HERITAGE IMPACT ASSESSMENT

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

PROPOSED DEVIATION TO THE APPROVED WAAIHOEK GRID CONNECTION, UTRECHT, KZN

Prepared by CTS Heritage

CTS HERITAGE

Jenna Lavin

For

Nala Environmental Consulting Firm

July 2022

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EXECUTIVE SUMMARY

1. Site Name:

Waaihoek Grid Connection

2. Location:

Near Utrecht, KZN

3. Locality Plan:

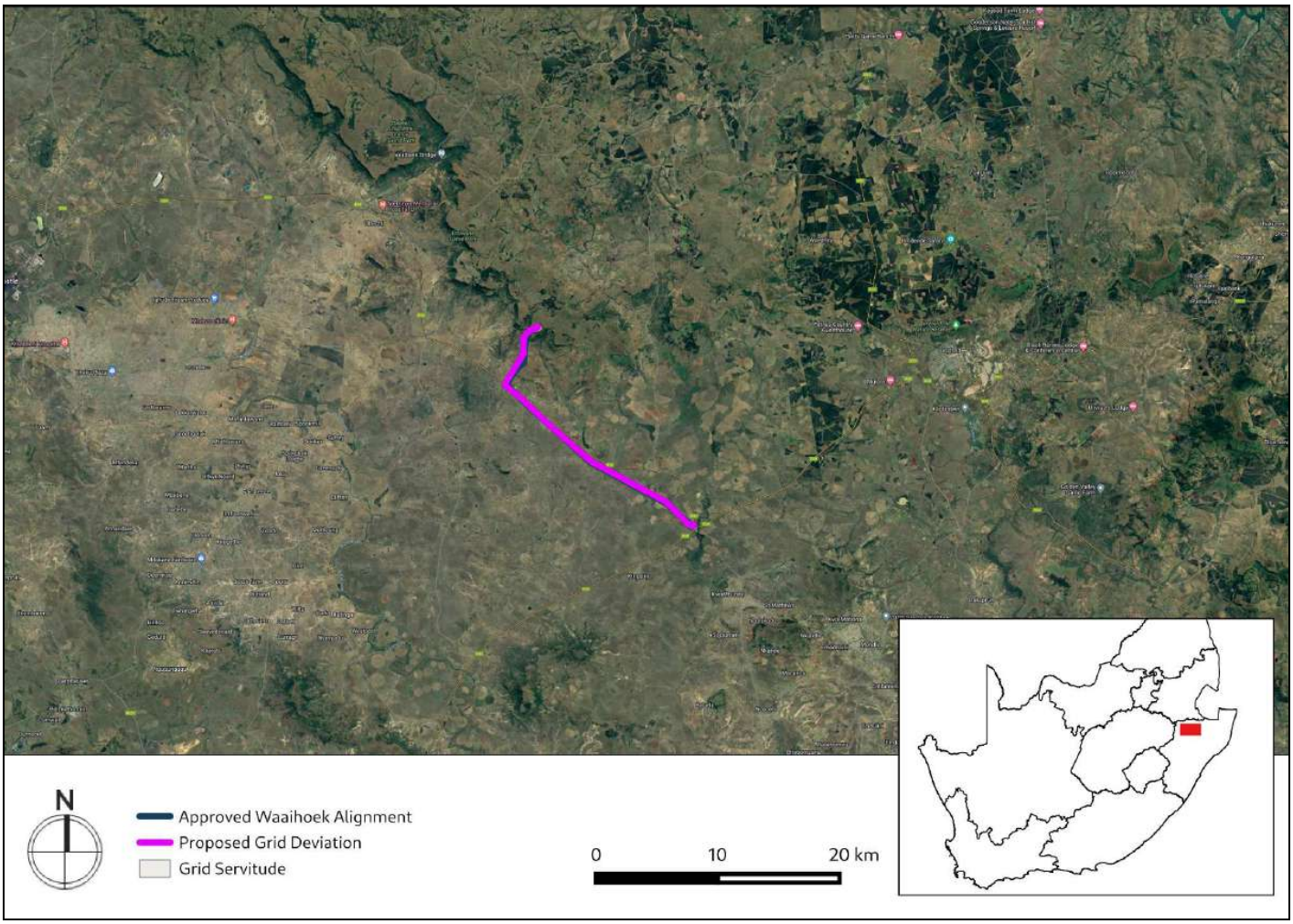

Figure A: Location of the proposed development area

4. Description of Proposed Development:

Waaihoek Wind Farm (Pty) Ltd, is proposing a powerline deviation route from the authorised 88kV powerline for the Waaihoek Wind Energy Facility (WEF). The authorised WEF is located south-east of Utrecht in the Emadlangeni Local Municipality, KwaZulu-Natal Province approximately 25km south west of the town of Vryheid.

5. Heritage Resources Identified:

POINT ID	Site Name	Period	Description	Co-ordinates		Grading	Mitigation
WH1	Waaihoek 1	Historical	Historical grave	27.78366	30.42686	IIIA	Avoid, no impact anticipated
WH2	Waaihoek 2	Modern	Possible stone structure (recent)	27.74892	30.4446	NCW	NA
WH3	Waaihoek 3	Historical	Three historical graves	27.75679	30.43677	IIIA	100m Buffer
WH4	Waaihoek 4	Historical	Historical grave	27.75709	30.43626	IIIA	100m Buffer
WH5	Waaihoek 5	Historical	Historical stone hut base	27.75709	30.43589	IIIC	30m Buffer
WH6	Waaihoek 6	Historical	Historical kraal	27.76102	30.4338	IIIC	30m Buffer
WH7	Waaihoek 7	Historical	Historical grave	27.76226	30.43475	IIIA	100m Buffer
WH8	Waaihoek 8	Historical	Historical stone walling (right angle evident)	27.7627	30.43481	IIIC	30m Buffer
WH9	Waaihoek 9	Historical	Historical grave	27.76365	30.43429	IIIA	100m Buffer
WH10	Waaihoek 10	Historical	Possible grave	27.76847	30.43484	IIIA	100m Buffer
WH11	Waaihoek 11	Historical	Historical structure	27.77266	30.43111	IIIC	30m Buffer
WH12	Waaihoek 12	Historical	Possible historical structure	27.77725	30.42817	IIIC	30m Buffer
WH13	Waaihoek 13	MSA	Middle Stone Age artefacts in a donga	27.77961	30.42684	NCW	NA
WH14	Waaihoek 14	Historical	Multiple human graves	27.84483	30.48937	IIIA	100m Buffer
WH15	Waaihoek 15	Historical	Multiple graves and associated structures	27.84627	30.48851	IIIA	100m Buffer
036	Grid	MSA	Silcrete point on top of sand Bank of dam wall	-32.81892	25.99685	NCW	NA
037	Grid	MSA	Quartzite flake early MSA	-32.82573	26.00442	NCW	`NA
038	Grid	MSA	Quartzite blade flake	-32.83107	26.01001	NCW	NA
039	Grid	MSA, LSA	Hornfels and quartzite flakes in eroded warthog den	-32.84437	26.02901	NCW	NA
040	Grid	MSA	Siltstone flake	-32.84965	26.03786	NCW	NA

6. Anticipated Impacts on Heritage Resources:

Based on this field assessment and on the findings of previous assessments in the area, it is not anticipated that the proposed OHL development will negatively impact on significant archaeological heritage on condition that the recommendations articulated below are implemented.

A small portion of the proposed grid connection was not assessed by the archaeologists due to a hostile landowner (Figure 5) and as such, it is not possible to comment on the archaeological sensitivity of this section of the grid alignment. However, this area was looked at by the EAP and no obvious heritage resources were identified. Should any stone structures be present within this unassessed area that are similar to the structures and burials described above, the appropriate recommendations articulated below are applicable.

No observations of palaeontological significance were noted within the area proposed for development. However, the geology underlying the development area remains sensitive for impacts to significant palaeontological heritage.

There are limited impacts anticipated to archaeological and palaeontological heritage from this proposed development and as such, the principle of grid connection infrastructure in this location is supported from a heritage perspective as the infrastructure is located in an area able to tolerate this impact.

7. Recommendations:

Based on the outcomes of this report, it is not anticipated that the proposed development of the grid connection infrastructure and substation will negatively impact on significant archaeological heritage on condition that:

- A no-go 30m buffer must be implemented around sites WH5, WH6, WH8, WH11 and WH12 (graded IIIC) to ensure that no impact takes place (Figure 7.1 to Figure 7.5). The OHL can pass over these structures if necessary.
- A no-go buffer of 100m must be implemented around the burial sites WH1, WH3, WH4, WH7, WH9, WH10, WH14 and WH15 (graded IIIA) to ensure that no impact takes place and to ensure that the sense of place associated with the burials is maintained (Figures 7.1 to Figure 7.5).
- The attached Chance Fossil Finds Procedure is implemented for the duration of all excavation 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 AMAFA must be alerted immediately to determine an appropriate way forward.

8. Author/s and Date:

Jenna Lavin

July 2022

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

Waaihoek Wind Farm (Pty) Ltd, is proposing a powerline deviation route from the authorised 88kV powerline for the Waaihoek Wind Energy Facility (WEF). The authorised WEF is located south-east of Utrecht in the Emadlangeni Local Municipality, KwaZulu-Natal Province approximately 25km south west of the town of Vryheid.

The developer bid the wind energy facility and associated infrastructure into the Renewable Energy IPP Procurement Programme (REIPPPP) Bid Window 5 for the procurement of up to 1 600MW of onshore wind energy technologies. On the 28th October 2021, the Minister of the Department of Mineral Resources and Energy, Mr Gwede Mantashe, announced the Preferred Bidders of the Fifth Bid Submission of the Renewable Energy Independent Power Producer Procurement Programme, of which Waaihoek Wind Farm (Pty) Ltd has received Preferred Bidder Status. The 25.5km power line infrastructure for the authorised Waaihoek Wind Energy Facility had previously been authorised (DEA Ref:. 14/12/16/3/3/2/654), however following consultation with Eskom and landowners, the powerline routing is proposed to be deviated outside of the previously assessed servitude in order to optimise the routing for associated with the final layout of the Waaihoek Wind Energy Facility. The proponent now proposes a deviation from this authorised route along the entire length of the powerline for approximately 25,4km. The deviation of the grid connection infrastructure is proposed in order to meet the requirements of the Bid Window 5 and meet financial close as the project has been selected as a preferred bidder. A Basic Assessment process will be undertaken to assess the powerline route deviation. It is noted that more than one feasible alternative may become viable following the appointment of the EAP and specialists.

The infrastructure and key components considered as part of this Basic Assessment process includes:

- Deviation of the authorised powerline, the deviation will occur along the length of the authorised route as portions of this new optimised routing falls outside of the previously authorised and assessed 50-70m servitude.
- The length of the powerline will be approximately 25,4km
- Jeep tracks of up to 4m wide and water crossing will be constructed along the powerline route to allow for construction and maintenance activities and will be assessed within a 400m along the length of the powerline route for approximately 25,2km
- A grid corridor of approximately 400m (200m on either side) will be assessed for the length of the powerline route.
- The Eskom portion of the 88kV switching station with a footprint of 60m x 60m within an assessed development footprint of 110m x 110m. The on-site substation has been authorised for the Waaihoek Wind Energy, however it must be noted that should the Environmental Authorisation for this powerline deviation and Eskom switching be granted, it will be ceded over to Eskom during the operation phase of the project.

The following properties have been identified for the proposed route deviation of the authorised 88kV powerline for the Waaihoek Wind Energy Facility. Grid Connection infrastructure: The affected properties are listed below:

- Portion 7 of the Farm Roodekoppe 119
- Portion 9 of the Farm Vlakplaats 83
- Portion 2 of the Farm Roodekoppe 119
- Portion 10 of the Farm Vlakplaats 83
- Portion 5 of the Farm Roodekoppe 119
- Portion 3 of the Farm Vlakplaats 83
- Portion 4 of the Farm Roodekoppe 119
- Portion 9 of the Farm Groothoek 152
- Portion 3 of the Farm Spartelspuit 150
- Portion 4 of the Farm Waaihoek 173
- Portion 12 of the Farm Grootvlei 66
- Portion 9 of the Farm Waaihoek 173
- Portion 13 of the Farm Grootvlei 66
- Portion 11 of the Farm Waaihoek 173
- Portion 6 of the Farm Grootvlei 66
- Portion 6 of the Farm Waaihoek 173
- Remainder of the Farm Grootvlei 66
- Portion 1 of the Farm Groothoek 152
- Portion 5 of the Farm Vlakplaats 83
- Portion 5 of the Farm Wijdgelegen 17068
- Portion 8 of the Farm Vlakplaats 83

1.2 Description of Property and Affected Environment

The footprint of the proposed deviation of the grid connection for the Waaihoek Wind Energy Facility, and associated infrastructure, is located across several private agricultural camps and community owned trust properties, approximately 25 km south-east of the town of Vryheid, in the summer rainfall region of southern Africa, KwaZulu-Natal (KZN, South Africa). Intensive summer rainfall and residual impacts of flooding experienced during the survey had impacts on visibility in portions of the footprint (see Constraints & Limitations).

In the areas less affected by modern agriculture, and that consequently retain natural vegetation, the vegetation comprises grassland and bushveld typical of the southern African Grassland Biome, with Savanna persisting predominantly in the north-western ~6 km section of the grid deviation (east of the R34 road). The archaeological remains are densest in the north-western portion, relating potentially to the abovementioned variation in vegetation in this area, in addition to the relatively minimal impact of modern agricultural activities. In the north-western portion, donga formation was relatively intensive in some places, likely resulting from a combination of historical flooding, overgrazing and climatic factors. The donga formation process has exposed Pleistocene sediments and related archaeology in one locality (WH13). Vegetation coverage was more intense on the edges of several drainage and paleo-drainage channels in the north-west, as well as on the edges of the dongas inhibiting visibility. Additionally, some drainages were completely submerged under recent floodwaters in the footprint west of the R34 regional road.

Sub-volcanic bedrock outcrops in multiple locations in the north-west, but this bedrock was largely not evident in the footprint on the western side of the R34. In the areas where indigenous grassland and savannah is retained, some indigenous faunal species were evident. Observed fauna, or indicative traces, include smaller antelope (such as Duiker and Steenbok), several primates including Vervet monkeys and baboons, indigenous fowl including francolin, guineafowl and several species of waterfowl, as well as evidence of burrowing rodents (hares and meerkats).

The topography of the project area is generally flat west of the R34, with extensive disturbance in the form of active crops, camps with evidence of recent and historical clearing for crop farming and bioturbation in the form of rodent activity, extensive flooding in lower lying areas as well as cattle and other stock rotation farming. The north-western portion, east of the R34, is more mountainous and elevation increases substantially from south-west to north-east across a ~6km transect, with bedrock outcropping more frequently at the higher elevations. The sandy upper sediments west of the R34 have been fluvially deposited across much of the area, with lithic inclusions (~6cm in maximum diameter) evident in recently deposited sediments. Indeed, active high-energy deposition of fluvial sediments was evident in some areas while the survey was underway.

