HERITAGE IMPACT ASSESSMENT

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

Proposed Development of the Aberdeen Wind Facility 1 near Aberdeen in the Eastern Cape

Prepared by CTS Heritage

CTS HERITAGE

For

Savannah Environmental

February 2022

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EXECUTIVE SUMMARY

1. Site Name:

Aberdeen Wind Facility 1

2. Location:

- Remainder of the Farm Doornpoort Number 93
- Portion 1 of the Farm Doorn Poort Number 93
- The Farm Kraanvogel Kuil No 155
- Portion 4 of Farm Sambokdoorns 92

3. Locality Plan:

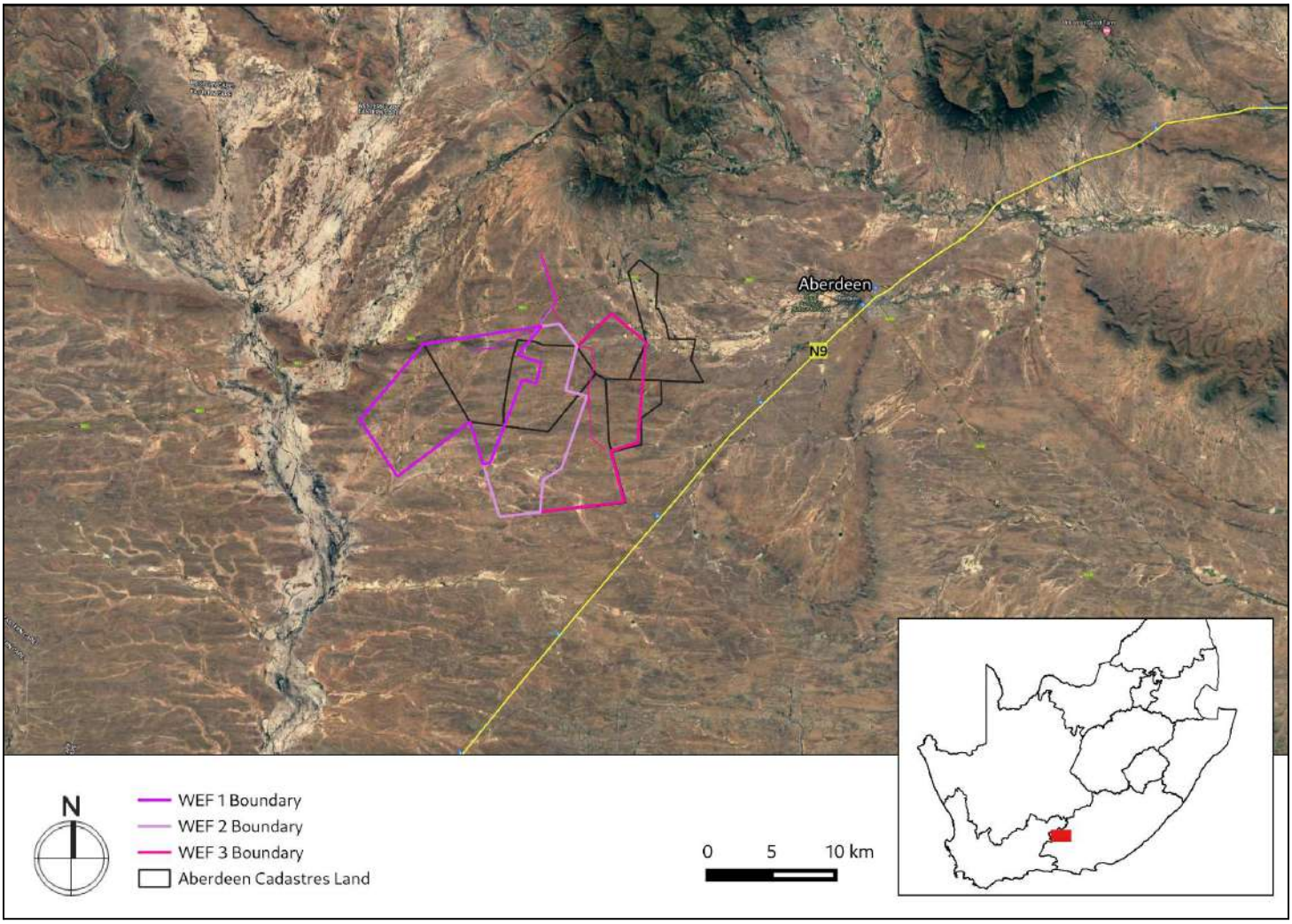

Figure A: Location of the proposed development area of Aberdeen Wind Facilities 1, 2 and 3

4. Description of Proposed Development:

Aberdeen Wind Facility 1 (Pty) Ltd is proposing the development of a commercial Wind Energy Facility and associated infrastructure on a site located approximately 20km west of the town of Aberdeen in the Eastern Cape Province. The site is located within the Dr Beyers Naude Local Municipality in the Sarah Baartman District Municipality.

5. Heritage Resources Identified:

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

- Topographical Features
    - 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.
- Water courses and infrastructure
    - The route of the periodical Kraai River crossing a portion of the site and informing a pattern of settlement.
    - Dams, wind pumps and water furrows.
- Planting Patterns
    - Clumps of trees typically found 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 east-west historic route running parallel to the R61 and through the site, which has structured a historical pattern of settlement. A 500m no development buffer is recommended on either side of this road.
- Settlements
    - Aberdeen town of suggested Grade IIIA heritage value and situated approximately 16 km east of the proposed Wind Facility.

- A number of farmsteads and stone kraals situated within or adjacent to the proposed Wind Facility 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.

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

Table A: Artefacts identified during the field assessment development area

POINT	Project Name	Description	Density/ m²	Period	Co-ordinates		Grading	Mitigation
ABD036	Aberdeen WEF 1	Square sandstone ruined farm dam, metal drum, bullet casings, glass, ceramics	n/a	Historic	-32.542108	23.714568	IIIC	500m Buffer
ABD037	Aberdeen WEF 1	Pile of sandstone, possibly collapsed structure, but next to glass, ceramics, metal midden	30+	Historic	-32.541617	23.714636	IIIB	500m Buffer
ABD039	Aberdeen WEF 1	Ruined sandstone large kraal	n/a	Historic	-32.542266	23.713945	IIIB	500m Buffer
ABD044	Aberdeen WEF 1	Possible graves, 5, maybe 6 headstones	n/a	Historic	-32.542874	23.715279	IIIA	500m Buffer
ABD061	Aberdeen WEF 1	Doornpoort ruined farmhouse complex	n/a	Historic	-32.507317	23.738369	IIIC	500m Buffer
ABD147	Aberdeen WEF 1	Kraanvoelkuil farmhouse complex	n/a	Historic	-32.582567	23.740764	IIIC	500m Buffer

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

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

POINT ID	Project Area	Description	Co-ordinates		Grading	Mitigation
193	Aberdeen 1	Farm Doornpoort 93. Abundant reworked blocks of fossil wood among alluvial gravels bordering Gannaleegte drainage line. Proposed Field Rating IIIC Local Resource. No mitigation recommended.	-32.520628	23.726627	IIIC	NA
196	Aberdeen 1	Farm Koppies Kraal 157. Blocks of fossil wood among eluvial gravels. Proposed Field Rating IIIC Local Resource. No mitigation recommended.	-32.553682	23.710204	IIIC	NA
197	Aberdeen 1	Farm Koppies Kraal 157. Abundant blocks of fossil wood with variable quality of preservation among surface gravels. Proposed Field Rating IIIC Local Resource. No mitigation recommended.	-32.568231	23.685375	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 Wind Facility 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.

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 Aberdeen Wind Facility 1 will negatively impact on significant heritage resources on condition that the following recommendations are implemented:

- 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 specific graded resources and farmstead settlements IIIB and IIIC, by 500m.
- Setback from farmsteads forming part of the settlement pattern by at least 500m
- A 500m no development buffer area must be implemented around sites ABD036, 037, 039, 044, 061 and ABD147
- 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, February 2023

Details of Specialist who prepared the HIA

Jenna Lavin, an archaeologist with an MSc in Archaeology and Palaeoenvironments, and currently completing an MPhil in Conservation Management , heads up the heritage division of the organisation, 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. 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. Recently, Jenna has been responsible for conducting training in how to write Wikipedia articles for the Africa Centre's WikiAfrica project.

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

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APPENDICES

1. INTRODUCTION

1.1 Background Information on Project

Aberdeen Wind Facility 1 (Pty) Ltd is proposing the development of a commercial Wind Energy Facility and associated infrastructure on a site located approximately 20km west of the town of Aberdeen in the Eastern Cape Province. The site is located within the Dr Beyers Naude Local Municipality in the Sarah Baartman District Municipality. The project site comprises the following farm portions:

- Farm Koppieskraal 157
- Remainder of the Farm Doornpoort 93
- Portion 1 of Farm Doorn Poort 93
- Farm Kraanvogel Kuil 155
- Portion 4 of Farm Sambokdoorns 92

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 project is planned as part of a larger cluster of renewable energy projects, which includes two adjacent up to 240MW Wind Energy Facilities (Aberdeen Wind Facility 2 and Aberdeen Wind Facility 3).

The Aberdeen Wind Facility 1 will have a contracted capacity of up to 240MW and comprise up to 41 wind turbines with a capacity of up to 8MW each. The project will have a preferred project site of approximately 9180 ha, and an estimated disturbance area of up to 62 ha. The Aberdeen Wind Facility 1 project site is proposed to accommodate the following infrastructure:

- Up to 41 wind turbines with a maximum hub height of up to 200m, rotor diameter of up to 200m, blade length of up to 100m and have a rotor tip height of up to 300m. The turbine foundations will have a combined permanent footprint of 6ha and 13ha for all turbine crane hardstands is required.
- Medium-voltage (MV) power lines internal to the wind farm will be trenched and located adjacent to internal access roads, where feasible.
- Up to 132kV on-site facility substation up to 2ha in extent.
- Battery Energy Storage System (BESS) with a footprint of up to 5ha.
- A main access road of approximately 2.5km in length and up to 10m in width[1].

[1] Access to the facility will be via an existing gravel road off the R61. The gravel road is well established (~10m wide excluding road reserve), however it's likely upgrades will be required at the access point off the R61 and potentially at water crossings.

- An internal road network between project components inclusive of stormwater infrastructure. A 12 m wide road corridor may be temporarily impacted during construction and rehabilitated to 6 m wide after construction
- Gate house and security: up to 0.5 ha
- Operation and Maintenance buildings (includes control centre, offices, warehouses, workshop, canteen, visitors centre, staff lockers, etc.): Up to 2 ha
- Site camp up to 1 ha
- Construction laydown areas up to 9ha

The power generated from the project will be sold to Eskom and will feed into the national electricity grid. Ultimately, the project is intended to be a part of the renewable energy projects portfolio for South Africa, as contemplated in the Integrated Resource Plan.

Table 1: Project Details

Infrastructure	**Footprint and dimensions**
Number of turbines	Up to 41 turbines
Hub Height	Up to 200m
Tower height	Up to 200m
Rotor Diameter	Up to 200m
Length of blade	~100m
Contracted Capacity	Up to 240MW (individual turbines up to 8MW in capacity each)
Tower Type	Full steel, full concrete, or hybrid
Area occupied by the on-site substation	Main Facility Substation of 2ha. The general height of the substation will be a maximum of 10 m, however will include switchgear portals up to 15 m in height and lightning masts up to 25 m in height
Capacity of on-site substation	132kV
Temporary infrastructure	Up to 51 ha. Temporary infrastructure, including laydown areas and hardstand, will be required during the construction phase. The construction period laydown area will be rehabilitated. The temporary hardstand area (boom erection, storage and assembly area) will also be rehabilitated. The preference for crane hardstands would be to leave them intact for unplanned maintenance/ replacement of the blades or nacelle.

1.2 Description of Property and Affected Environment

The proposed Aberdeen Wind Facility 1 lies to the south of the Kambdebooberge 20km 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 north-westerly 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 Wind Facility 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 Wind Facilities 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 Wind Facility 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, 2022);

- Mountains: This portion of the vast plains area is contained in the south by the Witberg mountain (peak 1427m) and bound to the north by the Great Escarpment. This includes the Sneeuberg mountain range, which lies north of Graaff-Reinet between Beaufort West and Cradock running roughly east west for 48 km. It curves slightly south at both eastern and western end, with the latter including the “Sleeping Giant” (1777m) section of the Camdeboo Mountain. Wolwekop is topographical landmark lying just north of the R61 and the proposed Wind Facility.
- Plains: Colloquially, the plains area has several names, which describe loosely identified geographic areas such as the Camdeboo south of Graaff-Reinet and the Koup (Die Vlaktes), west of Aberdeen towards Beaufort West.
- Water: This is an arid, semi-desert region with a low annual rainfall of 100-200mm. This has dictated low growing karroid shrub vegetation and sparse habitation. The occasional heavy water flow resulting from early summer storms is collected in dams; supply 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.

- 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 between the R61 and N9. It extends south from the R61. This route connects Beaufort West and Aberdeen, loosely following an early wagon route to Graaff-Reinet. The N9 follows an almost straight line across the plains where it connects Willowmore to Aberdeen. A secondary route to Murrarysburg connects to the R61 just west of the topographical landmark of Wolwekop.
- 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 16km to the east of the proposed Wind Facility. A number of the farmsteads investigated within the site of the proposed Wind Facility 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 16km from the proposed Wind Facility. It is a textbook example of a Karoo grid kerkdorp dating to the mid-19th century. It lies on the Kraay Rivier with the primary source of water supplied from the nearby perennial spring. The town has a noteworthy collection of flat roofed Karoo-type houses and turn of the 20th century villas associated with the merino-sheep boom. In addition to numerous distinctive streetscapes and townscape qualities, the street plan accommodates an octagonal block occupied by the Dutch Reformed Church and situated on an axis with Church, Market and Andries Pretorius Streets. The church steeple is visible from a 25 km distance. The setting of the town within the vast open plains of the Cambedoo is in contrast to the dramatic mountain backdrop of the Camdeboo Mountains to the north. Local topographical conditions shield views from the town towards the proposed Wind Facility.

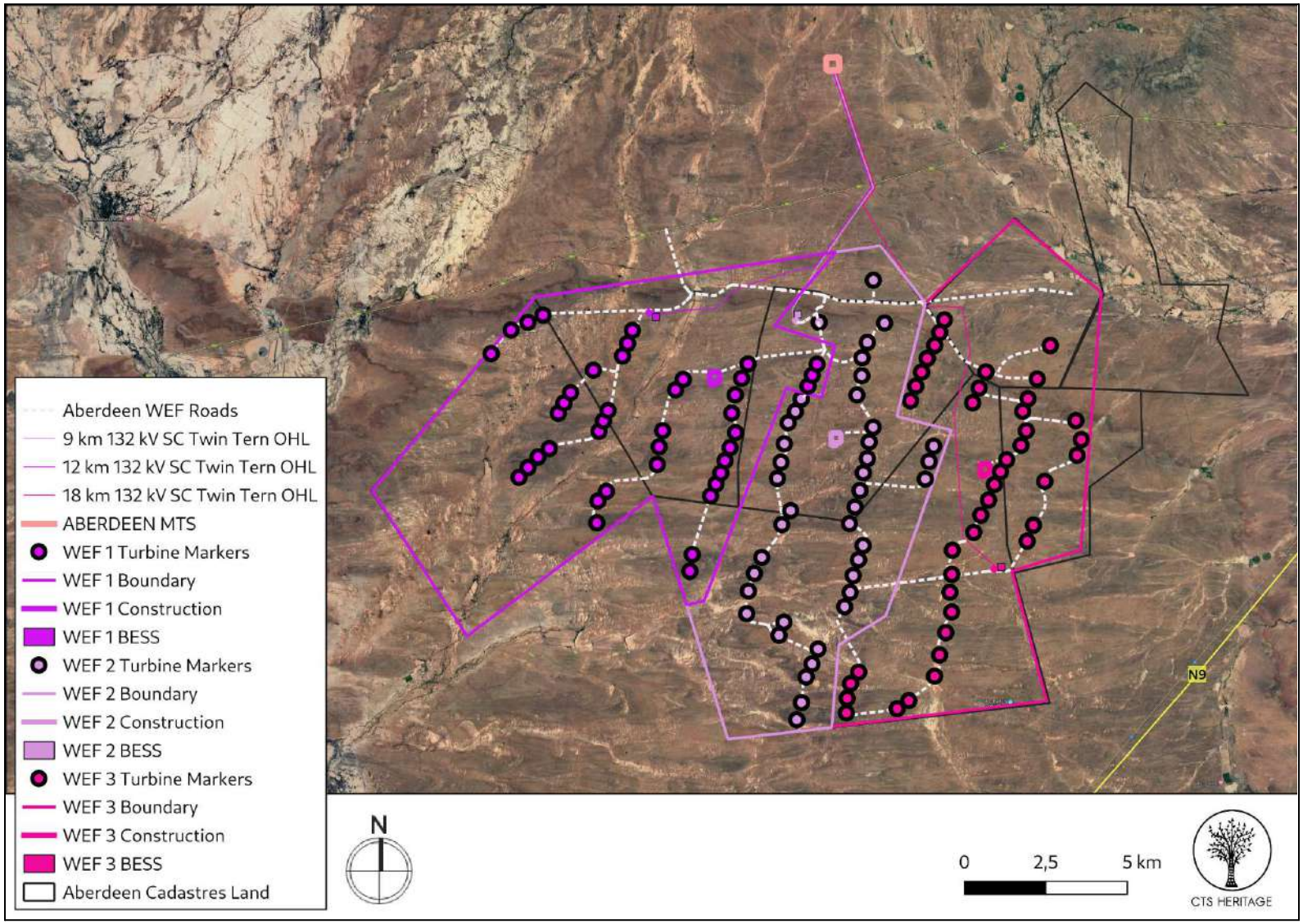

Figure 1.1: Proposed development layout of Aberdeen Wind Facilities Cluster

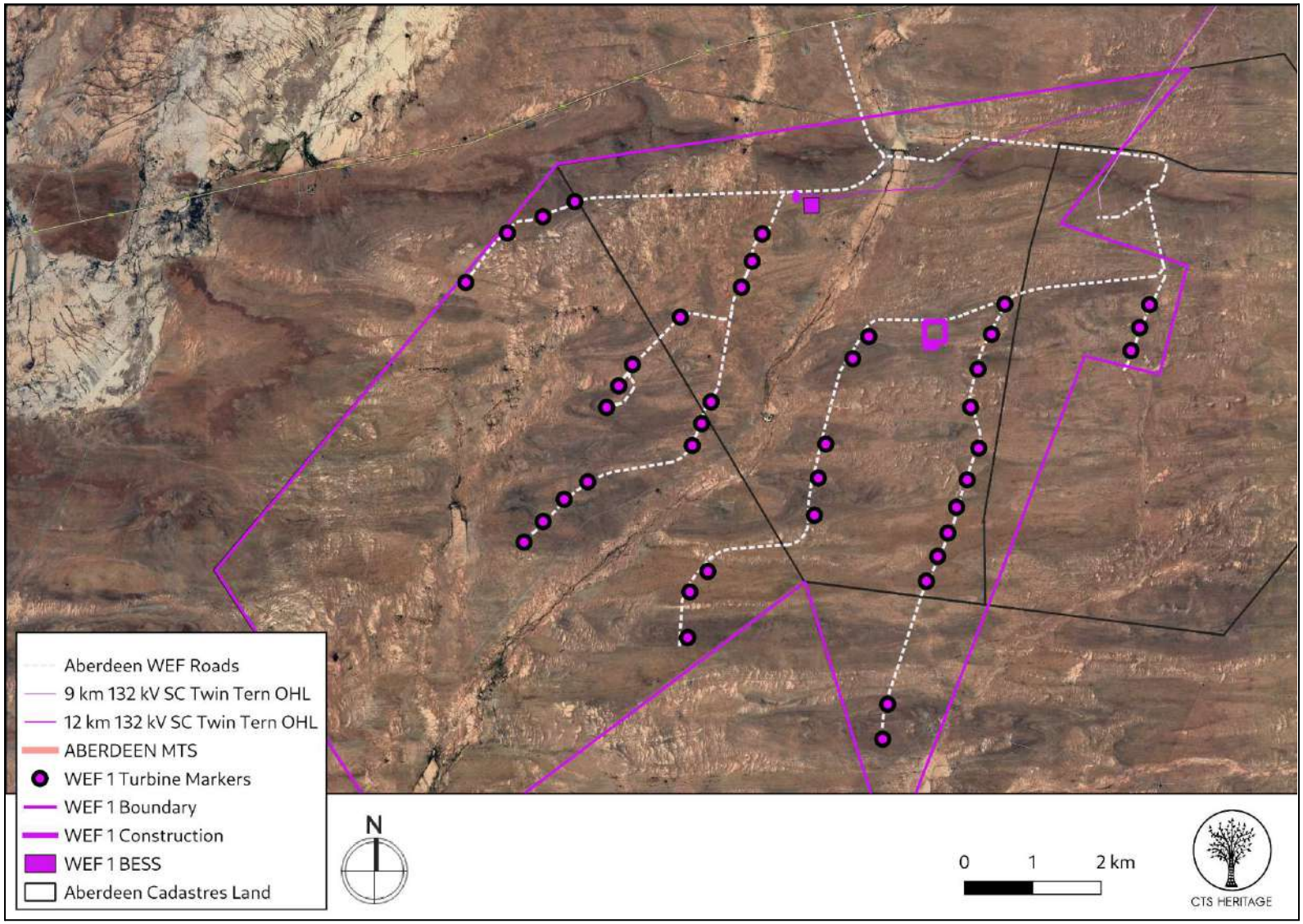

Figure 1.2: Proposed development layout of Aberdeen Wind Facility 1

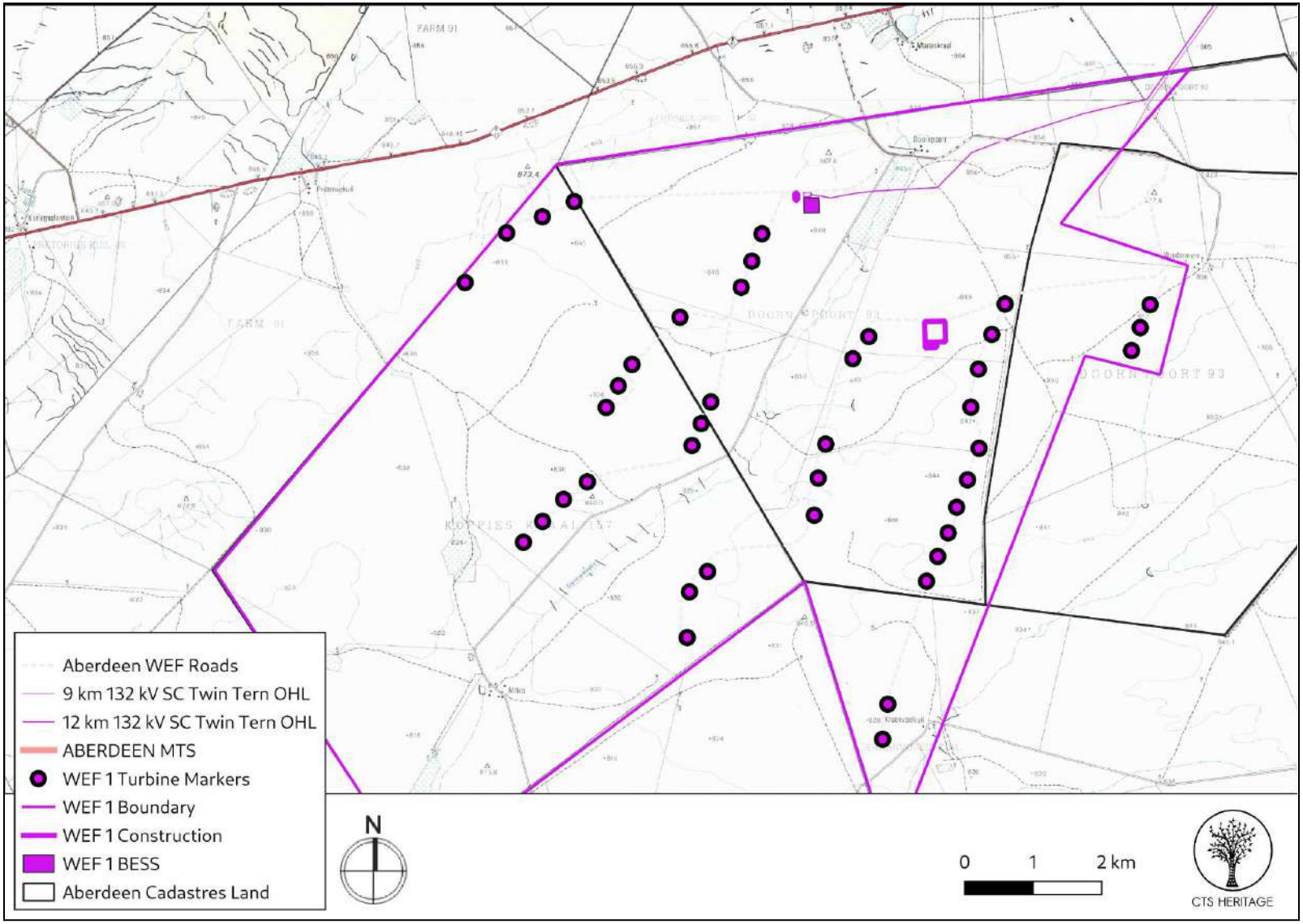

Figure 1.3: The proposed development layout of the Aberdeen Wind Facility 1

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).

The maps presented in this report reflect the Final Layout of the development as informed by the inputs of various specialists throughout the EIA process. Early project layouts have been assessed in the specialist studies attached to this report as Appendices and the recommendations of various specialists, including heritage (archaeology, palaeontology and cultural landscape), have been adopted in the Final Layout assessed in this HIA report.

It must also be noted that the maps included in this report reflect tentative proposals for the grid alignments associated with this project. However, these grid alignments are not finalised and are subject to change. Amended grid alignments will be subject to independent impact assessments in line with relevant legislation.

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 15 to 20 July 2022. 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 August 2022. 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 2022. The results of this work are reported on in Appendix 1. 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.

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.

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.

2.5 Savannah Impact Assessment Methodology

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

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

  - Long term (> 15 years) – assigned a score of 4.
  - Permanent – assigned a score of 5.

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

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

S = (E + D + M) x P

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

The significance weightings for each potential impact are as follows:

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

3. HISTORY AND EVOLUTION OF THE SITE AND CONTEXT

3.1 Desktop Assessment

Background:

The area proposed for the Aberdeen Wind Facility 1 Projects is located approximately 20km 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.

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

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

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

Aberdeen town was established on the farm Brakkefontein, which had been a fairly early grant for the area, signed over in 1817 by the British Governor Lord Charles Somerset. In 1855 the farm was bought by the Graaff-Reinet Dutch Reform church to provide for its congregation, growing as a 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 "windmill" (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 the 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 groundwater 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 and 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 grant- ed to JS Pienaar in 1876. The diagram shows a house and dam.
- The Kraayrivier Outspan 150, noted in early surveys as a public out- span on the periodical Kraay River and shown as having a bushy patch, moved into the private ownership of Jacob Johannes Weideman and sons in 1893. This reflects the late 19thC improved road systems and means of transport, reducing the need for outspan places.

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

Archaeology

Very few 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 immediately north 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." All of the resources identified by Booth and Sanker (2013) have been mapped relative to the proposed development in Figure 3.1 and 3.2.

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 Eskom Aberdeen Wind Energy Facility located immediately north of the area proposed for development (Almond, SAHRIS NID 251166). The findings of this assessment therefore provide an indication of the kinds of palaeontological resources likely to be present within this proposed development area. Almond (2014) noted that "The entire wind farm study area is underlain at depth by fluvial sediments assigned to the lowermost part of the Teekloof Formation (Lower Beaufort Group) that are of Late Permian age (*c.* 260 million years old). The mudstone-rich succession of the Hoedemaker Member represented here is associated with moderately diverse fossil biotas of the *Tropidostoma* Assemblage Zone that include a range of mammal-like reptiles, true reptiles, fish, amphibians as well as plants and trace fossils. To the author's knowledge there are no previously identified fossil vertebrate finds within the study area, although a small lizard-like specimen was apparently found (probably preserved within a palaeocalcrete nodule) among surface gravels along its northern margin (Mnr Loots, pers. comm., Nov. 2014). The only fossil material recorded during the present field assessment comprises sparse blocks of well-preserved silicified wood that occur widely among surface gravels through much of the study area. Most of the fossil wood specimens have probably been downwasted from channel sandstones within the Hoedemaker Member itself, but some cherty fossil wood clasts may have been introduced from elsewhere within fluvial gravels. The general lack of fossil records in the Aberdeen *vlaktes* may well be due, in large part, to very low levels of bedrock exposure in

this low-relief area, as well as due to local development of cleavage, near-surface calcrete veining and weathering. It is concluded that, while there is a significant chance that fossil vertebrate remains will be disturbed, destroyed or sealed-in by the proposed wind energy facility development, these are best mitigated by applying a chance find procedure. The operational and decommissioning phases of the wind farm are unlikely to involve further adverse impacts on local palaeontological heritage, however."

As noted above, the maps included in this report reflect tentative proposals for the grid alignments associated with this project. However, these grid alignments are not finalised and are subject to change. Amended grid alignments will be subject to independent impact assessments in line with relevant legislation.

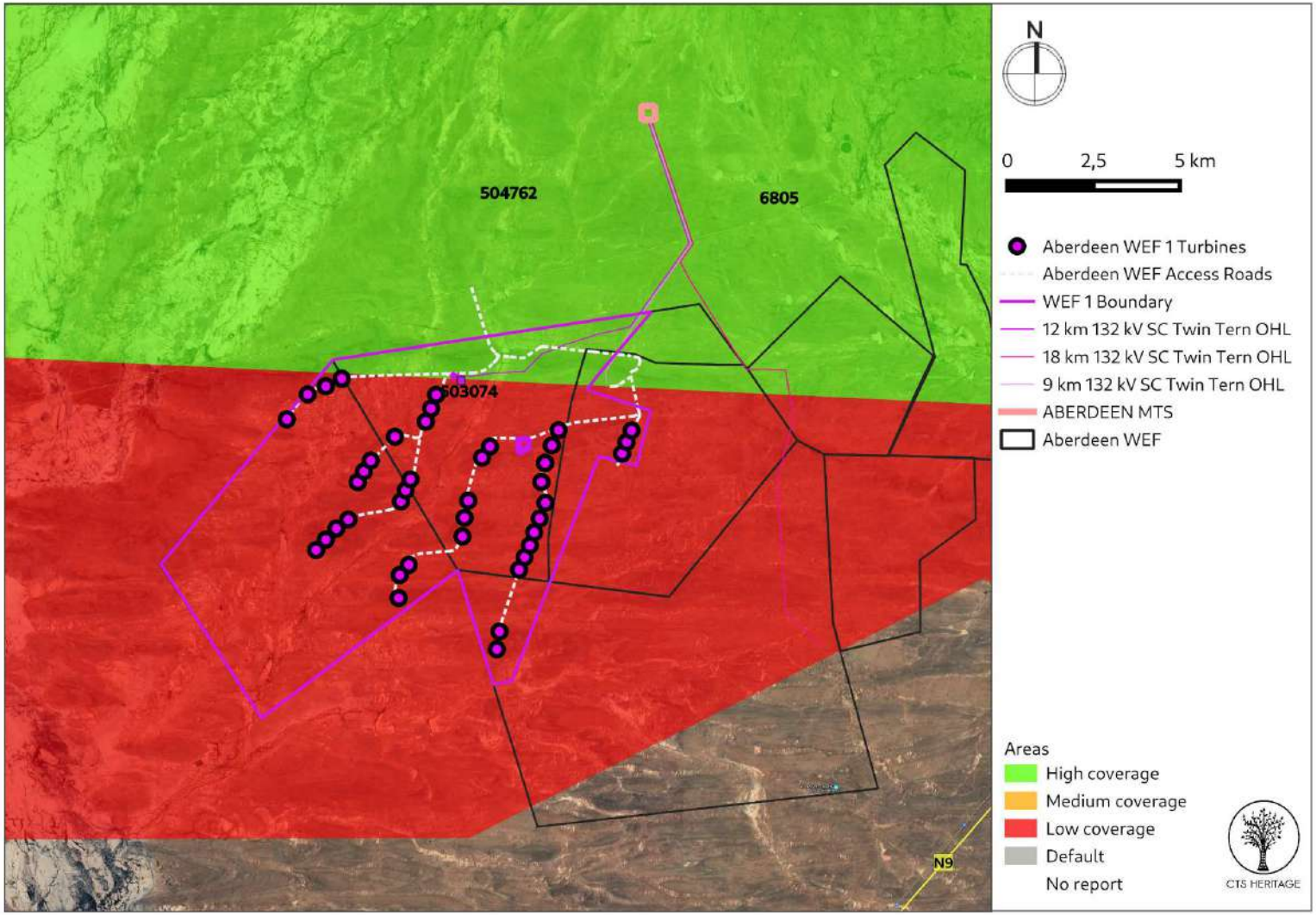

Figure 2: Spatialisation of heritage assessments conducted in proximity to the proposed development of Aberdeen WEF 1

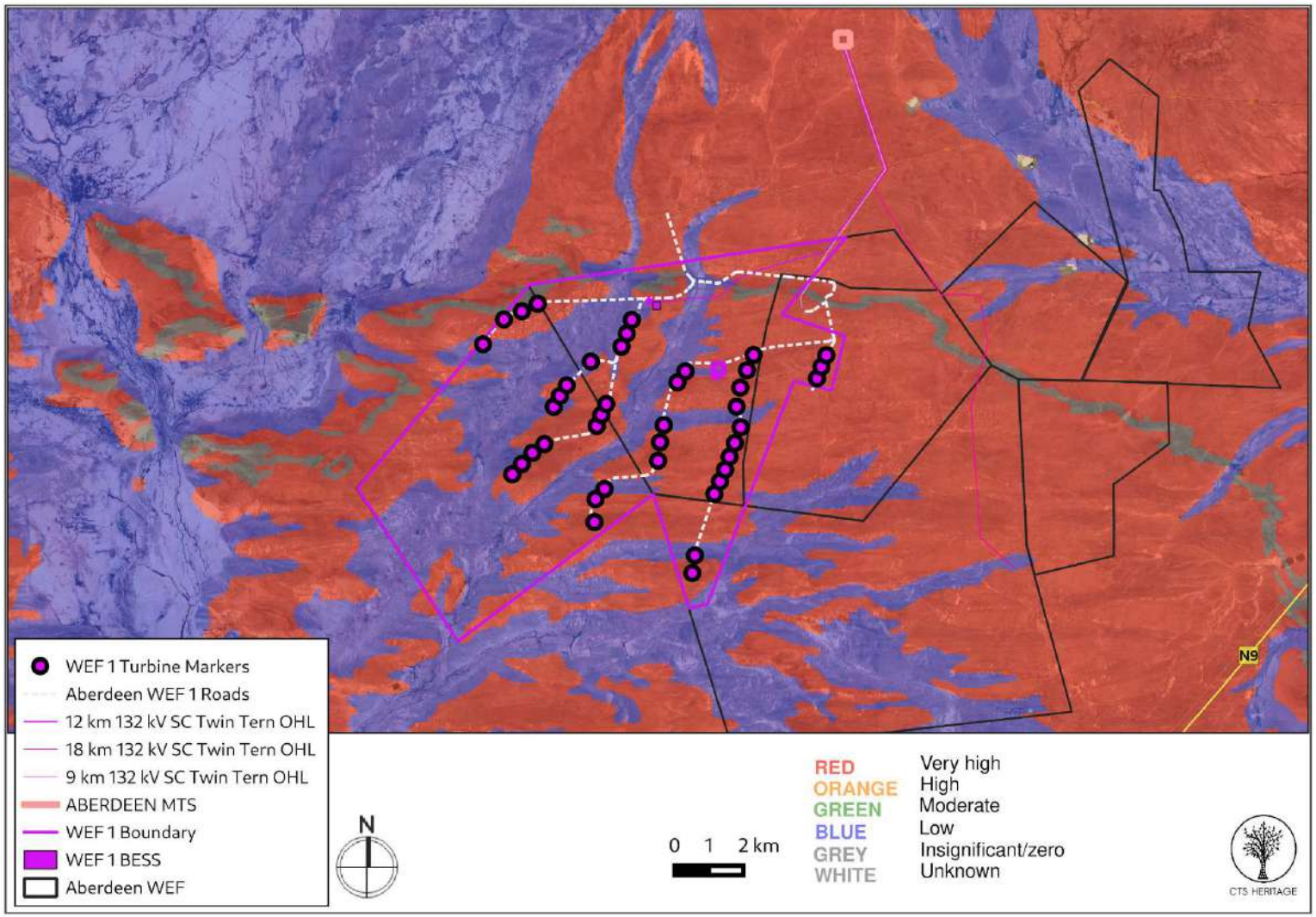

Figure 3.1: Palaeontological sensitivity of the proposed development area of Aberdeen WEF 1

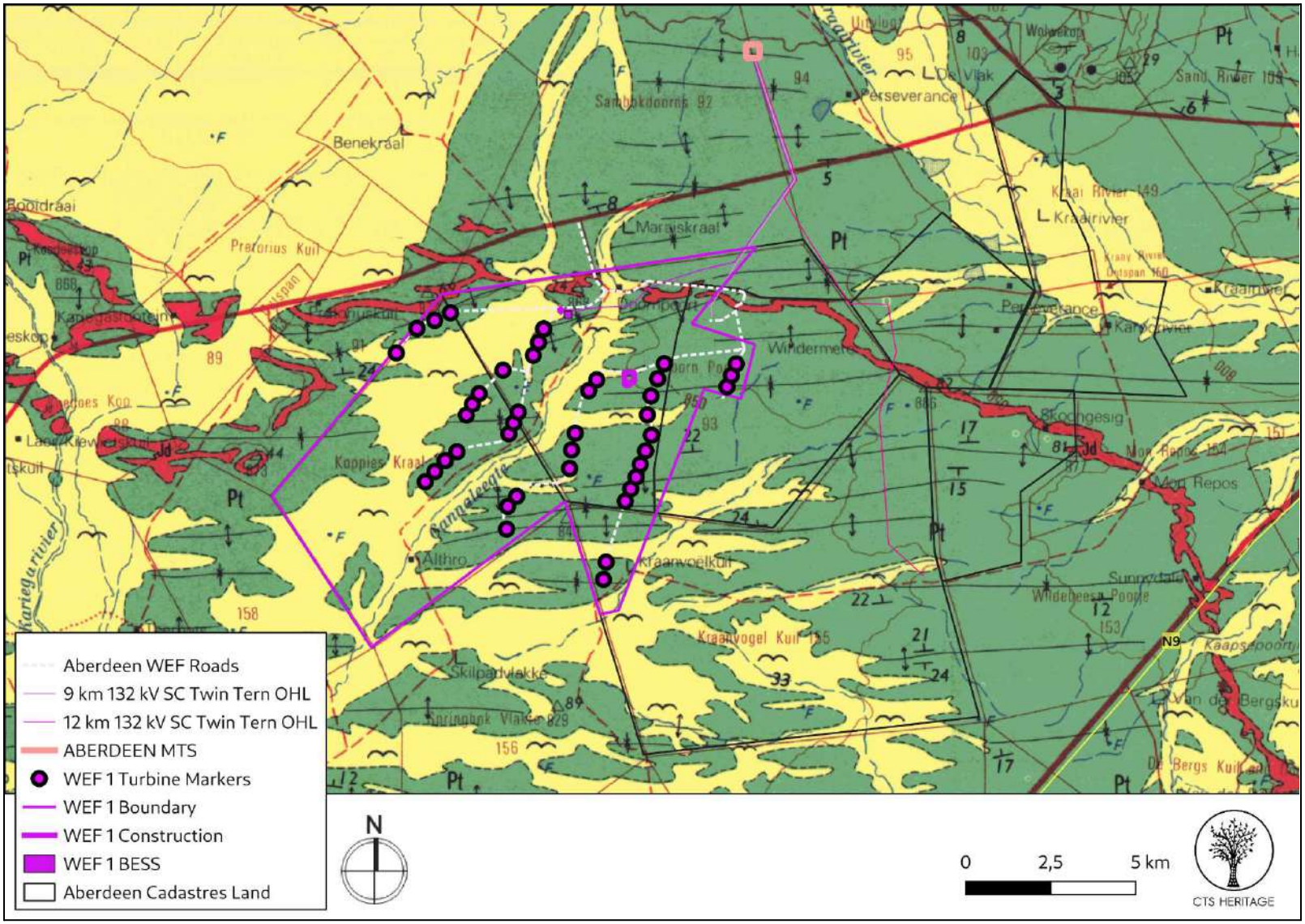

Figure 3.2: Geology Map. Extract from the CGS 3222 Beaufort West Map indicating that the development area for the PV development is underlain by sediments of Pt: Poortjie Member of the Teekloof Formation of the Adelaide Subgroup and Jd: Jurassic Dolerite as well as Qc: Quaternary Sands for Aberdeen WEF 1

4. IDENTIFICATION OF HERITAGE RESOURCES

4.1 Summary of findings of Specialist Reports

Cultural Landscape and the Built Environment (Winter et al. 2021, 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 field assessment completed for the Aberdeen WEF should be understood in conjunction with the findings made by Booth to the north of the R61 for the Eskom WEF (not built yet) in 2013. 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 MSA material found clearly spanned a very wide period of time as many examples of early MSA artefacts were found along with diagnostic pieces such as blade flakes, blanks, unifacial points, radial cores and bifacially retouched flakes. Locally abundant raw materials were extensively utilised as siltstones and hornfels contributed most of the stone used to make artefacts as well as a smaller but significant percentage of chert, particularly in the LSA assemblages. The artefacts are spread thinly but widely throughout the area with no particular focal points other than the slightly elevated ridges that are no more than 10-20m higher than the surrounding landscape.

Palaeontology (Appendix 2)

The Aberdeen WEF Cluster project area is underlain at depth by potentially fossiliferous continental (fluvial / lacustrine) bedrocks of the Lower Beaufort Group (Adelaide Subgroup) that probably belong to the Middle Permian Abrahamskraal Formation. There are no historical records of fossil vertebrates from this area; this is largely due to the extremely poor levels of bedrock exposure found here. During the recent 4-day palaeontological field assessment only two occurrences of fossil vertebrates were recorded, both comprising material reworked into superficial gravels rather than in situ. Both fossil vertebrate sites have been adequately sampled and do not require further mitigation. Occasional trace fossil assemblages comprise low diversity, small-scale invertebrate burrows of limited scientific interest.

A background scatter of numerous petrified (silicified) wood blocks reworked from the Lower Beaufort Group bedrocks occurs within surface gravels and sands of eluvial and alluvial origin throughout most of the WEF Cluster project area; only a small sample of such occurrences have been recorded here. Much of the fossil wood material is poorly preserved and of limited scientific value. However, a small minority of blocks show well-developed seasonal growth rings and excellent preservation of the original woody fabric; these are potentially identifiable and may be of biostratigraphic and palaeoecological interest. Mitigation of the recorded fossil wood sites in particular is not recommended here, given the abundance and widespread occurrence of the material. However, it is recommended that a representative sample of well-preserved fossil wood material from the WEF project area is collected by a suitably qualified palaeontologist for curation in an approved fossil collection (e.g. Evolutionary Studies institute, Wits University, Johannesburg) once the development is authorised and before the Construction Phase.

4.2 Heritage Resources identified

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

- Topographical Features
    - 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.
- Water courses and infrastructure
    - The route of the periodical Kraai River crossing a portion of the site and informing a pattern of settlement.
    - Dams, wind pumps and water furrows.
- Planting Patterns
    - Clumps of trees typically founds around homesteads as shelter from the sun/wind and as place-making elements.
- Scenic and historic routes
    - The R61 as a regional linkage route of some scenic value with dramatic views towards the mountain backdrop to the north. A 1km no-development buffer on either side of this road is recommended.
    - The combination of the intersection of the R61 and the Murraysberg Road, change in topography and the landmark qualities of the Wolwekop providing a threshold condition.
    - The east-west historic route running parallel to the R61 and through the site, which has structured a historical pattern of settlement. A 500m no development buffer is recommended on either side of this road.
- Settlements
    - Aberdeen town of suggested Grade IIIA heritage value and situated approximately 16 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.

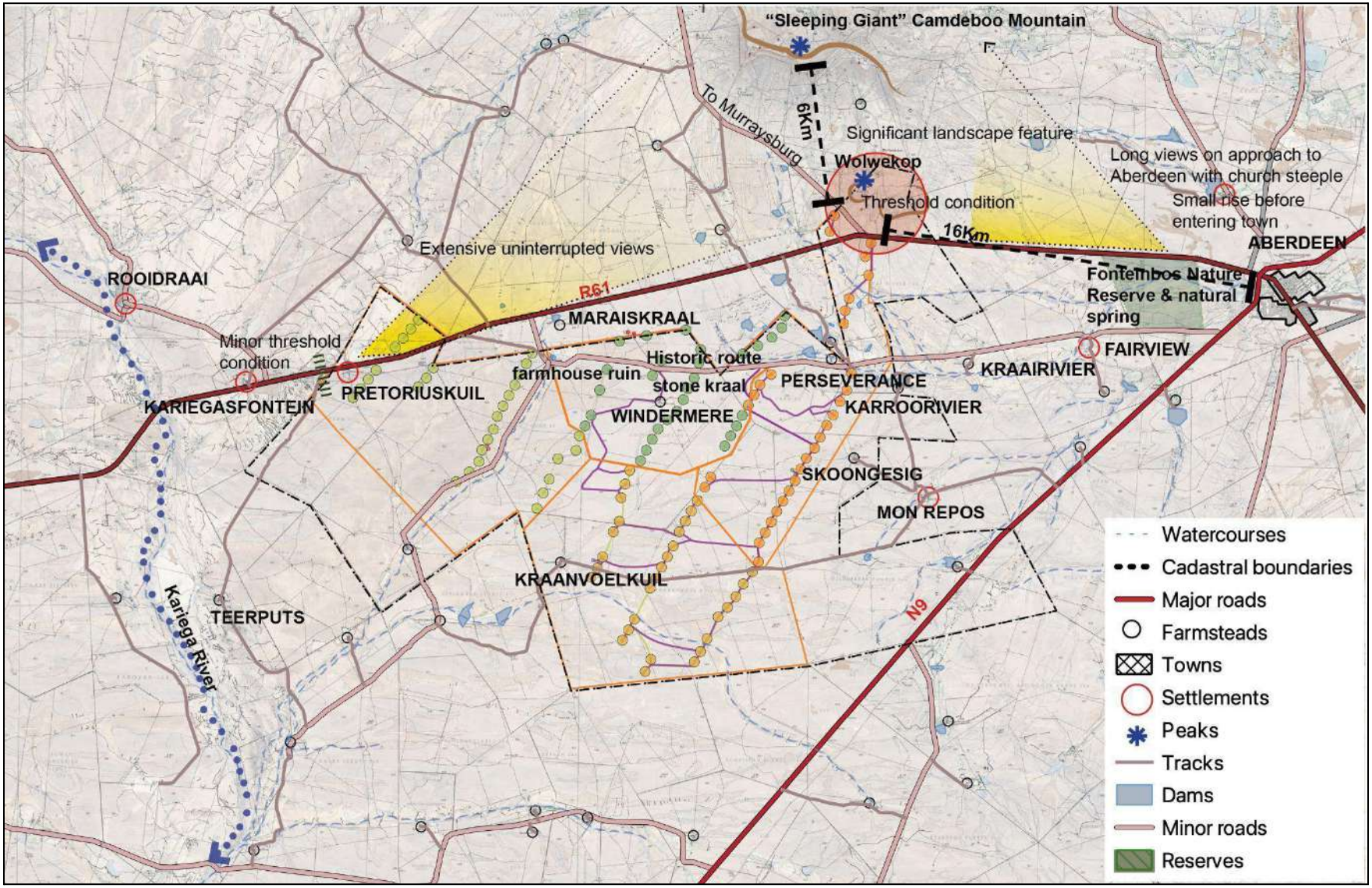

Figure 4: Cultural Landscape Elements Map from Winter et al. 2022 (Appendix 3) This map reflects an early turbine layout. The recommendations of the CL assessment have been adopted in the Final Layout assessed in this report.

In terms of the heritage resources identified in the archaeological field assessment, see Table 2 below.

Table 2: Artefacts identified during the field assessment development area

POINT	Project Name	Description	Density/ m^2	Period	Co-ordinates		Grading	Mitigation
ABD036	Aberdeen WEF 1	Square sandstone ruined farm dam, metal drum, bullet casings, glass, ceramics	n/a	Historic	-32.542108	23.714568	IIIC	500m Buffer
ABD037	Aberdeen WEF 1	Pile of sandstone, possibly collapsed structure, but next to glass, ceramics, metal midden	30+	Historic	-32.541617	23.714636	IIIB	500m Buffer
ABD039	Aberdeen WEF 1	Ruined sandstone large kraal	n/a	Historic	-32.542266	23.713945	IIIB	500m Buffer
ABD044	Aberdeen WEF 1	Possible graves, 5, maybe 6 headstones	n/a	Historic	-32.542874	23.715279	IIIA	500m Buffer
ABD061	Aberdeen WEF 1	Doornpoort ruined farmhouse complex	n/a	Historic	-32.507317	23.738369	IIIC	500m Buffer
ABD147	Aberdeen WEF 1	Kraanvoelkuil farmhouse complex	n/a	Historic	-32.582567	23.740764	IIIC	500m Buffer


Figure 5.3 Observation ABD036 - Square sandstone ruined farm dam, metal drum, bullet casings, glass, ceramics


Figure 5.4 Observation ABD037 - Pile of sandstone, possibly collapsed structure, but next to glass, ceramics, metal midden

Figure 5.5 Observation ABD039 - Ruined sandstone large kraal

Figure 5.6: Observation ABD044 0 Possible graves, 5, maybe 6 headstones

Figure 5.7: Observation ABD061 - Doornpoort ruined farmhouse complex

Figure 5.8: Observation ABD147 - Kraanvoelkuil farmhouse complex

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

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

POINT ID	Project Area	Description	Co-ordinates		Grading	Mitigation
193	Aberdeen 1	Farm Doornpoort 93. Abundant reworked blocks of fossil wood among alluvial gravels bordering Gannaleegte drainage line. Proposed Field Rating IIIC Local Resource. No mitigation recommended.	-32.520628	23.726627	IIIC	NA
196	Aberdeen 1	Farm Koppies Kraal 157. Blocks of fossil wood among alluvial gravels. Proposed Field Rating IIIC Local Resource. No mitigation recommended.	-32.553682	23.710204	IIIC	NA
197	Aberdeen 1	Farm Koppies Kraal 157. Abundant blocks of fossil wood with variable quality of preservation among surface gravels. Proposed Field Rating IIIC Local Resource. No mitigation recommended.	-32.568231	23.685375	IIIC	NA

As noted above, the maps included in this report reflect tentative proposals for the grid alignments associated with this project. However, these grid alignments are not finalised and are subject to change. Amended grid alignments will be subject to independent impact assessments in line with relevant legislation.

