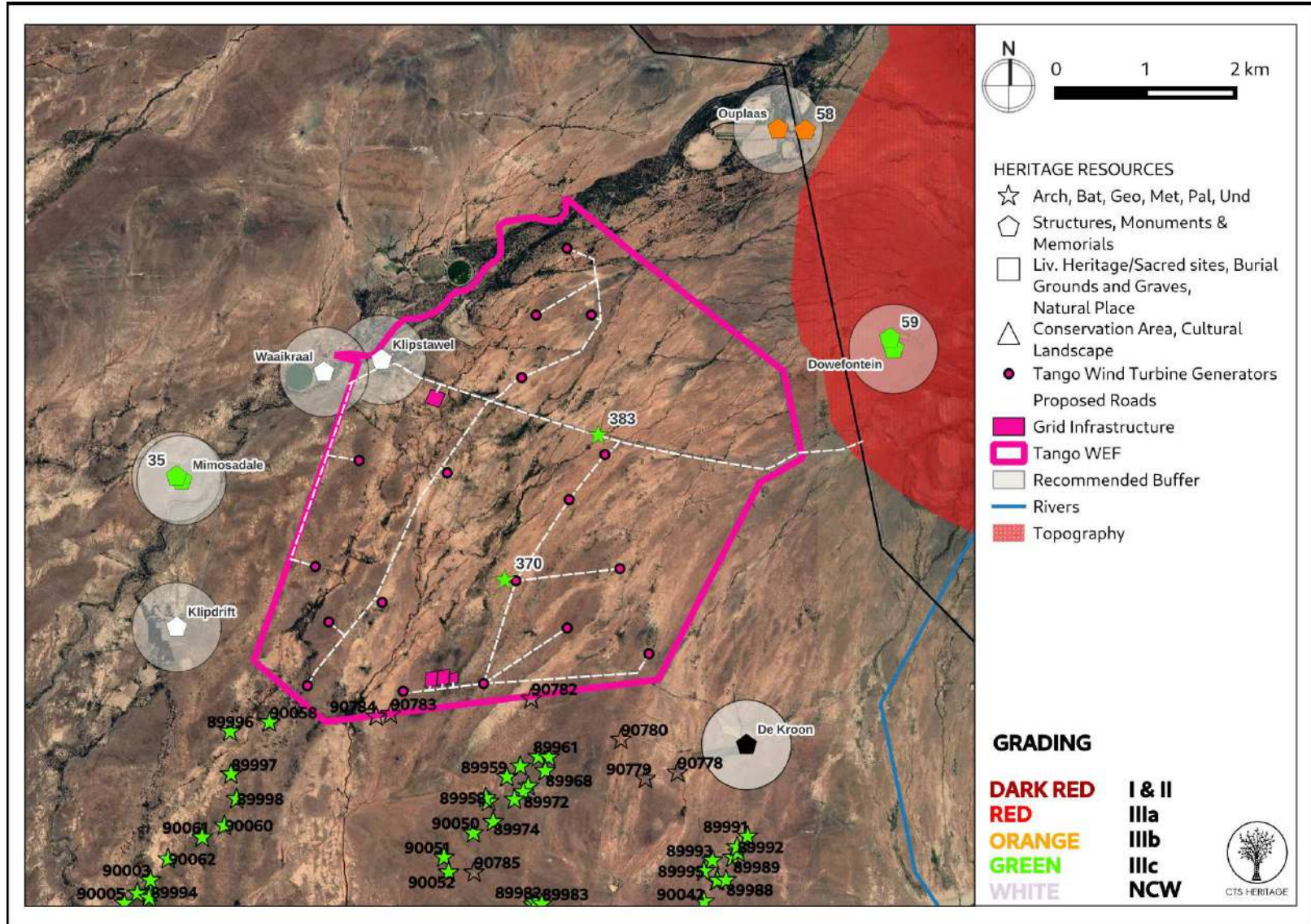


Figure 8: Map indicating the recommended mitigation measures discussed in Section 5.1

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## 5.2 Sustainable Social and Economic Benefit

### Construction Phase:

#### **Potential positive impacts**

1. 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 the 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.





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### 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 Tango Wind Energy Facility
Site-specific and Layout Alternatives	<p>A preferred project site (affected property) has been identified for the development of the FE Tango Wind Energy Facility due to site specific characteristics such as the wind resource, land availability, topographical considerations and environmental features. The project site is ~2 250ha in extent which is considered to be sufficient for the development of a wind farm with a contracted capacity of up to 240MW. 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.</p> <p>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.</p>
Activity Alternatives	<p>Only the development of a renewable energy facility is considered by FE Tango 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).</p>
Technology Alternatives	<p>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 240MW. 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.</p>
'Do-nothing' Alternative	<p>This is the option to not construct the FE Tango 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 realised.</p>



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#### 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 of Kudu 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.



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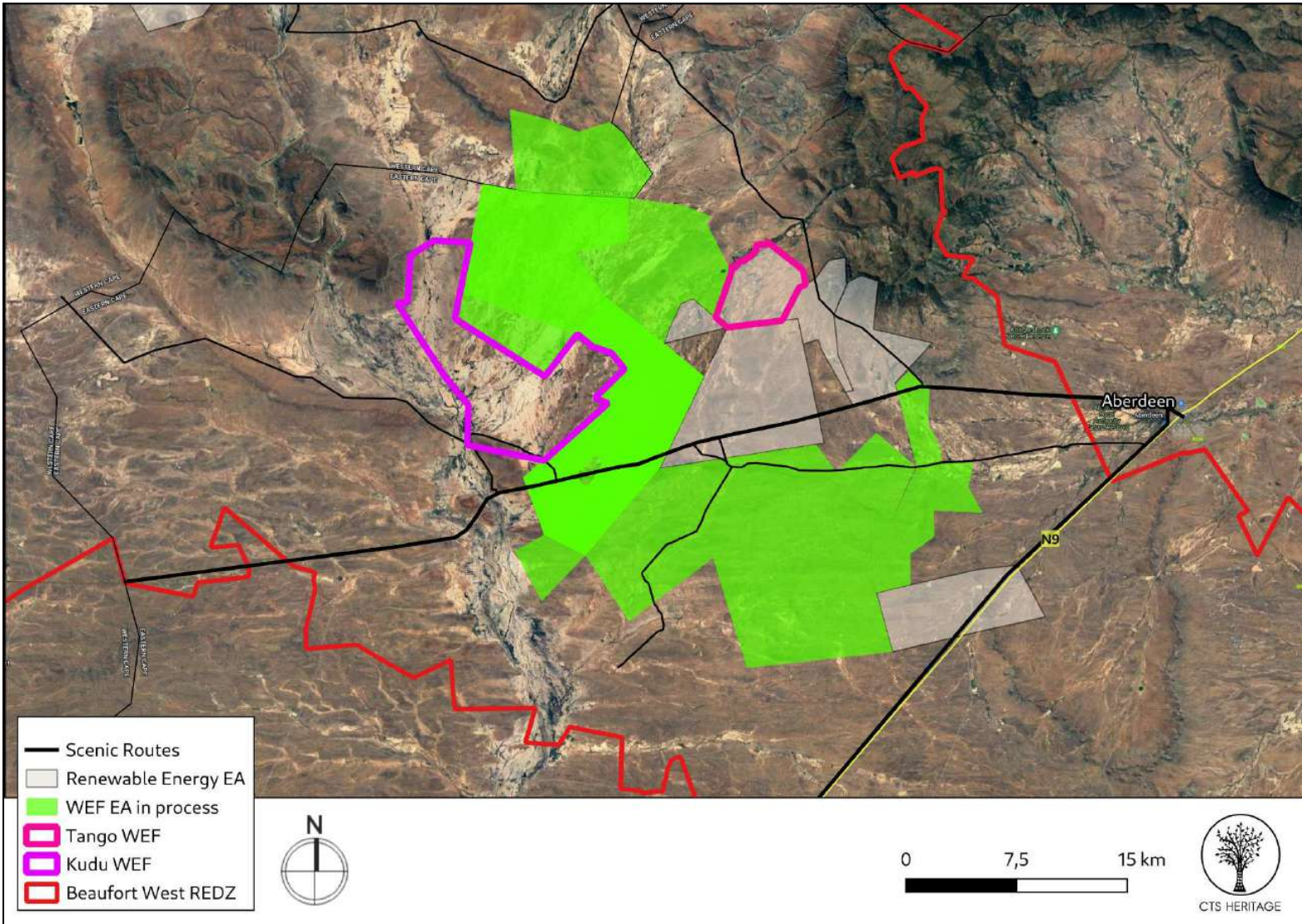


Figure 8: Approved REFs with Environmental Authorisation and the Beaufort West REDZ relative to the proposed development

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

<b>Nature:</b> The broader context of the area proposed for development has cultural significance that may be impacted by the proposed development				
		<b>Overall impact of the proposed project considered in isolation</b>		<b>Cumulative impact of the project and other projects in the area</b>
<b>Extent</b>	5	Regional	5	Regional
<b>Duration</b>	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
<b>Magnitude</b>	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
<b>Probability</b>	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
<b>Significance</b>	<b>60</b>	<b>MEDIUM</b>	<b>68</b>	<b>HIGH</b>
<b>Status (positive or negative)</b>		Negative		Negative
<b>Reversibility</b>		High		Low
<b>Irreplaceable loss of resources?</b>		Yes		Yes
<b>Can impacts be mitigated?</b>		Yes		Yes
<b>Confidence in findings:</b> High.				
<b>Mitigation relevant to all proposed projects:</b> 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				



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## 5.5 Site Sensitivity 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.***



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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 Tango WEF 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.



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## 9. INPUTS INTO THE EMPr

**OBJECTIVE: Conservation of significant archaeological and palaeontological cultural heritage resources**

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

<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
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

<b>Performance Indicator</b>	No unplanned impact or unplanned impact halted within 4 hours
<b>Monitoring</b>	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)

# DRAFT ARCHAEOLOGICAL SPECIALIST STUDY

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

## **Proposed development of the Tango WEF near Aberdeen, Eastern Cape**

**Prepared by**



**CTS HERITAGE**

Jenna Lavin and Nic Wiltshire

In Association with

**Savannah Environmental**

July 2023



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## EXECUTIVE SUMMARY

FE Tango (Pty) Ltd is proposing the development of a wind energy facility and associated infrastructure on a site located approximately 20km 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 1 of Farm Klipstavel 72. The project is known as the FE Tango 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 622.5MW (FE Kudu Wind Energy Facility), located approximately 20km west of the FE Tango Wind Energy Facility.

The findings of this assessment 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) and CTS Heritage (2021 and 2022). It is noted that high numbers of quarried stone artefacts predominantly from the Middle Stone Age and Later Stone Age period were found within the development area which is consistent with observations on neighbouring farms through impact assessments and research surveys. 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, 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.

### ***Recommendations***

Based on the outcomes of this report, it is not anticipated that the proposed development of the wind energy facilities will negatively impact on significant archaeological heritage on condition that:

- 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.



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## 1. INTRODUCTION

### 1.1 Background Information on Project

FE Tango (Pty) Ltd is proposing the development of a wind energy facility and associated infrastructure on a site located approximately 20km 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 1 of Farm Klipstavel 72. The project is known as the FE Tango 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 622.5MW (FE Kudu Wind Energy Facility), located approximately 20km west of the FE Tango Wind Energy Facility.

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 Tango Wind Energy Facility will have a contracted capacity of up to 240MW and comprise wind turbines with a capacity of up to 7.5MW each. The project has a preferred project site of approximately ~2 250ha. The current infrastructure is preliminarily proposed and will be updated once an optimised layout with all sensitivities considered has been generated. Access to the site will be via an access road off of the nearby R61. The FE Tango Wind Energy Facility project site is proposed to accommodate the following infrastructure:

- Wind turbines
- Concrete turbine foundations and turbine hardstands
- An on-site substation hub incorporating:
  - A132/33kV On-site substation
  - Switchyard with collector infrastructure
  - Battery Energy Storage System (BESS)
- A balance of plant area incorporating:
  - Temporary laydown areas
  - A construction camp laydown and temporary concrete batching plant
  - Operation and Maintenance buildings
- Cabling between the turbines, to be laid underground where practical.
- Access roads to the site and between project components with a width up to 10m and a servitude of 13.5m.

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.



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## 1.2 Description of Property and Affected Environment

The proposed Tango WEF lies just to the west of the Sleeping Giant mountain (part of the Kambdebooberge). It is accessed via the R61 out of Aberdeen for nearly 18km and then via the Murraysburg dirt road for another 10km. 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 the WEF is proposed. 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. The Tango WEF lies on the farm Klipstavel 72. Two working farms at Waaikraal and Klipstavel lie in the northwestern end on the boundary of the study site while another active farm, De Kroon, is within the areas planned for grid connections and access roads to the southeast of the project site. A well-built gravel road runs through the middle of the Klipstavel farm and connects the Murraysburg road to the werfs at Waaikraal and Klipstavel but the homesteads located further on along this road are now ruined and abandoned - these were recorded during the Kariega WEF assessment (Mimosadale, Wag 'n Bietjie, Klipdrift). The farm is predominantly used for sheep farming and several farm kraals with windmills and farm dams have been built. 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 wind, abundant sun exposure and direct access to the national grid which passes directly through the study area.



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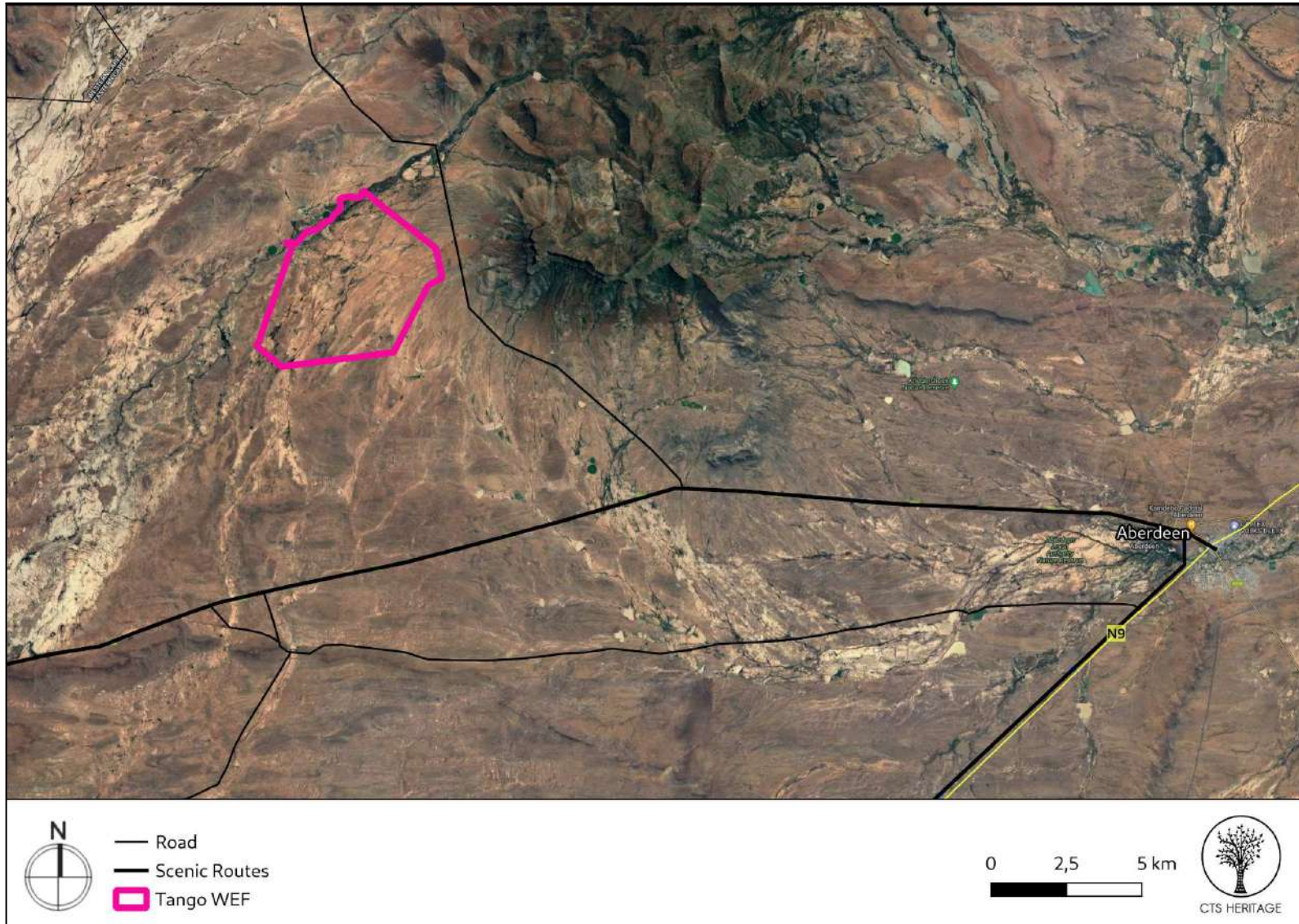


Figure 1.1: Satellite image indicating proposed location of development

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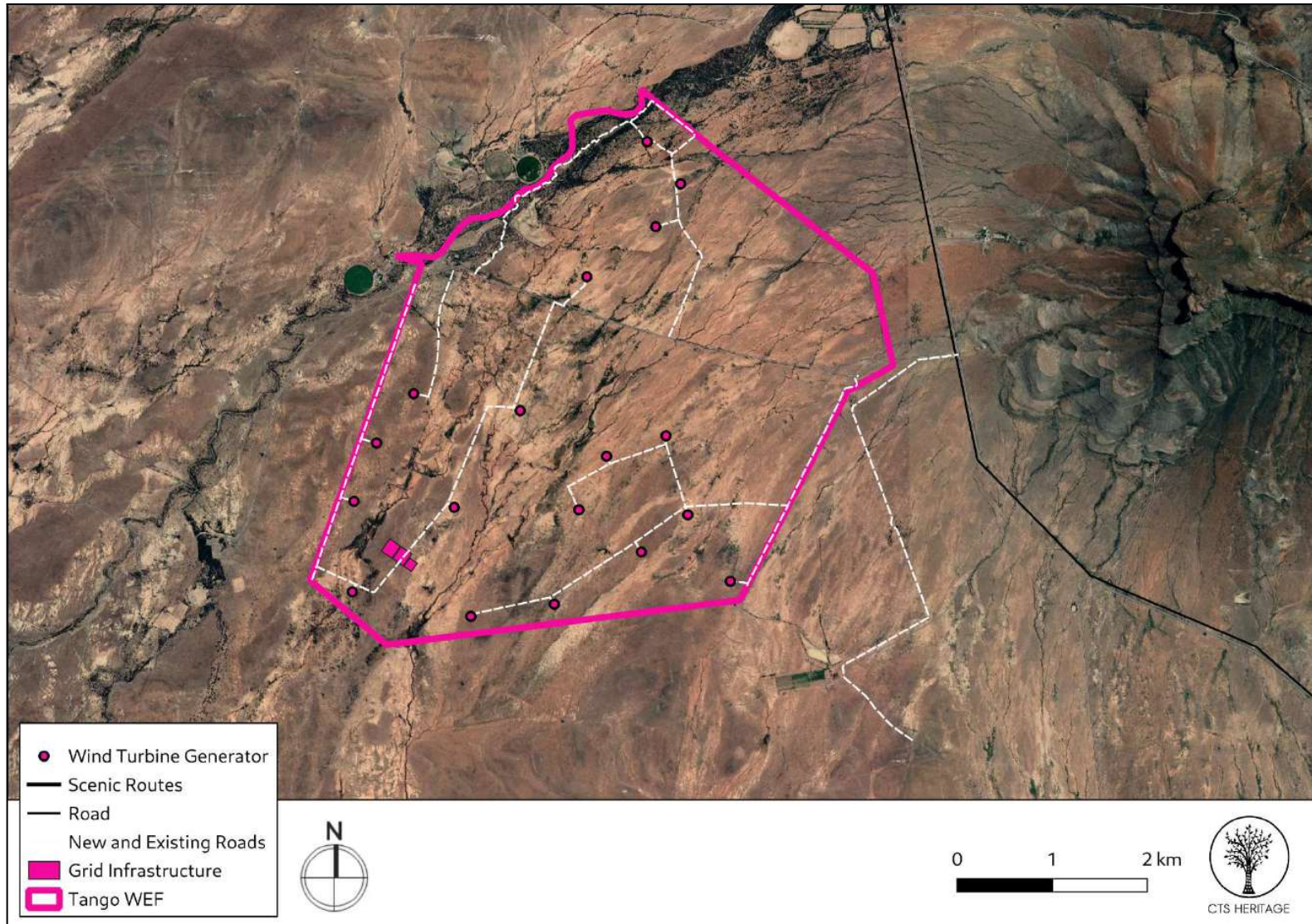


Figure 1.2: Proposed project boundary

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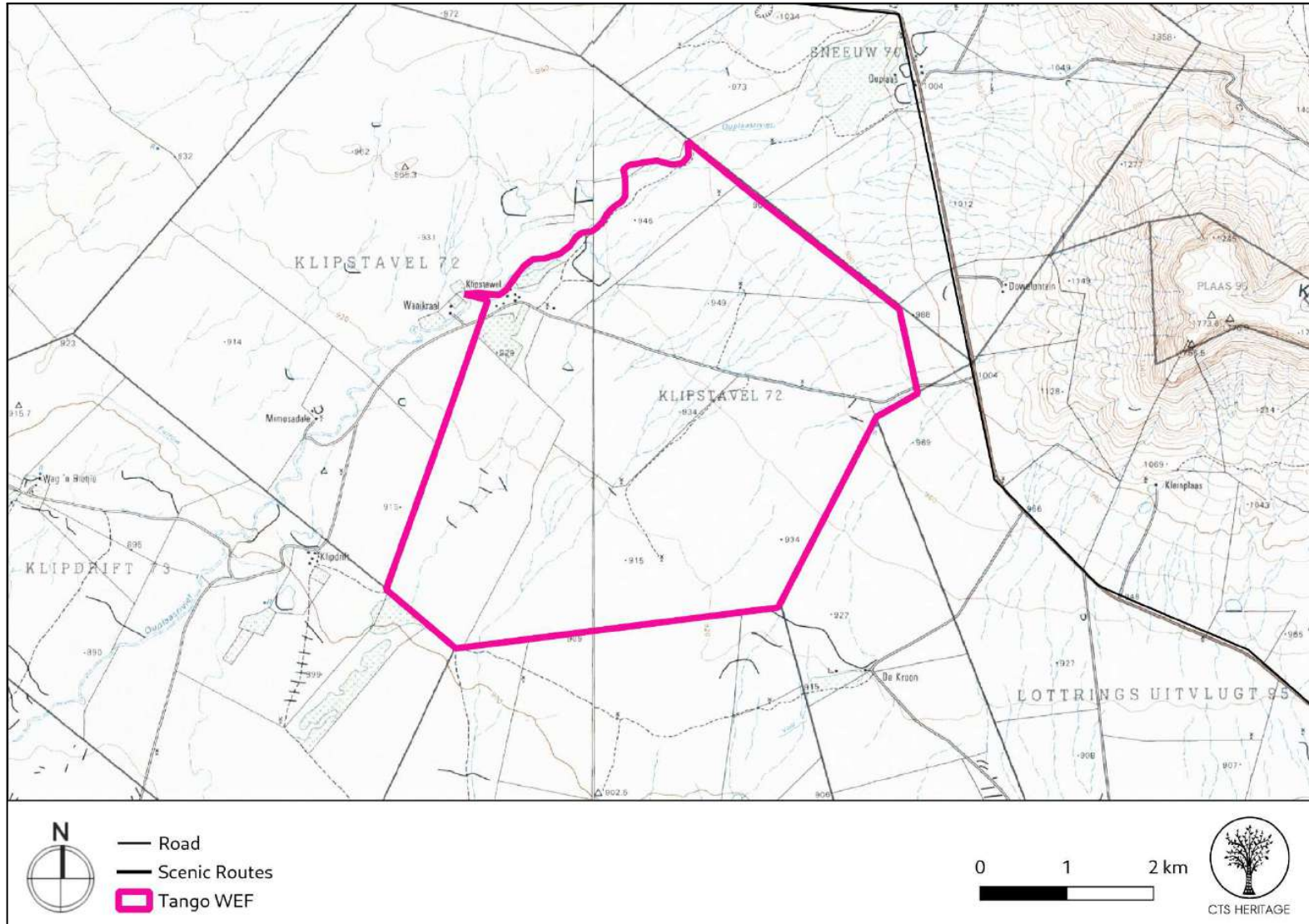


Figure 1.3: Proposed project boundary

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## **2. METHODOLOGY**

### **2.1 Purpose of Archaeological Study**

The purpose of this archaeological study is to satisfy the requirements of section 38(8), and therefore section 38(3) of the National Heritage Resources Act (Act 25 of 1999) in terms of impacts to archaeological resources.

### **2.2 Summary of steps followed**

- An archaeologist (N. Wiltshire) conducted a survey of the site and its environs from 20 to 24 June 2023 to determine what archaeological resources are likely to be impacted by the proposed development.
- The area proposed for development was assessed on foot, photographs of the context and finds were taken, and tracks were recorded using a GPS.
- The identified resources were assessed to evaluate their heritage significance in terms of the grading system outlined in section 3 of the NHRA (Act 25 of 1999).
- Alternatives and mitigation options were discussed with the Environmental Assessment Practitioner.
- As a result of the findings of this, and other specialist reports, the layout has been amended to respond to identified sensitivities.

### **2.3 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.



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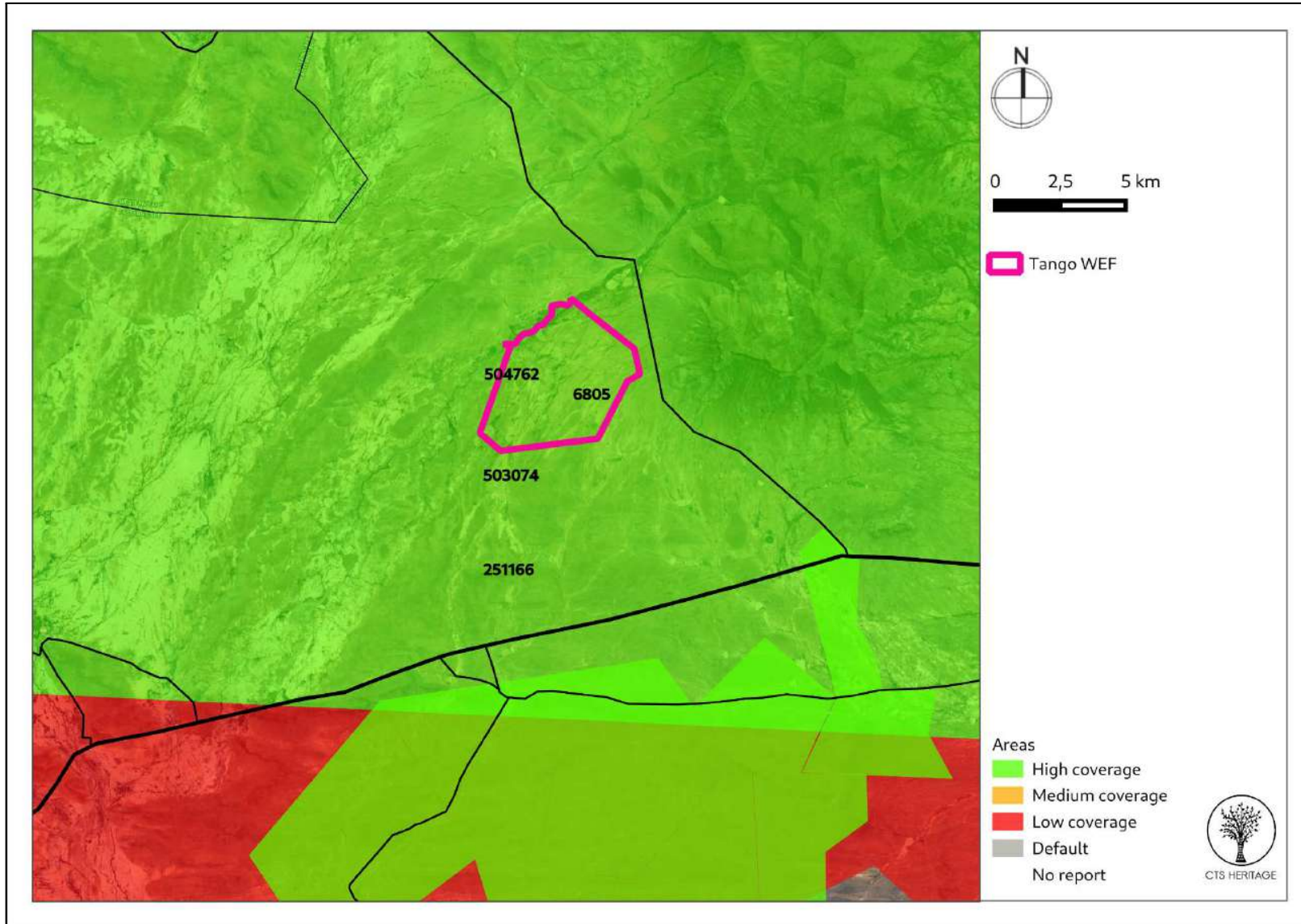


Figure 2: Close up satellite image indicating proposed location of development in relation to heritage studies previously conducted

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### 3. HISTORY AND EVOLUTION OF THE SITE AND CONTEXT

#### **Background:**

The area proposed for the Tango Wind Energy Facility Projects is located approximately 30km west of Aberdeen in the Eastern Cape, and is located within the identified Beaufort West REDZ (Figure 2b). 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.

#### **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



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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 Kariëga 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.



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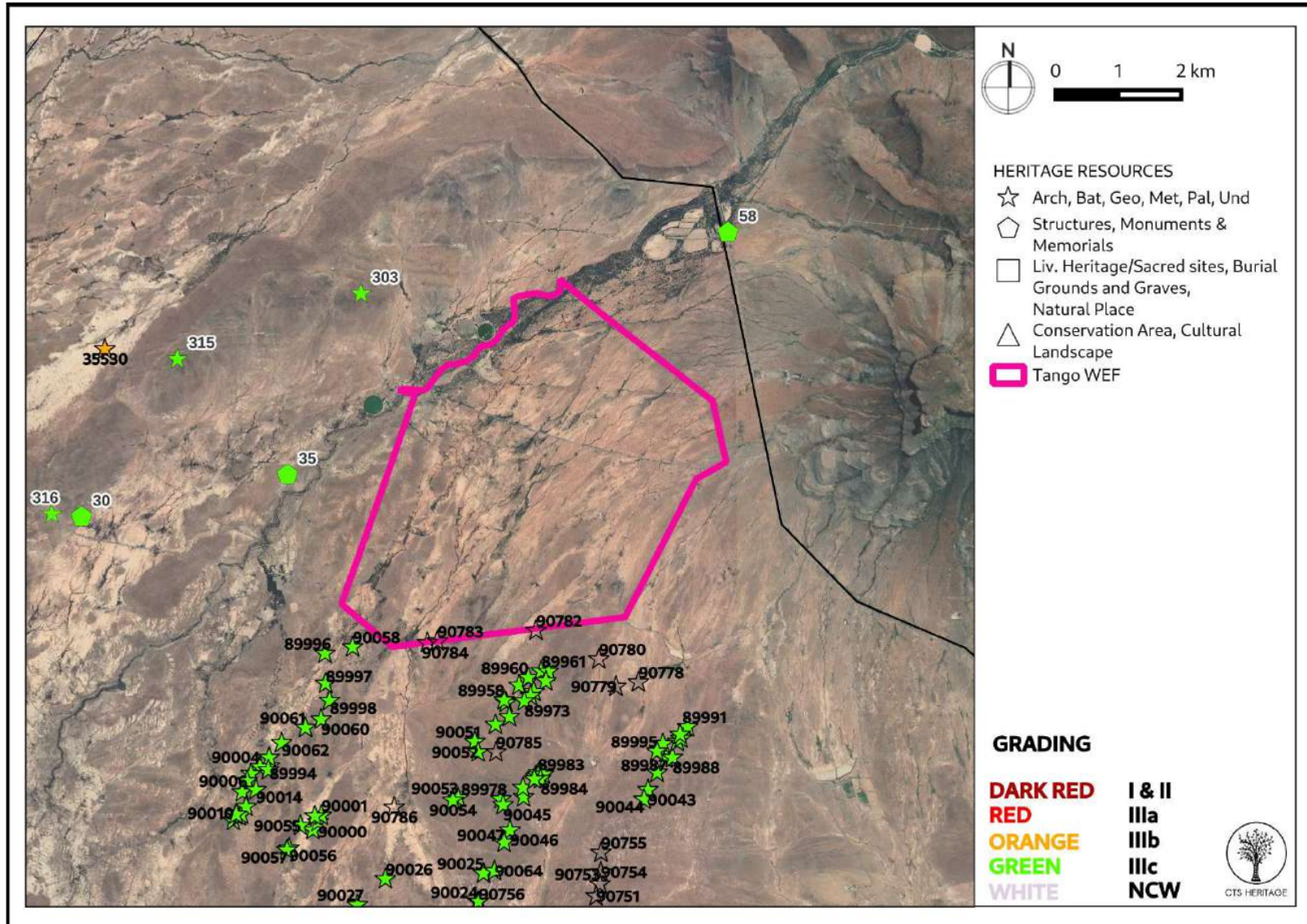


Figure 3. Heritage Resources Map. Heritage Resources previously identified in and near the study area, with SAHRIS Site IDs indicated

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## 4. IDENTIFICATION OF HERITAGE RESOURCES

### 4.1 Field Assessment

The non-perennial stream (Ouplaasrivier) runs roughly northeast to southwest along the western side of the study site and all the werfs cluster around this source of sporadic water. A few small patches of land have been tilled and irrigated to provide feed for stock farming while the rest of the ground has been left to grazing. A small area has been transformed by creating sand banks using heavy earthmoving equipment and this was commonly done in the 1950s as has been noted in our assessments of the surrounding farms. Most of the active farms have many modern buildings with some older fabric dating to the early 20th century.

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. The terrain starts to gently rise slightly as one moves towards the slopes of the Sleeping Giant and this results in changes in soil depth and water availability where a few thicker stands of thorn trees and grassland were found outside of the Ouplaasrivier. For the most part, however, the level terrain is covered in patchy shrubland with many deflated areas holding dispersed archaeological material spread thinly across a wide area.



Figure 4.1: View looking west across the study site from the Murraysburg road end.





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Figure 4.2: View looking south past the Sleeping Giant.