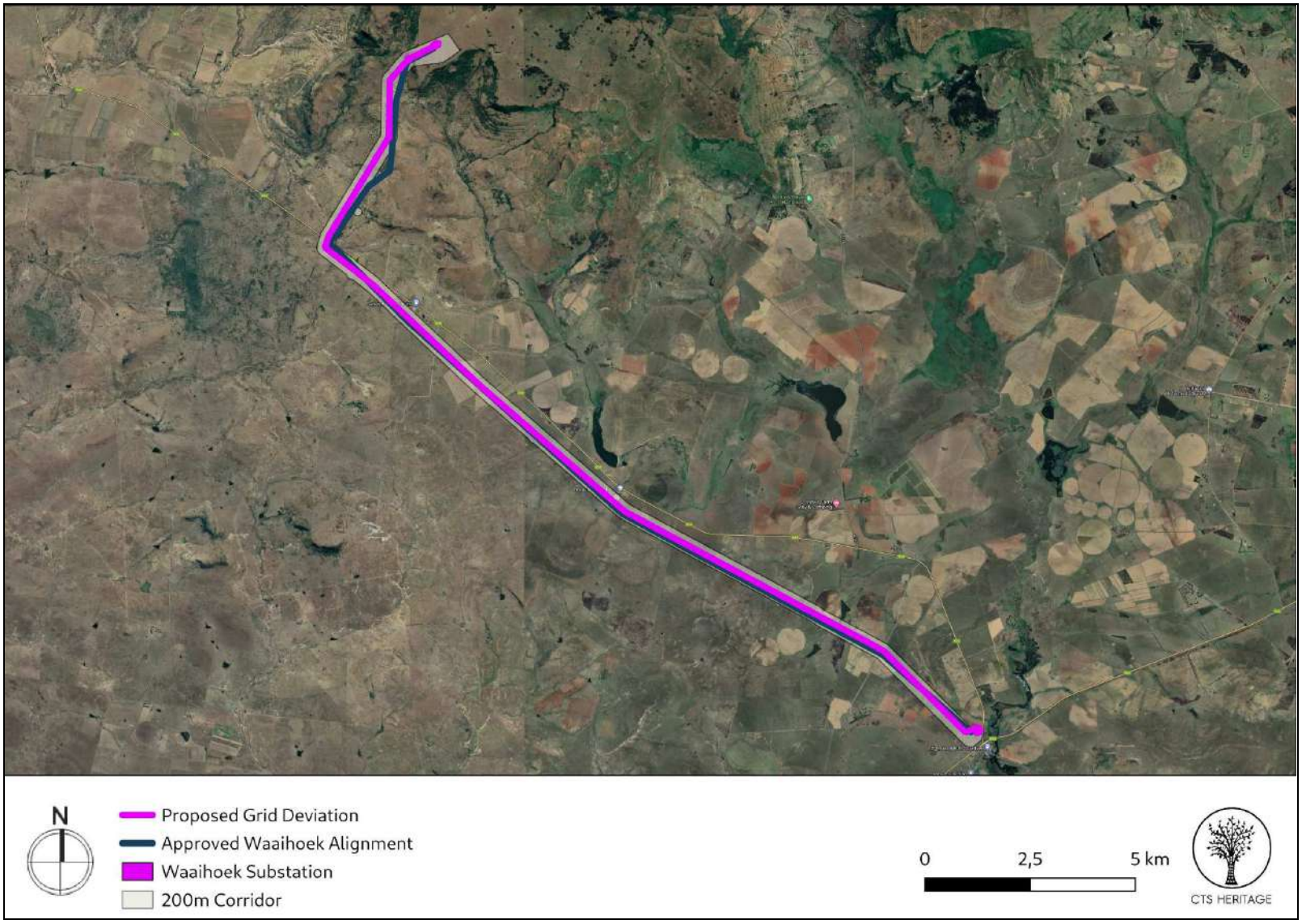

Figure 1.1: Proposed development

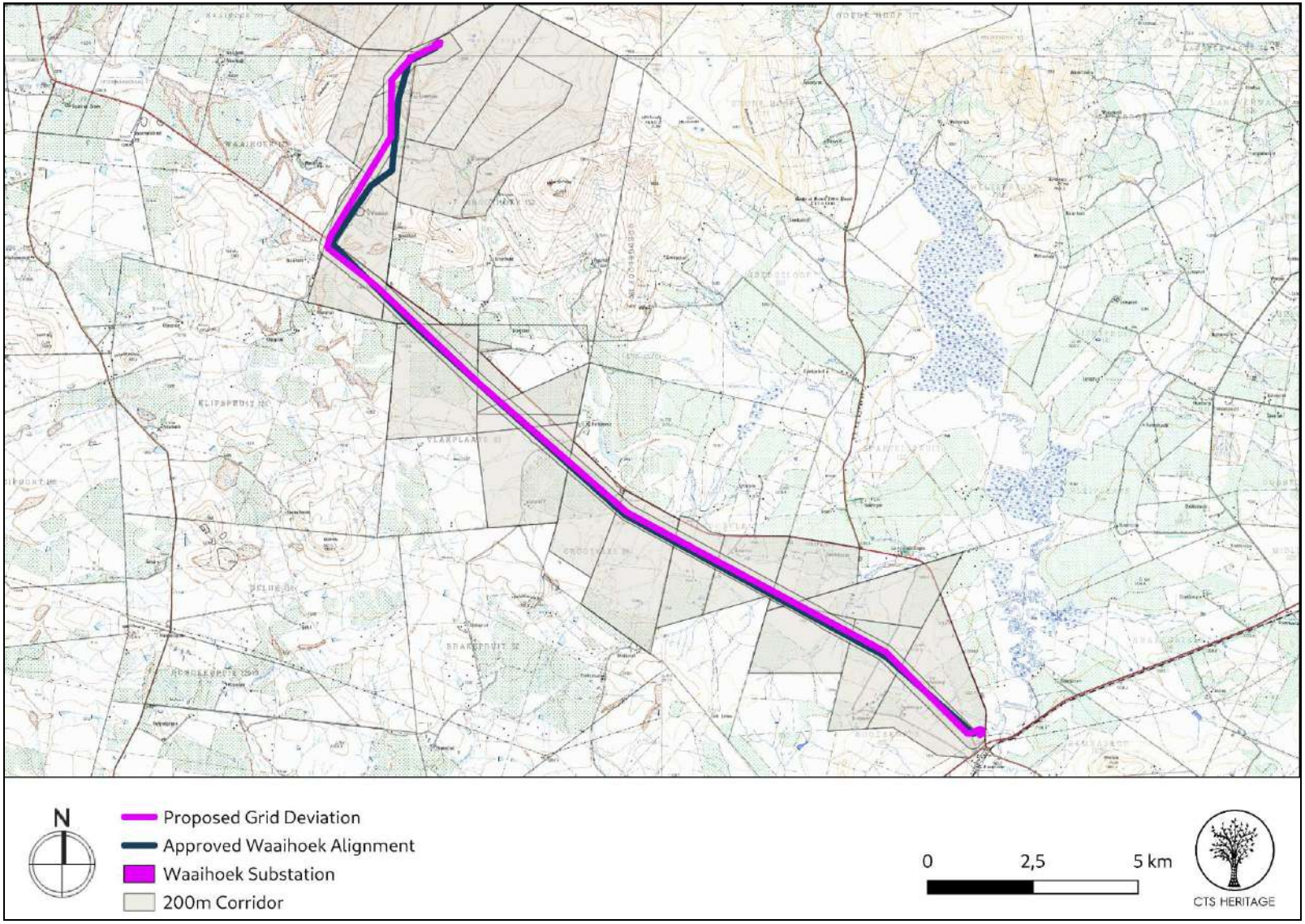

Figure 1.3: The proposed development layout of the proposed grid alignment on an extract of the 1:50 000 Topo Map

2. METHODOLOGY

2.1 Purpose of HIA

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

2.2 Summary of steps followed

- A Desktop Study was conducted of relevant reports previously written (please see the reference list for the age and nature of the reports used)
- An archaeologist conducted an assessment of archaeological resources likely to be disturbed by the proposed development. The archaeologist conducted his site visit from 10 to 14 April 2022.
- The findings from the palaeontological assessment completed for the authorised Waaihoek Grid Alignment were incorporated into this Heritage Impact Assessment (Groenewald, 2014).
- The identified resources were assessed to evaluate their heritage significance and impacts to these resources were assessed.
- Alternatives and mitigation options were discussed with the Environmental Assessment Practitioner

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

(1) The survey was conducted on 22-24 April, 2022 at the end of the summer rainfall season, and at a time when KZN has been experiencing active flooding. This is also the time of year when the area has the densest vegetation due to the abundant rainfall. Dense grasses and savanna cover portions of the project

area. This coverage significantly inhibited the visibility of surface archaeology in some places (CWH3, CWH4 and CWH12). However, this is not regarded as a substantial problem in relation to the Stone Age archaeological remains, which were exclusively associated with donga formation in the north west region of the footprint. Additionally, even in the few places that had optimal visibility, evidence of archaeology was extremely sparse. Apart from the area that we were prohibited from viewing (6), it is clear that the Stone Age sensitivity and scientific potential of the project area has been comprehensively assessed. However, the inability to assess some of the footprint area at ground surface level due to the abovementioned ecological parameters should be regarded as a constraint to the documentation of potential graves.

(2) The region of KZN experienced catastrophic floods in early 2022 – the survey took place at the end of the rainy season while the effects of flooding in lower lying areas were still evident. This prohibited driving anywhere near the grid deviation, and resulted in some areas being submerged under flood water (CWH 13 and 14).

(3) Previous vegetation clearing activities by farmers may have affected surface archaeology including the possible above-surface presence of material evidence of graves (i.e. the removal of surface stone structures).

(4) Clearly, topsoils are substantially disturbed in and around areas where crops are actively growing or were growing historically (CWH1).

(5) Large herds of cattle (n>100 in some instances) were grazing across substantial portions of the footprint, which potentially resulted in impacts on surface archaeology through trampling.

(6) One relatively small section was not accessible. The archaeologists were actively removed from the property by a landowner who did not consent to the fieldwork going ahead (this is clear from the track paths).

The survey proceeded with several constraints and limitations, yet the project area was comprehensively surveyed for heritage resources apart from a section where a landowner actively removed the archaeologists from the property.

Subsequently, the inaccessible small section - portions 7/119 and 2/119 - were approved by the owner for inclusion in the project and a walkthrough of this section was conducted by the EAP.

2.5 Nala Impact Assessment Methodology

Direct, indirect and cumulative impacts associated with the projects must be 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:

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

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

The significance weightings for each potential impact are as follows:

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

3. HISTORY AND EVOLUTION OF THE SITE AND CONTEXT

3.1 Desktop Assessment

This application is for the proposed deviation to the approved grid connection infrastructure associated with the Waaihoek Wine Energy Facility. The approved Waaihoek Grid Connection corridor is located approximately 15km southeast of Utrecht in KZN. Utrecht began as a colonial settlement and independent republic formed by the farmers of the Great Trek in 1854 before forming part of the Zuid-Afrikaanse Republiek in 1860. The historic core of Utrecht retains some of its Victorian character. Prior to colonial settlement, this area formed part of the Zulu Kingdom and remains under the domain of Zulu Chiefs.

Archaeology

A comprehensive Heritage Impact Assessment was completed by Anderson and Anderson (2014, SAHRIS NID 167017) for the Waaihoek WEF. This assessment is referred to extensively below. According to Anderson and Anderson (2014), the study area has a rich archaeological and historical record. The known archaeological sites cover the entire Stone Age sequence, the Late Iron Age and the Historical Period. According to Anderson and Anderson (2014), "The history of the area before 1850 ACE has tended to be under exposed. The area has archaeological sites dating to the Late Iron Age from c. 1400 ACE. Prior to the Late Iron Age occupation of the area, there were gatherer-hunters living in the area. There sites were in open areas as well as overhangs. The main evidence for the gather-hunter occupation is in the form of rock paintings and stone tools that occur in the area. The rock paintings are mostly poorly preserved and of little significance. Some of the stone tools noted during the survey may date back to the Middle Stone Age, with a maximum age of 250 000 years ago". The general area is also associated with the Voortrekkers, the Anglo-Zulu War and the Anglo-Boer War. Anderson and Anderson (2014) include a detailed extract of this history from Jones (2005) in their report and as such, it is not repeated here. Anderson and Anderson (2014) identified a number of heritage resources in their assessment for the Waaihoek WEF that are located in the vicinity of the proposed OHL deviation. These include battle sites including the Battle of Blood River and the Battle of Scheepers Nek as well as evidence of stone walling and burial sites. In the field assessment completed for the Waaihoek WEF, Anderson and Anderson (2014) noted that "there are very few settlements, or the remains thereof, on the upper plateau. This would be the southern part of the affected area (near to the proposed OHL deviation). These areas are rockier, have less sand and are more exposed to lightning strikes. When features do occur in these areas, they are either as stone walls or cattle kraals." All of the known heritage resources identified by Anderson and Anderson (2014) have been mapped in Figure 3 and none of these resources will be negatively impacted by the proposed OHL deviation. However, the proposed OHL deviation alignment corridor was not assessed by Anderson and Anderson (2014) and as such, it is likely that, in an area that has this high level of archaeological significance, the proposed deviation may impact on significant archaeology.