4.3 Mapping and spatialisation of heritage resources

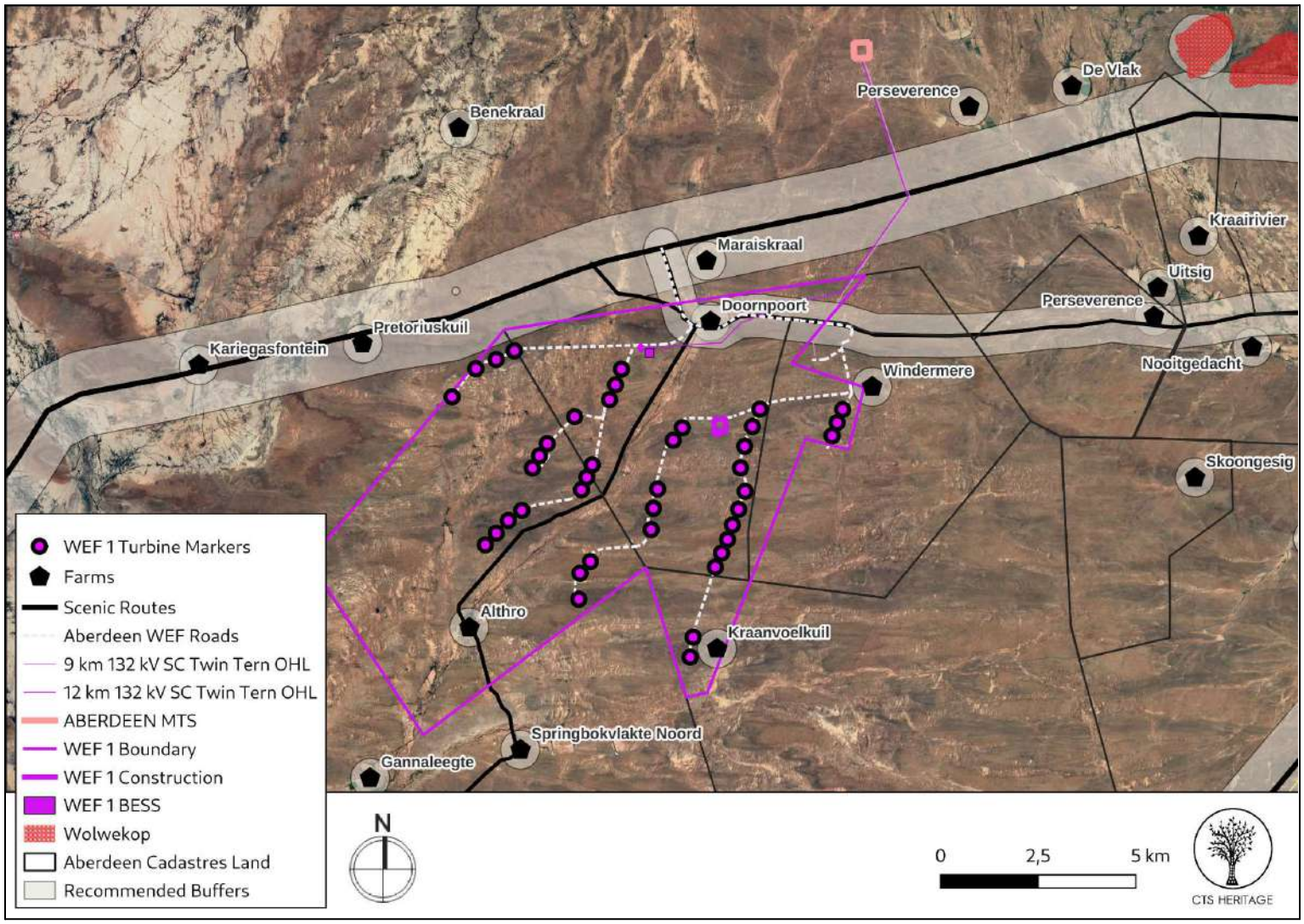

Figure 6.1: Map of landscape elements within the proposed development area

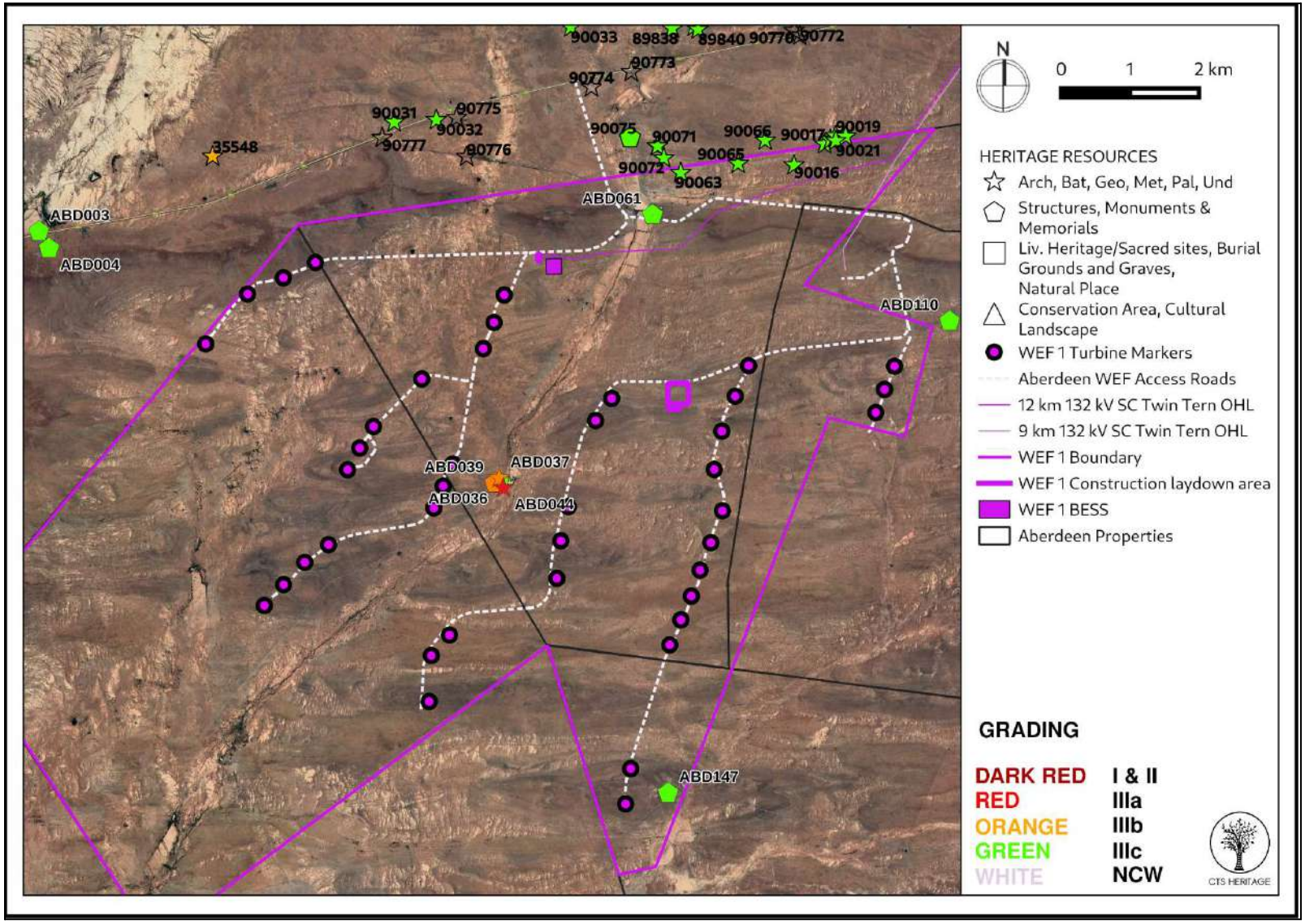

Figure 6.2: Map of archaeological heritage resources within the proposed development area

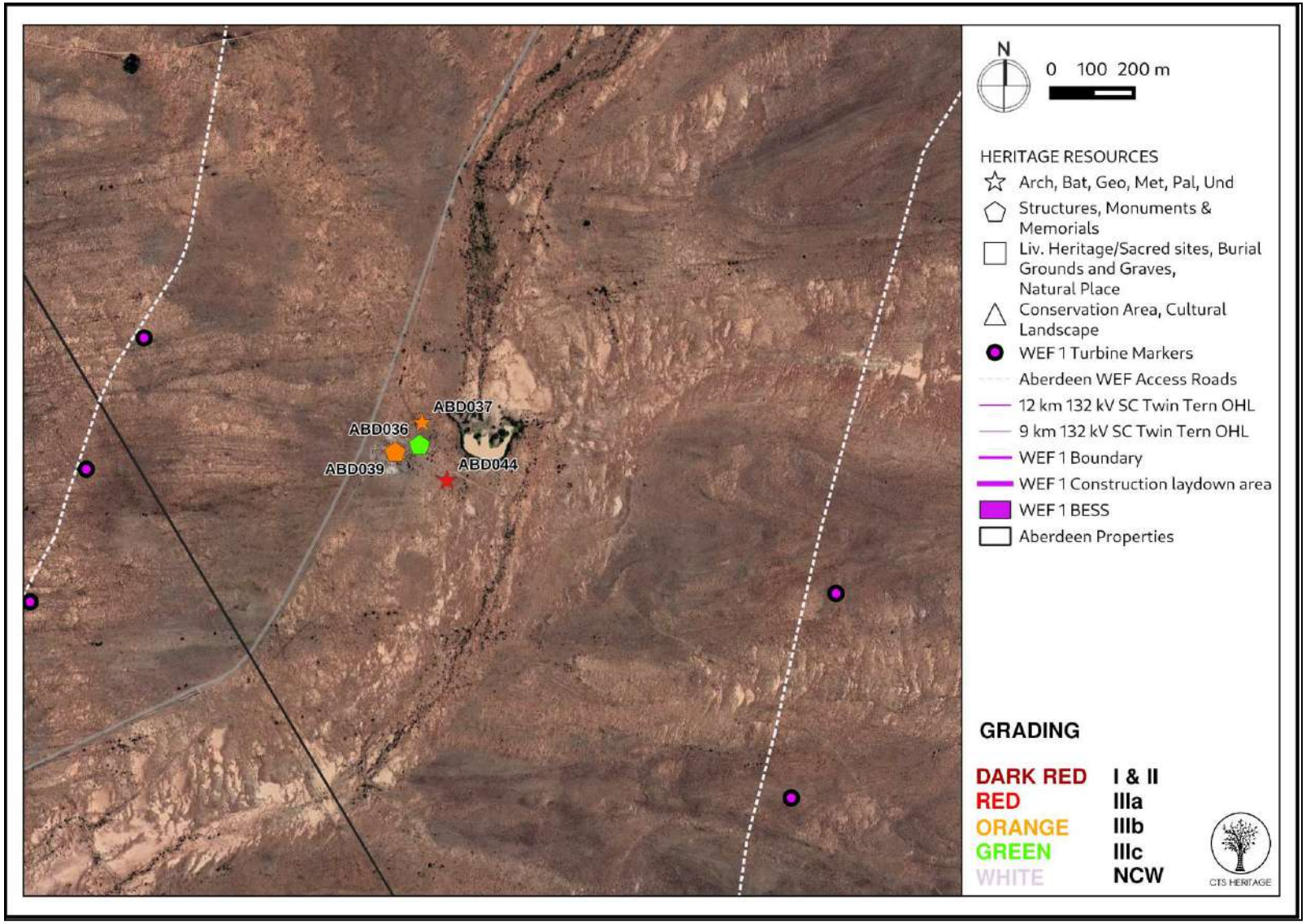

Figure 6.3: Map of heritage resources within the proposed development area - Inset

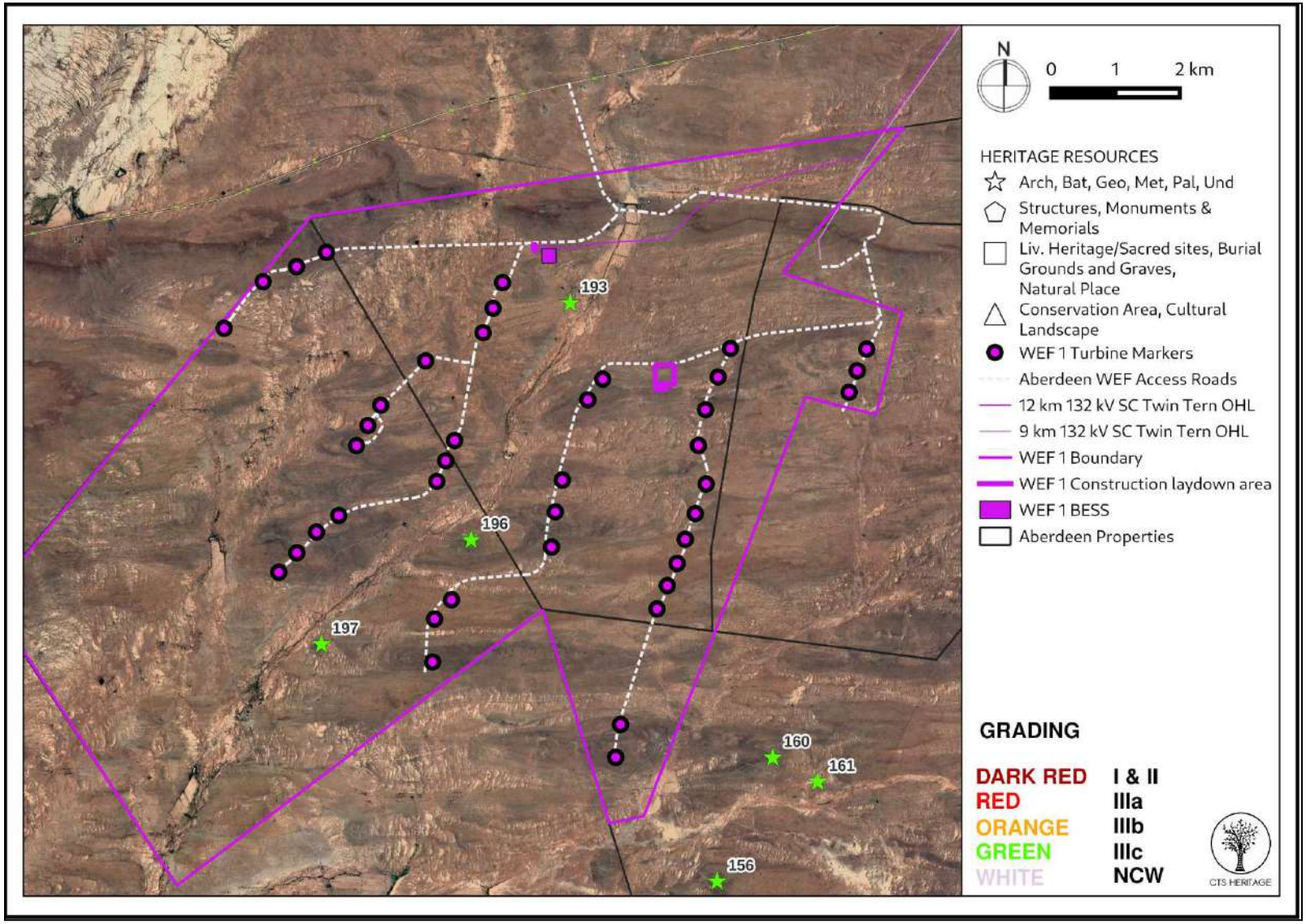

Figure 6.4: Map of palaeontological heritage resources within the proposed development area

5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

5.1 Assessment of impact to Heritage Resources

5.1.1 Cultural Landscape

The following recommendations are proposed to guide the development layout in terms of minimising potential impact to the cultural landscape. These recommendations have all been adopted in the Final Layout assessed and mapped in this report.

WEF Turbine placement - position ("where"):

The indicators below reflect best practice in terms of conservation of the cultural landscape and are intended to avoid high significance impacts:

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

Turbine placement - principles ("how"):

The following general principles apply to the turbine layout:

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

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

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

At the local scale, the project is generally located away from major scenic topographical features and beyond 16km from the town of Aberdeen and beyond 10km from the Fonteinbos Nature Reserve. At a local and site scales, the following sensitive heritage receptors have been identified:

- Historical farmsteads (Grade IIIB and IIIC)
- The scenic qualities of the R61
- The Murraysburg Road and east-west historical access route
- Wolwekop as a distinctive topographical feature adjacent to the R61

In order to mitigate negative impacts to the sensitive heritage receptors identified, the Cultural Landscape Assessment recommended that a number of turbines that were located within the recommended no-go buffer areas be relocated. This recommendation has been implemented in the Final Project Layout mapped in this report.

Table 4: Impact table for Cultural Landscape Heritage Resources impacted by the Aberdeen 1 WEF

NATURE: The broader context of the area proposed for development has cultural significance that may be impacted by the proposed development				
		Before Mitigation		**After Mitigation (Final Layout)**
MAGNITUDE	**H (8)**	The cultural value of the pristine Karoo Landscape is very high and the location of the proposed development will impact this significance	**H (8)**	The cultural value of the pristine Karoo Landscape is very high and the location of the proposed development will impact this significance
DURATION	**H (4)**	Where manifest, the impact will be long term - for the duration of the grid infrastructure lifetime	**H (4)**	Where manifest, the impact will be long term - for the duration of the grid infrastructure lifetime
EXTENT	**H (5)**	Regional	**H (5)**	Regional
PROBABILITY	**H (5)**	It is extremely likely that a significant cultural landscape resources will be impacted	**L (2)**	It is extremely unlikely that any significant cultural landscape resources will be impacted
SIGNIFICANCE	**H**	(8+4+5)x5=85	**M**	(8+4+5)x2=34
STATUS		Neutral		Neutral
REVERSIBILITY	**L**	Any impacts to heritage resources that do occur are reversible once the infrastructure is removed	**L**	Any impacts to heritage resources that do occur are reversible once the infrastructure is removed
IRREPLACEABLE LOSS OF RESOURCES?	**L**	Unlikely	**L**	Unlikely
CAN IMPACTS BE MITIGATED		NA		
MITIGATION: Setback from the N9 and the R61 by at least 1km on either side. Avoid steep or elevated topography, ridgelines or koppies, with a no development buffer of at least 2.5km from Wolwekop Setback from graded resources and farmstead settlements IIIB and IIIC, by 500m. Setback from farmsteads forming part of the settlement pattern by at least 500m				
RESIDUAL RISK: NA				

5.1.2 Archaeology

A total of 52 observations were made within proximity to the proposed layout for Aberdeen WEF 1 (Figure 6.1). Of these, the majority are low density Middle Stone Age or Later Stone Age artefact scatters that have been determined to have limited scientific value and have been determined to be not conservation-worthy. Two of the archaeological resources identified within this area were determined to be conservation-worthy, ABD037 and ABD044. ABD037 is described as a pile of sandstone, possibly collapsed structure, but located next to glass, ceramics and metal midden. This site is graded IIIB. Site SBD044 is described as a group of possible graves including 5, maybe 6, headstones. This site has been graded IIIA for its high levels of social significance. These sites form part of a cluster of resources along with sites ABD036 and ABD039. Both of these sites represent the ruins of historic kraals with associated material remains and are graded IIIB and IIIC. This complex of resources, along with a more modern dam (ABD038, graded as not conservation-worthy) are located along an existing dirt track located within the development area. No direct impact to these resources is anticipated based on the layout provided. It is, however, recommended that a no-development buffer of 500m is implemented around this cluster of sites in order to maintain some of the sense of place of this cluster. No turbines are located within this 500m buffer in the layouts provided.

Site ABD061 represents the Doornpoort ruined farmhouse complex, graded IIIC. This farm complex is located along an existing road and is located more than 1km from the nearest proposed turbine location. No direct impact to these structures is anticipated, however a no-development buffer of at least 500m is recommended in order to retain a sense of place for this complex. Upgrades to existing roads within the recommended buffers are deemed acceptable provided heritage resources aren't directly affected.

The structure identified at Site ABD147 represents the Kraanvoelkuil farmhouse complex. This site is graded IIIC and is located more than 1km from the nearest proposed turbine. As such, no direct or indirect impact is anticipated from the proposed development in the layout provided.

The above recommendations are proposed to guide the development layout in terms of minimising potential impacts to archaeological heritage. These recommendations have all been adopted in the Final Layout assessed in this report.

Table 5: Impact table for Archaeological Heritage Resources impacted by the Aberdeen 1 WEF

NATURE: The area proposed for development is known to conserve heritage resources of archaeological significance that may be impacted by the proposed development				
		Before Mitigation		**After Mitigation (Final Layout)**
MAGNITUDE	**H (7)**	Some significant archaeological resources were identified within the development area	**H (7)**	Some significant archaeological resources were identified within the development area
DURATION	**H (5)**	Where manifest, the impact will be permanent.	**H (5)**	Where manifest, the impact will be permanent.
EXTENT	**L (1)**	Localised within the site boundary	**L (1)**	Localised within the site boundary
PROBABILITY	**H (4)**	It is possible that any significant archaeological resources will be impacted	**L (1)**	It is extremely unlikely that any significant archaeological resources will be impacted
SIGNIFICANCE	**M**	(7+5+1)x4=52	**L**	(7+5+1)x1=13
STATUS		Neutral		Neutral
REVERSIBILITY	**L**	Any impacts to heritage resources that do occur are irreversible	**L**	Any impacts to heritage resources that do occur are irreversible
IRREPLACEABLE LOSS OF RESOURCES?	**L**	Unlikely	**L**	Unlikely
CAN IMPACTS BE MITIGATED		Yes		
MITIGATION: A no-go development buffer of 100m must be implemented around rock art Site 35548 A 500m no development buffer area must be implemented around sites ABD 036, 037, 039, 044 and 061 Should any significant archaeological resources be uncovered during the course of the construction phase, work must cease in the area of the find and ECPHRA must be contacted regarding an appropriate way forward.				
RESIDUAL RISK: Should any significant archaeological resources be impacted (however unlikely) residual impacts may occur, including a negative impact due to the loss of potentially scientific cultural resources				

5.1.3 Palaeontology

Most of the low-relief WEF Cluster project area is covered by a 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 the abundant reworked fossil wood blocks and very rare bones reworked from the Permian bedrocks, no fossils of Caenozoic age have been recorded within these younger sediments.

Given the rarity of significant vertebrate and other fossil finds, the overall palaeosensitivity of the Aberdeen WEF Cluster project 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 Aberdeen Wind Energy Facility Cluster is assessed as LOW since fossils of significant scientific and conservation value are so rare here. None of the recorded fossil sites lies directly within the provisional project footprint. The project is not fatally flawed and there are no objections on palaeontological heritage grounds to its authorization. This assessment applies equally to all infrastructure components and layout options currently under consideration.

The Environmental Control Officer (ECO) / Environmental Site Officer (ESO) responsible for the 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.

Table 6: Impact table for Palaeontological Heritage Resources impacted by the Aberdeen 1 WEF

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

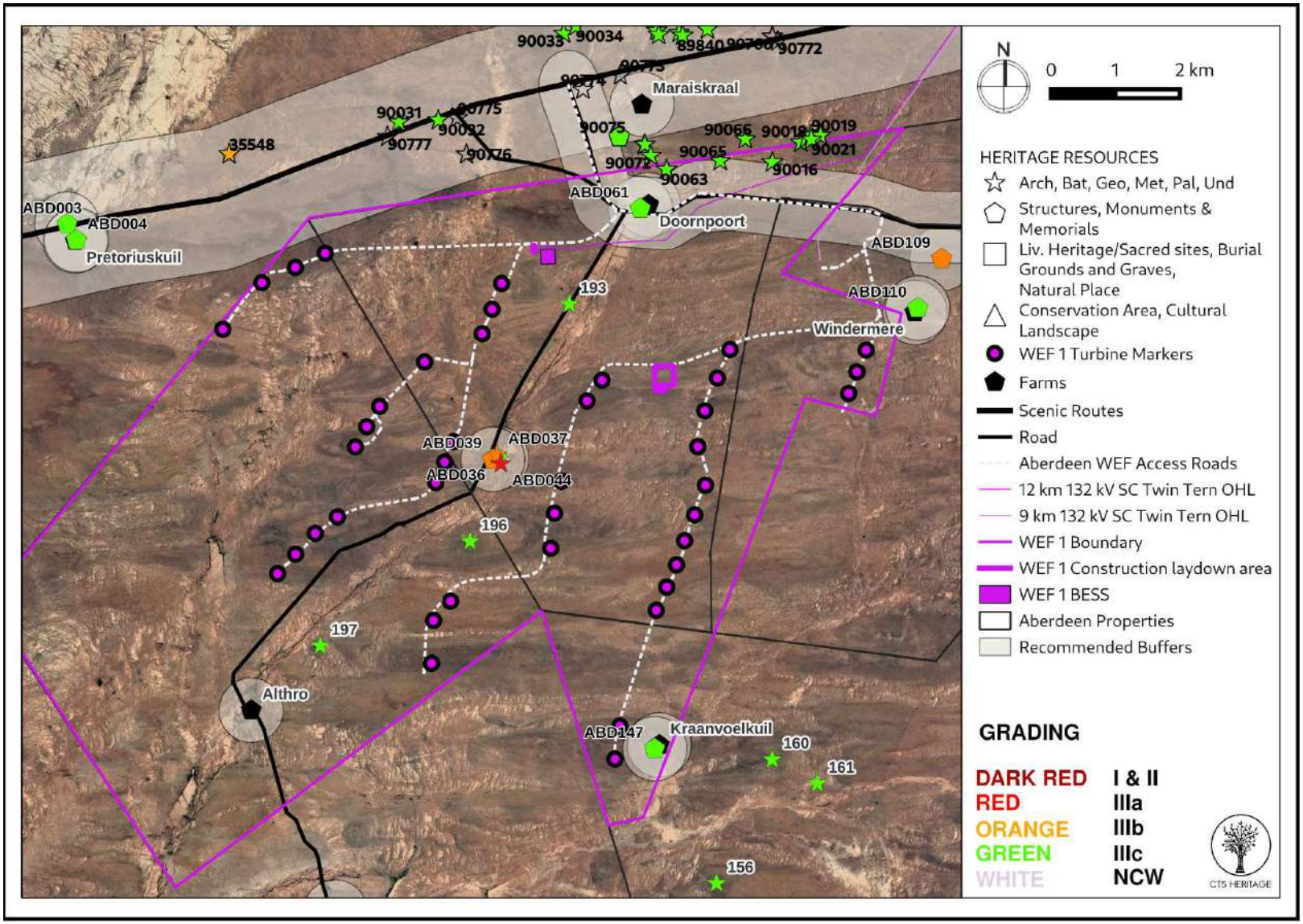

Figure 7: Map indicating the recommended mitigation measures discussed in Section 5.1

5.2 Sustainable Social and Economic Benefit

According to the SIA (2022) completed for this project, "The majority of social impacts associated with the project are anticipated to occur during the construction phase of the development and are typical of the type of social impacts generally associated with construction activities. These impacts will be temporary and short-term (24 – 30 months) but could have long-term effects on the surrounding social environment if not planned or managed appropriately. It is therefore necessary that the detailed design phase be conducted in such a manner so as not to result in permanent social impacts associated with the ill-placement of project components or associated infrastructure or result in the mismanagement of the construction phase activities.

The positive and negative social impacts identified at this stage and will be assessed for the construction phase includes:

- Direct and indirect employment opportunities
- Economic multiplier effects
- Influx of jobseekers and change in population.
- Safety and security impacts
- Impacts on daily living and movement patterns.
- Nuisance impacts, including noise and dust.
- Visual impacts and sense of place impacts"

It is anticipated that the primary long-term socio-economic benefit to be derived from this project is its contribution of generation capacity to the National Grid and its contribution to mitigating the negative impacts of load shedding. An additional benefit is the contribution of this project to the shift away from reliance on coal and fossil fuel for South Africa's energy needs and towards renewable energy sources.

As such, the anticipated benefits of the proposed development outweigh any negative impacts to heritage resources on condition that the recommendations outlined below are implemented.

5.3 Proposed development alternatives

There are no alternatives being considered for this project. Early project layouts have been assessed and the recommendations of various specialists, including heritage (archaeology, palaeontology and cultural landscape), have been adopted in the Final Layout assessed in this HIA report.

No alternatives are proposed from a heritage perspective as the impacts anticipated have been appropriately mitigated through the inclusion of the recommendations outlined in this report in the Final Layout assessed herein.

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 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.

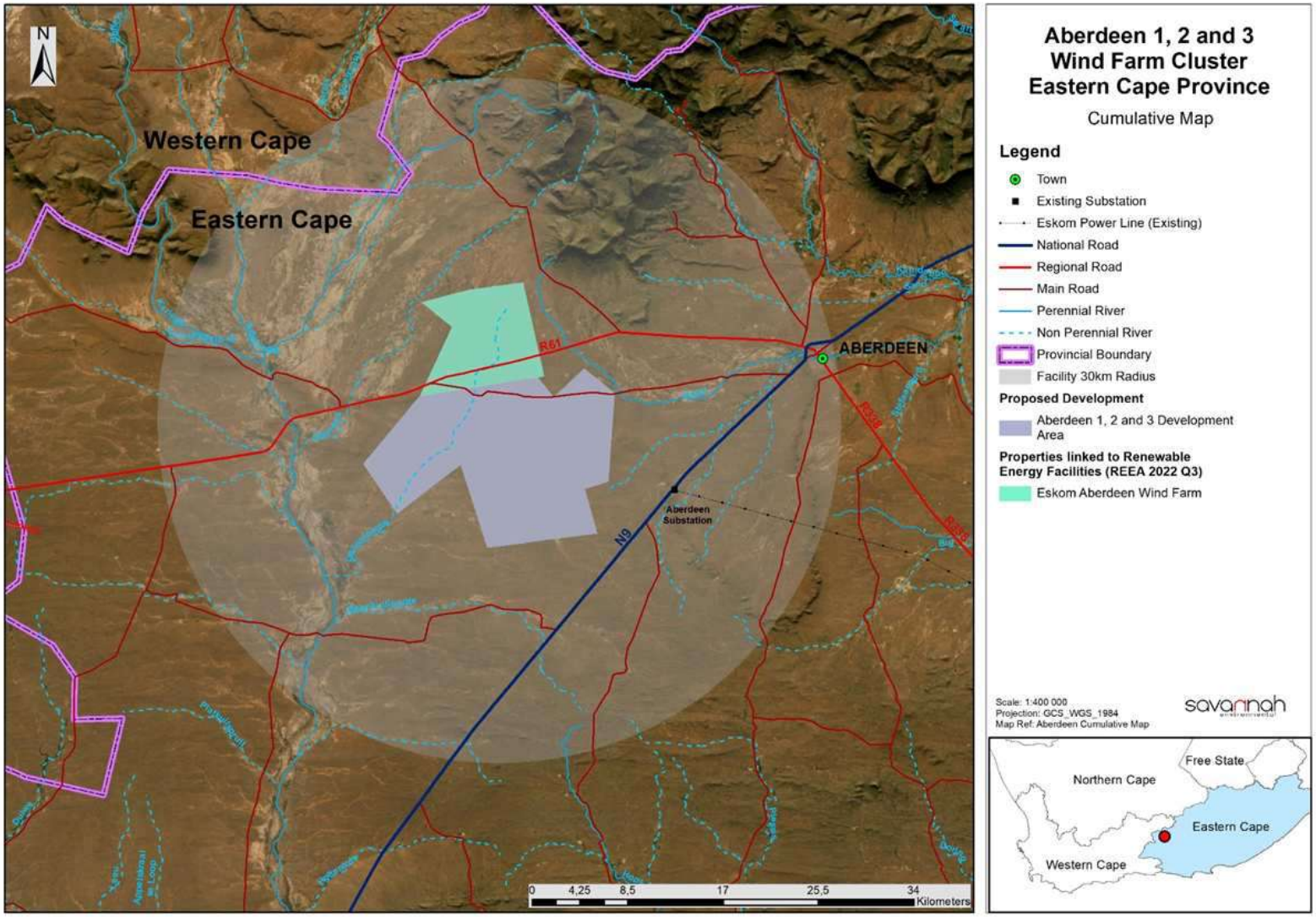

Figure 8: Approved REFs with Environmental Authorisation and the Beaufort West REDZ relative to the proposed development

Table 7: Cumulative Impact table for Heritage Resources impacted by the Aberdeen 1 WEF

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

5.5 Site Verification

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

- The cultural value of the pristine Karoo Landscape is very high (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, 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.

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 Aberdeen Wind Energy Facility 1 will negatively impact on significant heritage resources on condition that the following recommendations are implemented:

- 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
- A 500m no development buffer area must be implemented around sites ABD036, 037, 039, 044, 061 and ABD147
- The attached Chance Fossil Finds Procedure must be implemented for the duration of construction activities
- Although all possible care has been taken to identify sites of cultural importance during the investigation of the study area, it is always possible that hidden or subsurface sites could be overlooked during the assessment. If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils, burials or other categories of heritage resources are found during the proposed development, work must cease in the vicinity of the find and ECPHRA must be alerted immediately to determine an appropriate way forward.

9. 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.

APPENDICES

APPENDIX 1: Archaeological Assessment (2022)

DRAFT ARCHAEOLOGICAL SPECIALIST STUDY

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

Proposed development of the Aberdeen WEF, Eastern Cape

Prepared by

CTS HERITAGE

Jenna Lavin and Nic Wiltshire

In Association with

Savannah Environmental

July 2022

CTS HERITAGE

EXECUTIVE SUMMARY

Atlantic Energy Partners (Pty) Ltd is proposing to develop a cluster of 4 x 170MW wind farms plus grid connection infrastructure comprising a 132/400kV collector switching station and a 132/400kV overhead power line (within a 100km long and 300m wide corridor) on a site near Aberdeen in the Eastern Cape Province.

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). 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.

Two burial areas were located within the area proposed for development (ABD044 and ABD124), graded IIIA due to their high levels of local significance. No impact to these sites may occur and as such, appropriate no-development buffers around these sites are proposed. All of the other significant resources identified are either historic kraals, occupied farm werfs or the ruins of historic farm werfs. While no direct impact to any of these sites is anticipated in the layout provided (except for site ABD110), it is recommended that a no-development buffer of 500m is implemented around these sites.

In the layout provided, the proposed road alignment passes directly through site ABD110 which is likely to significantly negatively impact on this resource. As such, it is recommended that the proposed road alignment be amended to avoid impact.

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:

- A 500m no-go development buffer is implemented around sites ABD003, 004, 036, 037, 039, 044, 061, 062, 063, 091, 093, 109, 110, 124, 134, 144, 147 and 173.
- A 100m no-go development buffer is implemented around SAHRIS Site 35548
- The proposed road alignment must be adjusted to respect a minimum of a 50m buffer around site ABD110
- 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

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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

Atlantic Energy Partners (Pty) Ltd is proposing to develop a cluster of 4 x 170MW wind farms plus grid connection infrastructure comprising a 132/400kV collector switching station and a 132/400kV overhead power line (within a 100km long and 300m wide corridor) on a site near Aberdeen in the Eastern Cape Province.

The project site is located within the 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 Applications for Authorisation for the 4x 170MW wind farms and grid connection infrastructure will therefore follow a Basic Assessment (BA) process.

1.2 Description of Property and Affected Environment

The proposed Aberdeen WEF lies to the south of the Kambdebooberge 20km 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 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.

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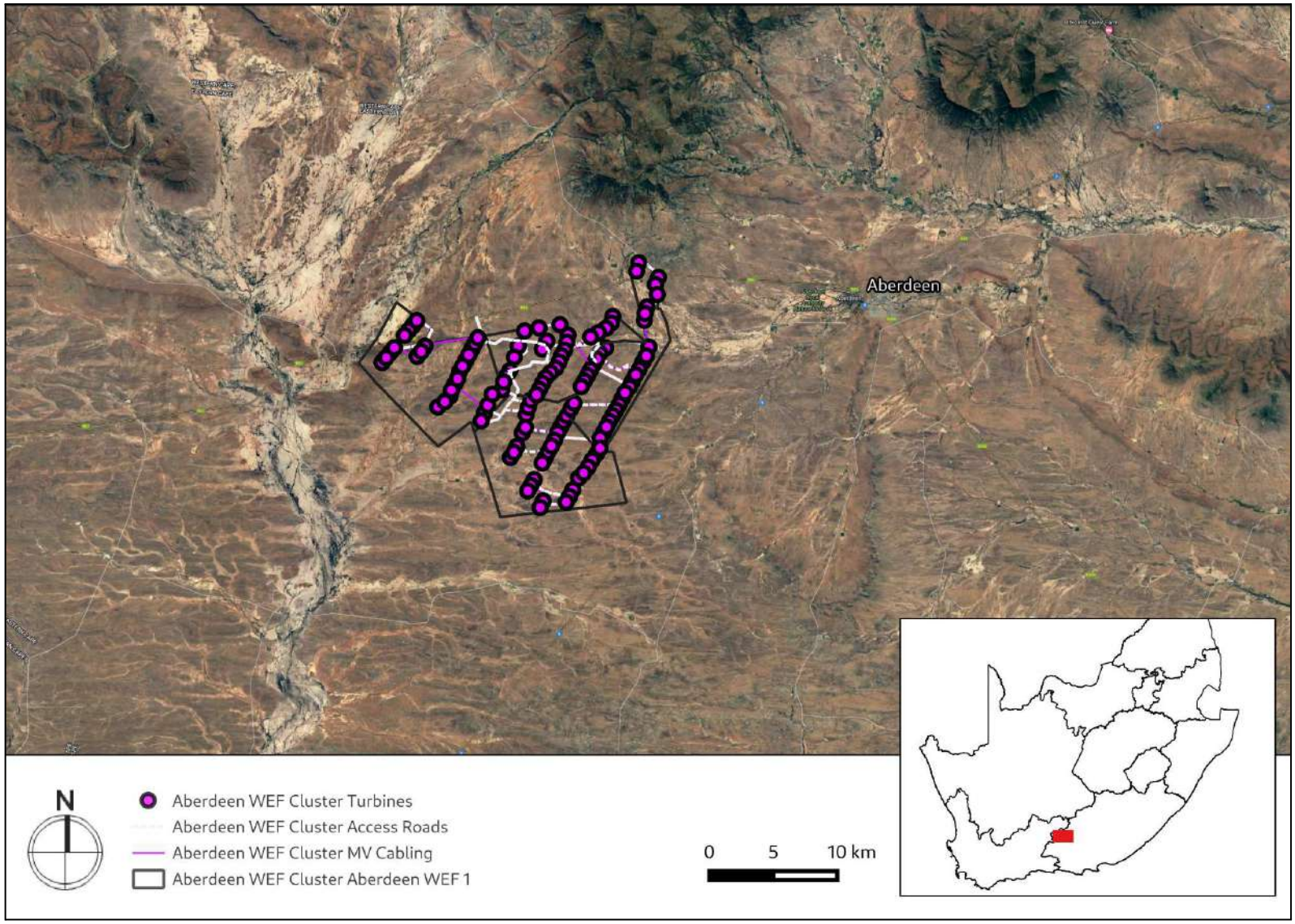

Figure 1.1: Satellite image indicating proposed location of development

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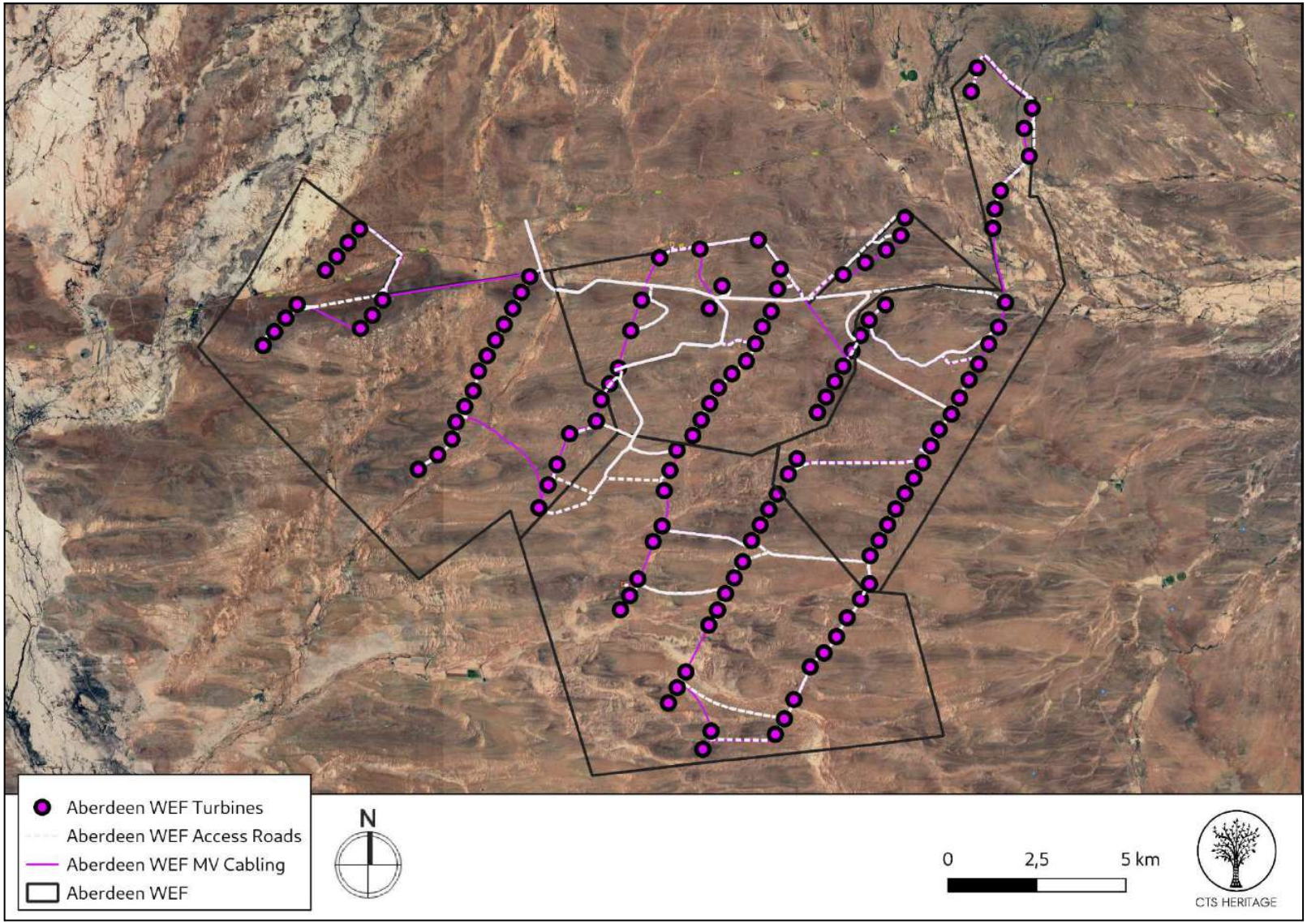

Figure 1.2: Proposed project boundary

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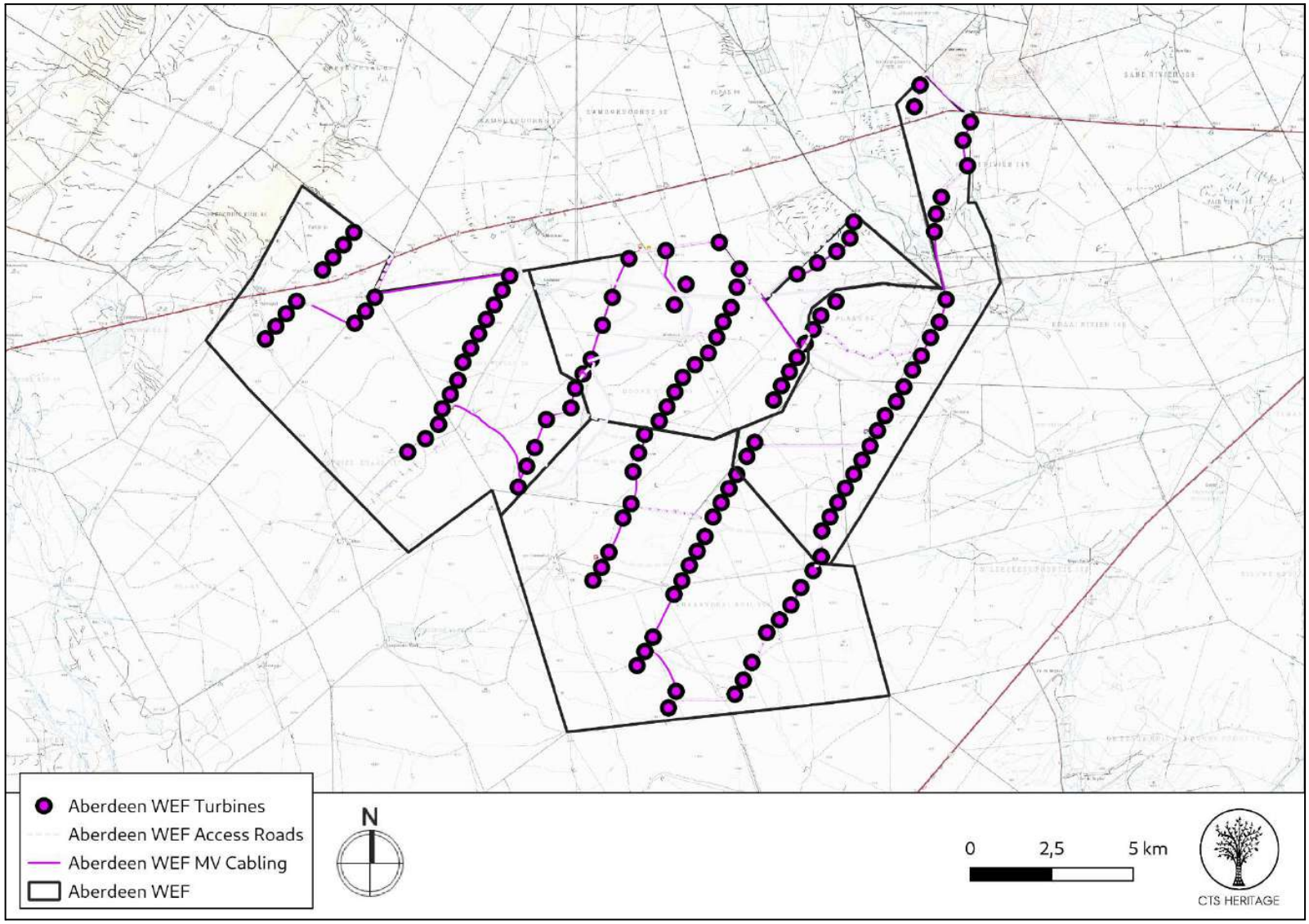

Figure 1.3: Proposed project boundary

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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 15 to 20 July 2022 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.

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.

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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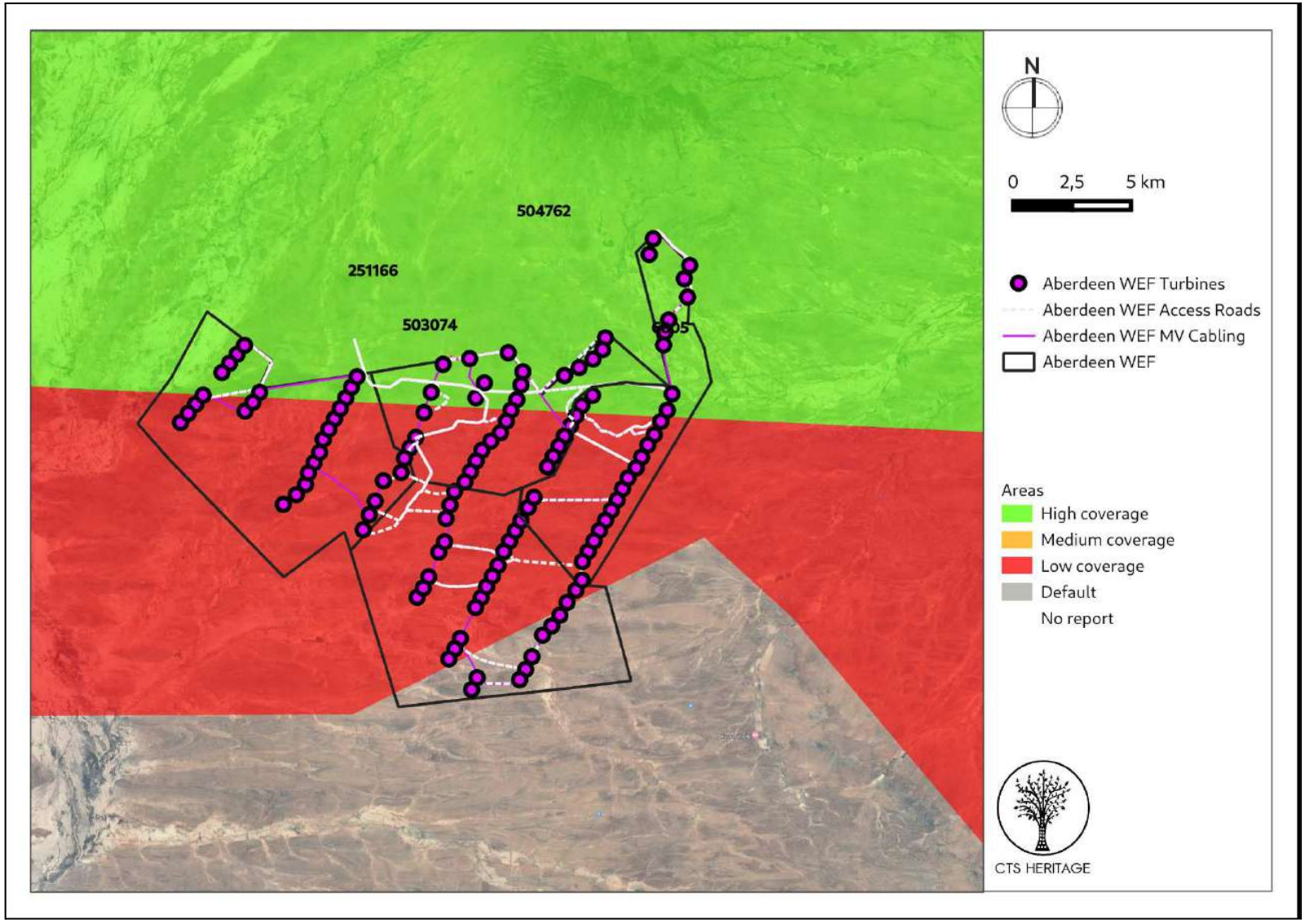

Figure 2: Close up satellite image indicating proposed location of development in relation to heritage studies previously conducted

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3. HISTORY AND EVOLUTION OF THE SITE AND CONTEXT

Background:

The area proposed for the Aberdeen Renewable Energy Facility Projects is located approximately 25km 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

Very few 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 immediately north of the area proposed for development (Booth and Sanker, SAHRIS NID 251161). The findings of this assessment therefore

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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." All of the resources identified by Booth and Sanker (2013) have been mapped relative to the proposed development in Figure 3.1 and 3.2.

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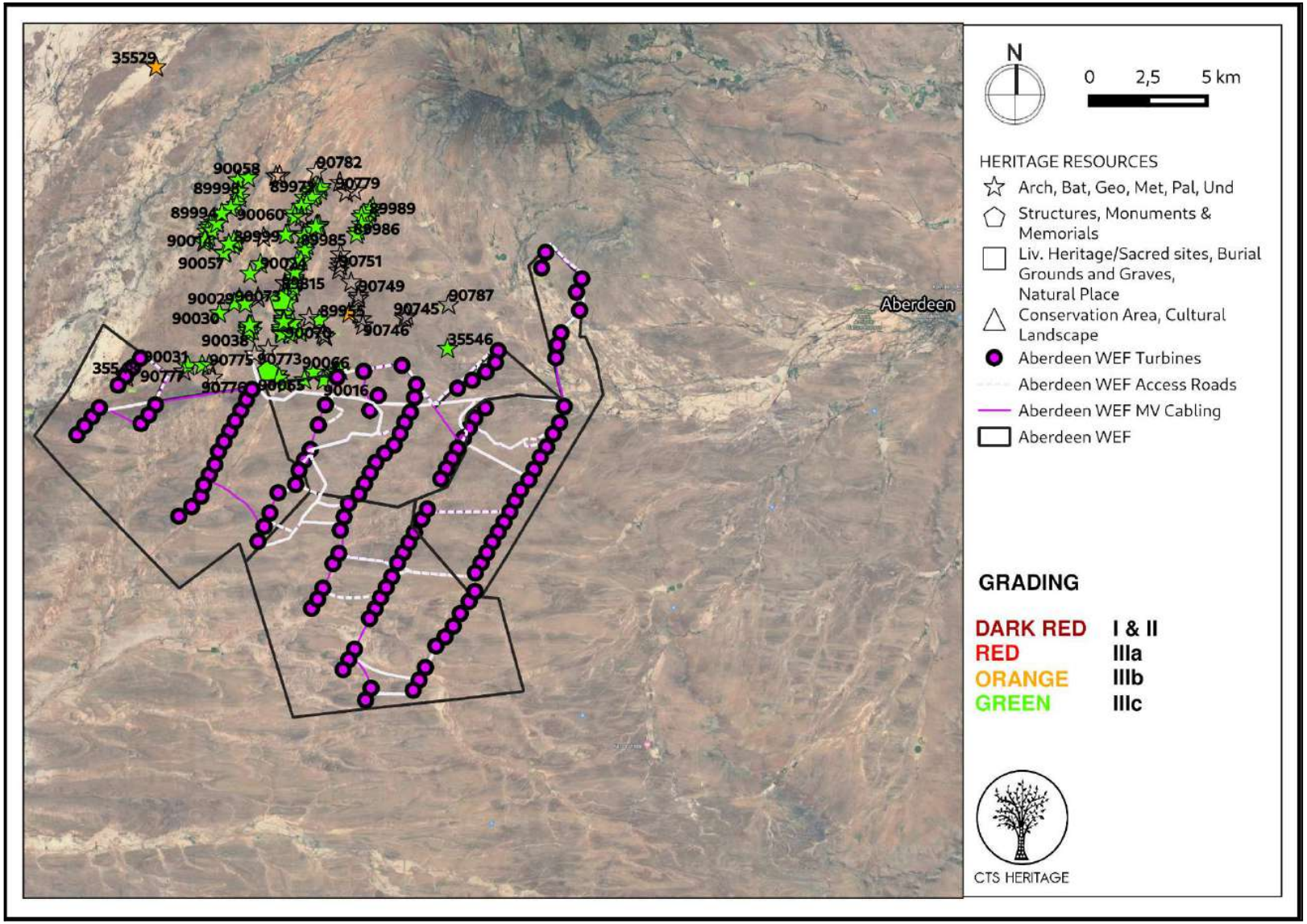

Figure 3. Heritage Resources Map. Heritage Resources previously identified in and near the study area, with SAHRIS Site IDs indicated

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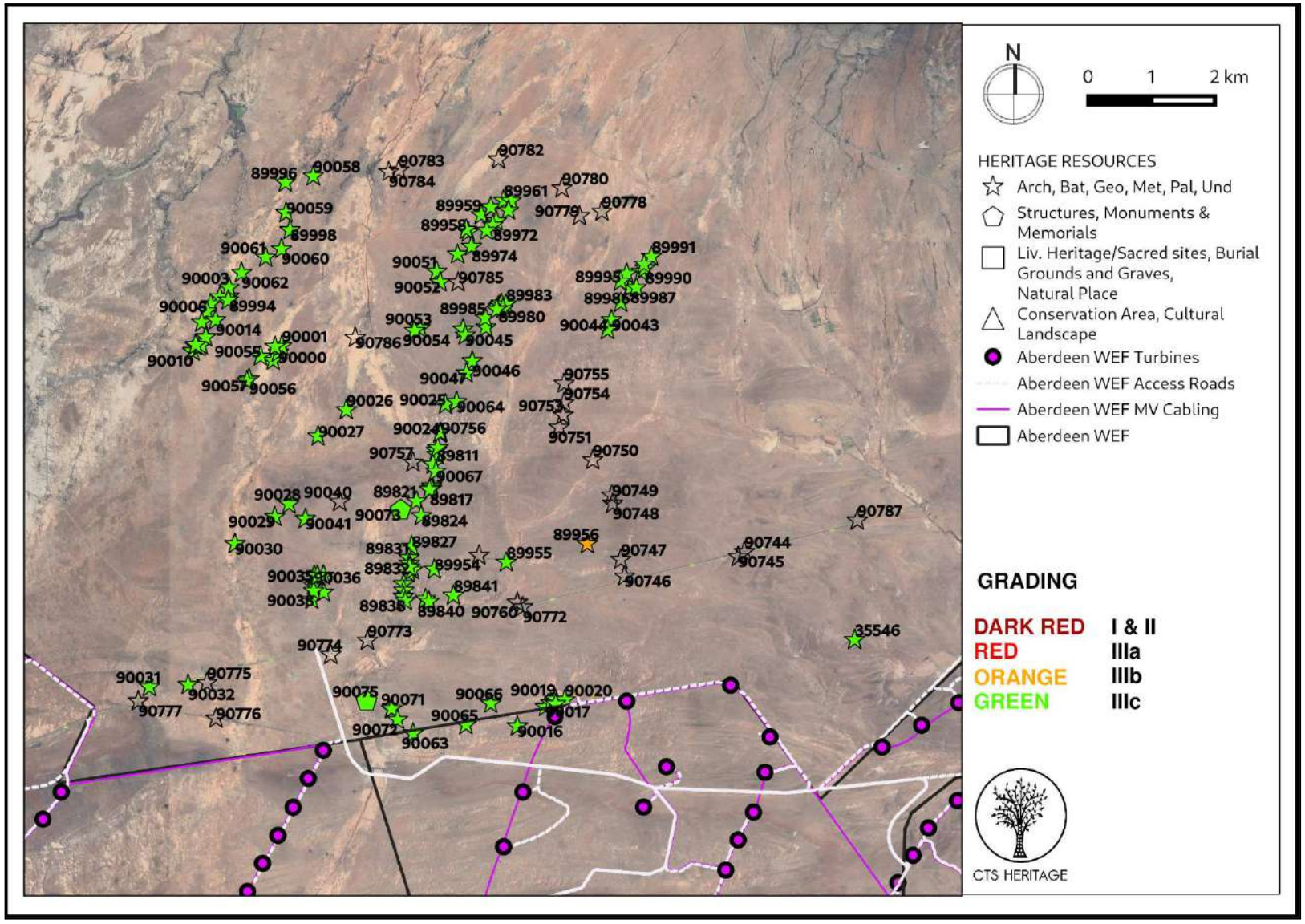

Figure 3.1. Heritage Resources Map. Inset A

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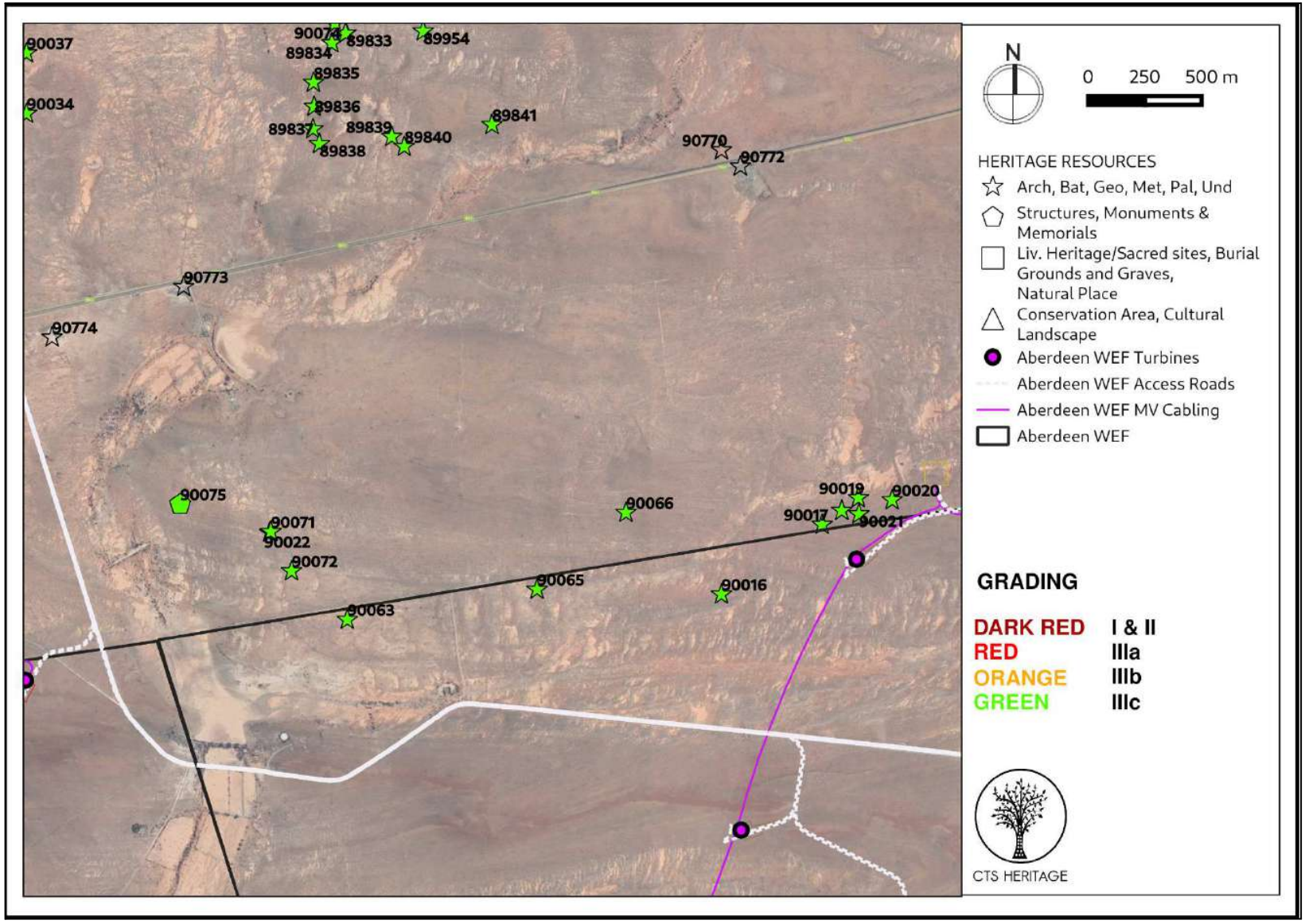

Figure 3.2. Heritage Resources Map. Inset B

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4. IDENTIFICATION OF HERITAGE RESOURCES

4.1 Field Assessment

The field assessment completed for the Aberdeen WEF should be understood in conjunction with the findings made by Booth to the north of the R61 for the Eskom WEF (not built yet) in 2013. 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 MSA material found clearly spanned a very wide period of time as many examples of early MSA artefacts were found along with diagnostic pieces such as blade flakes, blanks, unifacial points, radial cores and bifacially retouched flakes. Locally abundant raw materials were extensively utilised as siltstones and hornfels contributed most of the stone used to make artefacts as well as a smaller but significant percentage of chert, particularly in the LSA assemblages. The artefacts are spread thinly but widely throughout the area with no particular focal points other than the slightly elevated ridges that are no more than 10-20m higher than the surrounding landscape.