Figure 4.3: View of areas with extensive overgrazing by sheep and deflated MSA and LSA scatters of stone tools.



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**Figure 4.4: View from the Murraysburg end towards the Sleeping Giant.**



**Figure 4.5: View from the middle of the study area looking east towards the Sleeping Giant.**



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Figure 4.6: View looking south across the study site with stands of acacia thorn trees, patchy grassland and shrubland.



Figure 4.7: View of another open stretch of ground moving towards the southwest side of the study site.



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Figure 4.8: View looking north in the direction of Murraysburg.



Figure 4.9: View of a patch of denser vegetation near the slopes of the Kamdebooberge.



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Figure 4.10: Looking east across the study area.



Figure 4.11: View of the edges of the Ouplaasrivier floodplain.



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Figure 4.12: Another view of the Sleeping Giant and the study site.



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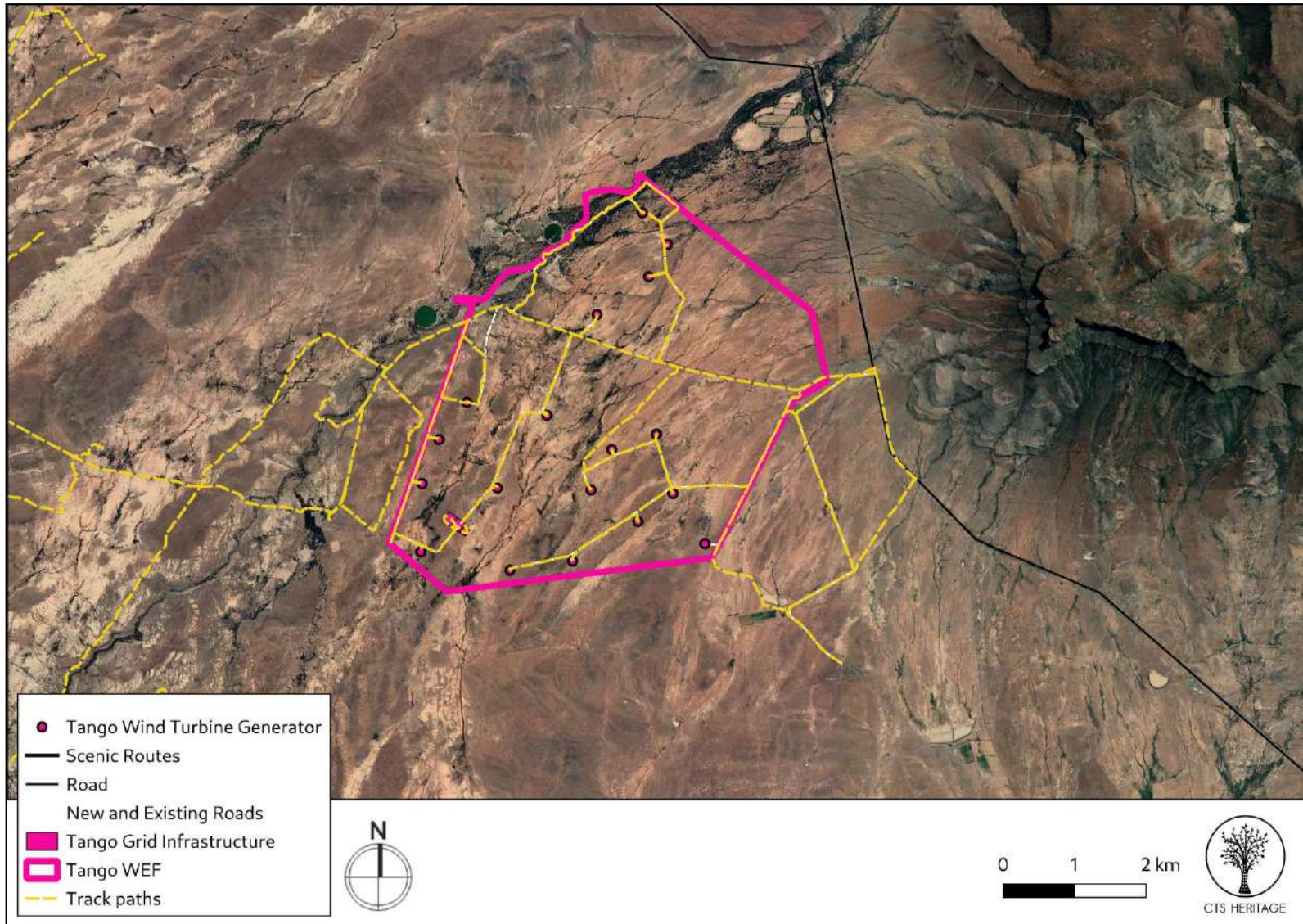


Figure 5: Overall track paths of foot survey

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## 4.2 Archaeological Resources identified

**Table 1: Observations noted during the field assessment**

POINT	Description	Type	Period	Density/ m <sup>2</sup>	Co-ordinates		Grading	Mitigation
001	Hornfels blade flake	Artefacts	MSA	0 to 5	-32.4177609	23.79229952	NCW	NA
002	Hornfels flake, prepared platform	Artefacts	MSA	0 to 5	-32.40487327	23.78637028	NCW	NA
003	Patinated hornfels flakes	Artefacts	MSA	5 to 10	-32.40429181	23.78073218	NCW	NA
004	Core, hornfels	Artefacts	MSA	0 to 5	-32.40992041	23.77745286	NCW	NA
005	Various hornfels flakes, retouched, cores	Artefacts	MSA	10 to 30	-32.41859126	23.77231083	NCW	NA
006	De Kroon werf, modern buildings and early 20th c homestead with corrugated iron roof.	Structure	Modern, Historic	n/a	-32.425645	23.782741	NCW	NA
007	Hornfels flakes	Artefacts	MSA	0 to 5	-32.40466616	23.76125563	NCW	NA
008	Cores and flakes, hornfels	Artefacts	MSA	5 to 10	-32.40403997	23.76337504	NCW	NA
009	Pointed hornfels flakes and points, patinated	Artefacts	MSA	0 to 5	-32.40890446	23.76575816	NCW	NA
010	Blade blank, hornfels	Artefacts	MSA	0 to 5	-32.41325068	23.76100531	NCW	NA
011	Hornfels core, flake	Artefacts	MSA	0 to 5	-32.4151045	23.75681535	NCW	NA
012	Siltstone and hornfels flakes	Artefacts	MSA	10 to 30	-32.41758851	23.75246181	NCW	NA
013	Hornfels blades, flakes, siltstone flakes	Artefacts	MSA	5 to 10	-32.41948187	23.74512344	NCW	NA
014	Patinated hornfels blade	Artefacts	MSA	0 to 5	-32.39107775	23.76547834	NCW	NA
015	Hornfels flake	Artefacts	MSA	0 to 5	-32.38638702	23.76785814	NCW	NA
016	Patinated hornfels flake	Artefacts	MSA	0 to 5	-32.3830322	23.76389662	NCW	NA
017	Hornfels cores and flakes	Artefacts	MSA	0 to 5	-32.37758945	23.76465719	NCW	NA
018	Siltstone and hornfels flakes	Artefacts	MSA	5 to 10	-32.37545562	23.76279914	NCW	NA
019	Patinated hornfels points, flakes	Artefacts	MSA	0 to 5	-32.37396389	23.75821956	NCW	NA
020	Hornfels radial core	Artefacts	MSA	0 to 5	-32.38703105	23.74332214	NCW	NA
021	Retouched patinated hornfels flake	Artefacts	MSA	0 to 5	-32.39635248	23.73798045	NCW	NA
022	Siltstone cores, hornfels flakes	Artefacts	LSA+MS A	10 to 30	-32.39900015	23.73483115	NCW	NA
023	Siltstone points	Artefacts	MSA	0 to 5	-32.40082185	23.73095578	NCW	NA
024	Cores and flakes, hornfels	Artefacts	MSA	0 to 5	-32.4081439	23.72784522	NCW	NA
025	Patinated hornfels points, core	Artefacts	MSA	0 to 5	-32.40848073	23.7277124	NCW	NA
026	Hornfels flakes	Artefacts	MSA	0 to 5	-32.41162658	23.72646079	NCW	NA
027	Hornfels core	Artefacts	LSA	0 to 5	-32.41567757	23.72549894	NCW	NA
028	Hornfels points	Artefacts	LSA	5 to 10	-32.41724924	23.72938945	NCW	NA
029	Hornfels retouched flakes	Artefacts	MSA	0 to 5	-32.41404281	23.73249669	NCW	NA
030	Microliths, flakes, hornfels	Artefacts	LSA	10 to 30	-32.41388379	23.7351859	NCW	NA
031	Core and flakes, hornfels	Artefacts	LSA+ MSA	0 to 5	-32.40989238	23.73963319	NCW	NA
032	Retouched points, flakes, hornfels	Artefacts	MSA	5 to 10	-32.40043158	23.74392689	NCW	NA
033	Patinated hornfels points	Artefacts	MSA	0 to 5	-32.39540821	23.74921832	NCW	NA
034	Patinated hornfels blade point	Artefacts	MSA	0 to 5	-32.39341677	23.75007827	NCW	NA
035	Siltstone flake	Artefacts	LSA	0 to 5	-32.39085308	23.75129228	NCW	NA
036	Siltstone and hornfels flakes	Artefacts	MSA	0 to 5	-32.39549148	23.76648643	NCW	NA
037	Hornfels flake, large b. of percussion	Artefacts	MSA	0 to 5	-32.40272888	23.75739624	NCW	NA





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038	Hornfels and siltstone flakes, some retouch	Artefacts	MSA	5 to 10	-32.40862535	23.75326784	NCW	NA
039	Retouched hornfels flake	Artefacts	MSA	0 to 5	-32.40731184	23.75429868	NCW	NA
040	Prep. Platform on hornfels point	Artefacts	MSA	0 to 5	-32.40603119	23.75705254	NCW	NA
041	Siltstone flakes	Artefacts	MSA	0 to 5	-32.39961325	23.78623238	NCW	NA
042	Hornfels blade struck flakes	Artefacts	MSA	0 to 5	-32.39889561	23.78743702	NCW	NA
043	Patinated hornfels blade flake	Artefacts	MSA	0 to 5	-32.3960159	23.79216541	NCW	NA
044	More modern buildings at Klipstavel	Structure	Modern	n/a	-32.386573	23.739953	NCW	NA
045	Some older staff cottages	Structure	Historic	n/a	-32.387465	23.73763	NCW	NA



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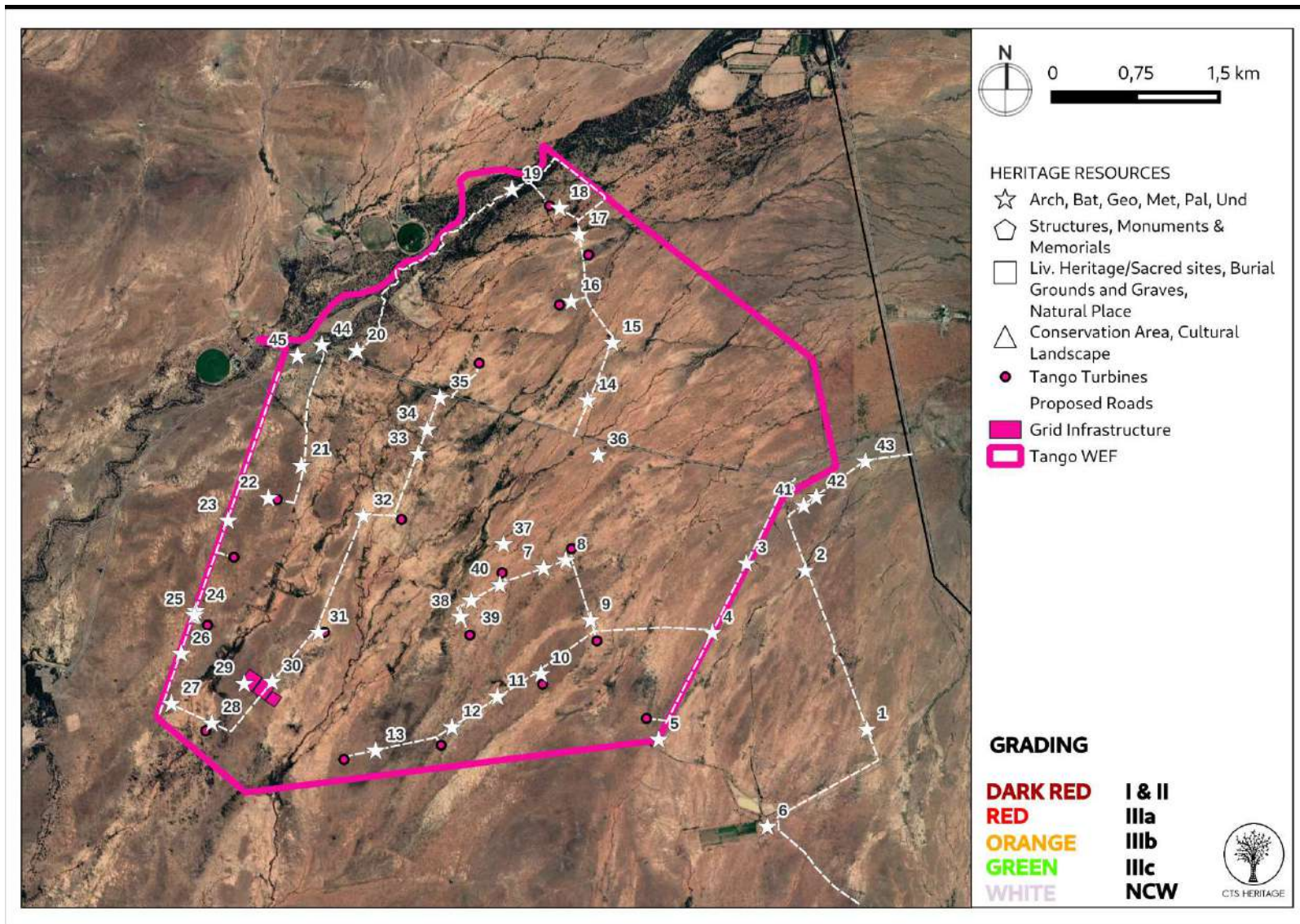


Figure 6: Map of all sites and observations noted within the development area

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### 4.3 Selected photographic record

(a full photographic record is available upon request)



Figure 6.1: Observation 001



Figure 6.2: Observation 002



Figure 6.3: Observation 003 and 004



Figure 6.4: Observation 005 and 006

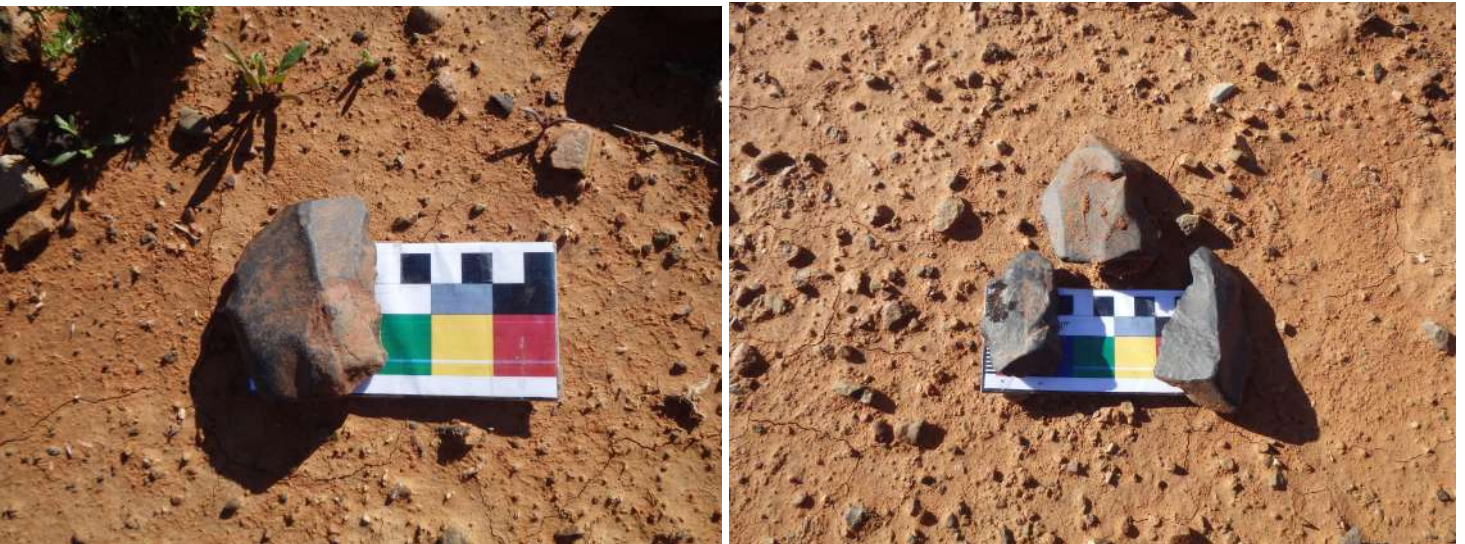


Figure 6.5: Observation 007 and 008



Figure 6.6: Observation 009 and 010



Figure 6.7: Observation 011 and 012

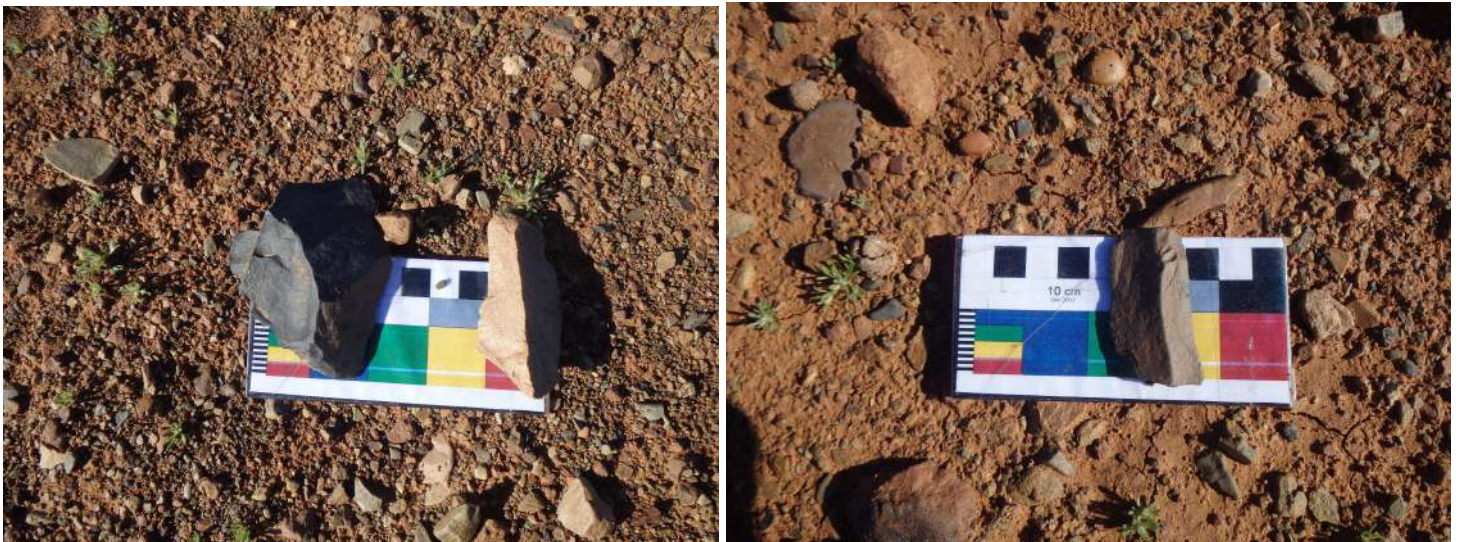


Figure 6.8: Observation 013 and 014



Figure 6.9: Observation 015 and 016



Figure 6.10: Observation 017 and 018

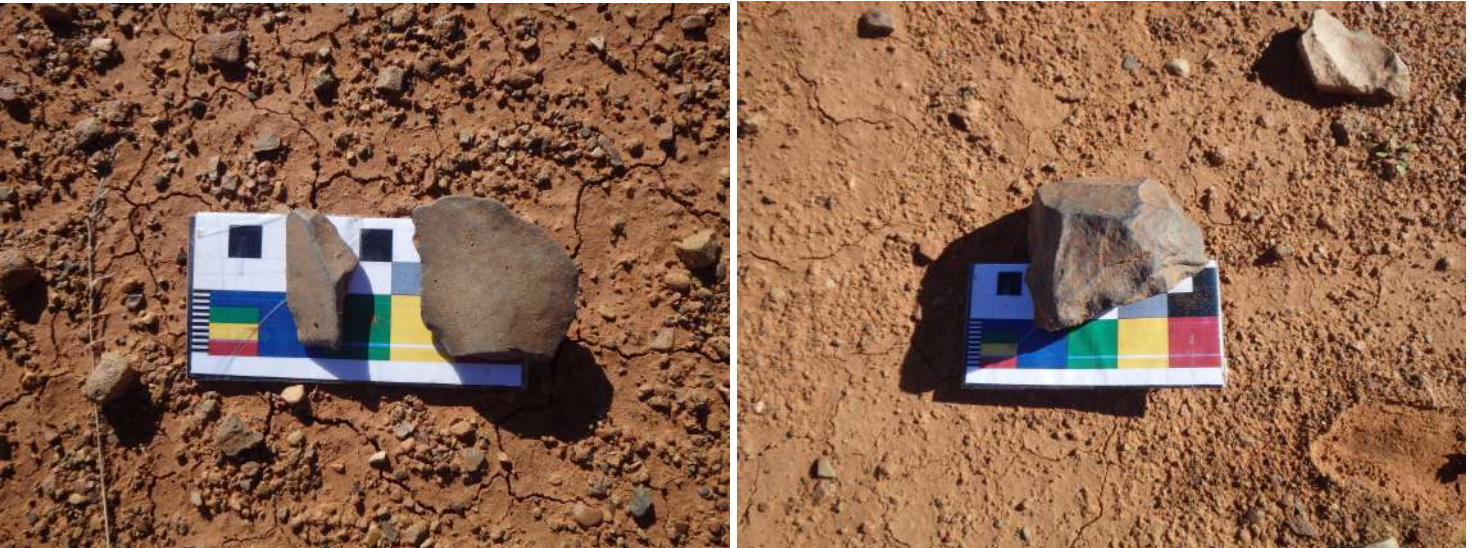


Figure 6.11: Observation 019 and 020



Figure 6.12: Observation 021 and 022

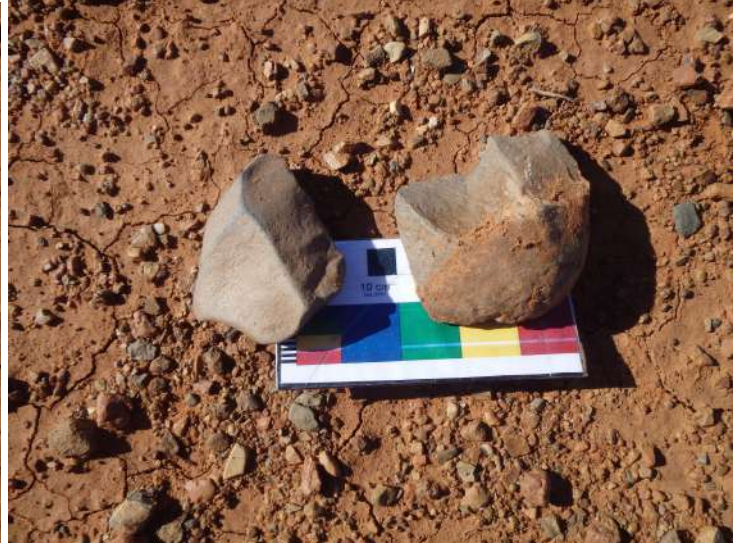


Figure 6.13: Observation 023 and 024



Figure 6.14: Observation 025 and 026



Figure 6.15: Observation 027 and 028



Figure 6.16: Observation 029 and 030



Figure 6.17: Observation 031 and 032



Figure 6.18: Observation 033 and 034



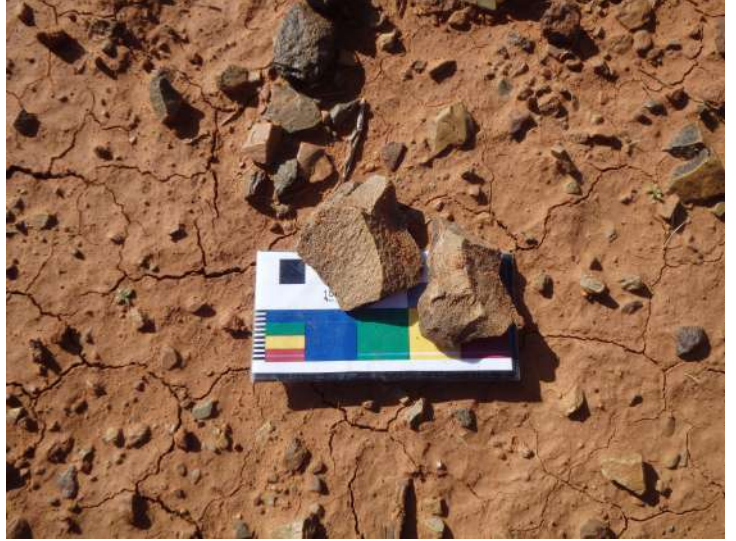


Figure 6.19: Observation 035 and 036



Figure 6.20: Observation 037 and 038



Figure 6.21: Observation 039 and 040



Figure 6.22: Observation 041 and 042



Figure 6.23: Observation 043 and 044



Figure 6.24: Observation 045



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## **5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT**

### **5.1 Assessment of impact to Archaeological Resources**

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, 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.



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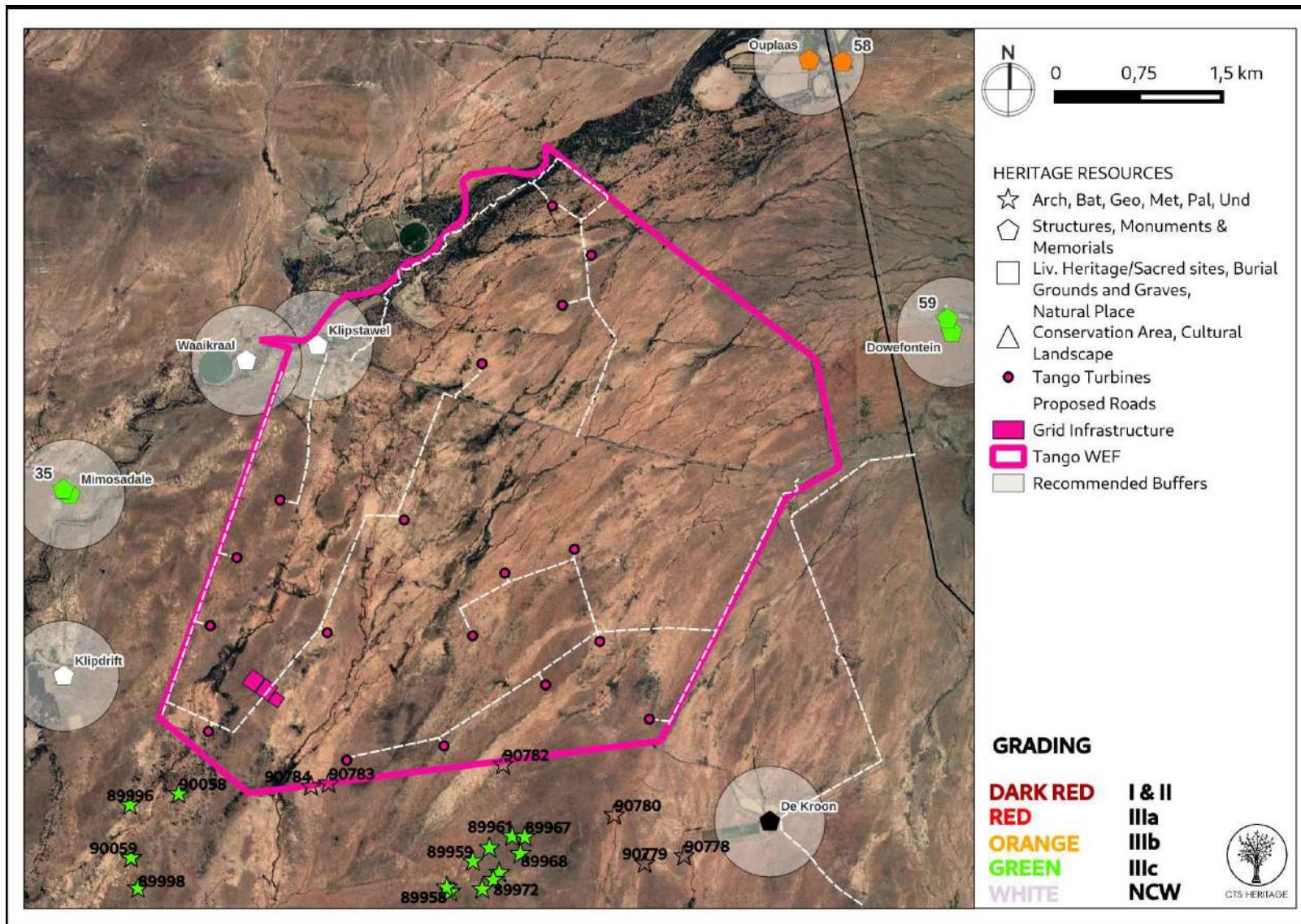


Figure 8: Map of all significant heritage resources noted within the development area



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## 6. CONCLUSION AND RECOMMENDATIONS

The findings of this assessment 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) and CTS Heritage (2021 and 2022). It is noted that high numbers of quarried stone artefacts predominantly from the Middle Stone Age and Later Stone Age period were found within the development area which is consistent with observations on neighbouring farms through impact assessments and research surveys. 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, 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.

### ***Recommendations***

Based on the outcomes of this report, it is not anticipated that the proposed development of the wind energy facilities will negatively impact on significant archaeological heritage on condition that:

- 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.



## 7. 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.

Lavin, Winter, Almond (2022). Heritage Impact Assessment for the proposed development of the Aberdeen WEF Cluster near Aberdeen, Eastern Cape. Section 38(8) HIA submitted to ECPHRA. Unpublished.

Lavin, Winter, Almond (2023). Heritage Impact Assessment for the proposed development of the Kariega WEF Cluster near Aberdeen, Eastern Cape. Section 38(8) HIA to be submitted to ECPHRA. Unpublished.



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## APPENDIX 2: Palaeontological Assessment (2023)

## Palaeontological Heritage Input: combined field-based & desktop study

### PROPOSED KUDU & TANGO WIND ENERGY FACILITIES NEAR ABERDEEN, SARAH BAARTMAN DISTRICT, EASTERN CAPE PROVINCE

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July 2023

#### EXECUTIVE SUMMARY

FE Kudu (Pty) Ltd is proposing to develop two wind energy facilities (WEFs) and associated infrastructure – to be known as the Kudu WEF and Tango WEF - on separate sites located approximately 20 to 40km west of Aberdeen, Sarah Baartman District Municipality (Dr Beyers Naude Local Municipality) in the Eastern Cape Province.

The Kudu WEF and Tango WEF project areas on the northern margins of the Aberdeen *Vlakte*s 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 two project areas; 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 *Vlakte*s 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. Only one, fairly well-preserved block of Palaeozoic petrified wood, was recorded within the Tango project area. 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 *vlakte*s and the fact that the material is not *in situ*.

Most of the low-relief terrain within the WEF project areas 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.

**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 and Tango WEF project areas 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 and Tango WEF developments 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.**

The Environmental Control Officer (ECO) / Environmental Site Officer (ESO) responsible for the Kudu WEF and Tango WEF developments should be made aware of the possibility of important fossil remains (vertebrate bones, teeth, burrows, petrified wood, plant-rich horizons *etc.*) being found or unearthed during the construction phase of the development. Monitoring for fossil material of all major surface clearance and deeper (>1m) excavations by the ECO/ESO on an on-going basis during the construction phase is therefore recommended. Significant fossil finds such as vertebrate bones, teeth and well-preserved petrified logs should be safeguarded and reported at the earliest opportunity to the Eastern Cape Provincial Heritage Resources Authority (ECPHRA). Contact details: Mr Sello Mokhanya, 74 Alexander Road, King Williams Town 5600; Email: smokhanya@ecphra.org.za). This is so that appropriate mitigation (e.g. recording, sampling or collection) can be taken by a professional palaeontologist (See tabulated Chance Fossil Finds Procedure in Appendix 2 to this report). The specialist involved would require a fossil collection permit from ECPHRA. Fossil material must be curated in an approved repository (e.g. museum or university collection) and all fieldwork and reports should meet the minimum standards for palaeontological impact studies developed by SAHRA (2013). These recommendations must be included in the EMPr for the proposed renewable energy developments.