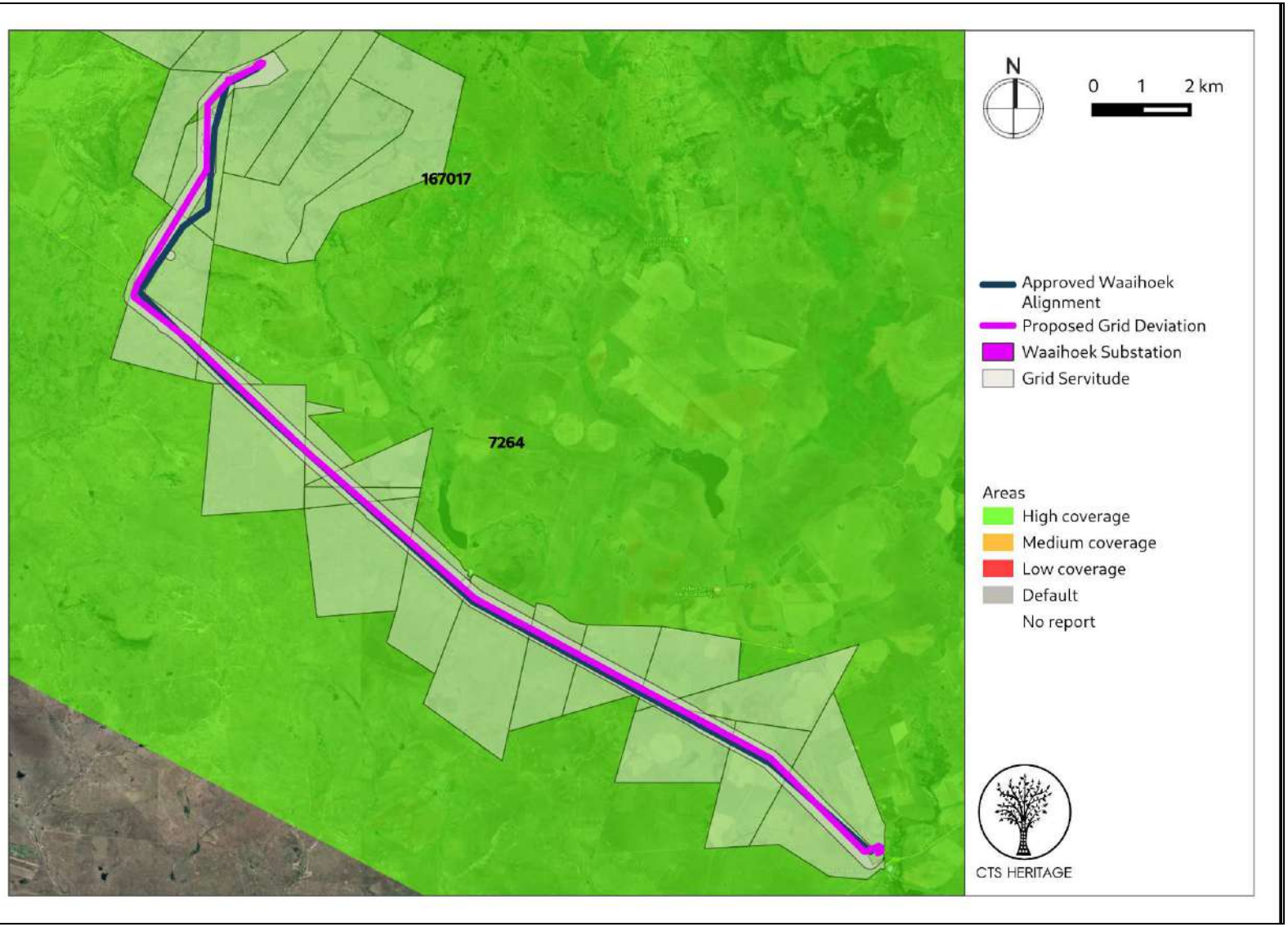

Figure 2. Previous HIAs Map. Previous Heritage Impact Assessments covering the proposed development area with SAHRIS NIDS indicated. Please see Appendix 2 for a full reference list.

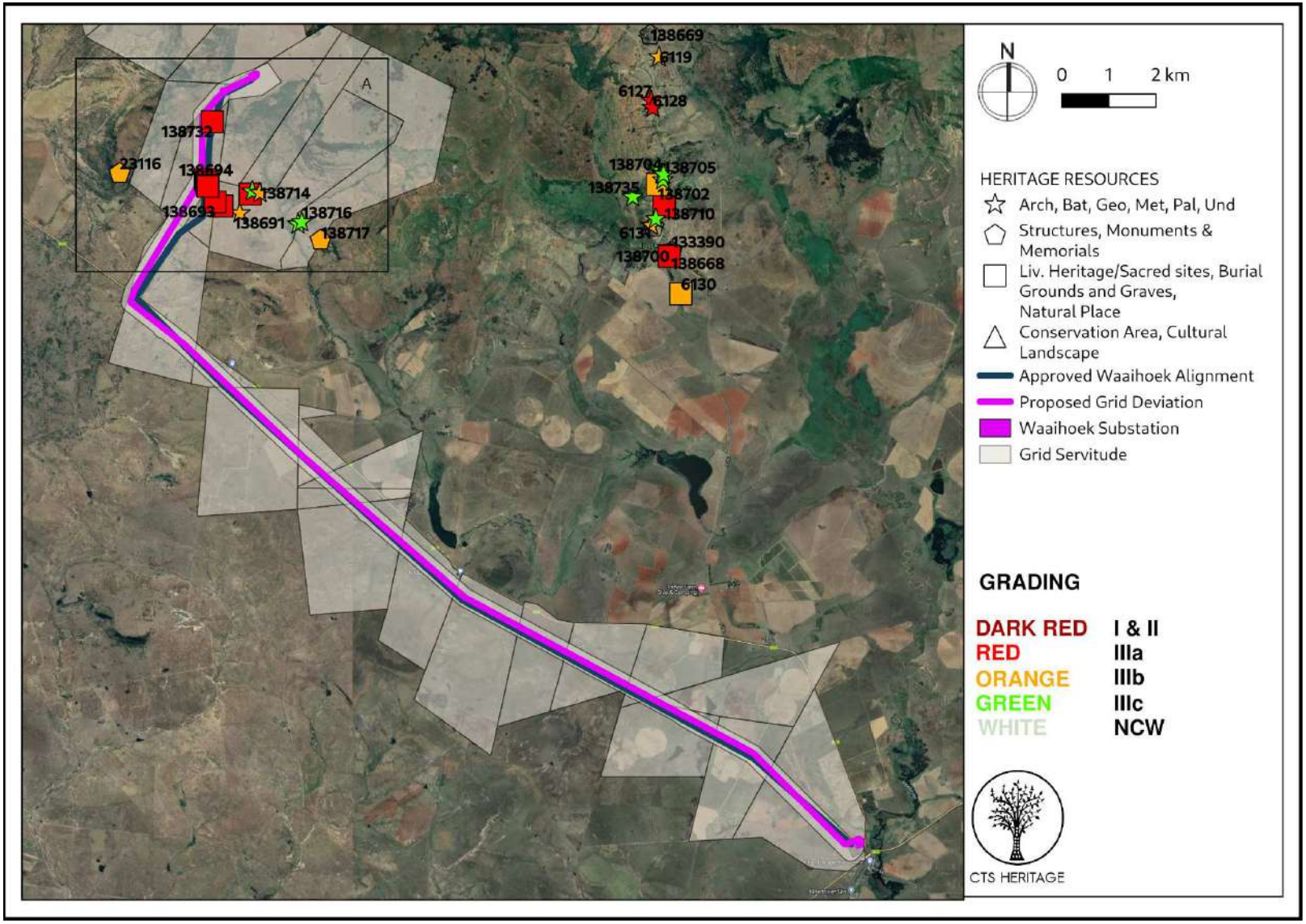

Figure 3. Heritage Resources Map. Heritage Resources previously identified within the study area, with SAHRIS Site IDs indicated in the insets below. Please See Appendix 4 for full description of heritage resource types.