The historic to modern farming use of the landscape has contributed to the built environment pattern of settlement in the area with typical Karoo werfs, many now ruined, dotting the landscape. A number of farm dams have been made in the past by using earthmoving equipment to push up dirt banks along the watercourses. The historic stonework of the ruined dam at observation #036 is near some possible graves and careful consideration of the upgrades to the existing access road must be made at this location as well as the roads at the very large vernacular stone kraal enclosure at #173.

Figure 4.1: Contextual Images of Landscape

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Figure 4.2: Contextual Images of Landscape

Figure 4.3: Contextual Images of Landscape

Figure 4.4: Contextual Images of Landscape

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Figure 4.5: Contextual Images of Landscape

Figure 4.6: Contextual Images of Landscape

Figure 4.7: Contextual Images of landscape

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Figure 4.8: Contextual Images of Landscape

Figure 4.9: Contextual Images of Landscape

Figure 4.10: Contextual Images of Landscape

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Figure 4.11: Contextual Images


Figure 4.12: Contextual Images


Figure 4.13: Contextual Images

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Figure 4.14: Contextual Images

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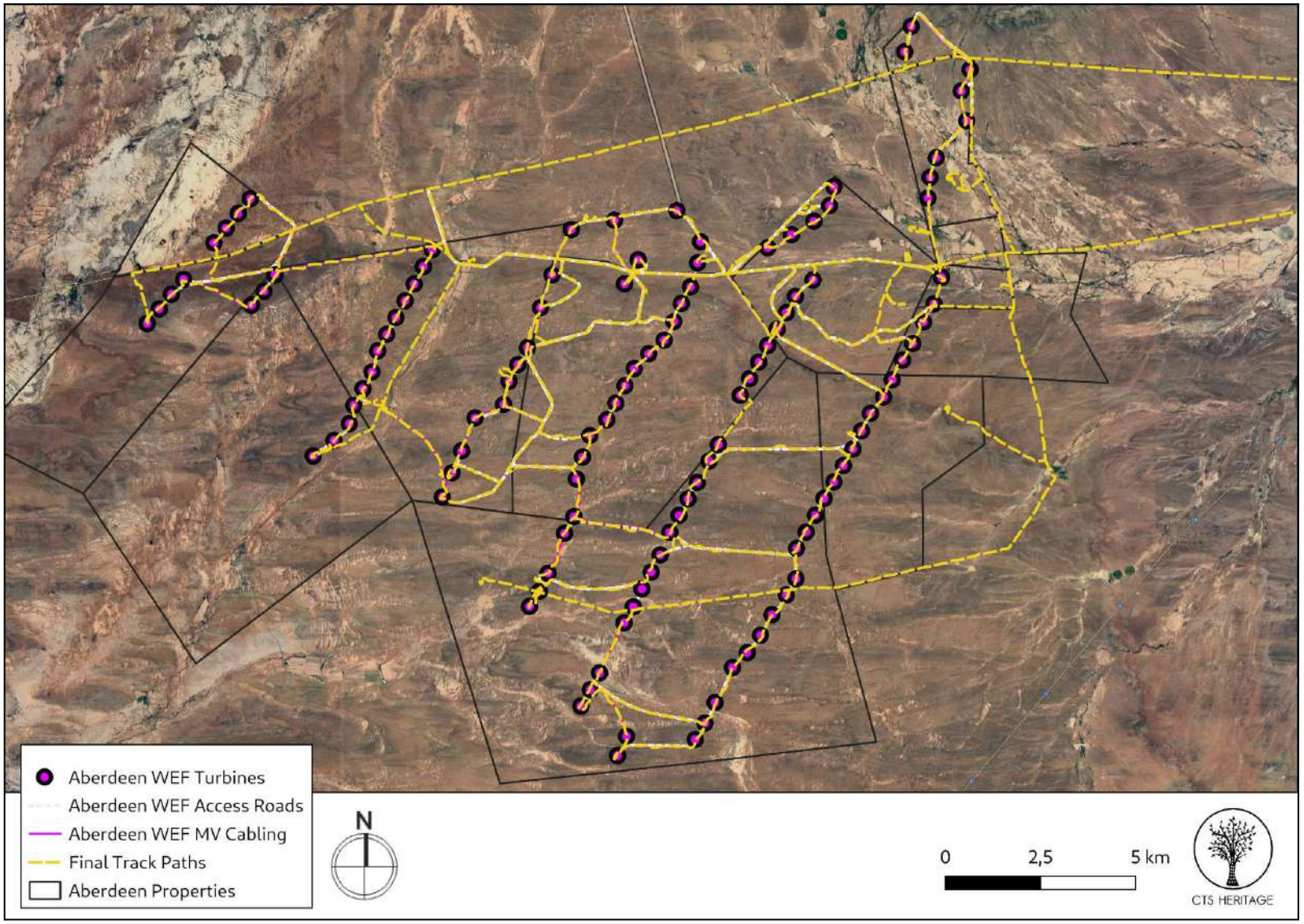

Figure 5: Overall track paths of foot survey

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4.2 Archaeological Resources identified

Table 1: Observations noted during the field assessment

POINT	Project Name	Description	Density/ m²	Period	Co-ordinates		Grading	Mitigation
ABD001	Aberdeen WEF 4	Fine grained quartzite flake unworked	0 to 5	MSA	-32.452372	23.867969	NCW	NA
ABD002	Aberdeen WEF 4	Farm dam	0 to 5	MSA	-32.453321	23.859429	NCW	NA
ABD003	Aberdeen WEF 1	Ruined long building, no roof, sandstone walls, metal windows x 3 on southern end	n/a	Historic	-32.509487	23.643425	IIIC	500m Buffer
ABD004	Aberdeen WEF 1	Pretoriuskuil farmhouse complex, Victorian hipped roofs, 3 labourers cottages	n/a	Historic	-32.511697	23.644984	IIIC	500m Buffer
ABD005	Aberdeen WEF 4	Siltstone flakes and cores	5 to 10	MSA	-32.456395	23.873796	NCW	NA
ABD006	Aberdeen WEF 1	Siltstone flakes and cores	0 to 5	MSA	-32.51913	23.649397	NCW	NA
ABD007	Aberdeen WEF 1	White chert core	0 to 5	LSA	-32.515726	23.653664	NCW	NA
ABD008	Aberdeen WEF 1	Early MSA flake prepared platform, prominent bulb of percussion siltstone	0 to 5	MSA	-32.511897	23.659404	NCW	NA
ABD009	Aberdeen WEF 1	Chert flakes	0 to 5	LSA	-32.515224	23.669892	NCW	NA
ABD010	Aberdeen WEF 1	Hornfels flake, edge worked back, possible adze	0 to 5	LSA+MSA	-32.515918	23.67819	NCW	NA
ABD011	Aberdeen WEF 1	Chert microliths	0 to 5	LSA	-32.514105	23.679974	NCW	NA
ABD012	Aberdeen WEF 1	Siltstone flake worked for hafting	0 to 5	MSA	-32.510639	23.683446	NCW	NA
ABD013	Aberdeen WEF 1	Chert and quartzite microliths	5 to 10	LSA	-32.503667	23.686759	NCW	NA
ABD014	Aberdeen WEF 1	Siltstone flake blade point and core	0 to 5	MSA	-32.496712	23.686448	NCW	NA
ABD015	Aberdeen WEF 1	Siltstone core and flakes	5 to 10	MSA	-32.49256	23.680454	NCW	NA
ABD016	Aberdeen WEF 1	Chert flakes retouched, siltstone core	0 to 5	LSA	-32.494472	23.674687	NCW	NA
ABD017	Aberdeen WEF 1	Quartzite blades	0 to 5	MSA	-32.499921	23.669211	NCW	NA
ABD018	Aberdeen WEF 1	Early MSA hornfels flake repatinated	0 to 5	MSA	-32.510323	23.673096	NCW	NA
ABD019	Aberdeen WEF 1	Siltstone flakes, clear dorsal spine	0 to 5	MSA	-32.507688	23.695748	NCW	NA
ABD020	Aberdeen WEF 1	Patinated siltstone flakes	0 to 5	MSA	-32.506332	23.706908	NCW	NA
ABD021	Aberdeen WEF 1	Fine grained hornfels flakes, retouched, prepared platform	5 to 10	LSA+MSA	-32.503798	23.724975	NCW	NA
ABD022	Aberdeen WEF 1	Chert flakes, unworked	0 to 5	MSA	-32.508452	23.725052	NCW	NA
ABD023	Aberdeen WEF 1	Chert and siltstone blade forms	0 to 5	MSA	-32.514076	23.721802	NCW	NA
ABD024	Aberdeen WEF 1	Hornfels radial core and flake	0 to 5	MSA	-32.522763	23.716284	NCW	NA
ABD025	Aberdeen WEF 1	Hornfels core and chert flake	0 to 5	MSA	-32.525546	23.714154	NCW	NA
ABD026	Aberdeen WEF 1	Siltstone point and flake, prominent bulb of percussion	0 to 5	MSA	-32.526289	23.713653	NCW	NA
ABD027	Aberdeen WEF 1	Siltstone and hornfels flakes, cores	5 to 10	MSA	-32.52801	23.712643	NCW	NA
ABD028	Aberdeen WEF 1	Hornfels retouched blade flake and quartzite flake	0 to 5	MSA	-32.530474	23.711775	NCW	NA
ABD029	Aberdeen WEF 1	Siltstone flakes prepared platform	0 to 5	MSA	-32.532648	23.711176	NCW	NA
ABD030	Aberdeen WEF 1	Chert microliths	0 to 5	LSA	-32.534669	23.710081	NCW	NA
ABD031	Aberdeen WEF 1	Large unworked siltstone flakes	0 to 5	MSA	-32.537025	23.70843	NCW	NA
ABD032	Aberdeen WEF 1	Reddish siltstone flake core with radial secondary scarring, core	0 to 5	MSA	-32.539017	23.70837	NCW	NA
ABD033	Aberdeen WEF 1	Various siltstone flakes prepared platforms, no retouch	5 to 10	MSA	-32.540121	23.706352	NCW	NA
ABD034	Aberdeen WEF 1	Chert core and blade flake	0 to 5	MSA	-32.546119	23.704341	NCW	NA

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ABD035	Aberdeen WEF 1	Hornfels flake, some retouch, siltstone flakes	0 to 5	MSA	-32.550296	23.698656	NCW	NA
ABD036	Aberdeen WEF 1	Square sandstone ruined farm dam, metal drum, bullet casings, glass, ceramics	n/a	Historic	-32.542108	23.714568	IIIC	500m Buffer
ABD037	Aberdeen WEF 1	Pile of sandstone, possibly collapsed structure, but next to glass, ceramics, metal midden	30+	Historic	-32.541617	23.714636	IIIB	500m Buffer
ABD038	Aberdeen WEF 1	Earthen dam	n/a	Modern	-32.542156	23.716033	NCW	NA
ABD039	Aberdeen WEF 1	Ruined sandstone large kraal	n/a	Historic	-32.542266	23.713945	IIIB	500m Buffer
ABD040	Aberdeen WEF 1	Hornfels and siltstone flakes, early MSA	0 to 5	MSA	-32.540273	23.710448	NCW	NA
ABD041	Aberdeen WEF 1	Hornfels flakes and siltstone core	0 to 5	MSA	-32.545314	23.719789	NCW	NA
ABD042	Aberdeen WEF 1	Siltstone core	0 to 5	MSA	-32.548675	23.725609	NCW	NA
ABD043	Aberdeen WEF 1	Kraal, windmill and dam	n/a	Historic	-32.55124	23.699079	NCW	NA
ABD044	Aberdeen WEF 1	Possible graves, 5, maybe 6 headstones	n/a	Historic	-32.542874	23.715279	IIIA	500m Buffer
ABD045	Aberdeen WEF 1	Concrete dam, solar pump	n/a	Modern	-32.557353	23.7296	NCW	NA
ABD046	Aberdeen WEF 1	Hornfels microliths	0 to 5	LSA	-32.562941	23.739237	NCW	NA
ABD047	Aberdeen WEF 1	Patinated hornfels flake and quartz chunk	0 to 5	MSA	-32.558041	23.74327	NCW	NA
ABD048	Aberdeen WEF 1	Hornfels and quartz flakes	0 to 5	MSA	-32.549286	23.736922	NCW	NA
ABD049	Aberdeen WEF 1	Hornfels and siltstone flakes	0 to 5	MSA	-32.544088	23.739731	NCW	NA
ABD050	Aberdeen WEF 1	Siltstone flakes	0 to 5	MSA	-32.542237	23.745575	NCW	NA
ABD051	Aberdeen WEF 1	Patinated siltstone flakes	0 to 5	LSA	-32.535778	23.748986	NCW	NA
ABD052	Aberdeen WEF 3	Ccs microliths	0 to 5	MSA	-32.531201	23.751923	NCW	NA
ABD053	Aberdeen WEF 3	Very patinated hornfels segment	0 to 5	MSA	-32.523967	23.754941	NCW	NA
ABD054	Aberdeen WEF 3	Siltstone flakes	0 to 5	MSA	-32.517394	23.760382	NCW	NA
ABD055	Aberdeen WEF 3	Ccs microlith	0 to 5	LSA	-32.514644	23.766924	NCW	NA
ABD056	Aberdeen WEF 3	Patinated hornfels flake and siltstone flake	0 to 5	MSA	-32.507947	23.763756	NCW	NA
ABD057	Aberdeen WEF 3	Siltstone core and flake	0 to 5	MSA	-32.500353	23.765966	NCW	NA
ABD058	Aberdeen WEF 3	Retouched hornfels blade flake	0 to 5	MSA	-32.505482	23.75362	NCW	NA
ABD059	Aberdeen WEF 1	Windmill and concrete dam	n/a	Modern	-32.533696	23.74733	NCW	NA
ABD060	Aberdeen WEF 3	Concrete dam	n/a	Modern	-32.520015	23.757115	NCW	NA
ABD061	Aberdeen WEF 1	Doornpoort ruined farmhouse complex	n/a	Historic	-32.507317	23.738369	IIIC	500m Buffer
ABD062	Aberdeen WEF 4	Perseverance farmhouse complex, some buildings 1951, earlier Victorian building too	n/a	Historic	-32.505487	23.86107	IIIC	500m Buffer
ABD063	Aberdeen WEF 4	Perseverance ruins	n/a	Historic	-32.499254	23.861448	IIIC	500m Buffer
ABD064	Aberdeen WEF 4	Hornfels patinated flakes	0 to 5	MSA	-32.500187	23.867462	NCW	NA
ABD065	Aberdeen WEF 4	Hornfels thin blade flake and patinated flakes	5 to 10	MSA	-32.493154	23.866669	NCW	NA
ABD066	Aberdeen WEF 4	Siltstone flake blanks	0 to 5	MSA	-32.489288	23.866809	NCW	NA
ABD067	Aberdeen WEF 4	Siltstone flake retouched and core	0 to 5	MSA	-32.487455	23.867012	NCW	NA
ABD068	Aberdeen WEF 4	Hornfels blades	0 to 5	MSA	-32.48433	23.867727	NCW	NA
ABD069	Aberdeen WEF 4	Siltstone core	0 to 5	MSA	-32.480231	23.870008	NCW	NA
ABD070	Aberdeen WEF 4	Patinated hornfels flakes	0 to 5	MSA	-32.474679	23.876833	NCW	NA
ABD071	Aberdeen WEF 4	Corrugated iron shed, stock kraal	n/a	Modern	-32.470804	23.878399	NCW	NA
ABD072	Aberdeen WEF 4	Hornfels and siltstone flakes	0 to 5	MSA	-32.468664	23.87574	NCW	NA

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ABD073	Aberdeen WEF 4	Early MSA siltstone flake, large	0 to 5	MSA	-32.462922	23.878566	NCW	NA
ABD074	Aberdeen WEF 4	Hornfels core and flake	0 to 5	MSA	-32.51265	23.869772	NCW	NA
ABD075	Aberdeen WEF 4	Hornfels flakes	0 to 5	MSA	-32.517396	23.867857	NCW	NA
ABD076	Aberdeen WEF 4	Siltstone flake and core	0 to 5	MSA	-32.520892	23.863927	NCW	NA
ABD077	Aberdeen WEF 4	Hornfels core, point, siltstone core	5 to 10	MSA	-32.525421	23.862693	NCW	NA
ABD078	Aberdeen WEF 4	Hornfels patinated flakes	0 to 5	MSA	-32.52503	23.849577	NCW	NA
ABD079	Aberdeen WEF 4	Long siltstone flake early MSA	0 to 5	MSA	-32.521934	23.835411	NCW	NA
ABD080	Aberdeen WEF 3	Hornfels retouched flake	0 to 5	LSA	-32.517052	23.829281	NCW	NA
ABD081	Aberdeen WEF 3	Siltstone flake early MSA	0 to 5	MSA	-32.513014	23.831667	NCW	NA
ABD082	Aberdeen WEF 3	Hornfels blanks and long flake with some retouch	0 to 5	MSA	-32.512923	23.824353	NCW	NA
ABD083	Aberdeen WEF 3	Siltstone radial core	0 to 5	MSA	-32.524496	23.824034	NCW	NA
ABD084	Aberdeen WEF 4	Siltstone blade flakes	0 to 5	MSA	-32.529369	23.834374	NCW	NA
ABD085	Aberdeen WEF 4	Siltstone flakes	0 to 5	MSA	-32.535178	23.84787	NCW	NA
ABD086	Aberdeen WEF 4	Hornfels flake and siltstone blade	0 to 5	MSA	-32.535086	23.856285	NCW	NA
ABD087	Aberdeen WEF 4	Dark siltstone flake point and hornfels core flake	0 to 5	MSA	-32.545399	23.84854	NCW	NA
ABD088	Aberdeen WEF 4	Hornfels flake with longitudinal scarring, point patinated	0 to 5	MSA	-32.551165	23.835017	NCW	NA
ABD089	Aberdeen WEF 4	Chert and hornfels flakes	0 to 5	MSA	-32.551188	23.819385	NCW	NA
ABD090	Aberdeen WEF 3	Siltstone core and flake	0 to 5	MSA	-32.535018	23.815856	NCW	NA
ABD091	Aberdeen WEF 4	Nooitgedacht Sandstone ruin, brick alterations, next to fully demolished brick buildings	n/a	Historic	-32.512902	23.886884	IIIC	500m Buffer
ABD092	Aberdeen WEF 4	Karroorivier Farmhouse complex, hipped corrugated iron roof	n/a	Modern	-32.515982	23.890521	NCW	NA
ABD093	Aberdeen WEF 4	Plaas 94, farmhouse complex, hipped corrugated iron roof, outbuildings	n/a	Historic	-32.517275	23.857198	IIIC	500m Buffer
ABD094	Aberdeen WEF 3	Thinned hornfels flakes	0 to 5	MSA	-32.51731	23.816318	NCW	NA
ABD095	Aberdeen WEF 3	Siltstone flake blanks	0 to 5	MSA	-32.506405	23.815506	NCW	NA
ABD096	Aberdeen WEF 3	Retouched chert and hornfels flakes	5 to 10	LSA	-32.498449	23.833291	NCW	NA
ABD097	Aberdeen WEF 3	Chert core, hornfels core, siltstone flake	0 to 5	LSA+MSA	-32.491138	23.834719	NCW	NA
ABD098	Aberdeen WEF 3	Large siltstone core	0 to 5	MSA	-32.496742	23.828187	NCW	NA
ABD099	Aberdeen WEF 3	Hornfels microliths	0 to 5	LSA	-32.501151	23.82293	NCW	NA
ABD100	Aberdeen WEF 3	Quartz core and siltstone point	0 to 5	LSA	-32.507525	23.808055	NCW	NA
ABD101	Aberdeen WEF 3	Creamy white siltstone core and blade flake	0 to 5	MSA	-32.499483	23.801237	NCW	NA
ABD102	Aberdeen WEF 3	Siltstone points	0 to 5	MSA	-32.495024	23.792018	NCW	NA
ABD103	Aberdeen WEF 3	Hornfels blade and reddish flake	0 to 5	MSA	-32.496126	23.781583	NCW	NA
ABD104	Aberdeen WEF 3	Siltstone core	0 to 5	MSA	-32.49738	23.774064	NCW	NA
ABD105	Aberdeen WEF 3	Various hornfels flakes	5 to 10	MSA	-32.502143	23.778798	NCW	NA
ABD106	Aberdeen WEF 3	Long siltstone flake	0 to 5	MSA	-32.507056	23.785914	NCW	NA
ABD107	Aberdeen WEF 3	Siltstone flakes	0 to 5	MSA	-32.512928	23.786206	NCW	NA
ABD108	Aberdeen WEF 3	Glossy hornfels flake, retouched, siltstone flakes	0 to 5	MSA	-32.521358	23.786448	NCW	NA
ABD109	Aberdeen WEF 3	Sandstone walled old kraal	n/a	Historic	-32.514289	23.788289	IIIB	500m Buffer
ABD110	Aberdeen WEF 3	Windermere farmhouse complex	n/a	Historic	-32.52117	23.784322	IIIC	500m Buffer
ABD111	Aberdeen WEF 3	Milky quartz core and hornfels flake retouched	0 to 5	MSA	-32.516316	23.797424	NCW	NA

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ABD112	Aberdeen WEF 3	Long siltstone flake blank	0 to 5	MSA	-32.527108	23.791201	NCW	NA
ABD113	Aberdeen WEF 3	Hornfels flakes retouched	0 to 5	LSA	-32.531977	23.784722	NCW	NA
ABD114	Aberdeen WEF 3	Siltstone core and flakes	0 to 5	MSA	-32.539948	23.779234	NCW	NA
ABD115	Aberdeen WEF 2	Ccs/hornfels flaked core	0 to 5	MSA	-32.550458	23.771572	NCW	NA
ABD116	Aberdeen WEF 2	Siltstone core and flake	0 to 5	MSA	-32.555623	23.765118	NCW	NA
ABD117	Aberdeen WEF 2	Retouched hornfels flake	0 to 5	MSA	-32.554074	23.75052	NCW	NA
ABD118	Aberdeen WEF 2	Patinated siltstone flake	0 to 5	MSA	-32.547696	23.756984	NCW	NA
ABD119	Aberdeen WEF 3	Patinated hornfels flakes	0 to 5	MSA	-32.539923	23.761036	NCW	NA
ABD120	Aberdeen WEF 3	Hornfels point	0 to 5	LSA	-32.533506	23.756577	NCW	NA
ABD121	Aberdeen WEF 3	Siltstone radial core	0 to 5	MSA	-32.526013	23.761057	NCW	NA
ABD122	Aberdeen WEF 3	Siltstone core and flakes	0 to 5	MSA	-32.524304	23.768978	NCW	NA
ABD123	Aberdeen WEF 3	Hornfels core, siltstone flake, prepared platform	5 to 10	LSA+MSA	-32.521231	23.777057	NCW	NA
ABD124	Aberdeen WEF 4	Kraairivier ruined kraal buildings. Completely demolished, only sheep kraals remain. 2 possible graves	n/a	Historic	-32.487162	23.872703	IIIA	500m Buffer
ABD125	Aberdeen WEF 4	Patinated hornfels flakes	0 to 5	MSA	-32.55772167	23.84060068	NCW	NA
ABD126	Aberdeen WEF 4	Siltstone core and flake	0 to 5	MSA	-32.57167944	23.83145022	NCW	NA
ABD127	Aberdeen WEF 2	Siltstone core, debitage	0 to 5	MSA	-32.57561745	23.81783807	NCW	NA
ABD128	Aberdeen WEF 2	Hornfels and siltstone flake blanks and one retouched	0 to 5	MSA	-32.57257899	23.79528359	NCW	NA
ABD129	Aberdeen WEF 2	Siltstone flake blanks	0 to 5	MSA	-32.56080476	23.79970246	NCW	NA
ABD130	Aberdeen WEF 2	Retouched siltstone flake	0 to 5	MSA	-32.57016993	23.78541361	NCW	NA
ABD131	Aberdeen WEF 2	Siltstone core and flake debitage	0 to 5	MSA	-32.56882576	23.77262954	NCW	NA
ABD132	Aberdeen WEF 2	Siltstone flakes	0 to 5	MSA	-32.56361573	23.76892011	NCW	NA
ABD133	Aberdeen WEF 2	Hornfels core	0 to 5	LSA	-32.57418822	23.76271901	NCW	NA
ABD134	Aberdeen WEF 4	Skoongesig farmhouse complex, kraals, Victorian hipped roof, corrugated iron	n/a	Historic	-32.541497	23.871905	IIIB	500m Buffer
ABD135	Aberdeen WEF 2	Siltstone flake and blank	0 to 5	MSA	-32.5803082	23.76036900	NCW	NA
ABD136	Aberdeen WEF 2	Siltstone, prepared platform, flakes	0 to 5	MSA	-32.58416822	23.75840480	NCW	NA
ABD137	Aberdeen WEF 2	Patinated hornfels flake, siltstone with dorsal spine	0 to 5	MSA	-32.58397043	23.77106123	NCW	NA
ABD138	Aberdeen WEF 2	Retouched patinated hornfels flake	0 to 5	MSA	-32.58029787	23.78893561	NCW	NA
ABD139	Aberdeen WEF 2	Banded siltstone flakes, some retouch	0 to 5	MSA	-32.59364617	23.77994454	NCW	NA
ABD140	Aberdeen WEF 2	Hornfels point	0 to 5	LSA	-32.60026771	23.77645434	NCW	NA
ABD141	Aberdeen WEF 2	Patinated hornfels flake and siltstone flakes	5 to 10	MSA	-32.61069349	23.77025612	NCW	NA
ABD142	Aberdeen WEF 2	Siltstone core	0 to 5	MSA	-32.61604947	23.78108916	NCW	NA
ABD143	Aberdeen WEF 2	Siltstone debitage and flake blanks	0 to 5	MSA	-32.61560887	23.80221588	NCW	NA
ABD144	Aberdeen WEF4	Mon Repos farmhouse complex	n/a	Historic	-32.55707	23.90482	IIIB	500m Buffer
ABD145	Aberdeen WEF 2	Vibracrete shed	n/a	Modern	-32.584941	23.825182	NCW	NA
ABD146	Aberdeen WEF 2	Windmill and tanks, kraal	n/a	Modern	-32.589897	23.777151	NCW	NA
ABD147	Aberdeen WEF 2	Kraanvoelkuil farmhouse complex	n/a	Historic	-32.582567	23.740764	IIIC	500m Buffer
ABD148	Aberdeen WEF 2	Siltstone core and flakes	0 to 5	MSA	-32.61250264	23.78535872	NCW	NA
ABD149	Aberdeen WEF 2	Hornfels microlithic point	0 to 5	LSA	-32.60361299	23.81156525	NCW	NA
ABD150	Aberdeen WEF 2	Siltstone flake blank from a prepared core	0 to 5	MSA	-32.59283571	23.82130036	NCW	NA
ABD151	Aberdeen WEF 2	Siltstone core and flake	0 to 5	MSA	-32.59011917	23.82345052	NCW	NA

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ABD152	Aberdeen WEF 2	Siltstone flake and broken upper grindstone	0 to 5	LSA+MSA	-32.55515168	23.75679576	NCW	NA
ABD153	Aberdeen WEF 3	Siltstone flakes and cores	5 to 10	MSA	-32.54525186	23.77665354	NCW	NA
ABD154	Aberdeen WEF 2	Siltstone flakes	0 to 5	MSA	-32.58401629	23.78080765	NCW	NA
ABD155	Aberdeen WEF 2	Siltstone and dark quartzite flakes	0 to 5	MSA	-32.5751333	23.80595454	NCW	NA
ABD156	Aberdeen WEF 4	Siltstone flakes, some with large bulbs of percussion	0 to 5	MSA	-32.55168795	23.80656658	NCW	NA
ABD157	Aberdeen WEF 3	Siltstone core	0 to 5	MSA	-32.54254194	23.81435704	NCW	NA
ABD158	Aberdeen WEF 2	Early MSA siltstone flakes	0 to 5	MSA	-32.6212902	23.78548873	NCW	NA
ABD159	Aberdeen WEF 2	More Early MSA siltstone cores, flakes, point forms	5 to 10	MSA	-32.60912316	23.77735281	NCW	NA
ABD160	Aberdeen WEF 2	Siltstone core and flake with prominent bulb of percussion	0 to 5	MSA	-32.60888487	23.80861144	NCW	NA
ABD161	Aberdeen WEF 4	Hornfels core and patinated point	0 to 5	MSA	-32.56478821	23.83626392	NCW	NA
ABD162	Aberdeen WEF 4	Hornfels microlith and quartz chunk	0 to 5	LSA	-32.55060417	23.84528476	NCW	NA
ABD163	Aberdeen WEF 1	Early MSA siltstone radial core	0 to 5	MSA	-32.54273913	23.75303353	NCW	NA
ABD164	Aberdeen WEF 1	Silstone core, patinated hornels elongated flake	0 to 5	MSA	-32.5566985	23.73364366	NCW	NA
ABD165	Aberdeen WEF 3	Early MSA siltstone flakes with flake scars off dorsal surfaces	0 to 5	MSA	-32.51371307	23.7597658	NCW	NA
ABD166	Aberdeen WEF 3	Patinated hornfels blade flake	0 to 5	MSA	-32.50432178	23.76348445	NCW	NA
ABD167	Aberdeen WEF 3	Siltstone flakes	0 to 5	MSA	-32.49544616	23.78708612	NCW	NA
ABD168	Aberdeen WEF 3	Patinated hornfels flakes, some retouched	5 to 10	MSA	-32.5069005	23.8036082	NCW	NA
ABD169	Aberdeen WEF 3	Chert CCS point and quartz chunk/core	0 to 5	LSA	-32.49470323	23.83875481	NCW	NA
ABD170	Aberdeen WEF 3	Siltstone core and flake	0 to 5	MSA	-32.51789479	23.82311456	NCW	NA
ABD171	Aberdeen WEF 3	Siltstone flake	0 to 5	MSA	-32.50969276	23.83470847	NCW	NA
ABD172	Aberdeen WEF 4	Hornfels flake with edge worked	0 to 5	LSA	-32.5230985	23.85850193	NCW	NA
ABD173	Aberdeen WEF 2	Large vernacular stone walled kraal with high walls (2.5m high), local stone used and prominent marker on the landscape	n/a	Historic	-32.620601	23.797257	IIIA	500m Buffer
ABD174	Aberdeen WEF 4	Siltstone debitage and flake blanks	0 to 5	MSA	-32.5320266	23.84066954	NCW	NA
ABD175	Aberdeen WEF 4	Siltstone flake with transverse scarring at base of platform	0 to 5	MSA	-32.45638324	23.86069768	NCW	NA
ABD176	Aberdeen WEF 4	Banded siltstone flakes	0 to 5	MSA	-32.47725894	23.8736445	NCW	NA
ABD177	Aberdeen WEF 2	Siltstone flake point with prominent bulb of percussion	0 to 5	MSA	-32.54818355	23.76391834	NCW	NA

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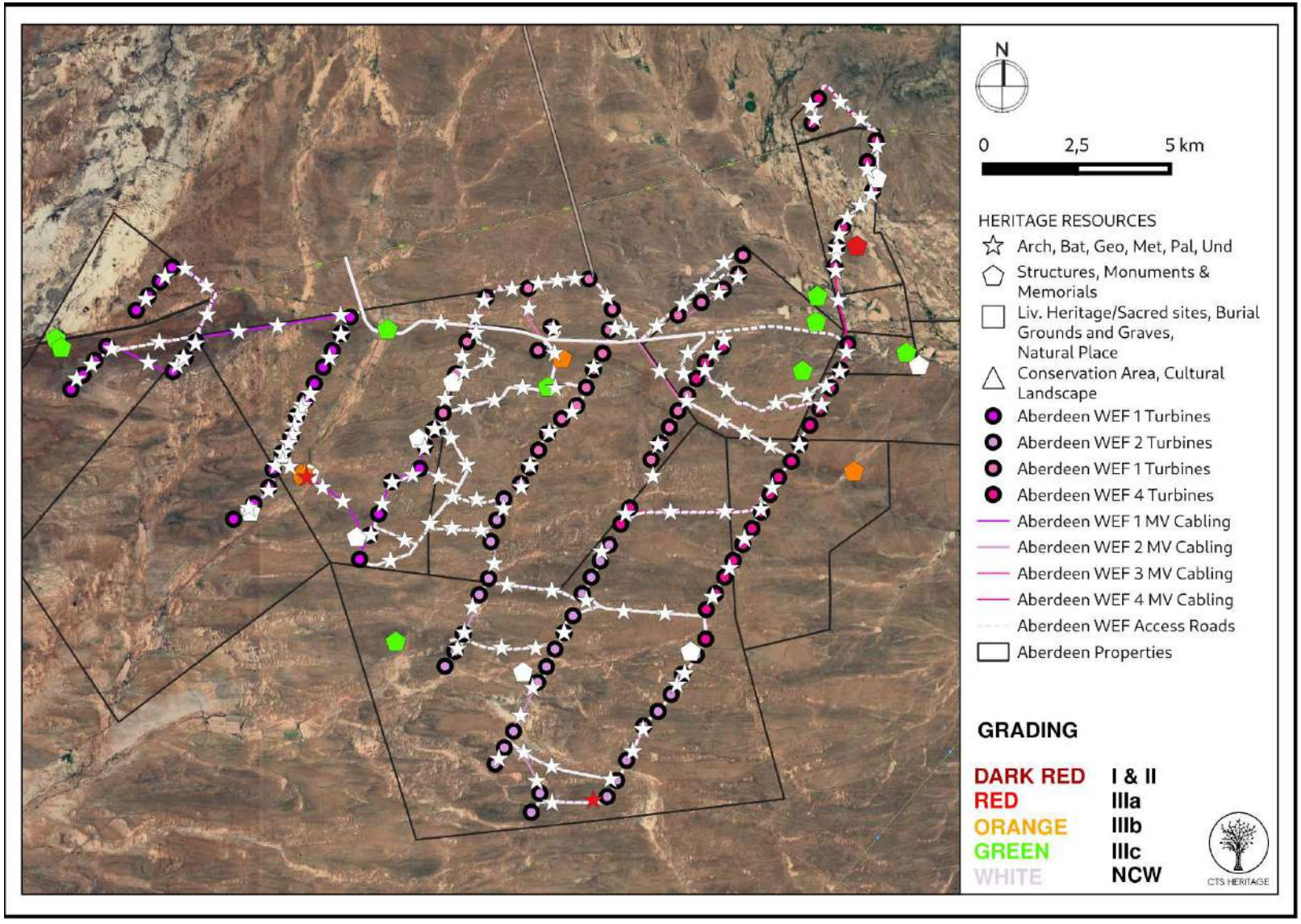

Figure 6: Map of all sites and observations noted within the development area

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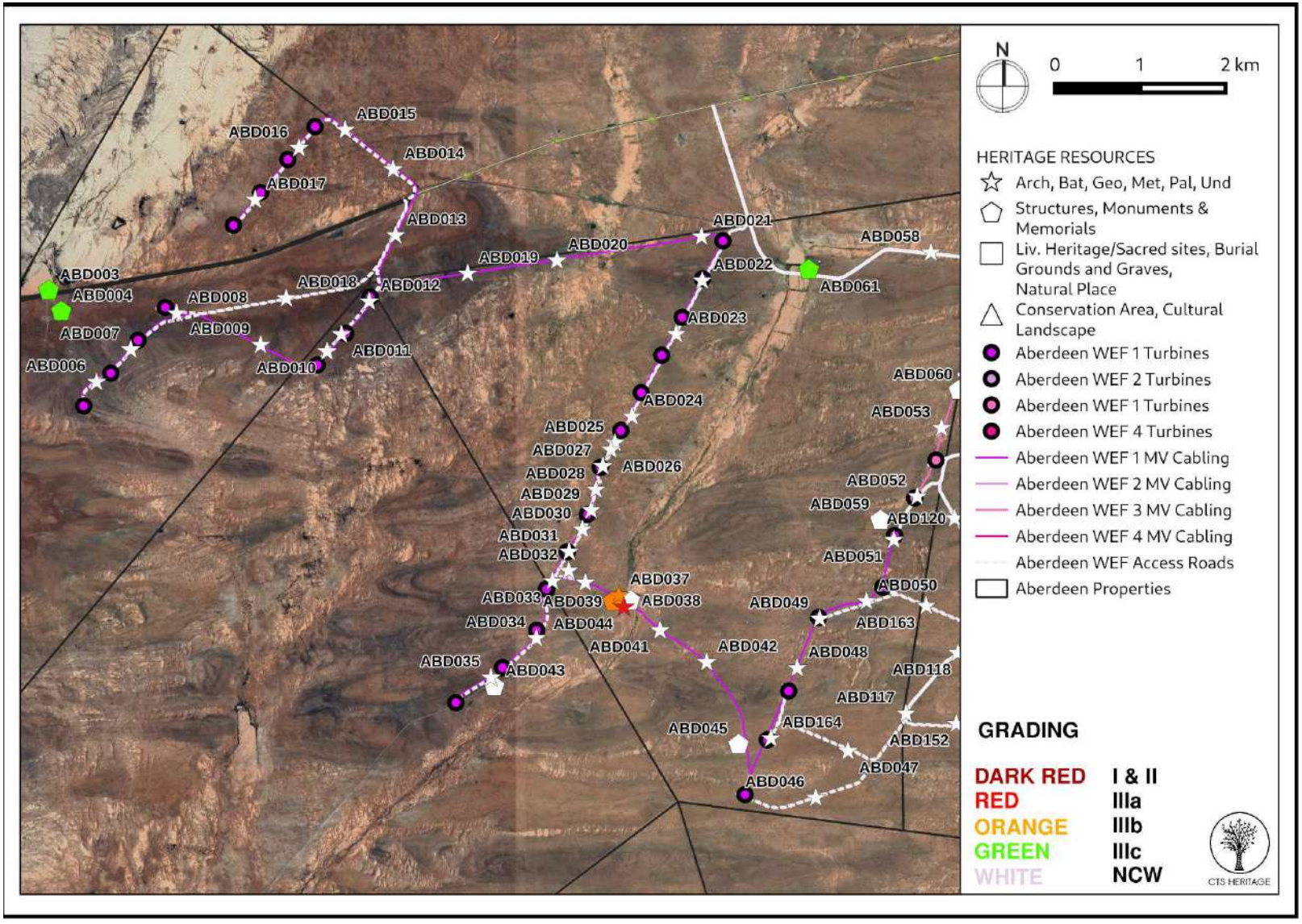

Figure 6.1: Map of all sites and observations noted within the development area for Aberdeen WEF 1

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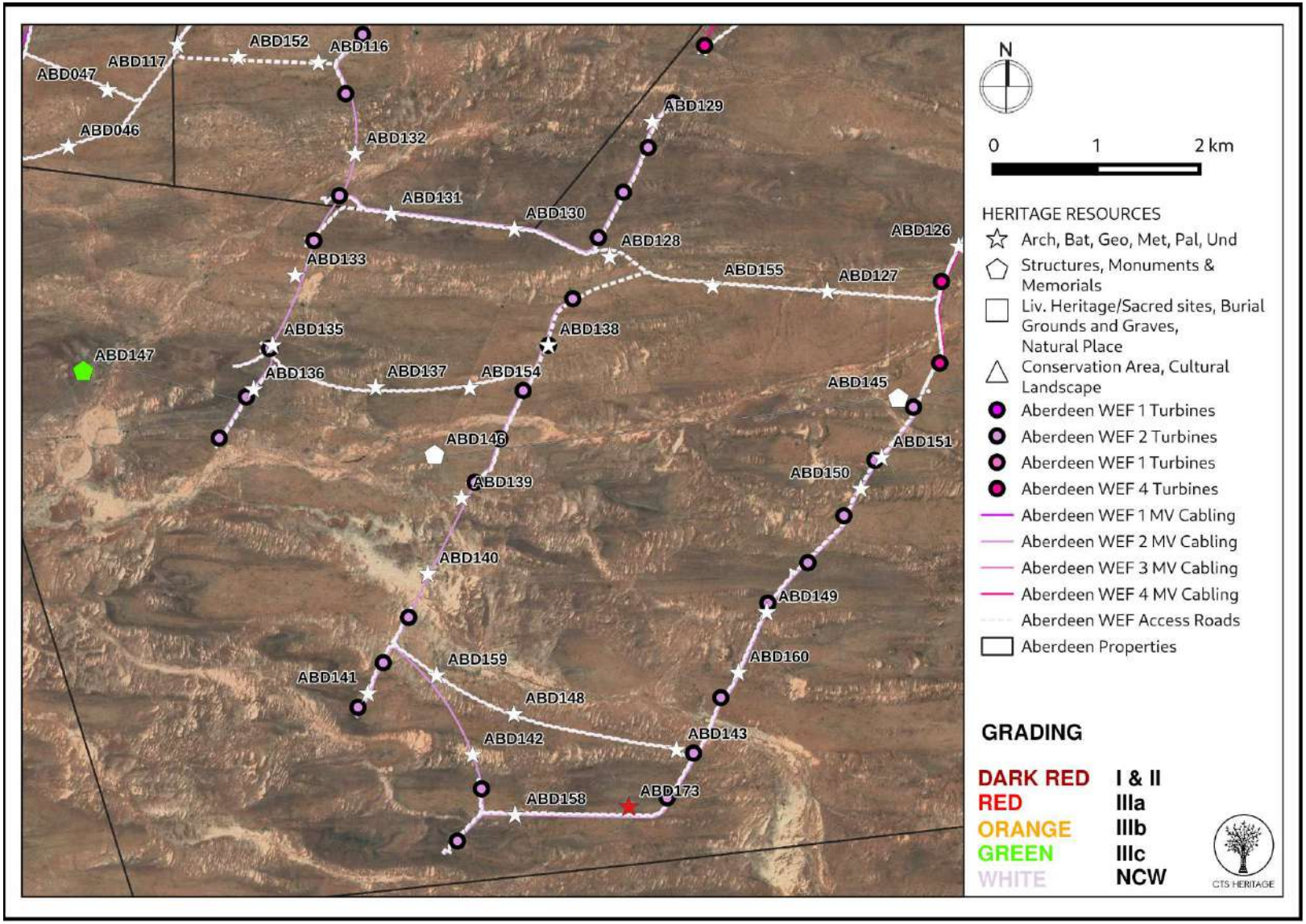

Figure 6.2: Map of all sites and observations noted within the development area for Aberdeen WEF 2

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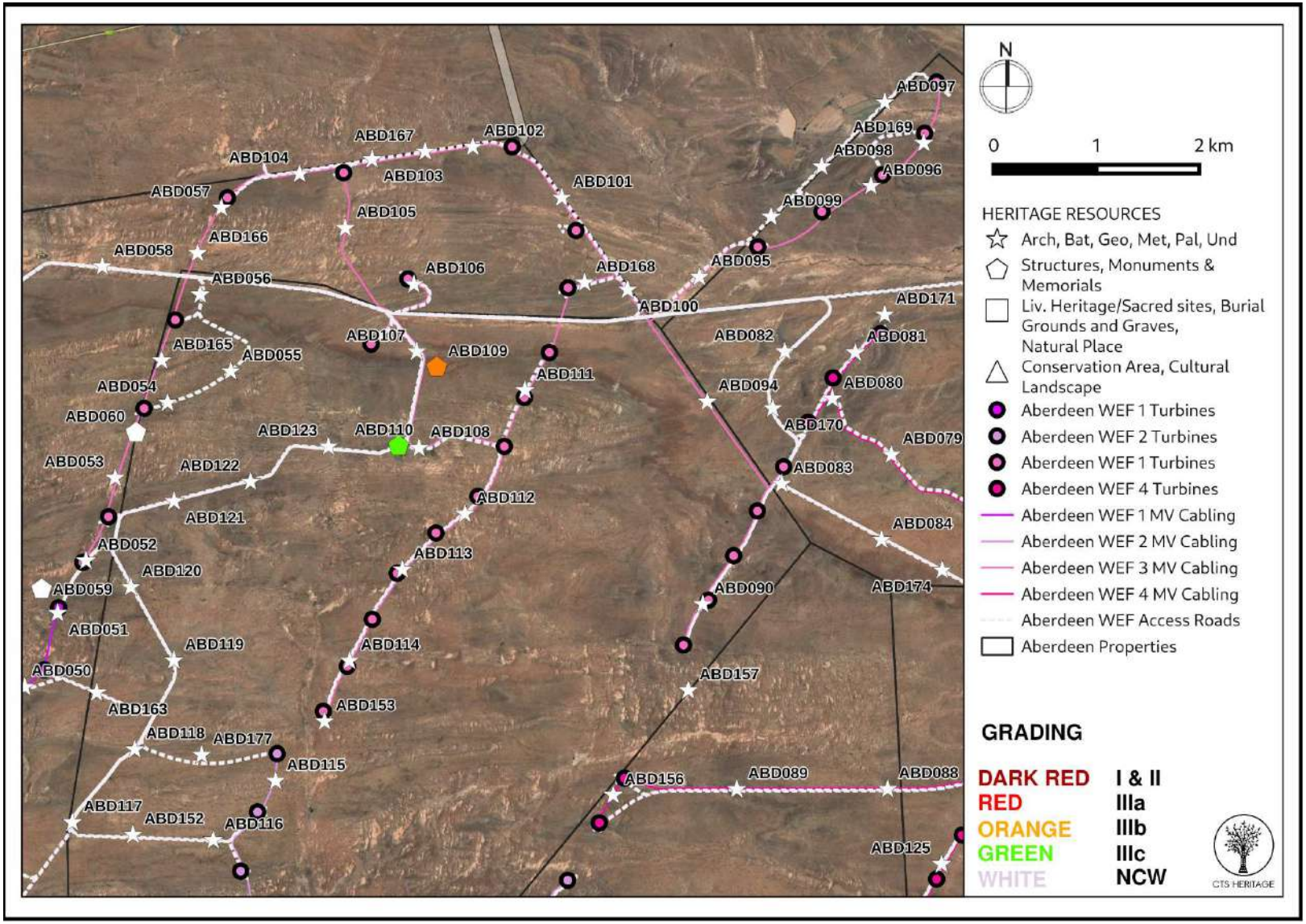

Figure 6.3: Map of all sites and observations noted within the development area for Aberdeen WEF 3

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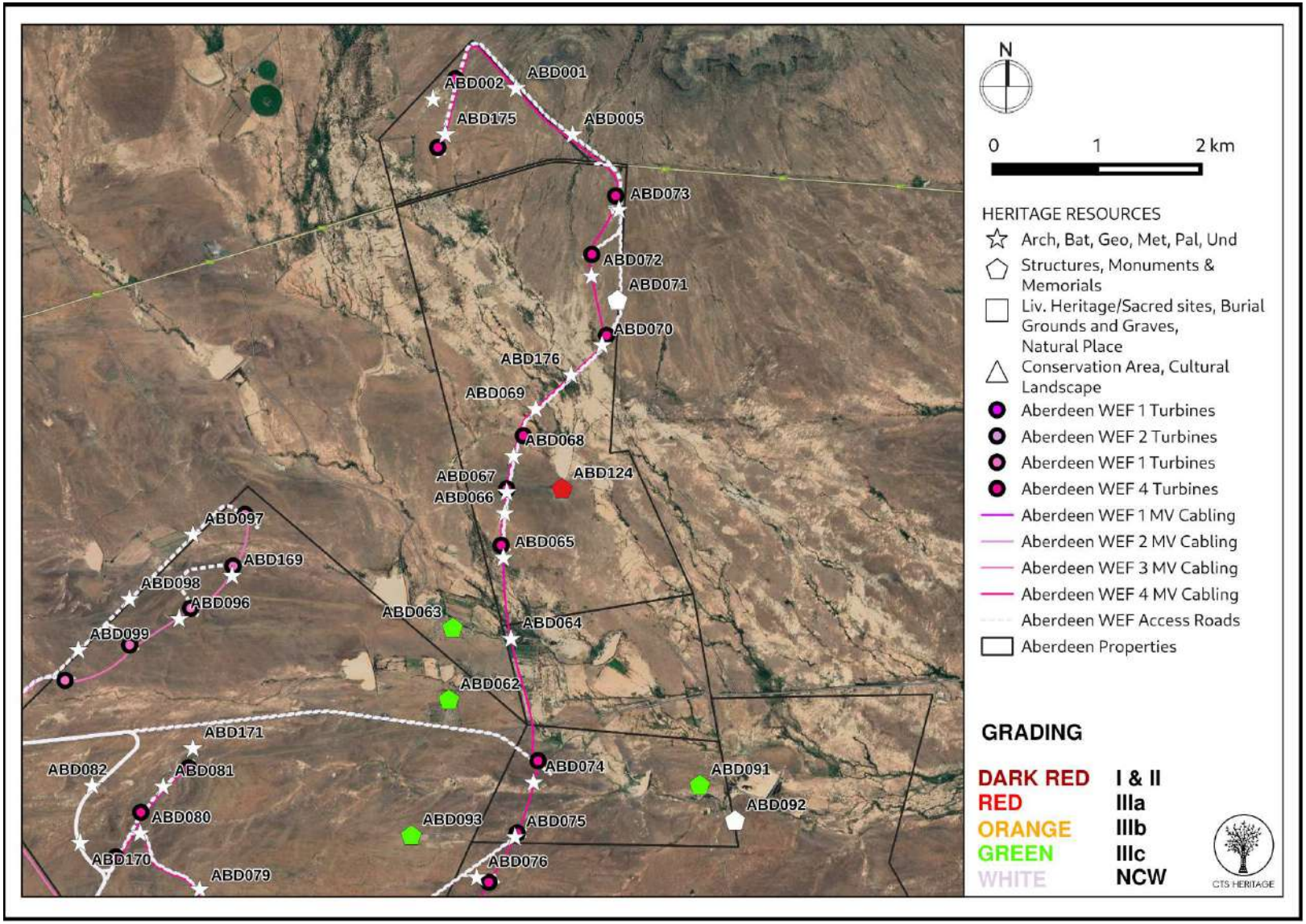