## 1. PROJECT OUTLINE & BRIEF

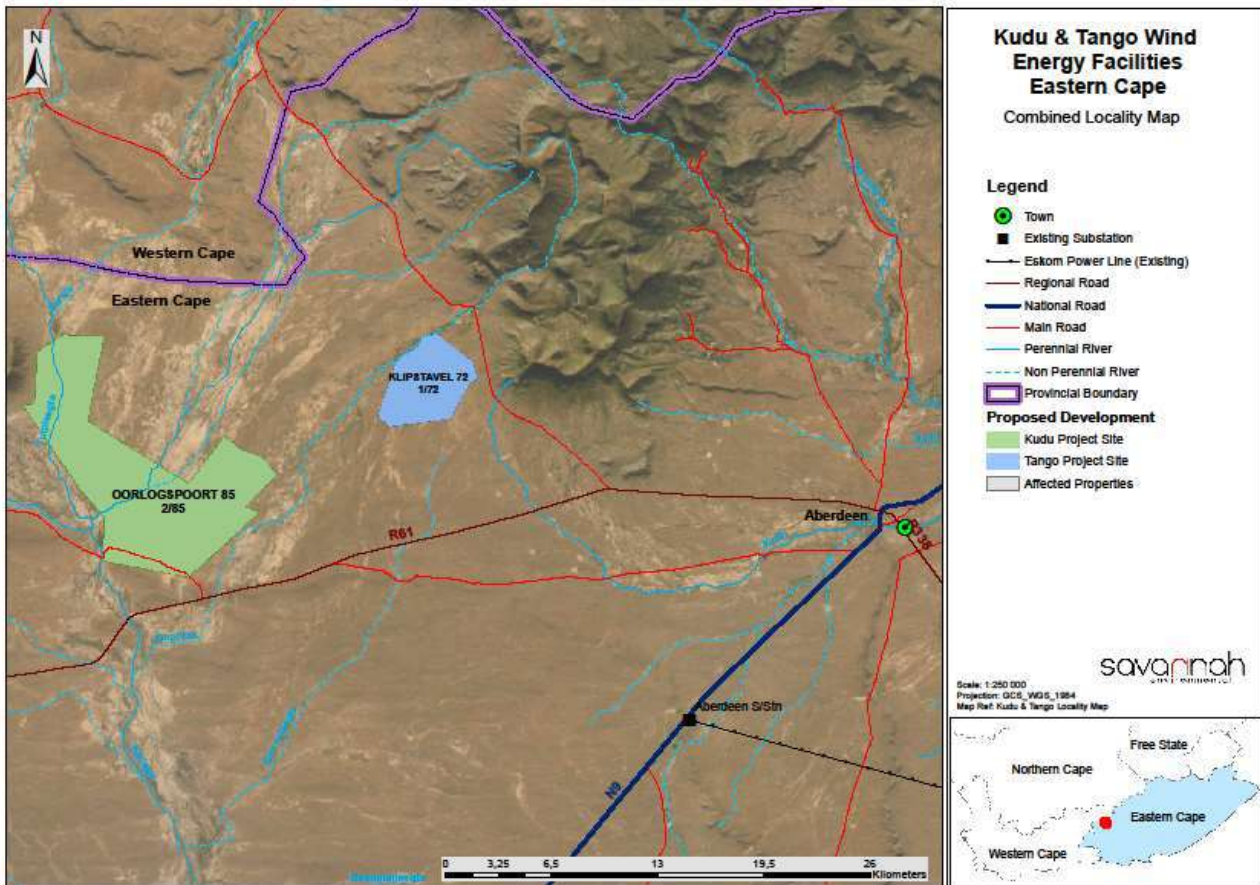
FE Kudu (Pty) Ltd is proposing to develop two wind energy facilities (WEFs) and associated infrastructure on separate sites located approximately 20 to 40km west of Aberdeen, Sarah Baartman District Municipality (Dr Beyers Naude Local Municipality) in the Eastern Cape Province (Figures 1 & 2). The two proposed renewable energy projects comprise (1) the FE Kudu Wind Energy Facility of up to 622.5MW generation capacity to be located on Portion 2 of Farm Oorlogspoort 85 (preferred project site of approximately ~9 170ha) and (2) the FE Tango Wind Energy Facility of up to 240MW generation capacity to be located Portion 1 of Farm Klipstavel 72 (preferred project site of approximately ~2 250ha). The entire extent of the two sites falls within the Beaufort West Renewable Energy Development Zones (i.e. REDZ Focus Area 11). The Applications for Authorisation for the two WEFs and associated grid connection infrastructure will therefore follow a Basic Assessment (BA) process.

Each of the two WEFs will comprise the following main infrastructural components:

- Wind turbines with a generation capacity of up to 7.5MW each;
- Concrete turbine foundations and turbine hardstands;
- An on-site substation hub incorporating:
  - A132/33kV On-site substation;
  - Switchyard with collector infrastructure;
  - Battery Energy Storage System (BESS).
- A balance of plant area incorporating:
  - Temporary laydown areas;
  - A construction camp laydown and temporary concrete batching plant;
  - Operation and Maintenance buildings,
- Cabling between the turbines, to be laid underground where practical.
- Access roads to the site and between project components with a width up to 10m and a servitude of 13.5m.

The proposed infrastructure is preliminarily and will be updated once an optimised layout with all sensitivities considered has been generated.

Provisional sensitivity mapping (SAHRIS palaeosensitivity map, DFFE Screening Tool) suggests that the majority of both sites is of Low Palaeosensitivity with small marginal areas of Very High Palaeosensitivity based on the presence here of potentially fossiliferous continental sediments of the Lower Beaufort Group (Karoo Supergroup) of Permian age (Figure 43). The present combined desktop and field-based palaeontological heritage report contributes palaeontological heritage data to the overarching Heritage Impact Assessments (HIAs) and EMPRs that are being compiled for the two FE WEFs near Aberdeen WEF by CTS Heritage, Cape Town (Contact details: Ms Jenna Lavin, CTS Heritage. 16 Edison Way, Century City, Cape Town. Tel: +27 (0)87 073 5739. Cell: +27 (0)83 619 0854. E-mail: info@ctsheritage.com). The independent EAP for this renewable energy project is Savannah Environmental (Pty) Ltd.



**Figure 1: Map showing the location of the Kudu and Tango WEF project areas situated on the northern margins of the low-relief Aberdeen *Vlakte* subregion of the Great Karoo, north of the R61 trunk road and approximately 20 to 40km west of Aberdeen, Sarah Baartman District Municipality (Dr Beyers Naude Local Municipality) in the Eastern Cape Province (Image prepared by Savannah Environmental).**



Figure 2: Google Earth© satellite image of the northern margins of the Aberdeen *Vlakte* and adjoining, dissected uplands of the Great Escarpment north of the R61 and to the west of Aberdeen, Eastern Cape. The Kudu WEF and Tango WEF project areas are indicated by dark and light blue polygons respectively. The majority of both areas is mantled by Late Caenozoic alluvial, eluvial and colluvial deposits related to the Kariegarivier drainage network draining the Great Escarpment towards the south. Bedrock exposures are largely limited to the eastern footslopes of the Oorlogskloofberge as well as baked sediments adjoining a major E-W trending dolerite dyke in the south.

## 2. INFORMATION SOURCES

This combined desktop and field-based palaeontological heritage study of the two FE WEF project areas near Aberdeen is based on the following information resources:

1. Short project outlines, kmz files, screening reports and maps provided by CTS Heritage, Cape Town;

2. A desktop review of:

(a) the relevant 1:50 000 scale topographic maps (3223AD Oorlogspoort, 3223BD Kamdeboo, 3223BC Kunna and 3223DA Kwietskuil) as well as the 1:250 000 scale topographic map 3222 Beaufort West;

(b) Google Earth© satellite imagery;

(c) published geological and palaeontological literature, including the 1:250 000 geological map (3222 Beaufort West) and relevant sheet explanation (Johnson & Keyser 1979) as well as

(d) previous fossil heritage (PIA) assessments for mining and renewable energy projects in the Aberdeen *Vlakte* subregion by Rubidge & Abdala (2008) and Almond (2014, 2022a, 2022b, 2023);

(e) Palaeontological data from the Karoo Fossil Database and additional unpublished information kindly provided by Dr Mike Day (Natural History Museum, London) and Professor Bruce Rubidge (Evolutionary Studies Institute, Wits University, Johannesburg);

3. The author's field experience with the formations concerned and their palaeontological heritage (*cf* Almond & Pether 2008 and PIA reports listed in the References); and

4. A three-day field assessment of the two Aberdeen WEF project areas by the author during the period 9 to 11 June 2023. Given the generally extremely poor levels of bedrock exposure in the Aberdeen *Vlakte*, fieldwork mainly focussed on examination of a representative selection of potentially fossiliferous bedrock exposures identified on the basis of Google Earth satellite imagery (many of which proved misleading in practice), especially those close to farm tracks, as well as relict alluvial gravels and calcretised older alluvial deposits. Given time constraints, it was not practicable to survey all parts of the huge project area, most of which is likely to be palaeontologically barren on the basis of satellite imagery.

The season in which the site visit took place has no critical bearing on the palaeontological study.

### 3. GEOLOGICAL CONTEXT

The Kudu WEF and Tango WEF project areas near Aberdeen feature low-relief, undulating to gently hilly, terrain of the Aberdeen *Vlakte*s of the Eastern Cape (Figures 2 & 4). Much of the area is clothed in sparse to dense karroid *bossieveld* with unvegetated pans and extensive open alluvial plains; woody vegetation dominated by thorn trees is mainly restricted to larger drainage lines. This portion of the Great Karoo region is located between outliers of the Great Escarpment represented by the Kamdeboberge in the east and the Oorlogspoortberge in the west. It is characterized by semi-arid, karroid vegetation, extensive sandy to gravelly alluvial plains (c. 840-870m amsl. in the Kudu WEF project area; 900-970 m amsl. in the Tango WEF project area), numerous shallow pans (*brak-kolle*), a few low E-W trending rocky ridges or *bulte* (e.g. near Rooidraai homestead) built of dolerite and baked metasediments and, for the most part, shallow, sandy to gravelly drainage lines. These last (e.g. Ouplaasrivier, Tulpleegte) mainly feed south-westwards into the wide, N-S trending Kariega River drainage system running to the southwest of the WEF project areas. The Aberdeen *Vlakte*s represent an ancient peneplanated land surface of possible Miocene age (Partridge & Maud 1987). As a result of protracted denudation, the gently dipping to regularly folded bedrocks have been planed down and extensively blanketed by colluvial, eluvial and alluvial sediments with extensive subsurface bedrock weathering and development of calcrete pedocretes. Due to the pervasive superficial sediment cover, levels of good, fresh bedrock exposure are generally rare to very rare in the Aberdeen *Vlakte*s region with occasional low exposures of channel sandstone beds in the lowlands and quartzitic baked sandstones and dolerite along the occasional ridges. Only a handful of – mainly small – mudrock exposures are encountered here, mainly comprising gullied areas on gentle to steep hillslopes as well as occasional “windows” through superficial sediments along active drainage lines (e.g. Kariegarivier near Rooidraai homestead). There are also occasional borrow pit exposures, such as those just east of Rooidraai homestead, which tend to be highly disturbed at surface.

The geology of the Great Karoo to the west of Aberdeen is depicted in 1: 250 000 geology sheet 3222 Beaufort West (Council for Geoscience, Pretoria; Johnson & Keyser 1979) (Figure 3). The bedrocks underlying the study area are currently *mapped* within the lower portion of the **Teekloof Formation (Pt)** of the **Lower Beaufort Group** (Adelaide Subgroup, Karoo Supergroup) that is predominantly fluvial in origin (Johnson *et al.* 2006). The Lower Beaufort beds here were erroneously assigned by Almond (2014) in a previous PIA report to the mudrock-dominated **Hoedemaker Member** of Late Permian (Wuchiapingian) age (c. 260 Ma) (Smith & Keyser 1995, Rubidge 2005, Rubidge *et al.* 2013) while the thin, closely-spaced, prominent-weathering sandstones seen on the lower slopes of the Kamdeboberg escarpment to the northeast were assigned to the overlying **Oukloof Member** (*cf* stratigraphic table in Figure 33). However, subsequent biostratigraphic data based on more recent fossil tetrapod finds indicates that the somewhat older (Middle Permian) **Abrahamskraal Formation** occurs in the footslopes of the Oorlogspoortberge, on the western margins of the Kudu WEF project area, and further to the north towards Nelspoort (Dr Mike Day, Professor B. Rubidge, pers. comm., 2022) (Figure 32). This suggests that the Aberdeen *Vlakte*s in the two Aberdeen WEF project areas are also underlain by the upper part of the Abrahamskraal Formation; the west-facing slopes of the Kamdeboberge to the east feature younger strata of the Poortjie, Hoedemaker and Oukloof Members of the Teekloof Formation while a probable Poortjie Member sandstone package can be seen on the east-facing slopes of the Oorlogspoortberge (Figure 5). The Beaufort Group bedrocks in the project area are extensively folded along E-W axes into low, open folds; this region accordingly lies within the northern margins of the Permo-Triassic Cape Fold Belt. Short, illustrated accounts of the poorly-exposed Abrahamskraal Formation and overlying Poortjie Member bedrocks in this northern

subregion of the Aberdeen *Vlakte*s have already been provided by Almond (2022b, 2023) and will not be repeated here.

Apart from scattered, low ridges and bands of highly fractured channel wackes and small areas of cleaved, grey-green siltstone with occasional rusty-brown ferruginous carbonate concretions in the *vlakte*s, as well as occasional borrow pit excavations showing folded and cleaved, weathered, calcrete-veined mudrocks (grey-green and minor purple-brown facies) and thin wackes, the best exposures of Beaufort Group bedrocks in the Kudu WEF project area are found on the lower eastern footslopes of the Oorlogspoortberge, close to the project area boundary (*cf* Figures 5 to 12). Here a thin, package of yellowish-brown weathering, thin-to medium-bedded, tabular, locally cross-bedded channel wackes with occasional large, lenticular concretions of ferruginous carbonate sharply overlies crumbly, weathered, grey-green overbank mudrocks containing occasional pedocrete concretions. The base of the package is erosional with local development of thin (*c.* 20 cm), lenticular mudflake intraclast breccias which are often associated with rusty-brown moulds of reworked woody plant axes (Section 5). This channel facies broadly resembles the Poortjie Member which may be more clearly represented higher up on the slopes of the Oorlogspoortberge (Figure 5); the fossiliferous beds on the western edge of the Kudu WEF project area might lie within the upper Abrahamskraal Formation or, alternatively, the base of the Poortjie Member (Teekloof Formation). Overlying mudrocks (*outside* the project area) show both grey-green and, much less commonly, purple-brown hues. Grey-green, fine-grained channel wackes with current ripple cross-laminated bedtops and local evidence of soft-sediment deformation (possibly dewatering) are exposed in a tributary of the Kariegarivier near Rooidraai homestead.

The Lower Beaufort Group country rocks are locally intruded by the **Karoo Dolerite Suite** of Early Jurassic age (Duncan & Marsh 2006). A laterally persistent, broadly W-E trending dyke of resistant-weathering dolerite runs along the southern margins of the Kudu WEF project area where it is expressed as a low rubbly ridge near Rooidraai homestead. Major, columnar-jointed dolerite sills are also visible further to the northeast in the upper slopes of the Kamdebooberg Escarpment (*e.g.* Sleeping Giant) and capping the Oorlogspoortberge in the west. Beaufort Group mudrocks and channel sandstones in the vicinity of the igneous intrusions have been baked to form dark hornfels and splintery, pale blue-green metaquartzite respectively; these tough lithologies form important raw materials for local Stone Age artefacts. Thin, prominent-weathering packages of tabular-bedded, occasionally small-scale wave-rippled, baked channel wackes of the upper Abrahamskraal Formation can be seen emerging from a mantle of doleritic colluvial gravels along the SSW-facing slopes of the ridge to the southeast of Rooidraai homestead (Figure 11). Small, patchy exposures of baked mudrocks in the vicinity are weathered and crumbly.

A wide spectrum of **Late Caenozoic superficial deposits** – mostly Quaternary or younger in age – overlies the Beaufort Group and Karoo dolerite bedrocks across the great majority of the Kudu WEF and Tango WEF project areas (Figures 13 to 31). Angular, blocky colluvial rubble of baked quartzite and dolerite mantles ridge slopes near Rooidraai. Low wacke (impure sandstone) ridges in low-lying terrain are often highly jointed and locally weather to form blocky eluvial gravels or well-rounded corestones. Extensive zones of relict, downwasted alluvial “High Level Gravels” margin the larger water courses (*e.g.* Ouplaasrivier) and form low stepped terraces or linear cobbly to bouldery zones in the adjoining *veld*; the clasts here include moderately to well-rounded pebbles, cobbles of brownish-orange patinated wacke, pale blue-grey, fine-grained quartzite, very dark hornfels, dolerite boulders, vein quartz, calcrete, pedocrete concretions, rare greenish, cherty tuffite and sparse to locally common petrified wood reworked from the Permian bedrocks. Some of this tough-weathering material which also dominates eluvial surface gravels in the region has been

transported downstream from the Escarpment Zone (*e.g.* doleritic boulder deposits). Thin alluvial and eluvial (downwasted), pebbly to cobbly and occasionally bouldery gravels of angular wacke / quartzite, hornfels, dolerite and vein quartz mantle large parts of the project area. Grey areas on satellite images often feature fine, flaky to crumbly mudrock / wacke clasts and / or greyish carbonate pedocrete concretions overlying sands rather than fine-grained bedrocks. Well-developed calcrete pedocretes are mainly developed along major drainage lines and probably also in close association with buried dolerite intrusions. Here older, orange-brown, polygonally veined, massive to finely nodular calcretes with sparse gravel clasts are overlain by younger, uncalcretised sandy alluvium. Most of the younger alluvium associated with currently active drainage lines consists of fine-grained sands and silts (locally reworked by wind) with lenses of coarser gravels (clasts of dolerite, wacke, quartzite, hornfels *etc*) at the base, dispersed calcrete glaebules and occasional sparse surface gravels, some of which are flaked and may well be manuports. Numerous, extensive pan areas (*brak-kolle*) are devoid of vegetation with floors of fine sand or silt which often underlain by a calcrete *dorbank*. The pan margins usually possess a sparse veneer of sheet-washed, pebbly to cobbly gravels of resistant rock-types (*e.g.* wacke, rare silicified wood, hornfels, quartzite *etc*) that are commonly anthropogenically flaked. Scattered bush clumps are associated with low mounds or *heuweltjies* of unusually thick silty to sandy soil. These areas are typically densely burrowed by mammals (aardvark, porcupines), often feature scattered modern bones, and may be associated with calcrete glaebules.

Representative exposures of the various bedrock and superficial sediment rock units present within the Kudu WEF and Tango WEF project areas are illustrated in Figures 4 to 23 and Figures 24 to 31 respectively.



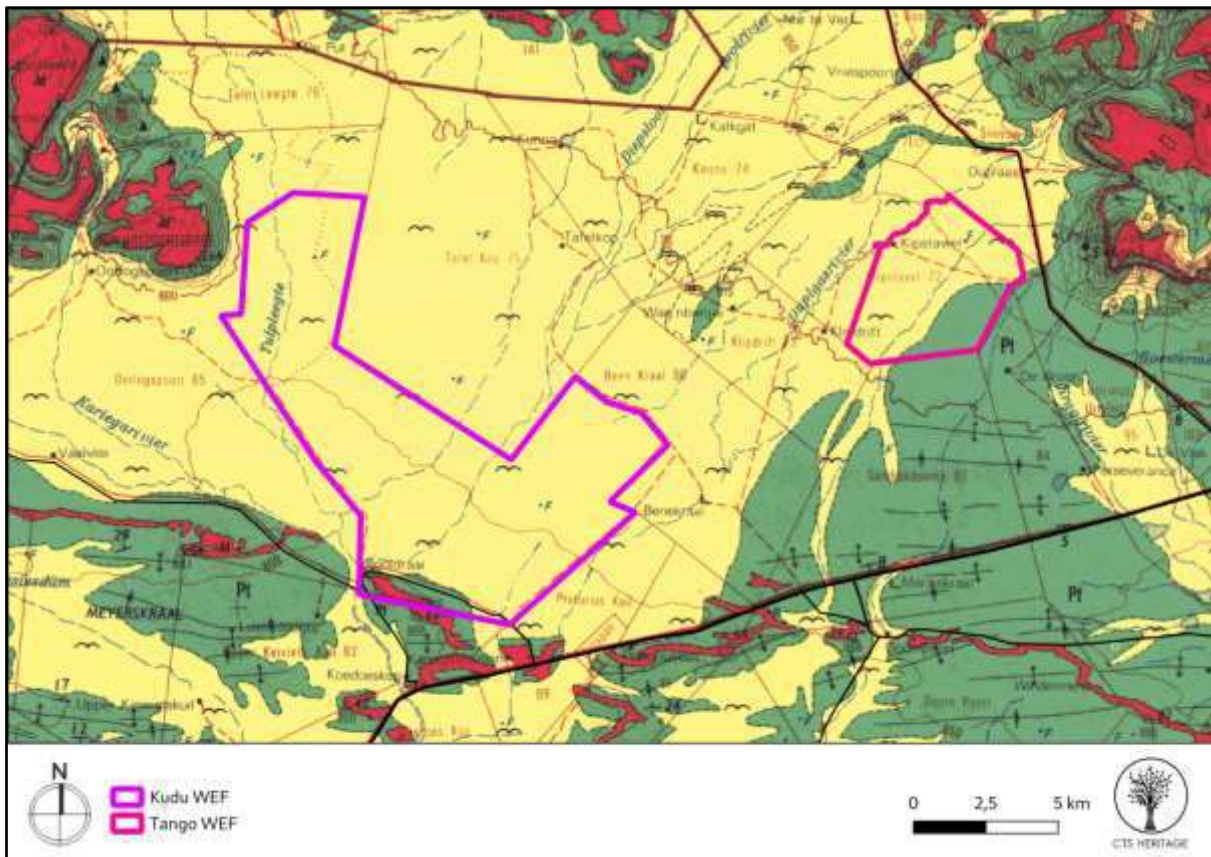


Figure 3: Extract from the 1: 250 000 geological map sheet 3222 Beaufort West (Council for Geoscience, Pretoria) showing the Kudu WEF (lilac polygon) and Tango WEF (pink polygon) project areas near Aberdeen. Exposures of potentially fossiliferous Lower Beaufort Group bedrocks (green) here are very limited. Recent palaeontological fieldwork suggests that these bedrocks belong to the upper Abrahamskraal Formation (*Tapinocephalus* Assemblage Zone) rather than the Teekloof Formation (Pt) as mapped here. Most of the project areas are mantled by Late Caenozoic sandy to gravelly alluvial deposits (yellow) that are generally of Low Palaeosensitivity. The bedrocks are locally intruded and baked by unfossiliferous Karoo dolerite (red) No historical fossil sites are mapped here within the WEF project areas (Image prepared by CTS Heritage).



Figure 4: General view eastwards across very low-relief terrain of the northern Aberdeen *Vlakte* where the proposed Kudu WEF and Tango WEF will be situated, from the Oorlogspoortberge (rocky footslopes in foreground) towards the Kamdebooberg on the skyline.

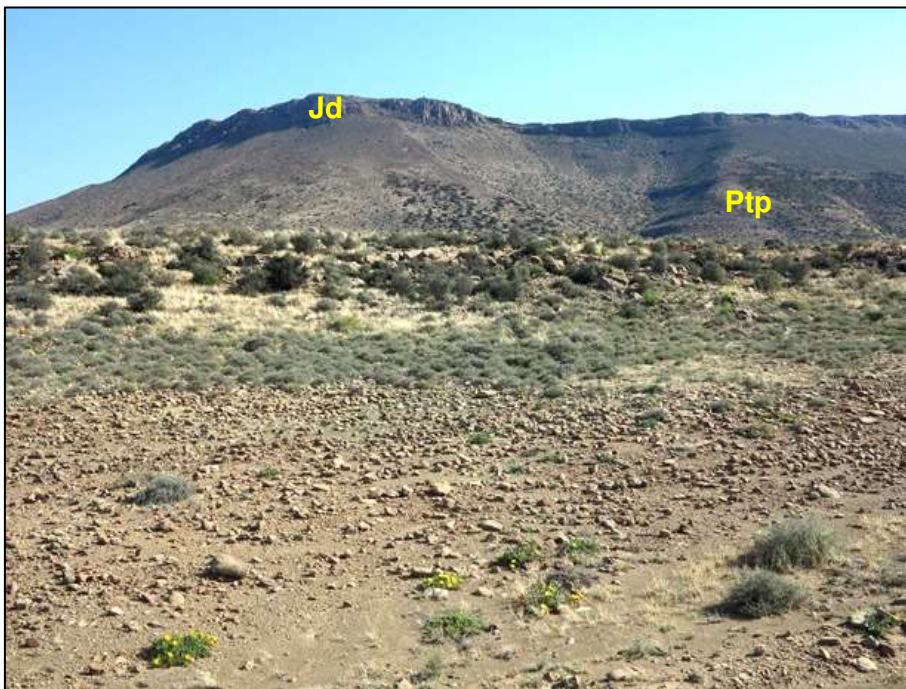


Figure 5: View of the Oorlogspoortberge from the east, situated on the western margins of (and largely *outside*) the Kudu WEF project area. Channel sandstones, assigned either to the upper Abrahamskraal Formation or the lower Poortjie Member (Teekloof Formation), building the low *kranz* in the middle ground – located just *inside* the Kudu WEF project area - contain locally abundant fossil debris of reworked woody plants. Ptp = Poortjie Member. Jd = sill of Karoo Dolerite Suite.



**Figure 6:** Close-up of the yellowish-brown weathering, tabular cross-bedded, poorly cemented channel sandstones building the low *kranz* seen in the previous figure (hammer = 30 cm). The sandstones display sedimentary and palaeontological facies typical of the Poortjie Member but might lie within the upper Abrahamskraal Formation.



**Figure 7:** Large, irregular to lenticular concretion of diagenetic ferruginous carbonate within the Poortjie-like channel sandstone unit illustrated above (hammer = 30 cm).



**Figure 8:** One of several lenses of mudflake-dominated breccio-conglomerate (behind hammer, 30 cm long) at the base of the channel sandstone package illustrated above. Such lenses are locally packed with ferruginized moulds of reworked woody plant debris and are the likely source of downwasted petrified wood in associated colluvial gravels (*cf* Figures 34 & 35).



**Figure 9:** Rare exposure of thinly interbedded wackes and grey-green mudrocks of the upper Abrahamskraal Formation within a borrow pit c. 750m east of the Rooidraai homestead. Overlying coluvial gravels are calcretised. Minor purple-brown mudrocks are exposed elsewhere in the same borrow pit.



Figure 10: Ripple cross-laminated, greyish channel sandstones of the upper Abrahamskraal Formation exposed in a tributary stream of the Kariegarivier near Rooidraai homestead (hammer = 30 cm).



Figure 11: Low *kranz* of baked, tabular-bedded quartzite and hornfels of the upper Abrahamskraal Formation exposed among doleritic colluvial gravels on the south-facing slopes of the dolerite-intruded ridge, c. 900 m SE of Rooidraai homestead. Hammer = 30 cm.



**Figure 12: Low exposures of cleaved, grey-green mudrocks of the Lower Beaufort Group in the north-eastern sector of the Kudu WEF project area (hammer = 30 cm).**



**Figure 13: Extensive bands of dark, patinated surface gravels in the north-eastern sector of the Kudu WEF project area are probably relict bars of older alluvial gravels. They are dominated by angular to subrounded dolerite, quartzite / wacke and hornfels clasts but sometimes contain very sparse reworked blocks of petrified wood.**



**Figure 14: Similar relict bars of dark alluvial gravels, seen here in the southern sector of the Kudu WEF project area. View towards the NE showing the Kamdebooberg in the background.**



**Figure 15: Relict "High Level" alluvial gravels in the NE sector of the Kudu WEF project area with extensive development of pale calcrete hardpan in the subsurface, perhaps associated with weathered dolerite clasts here.**



**Figure 16: Extensive, thin veneer of eluvial / reworked fluvial surface gravels typical of many portions of the Kudu WEF project area, seen here in the northeast. These gravels have yielded sparse reworked blocks of poorly- to well-preserved silicified fossil wood (e.g. Locs. 332, 333).**



**Figure 17: Downwasted eluvial gravels overlying semi-consolidated older sandy alluvium and mantled by unconsolidated younger alluvial sands, SE sector of Kudu WEF project area (hammer = 30 cm).**





**Figure 18: Flat-terrain with low karroid *bossieveld* vegetation and mantled by dark patches of downwasted / reworked, poorly-sorted older alluvial gravels (dolerite, wackes / quartzite, hornfels etc) are widely seen in the NE sector of the Kudu WEF project area.**



**Figure 19: Many darker grey patches seen on satellite images reflect surface gravels dominated by reworked platy grey-green mudrock gravels rather than *in situ* Lower Beaufort Group bedrocks, as seen here in the NE sector of the Kudu WEF project area. Such areas are generally unfossiliferous.**



**Figure 20: Older, semi-consolidated sandy alluvium containing abundant small calcrete glaebules exposed in shallowly dissected terrain some 900m east of the Roodraai homestead.**



**Figure 21: Extensive open *vlaktes* dominated by unconsolidated, fine sandy to silty alluvium in the southern sector of the Kudu WEF project area. Bedrocks here may lie at depths of up to a few meters.**



**Figure 22:** Much of the western sector of the Kudu WEF project area is dominated by fine sandy to silty alluvium and shallow, wooded channels of tributary streams of the Kariegarivier drainage system, such as the Tulpleegte.



**Figure 23:** Erosionally dissected areas within the sandy *vlaktes* the western sector of the Kudu WEF project area show that the fine alluvial deposits here are up to several meters thick. Bedrock exposure is non-existent, except along the most deeply incised drainage lines (e.g. Kariegarivier).



**Figure 24: Well-developed, coarse, boulder alluvium exposed along the Ouplaasrivier along the northern edge of the Tango WEF project area. The boulders are mainly composed of reworked corestones of greyish Karoo dolerite derived from major sill intrusions in the Kamdebooberg escarpment to the east.**



**Figure 25: Several elongate, SE-NW trending darker patches on satellite images of the southern sector of the Tango WEF project area represent relict, coarse “High Level” alluvial gravels dominated by well-rounded boulders and cobbles of dark patinated Karoo dolerite.**



**Figure 26: Linear trains of well-rounded dolerite boulders in the southern sector of the Tango WEF project area probably represent re-exhumed ancient drainage lines, generating an inverted topography.**



**Figure 27: Sandy alluvial *vlaktes* with a sparse mantle of downwasted eluvial gravels on the western margins of the Tango WEF project area. Reworked petrified wood clasts are very rarely encountered here.**



**Figure 28: Similar, more erosionally dissected sandy and gravelly deposits in the eastern sector of the Tango WEF project area.**



**Figure 29: Donga erosion into thick sandy alluvium reveals widespread calcrete development in the subsurface, as seen here in eastern sector of the Tango WEF project area.**



**Figure 30: Thin, locally gravel-rich calcrete hardpan beneath semi-consolidated, orange-brown sandy alluvium exposed in a shallow stream bank, eastern sector of the Tango WEF project area (hammer = 30 cm).**



**Figure 31: Flat terrain within the south-eastern sector of the Tango WEF project area with occasional patches of thin, pebbly to cobbly alluvial to eluvial gravels dominated by Karoo quartzite / wacke, hornfels and dolerite with very rare blocks of petrified wood.**

#### 4. PALAEOLOGICAL HERITAGE CONTEXT

The Aberdeen *Vlakte*s are largely *Terra Incognita* in palaeontological terms due to the exceedingly poor levels of bedrock exposure in the region (*cf* fossil vertebrate site maps presented by Keyser & Smith (1977-1978), Nicolas (2007)). The 1: 250 000 geological map in Figure 3 shows no historical sites within the WEF Cluster project area. Rubidge and Abdala (1988) recorded a modest number of small dicynodonts, large therocephalian postcranial remains and fossil wood from a series of farms extending across the Karoo *vlakte*s to the south-west of Oorlogspoortberge, due southwest of the present study area. The fossils were provisionally assigned to the formerly recognised *Pristerognathus* AZ (but might belong, at least in part, to the upper *Tapinocephalus* AZ. A PIA report by Almond (2014) for a 200MW WEF project area, situated just east of and directly south of the Kudu WEF and Tango WEF project areas respectively, recorded locally abundant petrified wood within surface gravels but no fossil vertebrate remains. No PIA reports were submitted for the proposed Biotherm Aberdeen PV/CPV Solar Energy Facility on Portion 1 of The Farm Wildebeest Poortje near Aberdeen, Camdeboo Municipality, Eastern Cape or the proposed Camdeboo Wind Energy Facility near Aberdeen Eastern Cape (CTS, pers. com., 2022). Recent PIA studies by Almond (2002a, 2022b, 2023) for solar project areas near Nelspoort as well as the Aberdeen Cluster WEFs and Kariega WEF in the vicinity of the Kudu and Tango WEFs yielded only very rare fossil tetrapod remains; these are of scientific interest because they probably include dinocephalians from the upper Abrahamskraal Formation. A local abundance of fossilized woody plant material (much of it poorly preserved as ferruginised moulds) was recorded here within the inferred lower part of the Poortjie Member as well as widespread scatter of silicified wood blocks within the Late Caenozoic superficial deposits. The petrified wood blocks here are probably derived both from channel sandstone bodies within the upper Abrahamskraal Formation as well as the overlying Poortjie Member.

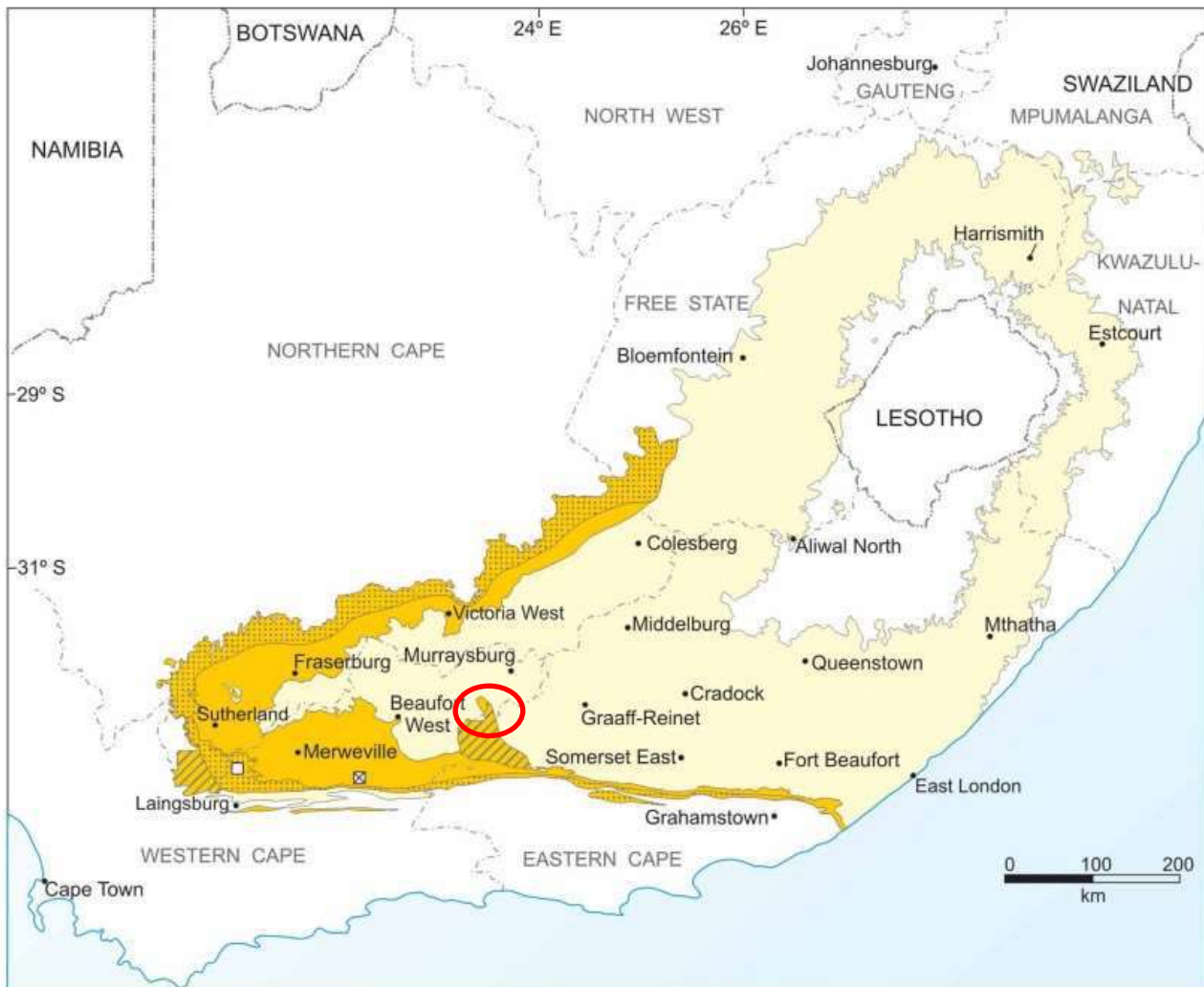
As discussed above, recent fossil collection by Wits University palaeontologists (Bruce Rubidge, Mike Day *et al.*) from better bedrock exposures within the Great Escarpment Zone (e.g. Oorlogspoortberge, foothills of the Kamdebooberg) suggests that the majority (and perhaps all) of the Lower Beaufort Group bedrocks in the present project area belong to the upper part of the Abrahamskraal Formation and *not* the Teekloof Formation as mapped (*cf* Figure 3). Fossil assemblages of the Middle Permian ***Tapinocephalus* Assemblage Zone** may therefore be expected here, but supporting material is exceedingly scarce. This revised biostratigraphy is reflected, albeit provisionally, in the most recent biozonation mapping of the Main Karoo Basin by Day & Rubidge (2020a) which shows an unconfirmed tongue of “Tap Zone” outcrop extending into the Aberdeen *Vlakte*s region from the south (Figure 32) (contrast the earlier account by Almond 2014, now outdated).