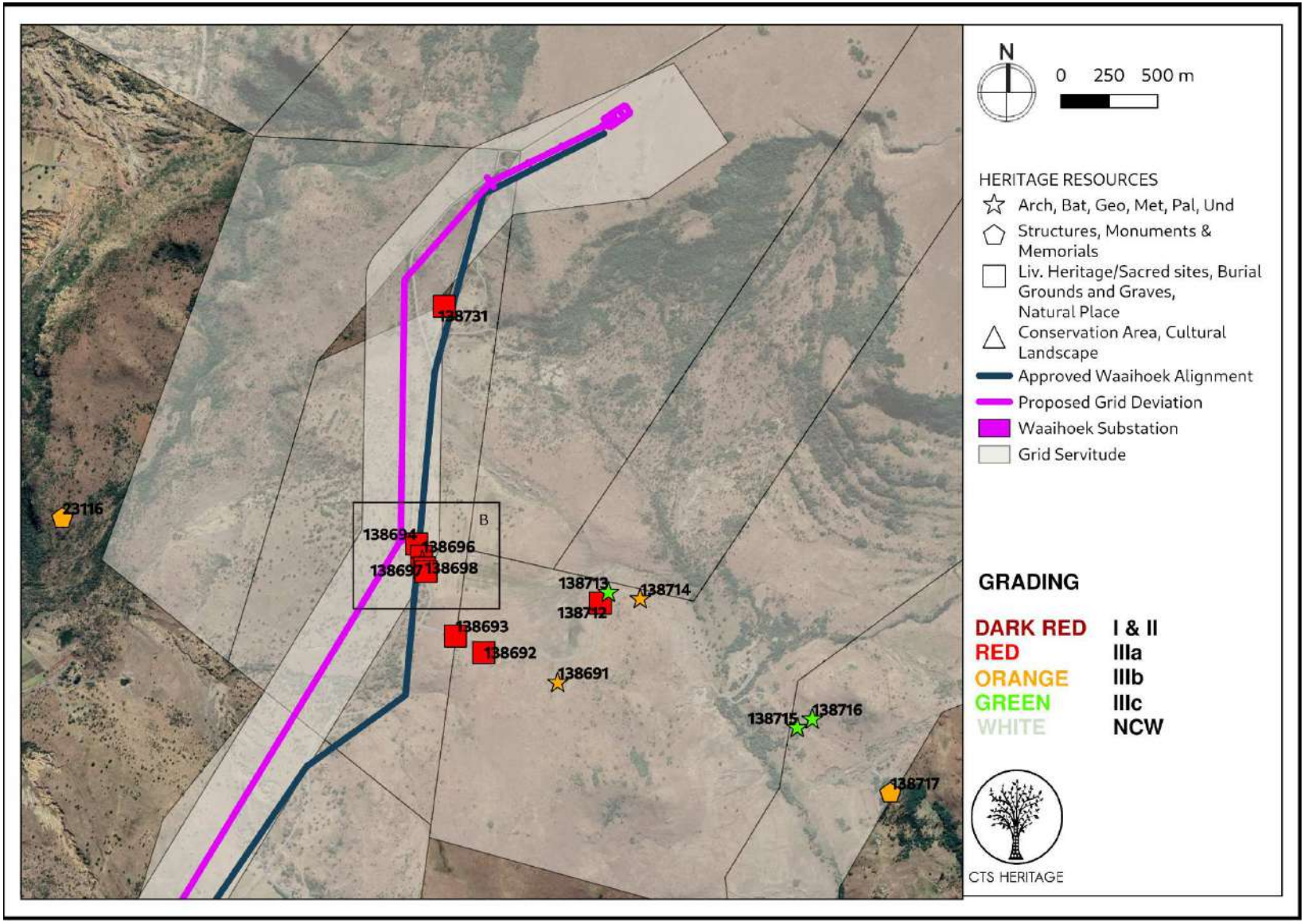

Figure 3.1. Heritage Resources Map Inset A

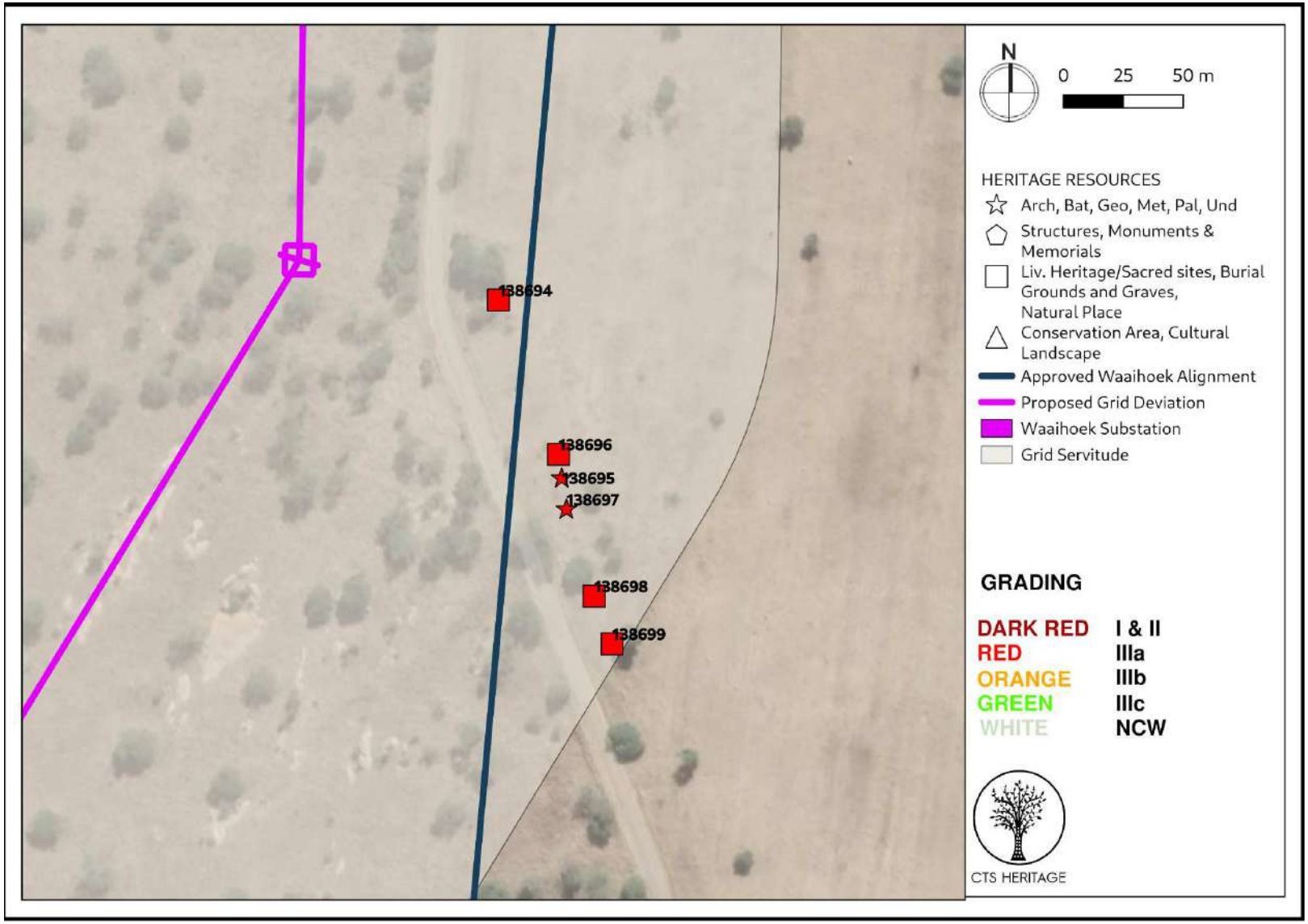

Figure 3.2. Heritage Resources Map Inset B

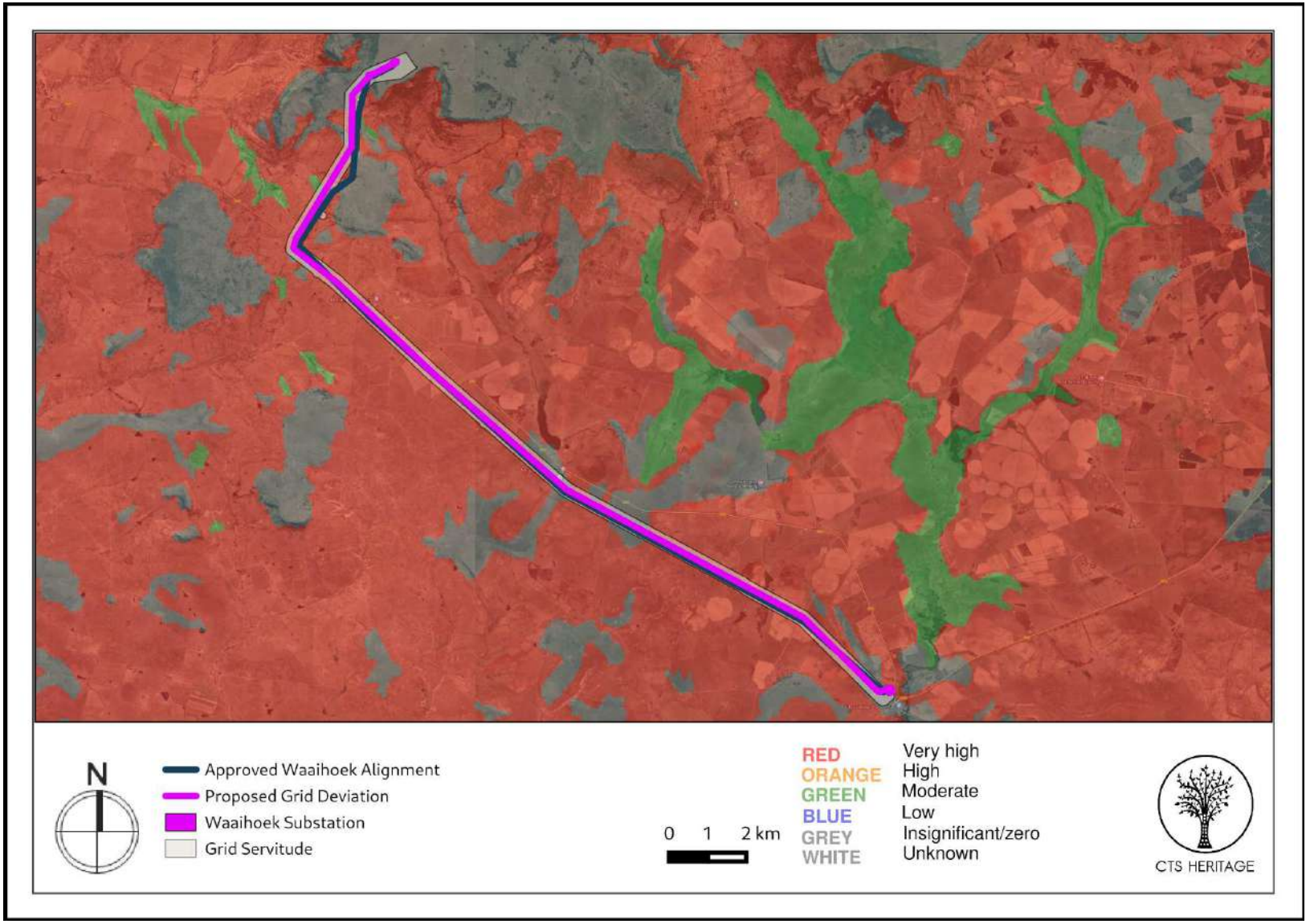

Figure 4.1: Palaeontological sensitivity of the proposed development area

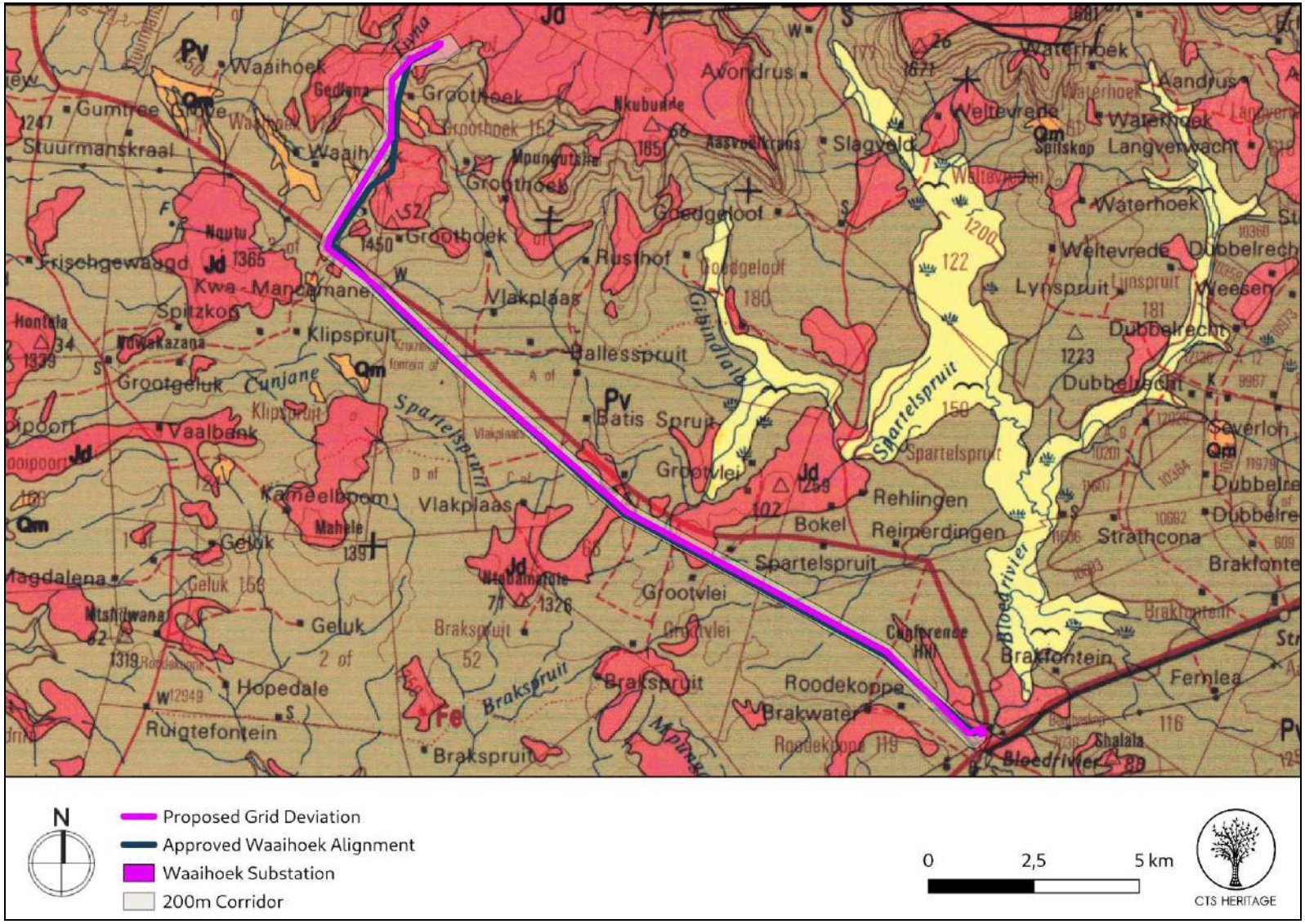

Figure 4.2: Geology Map. Extract from the CGS 2730 Vryheid Map indicating that the development area is underlain by sediments of the Vryheid Formation (Pv) of the Ecca Group as well as non-fossiliferous Jurassic Dolerites (Jd).

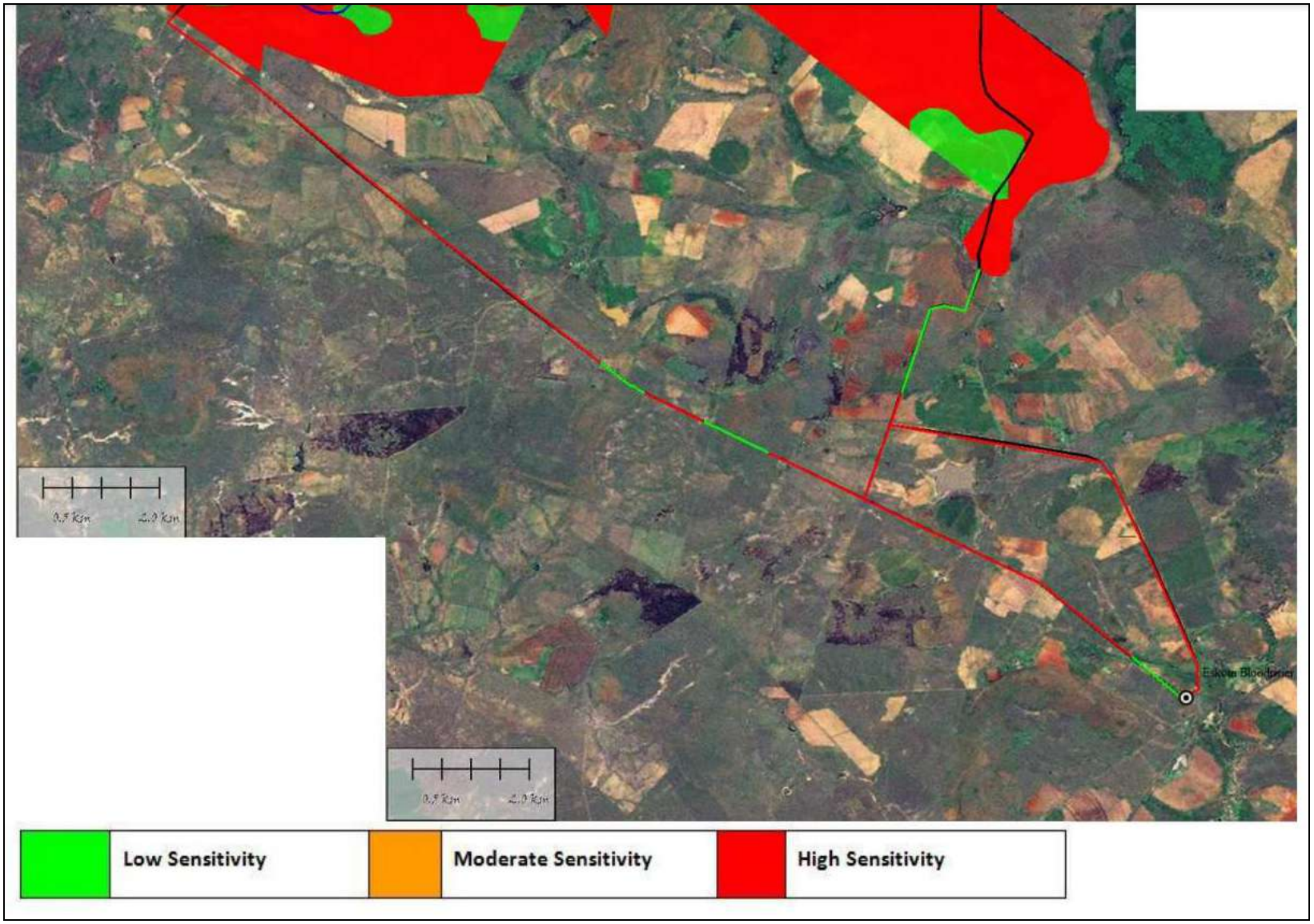

Figure 4.3: Palaeontology Map. Extract from Figure 9.1 on page 26 of the PIA for the Waaihoek WEF (Groenewald, 2014)

Palaeontology

According to the SAHRIS Palaeosensitivity Map, the area proposed for the OHL deviation is underlain by sediments of zero, moderate and very high palaeontological sensitivity (Figure 4a). According to the extract from the Council of Science Map for Vryheid 2730 (Figure 4b), the palaeontologically sensitive geology of the area is ascribed to the Vryheid Formation of the Ecca Group of sediments. Groenewald (2014, SAHRIS NID 167013) completed a field-based palaeontological assessment for the Waaihoek WEF. In this assessment, Groenewald (2014) notes that "The Vryheid Formation consists of interbedded very coarse-grained sandstone and mudstone that yields plant and trace fossils as well as some prominent coal seams."

In this assessment, Groenewald (2014) characterises the area proposed for the OHL deviation as having high sensitivity for impacts to palaeontology (Figure 4c). Groenewald (2014) recommends that "The PEA and CEO be made aware of the possibility of finding fossils in the Vryheid and Volksrust Formation sediments during excavation of the foundations for the turbines and other infrastructure. A professional palaeontologist is appointed to monitor possible palaeontological finds during excavation of turbine foundations and infrastructure where turbine positions and infrastructure fall on Vryheid and Volksrust Formation sediments." It is recommended that these requirements also apply to the proposed OHL deviation due to its high sensitivity.

Table 1: Explanation of symbols for the geological map and approximate ages. SG = Supergroup; Fm = Formation; Ma = million years; grey shading = formations impacted by the project.

Symbol	Group/Formation	Lithology	Approximate Age
Qm	Masotcheni Fm	Clay, gravel beds, laterite, silcrete, soil	Quaternary
Jd	Jurassic dykes	Dolerite dykes, intrusive	Jurassic, approx. 180 Ma
Pv	Vryheid Formation of the Ecca Group	Sandstone, Shale and grit with coal and oil-shale beds	Mid-Permian

4. IDENTIFICATION OF HERITAGE RESOURCES

4.1 Summary of findings of Specialists

Archaeology (Appendix 1)

The survey was conducted on foot, and sought to assess the presence and significance of archaeological occurrences within the project area. Field assessment documented a sparse number of isolated stone artefacts in secondary contexts in a donga system, suggesting the area may have been traversed by Stone Age groups potentially through periods in both the Middle Stone Age (MSA – ~300ka:~40ka) and the Later Stone Age (LSA: ~40ka: ~2ka), although only one flake with a faceted platform could be linked unequivocally to a time period (the MSA). The presence of small nodules of artefact-quality sub-volcanic rock in the project area as well as relatively abundant standing water, were likely the resources that attracted groups there, and resulted in them leaving behavioural traces in the form of stone artefacts in the Pleistocene.

Despite the apparent availability of artefact quality sub-volcanic rock in some localities, evidence of archaeology west of the R34 was extremely sparse. Some ephemeral Stone Age material remains in the form of flakes with faceted platforms (indicating Middle Stone Age lithic production) was identified in dongas east of the R34. The archaeological remains that need to be avoided are predominantly east of the R34 (with a small number of historical stone structures associated with modern dwellings west of the R34) (see table of waypoints below). Several identified stone structures have elongated morphologies indicative of human burials. These need to be entirely avoided (see sensitivity ranking and recommendation).

The intensive current and historical use of substantial portions of the landscape, and remnants of recently abandoned structures on some of the properties in combination with the presence of previously identified graves near the footprint, tie in with current observations of graves and isolated burials (WH1, WH3, WH4, WH7, WH9, WH10, WH14 and WH15) and more amorphous stone structures (WH2, WH5, WH6, WH8, WH11 and WH12) within or near the footprint. Importantly, there would not be evidence of graves within the extensively ploughed areas that comprise the majority of the footprint. However, the dense grass cover and extensively flooded lower lying areas were pertinent constraints to documenting archaeology where these constraints occur. Extensive grass cover and flooded drainages made potential grave locations impossible to exhaustively assess across the project area (particularly in cases where above surface material indicators may have been removed through crop related activities, through trampling related to stock farming or through recent flooding that has affected substantial portions of the KZN region). The contextual images below are ordered from north to south along the alignment.

A walkthrough of the proposed grid corridor sections that were not accessed by the archaeologists (7/119 and 2/119) was undertaken by the EAP on the 27/05/2022 starting at the existing Bloedrivier substation (7/119). The first 700m of the proposed grid corridor intersects the existing Bloedrivier powerline servitude with a few homesteads of farm workers residing approximately 150m from the Bloedrivier substation. No obvious or

demarcated indications of graves were noted around the homestead. For approximately 700m the grid corridor was largely transformed with evidence of cattle grazing, agriculture and internal farm roads with evidence of erosion due to small road crossings and tracks. A variety of ephemeral, permanent rivers and wetlands were observed within the lower lying regions of the powerline corridor within these properties, limiting identification of pre-existing features within these areas. There had been evidence of clearing of rock and stone material along the existing powerline servitude likely left following construction and clearing activities of the existing powerline routing.