Figure 6.4: Map of all sites and observations noted within the development area for Aberdeen WEF 4

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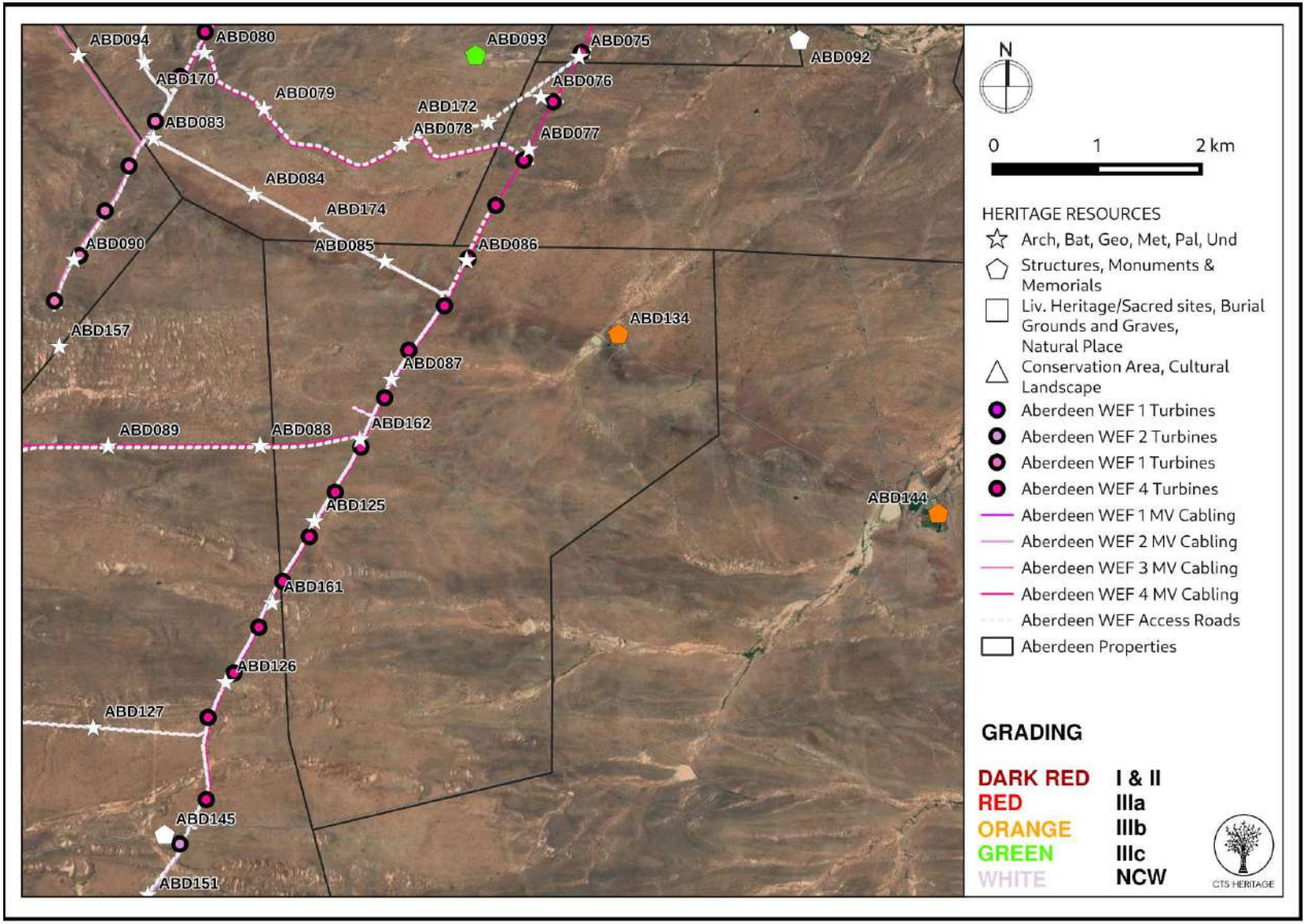

Figure 6.5: Map of all sites and observations noted within the development area for Aberdeen WEF 4

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4.3 Selected photographic record

(a full photographic record is available upon request)

Figure 6.1: Observation ABD003 - Ruined long building, no roof, sandstone walls, metal windows x 3 on southern end

Figure 6.2: Observation ABD004 - Pretoriuskuil farmhouse complex, Victorian hipped roofs, 3 labourers cottages

Figure 6.3: Observation ABD006 and ABD009 - Siltstone flakes and cores and Chert flakes

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Figure 6.4: Observation ABD010 and ABD015 - Hornfels flake, edge worked back, possible adze and Siltstone core and flakes

Figure 6.5 Observation ABD021 and ABD026 - Fine grained hornfels flakes, retouched, prepared platform and Siltstone point and flake, prominent bulb of percussion

Figure 6.6 Observation ABD036 - Square sandstone ruined farm dam, metal drum, bullet casings, glass, ceramics

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Figure 6.7 Observation ABD037 - Pile of sandstone, possibly collapsed structure, but next to glass, ceramics, metal midden

Figure 6.8 Observation ABD039 - Ruined sandstone large kraal

Figure 6.9: Observation ABD044 0 Possible graves, 5, maybe 6 headstones

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Figure 6.10: Observation ABD061 - Doornpoort ruined farmhouse complex

Figure 6.11: Observation ABD061 - Doornpoort ruined farmhouse complex

Figure 6.12: Observation ABD062 - Perseverance farmhouse complex, some buildings 1951

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Figures 6.13: Observation ABD062 - Perseverance farmhouse complex, some buildings 1951, earlier Victorian building too


Figure 6.14: Observation ABD063 - Perseverance ruins


Figure 6.15: Observation ABD063 - Perseverance ruins

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Figure 6.16: Observation ABD091 - Nooitgedacht Sandstone ruin, brick alterations, next to fully demolished brick buildings

Figure 6.17: Observation ABD092 - Karroorivier Farmhouse complex, hipped corrugated iron roof

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Figure 6.18: Observation ABD093 - Plaas 94, farmhouse complex, hipped corrugated iron roof, outbuildings

Figure 6.19: Observation ABD097 - Chert core, hornfels core, siltstone flake

Figure 6.20: Observation ABD101 - Creamy white siltstone core and blade flake

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Figure 6.21: Observation ABD109 - Sandstone walled old kraal

Figure 6.22: Observation ABD110 - Windermere farmhouse complex

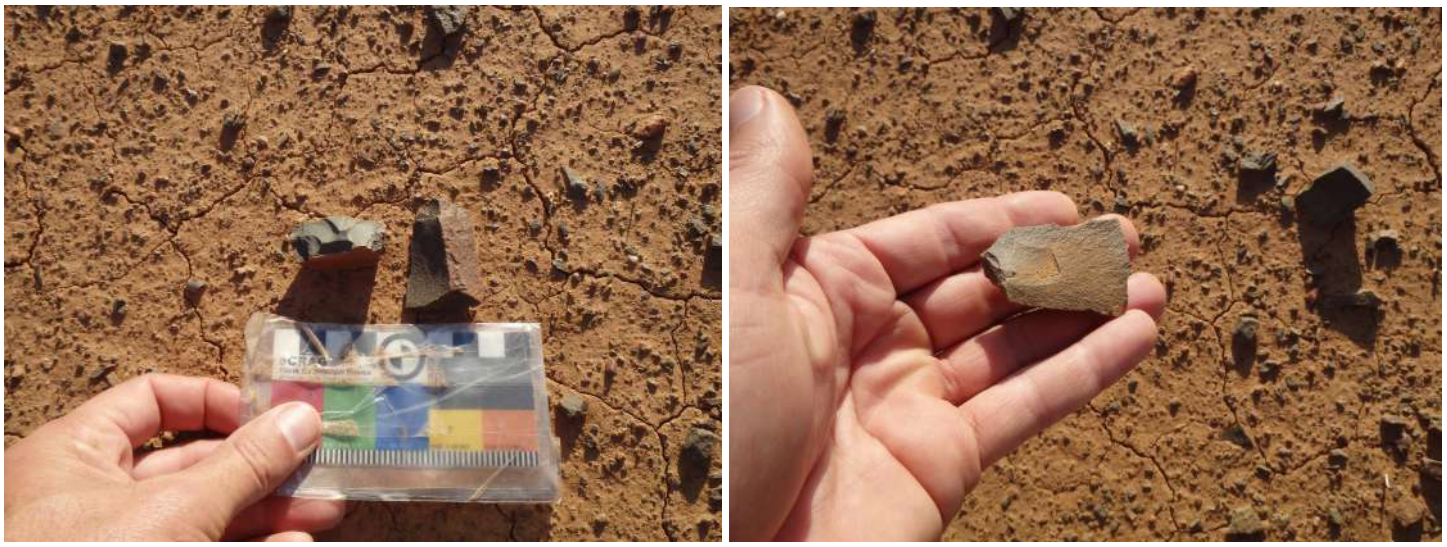

Figure 6.23: Observation ABD123 - Chert core, hornfels core, siltstone flake

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Figure 6.24: Observation ABD124 - Kraairivier ruined kraal buildings

Figure 6.25: Observation ABD134 - Skoongesig farmhouse complex, kraals, Victorian hipped roof, corrugated iron

Figure 6.26: Observation ABD144 - Mon Repos farmhouse complex

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Figure 6.27: Observation ABD147 - Kraanvoelkuil farmhouse complex

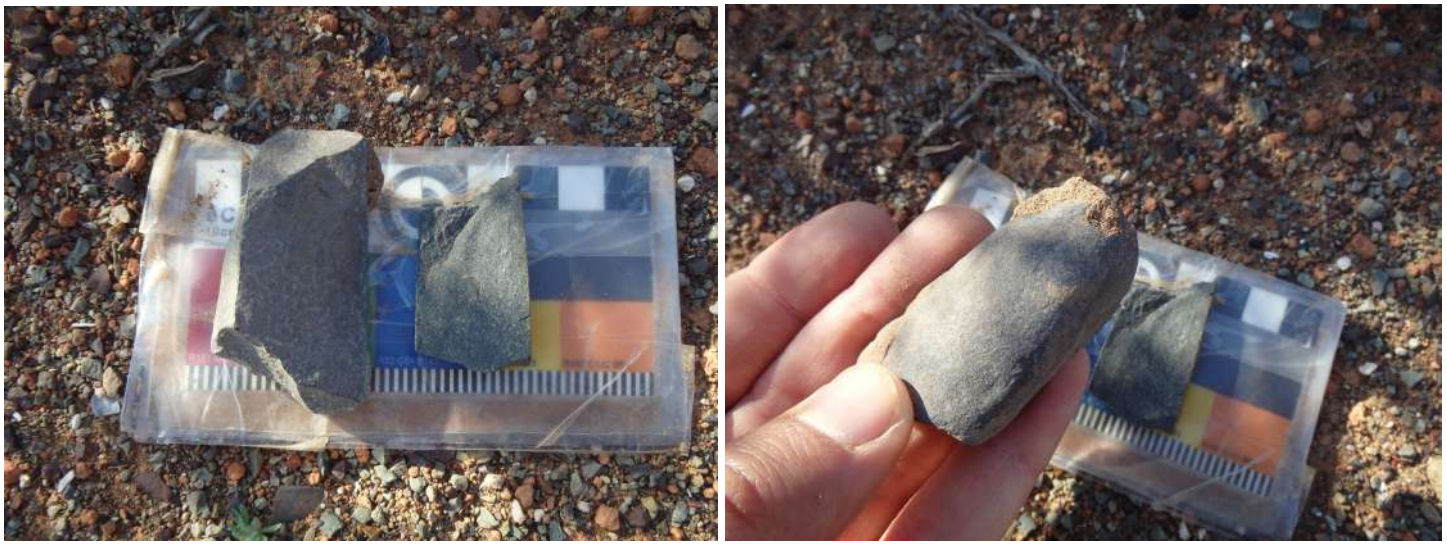

Figure 6.28: Observation ABD152 - Siltstone flake and broken upper grindstone

Figure 6.29: Observation ABD164 - Silstone core, patinated hornels elongated flake

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Figure 6.30: Observation ABD173 - Large vernacular stone walled kraal with high walls (2.5m high), local stone used and prominent marker on the landscape

Figure 6.31: Observation ABD177 - Siltstone flake point with prominent bulb of percussion

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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.

Aberdeen WEF 1

A total of 52 observations were made within proximity to the proposed layout for Aberdeen WEF 1 (Figure 6.1). Of these, the majority are low density Middle Stone Age or Later Stone Age artefact scatters that have been determined to have limited scientific value and have been determined to be not conservation-worthy. Two of the archaeological resources identified within this area were determined to be conservation-worthy, ABD037 and ABD044. ABD037 is described as a pile of sandstone, possibly collapsed structure, but located next to glass, ceramics and metal midden. This site is graded IIIB. Site SBD044 is described as a group of possible graves including 5, maybe 6, headstones. This site has been graded IIIA for its high levels of social significance. These sites form part of a cluster of resources along with sites ABD036 and ABD039. Both of these sites represent the ruins of historic kraals with associated material remains and are graded IIIB and IIIC. This complex of resources, along with a more modern dam (ABD038, graded as not conservation-worthy) are located along an existing dirt track located within the development area. No direct impact to these resources is anticipated based on the layout provided. It is, however, recommended that a no-development buffer of 500m is implemented around this cluster of sites in order to maintain some of the sense of place of this cluster. No turbines are located within this 500m buffer in the layouts provided.

Three structures identified in the field assessment fall within the area proposed for the development of Aberdeen WEF 1. Sites ABD003 and ABD004, both graded IIIC, are located along the R61 more than 1km from the nearest proposed turbine. No direct impact to these structures is anticipated, however a no-development buffer of at least 500m is recommended in order to retain a sense of place for these structures. Site ABD061 represents the Doornpoort ruined farmhouse complex, graded IIIC. This farm complex is located along an existing road and is located more than 1km from the nearest proposed turbine location. No direct impact to these structures is anticipated, however a no-development buffer of at least 500m is recommended in order to retain a sense of place for this complex.

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Importantly, one of the turbines is located only 70m from a grade IIIB rock art site identified by Bandama and Chirikure (2014) and described as rock engravings of a train (SAHRIS Site ID 35548). A no-go buffer of at least 100m is recommended for this unusual site.

Aberdeen WEF 2

A total of 37 observations were made within proximity to the proposed layout for Aberdeen WEF 2 (Figure 6.2). Of these, the majority are low density Middle Stone Age or Later Stone Age artefact scatters that have been determined to have limited scientific value and have been determined to be not conservation-worthy. One archaeological site of high local significance, ABD173, graded IIIA, is located within the area proposed for the Aberdeen WEF 2 development. This site is described as a large vernacular stone walled kraal with high walls (2.5m high), made from local stone and is a prominent marker on the landscape. This site is located approximately 400m from the nearest turbine. It is recommended that this turbine be relocated to respect a recommended 500m no-development buffer around this site in order to retain a sense of place for the kraal.

The structure identified at Site ABD147 represents the Kraanvoelkuil farmhouse complex. This site is graded IIIC and is located more than 1km from the nearest proposed turbine. As such, no direct or indirect impact is anticipated from the proposed development in the layout provided.

Aberdeen WEF 3

A total of 48 observations were made within proximity to the proposed layout for Aberdeen WEF 3 (Figure 6.3). Of these, the majority are low density Middle Stone Age or Later Stone Age artefact scatters that have been determined to have limited scientific value and have been determined to be not conservation-worthy. Similar artefact scatters identified by Booth and Sanker (2013) are located in proximity to one of the turbines in the north of the WEF 3 development area, however no direct impact is anticipated in the proposed layout and no further mitigation is recommended.

Two structures of significance have been identified as having heritage value within the area proposed for the Aberdeen WEF 3 development area - sites ABD109, graded IIIB and ABD110, graded IIIC. Site ABD109 is described as a sandstone walled old kraal. This site is located approximately 150m from an existing road and is located more than 600m from the nearest proposed turbine based on the layout provided. As such, no direct or indirect impact is anticipated from the proposed development, however should the layout be amended, it is recommended that a 500m no-development buffer be implemented around this site in order to retain a sense of place for the kraal.

Site ABD110 marks the Windermere farmhouse complex (Graded IIIC). As this site is located more than 900m from the nearest proposed turbines, no direct or indirect impact is anticipated as a result from the proposed turbine infrastructure in the layout provided. However, as per the provided layout, it appears that a proposed road alignment runs right through this structure. In order to ensure that this structure is not impacted by the proposed road alignment, it is recommended that the road alignment be adjusted to run approximately 50m away from Site ABD110 as per Figure 8.5 below.

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Aberdeen WEF 4

A total of 40 observations were made within proximity to the proposed layout for Aberdeen WEF 4 (Figure 6.4 and 6.5). Of these, the majority are low density Middle Stone Age or Later Stone Age artefact scatters that have been determined to have limited scientific value and have been determined to be not conservation-worthy. Sites ABD091 (graded IIIC), ABD134 (graded IIIB) and ABD144 (graded IIIB) are located more than 1.5km from the nearest proposed infrastructure and as such, no direct or indirect impact to these resources is anticipated.

Site ABD062 represents the Perseverance farmhouse complex. This farm complex includes some buildings dated to 1951 as well as an earlier Victorian building. This complex is graded IIIC and is located more than 1km from the nearest proposed turbine in the layout provided. Site ABD063 represents the ruins of older structures associated with the Perseverance farm. These ruins are also graded IIIC and are located more than 900m from the nearest proposed turbine in the layout provided. As such, no direct or indirect impact is anticipated from the proposed development to either site ABD062 or 063. However, should the layout be amended, it is recommended that a 500m no-development buffer be implemented around these sites in order to retain a sense of place.

Site ABD093 is described as Plaas 94, a farmhouse complex with a hipped corrugated iron roof and outbuildings. This site has been graded IIIC. This site is located approximately 800m from the nearest proposed turbine in the layout provided. As such, no direct or indirect impact is anticipated from the proposed development. However, should the layout be amended, it is recommended that a 500m no-development buffer be implemented around this site in order to retain a sense of place.

Site ABD124 is described as the Kraairivier ruined kraal buildings. These buildings have been completely demolished, and only sheep kraals remain. However, we did identify two possible graves associated with this complex. Due to the high local significance of the graves, this site has been graded as IIIA. This site is located approximately 500m from the nearest proposed turbine in the layout provided. As such, no direct or indirect impact is anticipated from the proposed development. However, should the layout be amended, it is recommended that a 500m no-development buffer be implemented around this site in order to retain a sense of place.

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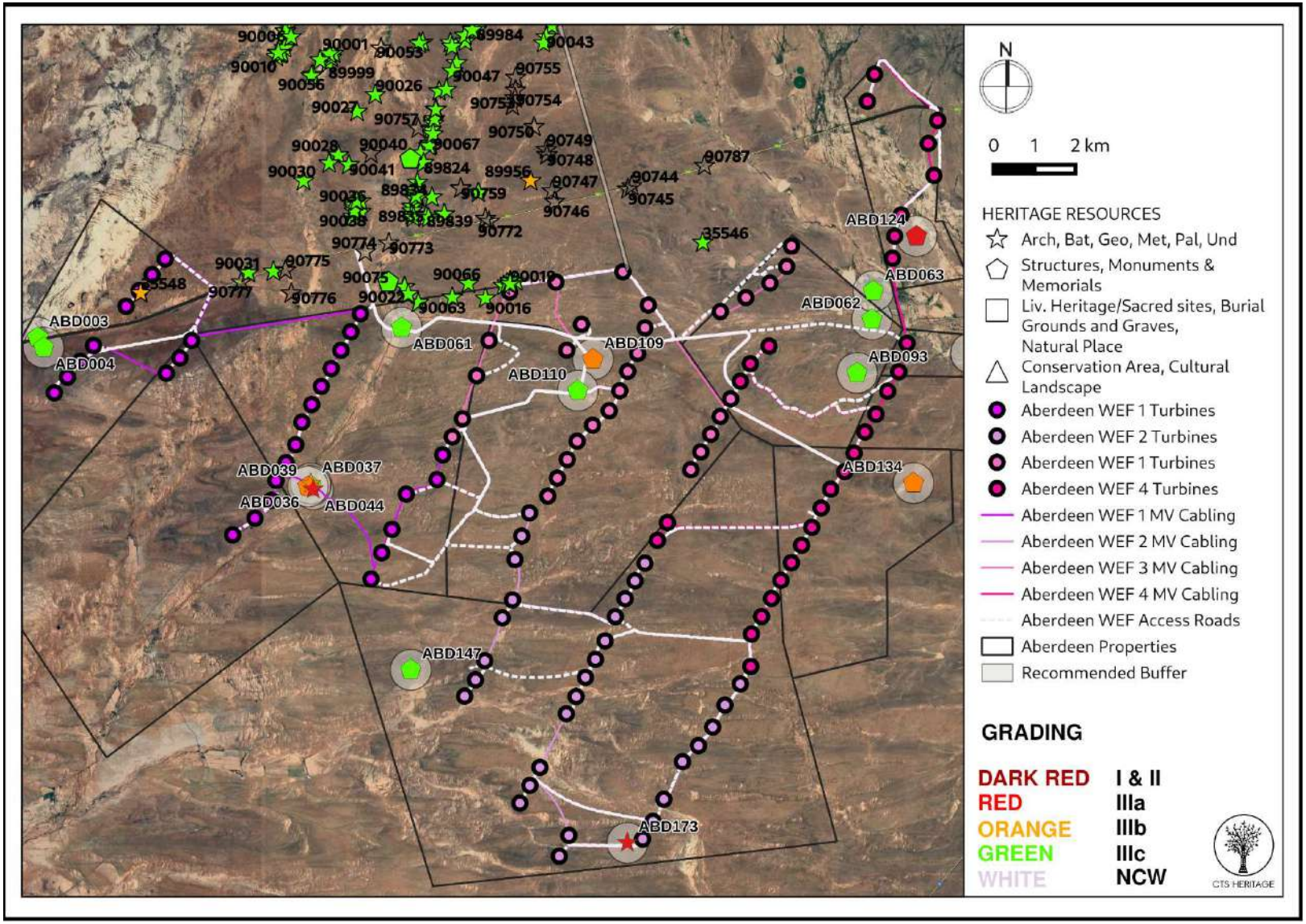

Figure 8: Map of all significant heritage resources noted within the development area

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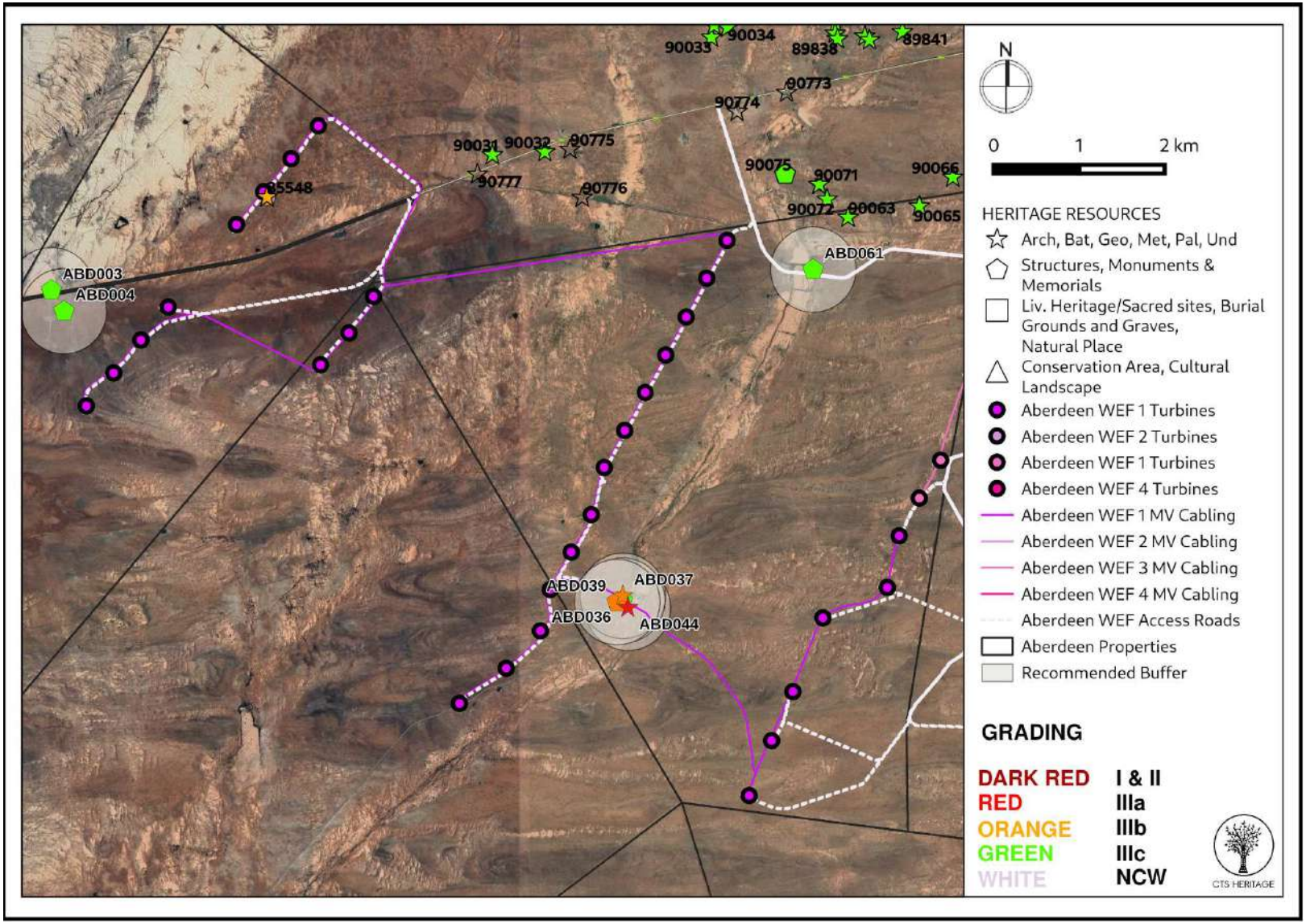

Figure 8.1: Map of all significant heritage resources noted within the development area for Aberdeen WEF 1

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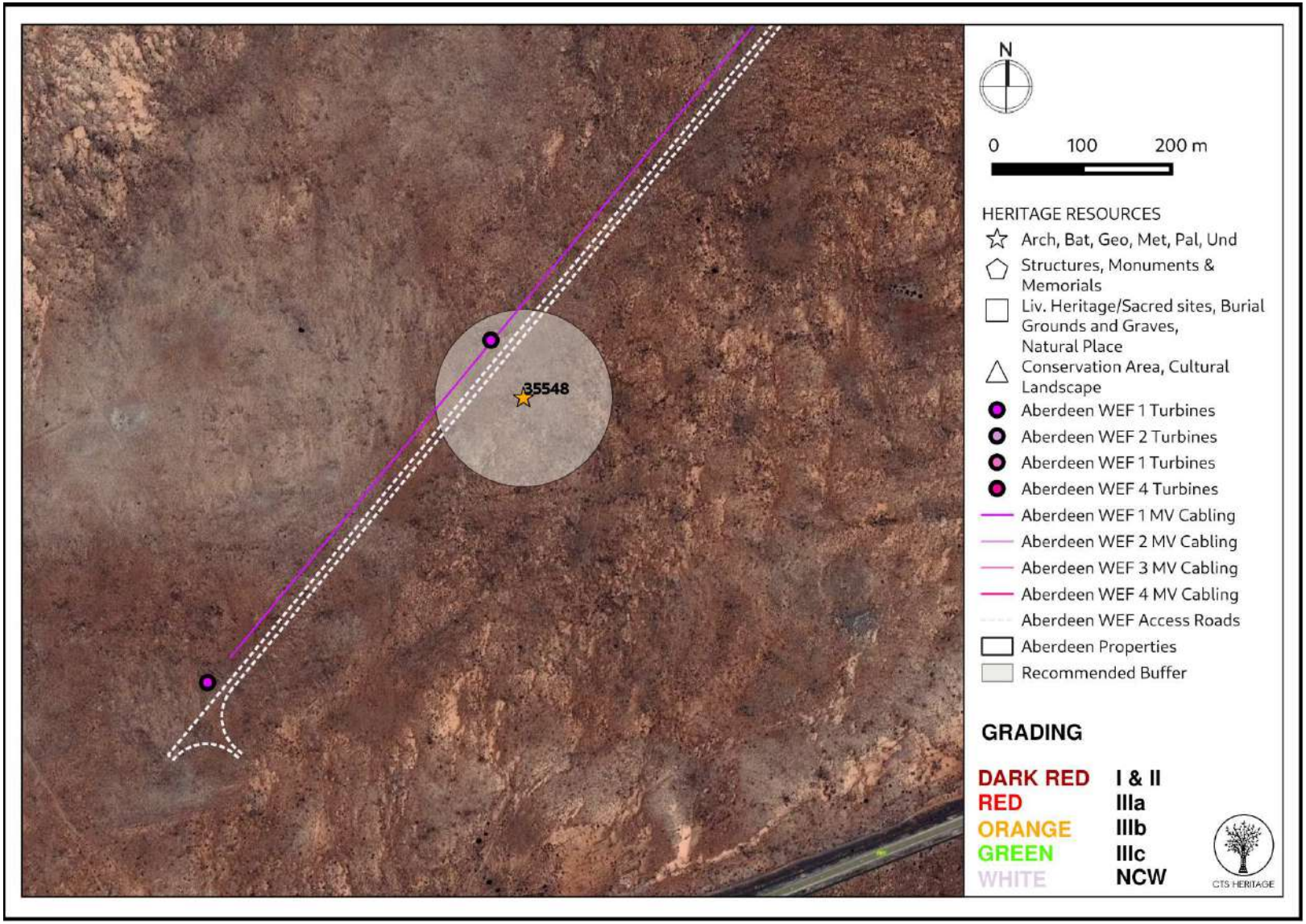

Figure 8.2: Map of significant heritage resources noted within the development area for Aberdeen WEF 1

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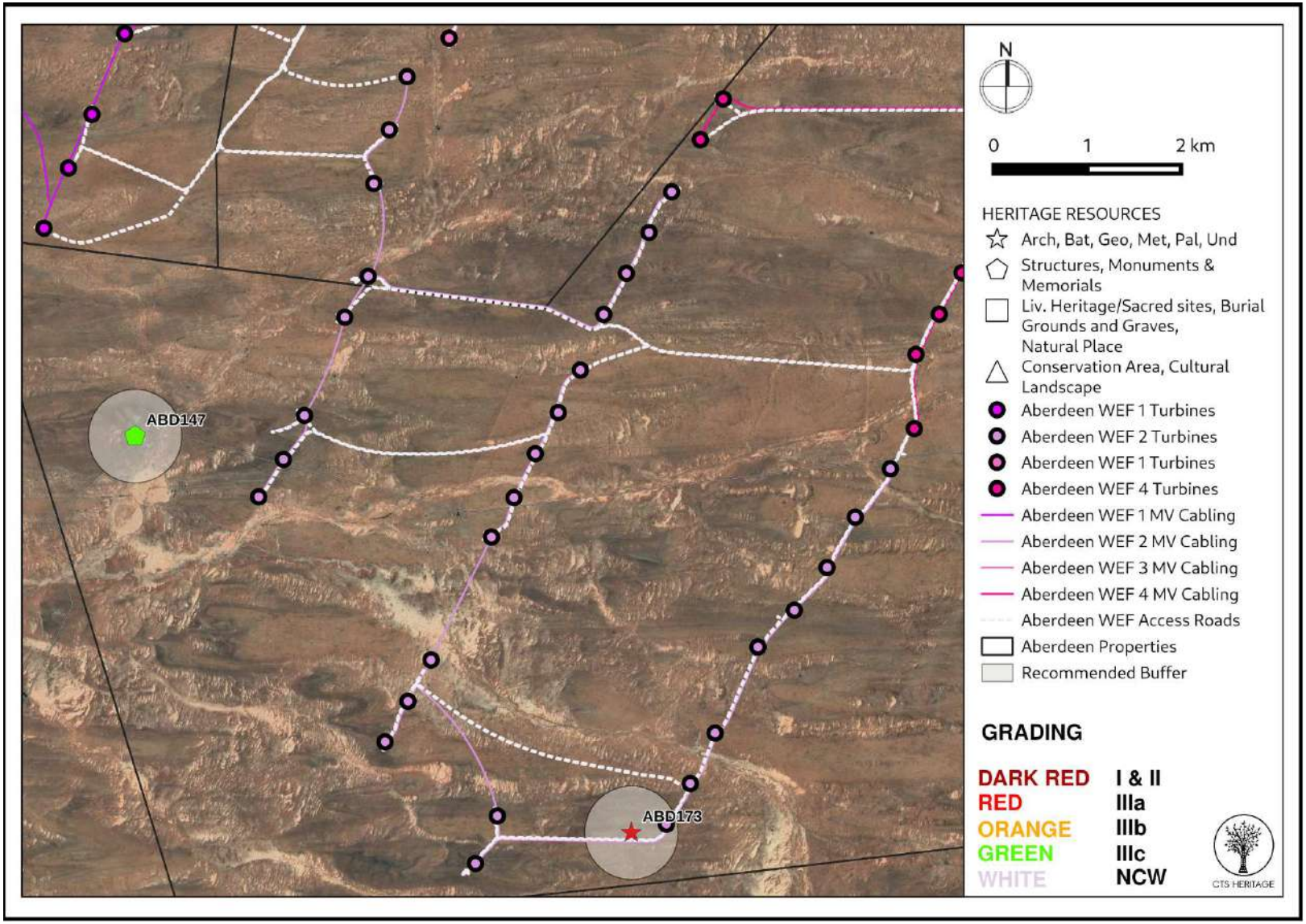

Figure 8.3: Map of all significant heritage resources noted within the development area for Aberdeen WEF 2

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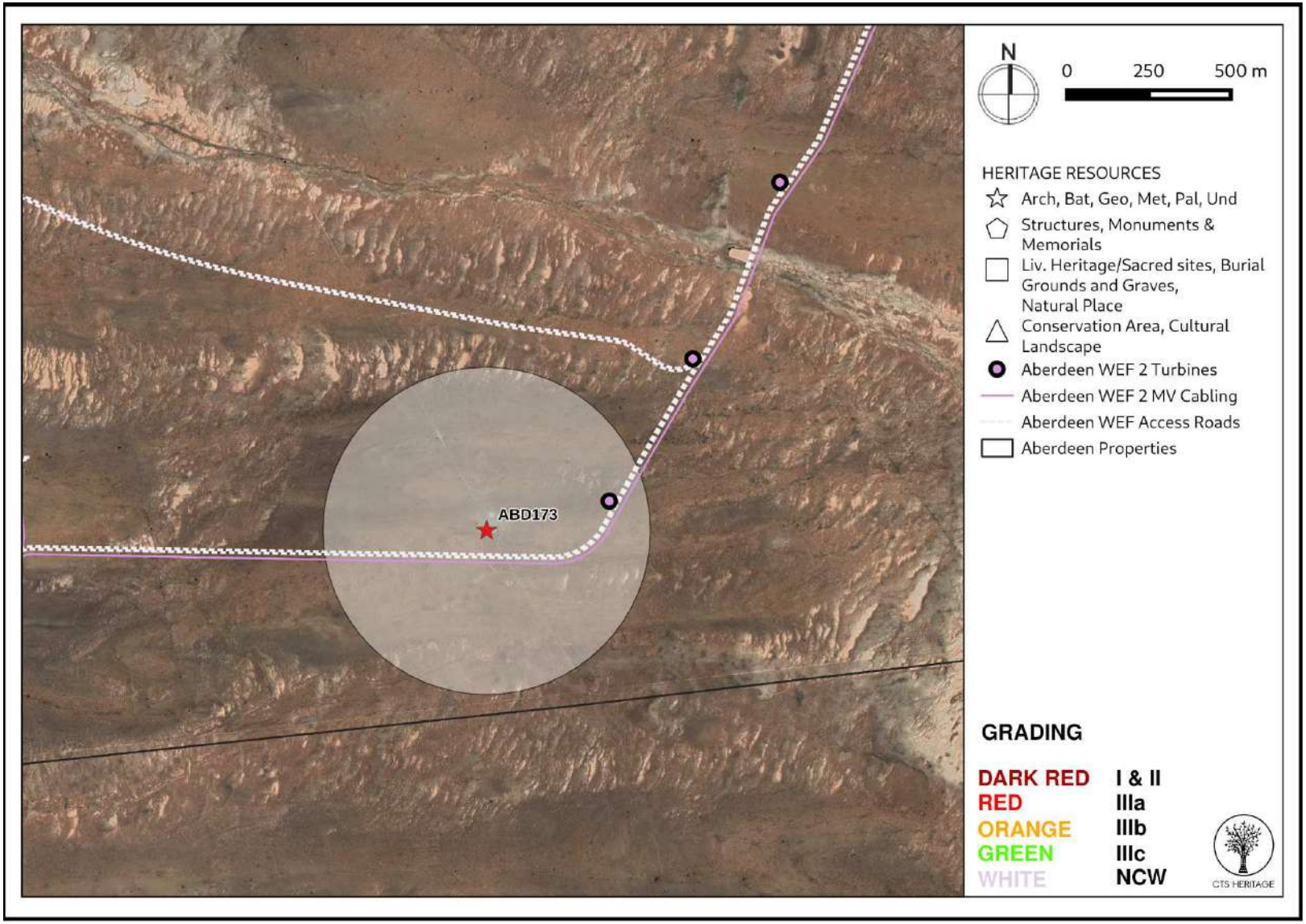

Figure 8.4: Map of all significant heritage resources noted within the development area for Aberdeen WEF 2

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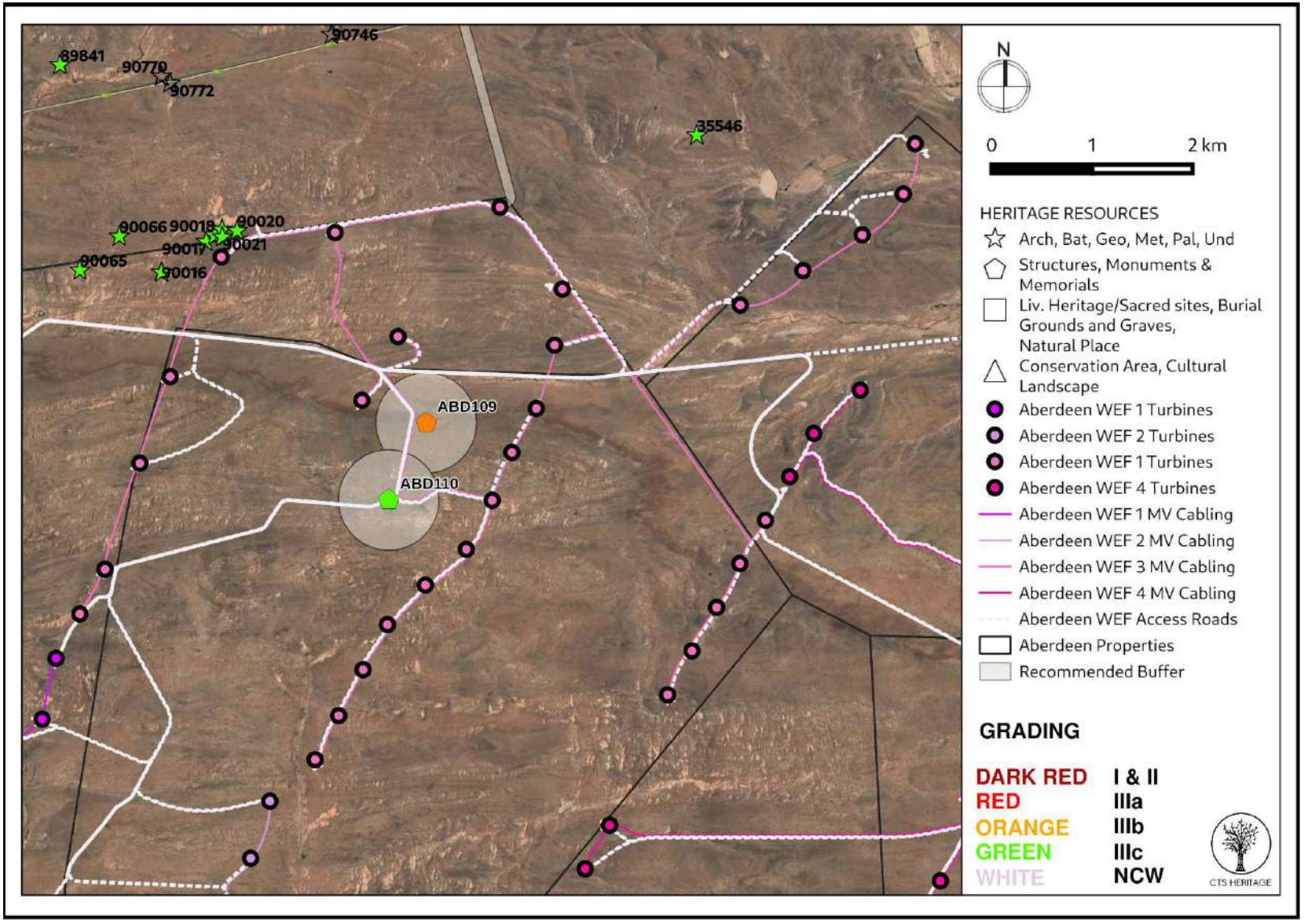

Figure 8.5: Map of all significant heritage resources noted within the development area for Aberdeen WEF 3

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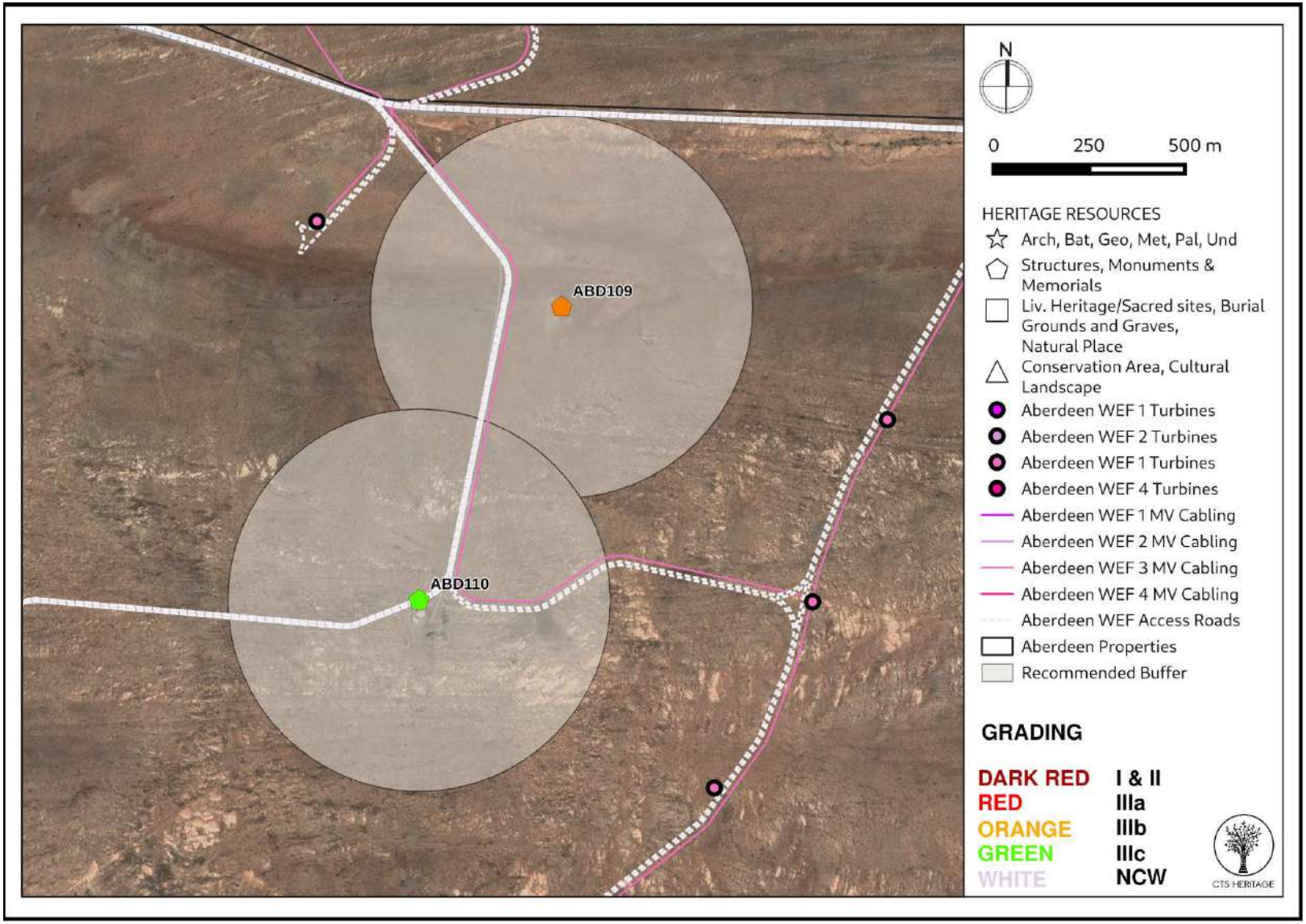

Figure 8.6: Map of all significant heritage resources noted within the development area for Aberdeen WEF 3

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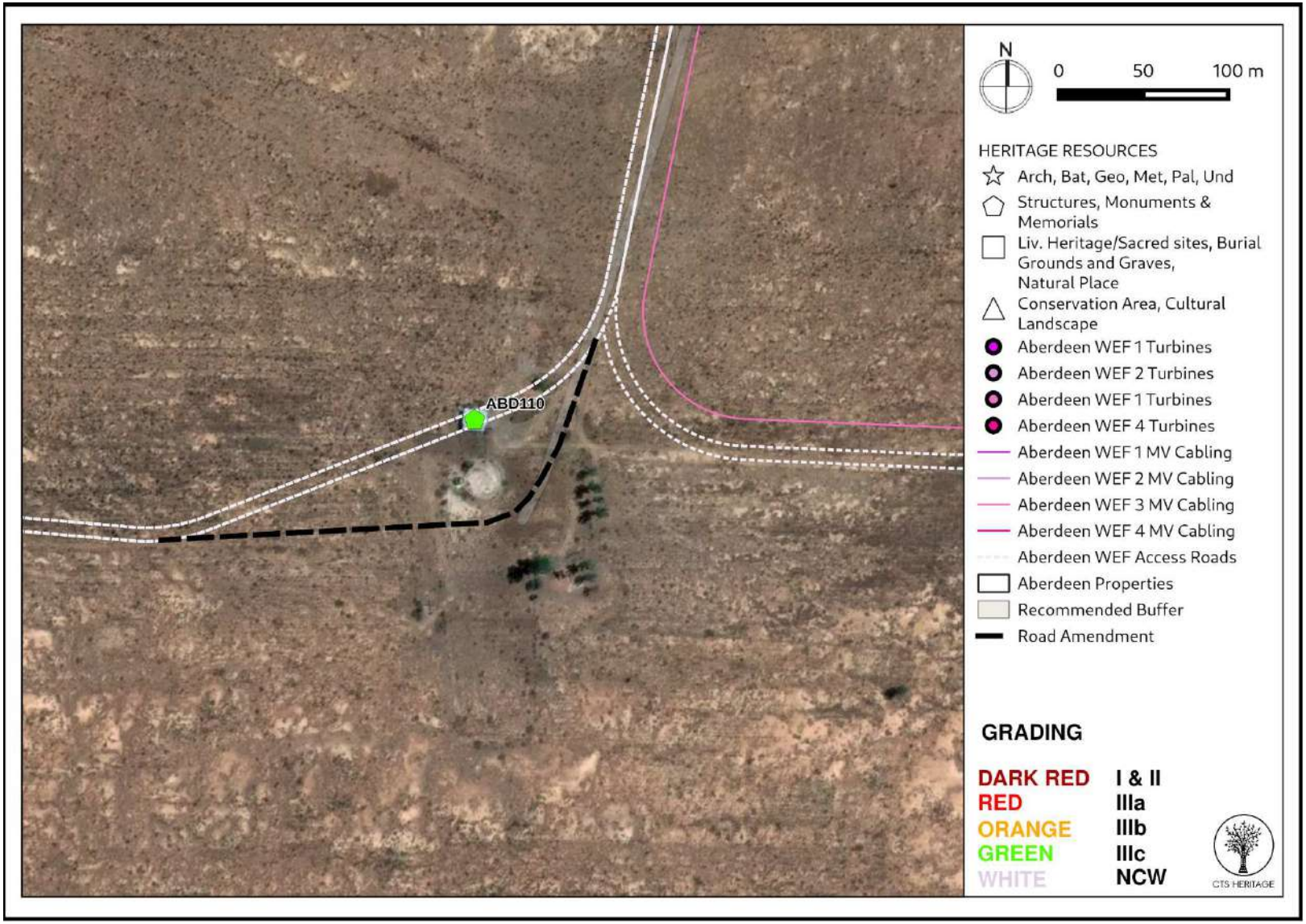

Figure 8.7: Map of all significant heritage resources noted within the development area for Aberdeen WEF 3

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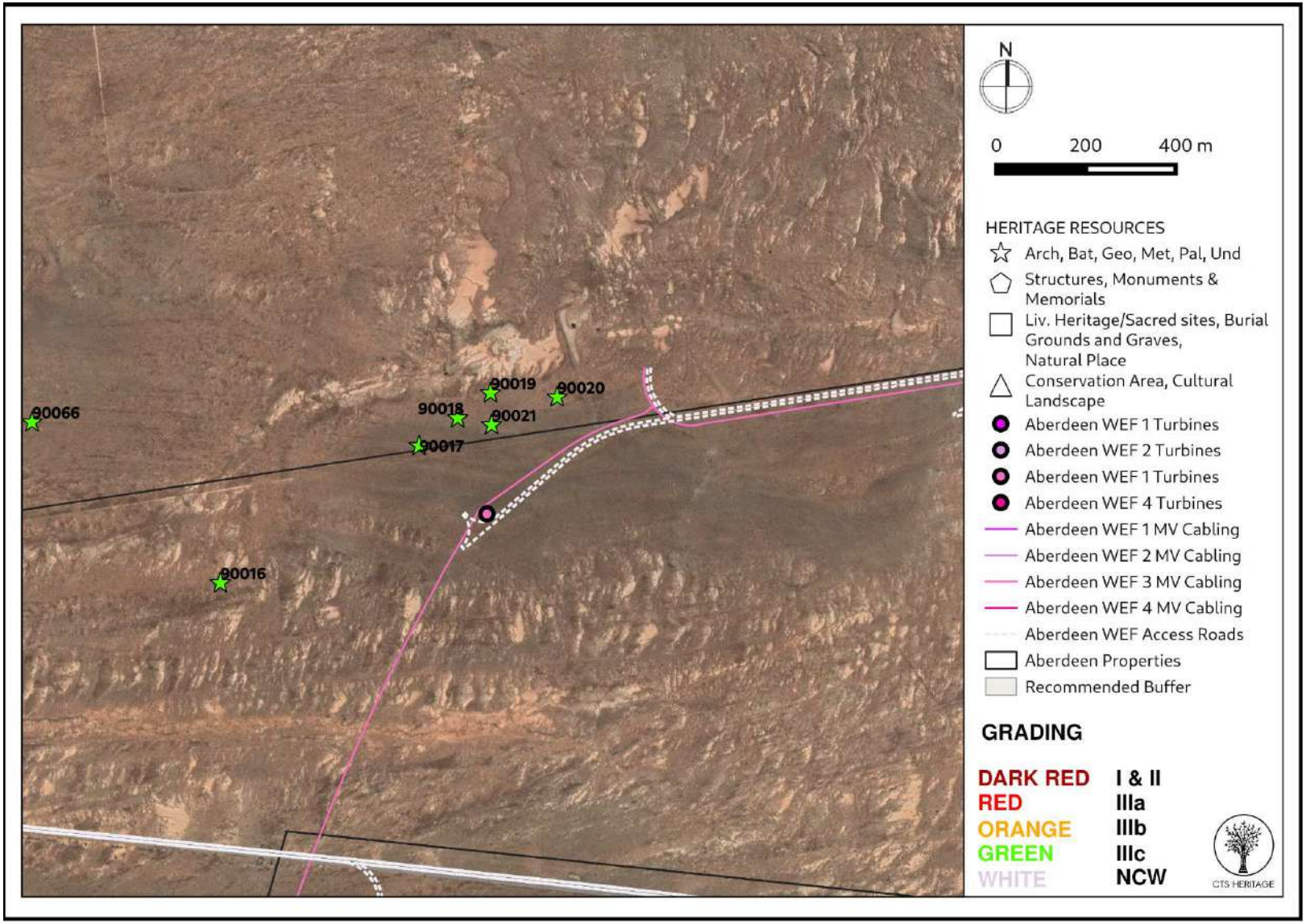

Figure 8.8: Map of all significant heritage resources noted within the development area for Aberdeen WEF 3

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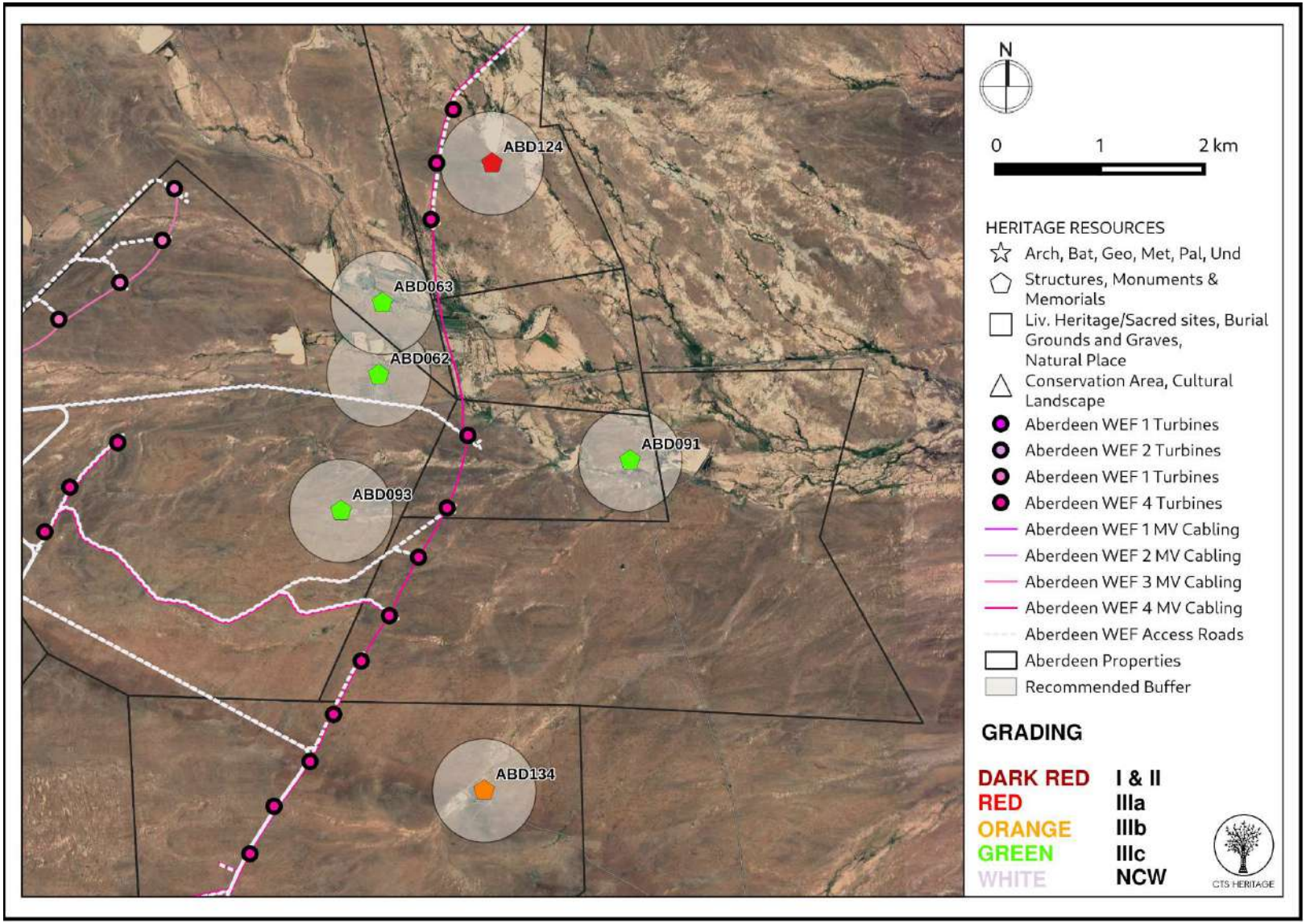

Figure 8.9: Map of all significant heritage resources noted within the development area for Aberdeen WEF 4

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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). 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.