Continental (terrestrial / lacustrine / fluvial) fossil biotas within the upper part of the Abrahamskraal Formation (Moordenaars and Karelskraal Members) as well as within the lowermost portion of the Poortjie Member of the Teekloof Formation are now assigned to the ***Diictodon* – *Styracocephalus* Subzone** of the revised ***Tapinocephalus* Assemblage Zone** (AZ) that is of Late Capitanian age (c. 262-260 Ma) (Day & Rubidge 2020a) (Figure 33). The highly impoverished, post-extinction vertebrate fauna represented in the uppermost part of the ***Diictodon* – *Styracocephalus* Subzone** (lowermost Poortjie Member) includes – or is inferred to include – only a few representatives of several tetrapod subgroups. These include amphibians, parareptiles (pareiasaurs, *Eunotosaurus*), dinocephalians (e.g. *Criocephalosaurus*, perhaps also *Styracocephalus*), dicynodonts (e.g. *Diictodon*), therocephalians (e.g. *Pristerognathus*) and



gorgonopsians (Retallack *et al* 2006, Smith *et al.* 2012, Day *et al.* 2015a, 2015b, Day & Rubidge 2020a).

The fossil record of the Abrahamskraal – Teekloof contact zone is of special scientific interest because of its record of environmental and palaeobiological events related to the major **Middle Permian Mass Extinction Event** of 262-260 million years ago (= Capitanian or Guadalupian Mass Extinction Event) (Day *et al.* 2015b). Since vertebrate fossils are generally rare within this interval, any new records of well-preserved, identifiable material here are of considerable scientific value (*cf* ongoing research project on this extinction event conducted by Professor Bruce Rubidge of Wits University and colleagues elsewhere).



**Figure 2.** Distribution of the Tapinocephalus Assemblage Zone (dark yellow) in the Beaufort Group (yellow), showing the distribution of the Eosimops – Glanosuchus Subzone (dotted), Diictodon – Styracocephalus Subzone (not dotted), and uncertain presence (diagonal batched). Positions of Type localities for the Eosimops – Glanosuchus Subzone (empty square) and Diictodon – Styracocephalus Subzone (crossed square) are indicated.

**Figure 32:** The most recent fossil biozonation mapping of the *Tapinocephalus* Assemblage Zone in the Main Karoo Basin by Day and Rubidge (2020a) indicates a region of the Onder Karoo between Beaufort West and Aberdeen where the presence of this AZ is uncertain (red ellipse) but strongly suggested by recent fossil finds. Any identifiable new tetrapod (and possibly also woody) fossil material from the Aberdeen *Vlakte* may help clarify these biostratigraphic ambiguities.

Age	Gp	West of 24° E	East of 24° E	Free State / KwaZulu-Natal	Vertebrate Assemblage Zones	Vertebrate Subzones	Radiometric dates				
JURASSIC	STORMBERG		Drakensberg Gp	Drakensberg Gp			← 183.0 Ma (A)				
			Clarens Fm	Clarens Fm	Massospondylus		← <187.5 Ma (B)				
			upper Elliot Fm	upper Elliot Fm			← <191.9 Ma (B)				
TRIASSIC	Tarkastad Subgp		lower Elliot Fm	lower Elliot Fm	Scalenodontoides		← <199.9 Ma (B)				
			Molteno Fm	Molteno Fm			← <204 Ma (B)				
			Burgersdorp Fm	Driekoppen Fm	Cynognathus	Cricodon-Ufudocyclops Trirachodon-Kannemeyeria Langbergia-Gargainia		← <219 Ma (B)			
			Katberg Fm	Verkykerskop Fm	Lystrosaurus declivis						
								← 252.24 Ma (G) ← 251.7 Ma (C)			
PERMIAN	BEAUFORT	Adelaide Subgp	Teekloof Fm	Balfour Fm	Normandem Fm	Daptocephalus	Palingkloof M.	Harrismith M.	Lystrosaurus maccaigi-Moschorhinus	← 253.02 Ma (D)	
							Elandsberg M.	Schoondraai M.			
							Ripplemead M.	Rooinekke M.	Dicynodon-Therapsid		
							Daggaboersnek M.	Frankfort M.			
							Oudeberg M.		Cistecephalus		
							Steenkampsvlakte M.				
							Oukloof M.	Middleton Fm	Endothiodon	Tropidostoma-Gorgonops Lycosuchus-Eunotosaurus	← 255.2 Ma (E) ← 256.247 Ma (E) ← 259.262 Ma (E)
							Hoedemaker M.				
							Poortjie M.				
										Diciodon-Styracocephalus	← 260.239 Ma (E) ← 260.407 Ma (E)
ECCA			Abrahamskraal Fm	Koonap Fm	Volksrust Fm	Tapinocephalus Eodicynodon	Eosimops-Glanosuchus	← 261.241 Ma (E)			
			Waterford Fm Tierberg/Fort Brown	Waterford Fm Fort Brown							

Figure 33: Stratigraphic subdivision of the Karoo Supergroup with the rock units and fossil biozones most relevant to the present Kudu WEF and Tango WEF study areas outlined in green (Modified from Smith *et al.* 2020). Recent Karoo fossil biozonation mapping suggests that Lower Beaufort Group bedrocks underlying the WEF project areas contain fossil assemblages within the Abrahamskraal Formation assigned to – probably the upper part of - the *Tapinocephalus* Assemblage Zone (green rectangle). Previous geological mapping suggested a high stratigraphic placement within the Teekloof Formation associated with *Endothiodon* Assemblage Zone fossil assemblages (previously assigned to the *Pristerognathus* AZ). The Poortjie, Hoedemaker and Oukloof Members of the Teekloof Formation are represented in the slopes of the Kamdebooberge Escarpment to the northeast of the WEF Cluster project area. Channel sandstones within the basal part of the Poortjie Member might extend into the western margins of the Kudu WEF project area on the lower footslopes of the Oorlogspoortberge.

#### 4. RESULTS FROM PALAEOLOGICAL SITE VISIT

Most of the palaeontological fieldwork for the present site visit focussed on sporadic, darker, greyish areas seen on satellite images of the WEF project areas (Figure 2) which, in some cases at least, are associated with local exposures of Lower Beaufort Group mudrocks (many only feature loose, shaley surface gravels or sandstone, however). A representative sample of areas with dark-hued relict alluvial gravels were also intensively searched for reworked petrified wood blocks. Less attention was paid to rare sandstone exposures, although these may also contain valuable reworked fossil vertebrate and woody plant material in the Abrahamskraal Formation and overlying Poortjie Member channel packages. No fossils were observed within diagenetic ferruginous carbonate concretions (elsewhere associated with fossil plants in the Poortjie Member, for example) or within occasional greyish pedogenic palaeocalcrete concretions, either *in situ* or reworked into surface gravels.

Fossil heritage resources recorded during the recent 3-day site visit to the WEF project areas are briefly documented in Appendix 1 with representative illustrations provided in Figures 34 to 42 below. No fossil vertebrate specimens were recorded during the site visit; previous PIA studies in the northern Aberdeen *Vlakte* indicate that these are very rare in low relief areas (*cf* Almond 2022a, 2022b, 2023). The only trace fossils encountered were concentrations of probable calcretised subvertical plant root casts within thick sandy alluvial deposits of Late Caenozoic age (Figure 42); such occurrences are widespread within the Great Karoo region and of limited palaeontological interest.

A sparse background scatter of reworked blocks of petrified (silicified) wood in many different hues (pale grey to black, pearly, orange-brown, pale brown *etc.*, in part reflecting different iron and manganese content) occurs widely within alluvial and eluvial surface gravels across the Kudu WEF Cluster project area (Figures 35 to 40) (*N.B.* The sites noted in Appendix 1 and on satellite map Figure A1 probably represent only a *small fraction* of all fossil wood occurrences within the WEF project areas). However, only one example – albeit with well-preserved woody fabric – was recorded within the Tango WEF project area (Figure 41). Fossil wood may be concentrated in remanié / eluvial gravels at the contact between superficial sands and bedrock as well as in stream gravels. A large proportion of the wood blocks show only partially or poorly-preserved xylem fabrics which may reflect different levels of microbial decomposition before or at the time of diagenetic silicification. However, some of the blocks from the same areas do show well-developed seasonal growth rings and excellent preservation of xylem tissue. This better-preserved material is potentially identifiable to genus or species level on the basis of the woody microstructure, and may help refine the local biostratigraphy; unfortunately many Permian wood taxa have long stratigraphic ranges (*cf* Bamford 1999, 2000). Day and Rubidge (2020a) list the genera *Australoxylon* and *Prototaxoxylon* from the Middle Permian Tap Zone beds (Fossil wood taxa for the overlying *Endothiodon* AZ are not listed by Day & Smith (2020)). Bamford (1999) notes that *Australoxylon* also occurs within the lowermost Teekloof Formation / Poortjie Member at Stellenboschvlei, north of the Oorlogskloofberge, but recent dinocephalian finds here suggest this area might also lie within the Abrahamskraal Formation (or perhaps the lower Poortjie Member).

Many of the fossil wood blocks recorded within the WEF project areas near Aberdeen, including those within alluvial gravels, are subangular to angular and do not appear to have suffered extensive transport, while some small blocks are well-rounded. Such material is extremely tough-weathering and can potentially be transported far from source by vigorous streams. Denser scatters of fossil wood blocks occur among colluvial gravel aprons in the vicinity of breccio-

conglomerate lenses at the base of channel sandstone packages on the western edge of the Kudu WEF project area; locally abundant, ferruginised moulds of woody plant axes are seen within the channel breccias themselves (Figures 8 & 34). As previously discussed, these fossiliferous, yellowish-weathering, cross-bedded channel sandstone bodies might lie within the base of the Poortjie Member or perhaps rather within the uppermost part of the Abrahamskraal Formation. Almond (2023) has described the sudden increase in transported fossil wood material found in the inferred basal Poortjie Member within the Kariega WEF project area near Aberdeen.

Good sections through Late Caenozoic superficial deposits suitable for palaeontological prospecting are rare in the Aberdeen *Vlakte* region. No fossil material was observed within deposits such as thicker alluvial sands and calcretes, apart from the calcretised rhizoliths mentioned above (similar results were found by Almond 2014, 2022b, 2023). Reworked blocks of petrified wood are common, and locally abundant within alluvial / eluvial surface gravels, as discussed above.



**Figure 34: Rusty-brown moulds of reworked woody plant axes weathered out of mudclast breccias at the base of a thin package of yellowish-brown channel wackes (uppermost Abrahamskraal Fm or basal Poortjie Member, Teekloof Fm), Portion 2 of Farm Oorlogspoort 85 (Loc. 353). Scale = c. 15cm.**



**Figure 35: Locally abundant blocks of poorly-preserved silicified wood weathered-out from the channel sandstone package just above, Portion 2 of Farm Oorlogspoor 85 (Loc. 355). Scale = c. 15 cm.**



**Figure 36: Scatter of well-preserved petrified wood blocks (with seasonal growth lines) as well as poorly-preserved, amorphous blocks among surface gravels, Portion 2 of Farm Oorlogspoor 85 (Loc. 350). Largest block is c. 13 cm across.**



**Figure 37:** Reworked blocks of poorly-preserved silicified wood showing amorphous structure (possibly partially decomposed before silicification) recorded within a dense surface scatter of cobbly eluvial to alluvial gravels, Portion 2 of Farm Oorlogspoor 85 (Loc. 333). Scale = c. 15 cm.



**Figure 38:** Isolated block of colour-banded petrified wood recorded within a band of relict “High Level” alluvial gravels, Portion 2 of Farm Oorlogspoor 85 (Loc. 331). Scale in cm and half cm.



**Figure 39:** Blocks of cherty, colour-banded petrified wood recorded within eluvial surface gravels, Portion 2 of Farm Oorlogspoor 85 (Loc. 306). Block is c. 9 cm across.



**Figure 40:** Small block of well-preserved, cherty, grey-green petrified wood recorded from sheet-washed eluvial surface gravels within a pan-like *brak-koll* in sandy *vlaktes*, Portion 2 of Farm Oorlogspoor 85 (Loc. 335). Block is c. 8.5 cm across.



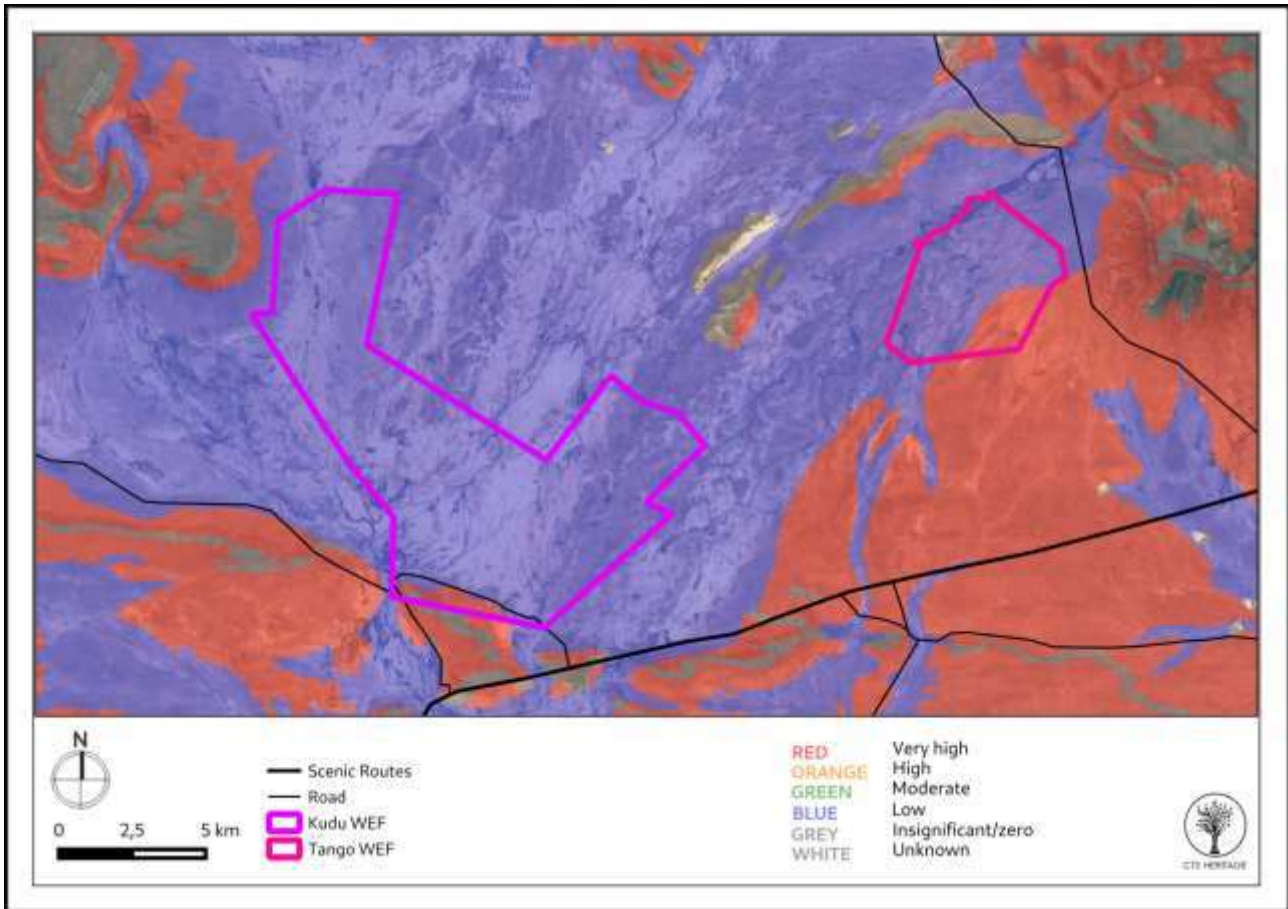
**Figure 41: Rare, reworked block of pale, silicified wood showing well-preserved seasonal growth lines recorded from extensive area of greyish surface gravels (wacke, dolerite etc) on Portion 1 of Farm Klipstavel 72 (Loc. 370). Block is c. 11 cm across. This is the only petrified wood specimen recorded within the Tango WEF project area.**



**Figure 42: Thick sandy alluvium exposed in the banks of a deeply-incised, narrow drainage line showing numerous vertical pale structures – possibly calcretized rhizoliths (root traces), Portion 1 of Farm Klipstavel 72 (Loc. 383).**



## 5. SITE SENSITIVITY VERIFICATION



**Figure 43: Provisional palaeosensitivity mapping for the Kudu WEF and Tango WEF project areas (lilac and pink polygons, respectively) (Image based on the DFFE Screening Tool and provided by CTS 2023). The Very High Palaeosensitivity shown for outcrop areas of the Lower Beaufort Group is *contested* in the present report since bedrock exposure levels here are generally very low and very few vertebrate fossils of scientific and conservation value have been recorded regionally. A small outcrop area of fossiliferous Lower Beaufort Group bedrocks on the footslopes of the Oorlogspoortberge (northwestern edge of the Kudu WEF project area) is not addressed on the map. Areas featuring substantial alluvial deposits are rated as of Low Palaeosensitivity and this particular assessment is upheld by this report.**

Preliminary palaeosensitivity mapping of the Kudu WEF and Tango WEF project areas near Aberdeen based on the DFFE Screening Tool is shown above in map Figure 43. Limited outcrop areas of Lower Beaufort Group bedrocks shown on the 1: 250 000 geology map (Figure 3) are assigned a Very High palaeosensitivity, extensive mapped alluvial areas a Low palaeosensitivity and dolerite intrusions an Insignificant / Zero palaeosensitivity.

Historically almost no vertebrate fossil sites have been recorded within the wider Aberdeen *Vlakte* subregion (Section 4). Based on the recent 3-day palaeontological site visit, the great majority of the Kudu WEF and Tango WEF project areas is mantled by thin to thick (several m) superficial deposits (alluvium, colluvium / eluvium, calcrete, pan sediments, soils) of low palaeosensitivity (Section 3). No tetrapod fossils were recorded from Lower Beaufort Group bedrocks here while

previous PIA studies indicate that vertebrate remains are very rare in the low-relief terrain of the Aberdeen *Vlakte* (e.g. Almond 2022b, 2023). Blocks of reworked fossil wood occur widely as a background scatter across the more gravelly portions of the Kudu WEF project area and may be locally quite common; however, a minority of the material is well-preserved and of scientific interest and most occurrences are rated as of low heritage significance. In contrast, only a single petrified wood block has been recorded within the Tango WEF project area. Apart from calcretised plant roots of limited scientific interest, and the reworked fossil wood material mentioned earlier, no fossils have been recorded within the Late Caenozoic superficial deposits (alluvium, colluvium, surface gravels, soils, calcretes *etc.*) that cover the majority of both WEF project areas

**It is concluded that the project areas of both the Kudu WEF and Tango WEF are in practice of Low Palaeosensitivity overall, so the preliminary DFFE site sensitivity mapping shown in Figure 43 is *contested* here.**

## 6. CONCLUSIONS & RECOMMENDATIONS

The Kudu WEF and Tango WEF project areas on the northern margins of the Aberdeen *Vlakte* 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 two project areas; 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 *Vlakte* 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. Only one, fairly well-preserved block of Palaeozoic petrified wood, was recorded within the Tango project area. 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 areas 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.

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 and Tango WEF project areas 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 and Tango WEF developments 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.

The Environmental Control Officer (ECO) / Environmental Site Officer (ESO) responsible for the Kudu WEF and Tango WEF developments should be made aware of the possibility of important fossil remains (vertebrate bones, teeth, burrows, petrified wood, plant-rich horizons *etc.*) being found or unearthed during the construction phase of the development. Monitoring for fossil material of all major surface clearance and deeper (>1m) excavations by the ECO/ESO on an on-going basis during the construction phase is therefore recommended. Significant fossil finds such as vertebrate bones, teeth and well-preserved petrified logs should be safeguarded and reported at the earliest opportunity to the Eastern Cape Provincial Heritage Resources Authority (ECPHRA). Contact details: Mr Sello Mokhanya, 74 Alexander Road, King Williams Town 5600; Email: smokhanya@ecphra.org.za). This is so that appropriate mitigation (*e.g.* recording, sampling or collection) can be taken by a professional palaeontologist (See tabulated Chance Fossil Finds Procedure in Appendix 2 to this report). The specialist involved would require a fossil collection permit from ECPHRA. Fossil material must be curated in an approved repository (*e.g.* museum or university collection) and all fieldwork and reports should meet the minimum standards for palaeontological impact studies developed by SAHRA (2013). These recommendations must be included in the EMPr for the proposed renewable energy developments.

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## 9. SHORT CV OF AUTHOR

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

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



**Declaration of Independence**

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

A handwritten signature in blue ink that reads "John E. Almond".

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

## APPENDIX 1: KUDU WEF & TANGO WEF NEAR ABERDEEN FOSSIL SITE DATA – JUNE 2023

All GPS readings were taken in the field using a hand-held Garmin GPSmap 65s instrument. The datum used is WGS 84.

Please note that:

- Locality data for South African fossil sites is *not* for public release, due to conservation concerns.
- The table does *not* represent all potential fossil sites within the project area but those sites recorded during the field survey (*N.B.* many background scatter occurrences of petrified wood are *not* included here since the material is widespread and occasionally common with surface gravels). The absence of recorded fossil sites in any area therefore does *not* mean that no fossils are present there.
- The stratigraphic data for each site has yet to be confirmed (probably Abrahamskraal Formation – member uncertain – but some fossil wood may be worked from higher stratigraphic levels within the Great Escarpment zone).

The recorded fossil sites are mapped with reference to the Kudu WEF and Tango WEF project areas in satellite image Figure A1 below.

LOC	GPS DATA	COMMENTS
306	-32.498458° 23.606089°	Portion 2 of Farm Oorlogspoort 85. Sparse blocks of colour-banded petrified wood within eluvial surface gravels. Proposed Field Rating IIIC. No mitigation recommended.
331	-32.446002° 23.619753°	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.
332	-32.450711° 23.616316°	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.
333	-32.451702° 23.616341°	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.
335	-32.485734° 23.591707°	Portion 2 of Farm Oorlogspoort 85. Sheet-washed eluvial surface gravels within pan-like <i>brak-koll</i> in sandy <i>vlaktes</i> with occasional small blocks of well-preserved, cherty, grey-green petrified wood. Proposed Field Rating IIIC. No mitigation recommended.
343	-32.455503° 23.563173°	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.
350	32.373267° 23.529151°	Portion 2 of Farm Oorlogspoort 85. Sparse scatter of well-preserved petrified wood blocks (with seasonal growth lines) as well as poorly-preserved, amorphous blocks among surface gravels. Proposed Field Rating IIIC. No mitigation recommended.
351	-32.390249° 23.507883°	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.

<b>353</b>	-32.390722° 23.503850°	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.
<b>354</b>	-32.392891° 23.504234°	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.
<b>355</b>	-32.392969° 23.504141°	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.
<b>370</b>	-32.408641° 23.753921°	Portion 1 of Farm Klipstavel 72. Extensive area of greyish surface gravels (wacke, dolerite <i>etc</i> ) with rare reworked blocks of pale silicified wood showing well-preserved seasonal growth lines. Proposed Field Rating IIIC. No mitigation recommended.
<b>383</b>	-32.394122° 23.765050°	Portion 1 of Farm Klipstavel 72. Thick sandy alluvium exposed in banks of deeply-incised, narrow drainage line showing numerous vertical pale structures – possibly calcretized rhizoliths (root traces). Proposed Field Rating IIIC. No mitigation recommended.



**Figure A1: Google Earth© satellite image showing the location of the recorded fossil sites – yellow numbered circles – within the Kudu WEF and Tango WEF project areas (dark blue and pale blue polygons respectively) which are tabulated above (*N.B.* A widespread background scatter of additional, unrecorded fossil wood blocks can be expected here within surface deposits). None of the recorded fossil sites is of high scientific or conservation value and therefore no mitigation in their regard is proposed here. Numbered yellow squares outside the present study areas refer to fossil sites in the northern Aberdeen *Vlakte* that have been recently recorded by Almond (2022b, 2023).**

## APPENDIX 2: CHANCE FOSSIL FINDS PROTOCOL

KUDU WEF & TANGO WEF NEAR ABERDEEN		
<b>Province &amp; region:</b>	Eastern Cape Cape; Sarah Baartman District , Dr Beyers Naude Local Municipality	
<b>Responsible Heritage Resources Agency</b>	ECPHRA. Contact details: Mr Sello Mokhanya, 74 Alexander Road, King Williams Town 5600; Email: smokhanya@ecphra.org.za	
<b>Rock unit(s)</b>	Abrahamskraal Formation (Lower Beaufort Group) possibly extending upwards into Poortjie Member of Teekloof Formation, Late Caenozoic alluvium, colluvium, calcrete pedocretes, pan sediments, surface gravels & soils	
<b>Potential fossils</b>	Fossil vertebrate bones, teeth, trace fossils ( <i>e.g.</i> vertebrate and invertebrate burrows), trackways, petrified wood, plant-rich beds in the Lower Beaufort Group bedrocks. Fossil mammal bones, teeth, horn cores, freshwater molluscs, calcretised trace fossils ( <i>e.g.</i> termitaria, rhizoliths), plant material in Late Caenozoic alluvium, calcretes.	
<b>ECO protocol</b>	1. Once alerted to fossil occurrence(s): alert site foreman, stop work in area immediately ( <i>N.B.</i> safety first!), safeguard site with security tape / fence / sand bags if necessary.	
	2. Record key data while fossil remains are still <i>in situ</i> : <ul style="list-style-type: none"> <li>• Accurate geographic location – describe and mark on site map / 1: 50 000 map / satellite image / aerial photo</li> <li>• Context – describe position of fossils within stratigraphy (rock layering), depth below surface</li> <li>• Photograph fossil(s) <i>in situ</i> with scale, from different angles, including images showing context (<i>e.g.</i> rock layering)</li> </ul>	
	3. If feasible to leave fossils <i>in situ</i> : Alert Heritage Resources Agency and project palaeontologist (if any) who will advise on any necessary mitigation Ensure fossil site remains safeguarded until clearance is given by the Heritage Resources Agency for work to resume	3. If <i>not</i> feasible to leave fossils <i>in situ</i> (emergency procedure only): <i>Carefully</i> remove fossils, as far as possible still enclosed within the original sedimentary matrix ( <i>e.g.</i> entire block of fossiliferous rock) Photograph fossils against a plain, level background, with scale Carefully wrap fossils in several layers of newspaper / tissue paper / plastic bags Safeguard fossils together with locality and collection data (including collector and date) in a box in a safe place for examination by a palaeontologist Alert Heritage Resources Agency and project palaeontologist (if any) who will advise on any necessary mitigation
	4. If required by Heritage Resources Agency, ensure that a suitably-qualified specialist palaeontologist is appointed as soon as possible by the developer.	
	5. Implement any further mitigation measures proposed by the palaeontologist and Heritage Resources Agency	
<b>Specialist palaeontologist</b>	Record, describe and judiciously sample fossil remains together with relevant contextual data (stratigraphy / sedimentology / taphonomy). Ensure that fossils are curated in an approved repository ( <i>e.g.</i> museum / university / Council for Geoscience collection) together with full collection data. Submit Palaeontological Mitigation report to Heritage Resources Agency. Adhere to best international practice for palaeontological fieldwork and Heritage Resources Agency minimum standards.	



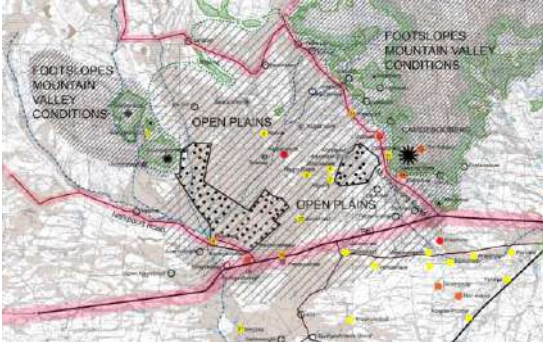
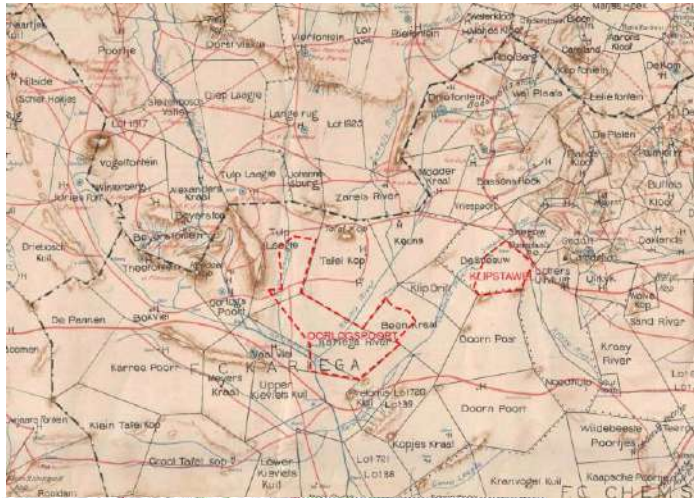
CTS HERITAGE

### APPENDIX 3: Cultural Landscape Assessment (2023)



# KUDU AND TANGO WIND ENERGY FACILITY, ABERDEEN EASTERN CAPE

## CULTURAL LANDSCAPE STUDY



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## A. INTRODUCTION

This cultural landscape study of the proposed Kudu and Tango Wind Energy Facility (WEF) is specialist input into a Heritage Impact Assessment (HIA) undertaken in terms of Section 38 (8) of the National Heritage Resources Act (Act 25 of 1999; NHRA).

The project area is located approximately 35 km west of Aberdeen in the Eastern Cape. It is located within the identified Beaufort West Renewable Energy Development Zone (REDZ) and the grid connection corridor falls within the Central and Eastern Corridors of the Strategic Transmission Corridors. The town of Aberdeen is some 55 km south-west of Graaff-Reinet, 155 km south-east of Beaufort West and 32 km south of the Camdeboo Mountains.

The project area is located in the Beyers Naude Municipality and the Sarah Baartman District Municipality of the Eastern Cape Province.

### A.1 Study Brief and Scope of Work

The purpose of this specialist study is to assess the project from a cultural landscape perspective as a component of an integrated HIA that satisfies Section 38 (3) of the NHRA. The assessment has included the following scope of work:

- A historical overview of the site and its broader context.
- The identification, mapping and assessment of heritage resources and sensitive heritage receptors from a cultural landscape

perspective at various scales, involving documentary research and fieldwork undertaken from the 14<sup>th</sup> to 15<sup>th</sup> July 2023.

- The identification of cultural landscape heritage indicators relating to the overall principle of the development and buffer areas for sensitive heritage resources/receptors.
- An assessment of the impact of the proposals on the cultural landscape and the formulation of recommended mitigation measures.

### A.2 Project Description

The proposed development involves two project sites assessed jointly from a cultural landscape perspective:

- Kudu WEF with the applicant being FE Kudu (Pty) Ltd
- Tango WEF with the applicant being FE Tango (Pty) Ltd

The layout of the proposed WEF is indicated in Figure 3.

Details of the proposed development summarised below.

#### A.2.1 Kudu WEF

The project site involves Portion 2 of Farm Oorlogspoort 85 and is 9170 hectares in extent. 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 (Tango WEF), located approximately 20km east of the Kudu WEF. The Kudu WEF will have a capacity of up to 622.5MW and wind turbines with a capacity of up to 7.5MW each. Access to the site is via the R61.

Infrastructure proposed to accommodate the following:

- Wind turbines
- Concrete turbine foundations and turbine hardstands
- On-site substation hub incorporating:
  - A132/33kV On-site substation
  - Switchyard with collector infrastructure
  - Battery Energy Storage System (BESS)
- Plant area incorporating:
  - Temporary laydown areas
  - Construction camp laydown, temporary concrete batching plant
  - Operation and Maintenance buildings
- Cabling between the turbines laid underground where practical.
- Access roads to the site and between project components with a width up to 10m and a servitude of 13.5m.

#### *A.2.2 Tango WEF*

The project site involves Portion 1 of Farm Klipstavel 72 and is 2250 hectares in extent. 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 (Kudu WEF), located approximately 20km east of the Tango WEF. The Kudu WEF will have a capacity of up to 622.5MW and wind turbines with a capacity of up to 7.5MW each. Access to the site is via the R61.

Infrastructure proposed to accommodate the following:

- Wind turbines
- Concrete turbine foundations and turbine hardstands
- On-site substation hub incorporating:
  - A132/33kV On-site substation
  - Switchyard with collector infrastructure
  - Battery Energy Storage System (BESS)
- Plant area incorporating:
  - Temporary laydown areas
  - Construction camp laydown, temporary concrete batching plant
  - Operation and Maintenance buildings
- Cabling between the turbines laid underground where practical.
- Access roads to the site and between project components with a width up to 10m and a servitude of 13.5m.