The proposed powerline corridor 2/119 has been extensively ploughed by the landowner and no observations of pre-existing structures or features were observed within the property.

Palaeontology (Groenewald, 2014)

The topography of the area forms part of the escarpment and consists of hills and cliffs in regions where outcrops of Vryheid Formation sandstone and mudstone are intruded by a thick dolerite sill. The larger part of the study area is underlain by deeply weathered dolerite. Fossils are restricted to outcrops of the Vryheid Formation.

No fossils were observed at any of the visited sites. This is either due to lack of exposure of Vryheid or Volkrust Formations or the presence of dolerite. It is however important to note that ***where outcrops of the Vryheid and Volkrust Formations are present, fossils were observed.*** Exposures on the farm Paardepoort yielded well preserved trace fossils on mudstone bedding planes and stromatolites associated with carbonate concretions. The proposed alternative powerline routes were also inspected during the field visit and fossil sites were recorded photographically, with GPS references. Outcrops of the Vryheid and Volksrust Formations are restricted to specific areas on the escarpment and in road cuttings. Extensive areas are underlain by dolerite.

4.2 Heritage Resources identified

The following archaeological and heritage resources were identified within the proposed grid connection corridor.

Table 2: Artefacts identified during the field assessment development area

POINT ID	Site Name	Period	Description	Co-ordinates		Grading	Mitigation
WH1	Waaihoek 1	Historical	Historical grave	27.78366	30.42686	IIIA	Avoid. No impact anticipated
WH2	Waaihoek 2	Modern	Possible stone structure (recent)	27.74892	30.4446	NCW	NA
WH3	Waaihoek 3	Historical	Three historical graves	27.75679	30.43677	IIIA	100m Buffer
WH4	Waaihoek 4	Historical	Historical grave	27.75709	30.43626	IIIA	100m Buffer
WH5	Waaihoek 5	Historical	Historical stone hut base	27.75709	30.43589	IIIC	30m Buffer
WH6	Waaihoek 6	Historical	Historical kraal	27.76102	30.4338	IIIC	30m Buffer
WH7	Waaihoek 7	Historical	Historical grave	27.76226	30.43475	IIIA	100m Buffer
WH8	Waaihoek 8	Historical	Historical stone walling (right angle	27.7627	30.43481	IIIC	30m Buffer

			evident)				
WH9	Waaihoek 9	Historical	Historical grave	27.76365	30.43429	IIIA	100m Buffer
WH10	Waaihoek 10	Historical	Possible grave	27.76847	30.43484	IIIA	100m Buffer
WH11	Waaihoek 11	Historical	Historical structure	27.77266	30.43111	IIIC	30m Buffer
WH12	Waaihoek 12	Historical	Possible historical structure	27.77725	30.42817	IIIC	30m Buffer
WH13	Waaihoek 13	MSA	Middle Stone Age artefacts in a donga	27.77961	30.42684	NCW	NA
WH14	Waaihoek 14	Historical	Multiple human graves	27.84483	30.48937	IIIA	100m Buffer
WH15	Waaihoek 15	Historical	Multiple graves and associated structures	27.84627	30.48851	IIIA	100m Buffer
036	Grid	MSA	Silcrete point on top of sand Bank of dam wall	-32.81892	25.99685	NCW	NA
037	Grid	MSA	Quartzite flake early MSA	-32.82573	26.00442	NCW	`NA
038	Grid	MSA	Quartzite blade flake	-32.83107	26.01001	NCW	NA
039	Grid	MSA, LSA	Hornfels and quartzite flakes in eroded warthog den	-32.84437	26.02901	NCW	NA
040	Grid	MSA	Siltstone flake	-32.84965	26.03786	NCW	NA

The palaeontological sensitivity of the proposed development area is informed by the geology underlying the development area. The geology of the grid connection route consists of:

- Vryheid Formation (Pv) In the study area the Vryheid Formation consists mainly of interbedded coarse-grained sandstone and mudstone, interpreted as deltaic deposits. The Vryheid Formation contains numerous coal seams that are of economic importance (Johnson et al, 2006).

  Volksrust Formation (Pvo) The Volksrust Formation consists of a monotonous sequence of grey mudstone and it is interpreted as a deeper water deposit (Johnson et al, 2006; Groenewald, 1996).
- Dolerite (Jd) A very prominent dolerite sill underlies a large part of the study area and represents magma intrusions into the Karoo Supergroup sediments during the Jurassic volcanic episode. This occurred during the breakup of Gondwanaland.

4.3 Mapping and spatialisation of heritage resources

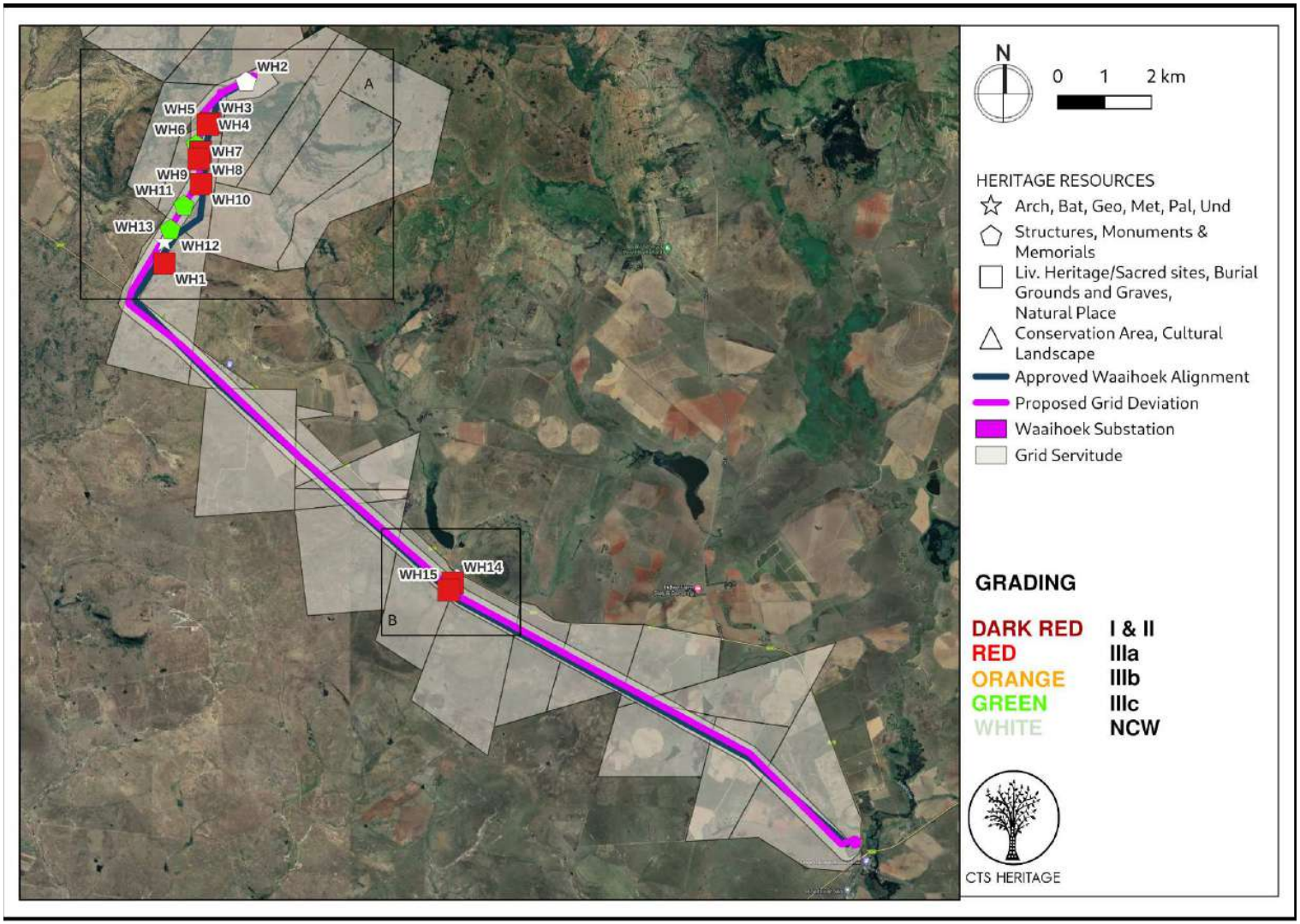

Figure 5.1: Map of archaeological and built environment heritage resources within the proposed development area

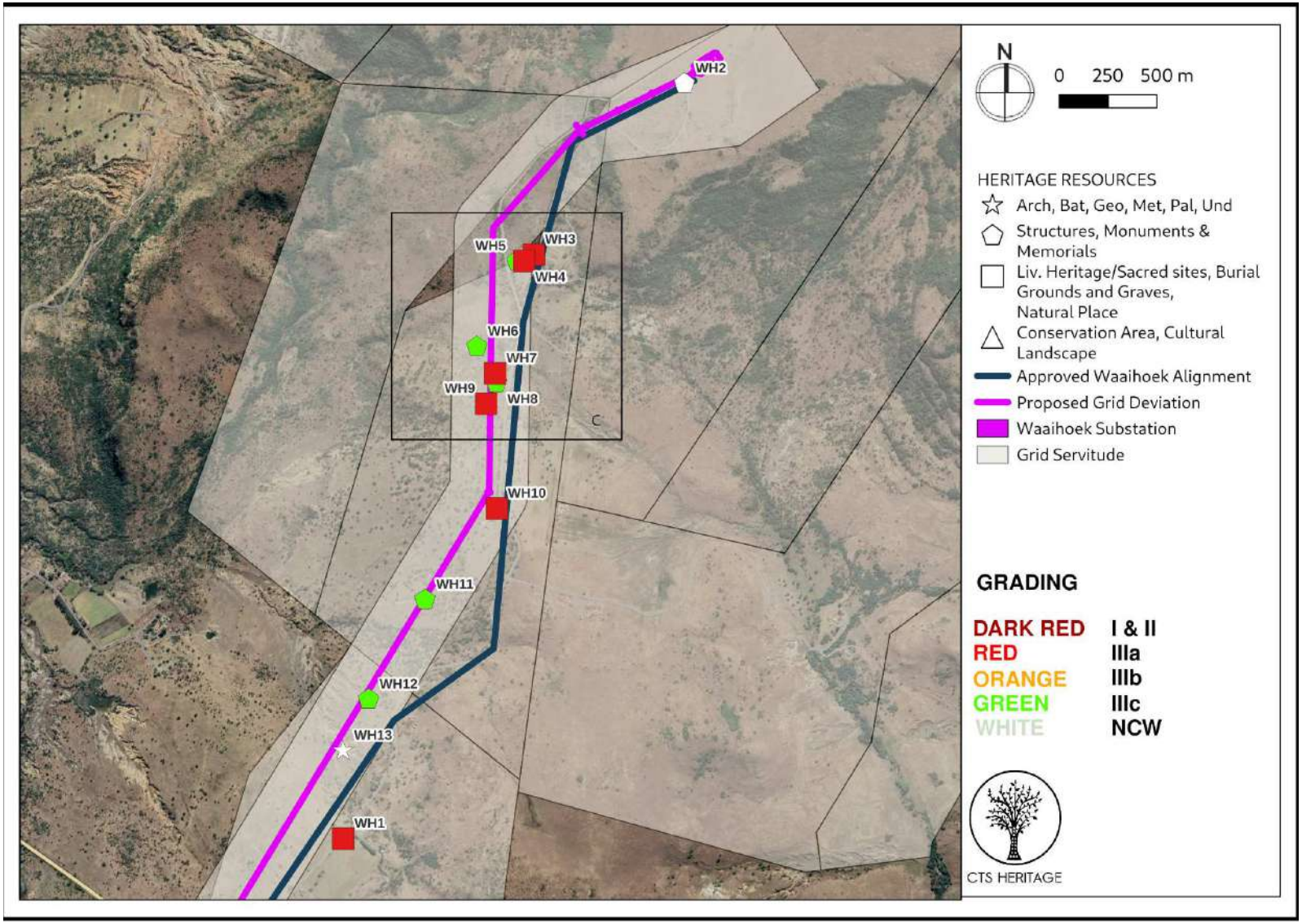

Figure 5.2: Map of heritage resources identified during the field assessment relative to the proposed development footprint - Inset A

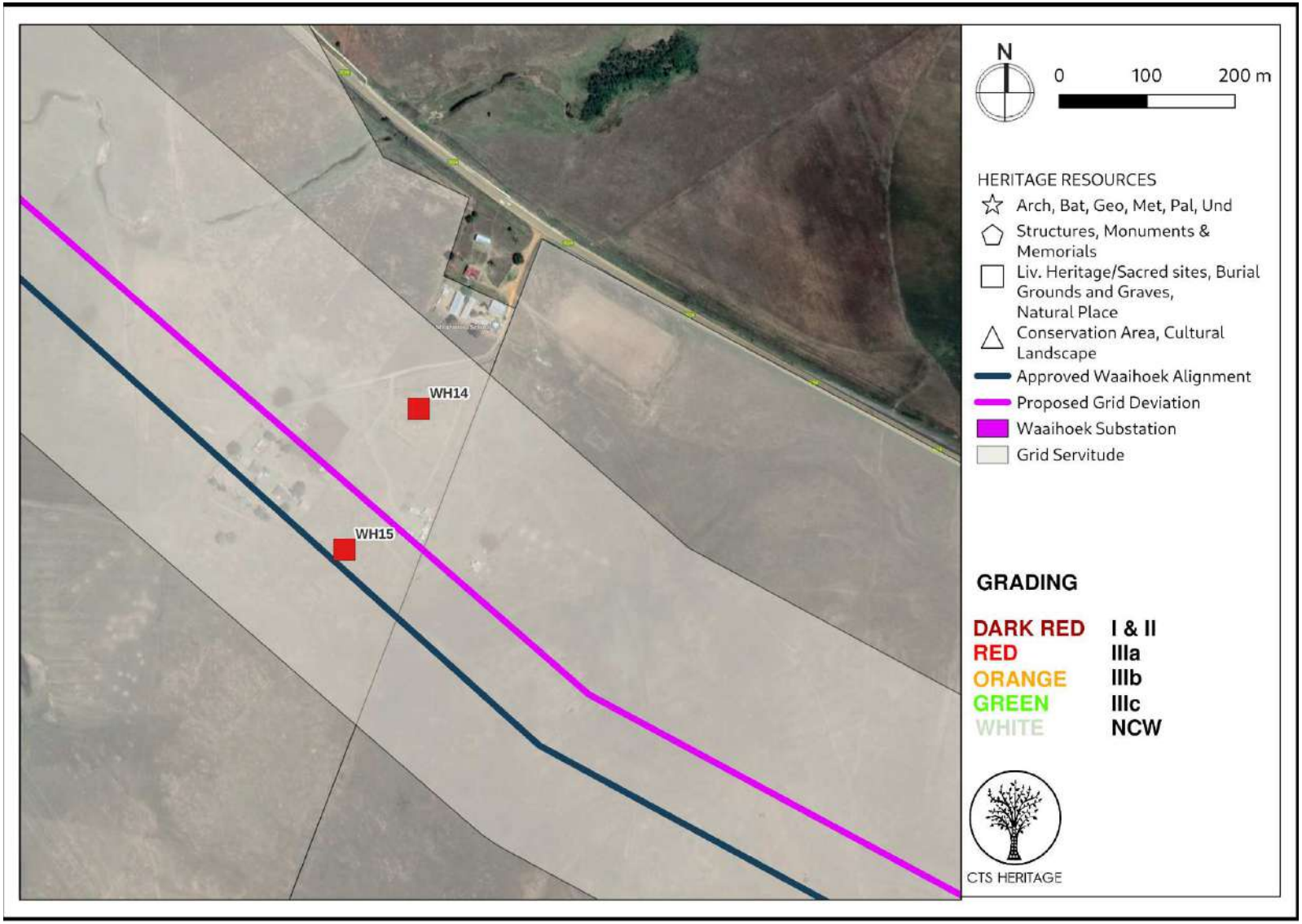

Figure 5.3: Map of heritage resources identified during the field assessment relative to the proposed development footprint - Inset B