Two burial areas were located within the area proposed for development (ABD044 and ABD124), graded IIIA due to their high levels of local significance. No impact to these sites may occur and as such, appropriate no-development buffers around these sites are proposed. All of the other significant resources identified are either historic kraals, occupied farm werfs or the ruins of historic farm werfs. While no direct impact to any of these sites is anticipated in the layout provided (except for site ABD110), it is recommended that a no-development buffer of 500m is implemented around these sites.

In the layout provided, the proposed road alignment passes directly through site ABD110 which is likely to significantly negatively impact on this resource. As such, it is recommended that the proposed road alignment be amended to avoid impact.

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:

- A 500m no-go development buffer is implemented around sites ABD003, 004, 036, 037, 039, 044, 061, 062, 063, 091, 093, 109, 110, 124, 134, 144, 147 and 173.
- A 100m no-go development buffer is implemented around SAHRIS Site 35548
- The proposed road alignment must be adjusted to respect a minimum of a 50m buffer around site ABD110
- 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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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.

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CTS HERITAGE

APPENDIX 2: Palaeontological Assessment (2022)

Palaeontological Heritage Input: combined field-based & desktop study

PROPOSED ABERDEEN WIND ENERGY FACILITY CLUSTER NEAR ABERDEEN, SARAH BAARTMAN DISTRICT, EASTERN CAPE PROVINCE

Dr John E. Almond
***Natura Viva* cc**
76 Breda Park
Breda Street
Oranjezicht
CAPE TOWN 8001, RSA

July 2022

EXECUTIVE SUMMARY

Atlantic Energy Partners (Pty) Ltd is proposing to develop a cluster of 4 x 170MW wind farms *plus* grid connection infrastructure on a site located between15 and 45 km west of the small town Aberdeen in the Sarah Baartman District (Dr Beyers Naude Local Municipality), Eastern Cape Province. The Aberdeen WEF Cluster project area is underlain at depth by potentially fossiliferous continental (fluvial / lacustrine) bedrocks of the Lower Beaufort Group (Adelaide Subgroup) that probably belong to the Middle Permian Abrahamskraal Formation. There are no historical records of fossil vertebrates from this area; this is largely due to the extremely poor levels of bedrock exposure found here. During the recent 4-day palaeontological field assessment only two occurrences of fossil vertebrates were recorded, both comprising material reworked into superficial gravels rather than *in situ*. Both fossil vertebrate sites have been adequately sampled and do not require further mitigation. Occasional trace fossil assemblages comprise low diversity, small-scale invertebrate burrows of limited scientific interest.

A background scatter of numerous petrified (silicified) wood blocks reworked from the Lower Beaufort Group bedrocks occurs within surface gravels and sands of eluvial and alluvial origin throughout most of the WEF Cluster project area; only a small sample of such occurrences have been recorded here. Much of the fossil wood material is poorly preserved and of limited scientific value. However, a small minority of blocks show well-developed seasonal growth rings and excellent preservation of the original woody fabric; these are potentially identifiable and may be of biostratigraphic and palaeoecological interest. Mitigation of the recorded fossil wood sites in particular is not recommended here, given the abundance and widespread occurrence of the material. However, it is recommended that a representative sample of well-preserved fossil wood material from the WEF project area is collected by a suitably qualified palaeontologist for curation in an approved fossil collection (*e.g.* Evolutionary Studies institute, Wits University, Johannesburg) once the development is authorized and before the Construction Phase.

Most of the low-relief WEF Cluster project area is covered by a 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 the abundant reworked fossil wood blocks and very rare bones reworked from the Permian bedrocks, no fossils of Caenozoic age have been recorded within these younger sediments.

Given the rarity of significant vertebrate and other fossil finds, the overall palaeosensitivity of the Aberdeen WEF Cluster project 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 (Appendix 2).

The impact significance of the proposed Aberdeen Wind Energy Facility Cluster is assessed as LOW since fossils of significant scientific and conservation value are so rare here. None of the recorded fossil sites lies directly within the provisional project footprint. The project is not fatally flawed and there are no objections on palaeontological heritage grounds to its authorization. This assessment applies equally to all infrastructure components and layout options currently under consideration.

The Environmental Control Officer (ECO) / Environmental Site Officer (ESO) responsible for the 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 development.

1. PROJECT OUTLINE & BRIEF

The company Atlantic Energy Partners (Pty) Ltd is proposing to develop a cluster of 4 x 170MW wind farms *plus* grid connection infrastructure comprising a 132/400kV collector switching station and a 132/400kV overhead power line (within a 100km long and 300m wide corridor) on a site near Aberdeen in the Eastern Cape Province (Fig. 1). The project site is located within the 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 Applications for Authorisation for the 4x 170MW wind farms and grid connection infrastructure will therefore follow a Basic Assessment (BA) process.

The WEF cluster project area is situated between15 and 45 km west of the small town Aberdeen in Sarah Baartman District (Dr Beyers Naude Local Municipality), Eastern Cape Province. It is located on the farms Koppies Kraal 157, RE of Farm 91, Doornpoort 93, Farm 94, Kraanvogel Kuil 154, Kraanvogel Kuil 55, Kraay Rivier Outspan 150, Farm 153 and Kraai Rivier 149, situated for the most part in the Aberdeen *Vlaktes* subregion of the Great Karoo between the R61 (Aberdeen – Beaufort West) and N9 (Aberdeen – Willowmore) tar roads (Fig. 1).

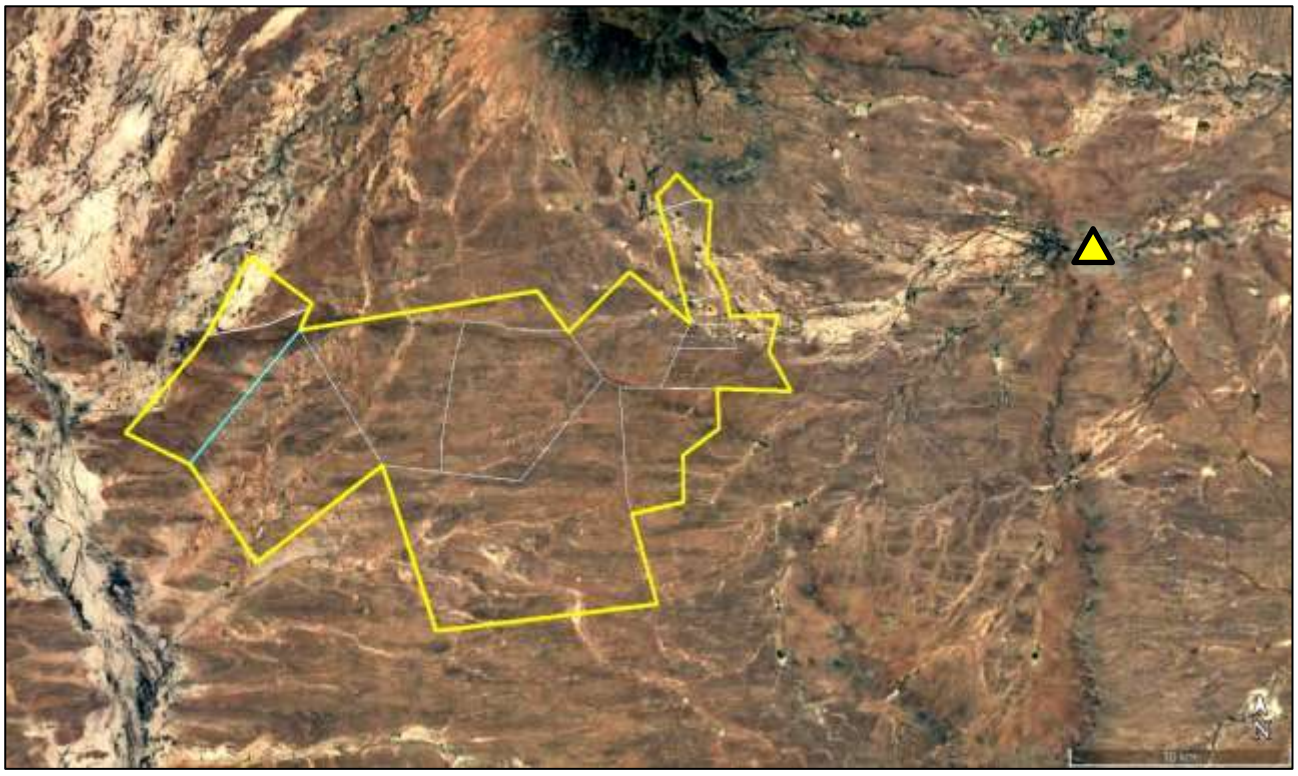

Figure 1: Google Earth© satellite image showing the location of the Aberdeen WEF Cluster project area (yellow polygon) situated in the low-relief Aberdeen *Vlaktes* region of the Great Karoo, *c.* 15 to 45 km west of Aberdeen (yellow triangle) and east of the main Kariega River drainage system.

Provisional sensitivity mapping (SAHRIS palaeosensitivity map, DFFE Screening Tool) suggests that much or most of the site is of High to Very High Palaeosensitivity based on the presence here of potentially fossiliferous continental sediments of the Lower Beaufort Group (Karoo Supergroup) of Permian age. The present combined desktop and field-based palaeontological heritage report contributes palaeontological heritage data to the overarching Heritage Impact Assessment (HIA)

and EMPR that are being compiled for the Aberdeen WEF Cluster 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.

2. INFORMATION SOURCES

This combined desktop and field-based palaeontological heritage study of the Aberdeen WEF Cluster project area 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 (3223BD Kamdeboo, 3223BC Kunna, 3223DB Kaapsepoortjie and 3223DA Kiwietskuil) 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 *Vlaktes* subregion by Rubidge & Abdala (2008) and Almond (2014);
(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 four-day field assessment of the WEF Cluster project area by the author and an experienced field assistant (Ms Madelon Tusenius, *Natura Viva* cc), during the period 30 July to 2 August 2022. Given the generally extremely poor levels of bedrock exposure in the Aberdeen *Vlaktes*, 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. 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.

Figure 2: View southwards across the WEF Cluster project area from a dolerite dyke ridge near the farmstead on Kraanvogel Kuil 55 showing the limited relief and low W-E trending ridges in this sector of the Aberdeen *Vlaktes*.

Figure 3: View eastwards across the SW sector of the WEF Cluster project area from the dolerite ridge with the communication mast and trigonometrical survey beacon on Farm 91 with highly jointed, baked quartzites in the foreground.

Figure 4: A wide, shallow, sandy tributary of the Kraairivier on Farm Kraai Rivier 149, one of the few sizeable drainage courses within the WEF Cluster project area. Note the lack of bedrock exposure here due to thick alluvial deposits.

Figure 5: View north-westwards towards the eastern margins of WEF Cluster project area from Mon Repos 154 showing part of the extensive, broadly E-W trending dolerite dyke that builds a low ridge across the northern part of the area.

Figure 6: Large areas of the WEF Cluster project area are covered with sparse to dense, karroid *bossieveld* and sandy to gravelly soils, as seen here on Kraanvogel Kuil 155.

Figure 7: Darker grey areas on satellite images of the Aberdeen *Vlaktes* often reflect thin surface gravels of siltstone overlying alluvial and pan sediments rather than bedrock, as seen here just outside the project area on Mon Repos 154.

3. GEOLOGICAL CONTEXT

The Aberdeen WEF Cluster project area features low-relief, undulating to gently hilly, terrain of the Aberdeen *Vlaktes* of the Eastern Cape (Figs. 1 to 7). Much of the area is clothed in sparse to dense karroid *bossieveld* with numerous unvegetated pans and 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 due south of the Kamdebooberge – a sector of the Great Escarpment - some 15 to 45 km west of the small town Aberdeen. It is characterized by semi-arid, karroid vegetation, extensive sandy to gravelly alluvial plains (*c*. 800-850m amsl), numerous shallow pans (*brak-kolle*), a few low E-W trending rocky ridges or *bulte* (*c*. 850-880m amsl) built of dolerite and baked metasediments and, for the most part very shallow, sandy drainage lines. These last (*e.g.* Gannaleegte system) mainly feed westwards into the wide, N-S trending Kariega River running to the west of the WEF Cluster project area while the NE sector is drained by the Kraairivier which flows eastwards towards Aberdeen. The Aberdeen *Vlaktes* represent an ancient peneplanated land surface of possible Miocene age (Partridge & Maud 1987). As a result of protracted denudation, the 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 *Vlaktes* region with occasional low projecting channel sandstone beds in the lowlands and quartzitic baked sandstones and dolerite along the 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. There are also several large borrow pit exposures – highly disturbed – as well as occasional low road cuttings along the R61 and elsewhere.

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) (Fig. 8). The bedrocks underlying the study area are *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 Kamdebooberg escarpment to the northeast were assigned to the overlying **Oukloof Member** (*cf* stratigraphic table in Fig. 39). 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 Great Escarpment (Oorlogspoortberge) *c*. 20 km to the NW of the WEF Cluster project area and further to the north (Dr Mike Day, Professor B. Rubidge, pers. comm., 2022). This suggests that the Aberdeen *Vlakes* in the WEF Cluster project area are also underlain by the Abrahamskraal Formation; the south-facing slopes of the Kamdebooberge to the north feature younger strata of the Poortjie, Hoedemaker and Oukloof Members of the Teekloof Formation. 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. Folding is associated with numerous joints and fractures, quartz veining with mineral lineation and mapped bedding dips up to *c*. 22°. Mudrock facies are locally cleaved. In many areas the bedrock folds can be readily picked out on satellite images (Fig. 1), showing that the superficial deposits here are often not, in fact, always very thick.

The **Abrahamskraal Formation** is a very thick (*c.* 2.4 km) succession of fluvial deposits laid down in the Main Karoo Basin by meandering rivers on an extensive, low-relief floodplain during the Middle Permian Period, some 268-261 million years ago (Smith & Keyser 1995a, Loock *et al*., 1994, McCarthy & Rubidge 2005, Johnson *et al*., 2006, Day & Rubidge 2014, Jirah & Rubidge 2014, Wilson *et al.* 2014, Cole *et al.* 2016). These sediments include (a) lenticular to sheet-like channel sandstones, often associated with occasional thin, impersistent intraformational breccio-conglomerates (larger clasts mainly of reworked mudflakes, calcrete nodules, *plus* sparse rolled bones, teeth, petrified wood), (b) well-bedded to laminated, grey-green to purple-brown floodplain mudrocks with common greyish to rusty brown pedocrete horizons (pebble to cobble-sized, sphaeroidal calcrete concretions formed in ancient soils), (c) thin, sheet-like crevasse-splay sandstones, as well as more (d) localized playa lake deposits (*e.g.* wave-rippled sandstones, laminated mudrocks, limestones, evaporates (Figs. 9 to 25). Most of the sandstones within the present study area are fine- to medium-grained, grey-green wackes, occasionally with fine heavy mineral lamination. A few channel sandstones are coarser, massive to cross-bedded with a speckled, biscuit-like texture and common *koffieklip* lenses. Lenses and zones of dark brown, ferruginous *koffieklip* are common within some mudrock packages as well as within channel sandstone bodies where they contain sphaeroidal calcrete concretions (possibly transported) and may be loosely associated with weathered-out petrified wood which has also been transported within river channels. A number of yellowish-green to reddish-weathering, silica-rich “chert” horizons are also found within the Abrahamskraal Formation, especially towards the top of the succession. Some of these appear to be secondarily silicified mudrocks or limestones of possible lacustrine origin but at least some contain high levels of reworked volcanic ash (tuffs and tuffites). Greenish-yellow, cobble-sized sphaeroidal cherty bodies embedded in baked mudrock are seen in the vicinity of a dolerite dyke just south of Pretoriuskuil homestead and are of uncertain origin – perhaps related to loading and boudinage of a lacustrine tuffite horizon (Fig. 25).

In contrast to pluvial episodes characterised by extensive lakes, a wide range of sedimentological and palaeontological observations also point to periods of deposition under seasonally arid climates in the Middle Permian Period. These include, for example, the abundance of calcretes and evaporites (silicified gypsum pseudomorphs or “desert roses”, reddened mudrocks, sun-cracked muds, “flashy” river systems, sun-cracked fossil bones, well-developed seasonal growth rings in fossil wood, rarity of fauna, common burrowing behavior by tetrapods *plus* little evidence for substantial bioturbation or vegetation cover (*e.g.* root casts) on floodplains away from the river banks.

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 across the wind farm project area where it is expressed as a low rocky ridge just to the south of the R61 (870 m amsl) with additional extensions towards the west of the area (Figs. 5 & 26. Major, columnar-jointed dolerite sills are also visible further to the northeast in the upper slopes of the Kamdebooberg Escarpment (*e.g.* Sleeping Giant). 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.

A range of **Late Caenozoic superficial deposits** – mostly Quaternary or younger in age – overlies the Beaufort Group and Karoo dolerite bedrocks within the project area (Figs. 27 to 36). Angular, blocky colluvial rubble of baked quartzite and dolerite mantles the ridge slopes. Locally the rock

rubble has been incorporated on lower hillslopes into thin debris flow diamictites with a chaotic fabric and gritty to fine-gravelly matrix. 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.* Gannaleegte); the clasts here include moderately to well-rounded pebbles and cobbles of brownish-orange patinated wacke, pale blue-grey, fine-grained quartzite, very dark hornfels, dolerite, vein quartz, calcrete, pedocrete concretions, greenish tuffite and locally common petrified wood reworked from the Permian bedrocks. Some of this tough-weathering material may have been transported downstream from the Escarpment Zone. Thin alluvial and eluvial (downwasted) gravels of angular wacke and vein quartz mantle large parts of the project area; grey areas on satellite images often feature fine, flaky to crumbly mudrock clasts and / or pedocrete concretions overlying sands rather than fine-grained bedrocks. Well-developed calcrete pedocretes are mainly developed along major drainage lines such as the Gannaleegte. Here older, orange-brown, polygonally veined, massive calcretes with sparse gravel clasts are overlain by younger, pale cream-hued calcrete which also penetrates underlying mudrocks as veins along fractures. Most of the younger alluvium consists of fine-grained sands and silts (locally reworked by wind) with lenses of coarser gravels (clasts of dolerite, wacke, hornfels *etc*) at the base. Well-developed coarse gravelly alluvial deposits are rare. 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, silicified wood, hornfels, quartzite) 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 Aberdeen WEF Cluster project area are illustrated in Figures 9 to 36 below.

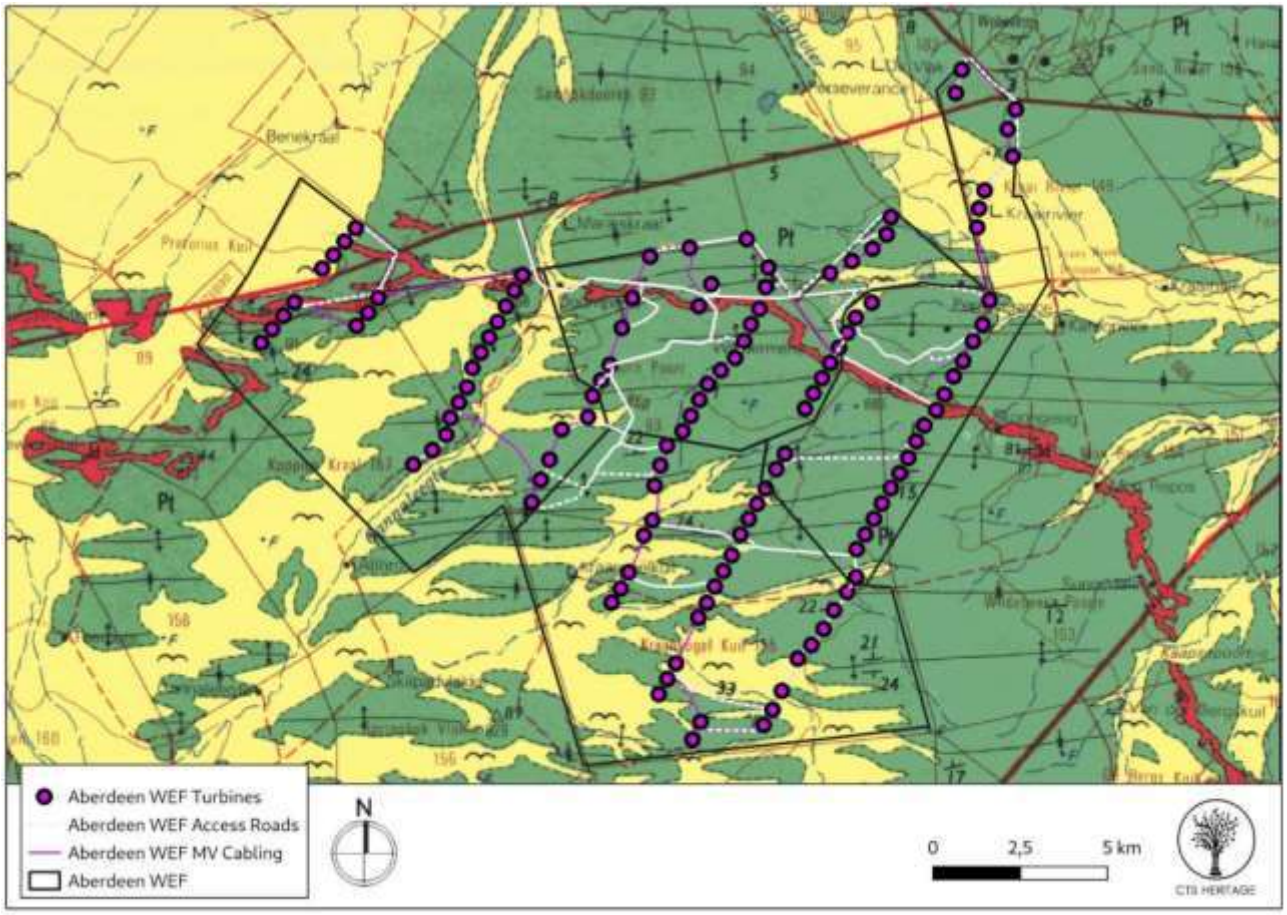

Figure 8: Extract from 1: 250 000 geology sheet 3222 Beaufort West (Council for Geoscience, Pretoria) showing the approximate boundaries of the Aberdeen Wind Farm Cluster project study area *c.* 15-45 km west of Aberdeen (black polygons). Provisional wind turbine positions are shown by the purple circles and internal access roads by red lines. The main rock units mapped here within the study area include: Pt (green) = Late Permian Teekloof Formation (Lower Beaufort Group / Adelaide Subgroup, Lower Beaufort Group). Note the numerous W-E trending fold axes indicated in this area. New biostratigraphic data suggests that the Lower Beaufort Group bedrocks in the project area probably belong to the Middle Permian Abrahamskraal Formation. Jd (red) = Early Jurassic intrusions of the Karoo Dolerite Suite. Yellow with flying bird symbol = Quaternary superficial sediments, including alluvium, sheet wash, colluvium, soils, locally cemented by pedocretes such as calcrete. Older alluvial terrace gravels ("High Level Gravels") are not mapped within the study area. No historical fossil sites are mapped here.

Figure 9: Thin channel sandstone package composed of tabular-bedded, fine-grained wacke, Kraay River Outspan 158.

Figure 10: Float block of ferruginised basal channel breccio-conglomerate composed of mudflake intraclasts and reworked pedocrete concretions, Kraanvogel Kuil 155 (*c.* 20 cm wide). Fragments of transported bone and teeth may sometimes be found within this facies.

Figure 11: Prominent-weathering bed of channel wacke on Koppies Kraal 157 showing gentle dips and dense jointing typical for this marginal region of the Cape Fold Belt.

Figure 12: Unusually extensive bedding plane exposures of gently dipping channel wackes in a dam overflow channel on Farm 94. Note elliptical pod of diagenetic ferruginous *koffieklip* in the foreground (hammer = 30 cm).

Figure 13: Pale greyish, well-rounded clasts within a *koffieklip* lens on Farm 94 (scale in mm and cm). These may be reworked calcrete concretions eroded out of floodplain deposits and transported as pebbly lags (as also inferred for logs of wood found in the wider region) or perhaps represent exotic, extra-basinal pebbles.

Figure 14: Prominent-weathering, highly jointed lens of dark brown *koffieklip*, seen here on Mon Repos 154 just east of the WEF Cluster project area (hammer = 30 cm). Abundant blocks of fossil wood are sometimes found in the vicinity of such *koffieklip* bodies and probably stem from the same channel sandstone bodies.

Figure 15: Distinctive, yellow-weathering, speckled, medium-grained channel sandstone facies building low ridges on Farm 94. This facies occurs commonly within the upper Abrahamskraal Formation and overlying Poortjie Member of the Teekloof Formation.

Figure 16: Extensive exposure of grey-green, fine-grained channel wacke on Farm 94 showing blocky jointing and angular eluvial gravels.

Figure 17: Rare gulley exposure of purple-brown overbank siltstones overlying a wave-rippled greenish-grey sandstone bed, Farm 91.

Figure 18: Extensive exposure of cleaved, grey-green and purple-brown overbank mudrocks in a riverine area on Kraay River Outspan 158.

Figure 19: Isolated exposure of grey-green, crumbly overbank mudrocks on Koppies Kraal 157 – ideal for palaeontological surveying, but rare in the Aberdeen *Vlaktes* region.

Figure 20: Detail of the exposure seen above showing common lenses of ferruginous carbonate which are probably of diagenetic or pedogenic origin, perhaps reflecting episodes of high water tables on the ancient Karoo floodplain, Koppies Kraal 157.

Figure 21: Gullied hillslope on Kraanvogel Kuil 55 exposing baked and weathered, grey-green overbank mudrocks and thin crevasse-splay sandstones.

Figure 22: Isolated window exposing highly cleaved, grey-green overbank mudrocks on Kraanvogel Kuil 155 (hammer = 30 cm). These readily-weathered and easily-eroded bedrocks are usually obscured by superficial deposits on the Aberdeen *Vlaktes*.

Figure 23: Good exposure of a pedocrete (ancient soil) horizon marked by pebble-sized sphaeroidal calcrete concretions, Kraay River Outspan 158 (hammer = 30 cm). Such horizons are an important target for vertebrate fossil prospecting.

Figure 24: Extensive surface scatter of ferruginous calcrete concretions on Farm 94. Areas like this have potential for recording fossil tetrapod remains.

Figure 25: Horizon of cobble-sized, rounded, greenish-yellow siliceous bodies of uncertain origin (possibly tuffitic) within a dark siltstone matrix shortly below a dolerite intrusion on Farm RE/91 (hammer = 30 cm).

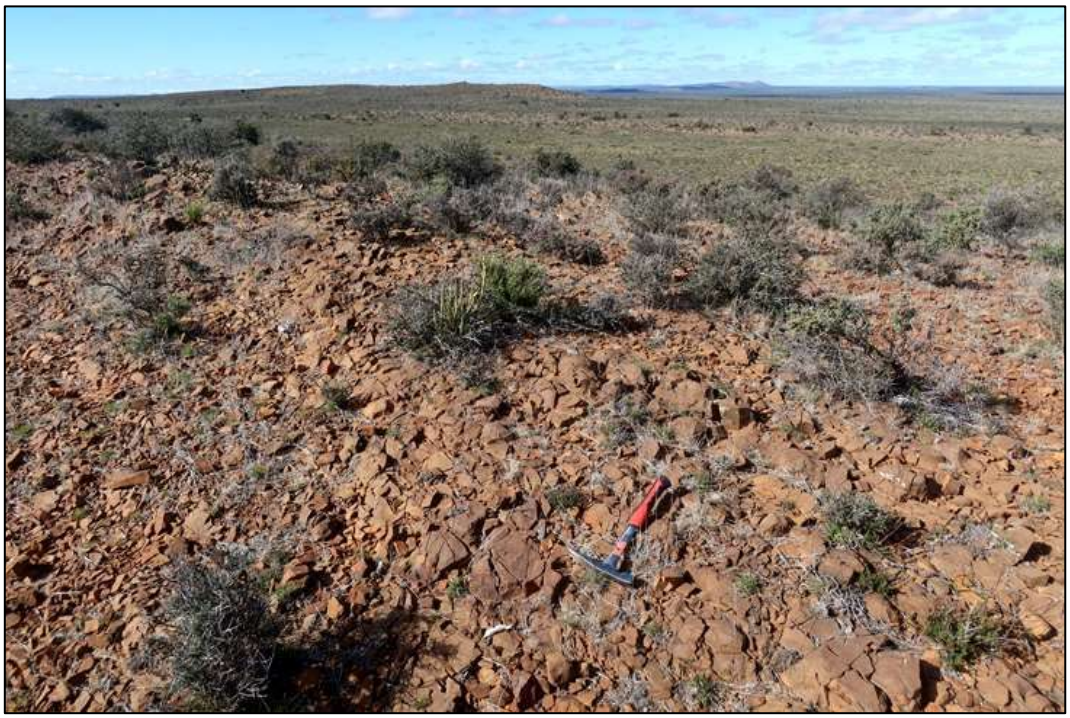

Figure 26: Highly jointed, blocky weathering dolerite dyke exposed along a ridge crest near the farmstead on Kraanvogel Kuil 55 (hammer = 30 cm).

Figure 27: Lobe of rubbly diamictite with chaotic fabric of floating wacke and dolerite blocks within a gritty matrix, probably of debris flow origin, Farm 91 (hammer = 30 cm).

Figure 28: Massive, calcretised, orange-brown older alluvial deposits exposed along the edge of the Gannaleegte on Doorn Poort 93 (hammer = 30 cm).

Figure 29: Pale, creamy, calcretised younger alluvium exposed in a borrow pit along the Gannaleegte on Doorn Poort 93. The underlying fractured siltstone bedrocks are also extensively veined by calcrete.

Figure 30: Rubbly alluvial basal gravels overlain by thicker sandy alluvium with gravel lenses, tributary of the Kraairivier on Kraai Rivier 149.

Figure 31: Shallow incised stream on Farm 94 with sandy banks and coarser gravels along its bed.

Figure 32: Reworked pebbly alluvial gravels associated with the Gannaleegte drainage system on Koppies Kraal 157 (hammer = 30 cm). These resistant weathering gravels contain abundant, subrounded to well-rounded clasts of dark hornfels, angular blocks of petrified wood (arrowed) as well as numerous MSA and LSA stone tools.

Figure 33: Alluvial *vlaktes* on Kraanvogel Kuil 155 mantled by thick, orange or yelllow sandy alluvium with a network of shallow drainage lines. Aeolian reworking of sands during the dry season, with polishing and faceting of pebbly clasts (ventifacts) is common.

Figure 34: Large areas of the Aberdeen *Vlaktes* comprise gravelly plains dominated by angular to well-rounded clasts of brownish channel wacke, seen here on Farm 94. Many of the well-rounded clasts are weathered corestones rather than water-worn cobles.

Figure 35: Open, shallow pan areas (*brak-kolle*) on the Aberdeen *Vlaktes*, seen here on Kraanvogel Kuil 155, often feature a dense to sparse veneer of surface gravels, among which reworked blocks of petrified wood are commonly found.

Figure 36: Typical raised *heuweltjie* characterised by thick, sandy soils, bush clumps, impersistent calcretisation at depth, modern bones and intense mammalian burrowing, as seen here on Farm RE/91.

4. PALAEONTOLOGICAL HERITAGE CONTEXT

The Aberdeen *Vlaktes* are largely *Terra Incognita* in palaeontological terms due to the exceedingly poor levels of bedrock exposure in the region (See fossil vertebrate site maps presented by Keyser & Smith (1977-1978) (Fig. 37), Nicolas (2007) as well as the 1: 250 000 geological map in Figure 8 which 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 *vlaktes* to the south-west of Oorlogspoortberge, due west 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 more recent PIA report by Almond (2014) for a 200MW WEF project area adjoining the present Aberdeen WEF Cluster project area on the northern side 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).

As discussed above, recent fossil collection from better bedrock exposures within the Great Escarpment Zone (Oorlogspoortberge, foothills of the Kamdebooberge) to the north suggests that 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* Fig. 8). Fossil assemblages of the Middle Permian ***Tapinocephalus* Assemblage Zone** may therefore be expected here but supporting material is exceedingly scarce. This revised mapping 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 Vlaktes region from the south (Fig. 38) (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) (Fig. 39). 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).

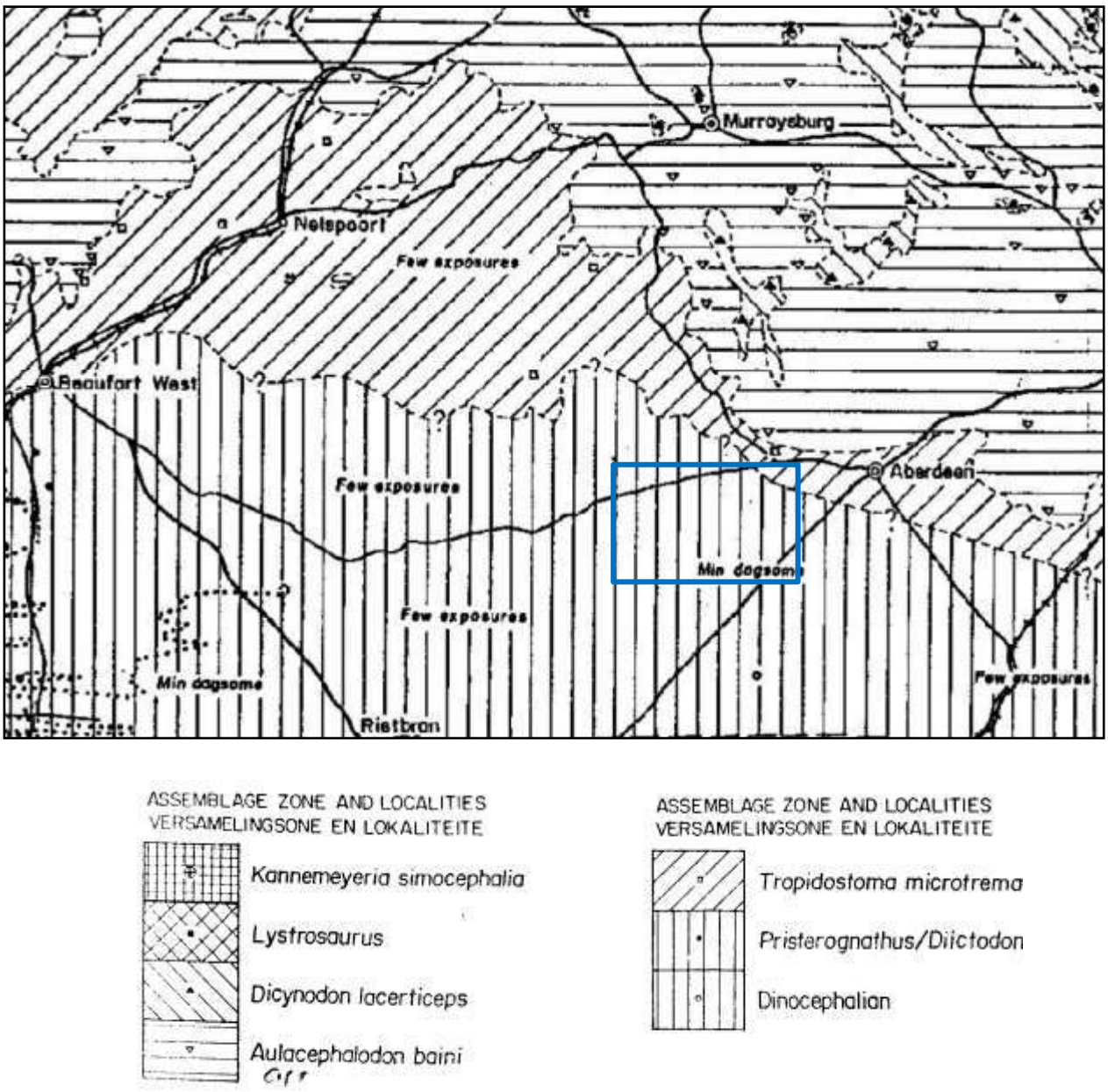

Figure 37: Early, and now outdated, biostratigraphical map of the Lower Beaufort Group in the Great Karoo between Beaufort West and Aberdeen showing the distribution of the various palaeontological Assemblage Zones, mainly based on tetrapod fossils (Keyser & Smith 1977-78). According to this map the Aberdeen WEF Cluster project area *c.* 15-45 km west of Aberdeen (*approximately* indicated by the blue rectangle) lies in a region of limited bedrock exposure (*min dagsome*) within which no tetrapod fossils have been recorded. *Tapinocephalus* AZ fossils ("Dinocephalian) are known to the south of the N9. *Endothiodon* AZ fossils (previously *Tropidostoma* AZ) as well as *Cistecephalus* AZ fossils are recorded in the Kamdebooberge Escarpment to the north of the WEF Cluster project area, associated with the Hoedemaker and Oukloof Members of the Teekloof Formation respectively.

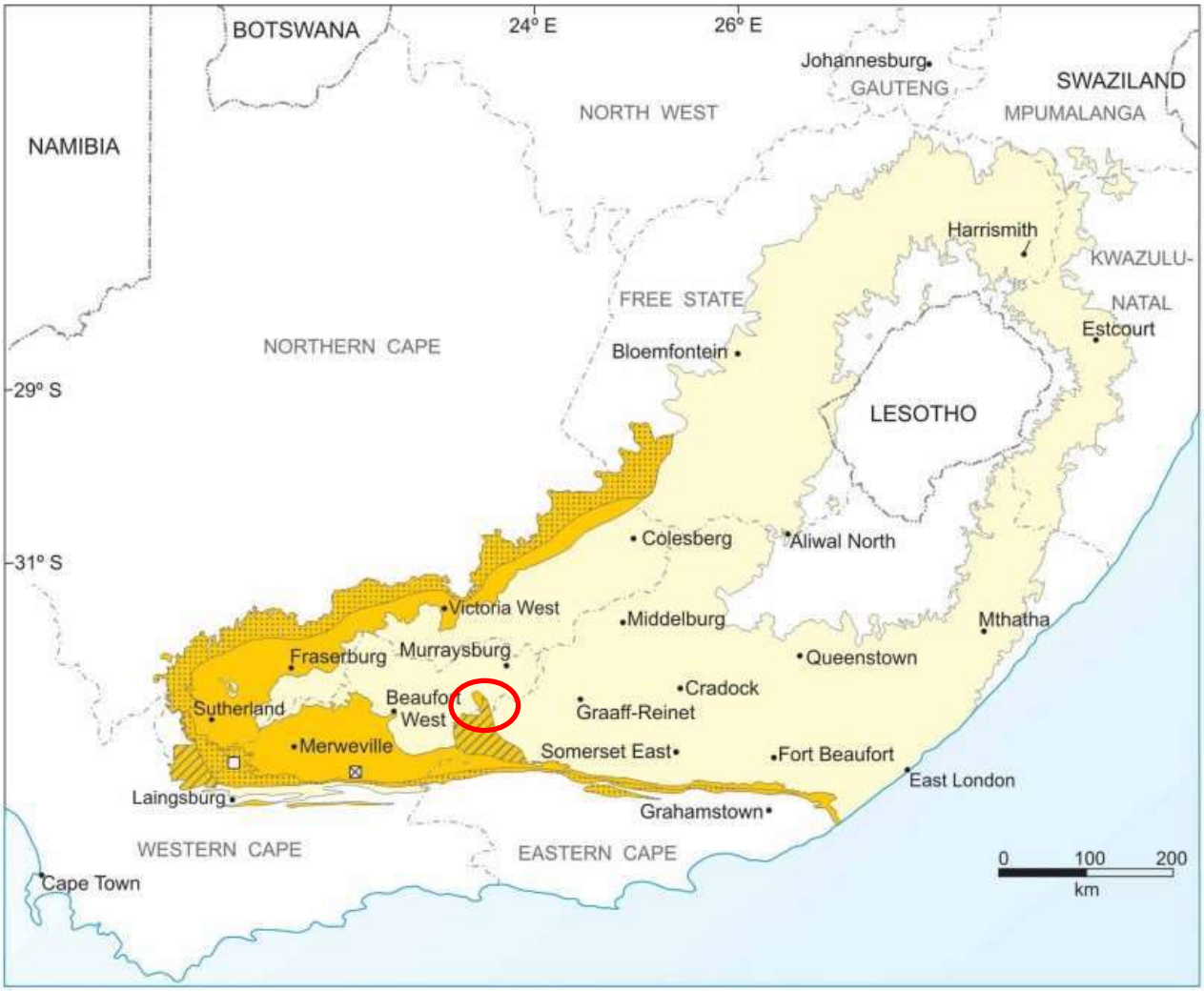

Figure 2. *Distribution of the* Tapinocephalus *Assemblage Zone (dark yellow) in the Beaufort Group (yellow), showing the distribution of the* Eosimops – Glanosuchus *Subzone (dotted),* Diictodon – Styracocephalus *Subzone (not dotted), and uncertain presence (diagonal hatched). Positions of Type localities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

Figure 38: 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). Any identifiable new tetrapod (and possibly also woody) fossil material from the Aberdeen *Vlaktes* may help clarify these biostratigraphic ambiguities.

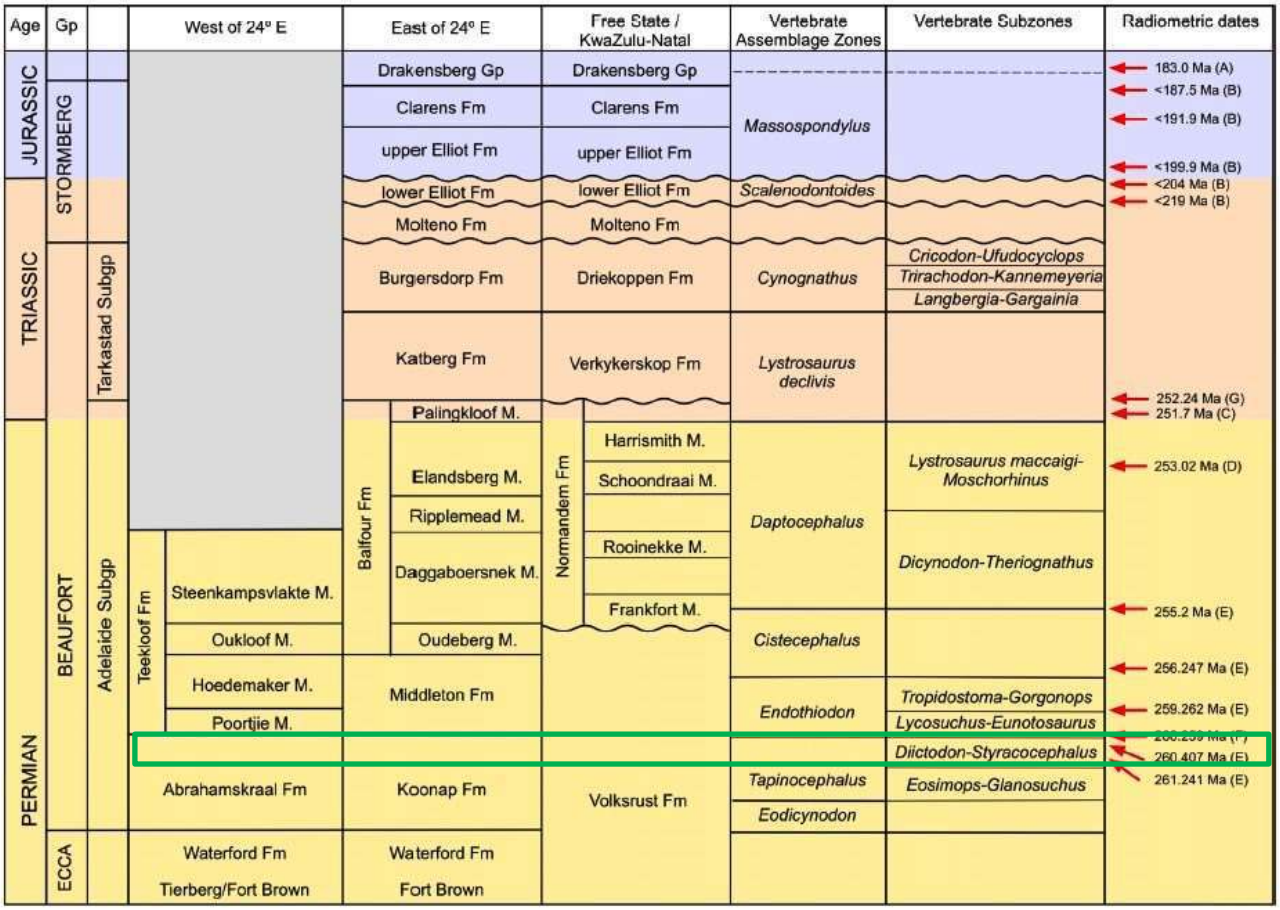

Figure 39: Stratigraphic subdivision of the Karoo Supergroup with the rock units and fossil biozones most relevant to the present PIA study outlined in green (Modified from Smith *et al.* 2020). Recent Karoo fossil biozonation mapping suggests that Lower Beaufort Group bedrocks underlying the Aberdeen WEF Cluster project area 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.

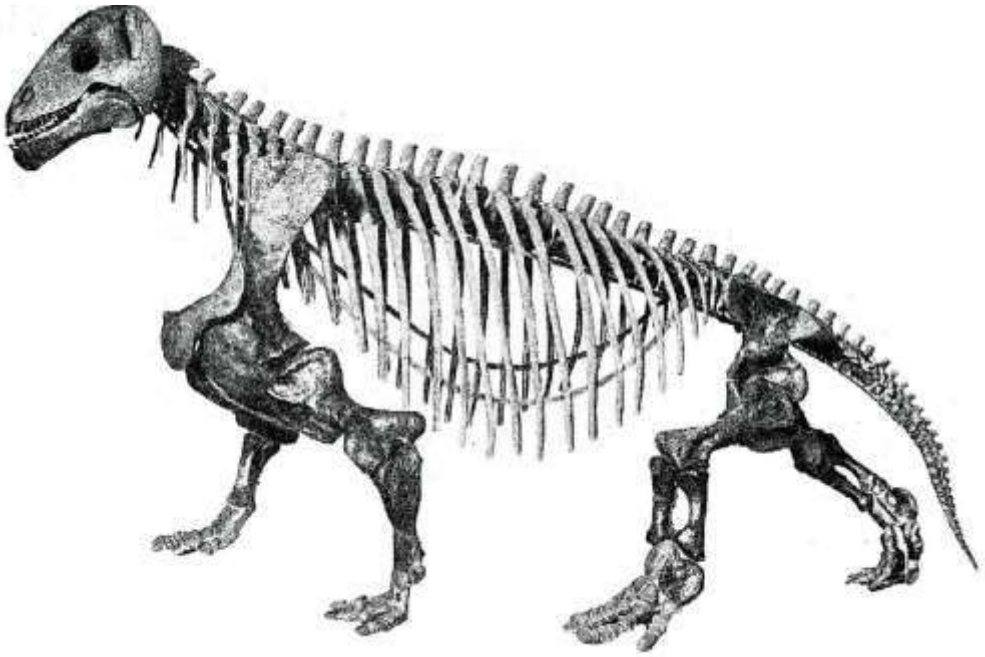

Figure 40: Skeleton of the tapinocephalid (thick-skulled) dinocephalian *Moschops*, a rhino-sized herbivorous therapsid that reached lengths of 2.5 to 3 m and may have lived in small herds. Possible cranial fragments of a tapinocephalid dinocephalian have now been recorded within the Abderdeen WEF Cluster project area.

4. RESULTS FROM PALAEONTOLOGICAL SITE VISIT

Most of the palaeontological fieldwork for the present site visit focussed on sporadic, darker, greyish areas seen on satellite images 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). Areas with abundant pale grey or rusty-brown pedocrete concretions, as well as *koffieklip* lenses, were also intensively searched. Less attention was paid to sandstone exposures, although these may also contain valuable reworked fossil vertebrate material in the Abrahamskraal Formation.

The only significant Karoo fossil vertebrate site recorded during the palaeontological site visit comprises a scatter of *ex situ* fragmentary bone material of a large-bodied tetrapod on Farm RE/91 (Locs. 215-216; Figs. 41 to 44). The bones were recorded at surface or embedded within gravelly sands overlying a channel sandstone body which is exposed in the vicinity, as is a narrow dolerite dyke. They include several probable cranial fragments, probably but not certainly from a single individual, one of which shows dense pachyostosis 12 cm or more thick with sparse radial canals. Another small jaw fragment contains the conical roots of several small teeth. A tapinocephalid dinocephalian identification therefore seems to be most likely (*cf* Fig. 40), supporting the re-assignation of the bedrocks here to the *Tapinocephalus* Assemblage Zone, *i.e.* Abrahamskraal Formation or, at most but less likely, lower Poortjie Member (*cf* Day *et al.* 2015a). The fossil material has been partially sampled for the collections of the Evolutionary Studies Institute (Wits University, Johannesburg) under the Fossil Collection Permit of Professor Bruce Rubidge who is currently reviewing the “Tap Zone” biotas of the Main Karoo Basin. Additional bone material remains buried on site.

Trace fossils, including tetrapod burrows, are not widely recorded within the project area, Small-scale, meandering invertebrate burrows associated with wave-rippled pond palaeosurfaces on top of thin, tabular crevasse splay sandstones may be attributable to undermat miners such as insects (Fig. 46).

A 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 and sands across the WEF Cluster project area (*N.B.* The sites noted in Appendix 1 and on satellite map Figure A1 represent only a *small fraction* of all fossil wood occurrences within the WEF Cluster project area). 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 partially or poorly-preserved xylem fabrics which may reflect different levels of microbial decomposition before or at the time of diagenetic silicification (Figs. 52 to 54). However, some of the blocks show well-developed seasonal growth rings and excellent preservation of xylem tissue. Occasional elongate subcylindical hollows might reflect insect borings (Fig. 49). Such 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 occur 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 Aberdeen WEF Cluster project area, including those within alluvial gravels, are subangular to angular and do not appear to have suffered extensive transport, which 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 may occur preferentially in the vicinity of channel-hosted *koffieklip* bodies. At one site, south of and outside the WEF Cluster project area, numerous sizeable blocks of silicified wood occur incorporated within superficial sands just downslope of an extensive *koffieklip* lens or zone developed within a channel sandstone. The fact that the blocks apparently do not occur upslope of the sandstone / *koffieklip* horizon suggests that this last may be the source of the fossil log material, although none has been observed *in situ* here. The marked decrease in reworked fossil wood material on farms to the north of the present project area, underlain by Poortjie Member beds, supports an Abrahamskraal Formation provenance for the super-abundant material recorded here.