Figure 1: Site location within the regional context

## B. SITE DESCRIPTION

The proposed development site lies within the central plateau basin of the Great Karoo.

- **Geology:** The Adelaide subgroup, mainly compact tillite, shale and sandstone (Dwyka Formation and Eccca Group), with very low ground water yield.
- **Topography:** The project areas is topographical 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 Sneeu Berg 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 Sneeu Berg includes the Camdeboo Mountains with the “Sleeping Giant” (1777m) defining the project area to the east. Wolwekop is local topographical landmark to the just 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 karoo shrub vegetation and sparse habitation. The occasional heavy water flow resulting from early summer storms is collected in dams; supply it 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.
- **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 heavily impacted farming activities heavily in this area.
- **Routes:** The development site lies to the north of the R61. It connects Beaufort West and Aberdeen, loosely following an early wagon route to Graaff-Reinet. A secondary route to Murraysburg connects to the R61 just west of the topographical landmark of Wolwekop. A secondary route to Nelspoort connects 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 urban settlement within the local area situated at the intersection of the R61 and N9, and approximately 35 km to the east of the project area. A number of the farmsteads are abandoned and in a ruinous state.
- **Aberdeen:** Situated approximately 35km from the project area, the historical settlement 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 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 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 Camdeboo is in contrast to the dramatic mountain backdrop of the Camdeboo Mountains to the north.

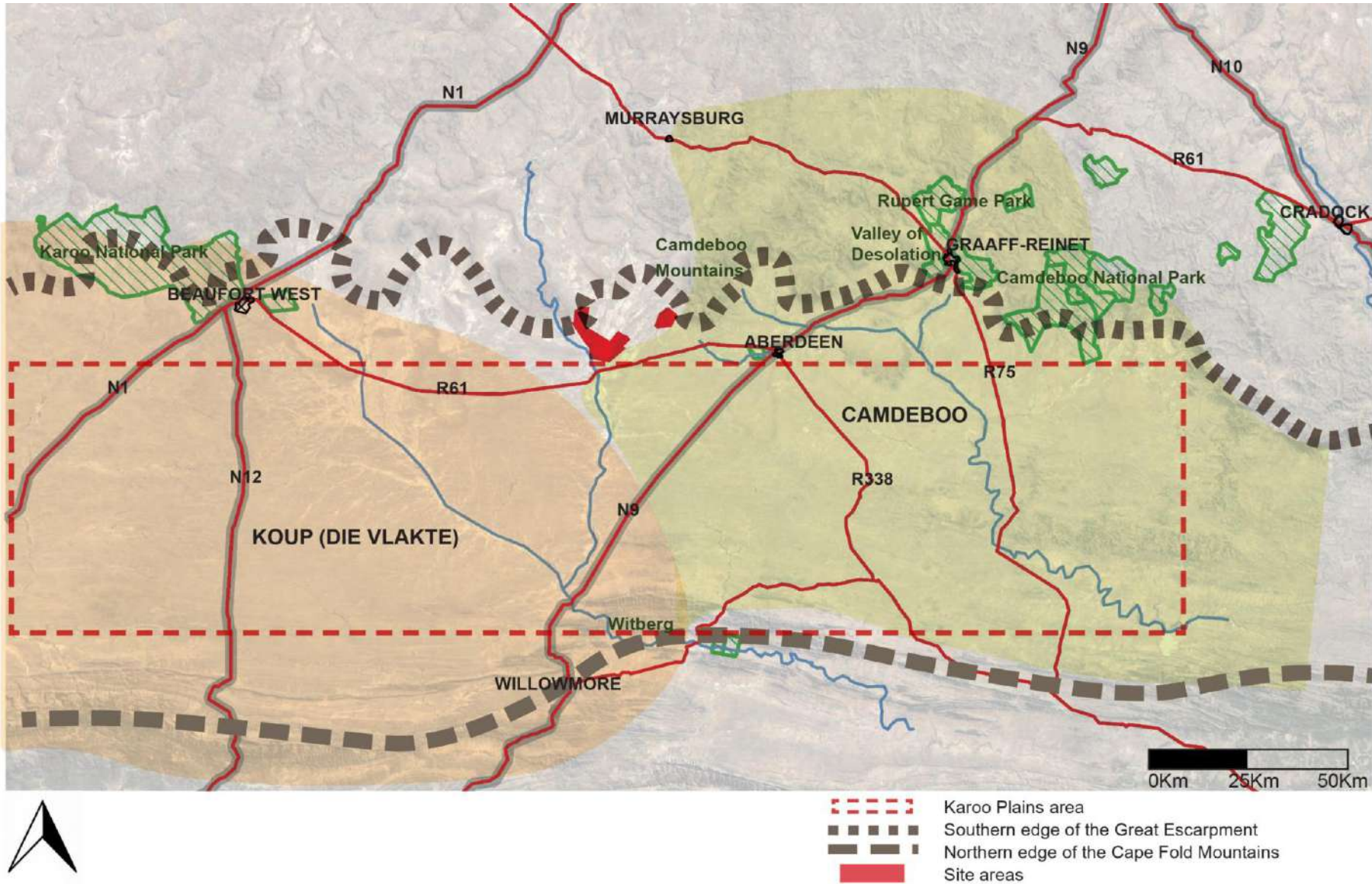


Figure 2. Site location within regional landscape domains

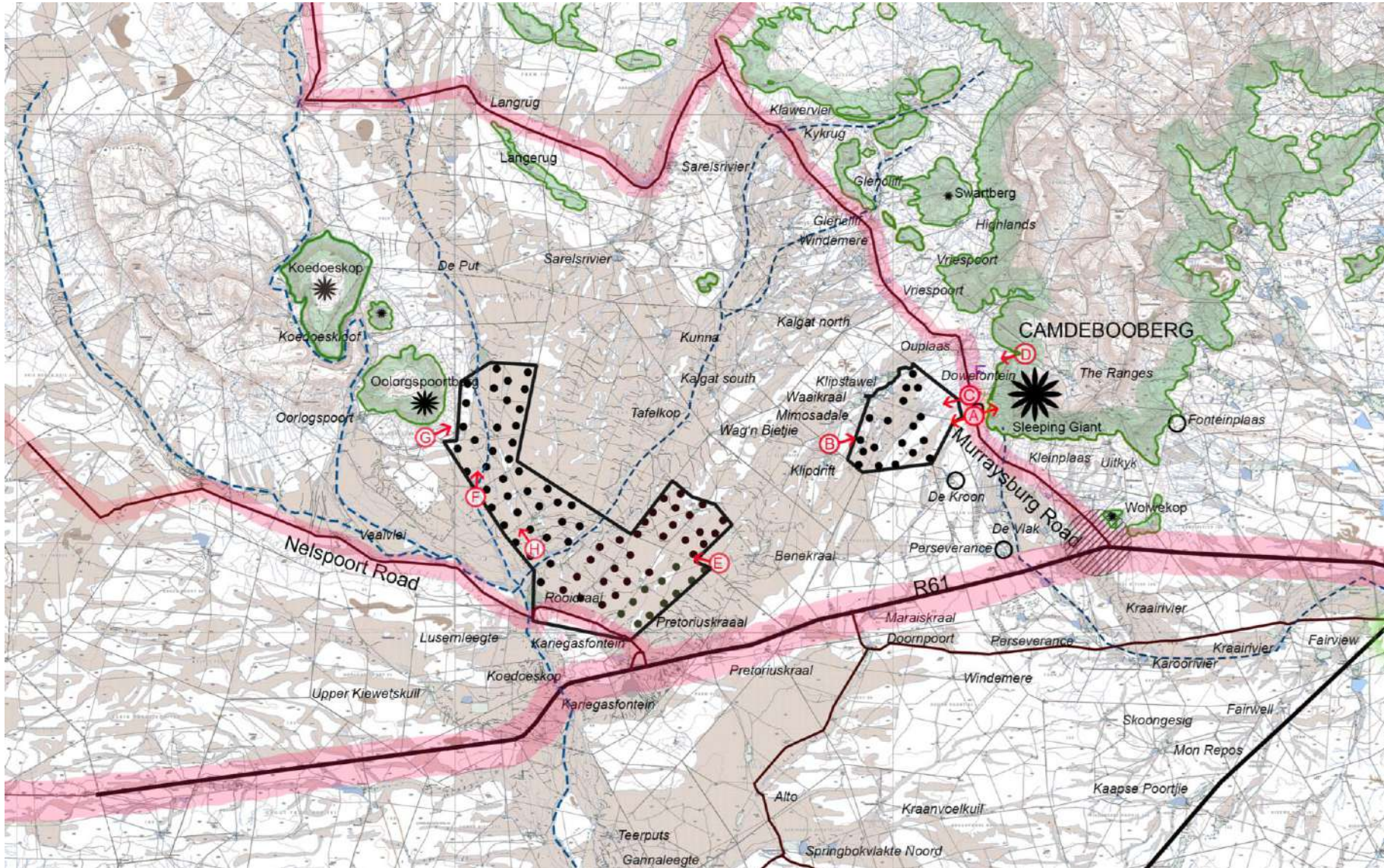


Figure 3. Turbine layout with reference to site photographs

## SITE PHOTOGRAPHS



Photo A.1 View across the flat plains of study area (Tango WEF) looking west with the Oorlogspoortberg in the distance



Photo A.2 View from the entrance to the study area (Tango WEF) off the Murraysburg Road looking east



Photo B. View from the study area (Tango WEF) looking north-east with the Camdeboo Mountains in the distance



Photo C.1 View across the study area (Tango WEF) looking west from the Dowefontein homestead located on the lower slopes Camdeboo Mountains with the Oorlogspoortberg in the distance



Photo C.2 View across the study area (Tango WEF) looking west from the Murraysburg Road with the Oorlogspoortberg in the distance



Photo D. View across the study area (Tango WEF) looking west from the upper slopes of the Camdeboo Mountains with the Oorlogspoortberg in the distance





Photo E. View across the study area (Kudu WEF) looking west with the Oorlogspoortberg in the distance



Photo F. View across the study area (Kudu WEF) looking north with the Oorlogspoortberg in the distance



Photo G. View across the study area (Kudu WEF) looking north-east from the footslopes of the Oorlogspoortberg across vast open plains with the Camdeboo Mountains in the distance



Photo H. View across the study area (Kudu WEF) looking north-west with project area located to the right of the Oorlogspoortberg

## C. HISTORICAL OVERVIEW

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 and 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 Merino wool export boom which began in the 1840s.



Figure 4: 1844 map. Route connecting Beaufort and Graaff-Reinet. Brakkefontein farm (Aberdeen) circled. (Source: Jas Wyld, UCT Digital Collections, islandora19573)

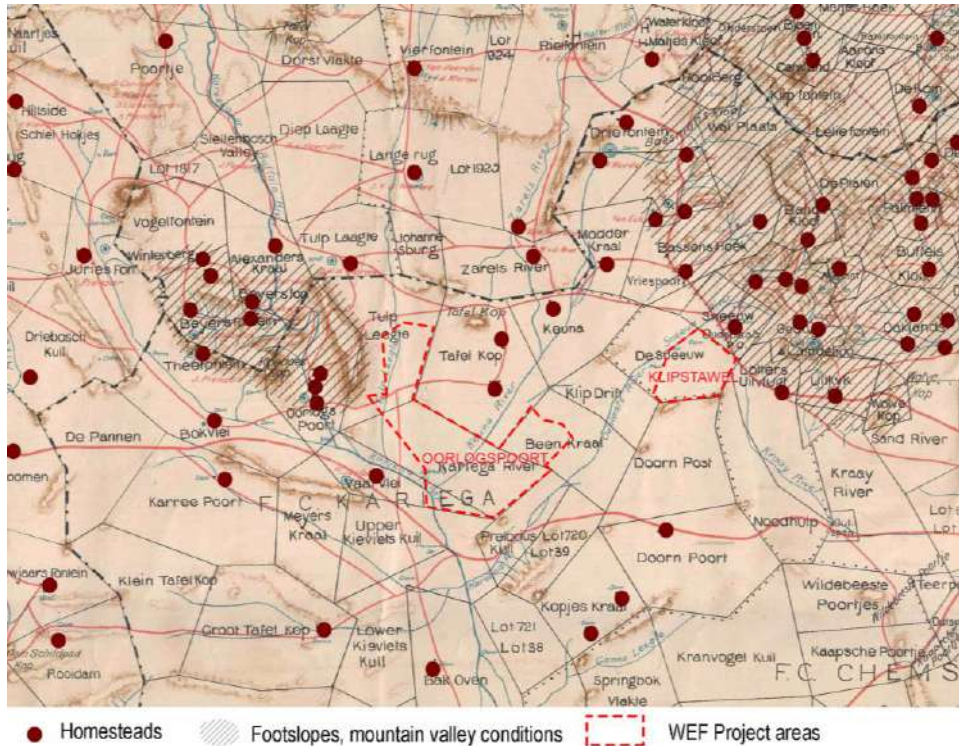


Figure 5: Annotated 1901 map (Source: UCT Digital Collections islandora: 24827 and islandora: 24848). Note the concentration of settlement on the footslopes and within the valleys of the Cambedoo and Oorlogspoortberg Mountains

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. The cemetery in Aberdeen is testament to this particularly unsettled period in the history of the town. While it was not a significant military base nor the site of major battles, a number of skirmishes occurred in the area. The collection of graves on the farm Kalgat is purported to be associated with the South African War (pers.com. Izak van der Merwe 2023).

### C.1 Farms Affected by Proposed Development

The farms affected by the proposed development fall into the mid-19<sup>th</sup> 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.

The project area is located on 19<sup>th</sup> century landholdings comprising the farms Klipstavel (De Sneeuw), Benekraal, Tulp Laagte and Kariega River.

Surveyor annotations on the early survey diagrams for the affected farms indicate roads, water features, homesteads 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.

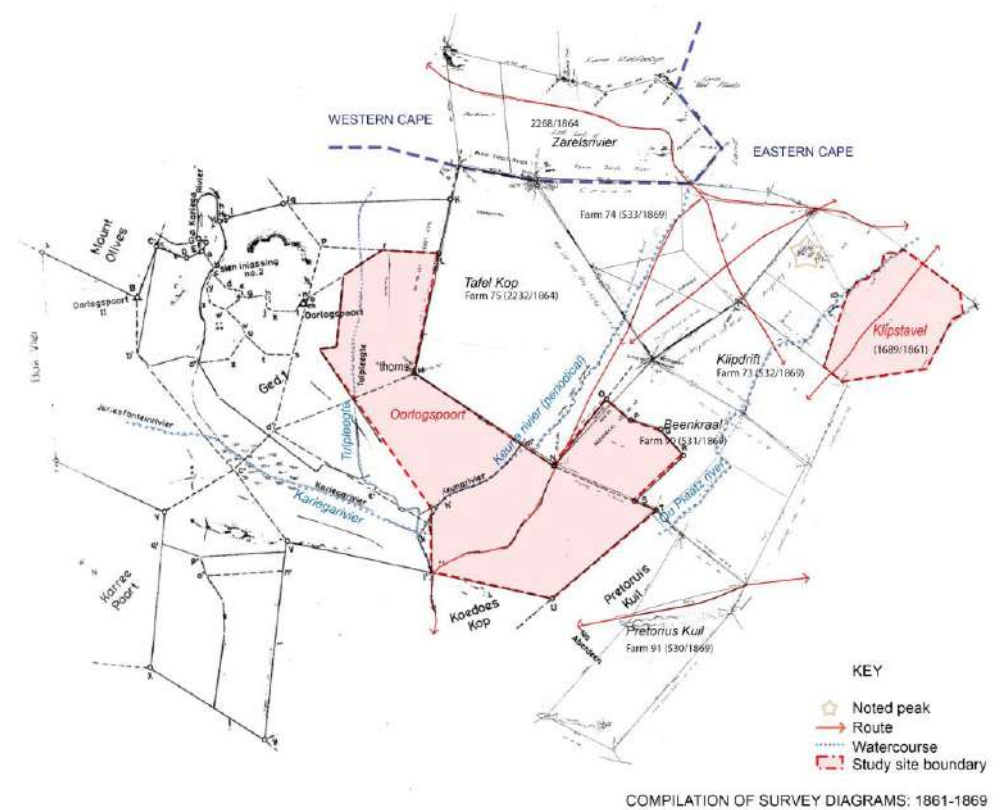


Figure 6: Composite of 19<sup>th</sup> century survey diagrams

### C. HERITAGE SIGNIFICANCE: CULTURAL LANDSCAPE

The overall landscape of the project area is a vast, open plain framed by distant views towards mountain backdrops. It is characteristic of the semi-arid conditions and remote settlement qualities of the Karoo landscape with evidence of human occupation spanning the pre-colonial, earlier and later colonial periods. It demonstrates a shift in patterns of land ownership, settlement and use over time within the context of a harsh natural environment. The overall scenic aesthetic qualities of the landscape lies in its expansiveness and sense of remoteness.

The immediate study area is representative of the transition between the Koupsvlakte and the Camdeboo Plains with prominent views across a flat open plain towards the “Sleeping Giant” in the east and the Oorlogspoortberg in the west.

The R61 is a historical scenic route traversing a representative remote karoo landscape and connecting the towns of Beaufort West and Aberdeen.

The Camdeboo Plains possess 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-19<sup>th</sup> 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 of the immediate study area has historical value in terms of forming part of a pattern of land grants dating to the 19th century with many of the farms having being in the same family for generations. Underlying this pattern of land grants is a pattern of pre-colonial and early colonial occupation and use. Natural features and patterns of use contribute to landscape character (topographical features, water courses, routes, farmsteads, stone kraals, graves and grazing lands). There is also an inherent logic in the manner in which settlement patterns have occurred over time in relation to topography, river courses and movement routes.

The pattern of settlement occupying the flat open plains and forming part of the immediate study area contrasts with a more concentrated pattern of historical settlement occupying the foot slopes and discrete valleys of the surrounding mountains (Figure 8).

A characteristic feature of the cultural landscape is the use of local stone in the vernacular built form including kraal walling and farm buildings.

While the cultural landscape in its entirety is not worthy of formal protection in terms of the NHRA, it possesses conservation-worthy landscape elements for historical, architectural, aesthetic (visual, place making) and social reasons.

## D.2 Landscape Elements

### D.2.1 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.
- Camdeboo Mountains and the “Sleeping Giant” framing the views westwards.
- The Oorlogspoortberg framing views westwards.

### D.2.2 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.

### D.2.3 Planting Patterns

- Clumps of trees typically founds around homesteads as shelter from the sun/wind and place-making elements.

### D.2.4 Historical Scenic Routes

- The R61 as a regional linkage route of some scenic value with dramatic views towards the mountain backdrop of the Camdeboo Mountains.
- The Murraysburg Road and Nelspoort Road of local historical scenic value.
- The combination of the intersection of the R61 and the Murraysburg Road, change in topography and the landmark qualities of the Wolwekop providing a threshold condition.

### D.2.5 Settlements

- Aberdeen town of suggested Grade IIIA heritage value and situated approximately 35 km east of the project area.
- A number of farmsteads and stone kraals situated within or adjacent to the proposed WEF of mostly Grade IIIC heritage value with some of Grade IIIB heritage value.
- Oorlogspoort farmstead of suggested Grade II heritage value in terms of its evidence of historical layering dating to the 19<sup>th</sup> century, possible 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.

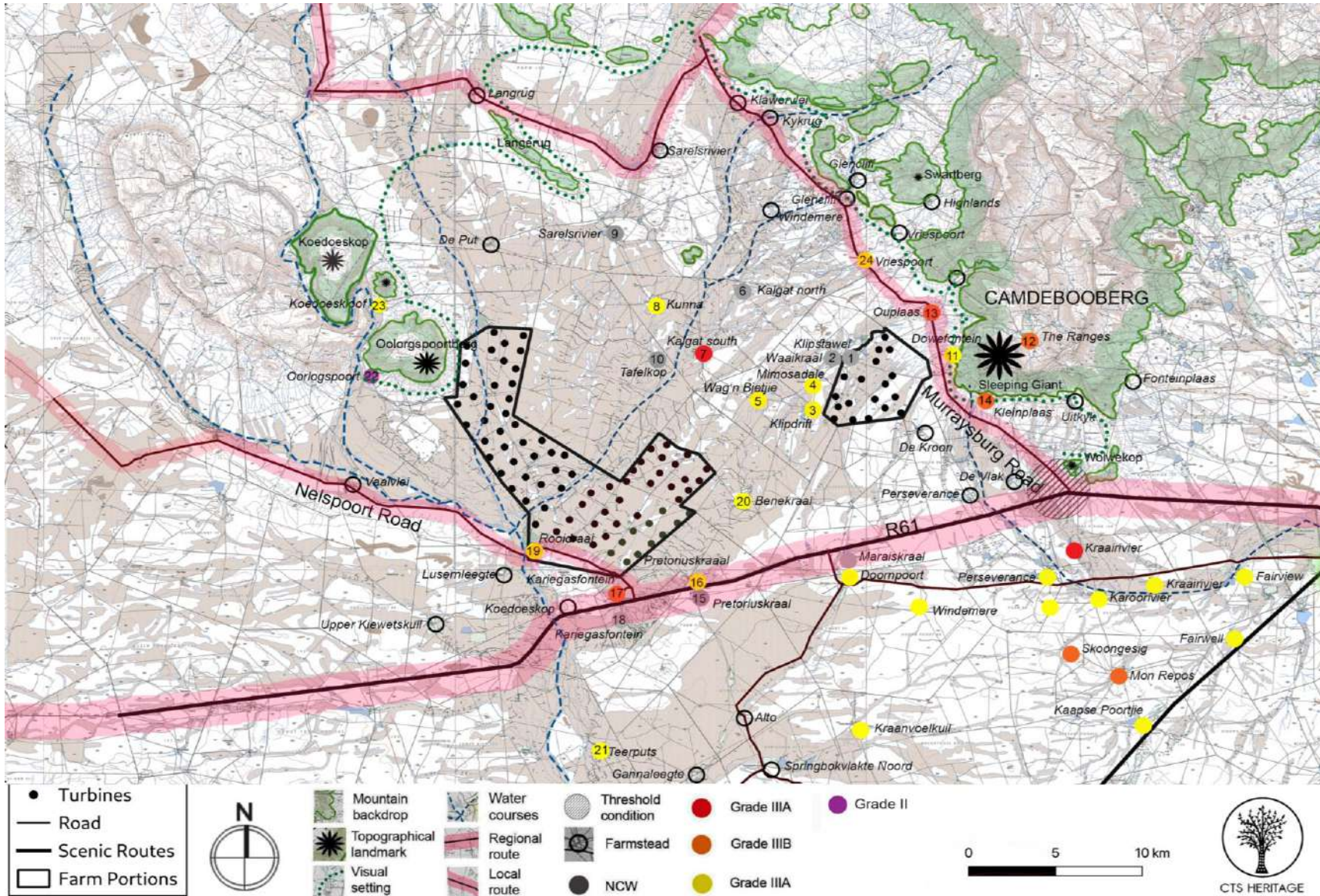


Figure 7: Cultural landscape elements



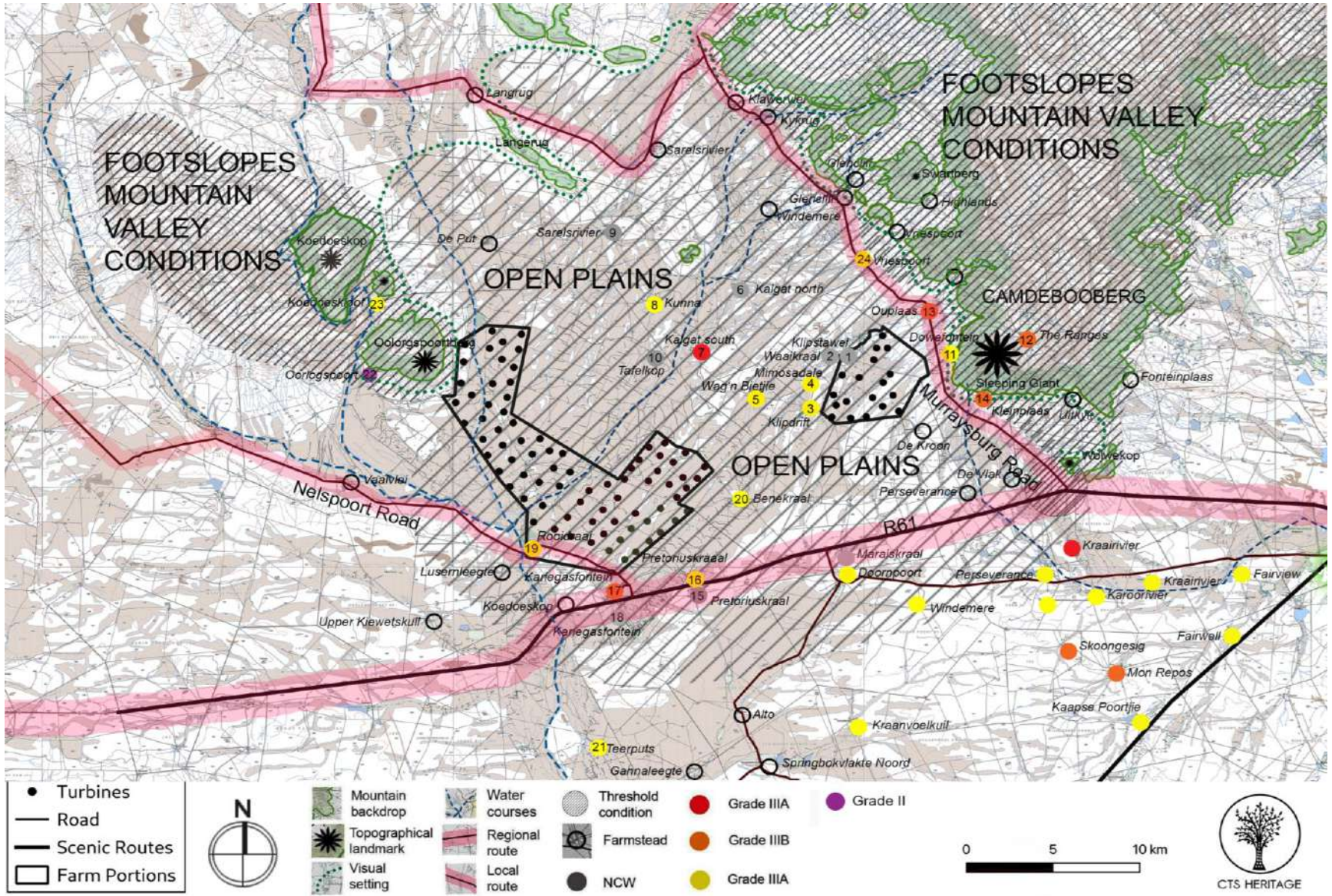























Figure 8: Cultural landscape character areas







Table 1: Built Environment Elements






MAP REFERENCE Figure 7	DESCRIPTION	SIGNIFICANCE	SUGGESTED GRADING	PHOTOGRAPH	PHOTOGRAPH
01. Klipstawel	Mid-20 <sup>th</sup> century farmstead with no distinct architectural qualities. Contributing to a pattern of settlement characteristic of the broader landscape.	No intrinsic or contextual heritage value.	NCW		
02. Waaikraal	Mid-20 <sup>th</sup> century farmstead with no distinct architectural qualities. Contributing to a pattern of settlement characteristic of the broader landscape.	No intrinsic or contextual heritage value.	NCW		
03. Klipdrift	Early to mid-20 <sup>th</sup> century homestead with hipped corrugated iron roof and covered stoep. Abandoned and in poor condition. Contributing to a pattern of settlement characteristic of the broader landscape.	No intrinsic or contextual heritage value.	IIIC		






MAP REFERENCE Figure 7	DESCRIPTION	SIGNIFICANCE	SUGGESTED GRADING	PHOTOGRAPH	PHOTOGRAPH
04. Mimosadale	Ruined werf with mud-brick structure.	Some heritage value even though its ruinous state does not warrant retention from a historical built environment perspective.	IIIC		
05. Wag 'n Bietjie	Vernacular stone cottage. Abandoned and in poor condition.	Some heritage value in terms of its vernacular stone construction and being representative of a local historical built form typology.	IIIC		
06. Kalgat (north)	Mid to late-20 <sup>th</sup> century corrugated iron shed and brick structures.	No intrinsic or contextual heritage value.	NCW		

MAP REFERENCE Figure 7	DESCRIPTION	SIGNIFICANCE	SUGGESTED GRADING	PHOTOGRAPH	PHOTOGRAPH
07. Kalgat (south)	Graves associated with the South African War (pers.com. Izak van der Merwe)  Photographs courtesy of Izak van der Merwe.	Of historical and social heritage value.	IIIA		
08. Kunna	Farmstead dating to the early to mid-20 <sup>th</sup> century situated on an active ostrich farm. Earlier outbuildings. Contributing to a pattern of settlement characteristic of the broader landscape. Site of earlier mud-brick homestead.	Some contextual heritage value.	IIIC		
09. Sarelsrivier	Large farmstead including mid-20 <sup>th</sup> century homestead possibly with earlier fabric, modern outbuildings and a number of farm cottages.	No intrinsic or contextual heritage value.	NCW		







MAP REFERENCE Figure 7	DESCRIPTION	SIGNIFICANCE	SUGGESTED GRADING	PHOTOGRAPH	PHOTOGRAPH
10. Tafelkop	Mid to late 20 <sup>th</sup> century structures, ruins and dam	No intrinsic or contextual heritage value.	NCW		
11. Dowefontein	Farmstead dating to the 1920s/30s, highly altered. Important relationship with its setting on the foot slopes of the Sleeping Giant with access to water spring.	No intrinsic value but of some contextual value in terms of its distinctive relationship with its setting.	IIIC		
12. The Ranges	Farmstead with early 20 <sup>th</sup> century farmhouse (dated 1918), Cape Revival farmhouse with possible earlier fabric and extensive stone kraal walling. Treed setting. Secluded mountain setting located outside of the viewshed of the WEF.	Some intrinsic and contextual heritage value.	IIIB		






MAP REFERENCE Figure 7	DESCRIPTION	SIGNIFICANCE	SUGGESTED GRADING	PHOTOGRAPH	PHOTOGRAPH
13. Ouplaas	Farmstead with the historic core of the homestead dating to the late 19 <sup>th</sup> early 20 <sup>th</sup> century, later 20 <sup>th</sup> century additions including wide gable on front elevation. Strategic location adjacent to Murraysburg Road possessing landmark qualities.	Some intrinsic and contextual heritage value.	IIIB		
14. Kleinplaas	Late 19 <sup>th</sup> early 20 <sup>th</sup> century farmstead with later 20 <sup>th</sup> century additions. Abandoned condition with homestead stripped of ceiling and floor timbers. Shuttered sliding sashes and other original joinery. Located on mountain foot slopes with gabled homestead visible from Murraysburg.road	Some intrinsic and contextual heritage value.	IIIB		
15. Pretoriuskraal	Mid-20 <sup>th</sup> century farmhouse with hipped corrugated iron roof, combination of face brick and plastered brick, steel window and veranda. Associated group of farm cottages.	No intrinsic or contextual heritage value.	NCW		

MAP REFERENCE Figure 7	DESCRIPTION	SIGNIFICANCE	SUGGESTED GRADING	PHOTOGRAPH	PHOTOGRAPH
16. Pretoriuskraal	Stone ruin in close proximity to the R61.	Some heritage value in terms of its vernacular stone construction and visible location adjacent to the R61.	IIIC		
17. Kariegasfontein	Farmhouse with 19 <sup>th</sup> century core and 1930s additions. Intact period features and joinery. Treed setting adjacent to the R61.	Intrinsic and contextual value in terms of historical, architectural and aesthetic qualities.	IIIB		
18. Kariegasfontein	Modern shed with dome roof construction highly visible from the R61.		NCW		

MAP REFERENCE Figure 7	DESCRIPTION	SIGNIFICANCE	SUGGESTED GRADING	PHOTOGRAPH	PHOTOGRAPH
19a. Rooidraai Lark Cottage	Early 20 <sup>th</sup> century farmhouse with later addition and various outbuildings.	Contextual value as a historical marker in the landscape.	IIIC		
19b. Rooidraai	Abandoned farm cottage in poor condition. Possibly older than 60 years.	No intrinsic or contextual heritage value.	NCW		
19c. Rooidraai Karoo Secret Cottage	20 <sup>th</sup> century cottage with corrugated iron roof and front veranda.	No intrinsic or contextual heritage value.	NCW		



MAP REFERENCE Figure 7	DESCRIPTION	SIGNIFICANCE	SUGGESTED GRADING	PHOTOGRAPH	PHOTOGRAPH
19d. Rooidraai	Modern cottage with corrugated iron roof.	No intrinsic or contextual heritage value.	NCW		
20. Benekraal	Early 20th century farmstead with a collection of farm buildings. Stone walling.	Contextual value as a historical marker in the landscape.	IIIC		
21. Teerputs	Early to mid-20th century farmstead. Treed setting. Remote setting on open plains.	Some contextual value as a historical marker in the landscape.	IIIC		

MAP REFERENCE Figure 7	DESCRIPTION	SIGNIFICANCE	SUGGESTED GRADING	PHOTOGRAPH	PHOTOGRAPH
22. Oorlogspoot	A highly layered farm complex including a remarkably intact homestead with 19 <sup>th</sup> century fabric, early 20 <sup>th</sup> century additions. Likely earlier origins. Distinctive treed setting with gateway qualities at the entrance to poort.	High intrinsic and contextual value.	II		
23. Koedoeskloof	A collection of ruined farm buildings. Discrete valley setting. 19 <sup>th</sup> century origins possibly earlier.	Contextual value as a historical marker in the landscape.	IIIC		
24. Vriespoort	Late 19 <sup>th</sup> to early 20 <sup>th</sup> century farmstead in a ruined condition. Possibly earlier origins. Strategic position adjacent to Murrayburg Road.	Contextual value as a historical marker in the landscape.	IIIC		

## E. HERITAGE INDICATORS: CULTURAL LANDSCAPE

### E.1 Principle of the Proposed Development

The principle of a WEF in the proposed location is acceptable from a cultural landscape perspective. There are no major 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 west of the Camdeboo Mountains and the distinctive Camdeboo Plains and at considerable distance from the cluster of Nature Reserves around Graaff-Reinet. At a local scale, the project is located away from the scenic topographical features and beyond 35km from the town of Aberdeen.

At a local scale, there are a number of sensitive heritage receptors from a cultural landscape perspective, which influence the location of certain wind turbines. Recommended buffer areas for these resources/receptors are unpacked in Section E.3.