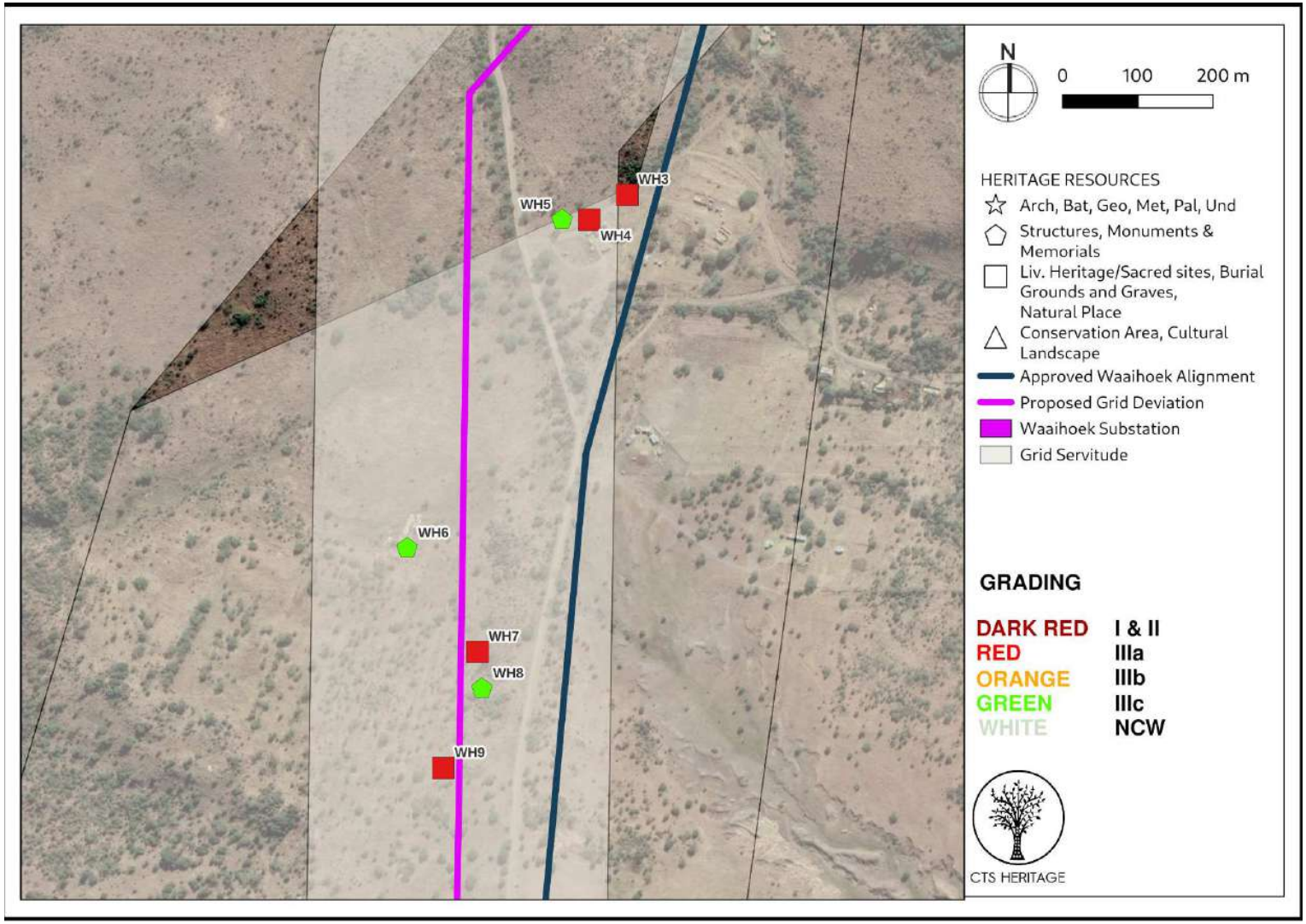

Figure 5.4 Map of heritage resources identified during the field assessment relative to the proposed development footprint - Inset C

5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

5.1 Assessment of impact to Heritage Resources

5.1.1 Archaeology

Stone Age Remains

The stone artefacts at WH13 are *ex-situ* and occur in a disturbed deflated context. The proposed development is unlikely to affect the scientific potential of the stone artefacts as they do not occur in contexts that can be dated. However, recent archaeological work in KZN has started to focus more on donga systems exposing Pleistocene sediments, so the potential for a dateable *in-situ* archaeological horizon is a possibility if extensive excavations within the donga system will take place. The documented Stone Age archaeology is classified as scientifically LOW-SIGNIFICANCE.

Concerning the Stone Age archaeology, there are no objections to the authorization of the proposed development, *provided that the recommendations outlined are adhered to*, and provided that if any evidence of human remains are exposed during excavation, that development activities cease in the area of the identified remains.

Stone Structures

Several stone structures were identified that had elongated morphologies and human-like sizes (~2m), potentially representing human burials (WH1, WH3, WH4, WH7, WH9, WH10, WH14 and WH15). Other human made stone structures were identified that had less typical morphologies for human graves, and had a more variable range of sizes and orientations (WH2, WH5, WH6, WH8, WH11 and WH12). The latter were recorded due to their proximity to abandoned building remains and other human made structures, and are considered to be potentially sensitive due to their spatial association to historical human occupation and activity, rather than their morphology and orientation alone. In terms of material form, the latter cannot definitively be identified as graves, however, any development in the vicinity of the less typical stone structures should proceed with extreme caution.

A 30m no-go buffer is recommended for around the historic ruins of structures graded IIIC and a 100m no-go buffer is recommended around the burial sites graded IIIA. This 100m buffer is intended to mitigate the risk of disturbance to human burials and to ensure some preservation of context and sense of place associated with burial practices of past people.

Table 3: Impact table for Archaeological Heritage Resources

NATURE: The area proposed for development is known to conserve heritage resources of archaeological significance that may be impacted by the proposed development				
		Before Mitigation		**After Mitigation**
MAGNITUDE	**H (8)**	Significant archaeological resources were identified within the development area 200m corridor including stone kraals and other structures as well as burials.	**L (2)**	Significant archaeological resources were identified within the development area 200m corridor including stone kraals and other structures as well as burials.
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 archaeological resources will be impacted	**L (1)**	It is extremely unlikely that any significant archaeological resources will be impacted
SIGNIFICANCE	**H**	(8+5+1)x5=70	**L**	(2+5+1)x1=8
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?	**M**	Possible	**L**	Unlikely
CAN IMPACTS BE MITIGATED		Yes		
MITIGATION: - A no-go 30m buffer must be implemented around sites WH5, WH6, WH8, WH11 and WH12 (graded IIIC) to ensure that no impact takes place (Figure 7.1 to Figure 7.5). The OHL can pass over these structures if necessary. - A no-go buffer of 100m must be implemented around the burial sites WH1, WH3, WH4, WH7, WH9, WH10, WH14 and WH15 (graded IIIA) to ensure that no impact takes place and to ensure that the sense of place associated with the burials is maintained (Figures 7.1 to Figure 7.5). - 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 AMAFA must be alerted immediately to determine 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

It is extremely unlikely that any fossils would be preserved in the overlying soils and sands of the Quaternary. There is a very small chance that fossils may occur below the ground surface in the mudstones of the Vryheid Formation so a Fossil Chance Find Protocol should be added to the EMPr. If fossils are found by the contractor, environmental officer, or other responsible person once excavations and drilling have commenced, then they should be rescued and a palaeontologist called to assess and collect a representative sample. There is no preferred route or no-go area for the OHPL.

Table 4: Impact table for Palaeontological Heritage Resources

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

5.2 Sustainable Social and Economic Benefit

The authorised wind energy facility and the proposed grid connection infrastructure is proposed by Waaihoek Wind Farm (Pty) Ltd has been bid into the Renewable Energy IPP Procurement Programme (REIPPPP) Bid Window 5 for the procurement of up to 1 600MW of onshore wind energy technologies and has since been selected as preferred bidder for the Waaihoek Wind Energy Facility. The construction period for a wind energy facility and its associated infrastructure is considerably shorter than that of coal fired power stations, and as a bid requirement of REIPPPP an income stream is made available to local communities through employment, training, land rental and the provision of local equity. In terms of job opportunities, the REIPPPP bidding process does place pressure on the renewable energy sector to include locally manufactured 'key components'. In the wind energy sector the key components that are being focussed on are wind turbine blades and towers. In this regard two tower manufacturers have, at the time of writing, started to establish facilities in South Africa. The increasing local content requirements are leading to increasing interest in setting up manufacturing in the country.

The KwaZulu-Natal Province will benefit from undertaking the initiative to generate electricity to the National Grid. There will also be a potential gain for development of renewable energy which is detailed in the local, regional and national policies to be of great importance for economic development. Socio-economic development will be in the form of disposable salaries and the purchases of services and supplies from the local communities in and around the region. There is a requirement as part of their bidding requirements of REIPPPP to contribute towards local economic development (LED) and social upliftment initiatives within the area in which they are proposed. The proposed development, therefore, has the potential to contribute positively towards socio-economic development and improvements within the local area.

As the anticipated impacts to heritage resources resulting from the proposed development are limited, the socio-economic benefits outweigh these impacts on condition that the delineated no-go areas are avoided and the recommended mitigations are applied.

5.3 Proposed development alternatives

For this assessment, no alternatives have been considered; however, this report does assess a 200m grid corridor on either side of the proposed alignment within which the powerline will be located. There is an existing grid line within this corridor and all of the 400m corridor falls within an area that has previously been assessed. As such, we are confident that the findings of this report are applicable to the 400m grid corridor in its entirety.

Development of the grid connection infrastructure within the assessed corridors is acceptable from a heritage perspective, provided all delineated no-go areas are avoided and the recommended mitigations are applied.

5.4 Cumulative Impacts

The proposed OHL and substation will form part of the infrastructure required for the Waaihoek WEF and is located along an existing servitude. Furthermore, the majority of the proposed OHL is located within a belt of approved renewable energy facilities (Figure 6).

In terms of impacts to heritage resources, it is preferred that this kind of infrastructure development is concentrated in one location and is not sprawled across an otherwise culturally significant landscape. The construction of the proposed OHL development and substation are therefore unlikely to result in unacceptable risk or loss, nor will the proposed development result in a complete change to the sense of place of the area or result in an unacceptable increase in impact. As the majority of the proposed OHL is located within an already approved WEF, no additional cumulative impacts are anticipated to archaeological, palaeontological or cultural landscape heritage resources.

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.

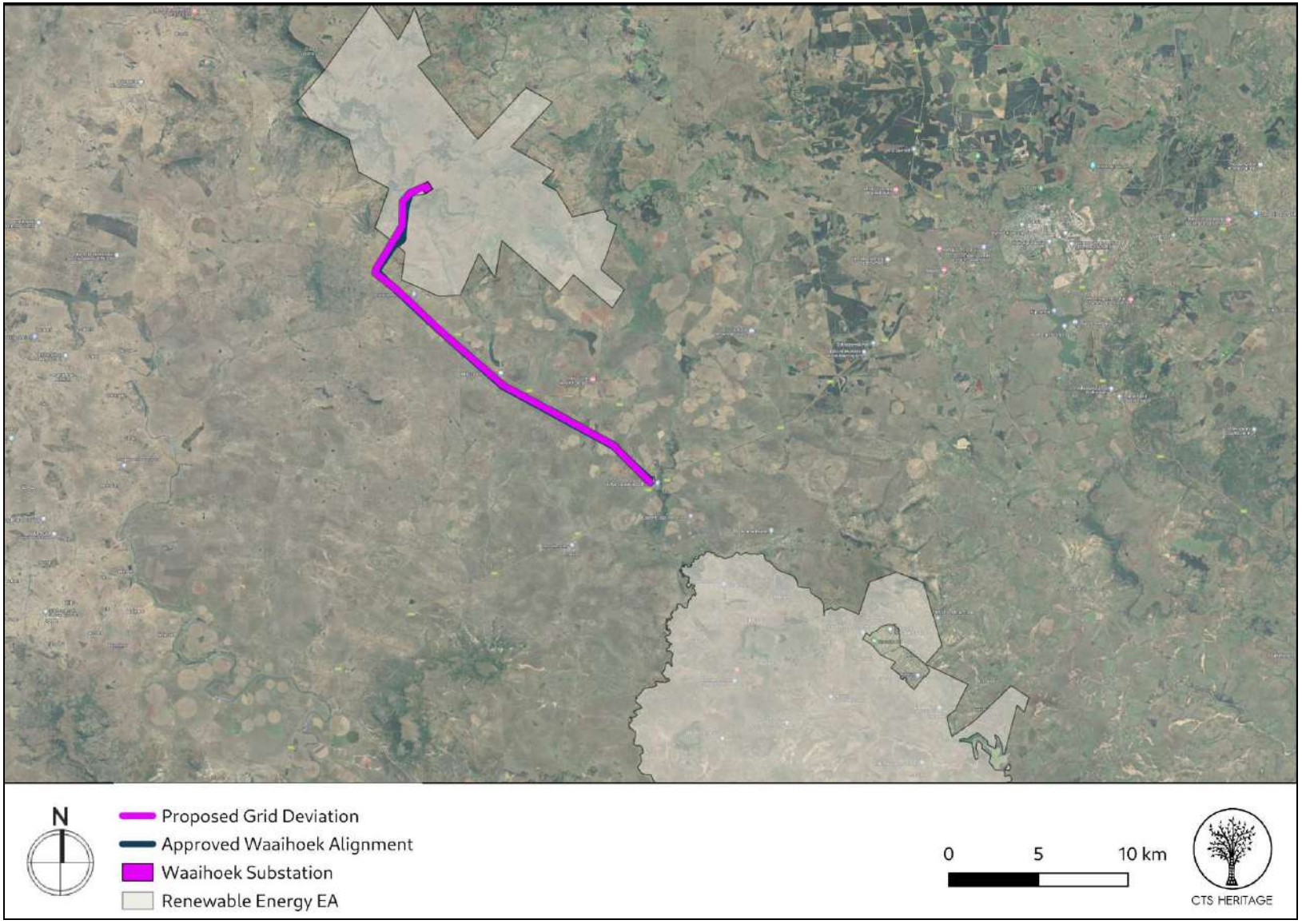

Figure 6: Approved REF projects within 20km of the proposed development area

7. CONCLUSION

Based on this field assessment and on the findings of previous assessments in the area, it is not anticipated that the proposed OHL development will negatively impact on significant archaeological heritage on condition that the recommendations articulated below are implemented.