Good sections through Late Caenozoic superficial deposits suitable for palaeontological prospecting are rare in the Aberdeen *Vlaktes* region. No fossil material was observed within deposits such as thicker alluvial sands and calcretes (as also found by Almond 2014). Reworked blocks of petrified wood are common, and locally abundant within surface gravels and even sands, as discussed above. The single, small rounded clast of fossil bone recorded from surface gravels on Farm 94 has probably been transported some distance. In contrast, the local concentration of fossil tetrapod bone recorded on Farm RE/91 described above has probably been weathered-out from local sandstone bedrocks seen in the area, broken up and then incorporated into overlying gravelly sands.

Figure 41: Assemblage of robust bone blocks from a large-bodied tetrapod collected from a small area of surface gravels on Farm RE/91 (Loc. 215) (scale = 15 cm). See following two figures for more detail. This material, key elements of which have now been sampled, *may* belong to a tapinocephalid dinocephalian (to be confirmed), indicative of the *Tapincephalus* Assemblage Zone.

Figure 42: Block of bone *c.* 11 cm long from Loc. 215 on Farm RE/91 showing very thick, dense pachyostosis and sparse canals – possibly part of the cranial roof of a tapinocephalid dinocephalian.

Figure 43: Two, robust bone fragments from Loc. 215 on Farm RE/91, possibly adjoining parts of the skull. The large block is *c.* 11 cm long.

Figure 44: Fractured curved bone (*c.* 20 cm long) of a large-bodied tetrapod embedded in sandy superficial sediments, Loc, 216 on Farm RE/91 – possibly part of the same individual seen at Loc. 215 nearby.

Figure 45: Isolated chunk of "rolled bone" (*c.* 4 cm long) from a medium- to large-bodied tetrapod found among surface gravels on Farm 94 (Loc. 182). Such material is rarely identifiable and of very limited scientific value.

Figure 46: Crevasse splay sandstone bed top featuring small, meandering burrows of probable undermat miners (possibly insects) foraging beneath microbial mats on damp pond margins (scale in cm), Kraai Rivier 149 (Loc. 180).

Figure 47: Several blocks of well-preserved, cherty fossil wood from among surface gravels on Farm 153 (Loc. 170). The largest block seen here is *c.* 6 cm wide.

Figure 48: Varied appearance of angular petrified wood blocks – in part due to differences in secondary iron mineralisation – found among surface gravels on Farm 153 (Loc. 138) (scale in cm and mm).

Figure 49: Well-preserved block of silicified wood (*c.* 7 cm across) from Mon Repos 154 (Loc. 136), just outside the WEF Cluster project area, showing well-developed seasonal growth banding and *possible* insect borings (elongate reddish areas).

Figure 50: Sizeable, angular block of petrified wood (*c.* 25 cm across) embedded within gravelly sands on Farm Kraanvogel Kuil 155 (Loc. 139). Several large blocks found within a small area suggest that a substantial fossil log may have broken-up locally.

Figure 51: Large block of seasonally banded fossil wood at surface on Farm Kraanvogel Kuil 155 (Loc. 139) (scale in cm).

Figure 52: Highly variable preservation styles shown by fossil wood blocks from the same area on Farm Kraanvogel Kuil 155 (Loc. 156). The longest, palest block seen here is *c.* 15 cm long.

Figure 53: Abundant silicified wood blocks among alluvial gravels on Farm Koppies Kraal 157 (Loc. 197) showing a range of preservation styles (scale in cm).

Figure 54: Attractive block of petrified wood from Farm Koppies Kraal 157 (Loc. 197) showing possible silicification of partially decomposed woody tissue.

5. SITE SENSITIVITY VERIFICATION

Preliminary palaeosensitivity mapping of the Aberdeen WEF Cluster project area based on the DFFE Screening Tool is shown below in map Figure 55. Outcrop areas of Lower Beaufort Group bedrocks shown on the 1: 250 000 geology map (Fig. 8) are assigned a Very High palaeosensitivity, mapped alluvial areas a Low palaeosensitivity and major dolerite intrusions an Insignificant / Zero palaeosensitivity.

Historically almost no vertebrate fossil sites have been recorded within the wider Aberdeen *Vlaktes* subregion (Fig. 37). Based on the recent 4-day palaeontological site visit, the great majority of the WEF Cluster project area is mantled by thin to thick (several m) superficial deposits (alluvium, colluvium / eluvium, calcrete, pan sediments, soils) of low palaeosensitivity (Section 4). In addition to very occasional invertebrate trace fossils of limited scientific interest, the only tetrapod fossils recorded from Lower Beaufort Group bedrocks here comprise an isolated, reworked bone fragment as well as a single concentration of robust bones of a large-bodied tetrapod weathered-out into surface gravels. Given the general rarity of vertebrate fossil finds, the latter site is of some scientific interest, while there is potential for sporadic occurrences of comparable or better material occurring at or beneath the surface elsewhere within this vast project area. Blocks of fossil wood occur widely as a background scatter across most of the WEF Cluster project area, locally in abundance; a minority of the material is well-preserved and of scientific interest and most occurrences are rated as of low heritage significance. No fossils have been recorded within the Late Caenozoic superficial deposits (alluvium, colluvium, surface gravels, soils, calcretes *etc*).

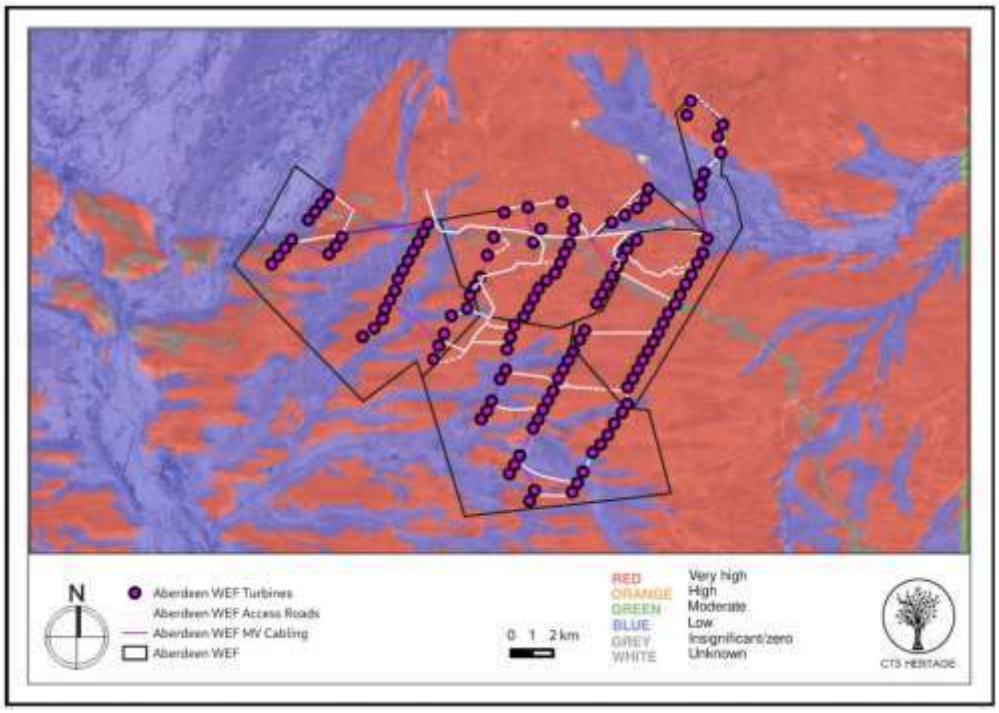

Figure 55: Provisional palaeosensitivity mapping for the Aberdeen WEF Cluster project area (black polygons) (Image based on the DFFE Screening Tool and provided by CTS 2022). The Very High Palaeosensitivity shown here for outcrop areas of the Lower Beaufort Group is *contested* in the present report since bedrock exposure levels are generally very low and very few vertebrate fossils of scientific and conservation value have been recorded here. Areas featuring substantial alluvial deposits are rated as of Low Palaeosensitivity and this particular assessment is upheld by this report.

It is concluded that the Aberdeen WEF Cluster project area is in practice of Low Palaeosensitivity overall, so the preliminary DFFE site sensitivity mapping shown in Figure 55 is *contested* here.

6. CONCLUSIONS & RECOMMENDATIONS

The Aberdeen WEF Cluster project area is underlain at depth by potentially fossiliferous continental (fluvial / lacustrine) bedrocks of the Lower Beaufort Group (Adelaide Subgroup). They probably belong 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 this area; this is largely due to the extremely poor levels of bedrock exposure found here. During the recent 4-day palaeontological field assessment only two occurrences of fossil vertebrates were recorded, both from superficial gravels rather than *in situ*. They include an unidentifiable fragment of rolled bone (Farm 94) as well as a concentration of bone chunks of a large-bodied tetrapod on Farm RE/91 which is provisionally interpreted to include cranial fragments (with a few teeth) of a tapinocephalid dinocephalian. The latter would support recent re-assignment of the bedrocks here to the *Tapinocephalus* Assemblage Zone. Both fossil vertebrate sites have been adequately sampled and do not require further mitigation. Occasional trace fossil assemblages comprise low diversity, small-scale invertebrate burrows of limited scientific interest.

A background scatter of petrified (silicified) wood blocks reworked from the Lower Beaufort Group bedrocks occurs within surface gravels and sands of eluvial and alluvial origin throughout most of the project area; only a small sample of occurrences have been recorded here. Much of the fossil wood material is poorly preserved and of limited scientific value. However, a small minority of blocks show well-developed seasonal growth rings and excellent preservation of the original woody fabric; these are potentially identifiable and may be of biostratigraphic and palaeoecological interest. Mitigation of the recorded fossil wood sites in particular is not recommended here, given the abundance and widespread occurrence of the material. However, it is recommended that a representative sample of well-preserved fossil wood material from the WEF Cluster project area is collected by a suitably qualified palaeontologist for curation in an approved fossil collection (*e.g.* Evolutionary Studies institute, Wits University, Johannesburg) once the development is authorized and before the Construction Phase.

Most of the low-relief WEF Cluster project area is covered by a 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 the abundant reworked fossil wood blocks and very rare bones, no fossils of Caenozoic age have been recorded within these younger sediments.

Given the rarity of significant vertebrate and other fossil finds, the overall palaeosensitivity of the Aberdeen WEF Cluster project 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 Aberdeen WEF Cluster is assessed as LOW. None of the recorded fossil sites lies directly within the provisional project footprint. The project is not fatally flawed and there are no objections on palaeontological heritage grounds to its authorization. This

assessment applies equally to all infrastructure components and layout options currently under consideration.

The Environmental Control Officer (ECO) / Environmental Site Officer (ESO) responsible for the 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 development.

7. ACKNOWLEDGEMENTS

Ms Jenna Lavin of CTS Heritage, Cape Town is thanked for commissioning this study as well as for providing the necessary project information. Mr Nic Wiltshire of CTS and Mnr Morne Marx of the Farm Perseverance also facilitated the palaeontological fieldwork. The companionship in the field, palaeontological contributions as well as logistical backup kindly provided by Ms Madelon Tusenius are all highly appreciated, as always. I am very grateful to Dr Mike Day (Natural History Museum, London) and Professor Bruce Rubidge (Evolutionary Studies Institute) for generously sharing their palaeontological knowledge of the Aberdeen area.

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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.

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

APPENDIX 1: ABERDEEN WEF CLUSTER PROJECT AREA NEAR ABERDEEN - FOSSIL SITE DATA – MARCH 2022

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 in *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 very widespread and 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 GreatEscarpment zone).

The recorded fossil sites are mapped in satellite image Figures A1 below and in relation to the provisional infrastructure layout in Figure A2.

LOC	GPS DATA	COMMENTS
136	-32.576024° 23.880584°	Mon Repos 154. Blocks of silicified fossil wood among surface gravels. Proposed Field Rating IIIC Local Resource. No mitigation recommended (*outside* project area).
138	-32.583672° 23.842179°	Farm 153, southern edge. Blocks of silicified wood among surface gravels possibly associated with lenses of *koffieklip*. Proposed Field Rating IIIC Local Resource. No mitigation recommended.
139	-32.584027° 23.832259°	Farm Kraanvogel Kuil 155, northern boundary. Concentration of well-preserved petrified wood blocks up to 30 cm across among surface gravels along farm track. Proposed Field Rating IIIC Local Resource. No mitigation recommended.
140	-32.590942° 23.824339°	Farm Kraanvogel Kuil 155. Blocks of petrified wood among surface gravels. Proposed Field Rating IIIC Local Resource. No mitigation recommended.
149	-32.622460° 23.778256°	Farm Kraanvogel Kuil 155. Blocks of petrified wood among surface gravels. Proposed Field Rating IIIC Local Resource. No mitigation recommended..
156	-32.601308° 23.751004°	Farm Kraanvogel Kuil 155. Blocks of petrified wood with very variable quality of preservation among surface gravels. Proposed Field Rating IIIC Local Resource. No mitigation recommended.
160	-32.584051° 23.760231°	Farm Kraanvogel Kuil 155. Blocks of petrified wood among surface gravels. Proposed Field Rating IIIC Local Resource. No mitigation recommended.
161	-32.587424° 23.767689°	Farm Kraanvogel Kuil 155. Abundant blocks of petrified wood, some substantial and well-preserved, among surface gravels. Proposed Field Rating IIIC Local Resource. No mitigation recommended.
164	-32.566510° 23.881011°	Mon Repos 154. Abundant blocks of fossil wood among surface gravels, possibly associated with nearby lenses of channel-hosted koffieklip. Proposed Field Rating IIIC Local Resource. No mitigation recommended

		(*outside* project area).
168	-32.569428° 23.858666°	Farm 153. Ridge crest with blocks of petrified wood among surface gravels. Proposed Field Rating IIIC Local Resource. No mitigation recommended.
169	-32.558420° 23.865376°	Farm 153. Heuweltjie with blocks of petrified wood among surrounding surface gravels. Proposed Field Rating IIIC Local Resource. No mitigation recommended.
170	-32.549473° 23.869668°	Farm 153. Gullied area with abundant blocks of petrified wood among surface gravels. Proposed Field Rating IIIC Local Resource. No mitigation recommended..
178	-32.510876° 23.879795°	Kraairivier 149. Extensive, low riverine exposure of purple-brown and grey-green mudrocks with pedocrete concretions, sparse blocks of petrified wood in surface gravels. Proposed Field Rating IIIC Local Resource. No mitigation recommended.
180	-32.514674° 23.893096°	Kraairivier 149. Extensive, low riverine exposure of purple-brown and grey-green mudrocks, thin, tabular crevasse splay sandstones with wave-rippled upper bed palaeosurfaces, local concentrations of small-scale meandering invertebrate traces – possibly undermat miners. Proposed Field Rating IIIC Local Resource. No mitigation recommended.
182	-32.513246° 23.857518°	Farm 94. Small pebble-sized, rounded clast of pale grey, reworked “rolled bone” as well as silicified wood blocks among surface gravels in shallow pan area. Proposed Field Rating IIIC Local Resource. Specimen collected. No mitigation required.
183	-32.513435° 23.857041°	Farm 94. Locally abundant blocks of silicified wood among surface gravels. Proposed Field Rating IIIC Local Resource. No mitigation recommended.
187	-32.524892° 23.835069°	Farm 94. Low ridges of yellowish-weathering, medium-grained, crumbly speckled sandstone with sparse scatter of fossil wood blocks among overlying eluvial gravels. Proposed Field Rating IIIC Local Resource. No mitigation recommended.
193	-32.520628° 23.726627°	Farm Doornpoort 93. Abundant reworked blocks of fossil wood among alluvial gravels bordering Gannaleegte drainage line. Proposed Field Rating IIIC Local Resource. No mitigation recommended.
196	-32.553682° 23.710204°	Farm Koppies Kraal 157. Blocks of fossil wood among eluvial gravels. Proposed Field Rating IIIC Local Resource. No mitigation recommended.
197	-32.568231° 23.685375°	Farm Koppies Kraal 157. Abundant blocks of fossil wood with variable quality of preservation among surface gravels. Proposed Field Rating IIIC Local Resource. No mitigation recommended.
215	-32.544215° 23.609752°	Farm RE/91. Concentration among surface gravels and sands of small to medium-sized (dm scale) bone blocks of a large-bodied tetrapod – possibly a tapinocephalid dinocephalian, including probable cranial material (e.g. jaw with embedded conical tooth roots). Proposed Field Rating IIIB. Site has been sampled. No mitigation recommended.
216	-32.544325° 23.609804°	Farm RE/91. Curved bone of large tetrapod (*possibly* dentary / lower jaw) embedded within surface sands and gravels (probably same individual as at Loc. 215). Proposed Field Rating IIIC. No mitigation recommended.

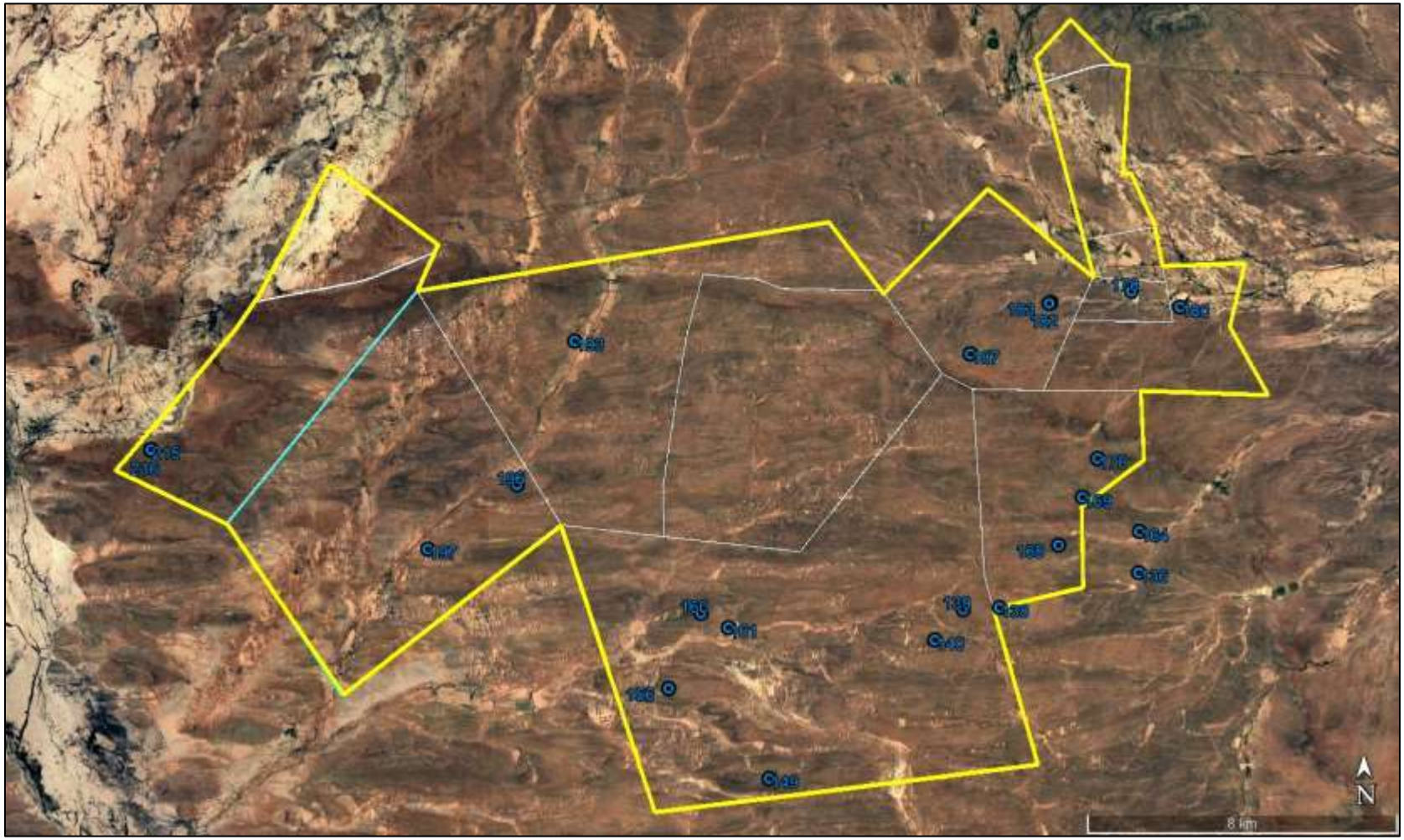

Figure A1: Google Earth© satellite image of the Aberdeen WEF Cluster project area (yellow polygon) showing the location of the recorded fossil sites - numbered in blue - that are tabulated above (*N.B.* The widespread background scatter of fossil wood encountered within surface deposits has not been recorded here).

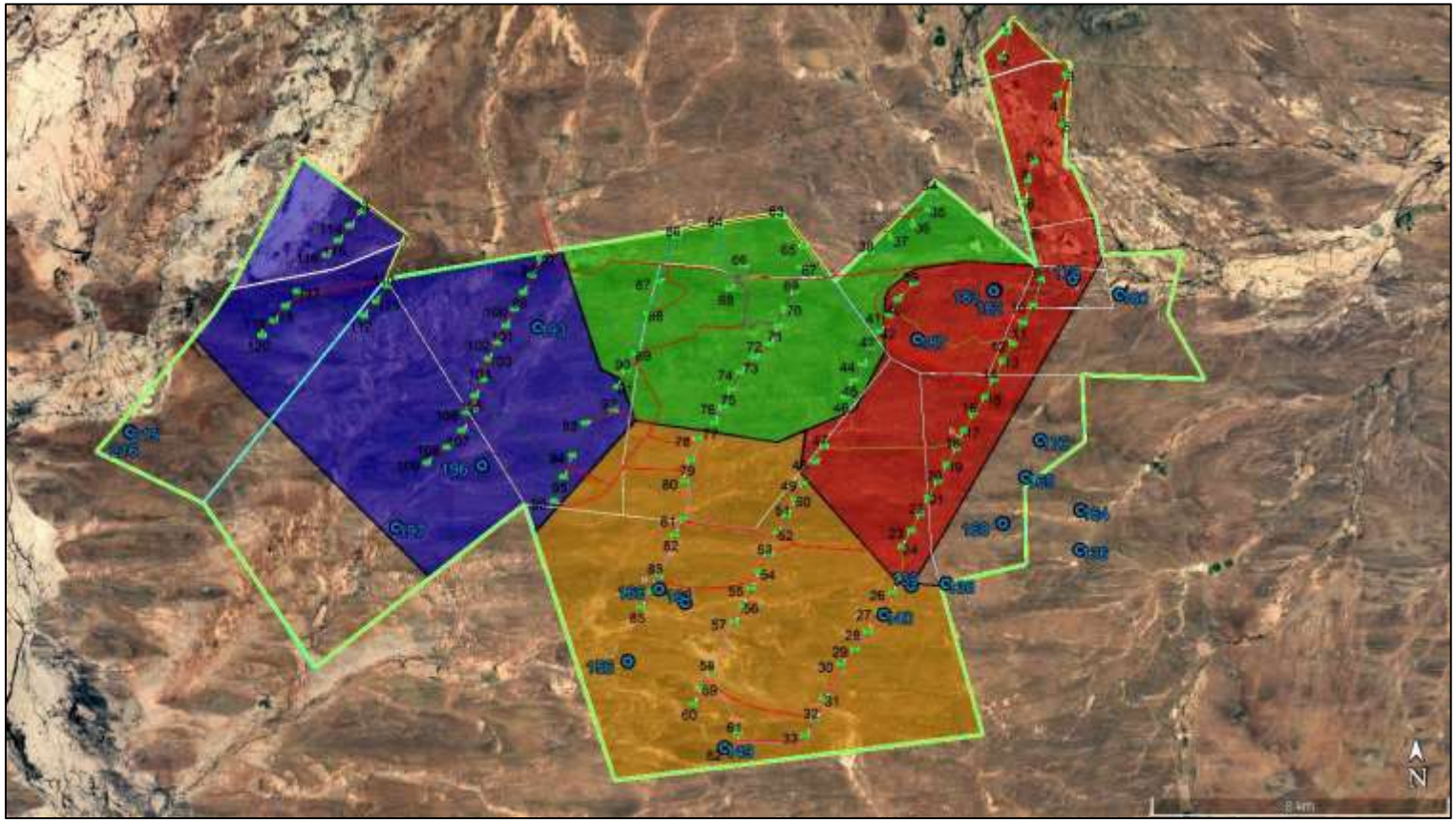

Figure A2: Google Earth© satellite image of the Aberdeen WEF Cluster project area showing the recorded fossil sites – numbered in blue - in the context of the provisional infrastructure layouts of the WEFs (wind turbine positions in green, access roads in red). None of the recorded sites lies within the provisional infrastructure footprint and palaeontological mitigation is not recommended for any of these sites.

APPENDIX 2: CHANCE FOSSIL FINDS PROTOCOL

<table>
<tr><td colspan="3">ABERDEEN WEF CLUSTER NEAR ABERDEEN</td></tr>
<tr><td>Province & region:</td><td colspan="2">Eastern Cape Cape; Sarah Baartman District , Dr Beyers Naude Local Municipality</td></tr>
<tr><td>Responsible Heritage Resources Agency</td><td colspan="2">ECPHRA. Contact details: Mr Sello Mokhanya, 74 Alexander Road, King Williams Town 5600; Email: smokhanya@ecphra.org.za</td></tr>
<tr><td>Rock unit(s)</td><td colspan="2">Abrahamskraal Formation (Lower Beaufort Group), Late Caenozoic alluvium, colluvium, calcrete pedocretes, pan sediments, surface gravels & soils</td></tr>
<tr><td>Potential fossils</td><td colspan="2">Fossil vertebrate bones, teeth, trace fossils (e.g. 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 (e.g. termitaria, rhizoliths), plant material in Late Caenozoic alluvium, calcretes.</td></tr>
<tr><td rowspan="5">ECO protocol</td><td colspan="2">1. Once alerted to fossil occurrence(s): alert site foreman, stop work in area immediately (N.B. safety first!), safeguard site with security tape / fence / sand bags if necessary.</td></tr>
<tr><td colspan="2">2. Record key data while fossil remains are still in situ:
• Accurate geographic location – describe and mark on site map / 1: 50 000 map / satellite image / aerial photo
• Context – describe position of fossils within stratigraphy (rock layering), depth below surface
• Photograph fossil(s) in situ with scale, from different angles, including images showing context (e.g. rock layering)</td></tr>
<tr><td>3. If feasible to leave fossils in situ:
Alert Heritage Resources Agency and project palaeontologist (if any) who will advise on any necessary mitigation
Ensure fossil site remains safeguarded until clearance is given by the Heritage Resources Agency for work to resume</td><td>3. If not feasible to leave fossils in situ (emergency procedure only):
Carefully remove fossils, as far as possible still enclosed within the original sedimentary matrix (e.g. entire block of fossiliferous rock)
Photograph fossils against a plain, level background, with scale
Carefully wrap fossils in several layers of newspaper / tissue paper / plastic bags
Safeguard fossils together with locality and collection data (including collector and date) in a box in a safe place for examination by a palaeontologist
Alert Heritage Resources Agency and project palaeontologist (if any) who will advise on any necessary mitigation</td></tr>
<tr><td colspan="2">4. If required by Heritage Resources Agency, ensure that a suitably-qualified specialist palaeontologist is appointed as soon as possible by the developer.</td></tr>
<tr><td colspan="2">5. Implement any further mitigation measures proposed by the palaeontologist and Heritage Resources Agency</td></tr>
<tr><td>Specialist palaeontologist</td><td colspan="2">Record, describe and judiciously sample fossil remains together with relevant contextual data (stratigraphy / sedimentology / taphonomy). Ensure that fossils are curated in an approved repository (e.g. museum / university / Council for Geoscience collection) together with full collection data. Submit Palaeontological Mitigation report to Heritage Resources Agency. Adhere to best international practice for palaeontological fieldwork and Heritage Resources Agency minimum standards.</td></tr>
</table>

APPENDIX 3: Cultural Landscape Assessment (2022)

PROPOSED ABERDEEN WIND ENERGY FACILITY

ABERDEEN, EASTERN CAPE PROVINCE

DESKTOP CULTURAL LANDSCAPE SCOPING STUDY

10 AUGUST 2022

Prepared for CTS Heritage

Prepared by Sarah Winter in association with Wendy Wilson

SARAH WINTER
HERITAGE CONSULTANT

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COVER IMAGE: Wolwekop from the R61 with Sleeping Giant behind, Winter 2022

A. INTRODUCTION

This cultural landscape study of the Aberdeen 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 area proposed for the Renewable Energy Facility (REF) is located approximately 16 km west of Aberdeen in the Eastern Cape. The area 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.

It is located in 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 an initial desktop study and subsequent field-work undertaken between the 17th and 18th July 2022.
- 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 land-scape including cumulative impacts and formulation of recommended mitigation measures.

A.2 Project Description

Atlantic Energy Partners (Pty) Ltd is proposing to develop a cluster of 4 x 170MW wind farms plus grid connection infrastructure comprising a 132/400kV collector switching station and a 132/400kV overhead power line (within a 100km long and 300m wide corridor) on a site near Aberdeen in the Eastern Cape Province.

The layout of the proposed WEF is indicated in Figure 2 incorporating up to 120 wind turbines spread across 4 project areas.

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 Ecca Group), with very low ground water yield.
- Mountains: This portion of the vast plains area is contained in the south by the Witberg mountain (peak 1427m), and bound to the north by the Great Escarpment. This includes the Sneeuberg mountain range, which lies north of Graaff-Reinet between Beaufort West and Cradock running roughly east west for 48 km. It curves slightly south at both eastern and western end, with the latter including the “Sleeping Giant” (1777m) section of the Camdeboo Mountain. Wolwekop is topographical landmark lying just north of the R61 and the proposed WEF.
- Plains: Colloquially, the plains area has several names, which describe loosely identified geographic areas such as the Camdeboo south of Graaff-Reinet and the Koup (Die Vlaktes), west of Aberdeen towards Beaufort West.
- Water: This is an arid, semi-desert region with a low annual rainfall of 100-200mm. This has dictated low growing karroid shrub vegetation and sparse habitation. The occasional heavy water flow resulting from early summer storms is collected in dams; supply 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.
- 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 between the R61 and N9. It extends south from the R61, occasionally straddling the route. This route connects Beaufort West and Aberdeen, loosely following an early wagon route to Graaff-Reinet. The N9 follows an almost straight line across the plains where it connects Willowmore to Aberdeen. A secondary route to Murrarysburg connect to the R61 just west of the topographical landmark of Wolwekop.
- 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 16km 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 16km 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 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 Cambedoo is in contrast to the dramatic mountain backdrop of the Camdeboo Mountains to the north. Local topographical conditions shield views from the town towards the proposed WEF.

Figure 1. Site location in regional context
(Source: Base map Google EarthPro)

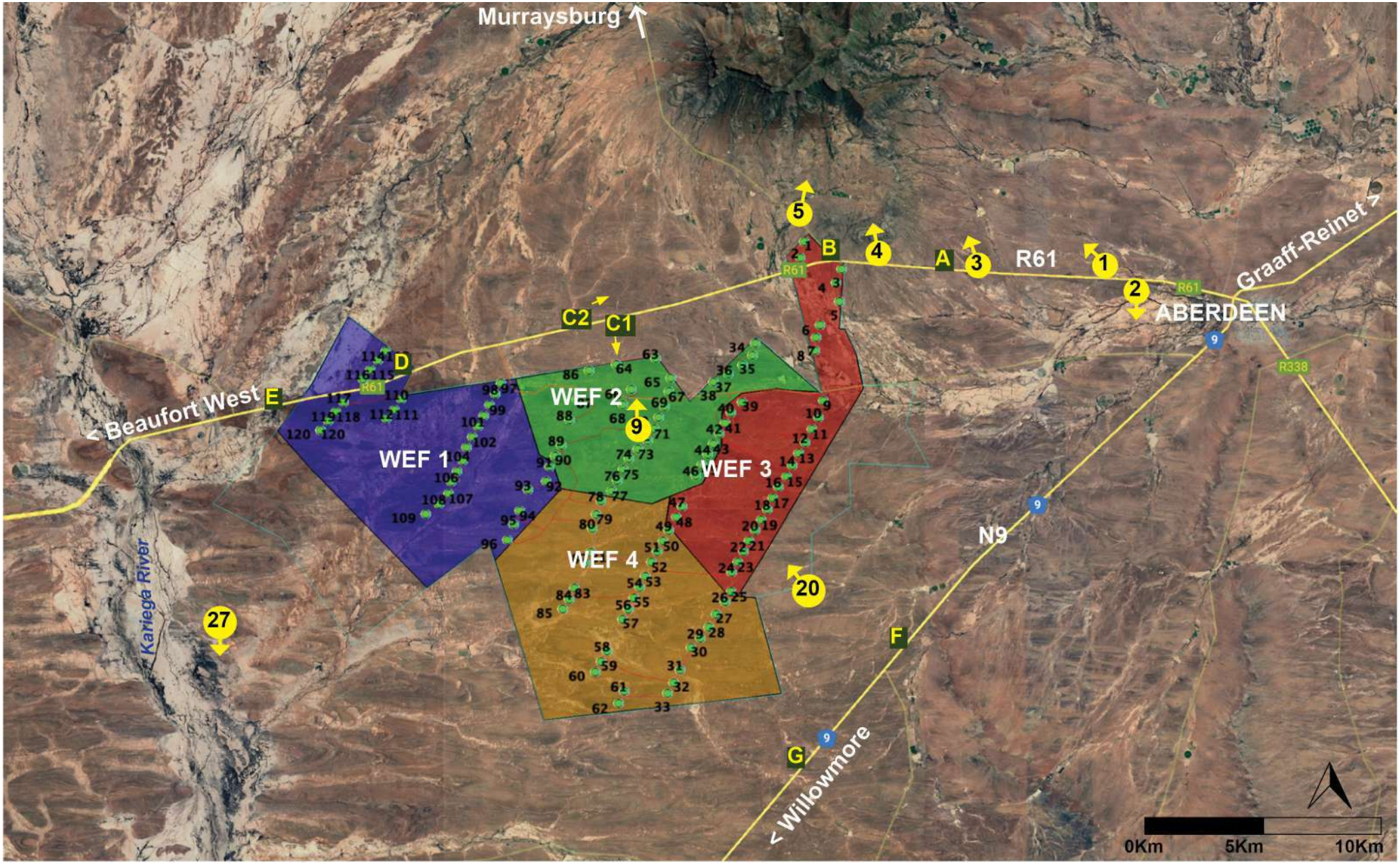


Figure 2. Site location in local context with reference to photographs (Source: Base map Google Earth).

Views of significant mountain formations

1. View from R61 looking north-west towards the towards Sleeping Giant mountain range.
2. View south from R61 into Fonteinbos Nature Reserve
3. View from R61 looking north-west towards the towards Sleeping Giant mountain range.
4. View from R61 near Murraysburg Road intersection towards Wolwekop and Sleeping Giant behind.
5. View north from Murraysburg Road toward Sleeping Giant.

9. View from farm road looking south across vast open plains with Windemere farmstead in the distance

20. View from farm road near Skoongesig farmstead looking north-west towards the proposed WEF

27. 27. View from farm road looking south across vast open plains characteristic of the local landscape with Teerputs farmstead in the distance

A. Streetview: R61 heading west out of Aberdeen

B. Streetview: R61 intersection with secondary, gravel road to Murraysburg

C1. Streetview: View south across plains

C2. Streetview: R61 east towards Aberdeen, with Camdeboo Mountains

D. Streetview: R61 west from Aberdeen, dam and wind pump feature

E. Streetview: R61 east towards Aberdeen, with Camdeboo Mountains

F. Streetview: N9 Aberdeen to Willowmore

G. Streetview: N9 view north towards proposed WEF location

C. BRIEF 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 Shell 1992). The 1820s to 1860s shows a steady pattern of Karoo land grants, with the later ones in more remote areas often formalising the rights of a pre-existing land user.

Aberdeen town was established on the farm Brakkefontein, which had been a fairly early grant for the area, signed over in 1817 by the British Governor Lord Charles Somerset. In 1855 the farm was bought by the Graaff-Reinet Dutch Reform church to provide for its congregation, growing as result of the Marino wool export boom which began in the 1840s.

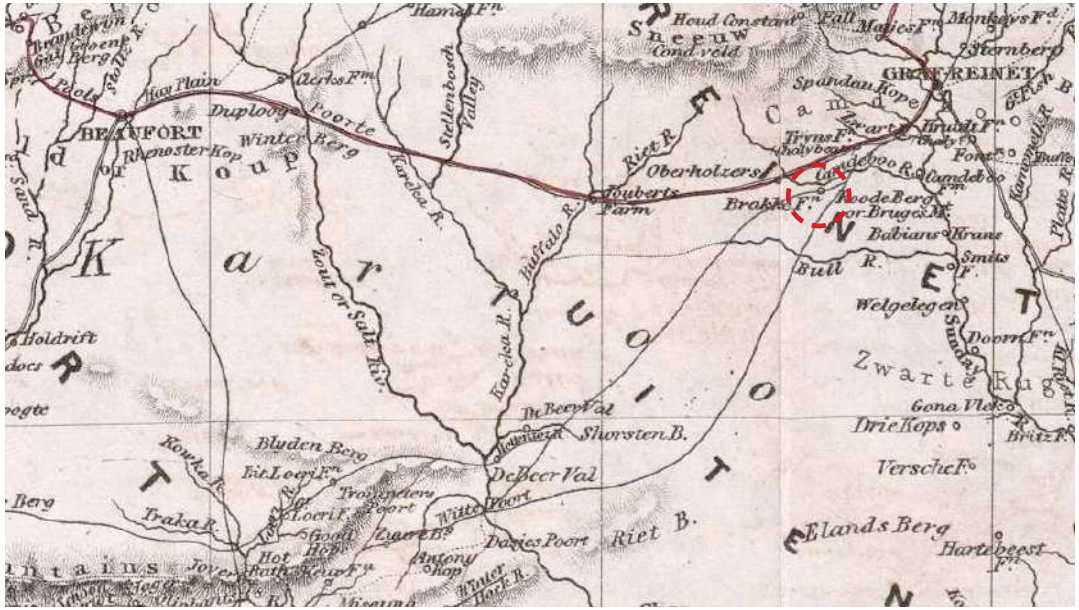


Figure 3. 1844 map. Route connecting Beaufort and Graaff-Reinet. Brakkefontein, farm (Aberdeen) circled. (Source: Jas Wyld, UCT Digital Collections, islandora19573).

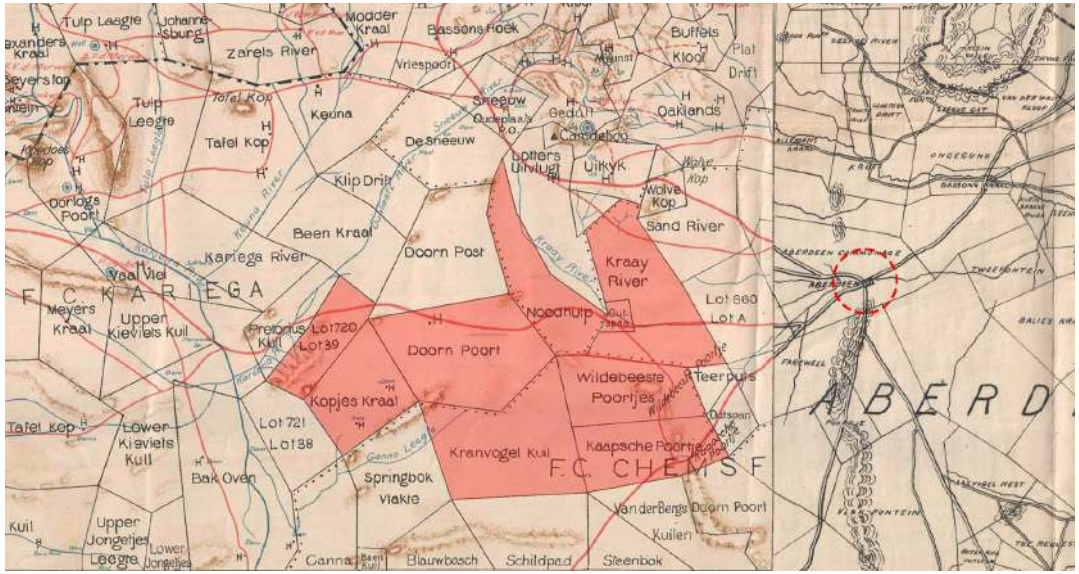


Figure 4. 1901 map. Historic route connects Beaufort West and Aberdeen running south of N61. (Source: UCT Digital Collections islandora:24827 and islandora:24848).

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.

C.1 Farms Affected by Proposed Development

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 is it 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.
- 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.

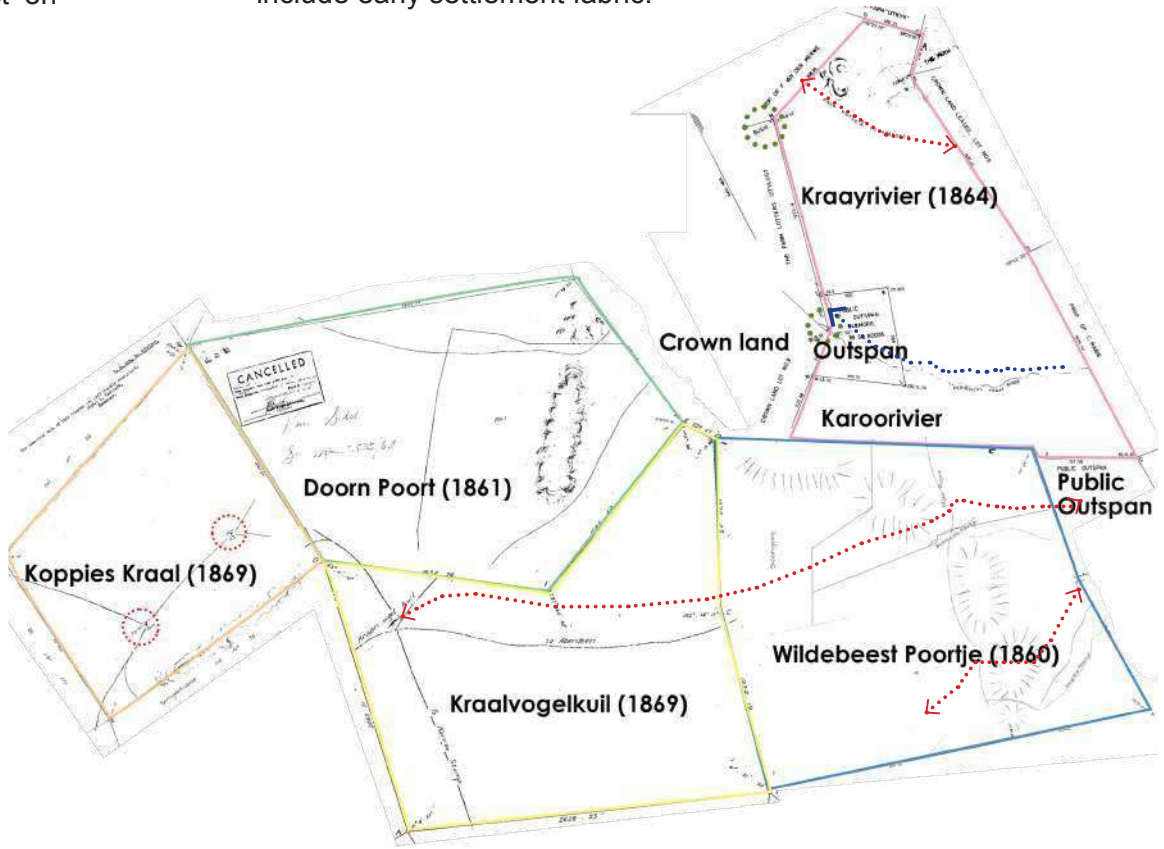


Figure 5. Partial composite of survey diagrams.

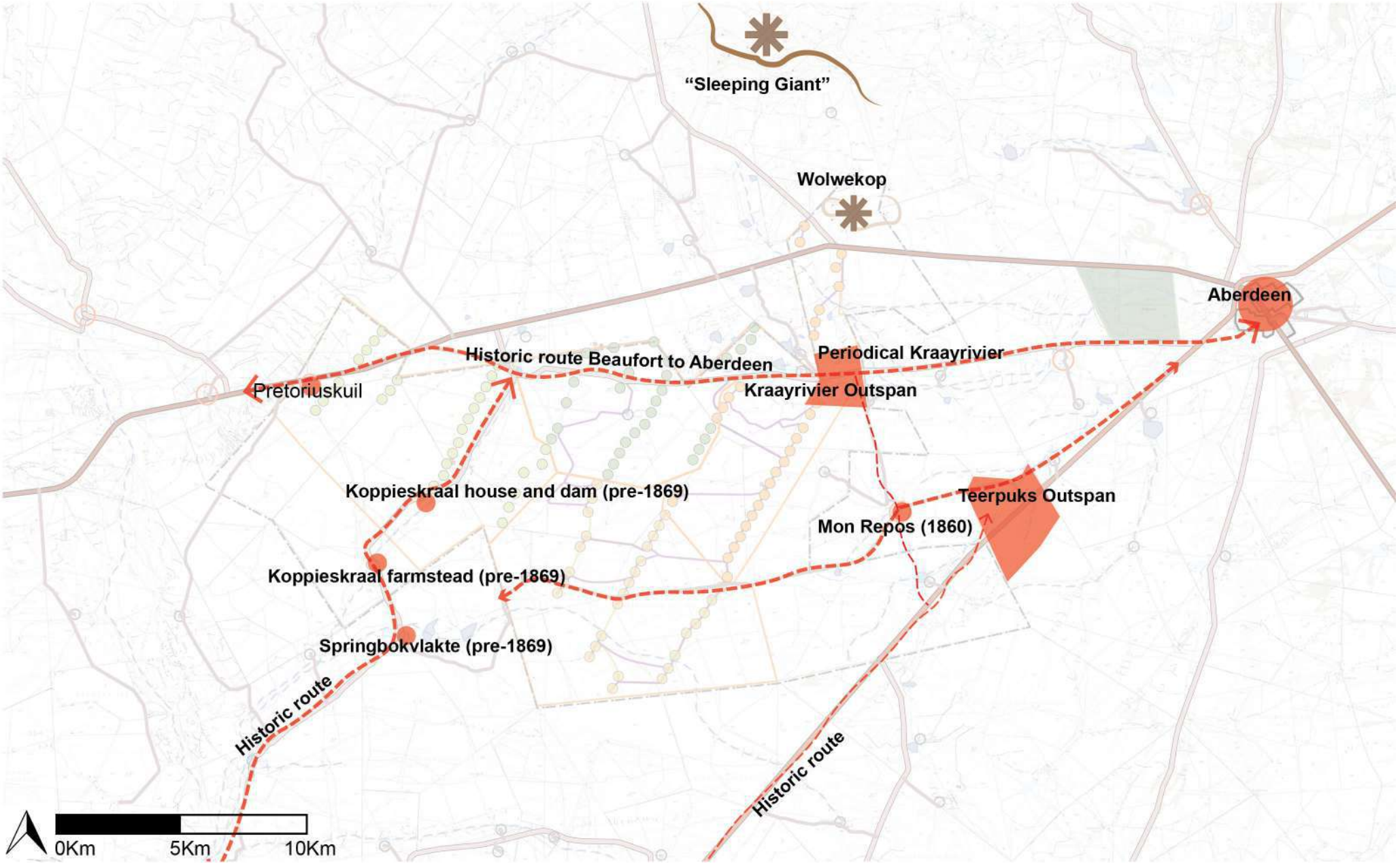


Figure 6. Historic routes, settlements, farmsteads.

D.1 Overall Landscape

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.

D.2 Landscape Elements

D.2.1 Topographical Features

- 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” formation framing the long views northwards.

D.2.2 Water courses and infrastructure

- The route of the periodical Kraai River crossing a portion of the site and informing a 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 as place-making elements.

D.2.4 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.
- The combination of the intersection of the R61 and the Murraysberg Road, change in topography and the landmark qualities of the Wolwekop providing a threshold condition.
- The east-west historic route running parallel to the R61 and through the site, which has structured a historical pattern of settlement.

D.2.5 Settlements

- Aberdeen town of suggested Grade IIIA heritage value and situated approximately 16 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. Refer to D.3 below.

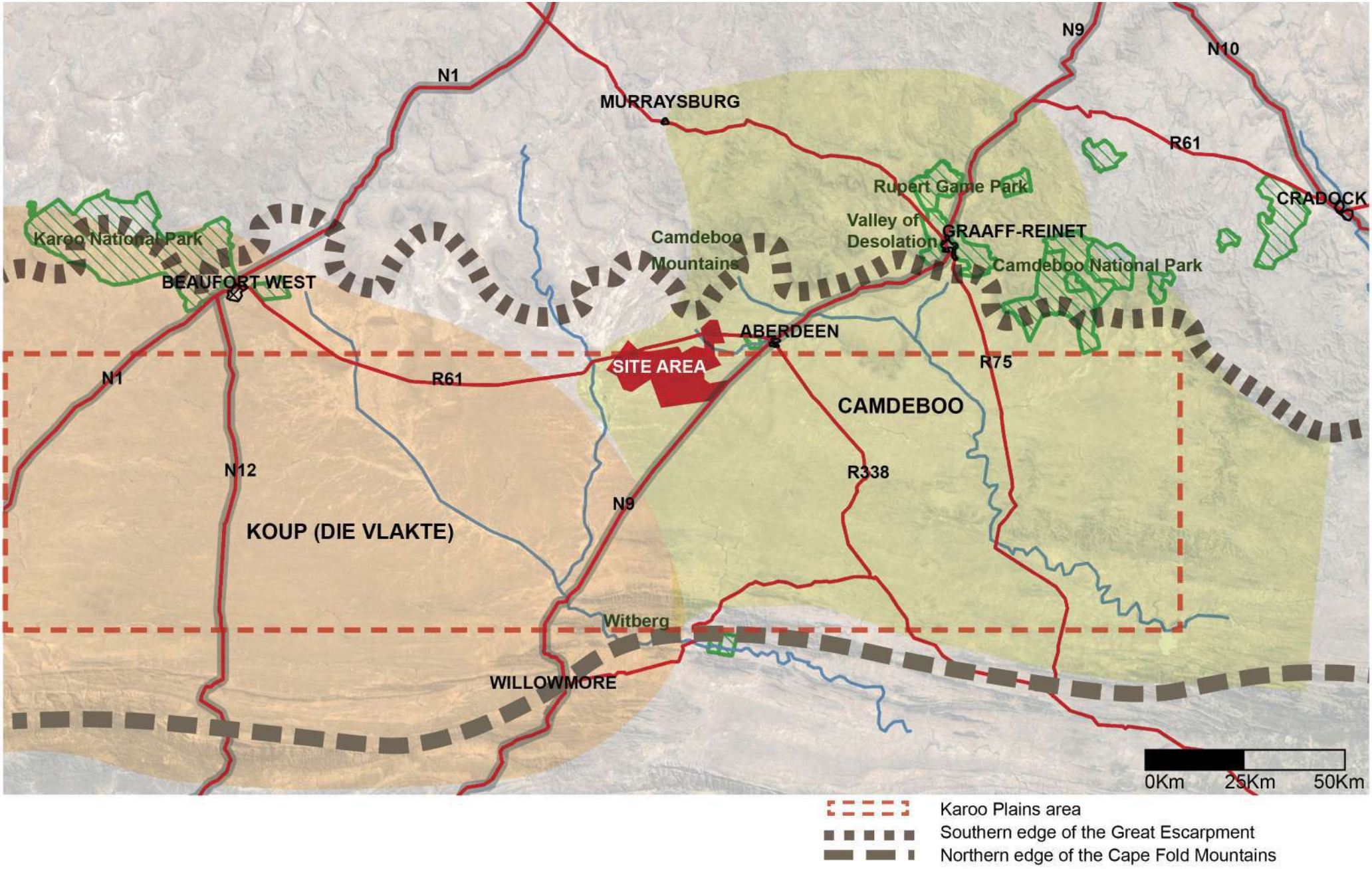


Figure 7. Cultural landscape overview at regional scale.

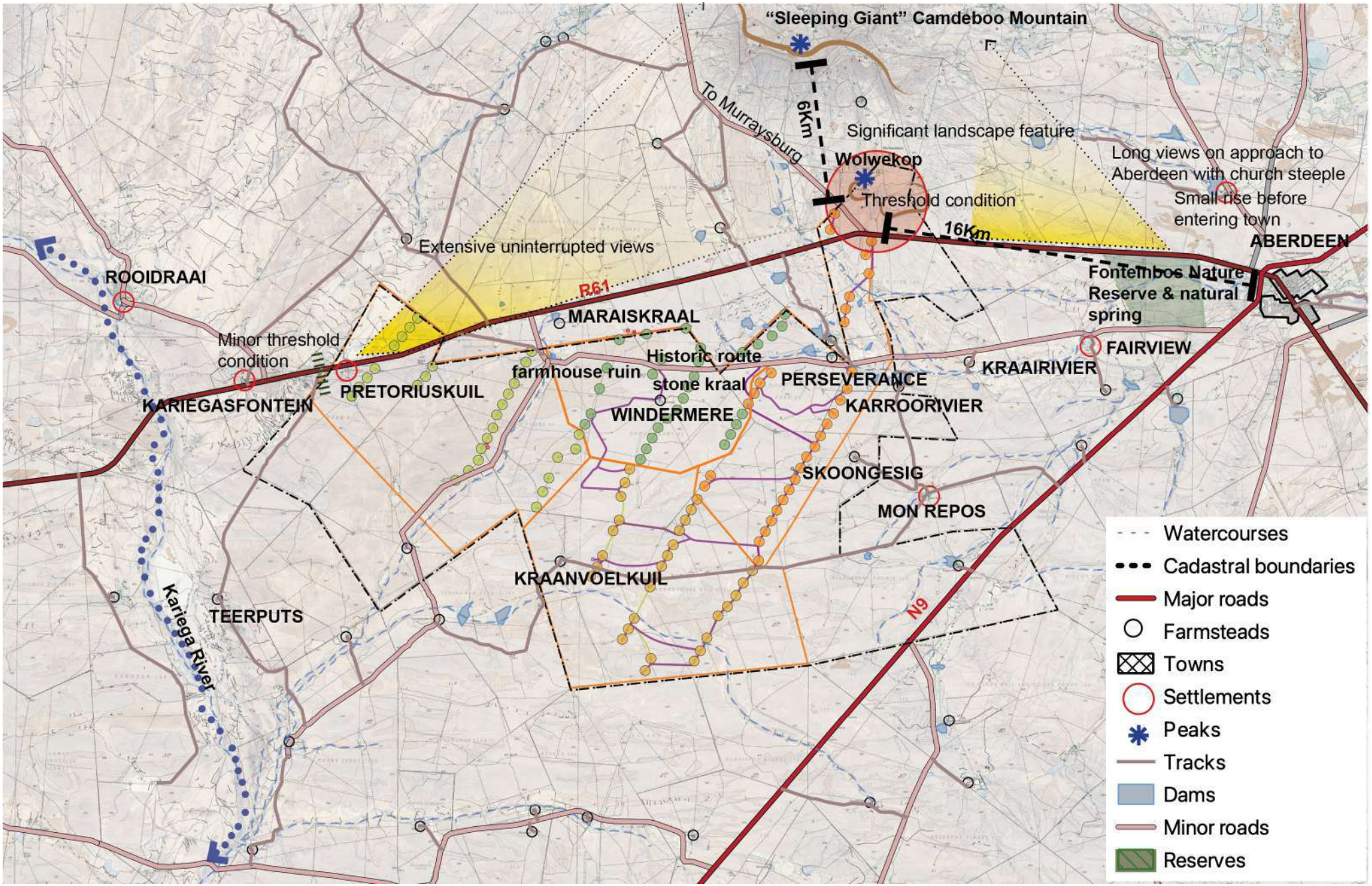


Figure 8. Cultural landscape elements at local scale.