### E.2 General Principles

These principles are derived from international best practice as contained in various International Charters on Conservation and a number of local adaptations, and apply to this cultural landscape assessment.

- Landscape significance - acknowledge the overall natural and cultural landscape, and the layered pattern of settlements in response to the natural landscape over time.
- Landscape integrity – retain the essential character and intactness of wilderness, rural and urban areas in the face of fragmentation through unstructured urbanisation and commercial agriculture.

- Landscape connectivity – retain the continuity and interconnectedness of wilderness and agricultural landscapes, including ecological corridors and green linkages.
- Landscape setting – maintain the role of the natural landscape as a “container” within which settlements are embedded, the landscape providing the dominant setting or backdrop.
- The logic of landscape – recognise the intrinsic characteristics and suitability of the landscape and its influence on land use, settlement and movement patterns, in response to geology, topography, water, soil types and microclimate.

#### *E.2.1 Wind turbine placement principles*

The following general principles are applicable to the placement of wind turbines:

- Avoid steep slopes and distinctive topographical features.
- Allow for a buffer of 3km around Nature Reserves and Cultural Landscapes worthy of formal protection
- Allow for a buffer of 2km around historical towns.
- Avoid the placement of turbines of both sides of major routes.
- Allow for a buffer of 1km either side of major historical scenic routes and 500m either side of secondary historical scenic routes.
- Allow for a buffer of 1km to 500m around heritage sites.
- Allow for a buffer of 250m either side of water courses and features.

### E.3 Heritage Receptors and Buffers

The following heritage receptors and associated buffer areas are applicable to the placement of WEF facilities. Listed are those specific heritage receptors applicable to the project area.

Table 2: Cultural Landscape Buffers

HERITAGE RESOURCE/RECEPTORS	NO-GO AREAS	MEDIUM SENSITIVITY	LOW SENSITIVITY
Cultural landscapes including natural reserves - formally protected or worthy of formal protection. <b>Not applicable</b>	0 - 3km radius	3 – 5km	5 - 10km
Settlements (towns, villages and hamlets) - formally protected or worthy of formal heritage protection. <b>Aberdeen located 35km from project area</b>	0 - 2km radius	2 - 5km	5 - 10km
Historic scenic linkage routes. <b>R61 (regional)</b> <b>Murraysburg and Nelspoort Roads</b>	0 - 1 km buffer either side 0 - 500m buffer either side	1 - 3km 500m – 2km	3 - 10km 2 - 5km
Heritage sites worthy of Grade I, II and IIIA heritage status. <b>Not applicable</b>	0 - 1km radius	1 – 2,5km	2,5 - 5km
Heritage sites worthy of grade IIIB and IIIC heritage status. <b>Various built environment features (farmsteads)</b>	0 - 500m radius	500m - 1km	1 - 2km
Water features (rivers, wetlands and dams) <b>Water courses forming part of the Kariega River network</b>	0 - 250m buffer either side/ surrounding water feature	250 - 500m	500m – 1km
Topographical features (ridgelines, peaks, scarps) <b>Oorloogspoorberg</b>	0 - 250m radius from peak/apex	250 - 500m	>500m
Steep slopes <b>Not applicable due to location of the facility on relatively flat land</b>	>1:4 slopes	>1:10 slopes	<1:10 slopes

## F. ASSESSMENT OF IMPACTS: CULTURAL LANDSCAPE

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.

A common theme associated with Renewable Energy Facilities (REF) within an agricultural landscape is that they provide additional revenue for farm owners, thereby assisting in the economic sustainability of continuing farming activities.

At a regional scale, the project is located to the west of the Camdeboo Mountains at considerable distance from the cluster of Nature Reserves around Graaff-Reinet.

At a local scale, the project is located away from scenic topographical features and beyond 35km from the town of Aberdeen. In particular, it is located away from the footslopes and mountain valley conditions of the Camdeboo Mountains and Oorlogspoortberg.

At a site scale, an overlay of the suggested buffers with the proposed turbine layout indicates congruence with the heritage indicators including setbacks from the historical-scenic routes, farmsteads and the footslopes of the Oorlogspoortberg.

### F.1 Cumulative impacts

Figure 10 indicates the location of Kudu 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.

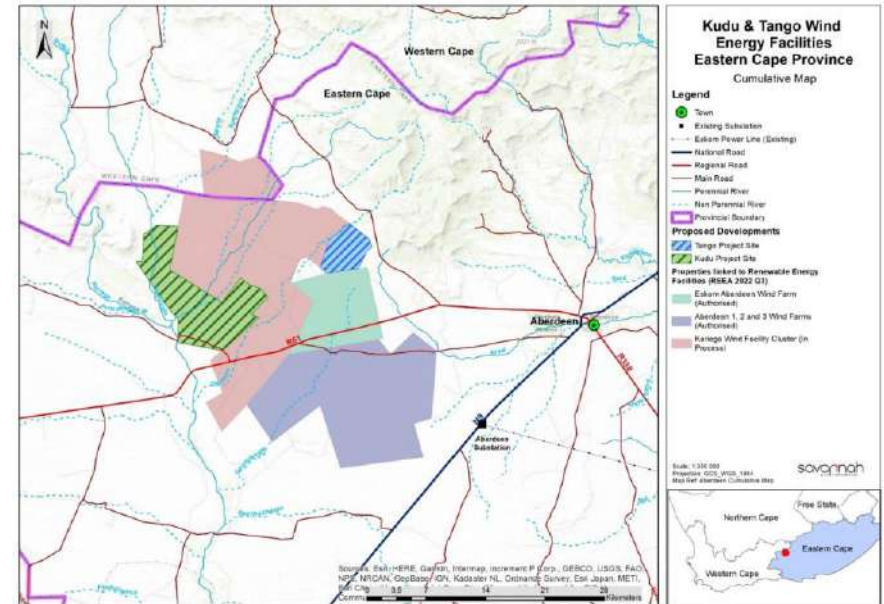


Figure 9: Cultural landscape character areas

## G. CONCLUSION AND RECOMMENDATIONS

The principle of the proposed Kudu and Tango WEF facilities are acceptable from a cultural landscape perspective.

At a regional scale, the project is located to the west of the Camdeboo Mountains and at considerable distance from the cluster of Nature Reserves around Graaff-Reinet.

At a local scale, the project is located away from scenic topographical features and beyond 35km from the town of Aberdeen. In particular, it is located away from the footslopes and mountain valley conditions of the Camdeboo Mountains and Oorlogspoortberg.

The cultural landscape impacted by the proposed WEF facilities is not worthy of formal protection in terms of the NHRA. However, it possesses conservation-worthy landscape elements for historical, architectural, aesthetic (visual, place making) and social reasons.

At a site scale, the following potential sensitive heritage resources/receptors have been identified from a cultural landscape perspective.

- Historical farmsteads (Grade IIIB and IIIC)
- Murraysburg and Nelspoort Routes
- Eastern footslopes of the Oorlogspoort

An overlay of the suggested buffer areas with the proposed turbine layout indicates congruence with the heritage indicators from a cultural landscape perspective.

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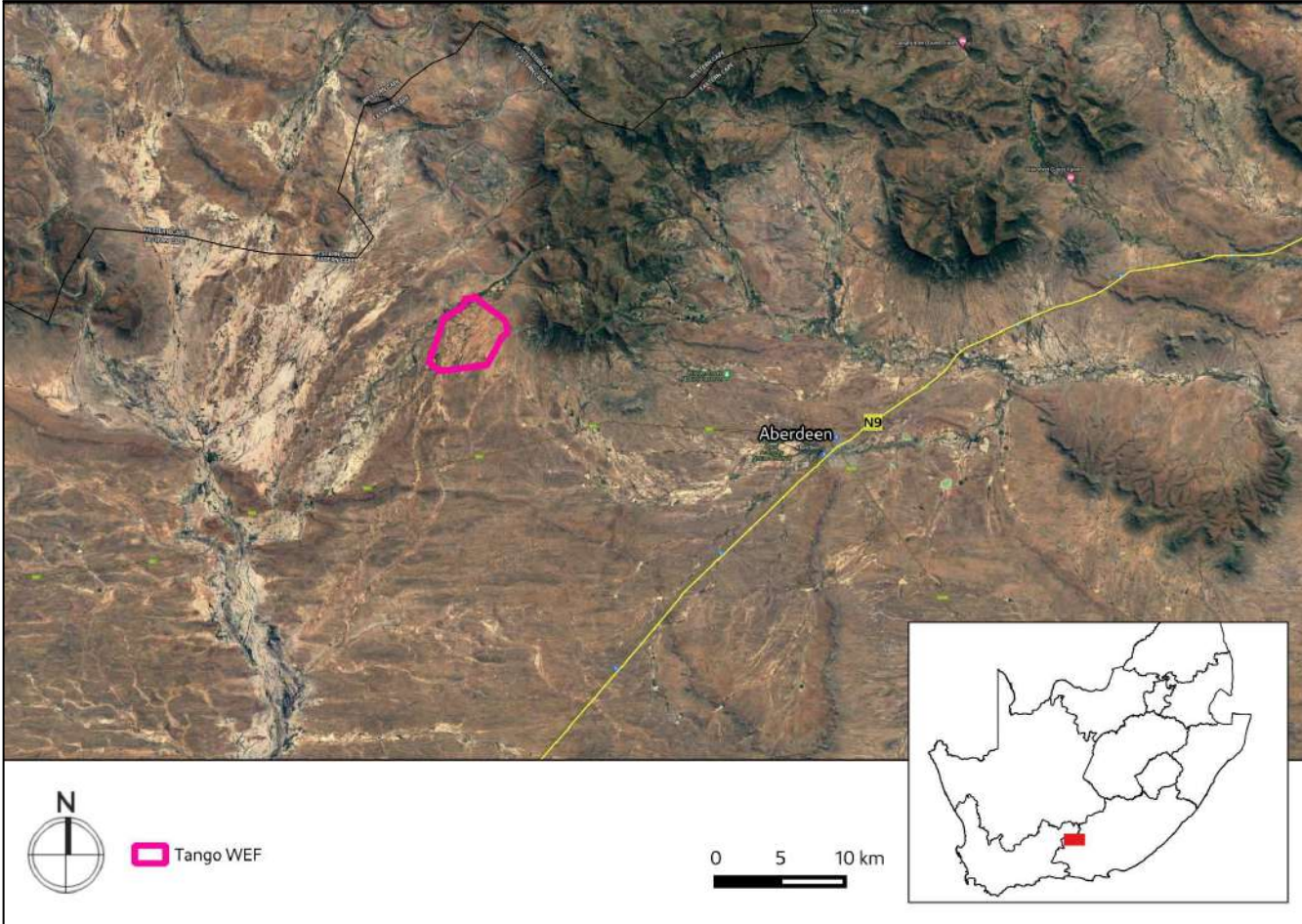
## APPENDIX 4: Heritage Screening Assessment and SSV





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# HERITAGE SCREENER

CTS Reference Number:	<b>CTS23_109</b>	
SAHRA Ref Number		
Client:	<b>Savannah</b>	
Date:	<b>June 2023</b>	
Title:	<b>Proposed development of the FE Tango Wind Energy Facility, Eastern Cape</b>	
Recommendation:	<p><b>RECOMMENDATION</b>  <b>The heritage resources in the area proposed for development are not yet sufficiently recorded</b>  Based on the available information, including the scale and nature of the proposed development, it is likely that significant heritage resources will be impacted by the proposed development and as such it is recommended that further heritage studies are required in terms of section 38 of the NHRA.</p>	

**Figure 1a.** Satellite map indicating the location of the proposed development in the Eastern Cape Province

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## 1. Proposed Development Summary

FE Tango (Pty) Ltd is proposing the development of a wind energy facility and associated infrastructure on a site located approximately 20km 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 1 of Farm Klipstavel 72. The project is known as the FE Tango 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 622.5MW (FE Kudu Wind Energy Facility), located approximately 20km west of the FE Tango Wind Energy Facility.

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 Tango Wind Energy Facility will have a contracted capacity of up to 240MW and comprise wind turbines with a capacity of up to 7.5MW each. The project has a preferred project site of approximately ~2 250ha. The current infrastructure is preliminarily proposed and will be updated once an optimised layout with all sensitivities considered has been generated. Access to the site will be via an access road off of the nearby R61. The FE Tango Wind Energy Facility project site is proposed to accommodate the following infrastructure:

- Wind turbines
- Concrete turbine foundations and turbine hardstands
- An on-site substation hub incorporating:
  - A132/33kV On-site substation
  - Switchyard with collector infrastructure
  - Battery Energy Storage System (BESS)
- A balance of plant area incorporating:
  - Temporary laydown areas
  - A construction camp laydown and temporary concrete batching plant
  - Operation and Maintenance buildings
- Cabling between the turbines, to be laid underground where practical.
- Access roads to the site and between project components with a width up to 10m and a servitude of 13.5m.

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. Application References

<b>Name of relevant heritage authority(s)</b>	ECPHRA
<b>Name of decision making authority(s)</b>	DFFE

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### 3. Property Information

<b>Latitude / Longitude</b>	-32.40102, 23.75382
<b>Erf number / Farm number</b>	Portion 1 of Farm Klipstavel 72
<b>Local Municipality</b>	Dr Beyers Naude
<b>District Municipality</b>	Sarah Baartman
<b>Province</b>	Eastern Cape
<b>Current Use</b>	Agriculture
<b>Current Zoning</b>	Agriculture

### 4. Nature of the Proposed Development

<b>Total Surface Area</b>	TBA
<b>Depth of excavation (m)</b>	TBA
<b>Height of development (m)</b>	TBA

### 5. Category of Development

x	<b>Triggers: Section 38(8) of the National Heritage Resources Act</b>
	<b>Triggers: Section 38(1) of the National Heritage Resources Act</b>
	1. Construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier over 300m in length.
	2. Construction of a bridge or similar structure exceeding 50m in length.
	3. Any development or activity that will change the character of a site-
x	a) exceeding 5 000m <sup>2</sup> in extent
	b) involving three or more existing erven or subdivisions thereof
	c) involving three or more erven or divisions thereof which have been consolidated within the past five years

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	4. Rezoning of a site exceeding 10 000m <sup>2</sup>
	5. Other (state):

## 6. Additional Infrastructure Required for this Development

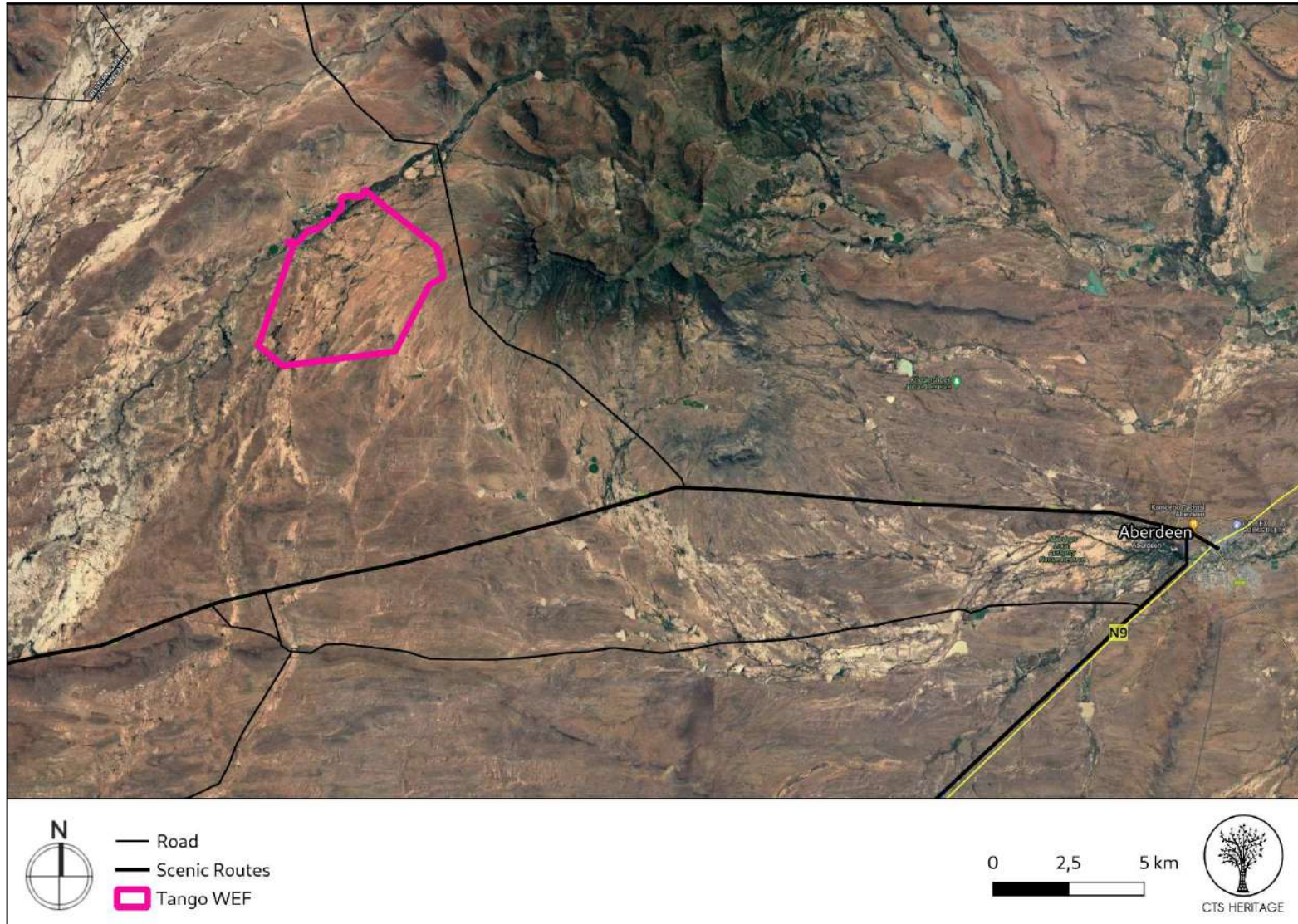
TBA

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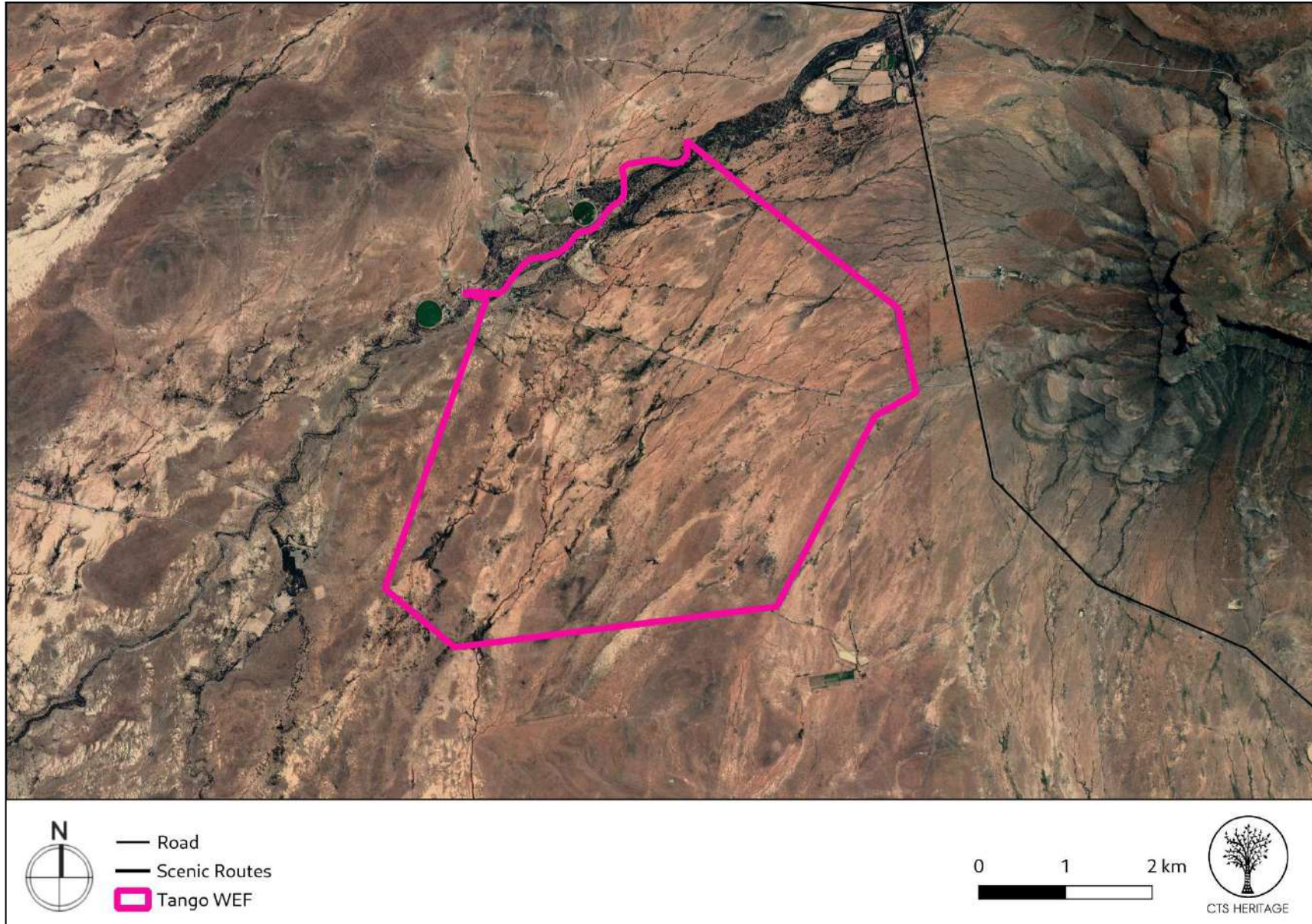
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## 7. Mapping (please see Appendix 3 and 4 for a full description of our methodology and map legends)



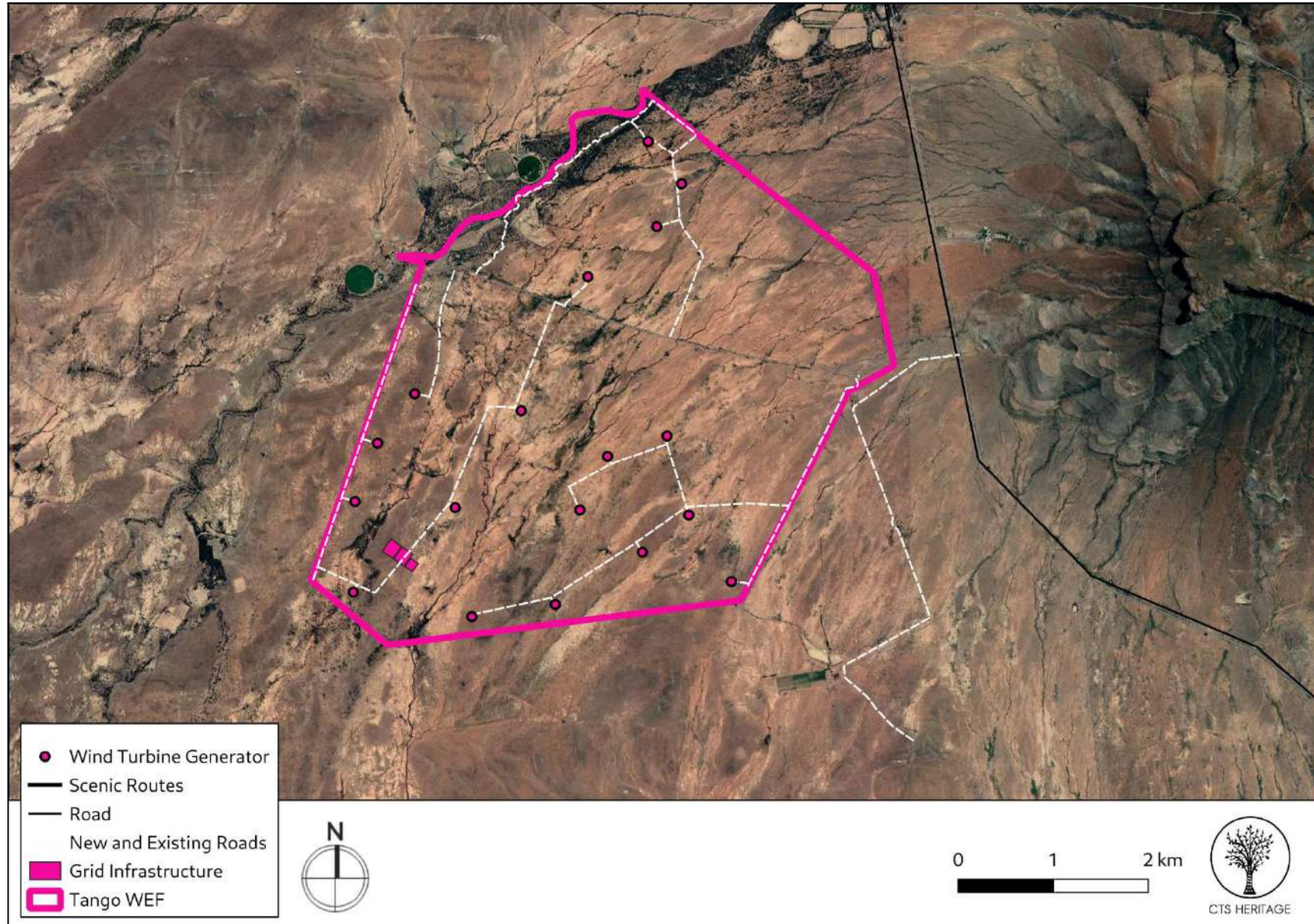
**Figure 1b Overview Map.** Satellite image (2023) indicating the proposed development area relative to Aberdeen



**Figure 1c. Overview Map.** Satellite image (2023) indicating the proposed development area at closer range.



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**Figure 1d. Overview Map.** Satellite image (2023) indicating the proposed development preliminary layout at closer range.

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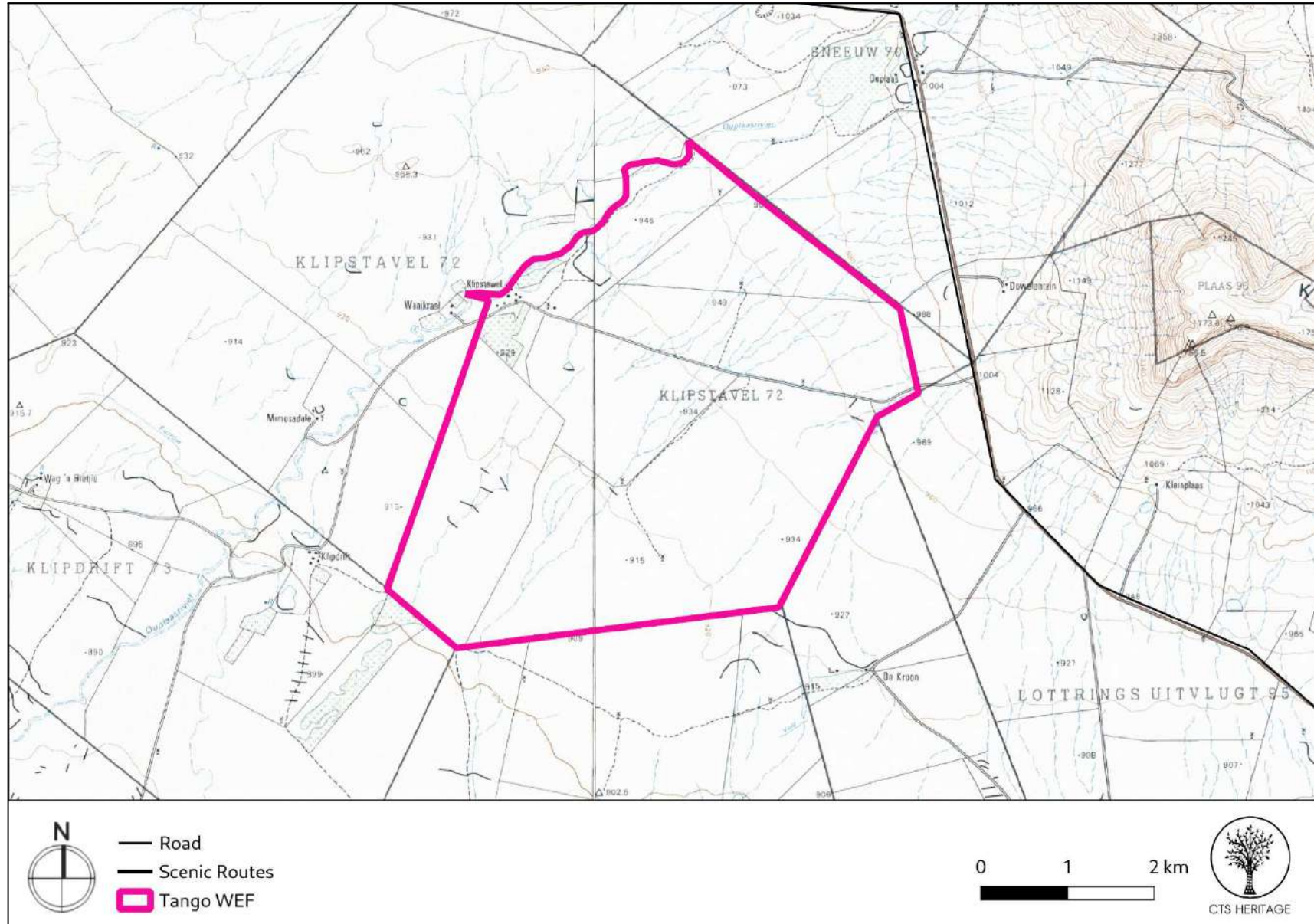


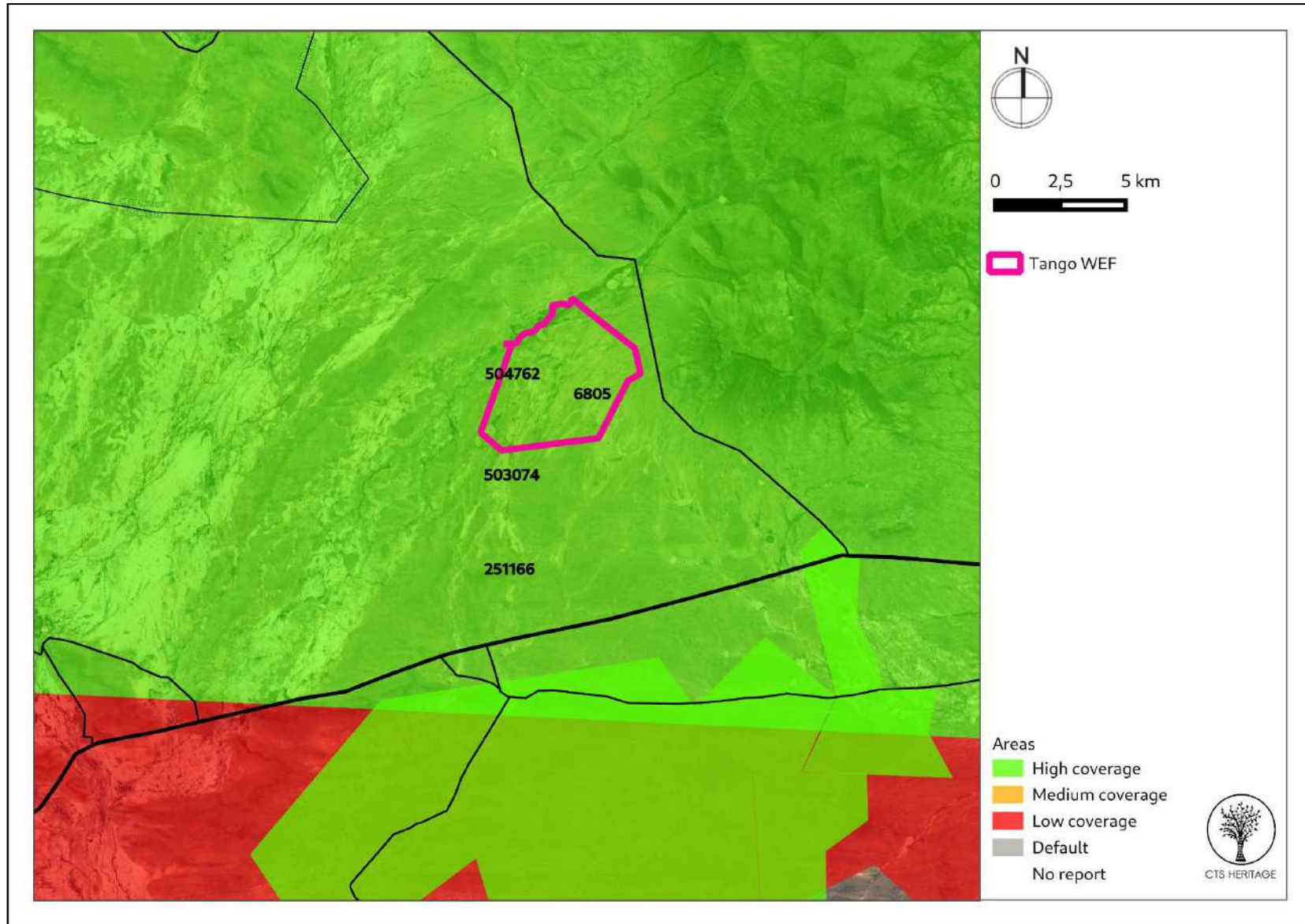
Figure 1e. Topo Map. Area proposed for development overlaying an extract from the 1:50 000 Topo Map

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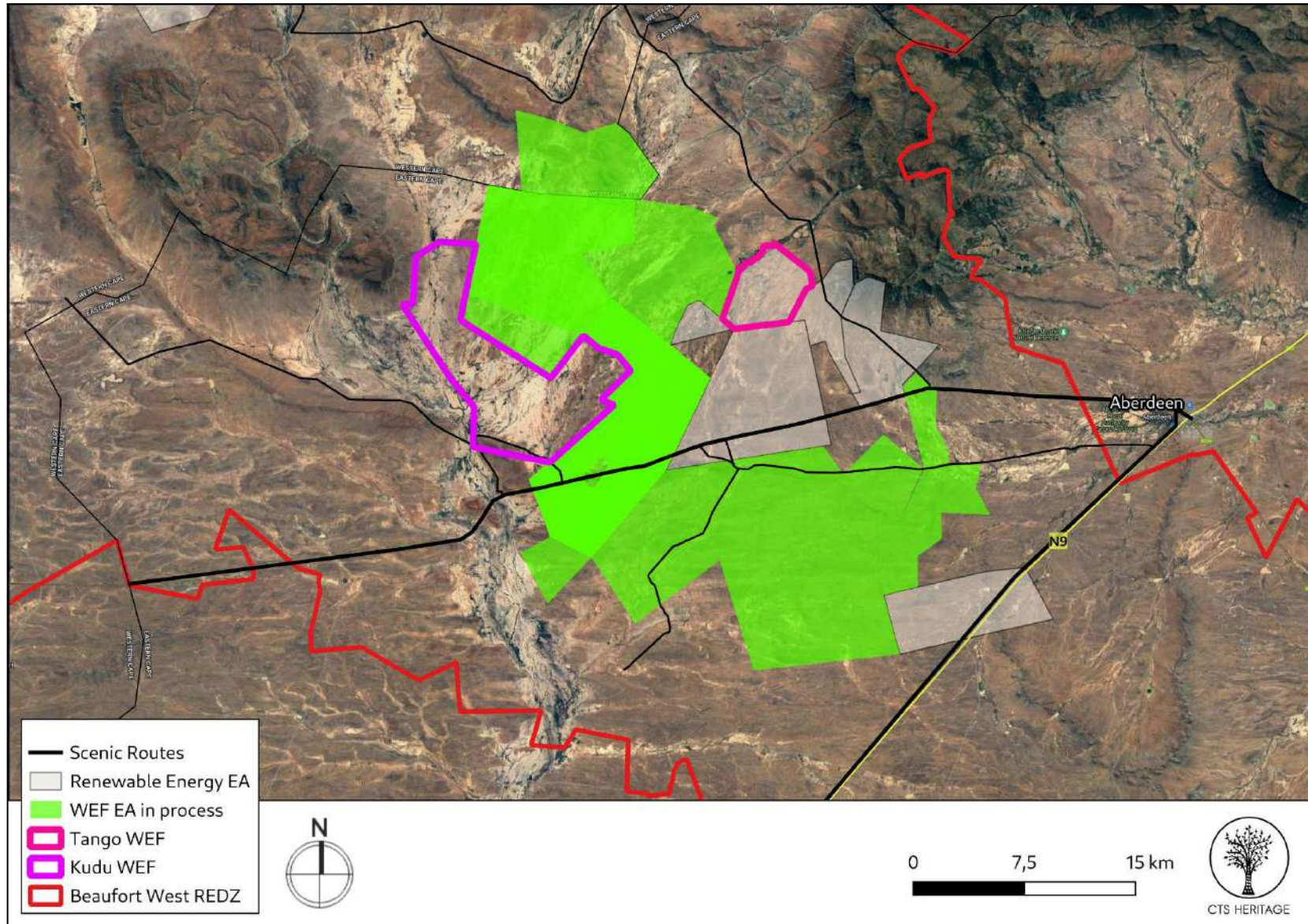




**Figure 2a. Previous HIAs Map.** Previous Heritage Impact Assessments surrounding the proposed development area within 15km, with SAHRIS NIDS indicated. Please see Appendix 2 for a full reference list.