A small portion of the proposed grid connection was not assessed due to a hostile landowner (Figure 5) and as such, it is not possible to comment on the archaeological sensitivity of this section of the grid alignment. Should any stone structures be present within this unassessed area that are similar to the structures and burials described above, the appropriate recommendations articulated below are applicable.

No observations of palaeontological significance were noted within the area proposed for development. However, the geology underlying the development area remains sensitive for impacts to significant palaeontological heritage.

There are limited impacts anticipated to archaeological and palaeontological heritage from this proposed development and as such, the principle of grid connection infrastructure in this location is supported from a heritage perspective as the infrastructure is located in an area able to tolerate this impact.

8. RECOMMENDATIONS

Based on the outcomes of this report, it is not anticipated that the proposed development of the grid connection infrastructure and substation will negatively impact on significant archaeological heritage on condition that:

- A no-go 30m buffer must be implemented around sites WH5, WH6, WH8, WH11 and WH12 (graded IIIC) to ensure that no impact takes place (Figure 7.1 to Figure 7.5). The OHL can pass over these structures if necessary.
- A no-go buffer of 100m must be implemented around the burial sites WH1, WH3, WH4, WH7, WH9, WH10, WH14 and WH15 (graded IIIA) to ensure that no impact takes place and to ensure that the sense of place associated with the burials is maintained (Figures 7.1 to Figure 7.5).
- The attached Chance Fossil Finds Procedure is implemented for the duration of all excavation 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 AMAFA must be alerted immediately to determine an appropriate way forward.