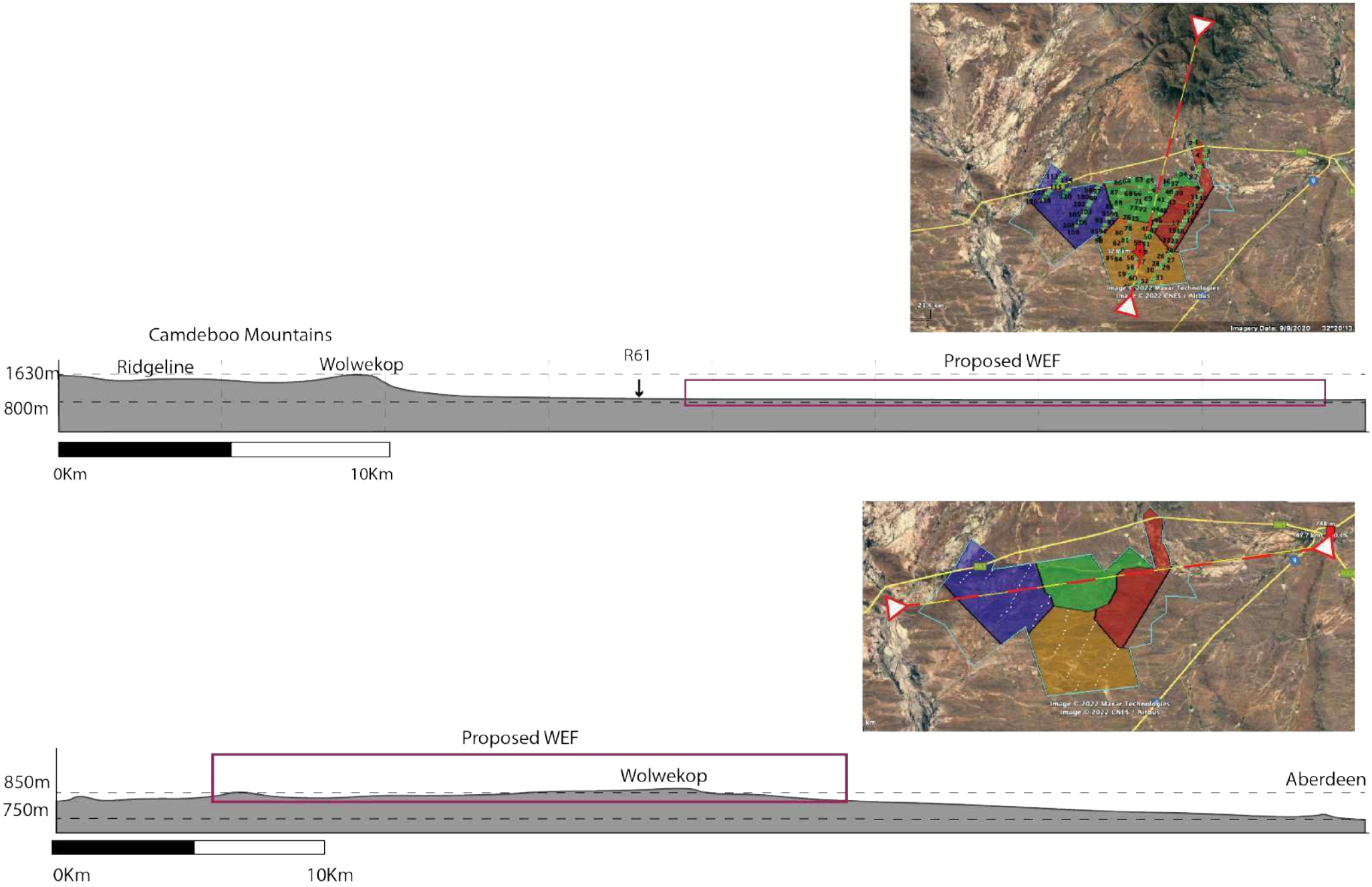


Figure 9. Diagrammatic sections of topographical condition

D.3 Built Environment Elements

This section including the map below identifies built environment elements and their suggested gradings.

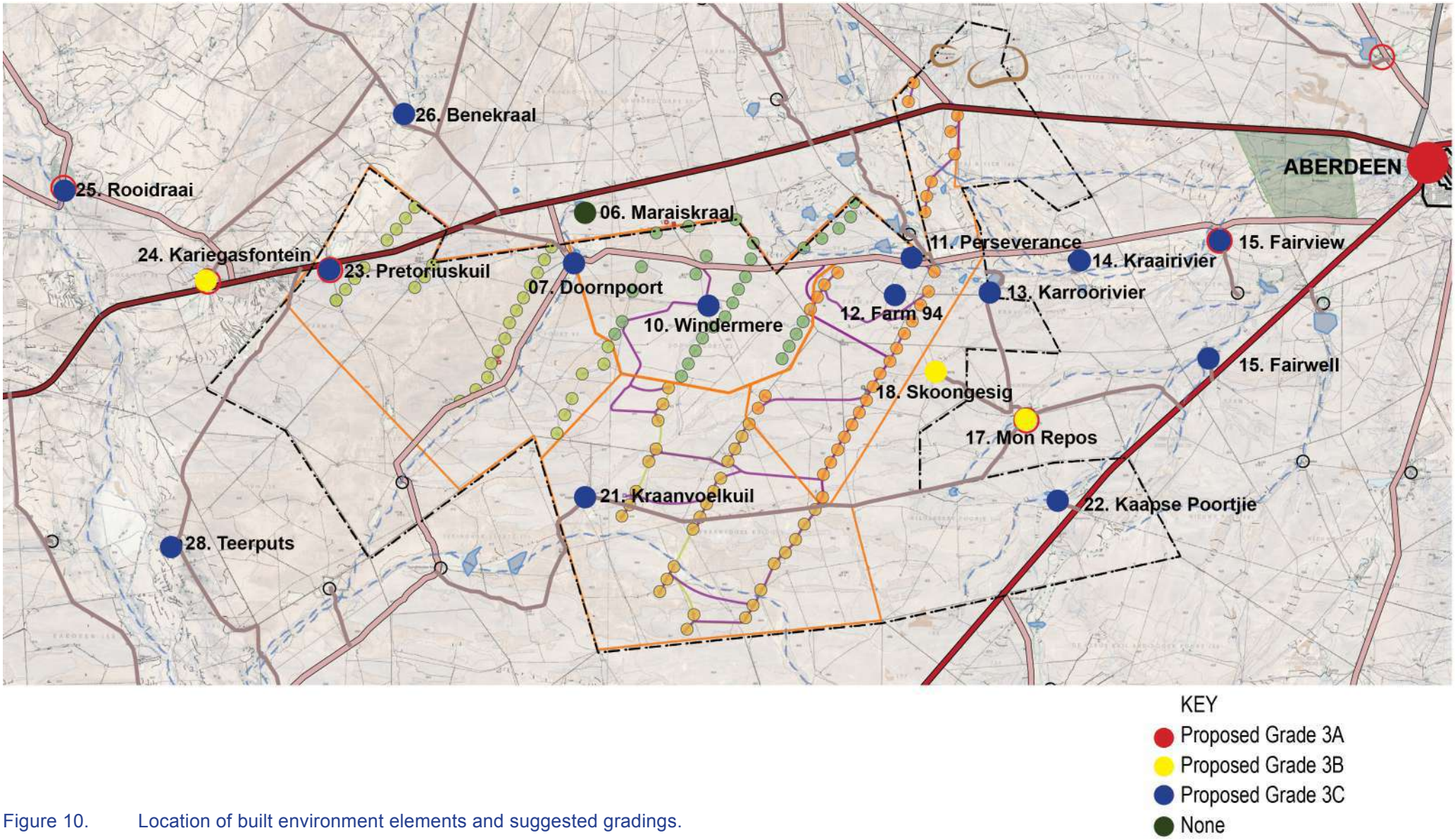


Figure 10. Location of built environment elements and suggested gradings.

Table of Built Environment Elements

MAP REFERENCE	DESCRIPTION	SIGNIFICANCE	SUGGESTED GRADING	PHOTOGRAPH (Winter July 2022)	
06. Maraiskraal	Abandoned farm structures located adjacent to the R61 and dam.	Minimal heritage value.	None		
07. Doornpoort	Ruinous homestead of mud brick construction with a clump of mature trees.	Some contextual heritage value as a historical marker in the landscape and related to historical east-west access route.	3C		
10. Windermere	Simple farmhouse with adjacent stone structure. Associated gum trees. Kraal structure to the east of the approach road on an elevated position overlooking plains to the south.	Some contextual heritage value as a distinctive feature in the flat open landscape and related to historical east-west access route.	3C		
11. Perseverance	Barn type structure located at entrance off historical access route and forming part of a group of mid-20th farm buildings. Located in the vicinity the confluence of tributaries of the Kraay Rivier and historical outspan.	Contextual heritage value as a historical marker in the landscape and related to the east-west historical access route, Kraay Rivier and historical outspan.	3C		

MAP REFERENCE	DESCRIPTION	SIGNIFICANCE	SUGGESTED GRADING	PHOTOGRAPH (Winter July 2022)	
12. Farm 94 (farmstead name undetermined)	Typical simple farmhouse dating to the mid-20th century.	Some contextual heritage value as a historical marker in the landscape and related to the east-west historical access route.	3C		
13. Karroorivier	Typical simple farmhouse dating to the mid-20th century	Some contextual heritage value as a historical marker in the landscape and related to the east-west historical access route.	3C		
14. Kraairivier	Abandoned farmstead of mud brick construction with stone kraal.	Some contextual heritage value as a historical marker in the landscape and related to the east-west historical access route. *NOTE: Graves and historic material located at a different Kraairivier location by CTS (ABD124) included in the Archaeological Impact Assessment Report (August 2022).*	3C		

MAP REFERENCE	DESCRIPTION	SIGNIFICANCE	SUGGESTED GRADING	PHOTOGRAPH (Winter July 2022)	
15. Fairview	Farm complex with evidence of late 19th early 20th century fabric, highly altered. Treed setting.	Some contextual heritage value as a historical marker in the landscape and related to the east-west historical access route. *Fairview farm as a whole has associations with the early military career of Captain Lawrence Oats, who participated in the South Pole Terra Nova Exploration 1911 – 1912. It was during his service in the South African War that he was wounded in a skirmish outside Aberdeen on Fairview farm (2022).*	3C	 	
16. Fairwell	Abandoned farmstead of mud brick construction visible from the N9.	Some contextual heritage value as a historical marker in the landscape related to the N9.	3C		
17. Mon Repos	Farm complex with late 19th early 20th century homestead (extensively altered), kraal structure, treed setting and associated dam.	Some intrinsic heritage value in terms of surviving historic fabric and as a historical marker in the landscape	3B		

MAP REFERENCE	DESCRIPTION	SIGNIFICANCE	SUGGESTED GRADING	PHOTOGRAPH (Winter July 2022)	
18. Skoongesig	Abandoned farm complex with a late 19th early 20th century farmhouse and stone kraal. Elevated location with expansive views.	Some intrinsic and contextual value in term of intact period features and as a historical marker in the landscape.	3B		
21. Kraanvoelkuil	Farm complex with simple dwellings and stone kraal. Remote setting.	Contextual heritage value as a historical marker in the landscape.	3C		
22. Kaapse Poortjie	Farm complex with 'Cape Revival' gabled homestead, possibly with earlier fabric. Treed setting. Large dam.	Contextual heritage value in term of contributing to landscape character.	3C		
23. Pretoriuskraal	Farmhouse dating to the mid-20th century. Possibly earlier fabric.	Some contextual value as a historical marker in the landscape	3C		

MAP REFERENCE	DESCRIPTION	SIGNIFICANCE	SUGGESTED GRADING	PHOTOGRAPH (Winter July 2022)	
24. Kariegasfontein	Farmstead dating to the late 19th early 20th century with 1930s additions. Treed setting.	Some intrinsic value in terms of period features and of contextual value as a historical marker in the landscape.	3B	 	
25. Rooidraai	Early 20th century farmstead, highly altered. Treed setting.	Contextual value as a historical marker in the landscape.	3C		

MAP REFERENCE	DESCRIPTION	SIGNIFICANCE	SUGGESTED GRADING	PHOTOGRAPH (Winter July 2022)	
26. Benekraal	Early 20th century farmstead. Remote setting.	Contextual value as a historical marker in the landscape.	3C	 	
28. Teerputs	Early to mid 20th century farmstead. Treed setting. Very remote.	Some contextual value as a historical marker in the landscape.	3C		

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 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 a local scale, the project is generally located away from major scenic topographical features and beyond 16km 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 is unpacked in Section E.3 below.

E.2. General Principles

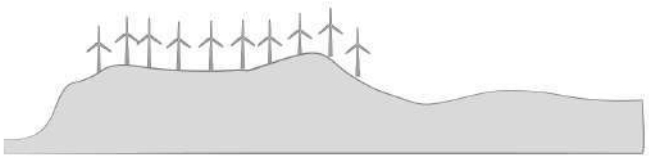
These principles are derived from international best practice as contained in various International Charters on Conservation and a number of local adaptations, and apply to this cultural landscape assessment.

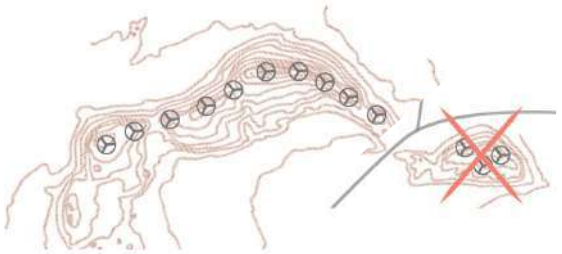
- Landscape significance - acknowledge the overall natural and cultural landscape, and the layered pattern of settlements in response to the natural landscape over time.
- Landscape integrity – retain the essential character and intactness of wilderness, rural and urban areas in the face of fragmentation 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.
- Allow for a buffer of 2km round 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.





E.3 Heritage Receptors and Buffers

The following heritage receptors and associated buffer areas are applicable to the placement of wind turbines. Listed are those specific heritage receptors applicable to the study area of the proposed Aberdeen WEF.

HERITAGE RESOURCE/RECEPTORS	NO-GO AREAS	HIGH SENSITIVITY	MEDIUM SENSITIVITY
Cultural landscapes including natural reserves - formally protected or worthy of formal protection. **Fonteinbos Nature Reserve**	0 – 3 km	3 – 5 km radius	5 – 10km
Settlements (towns, villages and hamlets) - formally protected or worthy of formal heritage protection. **Aberdeen and its setting**	0 - 2km radius	2 - 4km radius	4 – 6km
Historic scenic linkage routes. **R61, N9 as major linkage routes** **Murraysburg Road and east-west historical access route** **Threshold condition at intersection of R61 and Murraysberg Road, and landmark topographical feature (Wolwekop)**	0 – 1km buffer either side	1 – 2.5km	2,5 - 5km
Heritage sites worthy of Grade I, II and IIIA heritage status. **Not applicable**	0 – 1km radius	1 – 2km	2- 5 km
Heritage sites worthy of grade IIIB and IIIC heritage status. **Various built environment features (farmsteads, stone kraals)**	0 - 500m radius	500m – 1km	1 – 2km
Water features (rivers, wetlands and dams) **Related mostly to the Kraay Rivier as a landscape structuring element** **Farmsteads generally associated with dam structures**	0 - 250m buffer either side/ surrounding water feature	250 - 500m	
Topographical features (ridgelines, peaks, scarps) **Wolwekop**	0 - 250m radius buffer from peak/apex	250 - 500m	
Steep slopes **Not applicable due to placement of WEF in relatively flat landscape**	>1:4 slopes	>1:10 slopes	<1:10 slopes

Heritage receptors adapted from Oberholzer 2020

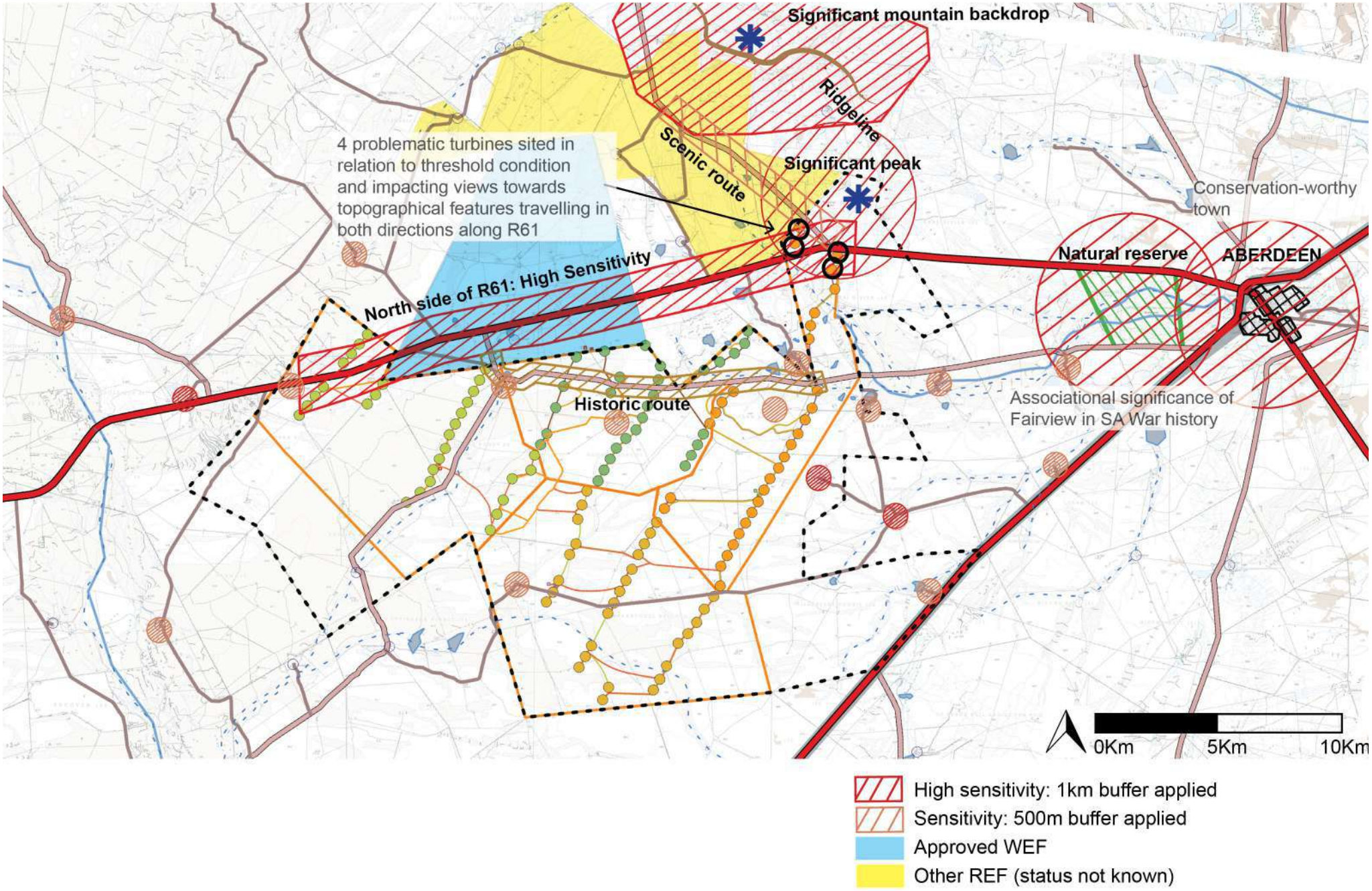


Figure 11. Buffer areas overlay with proposed WEF layout

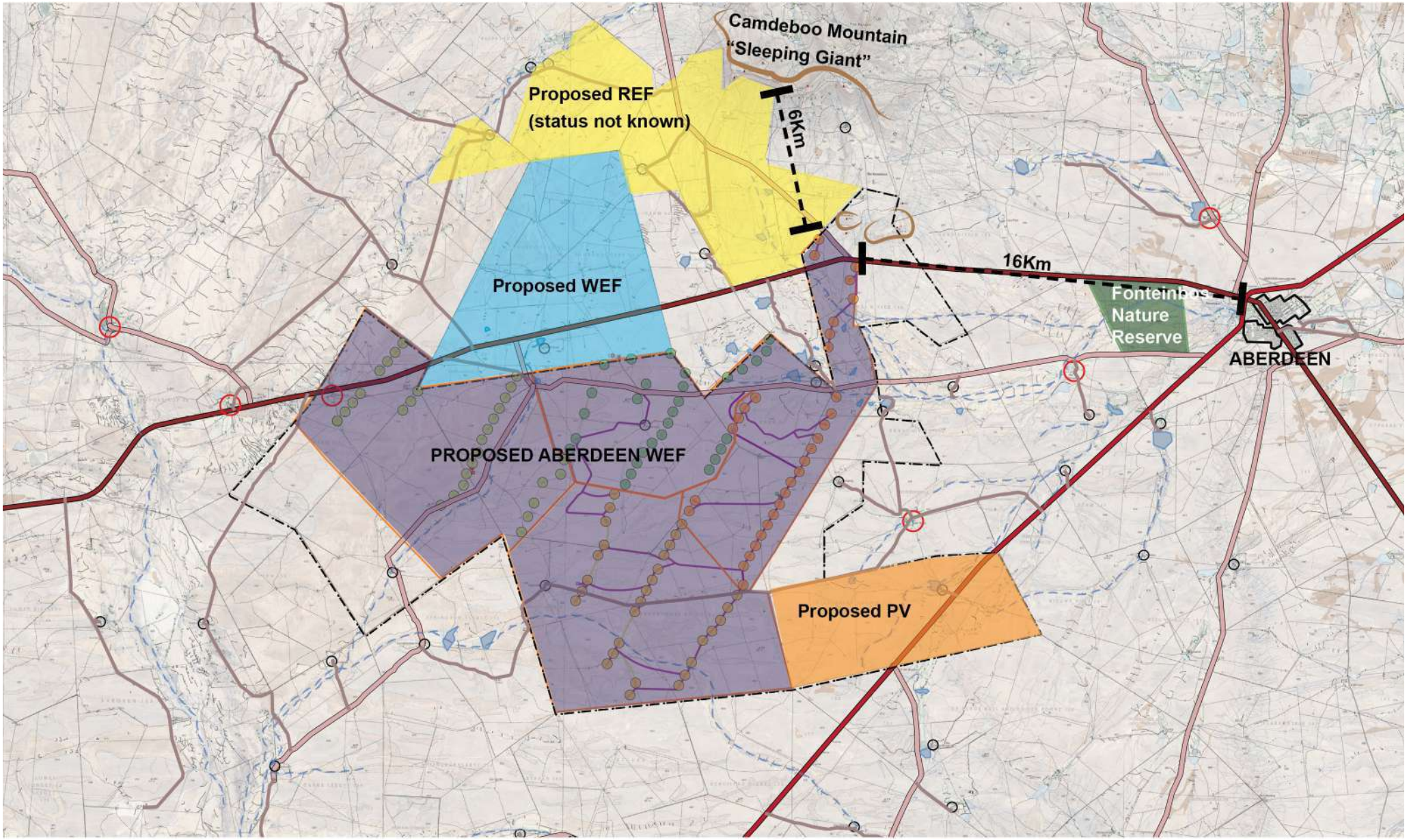


Figure 12. Cumulative impacts of approved and proposed REFs

F. ASSESSMENT OF IMPACTS (CULTURAL LANDSCAPE)

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 16km from the town of Aberdeen and beyond 10km from the Fonteinbos Nature Reserve.

At a local and site scales, the following sensitive heritage receptors have been identified:

- Historical farmsteads (Grade IIIB and IIIC)
- The scenic qualities of the R61
- The Murraysburg Road and east-west historical access route
- Wolwekop as a distinctive topographical feature adjacent to the R61

An overlay of the suggested buffer areas with the proposed WEF project in Figure 10 highlights the following problematic turbines:

- Turbines to the north of the R61: WET 1, 2, 113, 114, 115 and 116. These are located within the 1km buffer area along the R61 and should be removed avoid the placement of turbines both sides of the R61.
- Turbines south of the R61 within the 1km buffer area: WET 3, 4, 110, 117, 118 and 119.
- Turbines located in proximity to Wolwekop, which will impact views towards this topographical feature along the R61: WET 1 and 2.
- Turbines located within the 500m buffer either side of the Murraysburg Road and east-west historical access route: WET 9, 39, 66, 67, 68, 69, 87 and 97.

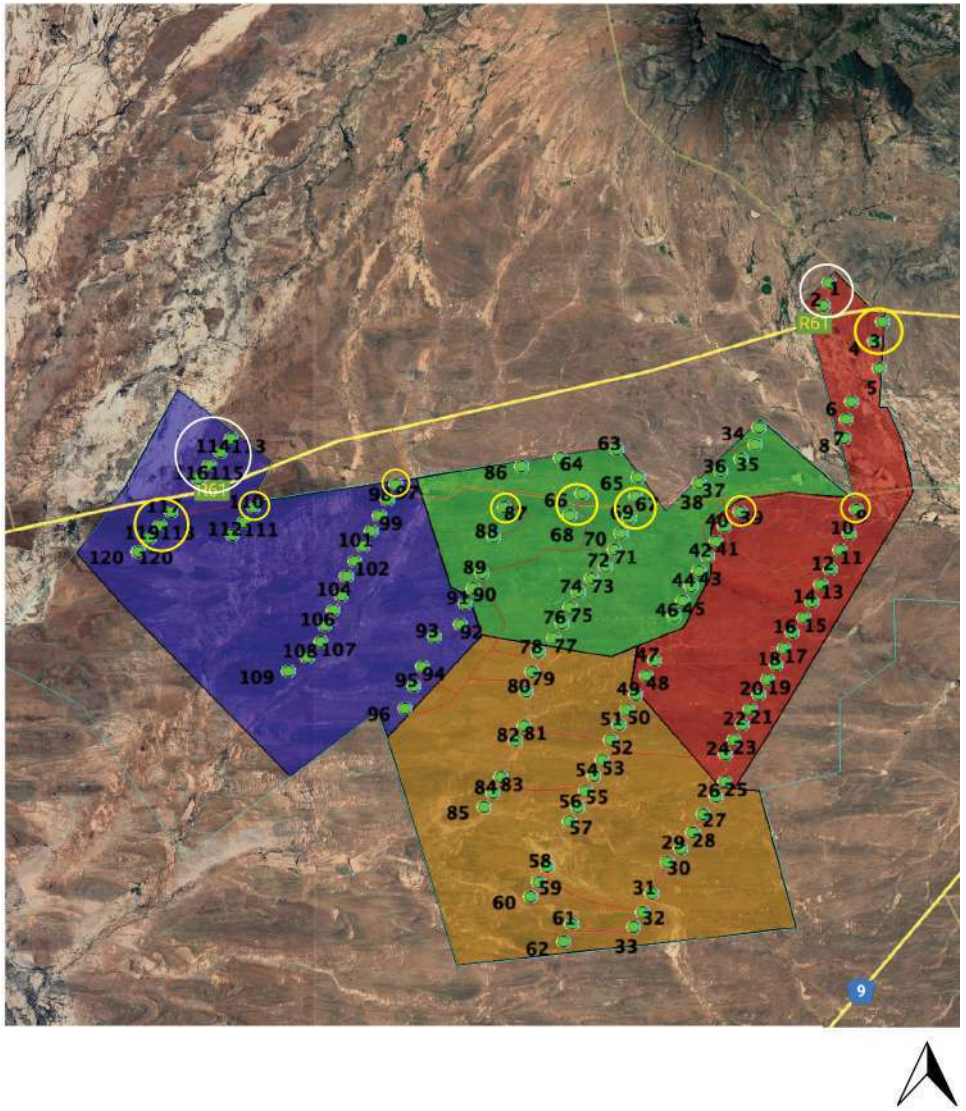


Figure 13. Recommended mitigation measures of no go buffer areas.

F.1 Cumulative Impacts

The exact extent of cumulative impacts is uncertain as the approval status of the one of the adjacent projects has not yet been clarified. Refer to Figure 11. However, based on the extent of the proposed Aberdeen WEF 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.

G. CONCLUSION AND RECOMMENDATIONS

The principle of the proposed Aberdeen WEF is acceptable 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 local and site scales, the project is generally located away from major scenic topographical features and beyond 16km from the town of Aberdeen and beyond 10km from the Fonteinbos Nature Reserve.

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 and patterns of planting).

The landscape itself is not worthy of formal protection in terms of the NHRA. However, it possesses conservation-worthy landscape elements for aesthetic (visual, place making) and historical reasons.

At a local and site scales, the following sensitive heritage resources/ receptors have been identified:

- Historical farmsteads (Grade IIIB and IIIC)
- The scenic qualities of the R61
- The Murraysburg Road and east-west historical access route
- Wolwekop as a distinctive topographical feature adjacent to the R61

Based on the recommended buffer areas for these receptors, it is recommended that the following wind turbines be relocated or removed:

- WET 1, 2, 3, 4, 9, 39, 66, 67, 68, 69, 87, 97, 110, 113, 114, 115, 116, 117, 118 and 119

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Watt, SA. “Deelfontein, a hospital in the Karoo during the Anglo-Boer War, a cemetery today).”

Military History Journal, Vol 7 No 4 - December 1987.

CTS HERITAGE

APPENDIX 4: Heritage Screening Assessment

CTS HERITAGE

HERITAGE SCREENER

CTS Reference Number:	**CTS21_069**
SAHRA Ref Number	
Client:	**Savannah**
Date:	**May 2022**
Title:	**Proposed development of the Aberdeen WEF, Eastern Cape**

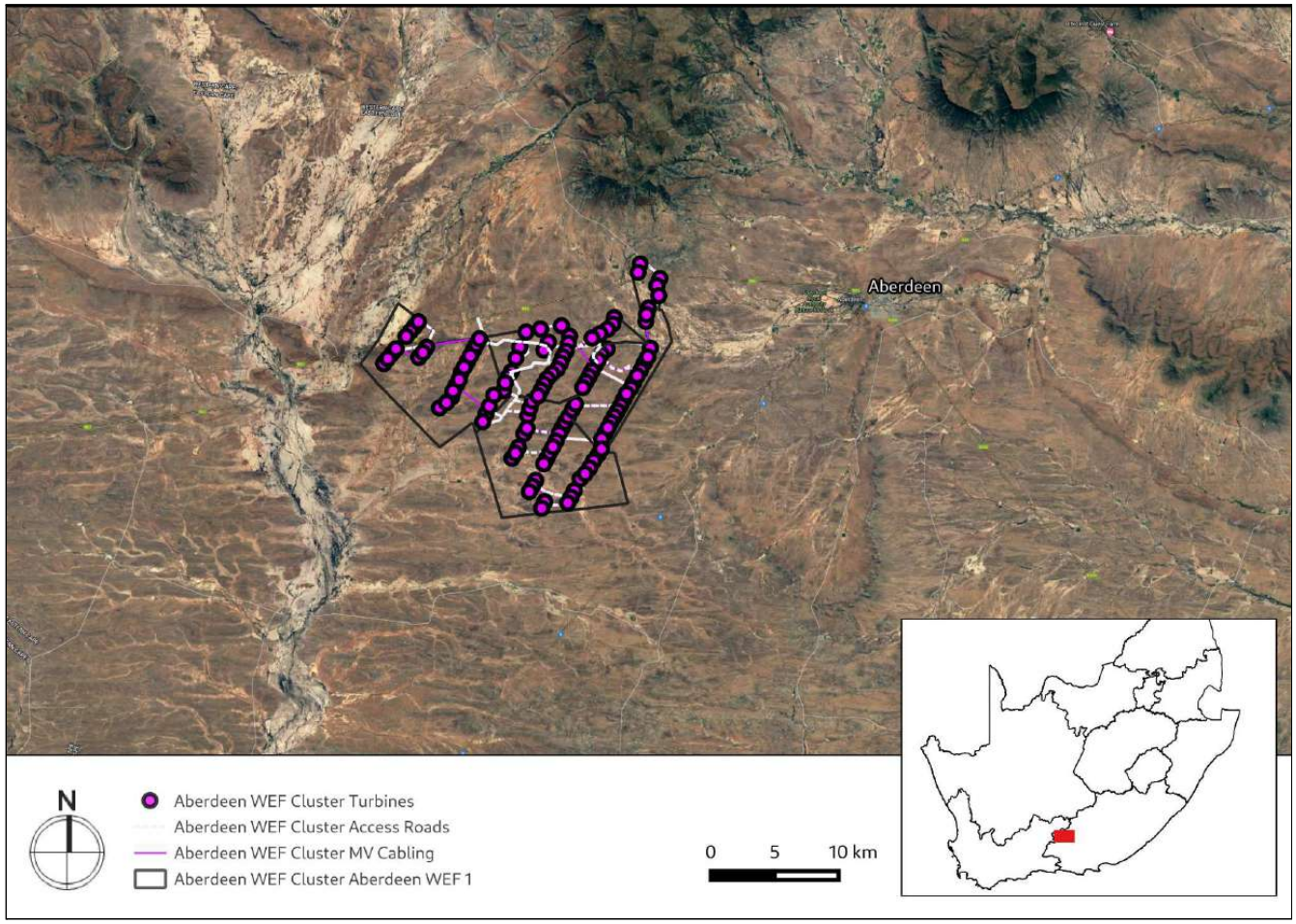

Figure 1a. Satellite map indicating the location of the proposed development in the Northern Cape Province

Recommendation:	**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.**

CTS Heritage
16 Edison Way, Century City, 7441
Tel: +27 (0)87 073 5739 **Email:** info@ctsheritage.com **Web:** www.ctsheritage.com

CTS HERITAGE

1. Proposed Development Summary

TBA

2. Application References

Name of relevant heritage authority(s)	SAHRA
Name of decision making authority(s)	DFFE

3. Property Information

Latitude / Longitude	32°32'46.05"S 23°46'21.04"E
Erf number / Farm number	Koppies Kraal 157, Doornpoort 93, Plaas 94, Kraanvogel Kuil 154, Kraal rivier 149
Local Municipality	Dr Beyers Naude
District Municipality	Sarah Baartman
Province	Eastern Cape
Current Use	Agriculture
Current Zoning	Agriculture

4. Nature of the Proposed Development

Total Surface Area	TBA
Depth of excavation (m)	TBA
Height of development (m)	TBA

5. Category of Development

x	**Triggers: Section 38(8) of the National Heritage Resources Act**
	Triggers: Section 38(1) of the National Heritage Resources Act
	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^2 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
	4. Rezoning of a site exceeding 10 000m^2
	5. Other (state):

6. Additional Infrastructure Required for this Development

TBA

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

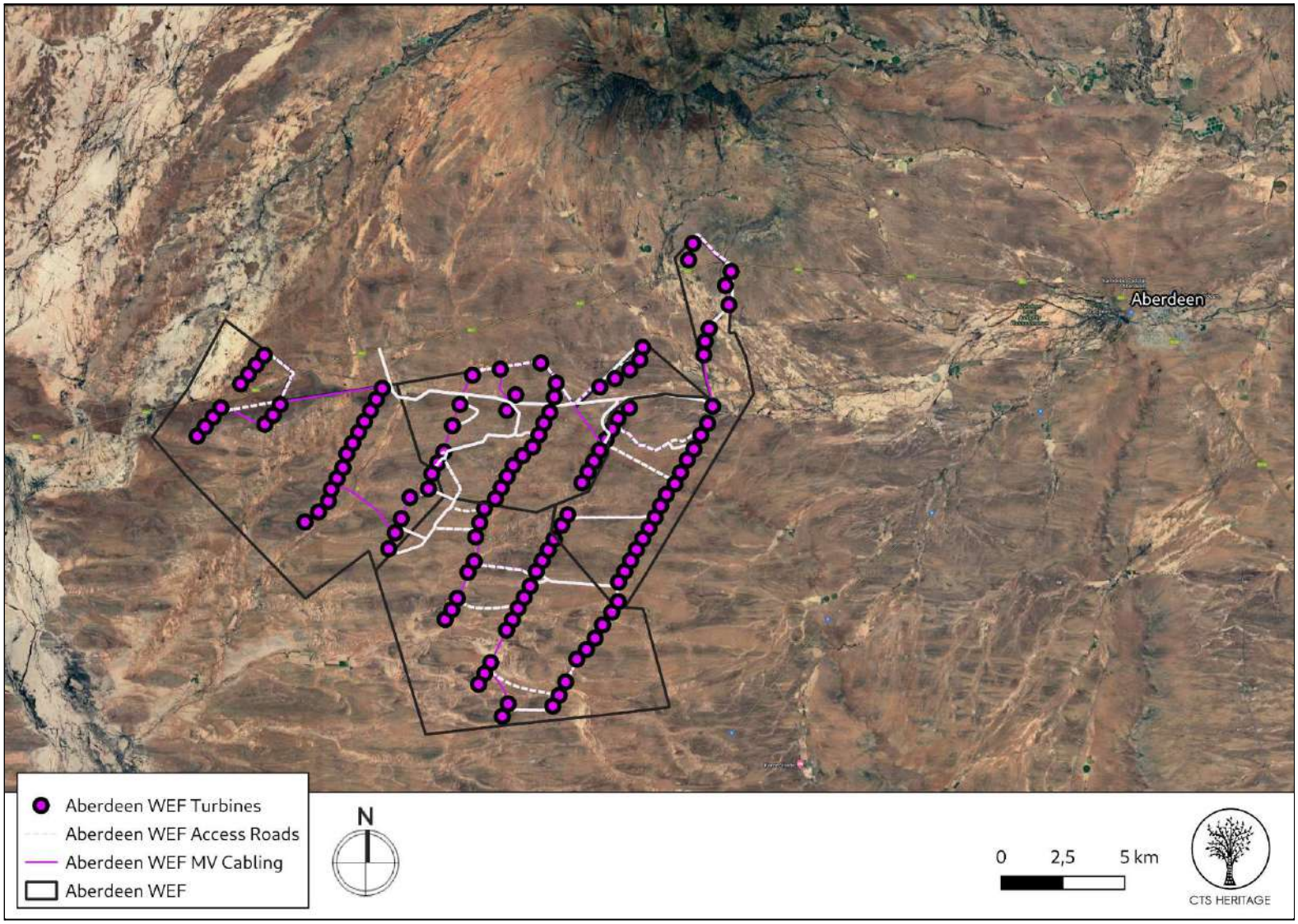

Figure 1b Overview Map. Satellite image (2019) indicating the proposed development area relative to Aberdeen

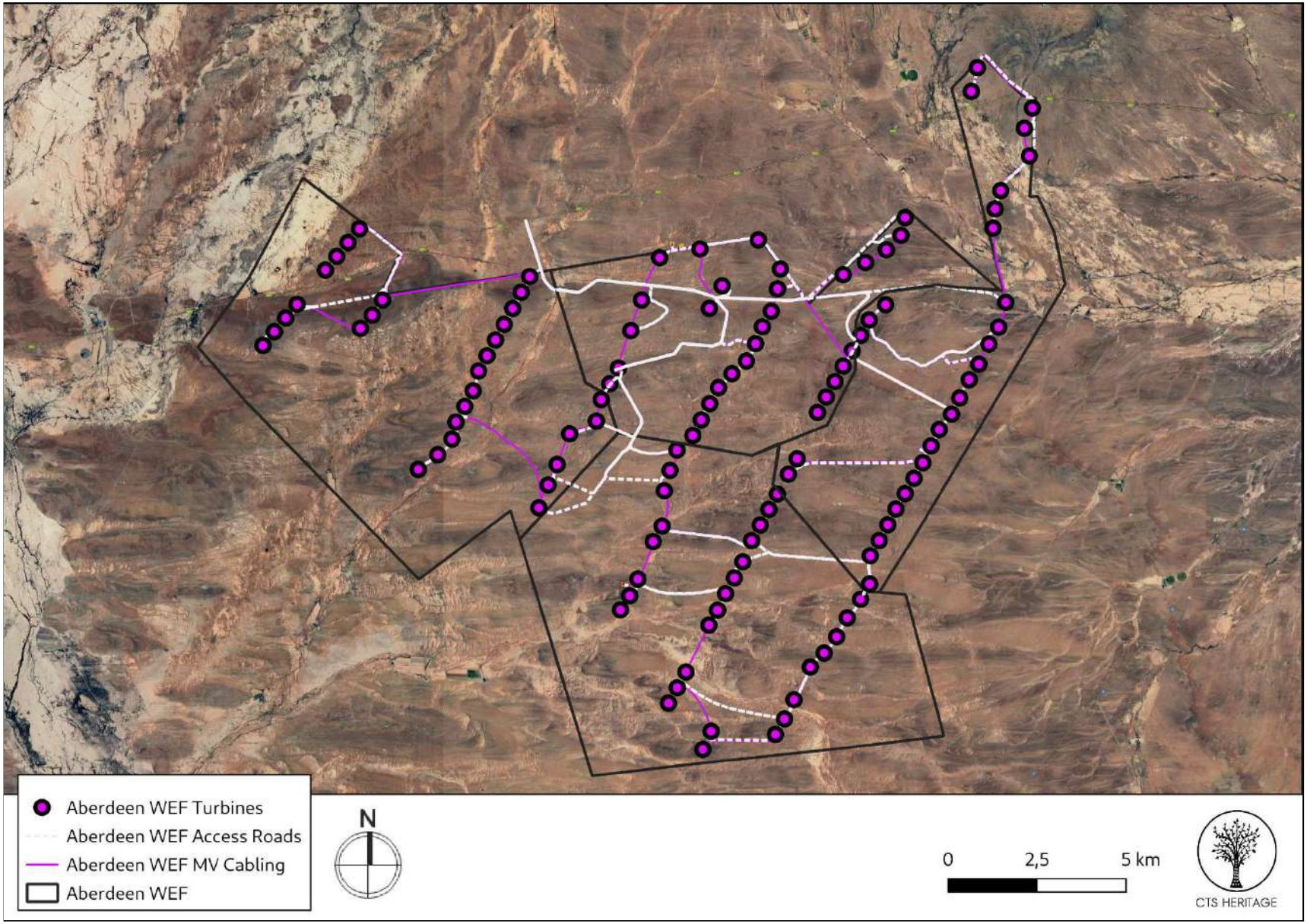

Figure 1c. Overview Map. Satellite image (2019) indicating the proposed development area at closer range.

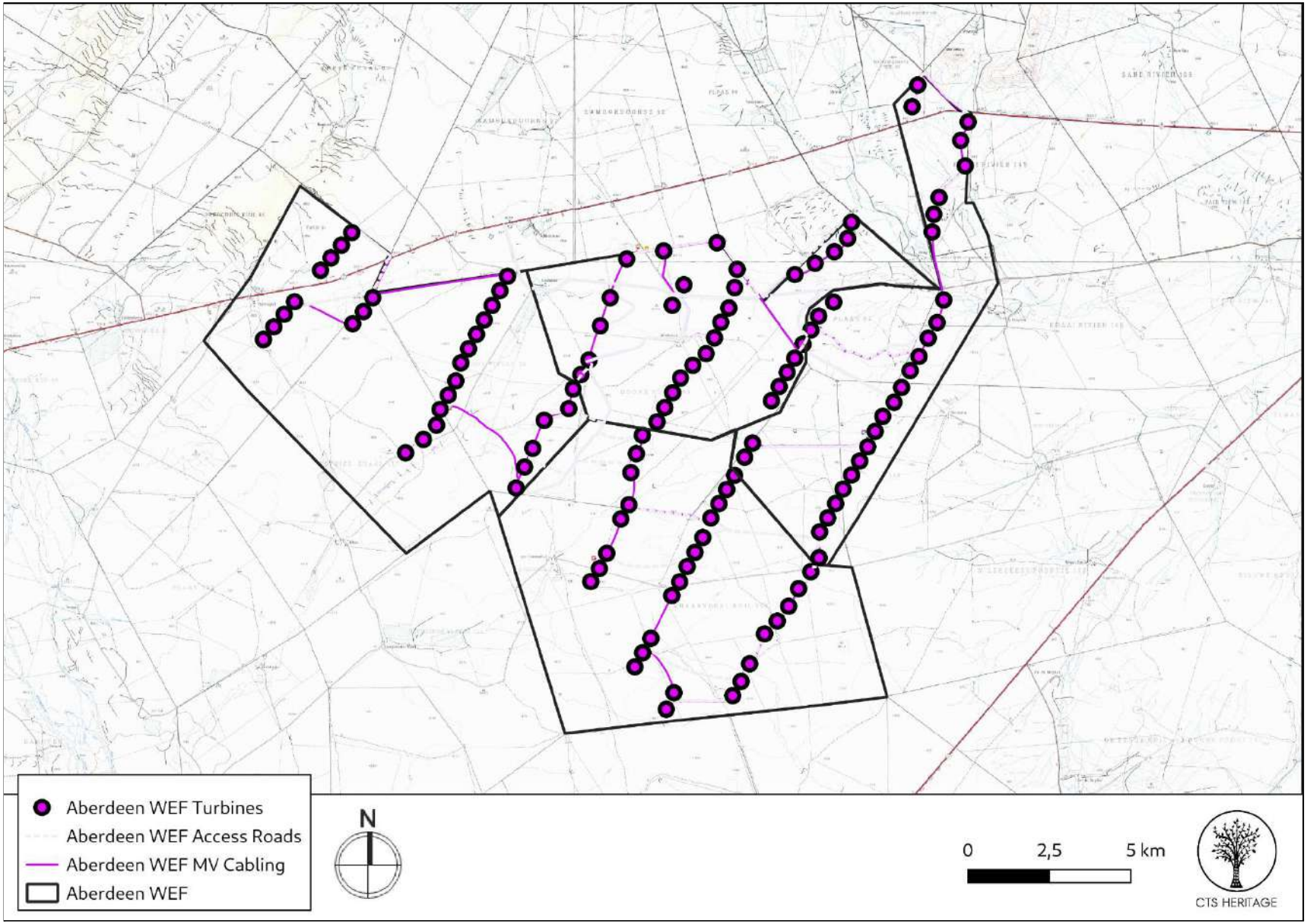

Figure 1d. Topo Map. Area proposed for development overlaying an extract from the 1:50 000 Topo Map

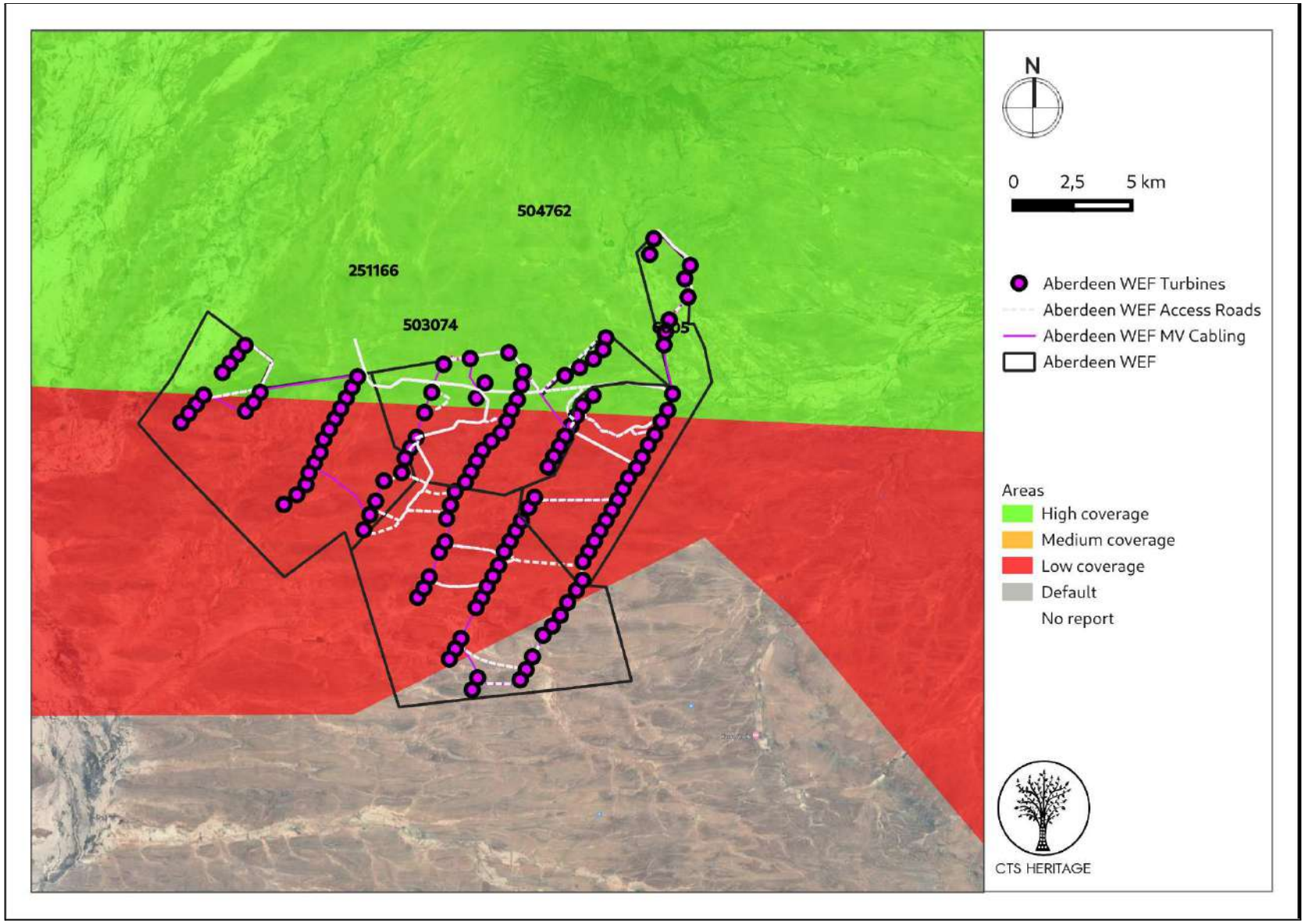

Figure 2a. Previous HIAs Map. Previous Heritage Impact Assessments surrounding the proposed development area within 15km, with SAHRIS NIDS indicated. Please see Appendix 2 for a full reference list.