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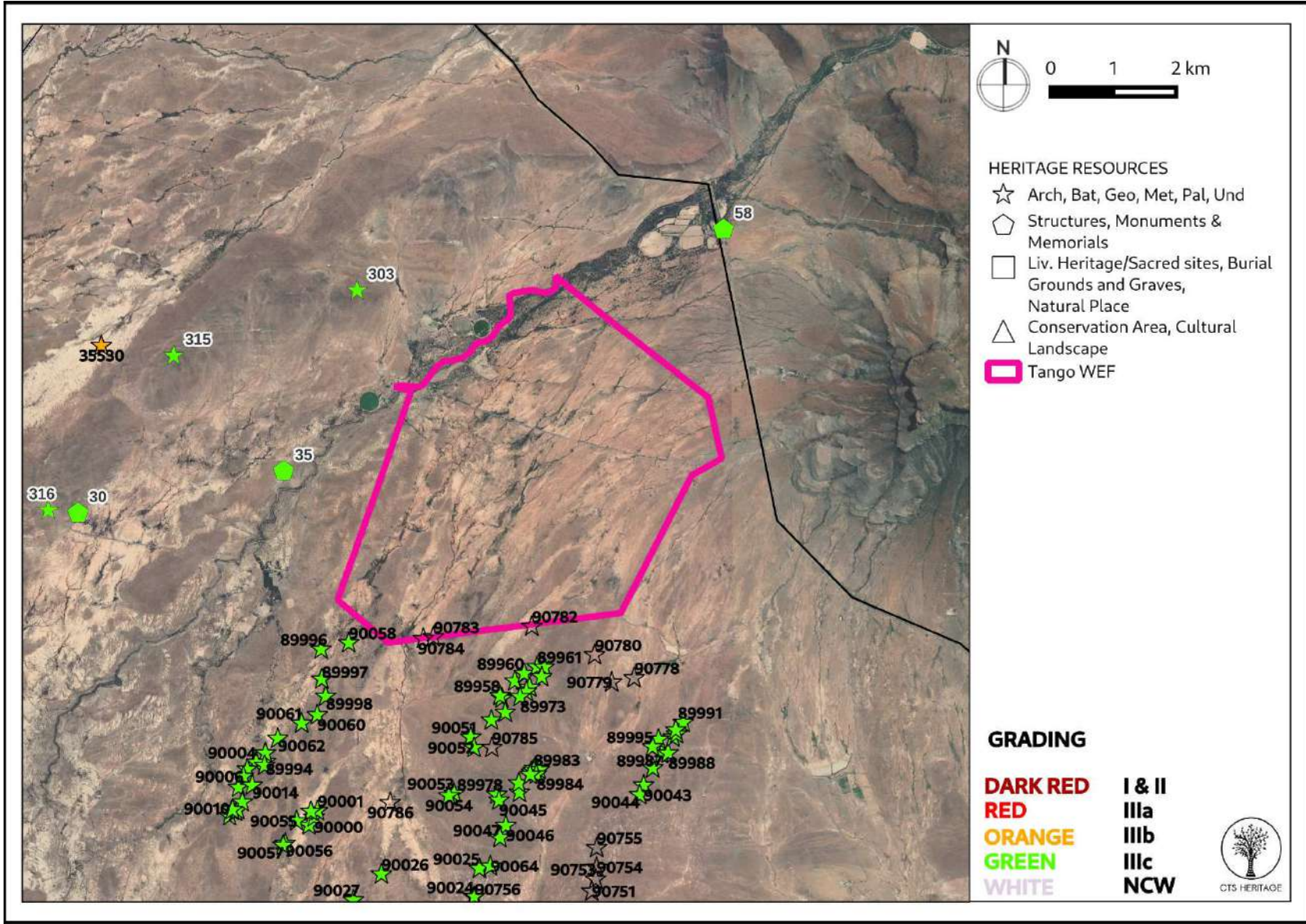


**Figure 2b. Previous EAs Map.** REFs with Environmental Authorisation and the Beaufort West REDZ relative to the proposed development

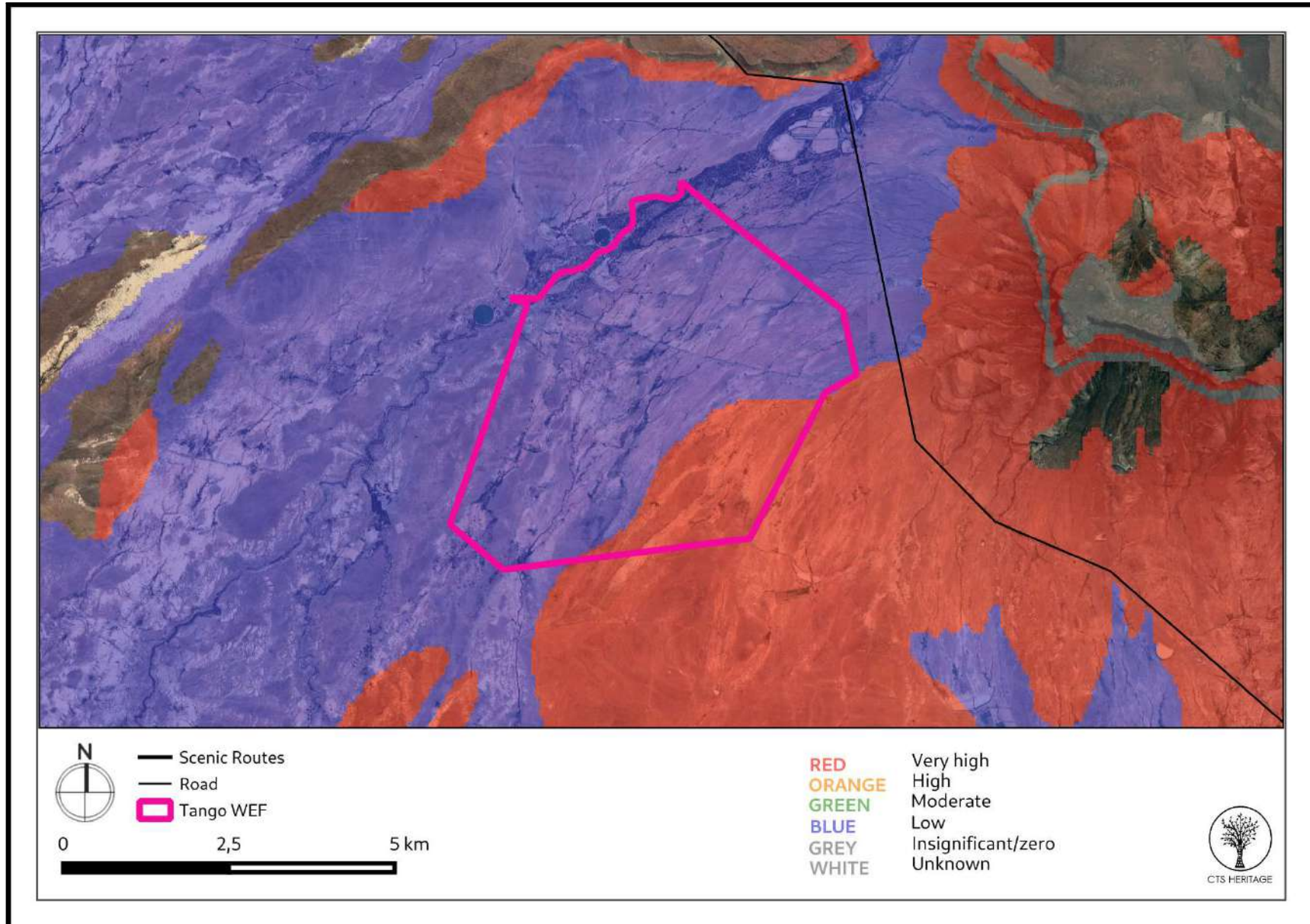
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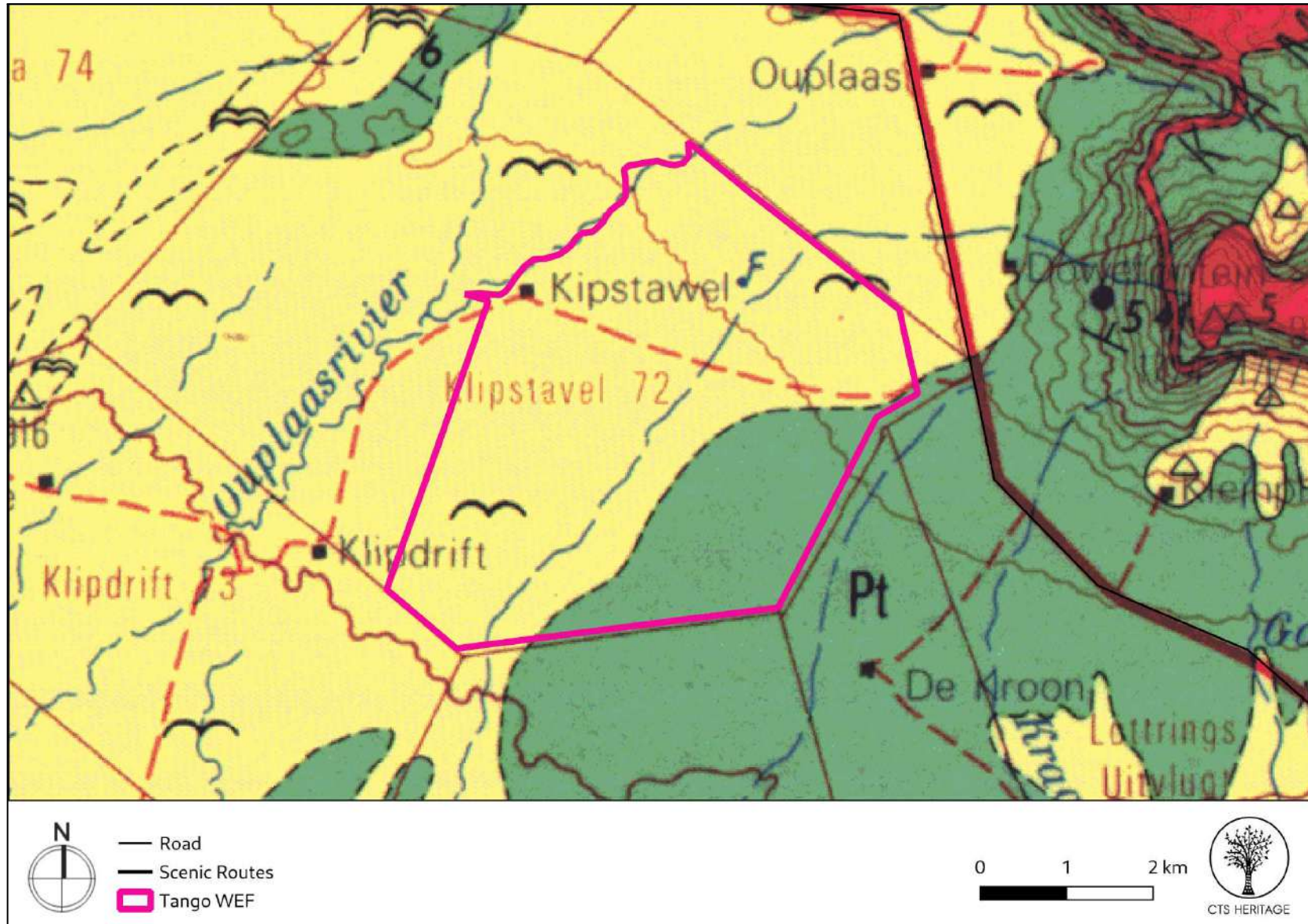
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**Figure 3. Heritage Resources Map.** Heritage Resources previously identified in and near the study area, with SAHRIS Site IDs indicated. Please See Appendix 4 for full description of heritage resource types.



**Figure 4. Palaeosensitivity Map.** Indicating high and low fossil sensitivity underlying the study area. Please See Appendix 3 for a full guide to the legend.



**Figure 4b. Geology Map.** Extract from the CGS 3222 Beaufort West Map indicating that the development area for the PV 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



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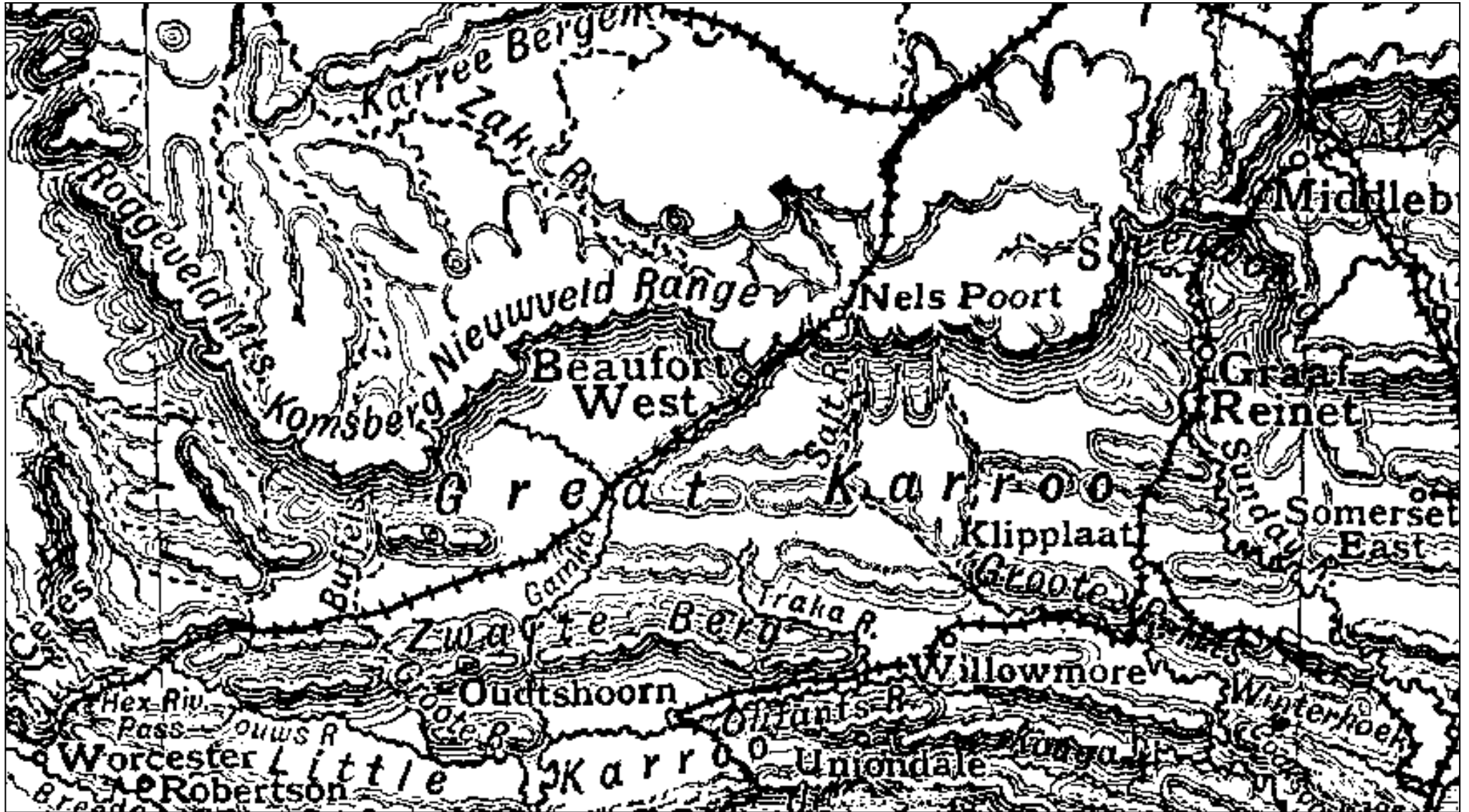


Figure 5. Historic Image. Aberdeen is located approximately half way between Beaufort West and Graaf Reinet. Map from 1911. By Encyclopedia Britannica. - 1911. Encyclopedia Britannica., Public Domain, <https://commons.wikimedia.org/w/index.php?curid=19573298>

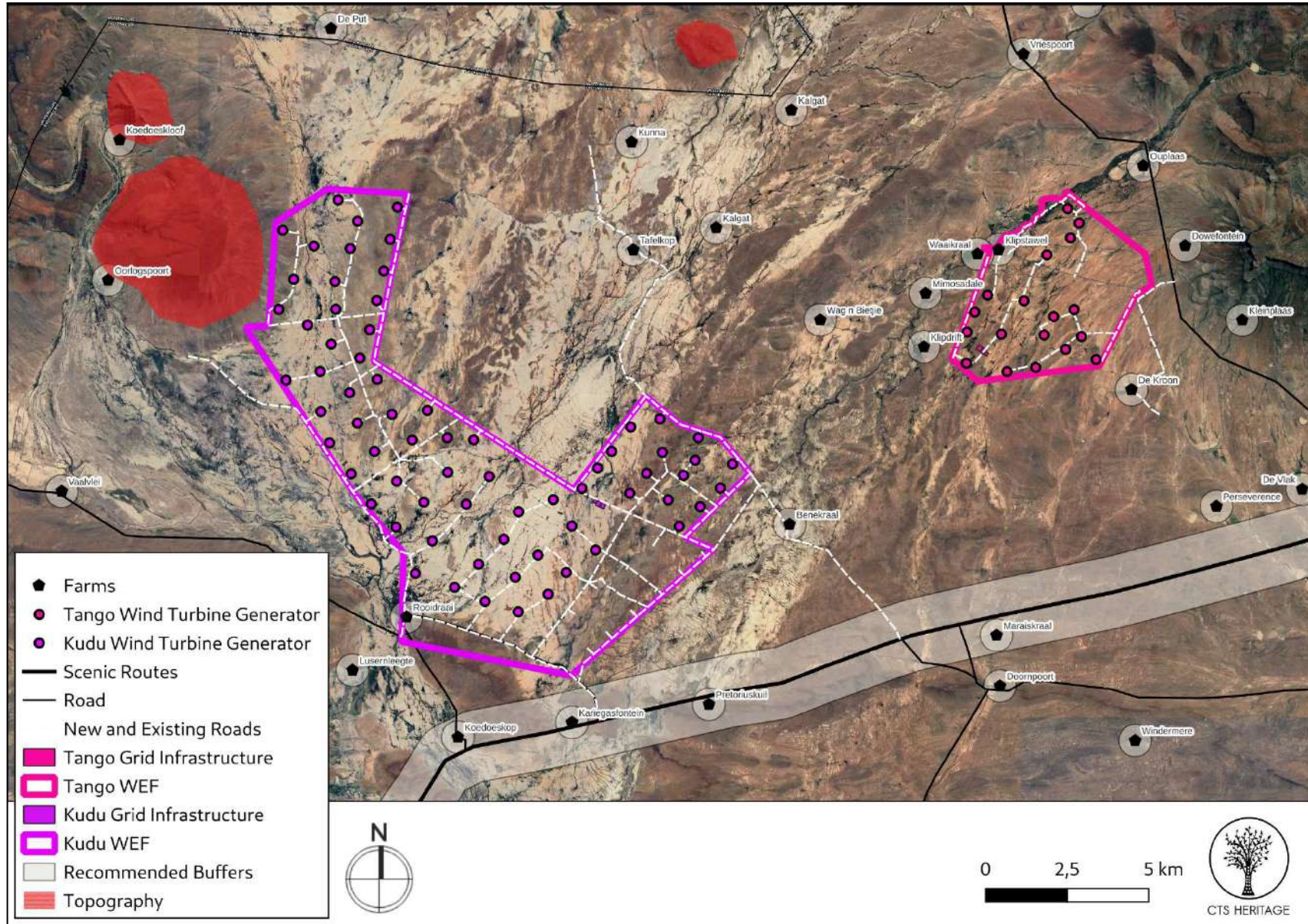
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**Figure 6a. Cultural Landscape.** Recommended Buffers for historic roads, scenic routes and farm werfs

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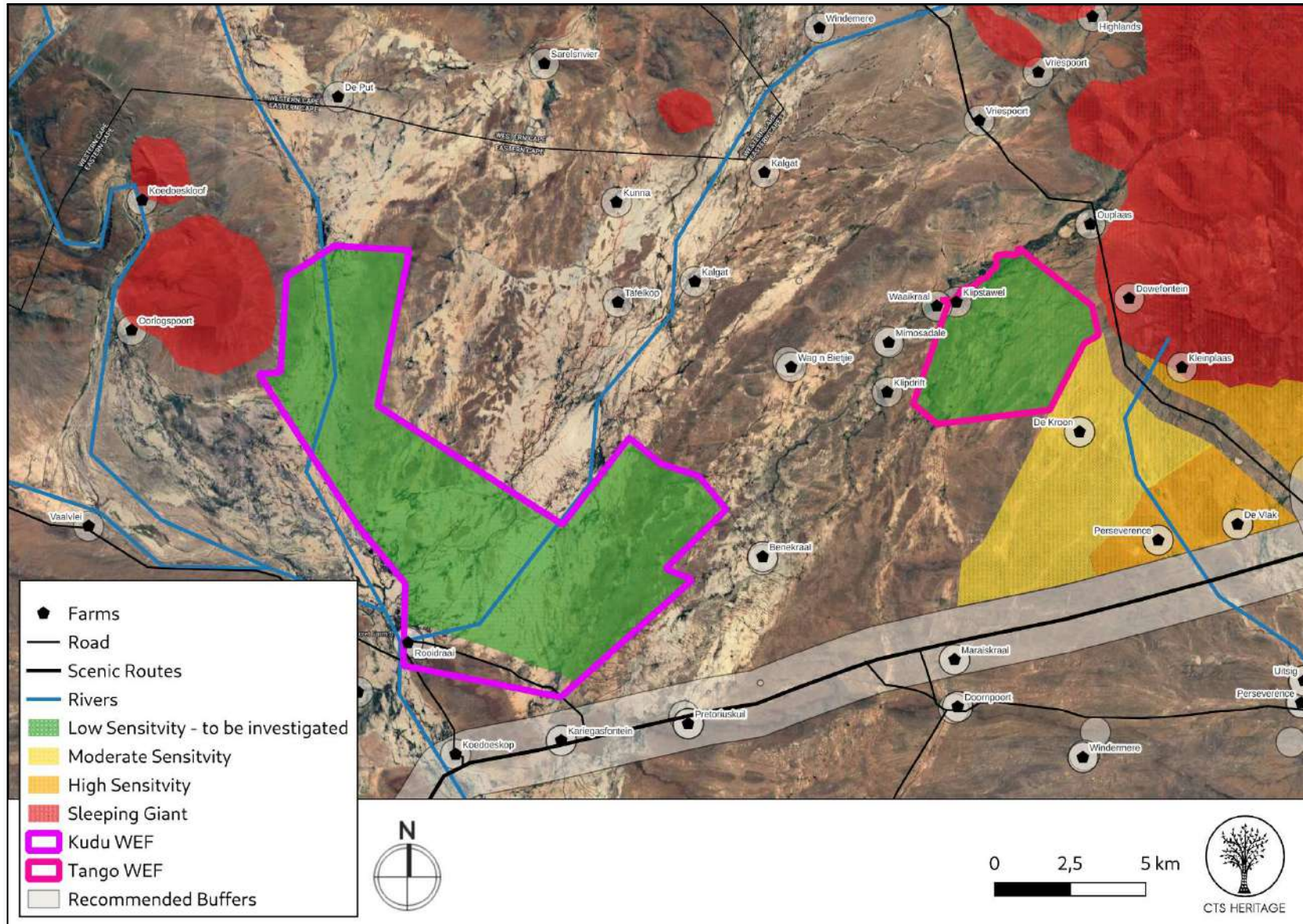


Figure 6b. Overview. Cultural Landscape Sensitivity

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## 8. Heritage statement and character of the area

The area proposed for the Tango Wind Energy Facility Projects is located approximately 30km west of Aberdeen in the Eastern Cape, and is located within the identified Beaufort West REDZ (Figure 2b). 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.

### Cultural Landscape

The name 'Karoo' has its roots in the Khoisan word meaning 'place of great dryness'. It once supported large grassy flatlands and the San and Khoekhoen migrated across the region for hunting and grazing purposes. Less than two hundred years ago large herds of antelope still roamed the grass plains. With the occupation of the area by stock farmers, the sheep gradually replaced the game and the grass receded along with changing grazing and weather patterns (Winter et al 2009; Winter & Oberholzer 2013). By the late 17th century, the Khoenhoen had moved from the region into the more water-rich southern Karoo and the coastal plains.

The area proposed for development is located in the immediate vicinity of Aberdeen, a detailed history for which is provided for online<sup>1</sup>. The early known history of Aberdeen dates back to the late seventeenth century when Ensign Shriver was sent by Governor Simon van der Stel to barter trade goods for the sheep and cattle of the Inqua Khoisan under the leadership of Heykon. The first meeting between the Inqua and Ensign Shriver took place some 30-kilometres north west of Aberdeen in the lee of the Onder Sneeuberge in January 1689. These initial contacts between the indigenous people of the region and the European settlers at Cape Town were a pre-cursor to the movement of the Trekboers or nomadic farmers who moved away from the restrictions imposed on them by the rule of the Dutch East India Company in Cape Town. In 1777 Captain Robert Jacob Gordon an employee of the Dutch East India Company travelled along the Kraai River in the vicinity of Aberdeen and with the assistance of a draughtsman drew a panoramic view of the Camdeboo Mountains from the crest of a small koppie or hillock some seven kilometres from Aberdeen towards Graaff-Reinet. This koppie later became known as Gordon's koppie and is situated close to the N9 highway towards Graaff-Reinet.

During the early colonial period, the harshness of the Karoo region formed an almost impenetrable barrier from the Cape to the interior for colonial explorers, hunters and travellers. The 18th century was characterised by a marked increase in the rate of expansion of the boundaries of the settlement at the Cape. This was associated with the emergence of the migrant stock farmer (trekboer) (Guelke 1982 In Winter et al 2009). Early routes into the interior largely followed the tracks initially used by migrating herds of game or the cattle herds and sheep flocks of the Khoekhoen on their seasonal route between coastal and inland grazing grounds. These routes were later reinforced by generations of trek farmers moving between the markets at the Cape and their farms (Winter et al 2009).

Permanent settlement of the region only really occurred in the 19th century with towns being established near permanent water sources. The original title deeds for the land on which Aberdeen is situated were signed by the British Governor Lord Charles Somerset in 1817. Aberdeen was established on the farm Brakkefontein which was sold by its owner Jan Vorster to the Dutch Reformed Church in 1855.

Aberdeen also has links with the Anglo-Boer War. In 1901, in an effort to prevent the northbound rail link from being destroyed, the British built hundreds of blockhouses. During the

<sup>1</sup> <https://www.karoo-southafrica.com/camdeboo/aberdeen/history-of-aberdeen/>



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war 139 residents of Aberdeen rebelled against the Colonial Administration and joined up with the Boers fighting on behalf of the Orange Free State and the Transvaal. By so doing they were technically traitors as all residents of the Cape Colony irrespective of whether they spoke Dutch or English were British citizens. It is likely that evidence pertaining to the Anglo-Boer War will be located in proximity to the area proposed for development.

### **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.

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## Palaeontology

According to the SAHRIS Palaeosensitivity Map (Figure 4a), the area proposed for development is underlain by sediments of low and 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 *vlaetes* 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. However, where found, such fossils may be of considerable scientific interest. Since the majority of such potential fossil occurrences probably lie along ecologically protected drainage lines and / or can be effectively mitigated through professional recording and collection in the Pre-construction Phase, with little or no need for micro-siting of infrastructure, they are very unlikely to constrain the layout of the WEF facilities.”

Based on the known paleontological sensitivity of this area, it is very likely that activities associated with the development of the proposed WEF will negatively impact on significant fossil heritage.

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### **Plan of Study**

Ground-truthing field assessments will be conducted by an archaeologist, a palaeontologist as well as a cultural landscape specialist. Each specialist will draft a report outlining the heritage resources identified in their respective analyses. A Heritage Impact Assessment (HIA) that satisfies section 38(3) of the NHRA will then be drafted that integrates the findings of the specialist assessments and determines the likely impact to the identified heritage resources from the proposed development. These impacts are then assessed in the HIA and mitigation measures will be proposed. The HIA will determine whether or not there are any heritage-based objections to the proposed development and will propose recommendations should the development proceed.

### **RECOMMENDATION**

**The heritage resources in the area proposed for development are not yet sufficiently recorded**

**Based on the available information, including the scale and nature of the proposed development, it is likely that significant heritage resources will be impacted by the proposed development and as such it is recommended that further heritage studies are required in terms of section 38 of the NHRA.**

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## 9. Scoping Assessment Impact Table

### Impact

- Impact to archaeological and built environment resources
- Impact to palaeontological resources
- Impact to Cultural Landscape
- Cumulative Impact

### Desktop Sensitivity Analysis of the Site

- Impact to significant archaeological resources such as Stone Age artefact scatters, burial grounds and graves, historical artefacts, historical structures and rock art engravings through destruction during the development phase and disturbance during the operational phase is unlikely.
- Impacts to palaeontological resources are unlikely.
- There is the potential for the cumulative impact of proposed solar energy facilities to negatively impact the cultural landscape due to a change in the landscape character from natural wilderness to semi-industrial, however, due to the remoteness of the area the impact on the experience of the cultural landscape is not foreseen to be significant.

Issue	Nature of Impact	Extent of Impact	No-Go Areas
Impact to significant heritage resources through destruction during the development phase and disturbance during the operational phase.	Destruction of significant heritage resources	Local scale with broader impacts to scientific knowledge	None known at present

### Gaps in knowledge & recommendations for further study

**The heritage resources in the area proposed for development are not yet sufficiently recorded**

Based on the available information, including the scale and nature of the proposed development, it is likely that significant heritage resources will be impacted by the proposed development and as such it is recommended that further heritage studies are required in terms of section 38 of the NHRA.