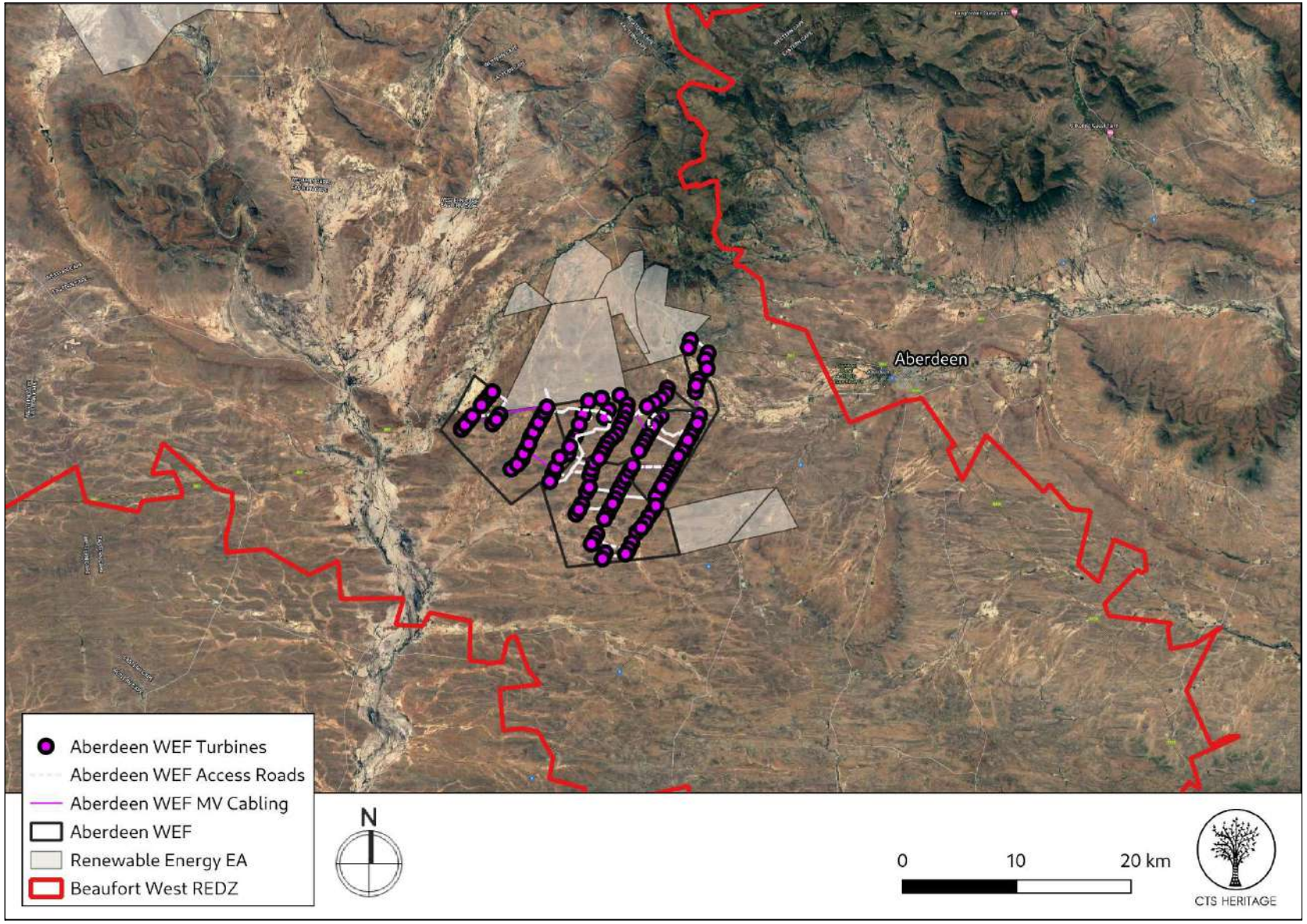

Figure 2b. Previous EAs Map. REFs with Environmental Authorisation and the Beaufort West REDZ relative to the proposed development

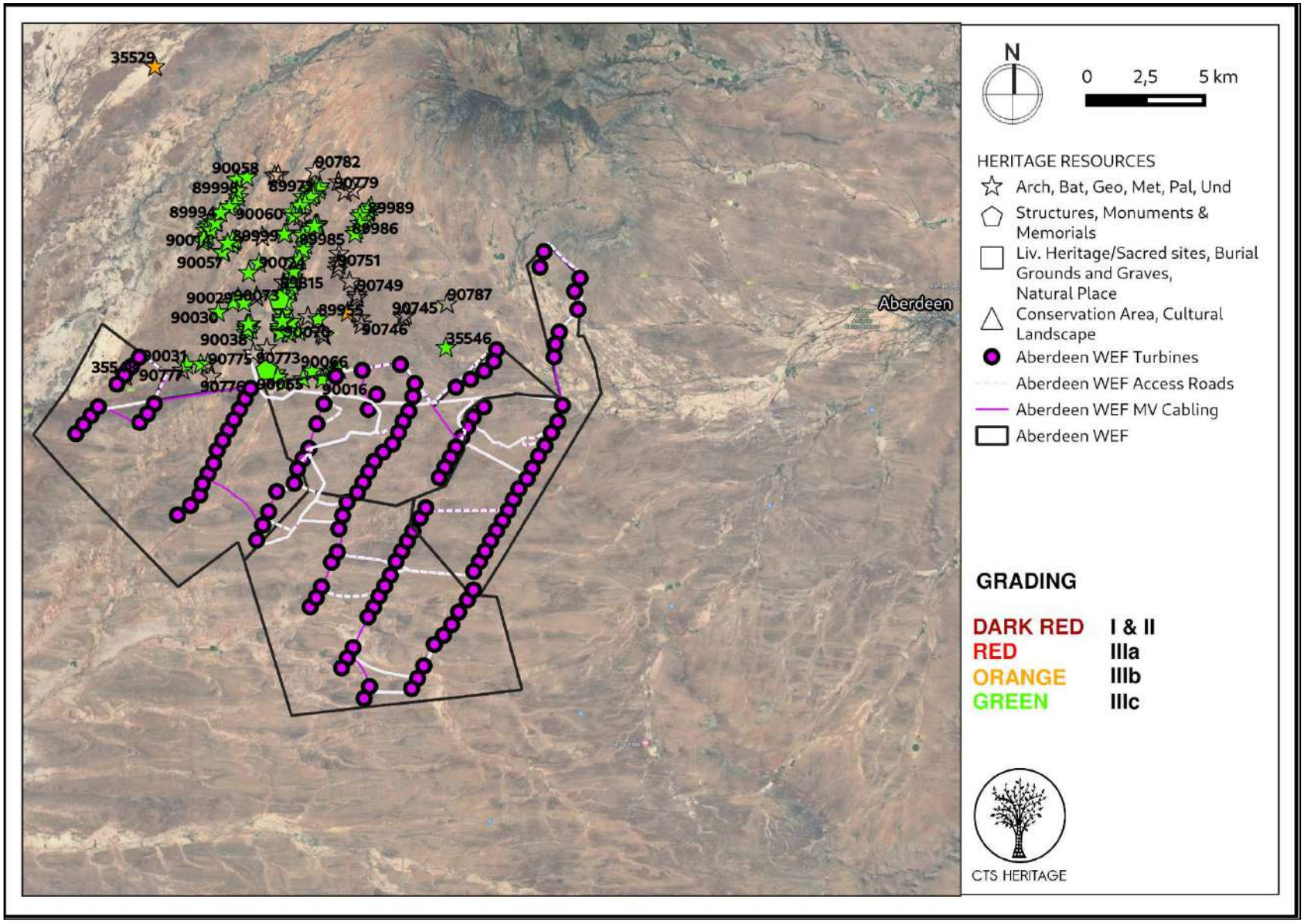

Figure 3. Heritage Resources Map. Heritage Resources previously identified in and near the study area, with SAHRIS Site IDs indicated. Please See Appendix 4 for full description of heritage resource types.

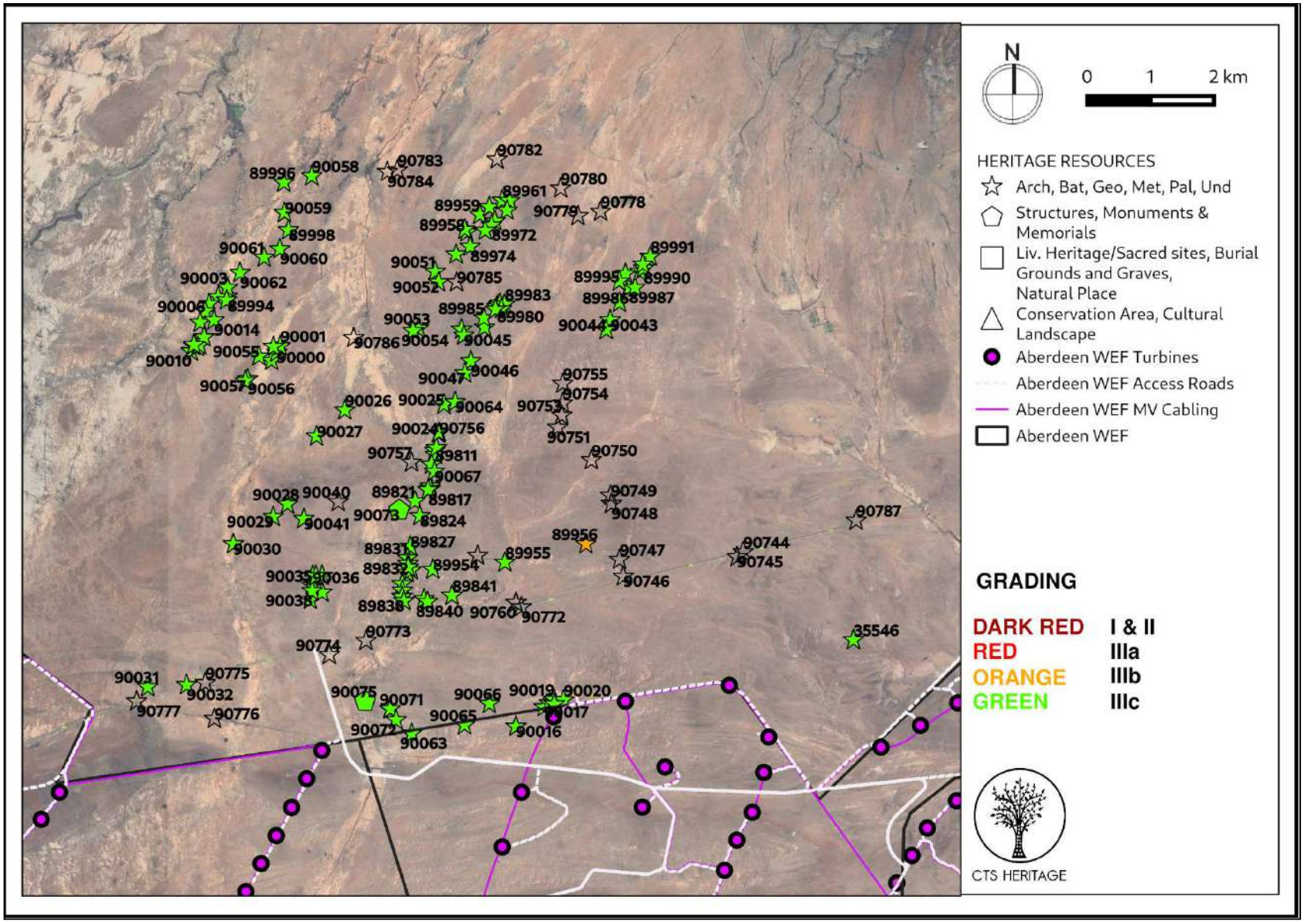

Figure 3a. Heritage Resources Map. Inset A

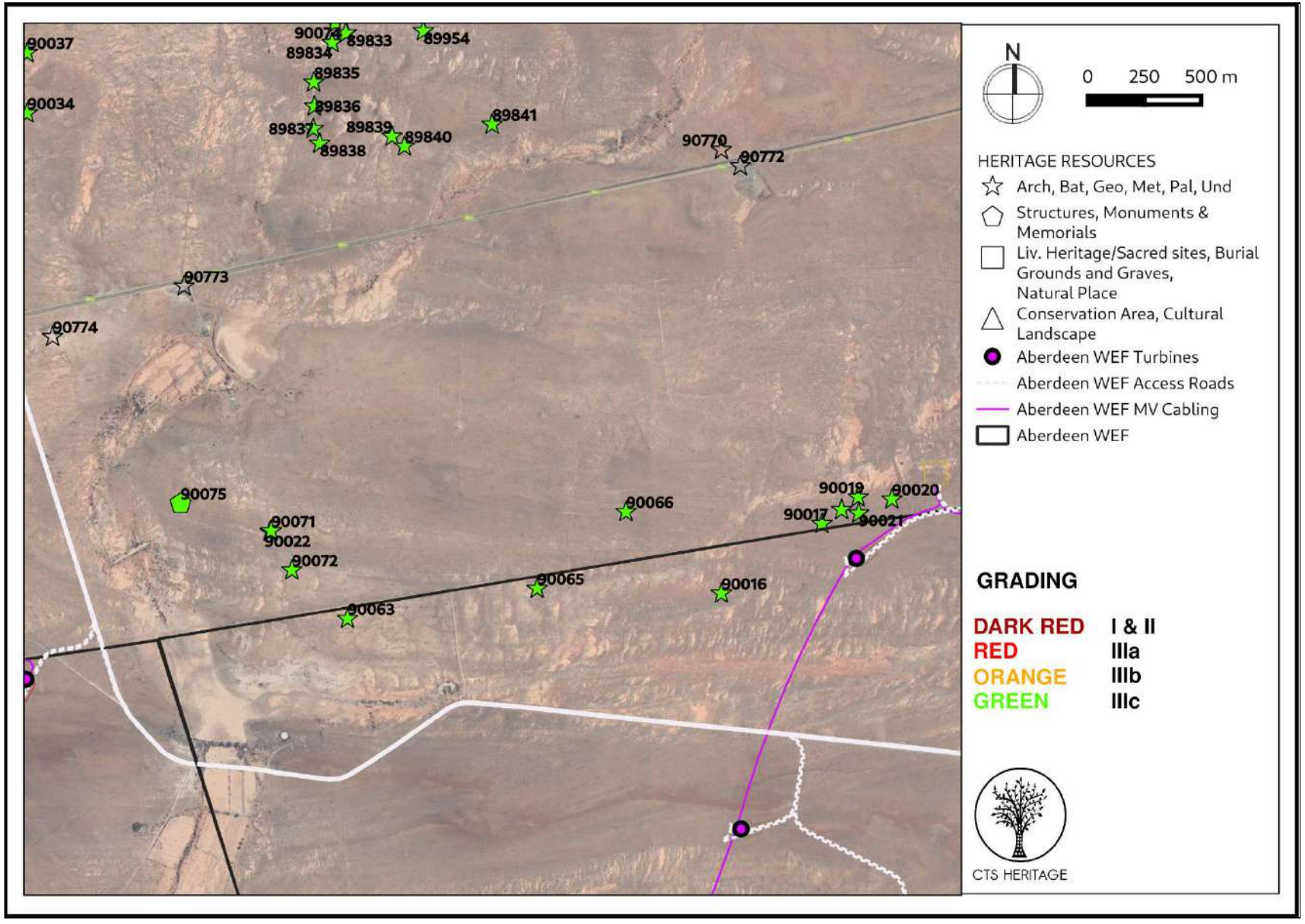

Figure 3b. Heritage Resources Map. Inset B

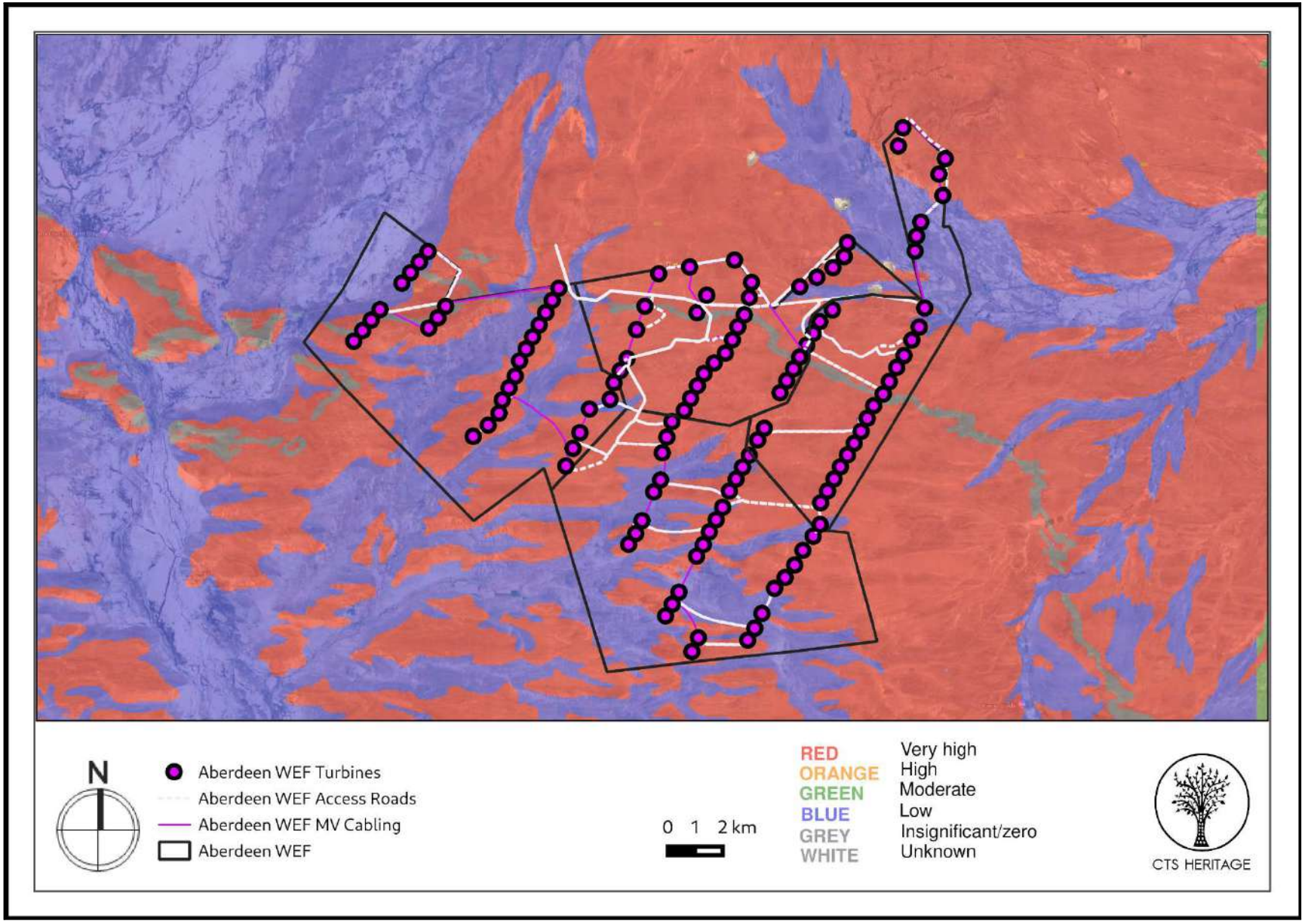

Figure 4. Palaeosensitivity Map. Indicating low and zero fossil sensitivity underlying the study area. Please See Appendix 3 for a full guide to the legend.

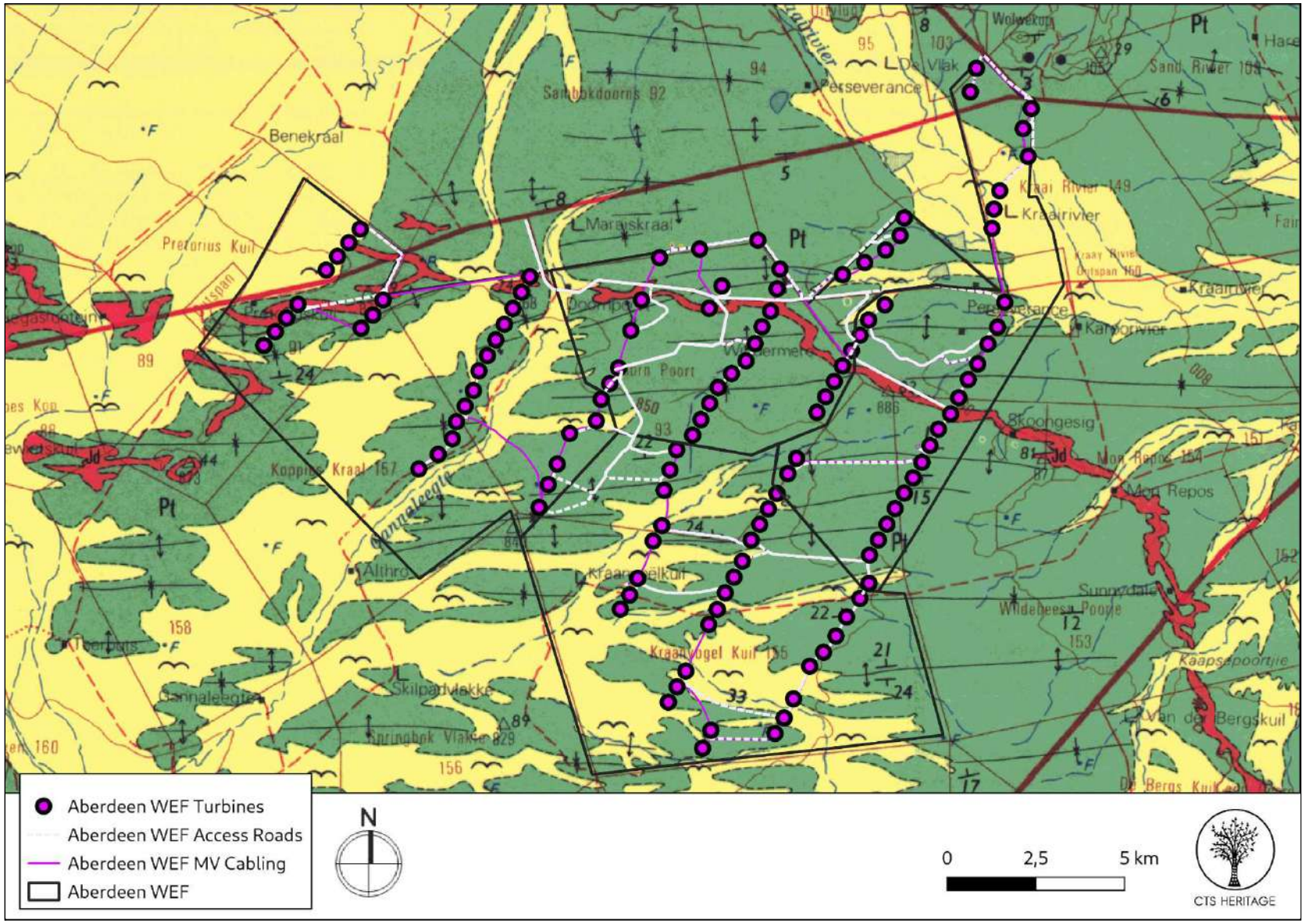

Figure 4b. Geology Map. Extract from the CGS 3222 Beaufort West Map indicating that the development area for the PV development is underlain by sediments of Pt: Poortjie Member of the Teekloof Formation of the Adelaide Subgroup and Jd: Jurassic Dolerite as well as Qc: Quaternary Sands

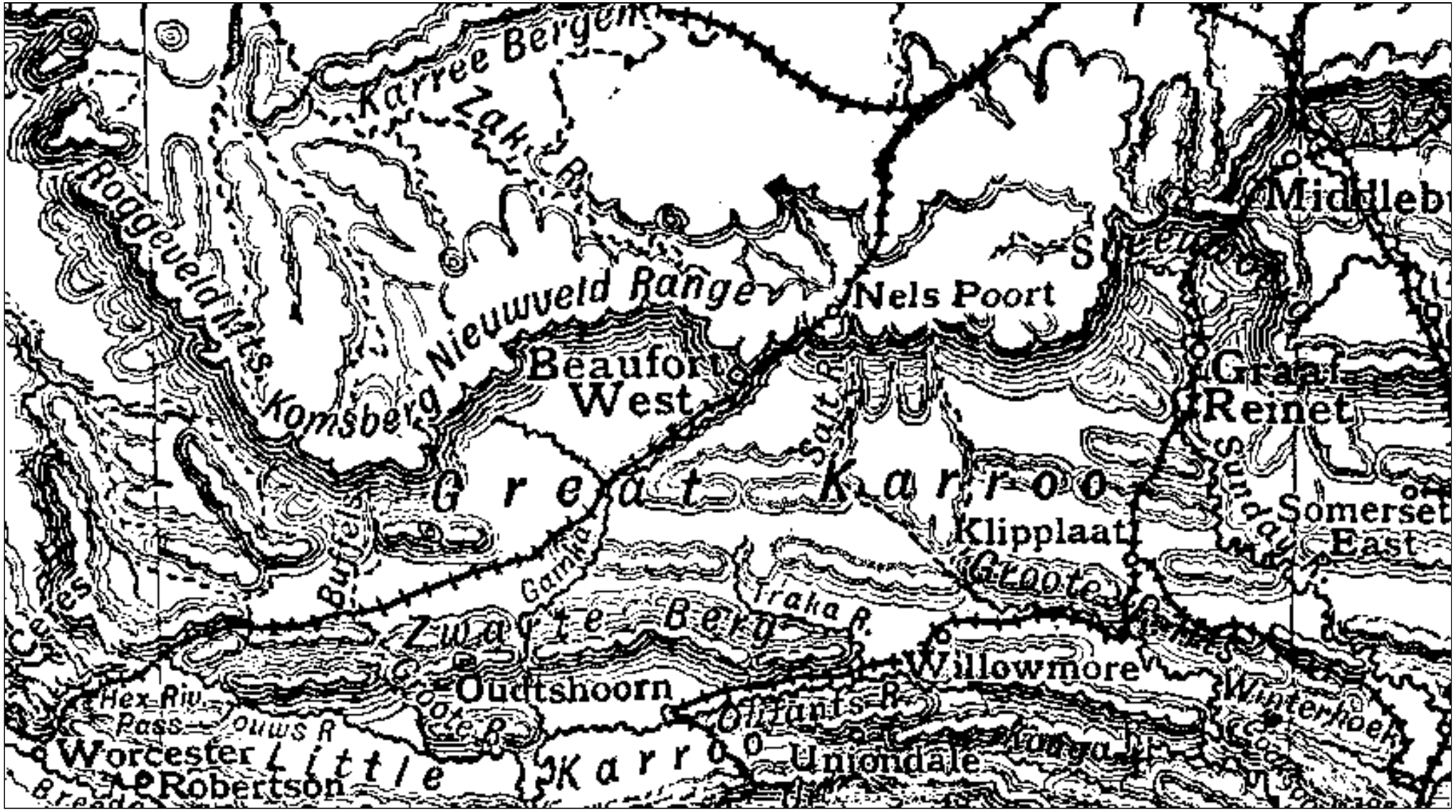

Figure 5. Historic Image. Aberdeen is located approximately half way between Beaufort West and Graaf Reniet. Map from 1911. By Encyclopedia Britannica. - 1911. Encyclopedia Britannica., Public Domain, https://commons.wikimedia.org/w/index.php?curid=19573298

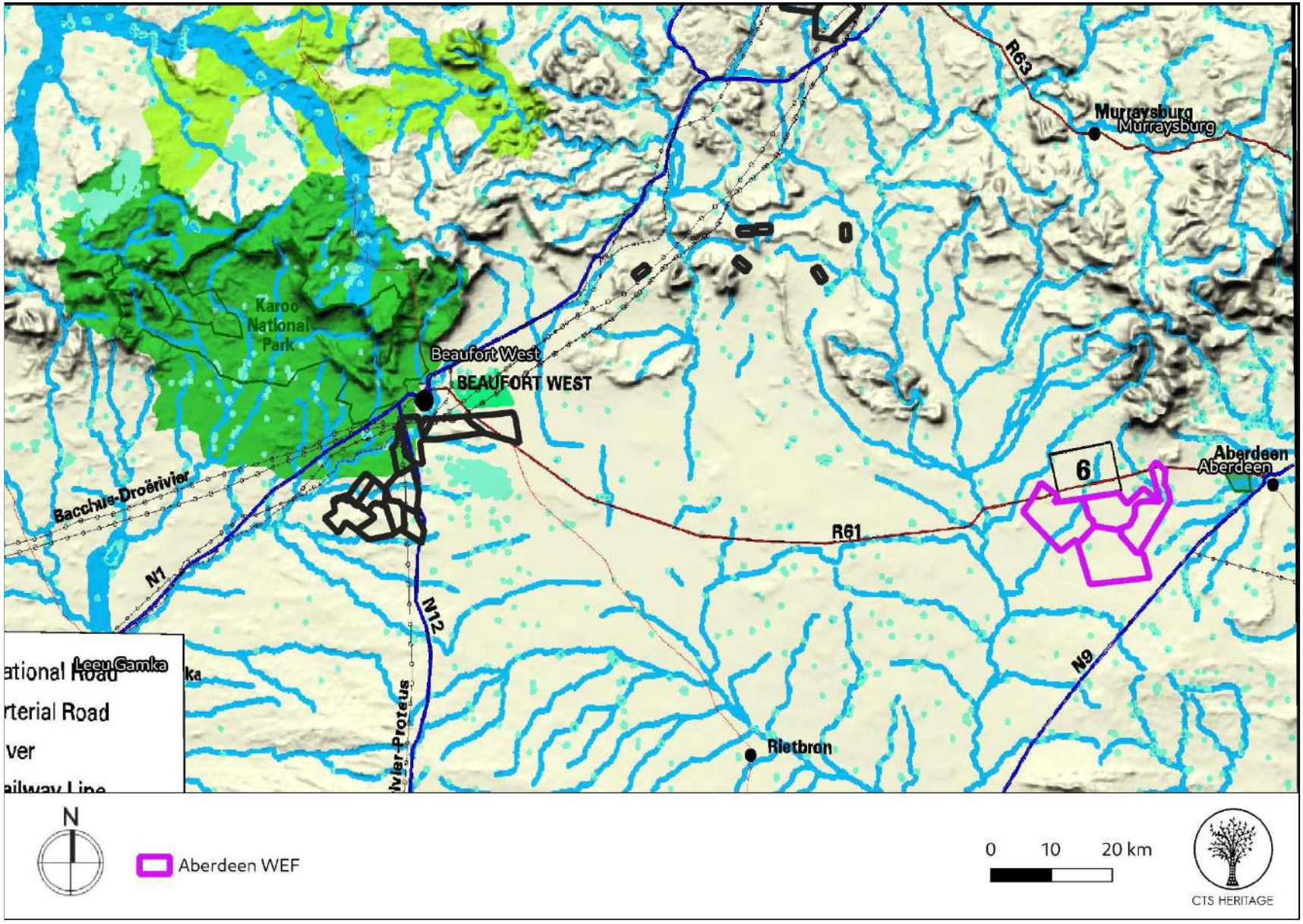

Figure 6a. Overview. Aberdeen WEF Rivers

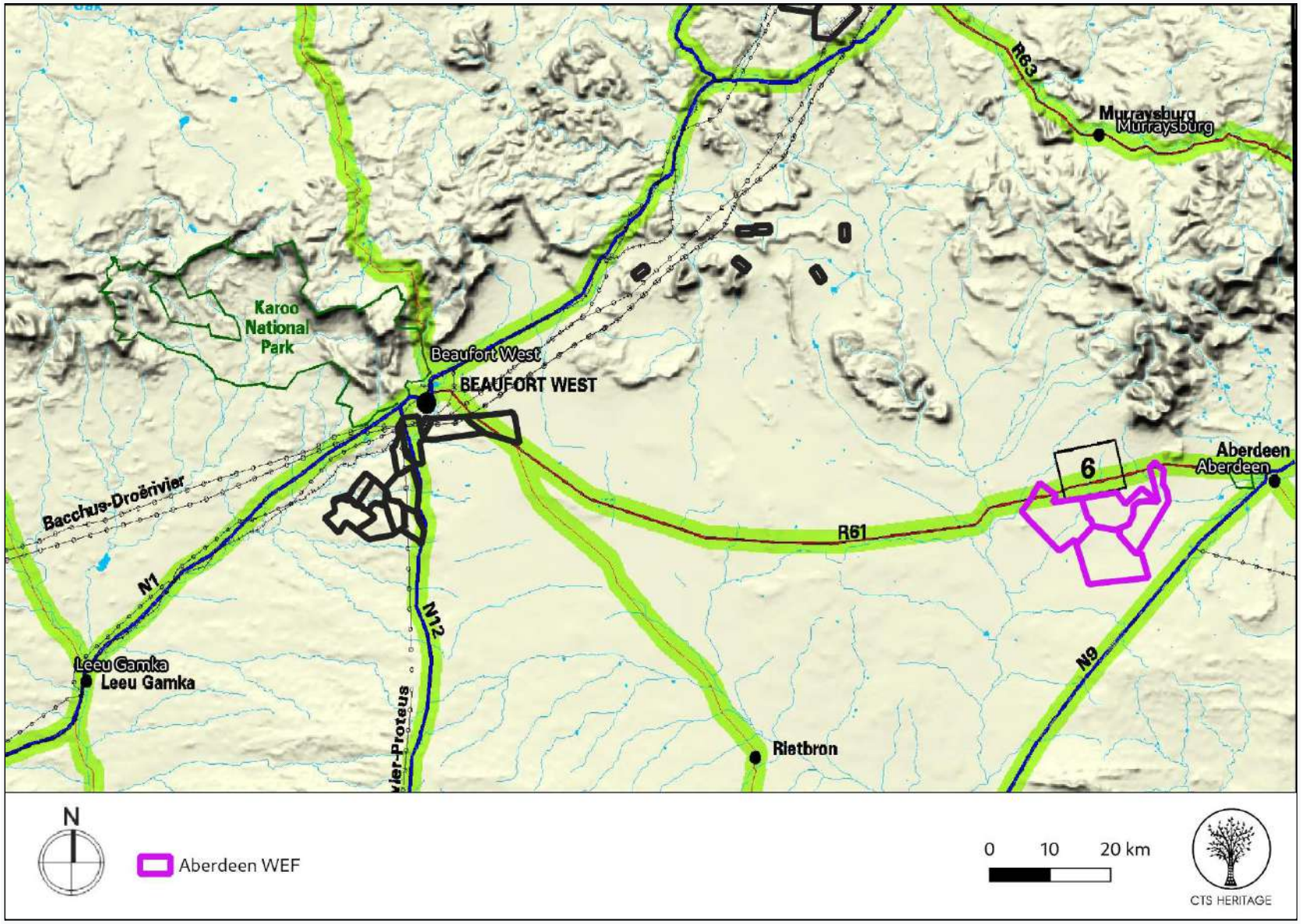

Figure 6b. Overview. Aberdeen WEF Roads

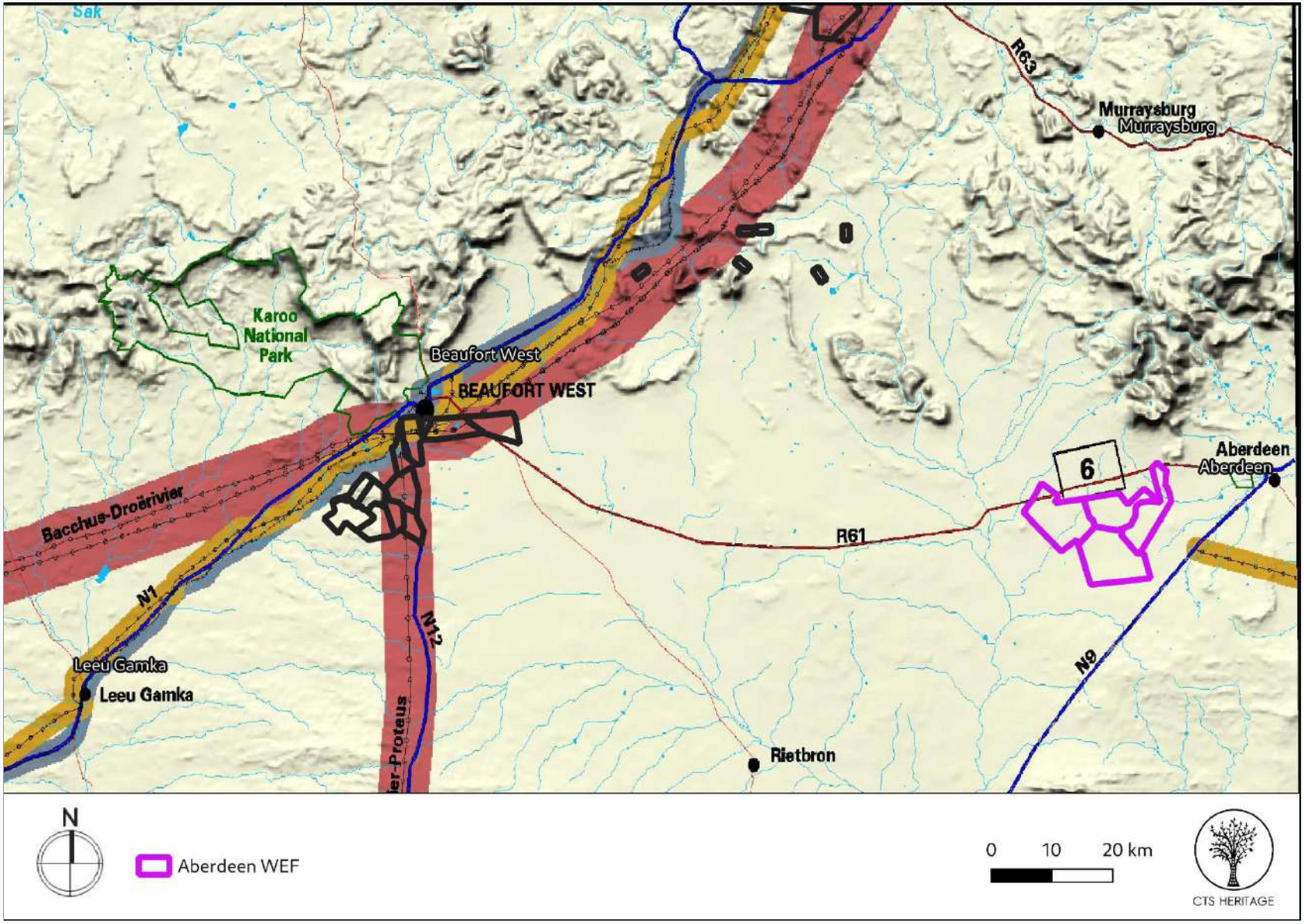

Figure 6c. Overview. Aberdeen WEF Road Exclusions

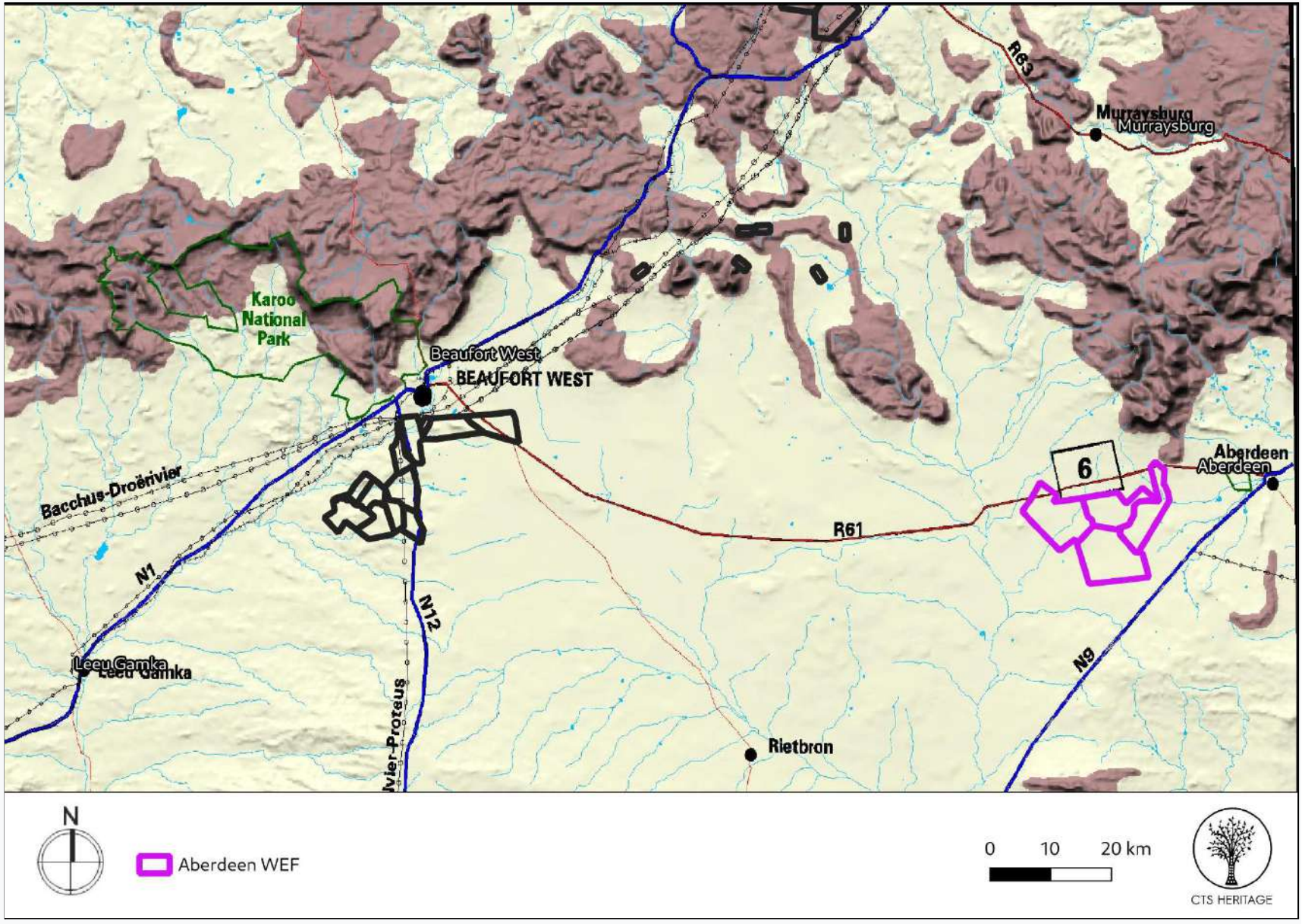

Figure 6d. Overview. Aberdeen WEF Mountains and Slopes

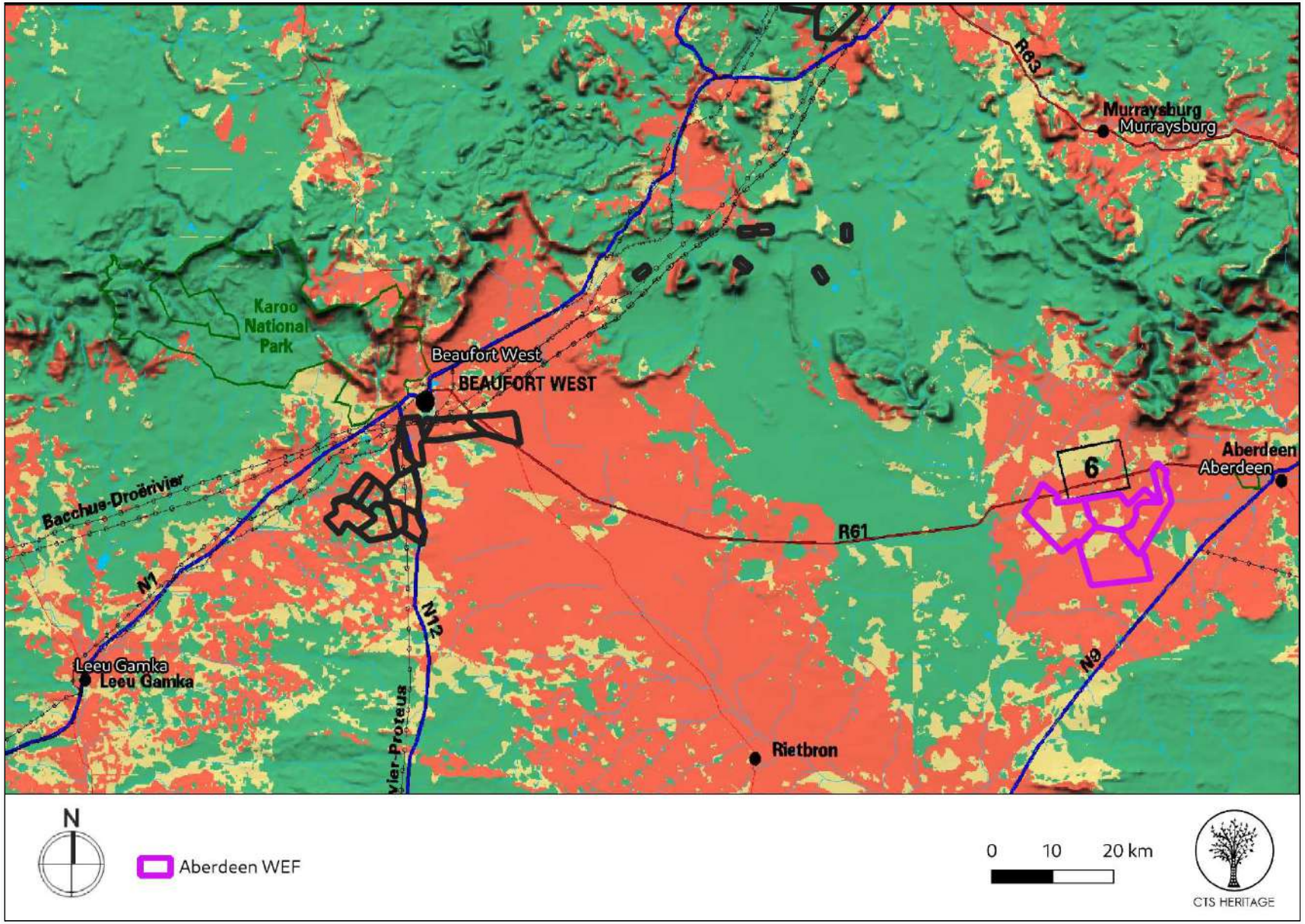

Figure 6e. Overview. Aberdeen WEF Visual Assessment and Landscape Character

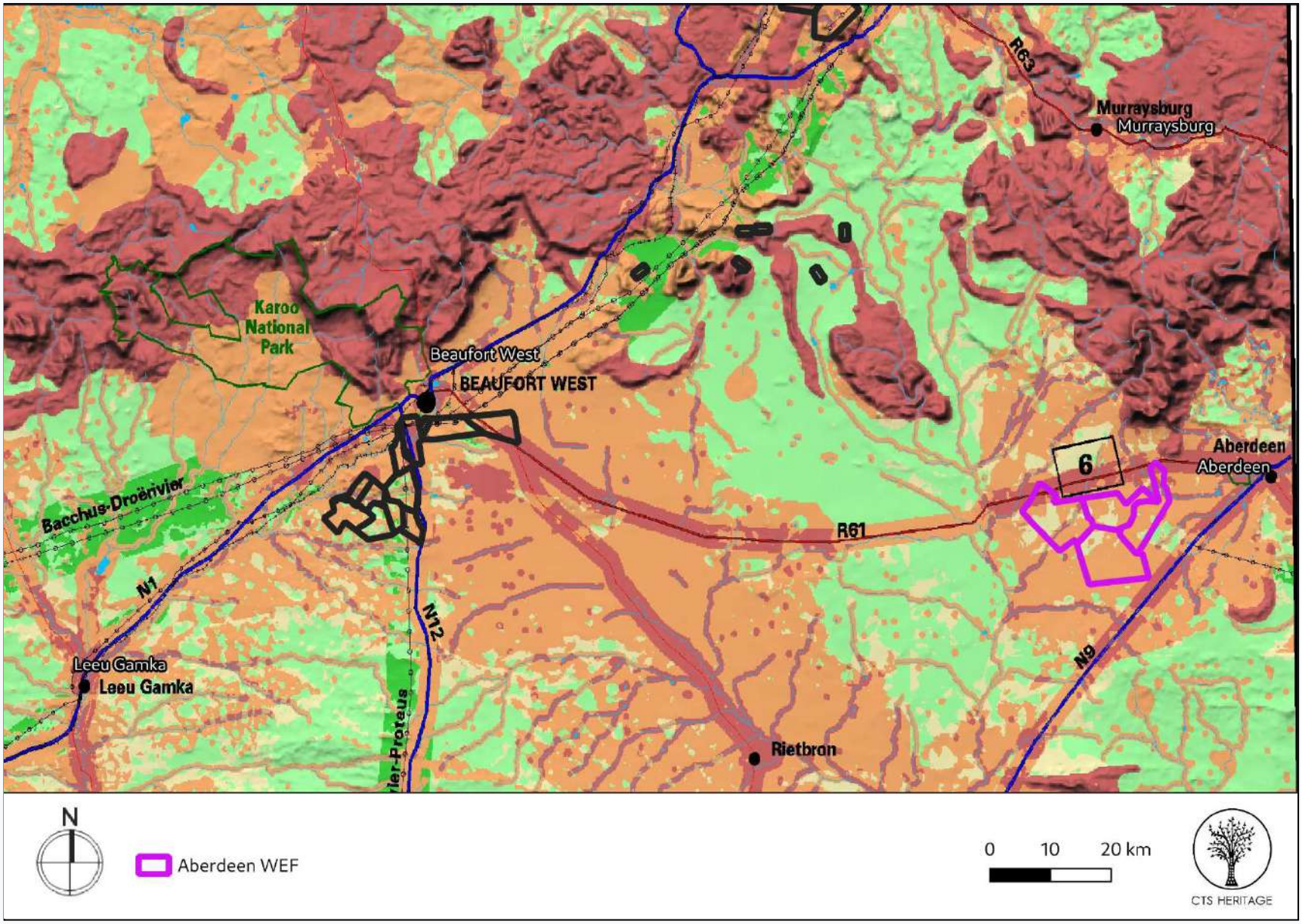

Figure 6f. Overview. Aberdeen WEF vs Preferred Development Areas (Composite Map)

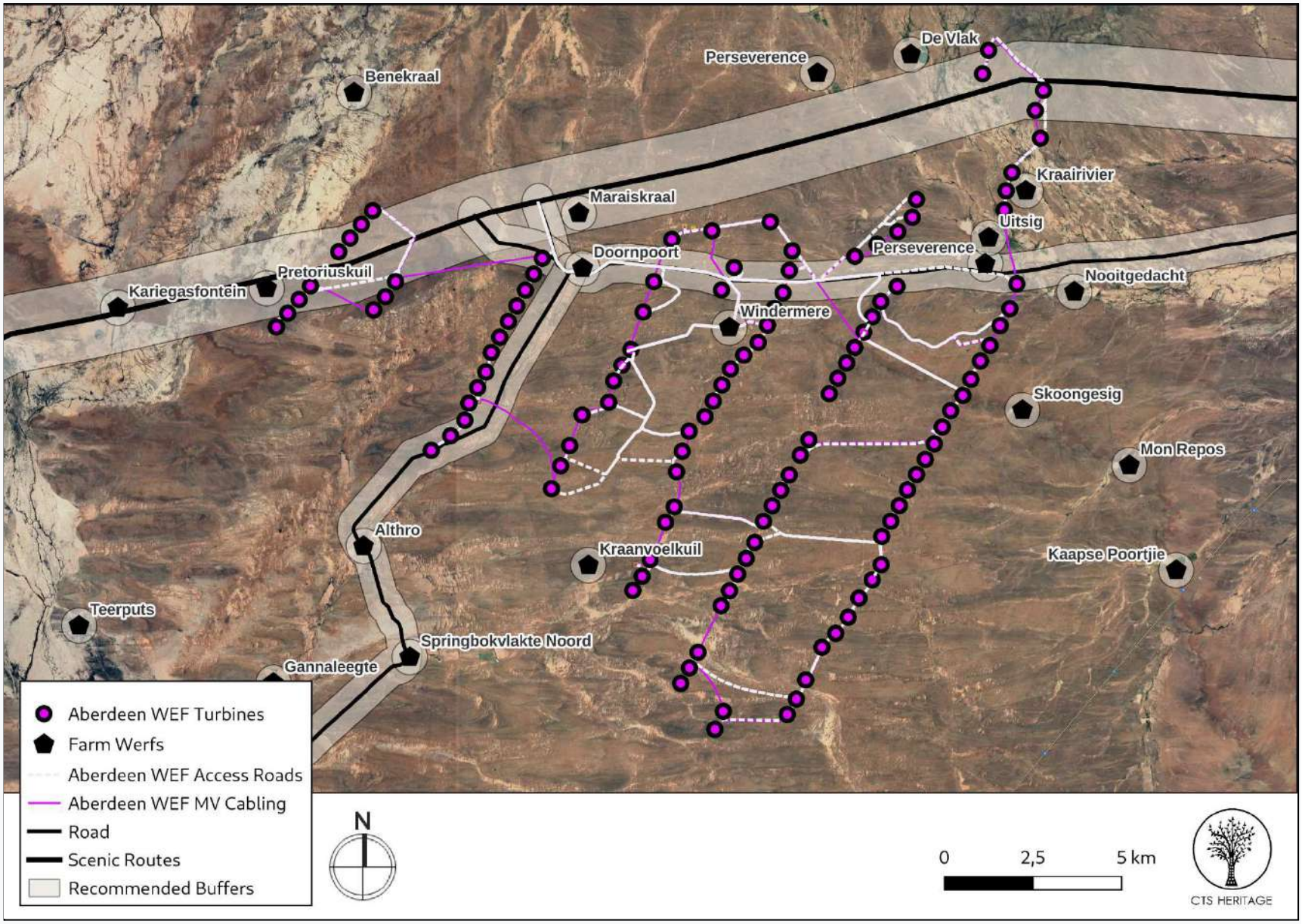

Figure 7. Cultural Landscape. Recommended Buffers for historic roads, scenic routes and farm werfs

8. Heritage statement and character of the area

The area proposed for the Poortjie Renewable Energy Facility Projects is located approximately 25km 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[1]. 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

[1] https://www.karoo-southafrica.com/camdeboo/aberdeen/history-of-aberdeen/

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

Very few 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 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 immediately north 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." All of the resources identified by Booth and Sanker (2013) have been mapped relative to the proposed development in Figure 3a and 3b.

Palaeontology

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

A Palaeontological Impact Assessment was completed in 2014 for the proposed Aberdeen WEF located immediately north of the area proposed for development (Almond, SAHRIS

NID 251166). The findings of this assessment therefore provide an indication of the kinds of palaeontological resources likely to be present within this proposed development area. Almond (2014) noted that "The entire wind farm study area is underlain at depth by fluvial sediments assigned to the lowermost part of the Teekloof Formation (Lower Beaufort Group) that are of Late Permian age (*c*. 260 million years old). The mudstone-rich succession of the Hoedemaker Member represented here is associated with moderately diverse fossil biotas of the *Tropidostoma* Assemblage Zone that include a range of mammal-like reptiles, true reptiles, fish, amphibians as well as plants and trace fossils. To the author's knowledge there are no previously identified fossil vertebrate finds within the study area, although a small lizard-like specimen was apparently found (probably preserved within a palaeocalcrete nodule) among surface gravels along its northern margin (Mnr Loots, pers. comm., Nov. 2014). The only fossil material recorded during the present field assessment comprises sparse blocks of well-preserved silicified wood that occur widely among surface gravels through much of the study area. Most of the fossil wood specimens have probably been downwasted from channel sandstones within the Hoedemaker Member itself, but some cherty fossil wood clasts may have been introduced from elsewhere within fluvial gravels. The general lack of fossil records in the Aberdeen *vlaktes* may well be due, in large part, to very low levels of bedrock exposure in this low-relief area, as well as due to local development of cleavage, near-surface calcrete veining and weathering. It is concluded that, while there is a significant chance that fossil vertebrate remains will be disturbed, destroyed or sealed-in by the proposed wind energy facility development, these are best mitigated by applying a chance find procedure. The operational and decommissioning phases of the wind farm are unlikely to involve further adverse impacts on local palaeontological heritage, however."

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

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.

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.

CTS HERITAGE

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

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

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

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

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

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

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

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

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

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 Poortjie Cluster of Renewable Energy Facilities near Nelspoort, Western Cape. Section 38(8) HIA submitted to HWC. Unpublished.

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APPENDIX 3 - Keys/Guides

Key/Guide to Acronyms

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

Full guide to Palaeosensitivity Map legend

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

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

- 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.

APPENDIX 5: Chance Fossil Finds Procedure

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CHANCE FINDS OF PALAEONTOLOGICAL 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.

- 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:	*Lat:*	*Long:*
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)	*Digital image of vertical section (side)*	
	Fossil from different angles	
	Wider context of the find	
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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