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### APPENDIX 1: List of heritage resources within 25km of the development area

Site ID	Site no	Full Site Name	Site Type	Grading
34902	DE DENNE	DE DENNE, 13 DARLING STREET, ABERDEEN	Building	Grade IIIb
35546	GK083	Gamma Kappa 083	Artefacts	Grade IIIc
35548	GK084	Gamma Kappa 084	Rock Art	Grade IIIb
135558	DC10/NAMM/0035	Afrikaans Language Monument, Voortrekker Street, Aberdeen	Monuments & Memorials	
135559	DC10/NAMM/0040	Carel Van Heerden Memorial, Meintjies Street, Aberdeen	Monuments & Memorials	
135581	DC10/NAMM/0038	Trek Monument, Voortrekker Street, Aberdeen	Monuments & Memorials	
89811	ABER001	AberdeenWindFarm 001	Artefacts	Grade IIIc
89812	ABER002	AberdeenWindFarm 002	Artefacts	Grade IIIc
89813	ABER003	AberdeenWindFarm 003	Artefacts	Grade IIIc
89814	ABER004	AberdeenWindFarm 004	Artefacts	Grade IIIc
89815	ABER005	AberdeenWindFarm 005	Artefacts	Grade IIIc
89817	ABER006	AberdeenWindFarm 006	Artefacts	Grade IIIc
89821	ABER007	AberdeenWindFarm 007	Artefacts	Grade IIIc
89824	ABER008	AberdeenWindFarm 008	Artefacts	Grade IIIc
89827	ABER009	AberdeenWindFarm 009	Artefacts	Grade IIIc

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89831	ABER010	AberdeenWindFarm 010	Artefacts	Grade IIIc
89832	ABER011	AberdeenWindFarm 011	Artefacts	Grade IIIc
89833	ABER012	AberdeenWindFarm 012	Artefacts	Grade IIIc
89834	ABER013	AberdeenWindFarm 013	Artefacts	Grade IIIc
89835	ABER014	AberdeenWindFarm 014	Artefacts	Grade IIIc
89836	ABER015	AberdeenWindFarm 015	Artefacts	Grade IIIc
89837	ABER016	AberdeenWindFarm 016	Artefacts	Grade IIIc
89838	ABER017	AberdeenWindFarm 017	Artefacts	Grade IIIc
89839	ABER018	AberdeenWindFarm 018	Artefacts	Grade IIIc
89840	ABER019	AberdeenWindFarm 019	Artefacts	Grade IIIc
89841	ABER020	AberdeenWindFarm 020	Artefacts	Grade IIIc
89954	ABER021	AberdeenWindFarm 021	Artefacts	Grade IIIc
89955	ABER022	AberdeenWindFarm 022	Artefacts	Grade IIIc
89956	ABER023	AberdeenWindFarm 023	Artefacts	Grade IIIb
89957	ABER024	AberdeenWindFarm 024	Artefacts	Grade IIIc
89958	ABER025	AberdeenWindFarm 025	Artefacts	Grade IIIc
89959	ABER026	AberdeenWindFarm 026	Artefacts	Grade IIIc
89960	ABER027	AberdeenWindFarm 027	Artefacts	Grade IIIc
89961	ABER028	AberdeenWindFarm 028	Artefacts	Grade IIIc

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89967	ABER029	AberdeenWindFarm 029	Artefacts	Grade IIIc
89968	ABER030	AberdeenWindFarm 030	Artefacts	Grade IIIc
89970	ABER031	AberdeenWindFarm 031	Artefacts	Grade IIIc
89971	ABER032	AberdeenWindFarm 032	Artefacts	Grade IIIc
89972	ABER033	AberdeenWindFarm 033	Artefacts	Grade IIIc
89973	ABER034	AberdeenWindFarm 034	Artefacts	Grade IIIc
89974	ABER035	AberdeenWindFarm 035	Artefacts	Grade IIIc
89989	ABER047	AberdeenWindFarm 047	Artefacts	Grade IIIc
89978	ABER036	AberdeenWindFarm 036	Artefacts	Grade IIIc
89979	ABER037	AberdeenWindFarm 037	Artefacts	Grade IIIc
89980	ABER038	AberdeenWindFarm 038	Artefacts	Grade IIIc
89981	ABER039	AberdeenWindFarm 039	Artefacts	Grade IIIc
89982	ABER040	AberdeenWindFarm 040	Artefacts	Grade IIIc
89983	ABER041	AberdeenWindFarm 041	Artefacts	Grade IIIc
89984	ABER042	AberdeenWindFarm 042	Artefacts	Grade IIIc
89985	ABER043	AberdeenWindFarm 043	Artefacts	Grade IIIc
89986	ABER044	AberdeenWindFarm 044	Artefacts	Grade IIIc
89987	ABER045	AberdeenWindFarm 045	Artefacts	Grade IIIc
89988	ABER046	AberdeenWindFarm 046	Artefacts	Grade IIIc

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89990	ABER048	AberdeenWindFarm 048	Artefacts	Grade IIIc
89991	ABER049	AberdeenWindFarm 049	Artefacts	Grade IIIc
89992	ABER050	AberdeenWindFarm 050	Artefacts	Grade IIIc
89993	ABER051	AberdeenWindFarm 051	Artefacts	Grade IIIc
89994	ABER052	AberdeenWindFarm 052	Artefacts	Grade IIIc
89995	ABER053	AberdeenWindFarm 053	Artefacts	Grade IIIc
89996	ABER054	AberdeenWindFarm 054	Artefacts	Grade IIIc
89997	ABER055	AberdeenWindFarm 055	Artefacts	Grade IIIc
89998	ABER056	AberdeenWindFarm 056	Artefacts	Grade IIIc
89999	ABER057	AberdeenWindFarm 057	Artefacts	Grade IIIc
90000	ABER058	AberdeenWindFarm 058	Artefacts	Grade IIIc
90001	ABER059	AberdeenWindFarm 059	Artefacts	Grade IIIc
90002	ABER060	AberdeenWindFarm 060	Artefacts	Grade IIIc
90003	ABER061	AberdeenWindFarm 061	Artefacts	Grade IIIc
90004	ABER062	AberdeenWindFarm 062	Artefacts	Grade IIIc
90005	ABER063	AberdeenWindFarm 063	Artefacts	Grade IIIc
90006	ABER064	AberdeenWindFarm 064	Artefacts	Grade IIIc
90007	ABER065	AberdeenWindFarm 065	Artefacts	Grade IIIc
90009	ABER067	AberdeenWindFarm 067	Artefacts	Grade IIIc

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90010	ABER068	AberdeenWindFarm 068	Artefacts	Grade IIIc
90011	ABER069	AberdeenWindFarm 069	Artefacts	Grade IIIc
90012	ABER070	AberdeenWindFarm 070	Artefacts	Grade IIIc
90013	ABER071	AberdeenWindFarm 071	Artefacts	Grade IIIc
90014	ABER072	AberdeenWindFarm 072	Artefacts	Grade IIIc
90015	ABER073	AberdeenWindFarm 073	Artefacts	Grade IIIc
90016	ABER074	AberdeenWindFarm 074	Artefacts	Grade IIIc
90017	ABER075	AberdeenWindFarm 075	Artefacts	Grade IIIc
90008	ABER066	AberdeenWindFarm 066	Artefacts	Grade IIIc
90018	ABER076	AberdeenWindFarm 076	Artefacts	Grade IIIc
90019	ABER077	AberdeenWindFarm 077	Artefacts	Grade IIIc
90020	ABER078	AberdeenWindFarm 078	Artefacts	Grade IIIc
90021	ABER079	AberdeenWindFarm 079	Artefacts	Grade IIIc
90022	ABER080	AberdeenWindFarm 080	Artefacts	Grade IIIc
90023	ABER081	AberdeenWindFarm 081	Artefacts	Grade IIIc
90024	ABER082	AberdeenWindFarm 082	Artefacts	Grade IIIc
90025	ABER083	AberdeenWindFarm 083	Artefacts	Grade IIIc
90026	ABER084	AberdeenWindFarm 084	Artefacts	Grade IIIc
90027	ABER085	AberdeenWindFarm 085	Artefacts	Grade IIIc

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90028	ABER086	AberdeenWindFarm 086	Artefacts	Grade IIIc
90029	ABER087	AberdeenWindFarm 087	Artefacts	Grade IIIc
90030	ABER088	AberdeenWindFarm 088	Artefacts	Grade IIIc
90031	ABER089	AberdeenWindFarm 089	Artefacts	Grade IIIc
90032	ABER090	AberdeenWindFarm 090	Artefacts	Grade IIIc
90033	ABER091	AberdeenWindFarm 091	Artefacts	Grade IIIc
90034	ABER092	AberdeenWindFarm 092	Artefacts	Grade IIIc
90035	ABER093	AberdeenWindFarm 093	Artefacts	Grade IIIc
90036	ABER094	AberdeenWindFarm 094	Artefacts	Grade IIIc
90037	ABER095	AberdeenWindFarm 095	Artefacts	Grade IIIc
90038	ABER096	AberdeenWindFarm 096	Artefacts	Grade IIIc
90039	ABER097	AberdeenWindFarm 097	Artefacts	Grade IIIc
90040	ABER098	AberdeenWindFarm 098	Artefacts	
90041	ABER099	AberdeenWindFarm 099	Artefacts	Grade IIIc
90042	ABER100	AberdeenWindFarm 100	Artefacts	Grade IIIc
90043	ABER101	AberdeenWindFarm 101	Artefacts	Grade IIIc
90044	ABER102	AberdeenWindFarm 102	Artefacts	Grade IIIc
90045	ABER103	AberdeenWindFarm 103	Artefacts	Grade IIIc
90046	ABER104	AberdeenWindFarm 104	Artefacts	Grade IIIc

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90047	ABER105	AberdeenWindFarm 105	Artefacts	Grade IIIc
90050	ABER106	AberdeenWindFarm 106	Artefacts	Grade IIIc
90051	ABER107	AberdeenWindFarm 107	Artefacts	Grade IIIc
90052	ABER108	AberdeenWindFarm 108	Artefacts	Grade IIIc
90053	ABER109	AberdeenWindFarm 109	Artefacts	Grade IIIc
90054	ABER110	AberdeenWindFarm 110	Artefacts	Grade IIIc
90056	ABER112	AberdeenWindFarm 112	Artefacts	Grade IIIc
90057	ABER113	AberdeenWindFarm 113	Artefacts	Grade IIIc
90058	ABER114	AberdeenWindFarm 114	Artefacts	Grade IIIc
90059	ABER115	AberdeenWindFarm 115	Artefacts	Grade IIIc
90060	ABER116	AberdeenWindFarm 116	Artefacts	Grade IIIc
90061	ABER117	AberdeenWindFarm 117	Artefacts	Grade IIIc
90062	ABER118	AberdeenWindFarm 118	Artefacts	Grade IIIc
90063	ABER119	AberdeenWindFarm 119	Artefacts	Grade IIIc
90064	ABER120	AberdeenWindFarm 120	Artefacts	Grade IIIc
90055	ABER111	AberdeenWindFarm 111	Artefacts	Grade IIIc
90065	ABER121	AberdeenWindFarm 121	Artefacts	Grade IIIc
90066	ABER122	AberdeenWindFarm 122	Artefacts	Grade IIIc
90067	ABER123	AberdeenWindFarm 123	Artefacts	Grade IIIc

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90068	ABER124	AberdeenWindFarm 124	Artefacts	Grade IIIc
90069	ABER125	AberdeenWindFarm 125	Artefacts	Grade IIIc
90070	ABER126	AberdeenWindFarm 126	Artefacts	Grade IIIc
90071	ABER127	AberdeenWindFarm 127	Stone walling	Grade IIIc
90072	ABER128	AberdeenWindFarm 128	Stone walling	Grade IIIc
90073	ABER129	AberdeenWindFarm 129	Building, Stone walling	Grade IIIc
90074	ABER130	AberdeenWindFarm 130	Artefacts	Grade IIIc
90075	ABER131	AberdeenWindFarm 131	Structures	Grade IIIc
90744	ABER132	AberdeenWindFarm 132	Palaeontological	Ungraded
90745	ABER133	AberdeenWindFarm 133	Palaeontological	Ungraded
90746	ABER134	AberdeenWindFarm 134	Palaeontological	Ungraded
90747	ABER135	AberdeenWindFarm 135	Palaeontological	Ungraded
90748	ABER136	AberdeenWindFarm 136	Palaeontological	Ungraded
90749	ABER137	AberdeenWindFarm 137	Palaeontological	Ungraded
90750	ABER138	AberdeenWindFarm 138	Palaeontological	Ungraded
90751	ABER139	AberdeenWindFarm 139	Palaeontological	Ungraded
90752	ABER140	AberdeenWindFarm 140	Palaeontological	
90753	ABER140	AberdeenWindFarm 140	Palaeontological	Ungraded
90754	ABER141	AberdeenWindFarm 141	Palaeontological	Ungraded

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90755	ABER142	AberdeenWindFarm 142	Palaeontological	Ungraded
90756	ABER143	AberdeenWindFarm 143	Palaeontological	Ungraded
90757	ABER144	AberdeenWindFarm 144	Palaeontological	Ungraded
90758	ABER145	AberdeenWindFarm 145	Palaeontological	
90759	ABER145	AberdeenWindFarm 145	Palaeontological	Ungraded
90760	ABER146	AberdeenWindFarm 146	Palaeontological	Ungraded
90770	ABER147	AberdeenWindFarm 147	Palaeontological	Ungraded
90772	ABER148	AberdeenWindFarm 148	Palaeontological	Ungraded
90773	ABER149	AberdeenWindFarm 149	Palaeontological	Ungraded
90774	ABER150	AberdeenWindFarm 150	Palaeontological	Ungraded
90775	ABER151	AberdeenWindFarm 151	Palaeontological	Ungraded
90776	ABER152	AberdeenWindFarm 152	Palaeontological	Ungraded
90778	ABER154	AberdeenWindFarm 154	Palaeontological	Ungraded
90779	ABER155	AberdeenWindFarm 155	Palaeontological	Ungraded
90780	ABER156	AberdeenWindFarm 156	Palaeontological	Ungraded
90782	ABER157	AberdeenWindFarm 157	Palaeontological	Ungraded
90783	ABER158	AberdeenWindFarm 158	Palaeontological	Ungraded
90784	ABER159	AberdeenWindFarm 159	Palaeontological	Ungraded
90785	ABER160	AberdeenWindFarm 160	Palaeontological	Ungraded

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90786	ABER161	AberdeenWindFarm 161	Palaeontological	Ungraded
90787	ABER162	AberdeenWindFarm 162	Palaeontological	Ungraded
90777	ABER153	AberdeenWindFarm 153	Palaeontological	Ungraded
17	9/2/001/0003	Post Office and Magistrate's Court, Grey Street, Aberdeen	Building	Grade II

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## APPENDIX 2: Reference List

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 Aberdeen WEF Cluster near Aberdeen, Eastern Cape. Section 38(8) HIA submitted to ECPHRA. Unpublished.

Lavin, Winter, Almond (2023). Heritage Impact Assessment for the proposed development of the Kariega WEF Cluster near Aberdeen, Eastern Cape. Section 38(8) HIA to be submitted to ECPHRA. Unpublished.

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## APPENDIX 3 - Keys/Guides

### Key/Guide to Acronyms

<b>AIA</b>	Archaeological Impact Assessment
<b>DARD</b>	Department of Agriculture and Rural Development (KwaZulu-Natal)
<b>DEFF</b>	Department of Environment, Forest and Fisheries (National)
<b>DEADP</b>	Department of Environmental Affairs and Development Planning (Western Cape)
<b>DEDEAT</b>	Department of Economic Development, Environmental Affairs and Tourism (Eastern Cape)
<b>DEDECT</b>	Department of Economic Development, Environment, Conservation and Tourism (North West)
<b>DEDT</b>	Department of Economic Development and Tourism (Mpumalanga)
<b>DEDTEA</b>	Department of economic Development, Tourism and Environmental Affairs (Free State)
<b>DENC</b>	Department of Environment and Nature Conservation (Northern Cape)
<b>DMR</b>	Department of Mineral Resources (National)
<b>GDARD</b>	Gauteng Department of Agriculture and Rural Development (Gauteng)
<b>HIA</b>	Heritage Impact Assessment
<b>LEDET</b>	Department of Economic Development, Environment and Tourism (Limpopo)
<b>MPRDA</b>	Mineral and Petroleum Resources Development Act, no 28 of 2002
<b>NEMA</b>	National Environmental Management Act, no 107 of 1998
<b>NHRA</b>	National Heritage Resources Act, no 25 of 1999
<b>PIA</b>	Palaeontological Impact Assessment
<b>SAHRA</b>	South African Heritage Resources Agency
<b>SAHRIS</b>	South African Heritage Resources Information System
<b>VIA</b>	Visual Impact Assessment

### Full guide to Palaeosensitivity Map legend

	<b>RED:</b>	VERY HIGH - field assessment and protocol for finds is required
	<b>ORANGE/YELLOW:</b>	HIGH - desktop study is required and based on the outcome of the desktop study, a field assessment is likely
	<b>GREEN:</b>	MODERATE - desktop study is required
	<b>BLUE/PURPLE:</b>	LOW - no palaeontological studies are required however a protocol for chance finds is required
	<b>GREY:</b>	INSIGNIFICANT/ZERO - no palaeontological studies are required
	<b>WHITE/CLEAR:</b>	UNKNOWN - these areas will require a minimum of a desktop study.

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## APPENDIX 4 - Methodology

The Heritage Screener summarises the heritage impact assessments and studies previously undertaken within the area of the proposed development and its surroundings. Heritage resources identified in these reports are assessed by our team during the screening process.

The heritage resources will be described both in terms of **type**:

- Group 1: Archaeological, Underwater, Palaeontological and Geological sites, Meteorites, and Battlefields
- Group 2: Structures, Monuments and Memorials
- Group 3: Burial Grounds and Graves, Living Heritage, Sacred and Natural sites
- Group 4: Cultural Landscapes, Conservation Areas and Scenic routes

and **significance** (Grade I, II, IIIa, b or c, ungraded), as determined by the author of the original heritage impact assessment report or by formal grading and/or protection by the heritage authorities.

Sites identified and mapped during research projects will also be considered.

### DETERMINATION OF THE EXTENT OF THE INCLUSION ZONE TO BE TAKEN INTO CONSIDERATION

The extent of the inclusion zone to be considered for the Heritage Screener will be determined by CTS based on:

- the size of the development,
- the number and outcome of previous surveys existing in the area
- the potential cumulative impact of the application.

The inclusion zone will be considered as the region within a maximum distance of 50 km from the boundary of the proposed development.

### DETERMINATION OF THE PALAEOLOGICAL SENSITIVITY

The possible impact of the proposed development on palaeontological resources is gauged by:

- reviewing the fossil sensitivity maps available on the South African Heritage Resources Information System (SAHRIS)
- considering the nature of the proposed development
- when available, taking information provided by the applicant related to the geological background of the area into account

### DETERMINATION OF THE COVERAGE RATING ASCRIBED TO A REPORT POLYGON

Each report assessed for the compilation of the Heritage Screener is colour-coded according to the level of coverage accomplished. The extent of the surveyed coverage is labeled in three categories, namely low, medium and high. In most instances the extent of the map corresponds to the extent of the development for which the specific report was undertaken.

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**Low coverage** will be used for:

- desktop studies where no field assessment of the area was undertaken;
- reports where the sites are listed and described but no GPS coordinates were provided.
- older reports with GPS coordinates with low accuracy ratings;
- reports where the entire property was mapped, but only a small/limited area was surveyed.
- uploads on the National Inventory which are not properly mapped.

**Medium coverage** will be used for

- reports for which a field survey was undertaken but the area was not extensively covered. This may apply to instances where some impediments did not allow for full coverage such as thick vegetation, etc.
- reports for which the entire property was mapped, but only a specific area was surveyed thoroughly. This is differentiated from low ratings listed above when these surveys cover up to around 50% of the property.

**High coverage** will be used for

- reports where the area highlighted in the map was extensively surveyed as shown by the GPS track coordinates. This category will also apply to permit reports.

## RECOMMENDATION GUIDE

The Heritage Screener includes a set of recommendations to the applicant based on whether an impact on heritage resources is anticipated. One of three possible recommendations is formulated:

**(1) The heritage resources in the area proposed for development are sufficiently recorded** - The surveys undertaken in the area adequately captured the heritage resources. There are no known sites which require mitigation or management plans. No further heritage work is recommended for the proposed development.

This recommendation is made when:

- enough work has been undertaken in the area
- it is the professional opinion of CTS that the area has already been assessed adequately from a heritage perspective for the type of development proposed

**(2) The heritage resources and the area proposed for development are only partially recorded** - The surveys undertaken in the area have not adequately captured the heritage resources and/or there are sites which require mitigation or management plans. Further specific heritage work is recommended for the proposed development.

This recommendation is made in instances in which there are already some studies undertaken in the area and/or in the adjacent area for the proposed development. Further studies in a limited HIA may include:

- improvement on some components of the heritage assessments already undertaken, for instance with a renewed field survey and/or with a specific specialist for the type of heritage resources expected in the area
- compilation of a report for a component of a heritage impact assessment not already undertaken in the area

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- undertaking mitigation measures requested in previous assessments/records of decision.

**(3) The heritage resources within the area proposed for the development have not been adequately surveyed yet - Few or no surveys have been undertaken in the area proposed for development. A full Heritage Impact Assessment with a detailed field component is recommended for the proposed development.**

**Note:**

The responsibility for generating a response detailing the requirements for the development lies with the heritage authority. However, since the methodology utilised for the compilation of the Heritage Screeners is thorough and consistent, contradictory outcomes to the recommendations made by CTS should rarely occur. Should a discrepancy arise, CTS will immediately take up the matter with the heritage authority to clarify the dispute.

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

## 1 Introduction

**FE Tango (Pty) Ltd** is proposing the development of a wind energy facility and associated infrastructure on a site located approximately 20km 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 1 of Farm Klipstavel 72. The project is known as the FE Tango Wind Energy Facility. The project is planned as part of a cluster of renewable energy projects, which includes a second facility, FE Kudu Wind Energy Facility, located approximately 20km to the west of the site.

CTS Heritage was appointed by Savannah Environmental to undertake a Site Verification and Sensitivity analysis that forms part of the Environmental Authorisation (EA) for the proposed Tango Wind Farm and its associated grid connections.

## 2 Site sensitivity verification

The site sensitivity verification was undertaken as follows:

- 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.
- 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.
- A cultural landscape assessment was conducted that covers the proposed development area with fieldwork completed in July 2023.

A Heritage Impact Assessment (HIA) process has been undertaken and is reported on in a separate HIA report that will be submitted to the South African Heritage Resources Agency (SAHRA) as is required in terms of Section 38(8) of the National Heritage Resources Act (NHRA).



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### 3 Outcome

In terms of site sensitivity with specific consideration of heritage resources, clarity on the broader context and its cultural value is important to understand overall heritage sensitivity and in order to contextualise site specific findings. Please find both contextual information as well as site specific information below.

#### ***Cultural Landscape and the Built Environment***

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***



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The non-perennial stream (Ouplaasrivier) runs roughly northeast to southwest along the western side of the study site and all the werfs cluster around this source of sporadic water. A few small patches of land have been tilled and irrigated to provide feed for stock farming while the rest of the ground has been left to grazing. A small area has been transformed by creating sand banks using heavy earthmoving equipment and this was commonly done in the 1950s as has been noted in our assessments of the surrounding farms. Most of the active farms have many modern buildings with some older fabric dating to the early 20th century.

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. The terrain starts to gently rise slightly as one moves towards the slopes of the Sleeping Giant and this results in changes in soil depth and water availability where a few thicker stands of thorn trees and grassland were found outside of the Ouplaasrivier. For the most part, however, the level terrain is covered in patchy shrubland with many deflated areas holding dispersed archaeological material spread thinly across a wide area.

No significant archaeological or cultural landscape heritage resources were identified within the area proposed for development.



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### ***Palaeontology***

The Tango WEF project area on the northern margins of the Aberdeen *Vlakte* 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. 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 *Vlakte* 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 Tango WEF project area. Most of the fossil wood material is poorly preserved and of very limited scientific value. Only one, fairly well-preserved block of Palaeozoic petrified wood, was recorded within the Tango project area. 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 *vlakte* 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.

*Tango WEF is mapped relative to significant heritage resources including cultural landscape elements, archaeology and palaeontology in Figure 1 and 2 below.*





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## 4 National Environmental Screening Tool

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 (Very High)
- Some significant archaeological resources were identified within the development area (High)
- 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 (Very High)

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

## 5 Conclusion

It is confirmed that the site sensitivities identified in the specialist study have been verified as per section 4 above.



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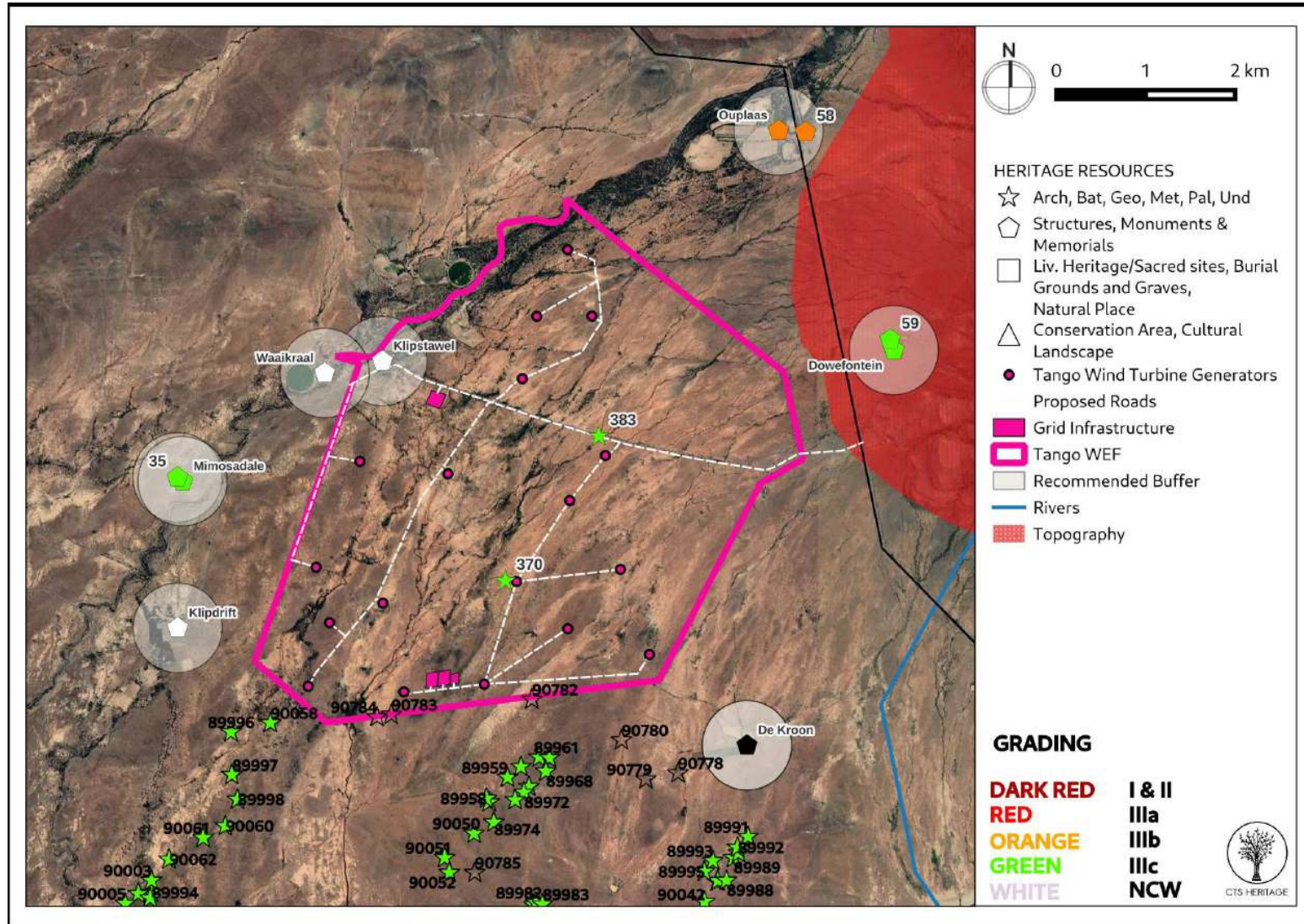


Figure 1: All heritage resources within proximity to the development area



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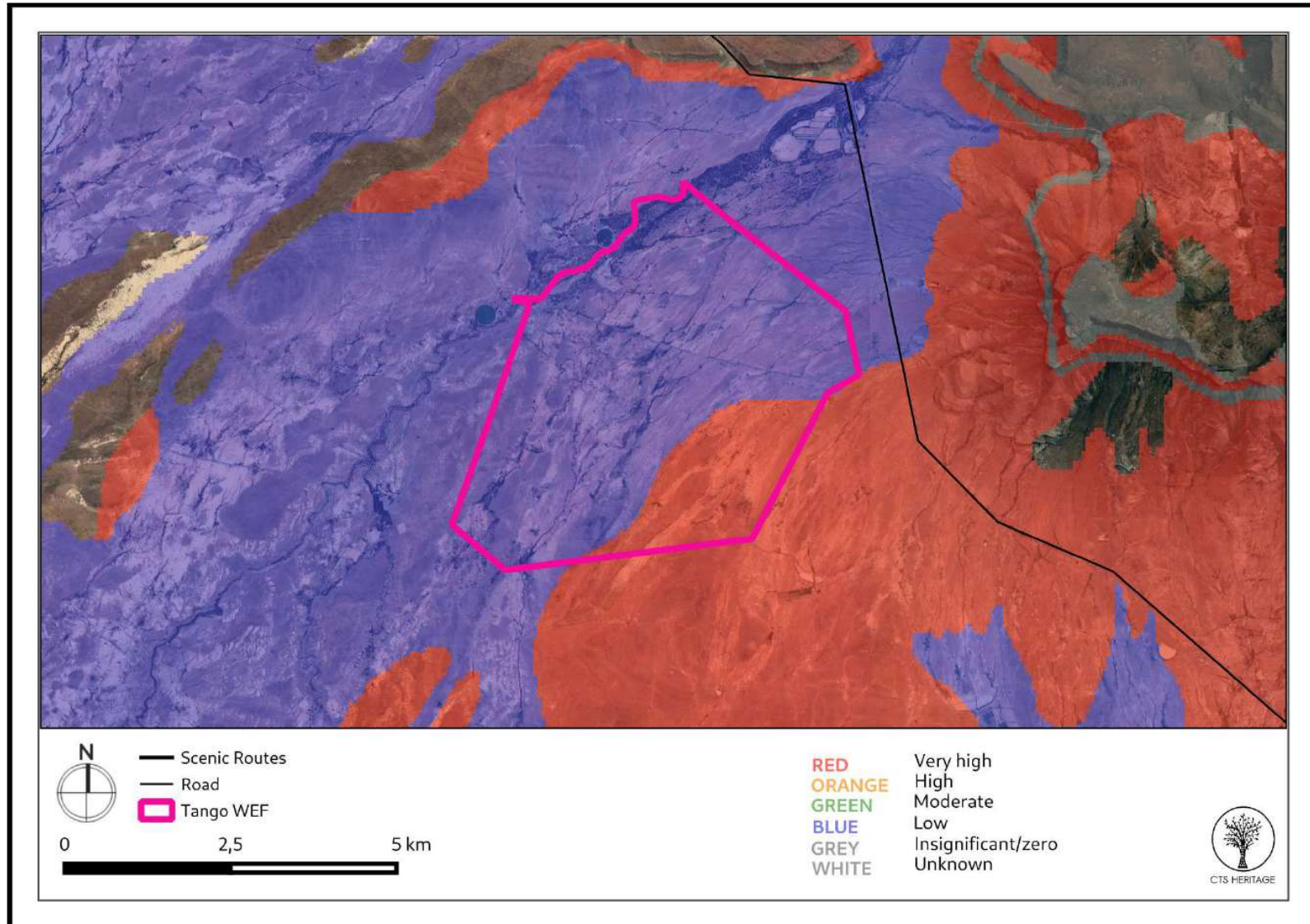


Figure 2: Palaeontological sensitivity of the development area from SAHRIS



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## APPENDIX 5: Chance Fossil Finds Procedure



## **CHANCE FINDS OF PALAEOLOGICAL MATERIAL**

*(Adopted from the HWC Chance Fossils Finds Procedure: June 2016)*

### **Introduction**

This document is aimed to inform workmen and foremen working on a construction and/or mining site. It describes the procedure to follow in instances of accidental discovery of palaeontological material (please see attached poster with descriptions of palaeontological material) during construction/mining activities. This protocol does not apply to resources already identified under an assessment undertaken under s. 38 of the National Heritage Resources Act (no 25 of 1999).

Fossils are rare and irreplaceable. Fossils tell us about the environmental conditions that existed in a specific geographical area millions of years ago. As heritage resources that inform us of the history of a place, fossils are public property that the State is required to manage and conserve on behalf of all the citizens of South Africa. Fossils are therefore protected by the National Heritage Resources Act and are the property of the State. Ideally, a qualified person should be responsible for the recovery of fossils noticed during construction/mining to ensure that all relevant contextual information is recorded.

Heritage Authorities often rely on workmen and foremen to report finds, and thereby contribute to our knowledge of South Africa's past and contribute to its conservation for future generations.

### **Training**

Workmen and foremen need to be trained in the procedure to follow in instances of accidental discovery of fossil material, in a similar way to the Health and Safety protocol. A brief introduction to the process to follow in the event of possible accidental discovery of fossils should be conducted by the designated Environmental Control Officer (ECO) for the project, or the foreman or site agent in the absence of the ECO. It is recommended that copies of the attached poster and procedure are printed out and displayed at the site office so that workmen may familiarise themselves with them and are thereby prepared in the event that accidental discovery of fossil material takes place.



### **Actions to be taken**

One person in the staff must be identified and appointed as responsible for the implementation of the attached protocol in instances of accidental fossil discovery and must report to the ECO or site agent. If the ECO or site agent is not present on site, then the responsible person on site should follow the protocol correctly in order to not jeopardize the conservation and well-being of the fossil material.

Once a workman notices possible fossil material, he/she should report this to the ECO or site agent. Procedure to follow if it is likely that the material identified is a fossil:

- The ECO or site agent must ensure that all work ceases immediately in the vicinity of the area where the fossil or fossils have been found;
- The ECO or site agent must inform SAHRA of the find immediately. This information must include photographs of the findings and GPS co-ordinates;
- The ECO or site agent must compile a Preliminary Report and fill in the attached Fossil Discoveries: Preliminary Record Form within 24 hours without removing the fossil from its original position. The Preliminary Report records basic information about the find including:
  - The date
  - A description of the discovery
  - A description of the fossil and its context (e.g. position and depth of find)
  - Where and how the find has been stored
  - Photographs to accompany the preliminary report (the more the better):
    - A scale must be used
    - Photos of location from several angles
    - Photos of vertical section should be provided
    - Digital images of hole showing vertical section (side);
    - Digital images of fossil or fossils.

Upon receipt of this Preliminary Report, SAHRA will inform the ECO or site agent whether or not a rescue excavation or rescue collection by a palaeontologist is necessary.



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- Exposed finds must be stabilised where they are unstable and the site capped, e.g. with a plastic sheet or sand bags. This protection should allow for the later excavation of the finds with due scientific care and diligence. SAHRA can advise on the most appropriate method for stabilisation.
- If the find cannot be stabilised, the fossil may be collect with extreme care by the ECO or the site agent and put aside and protected until SAHRA advises on further action. Finds collected in this way must be safely and securely stored in tissue paper and an appropriate box. Care must be taken to remove the all fossil material and any breakage of fossil material must be avoided at all costs.

No work may continue in the vicinity of the find until SAHRA has indicated, in writing, that it is appropriate to proceed.

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FOSSIL DISCOVERIES: PRELIMINARY RECORDING FORM		
Name of project:		
Name of fossil location:		
Date of discovery:		
Description of situation in which the fossil was found:		
Description of context in which the fossil was found:		
Description and condition of fossil identified:		
GPS coordinates:	<i>Lat:</i>	<i>Long:</i>
If no co-ordinates available then please describe the location:		
Time of discovery:		
Depth of find in hole		
Photographs (tick as appropriate and indicate number of the photograph)	<i>Digital image of vertical section (side)</i>	
	<i>Fossil from different angles</i>	
	<i>Wider context of the find</i>	
Temporary storage (where it is located and how it is conserved)		
Person identifying the fossil Name:		
Contact:		
Recorder Name:		
Contact:		
Photographer Name:		
Contact:		

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