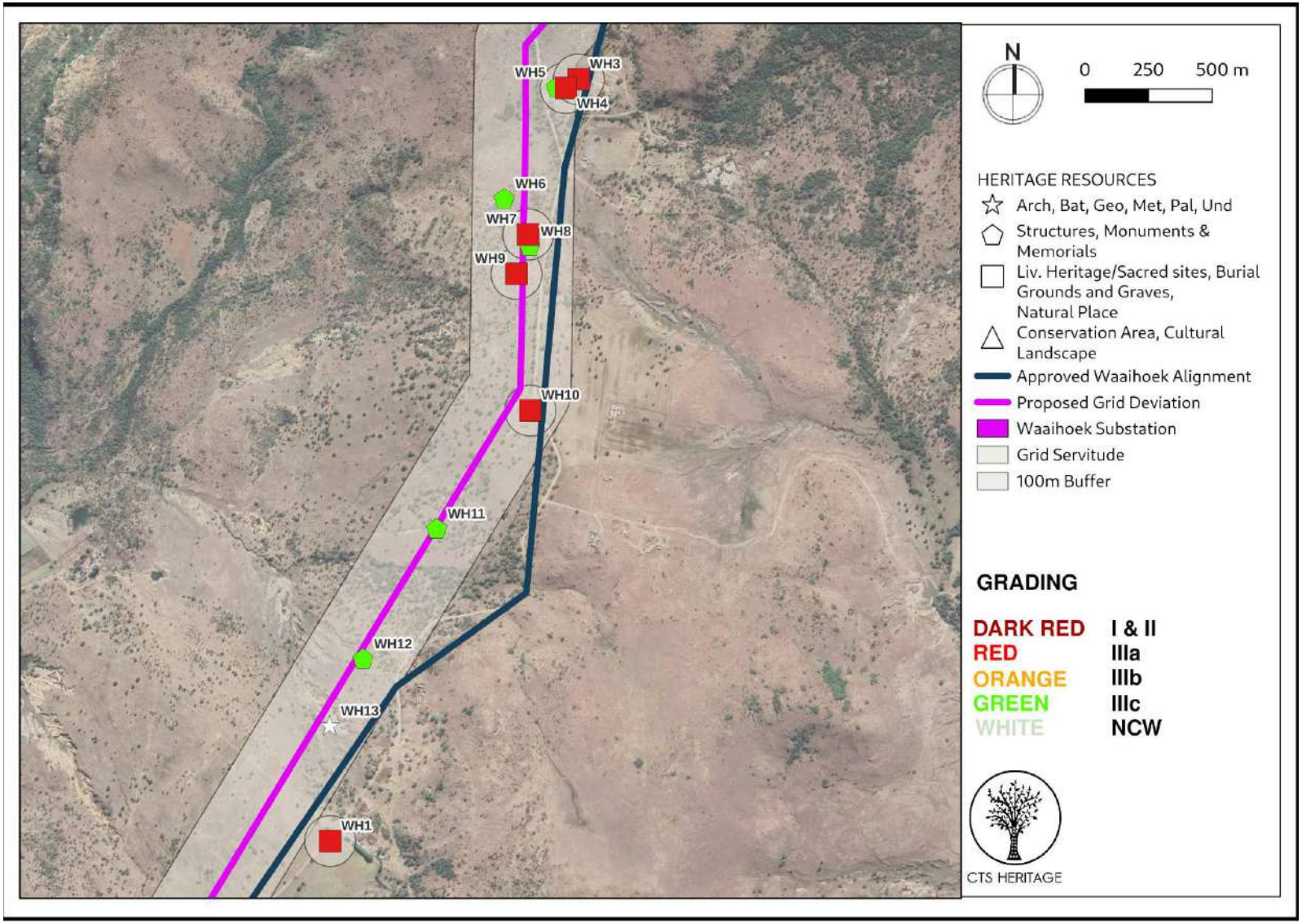

Figure 7.1: Map of recommended mitigation measures as per the recommendations

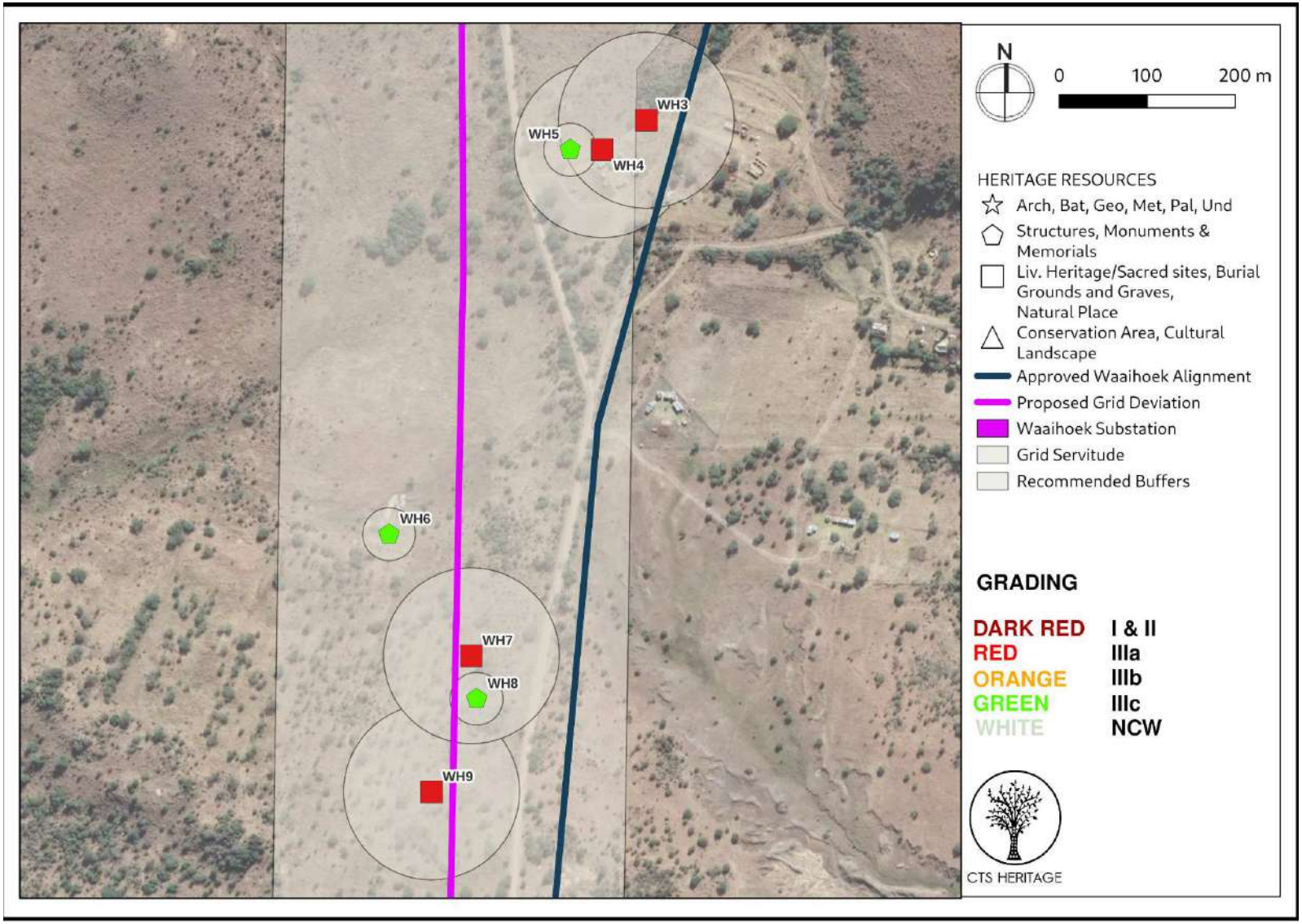

Figure 7.2: Map of recommended mitigation measures as per the recommendations

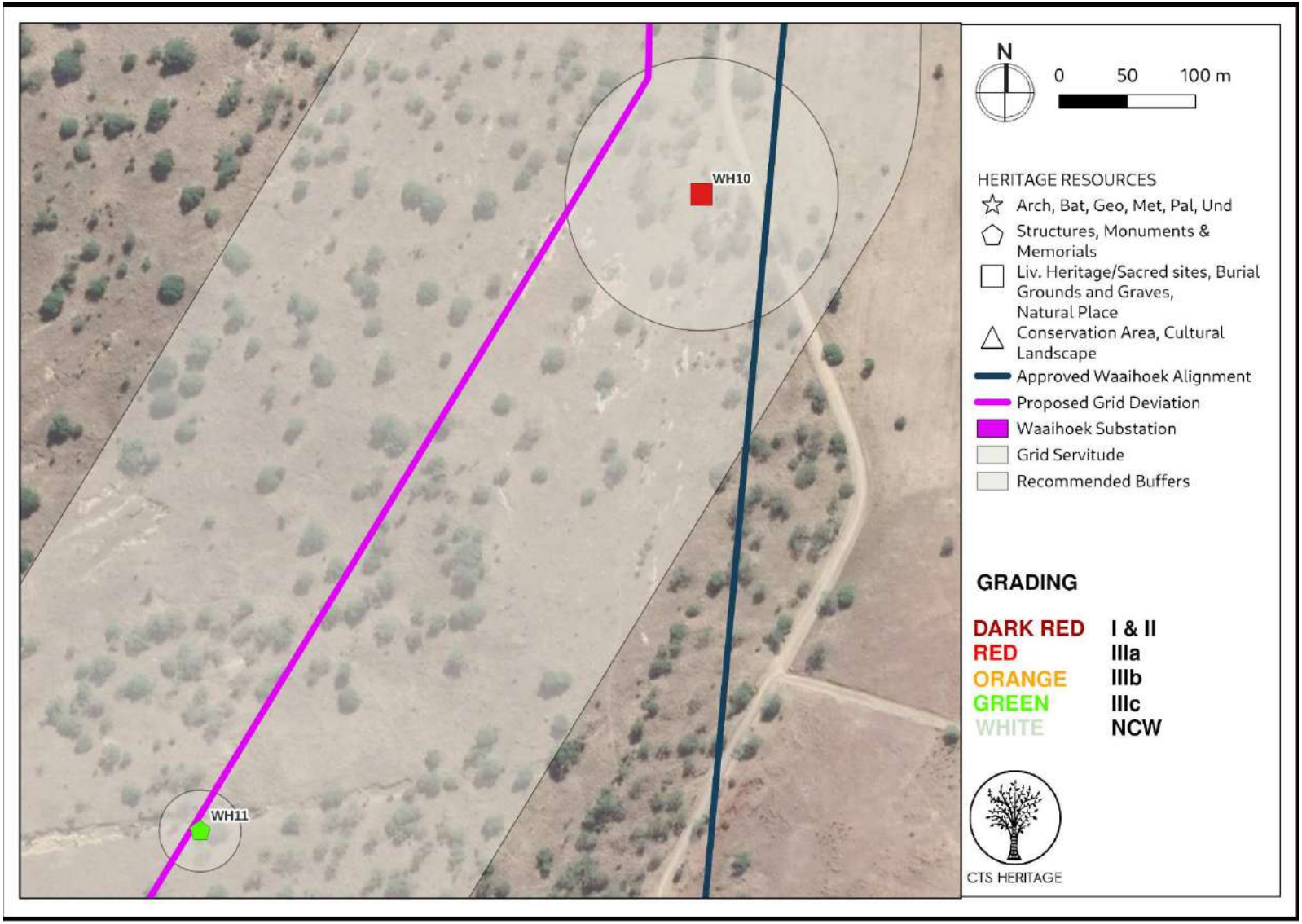

Figure 7.3: Map of recommended mitigation measures as per the recommendations

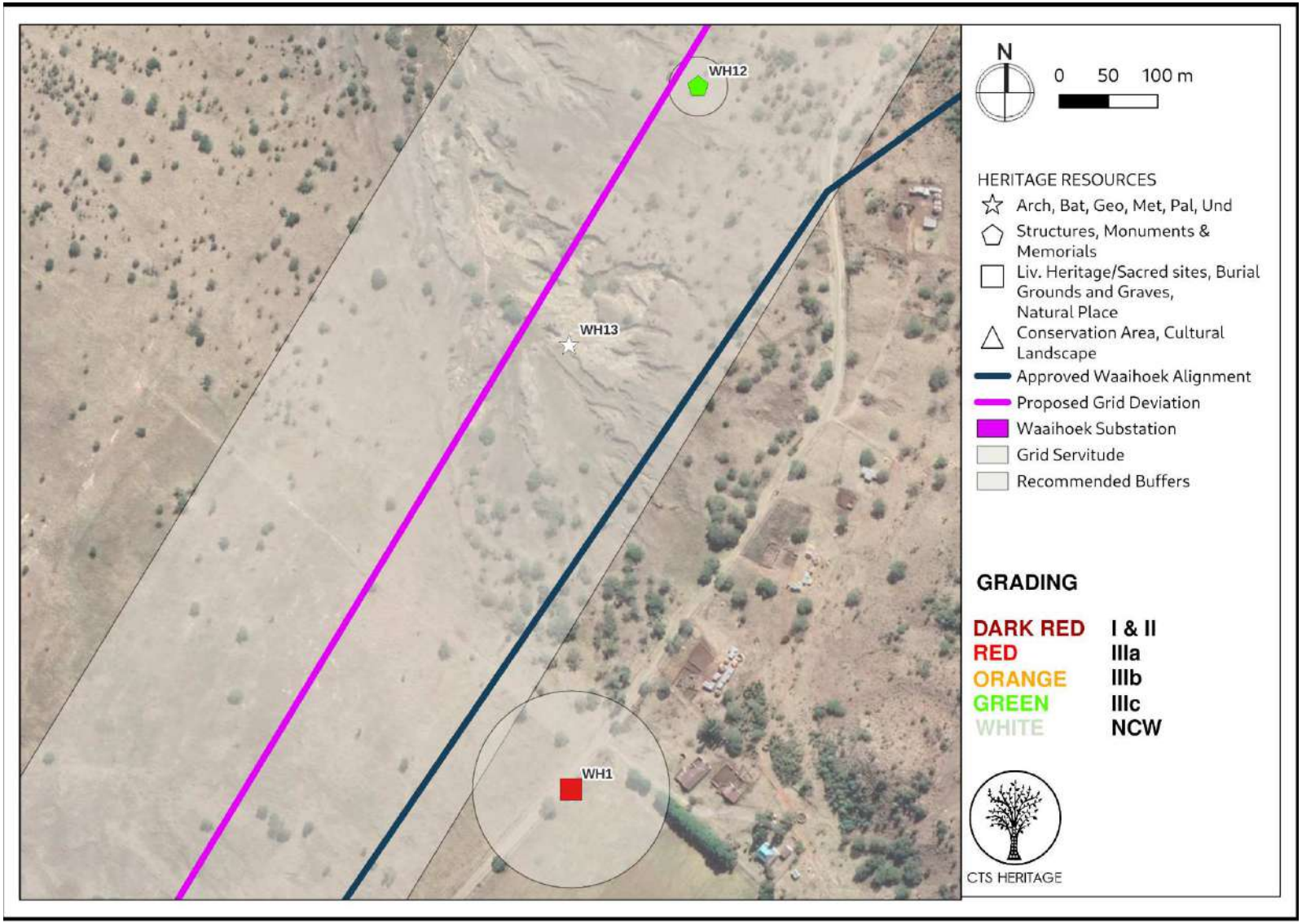

Figure 7.4: Map of recommended mitigation measures as per the recommendations

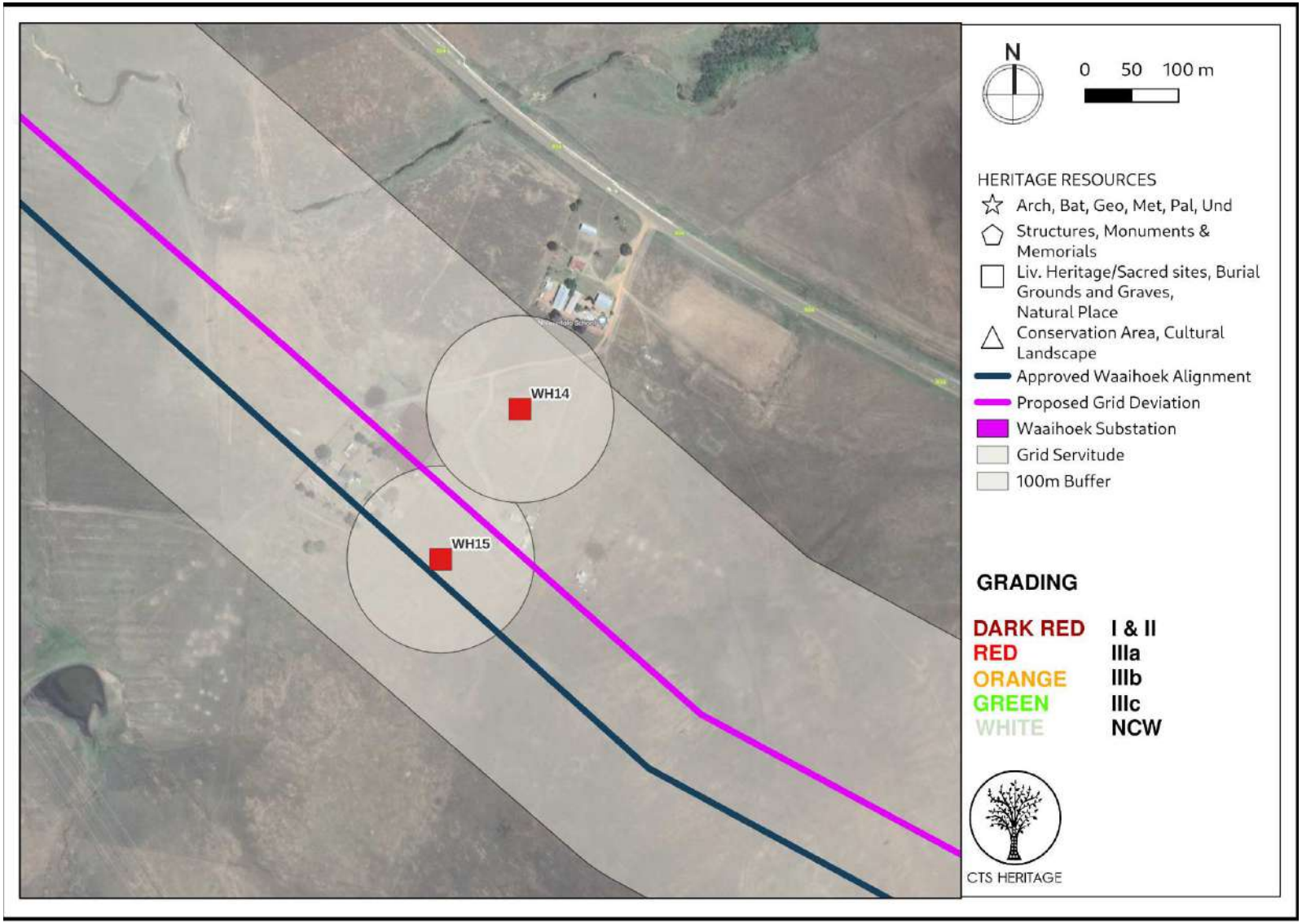

Figure 7.5: Map of recommended mitigation measures as per the recommendations

9. REFERENCES

Heritage Impact Assessments				
Nid	**Report Type**	**Author/s**	**Date**	**Title**
167013	PIA Phase 1	Gideon Groenewald	18/03/2014	PALAEONTOLOGICAL IMPACT ASSESSMENT REPORT Waaihoek Wind Energy Facility (WEF) Utrecht, Kwa-Zulu Natal Province
167017	AIA Phase 1	Gavin Anderson, Louise Anderson	19/05/2014	HERITAGE SURVEY OF THE PROPOSED WAAIHOEK WIND ENERGY FACILITY, UTRECHT, KWAZULU-NATAL
7264	AIA Phase 1	Len van Schalkwyk	10/05/2006	Heritage Impact Assessment for the Majuba-Umfolozi 765 kV Transmission Line, in Mpumalanga and Kwazulu Natal

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APPENDICES

APPENDIX 1: Archaeological Assessment (2022)

ARCHAEOLOGICAL SPECIALIST STUDY

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

PROPOSED DEVIATION TO THE APPROVED WAAIHOEK GRID CONNECTION, UTRECHT, KZN

Prepared by

Dr Darya Presnyakova, Dr William Archer
And Jenna Lavin

In Association with

Nala Environmental Consulting Firm

June 2022

CTS HERITAGE

EXECUTIVE SUMMARY

Waaihoek Wind Farm (Pty) Ltd, is proposing a powerline deviation route from the authorised 88kV powerline for the Waaihoek Wind Energy Facility (WEF). The authorised WEF is located south-east of Utrecht in the Emadlangeni Local Municipality, KwaZulu-Natal Province approximately 25km south west of the town of Vryheid.

Stone Age Remains

The stone artefacts at WH13 are *ex-situ* and occur in a disturbed deflated context. The proposed development is unlikely to affect the scientific potential of the stone artefacts as they do not occur in contexts that can be dated. However, recent archaeological work in KZN has started to focus more on donga systems exposing Pleistocene sediments, so the potential for a dateable *in-situ* archaeological horizon is a possibility if extensive excavations within the donga system will take place. The documented Stone Age archaeology is classified as scientifically LOW-SIGNIFICANCE.

Concerning the Stone Age archaeology, there are no objections to the authorization of the proposed development, *provided that the recommendations outlined are adhered to*, and provided that if any evidence of human remains are exposed during excavation, that development activities cease in the area of the identified remains.

Stone Structures

Several stone structures were identified that had elongated morphologies and human-like sizes (~2m), potentially representing human burials (WH1, WH3, WH4, WH7, WH9, WH10, WH14 and WH15). Other human made stone structures were identified that had less typical morphologies for human graves, and had a more variable range of sizes and orientations (WH2, WH5, WH6, WH8, WH11 and WH12). The latter were recorded due to their proximity to abandoned building remains and other human made structures, and are considered to be potentially sensitive due to their spatial association to historical human occupation and activity, rather than their morphology and orientation alone. In terms of material form, the latter cannot definitively be identified as graves, however, any development in the vicinity of the less typical stone structures should proceed with extreme caution.

A 30m no-go buffer is recommended for around the historic ruins of structures graded IIIC and a 100m no-go buffer is recommended around the burial sites graded IIIA. This 100m buffer is intended to mitigate the risk of disturbance to human burials and to ensure some preservation of context and sense of place associated with burial practices of past people.

Based on the outcomes of this report, it is not anticipated that the proposed development of the grid connection infrastructure will negatively impact on significant archaeological heritage on condition that:

- A no-go 30m buffer must be implemented around sites WH5, WH6, WH8, WH11 and WH12 (graded IIIC) to ensure that no impact takes place (Figure 7.1 to Figure 7.5). The OHL can pass over these structures if necessary.

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- A no-go buffer of 100m must be implemented around the burial sites WH1, WH3, WH4, WH7, WH9, WH10, WH14 and WH15 (graded IIIA) to ensure that no impact takes place and to ensure that the sense of place associated with the burials is maintained (Figures 7.1 to Figure 7.5).
- 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 AMAFA must be alerted immediately to determine an appropriate way forward.

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1. INTRODUCTION

1.1 Background Information on Project

Waaihoek Wind Farm (Pty) Ltd, is proposing a powerline deviation route from the authorised 88kV powerline for the Waaihoek Wind Energy Facility (WEF). The authorised WEF is located south-east of Utrecht in the Emadlangeni Local Municipality, KwaZulu-Natal Province approximately 25km south west of the town of Vryheid.

The developer bid the wind energy facility and associated infrastructure into the Renewable Energy IPP Procurement Programme (REIPPPP) Bid Window 5 for the procurement of up to 1 600MW of onshore wind energy technologies. On the 28th October 2021, the Minister of the Department of Mineral Resources and Energy, Mr Gwede Mantashe, announced the Preferred Bidders of the Fifth Bid Submission of the Renewable Energy Independent Power Producer Procurement Programme, of which Waaihoek Wind Farm (Pty) Ltd has received Preferred Bidder Status. The 25.5km power line infrastructure for the authorised Waaihoek Wind Energy Facility had previously been authorised (DEA Ref:. 14/12/16/3/3/2/654), however following consultation with Eskom and landowners, the powerline routing is proposed to be deviated outside of the previously assessed servitude in order to optimise the routing for associated with the final layout of the Waaihoek Wind Energy Facility. The proponent now proposes a deviation from this authorised route along the entire length of the powerline for approximately 25,4km. The deviation of the grid connection infrastructure is proposed in order to meet the requirements of the Bid Window 5 and meet financial close as the project has been selected as a preferred bidder. A Basic Assessment process will be undertaken to assess the powerline route deviation. It is noted that more than one feasible alternative may become viable following the appointment of the EAP and specialists.

The infrastructure and key components considered as part of this Basic Assessment process includes:

- Deviation of the authorised powerline, the deviation will occur along the length of the authorised route as portions of this new optimised routing falls outside of the previously authorised and assessed 50-70m servitude.
- The length of the powerline will be approximately 25,4km
- Jeep tracks of up to 4m wide and water crossing will be constructed along the powerline route to allow for construction and maintenance activities and will be assessed within a 400m along the length of the powerline route for approximately 25,2km
- A grid corridor of approximately 400m (200m on either side) will be assessed for the length of the powerline route.
- The Eskom portion of the 88kV switching station with a footprint of 60m x 60m within an assessed development footprint of 110m x 110m. The on-site substation has been authorised for the Waaihoek Wind Energy, however it must be noted that should the Environmental Authorisation for this powerline deviation and Eskom switching be granted, it will be ceded over to Eskom during the operation phase of the project.

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1.2 Description of Property and Affected Environment

The footprint of the proposed deviation of the grid connection for the Waaihoek Wind Energy Facility, and associated infrastructure, is located across several private agricultural camps and community owned trust properties, approximately 25 km south-east of the town of Vryheid, in the summer rainfall region of southern Africa, KwaZulu-Natal (KZN, South Africa). Intensive summer rainfall and residual impacts of flooding experienced during the survey had impacts on visibility in portions of the footprint (see Constraints & Limitations).

In the areas less affected by modern agriculture, and that consequently retain natural vegetation, the vegetation comprises grassland and bushveld typical of the southern African Grassland Biome, with Savanna persisting predominantly in the north-western ~6 km section of the grid deviation (east of the R34 road). The archaeological remains are densest in the north-western portion, relating potentially to the abovementioned variation in vegetation in this area, in addition to the relatively minimal impact of modern agricultural activities. In the north-western portion, donga formation was relatively intensive in some places, likely resulting from a combination of historical flooding, overgrazing and climatic factors. The donga formation process has exposed Pleistocene sediments and related archaeology in one locality (WH13). Vegetation coverage was more intense on the edges of several drainage and paleo-drainage channels in the north-west, as well as on the edges of the dongas inhibiting visibility. Additionally, some drainages were completely submerged under recent floodwaters in the footprint west of the R34 regional road.

Sub-volcanic bedrock outcrops in multiple locations in the north-west, but this bedrock was largely not evident in the footprint on the western side of the R34. In the areas where indigenous grassland and savannah is retained, some indigenous faunal species were evident. Observed fauna, or indicative traces, include smaller antelope (such as Duiker and Steenbok), several primates including Vervet monkeys and baboons, indigenous fowl including francolin, guineafowl and several species of waterfowl, as well as evidence of burrowing rodents (hares and meerkats).

The topography of the project area is generally flat west of the R34, with extensive disturbance in the form of active crops, camps with evidence of recent and historical clearing for crop farming and bioturbation in the form of rodent activity, extensive flooding in lower lying areas as well as cattle and other stock rotation farming. The north-western portion, east of the R34, is more mountainous and elevation increases substantially from south-west to north-east across a ~6km transect, with bedrock outcropping more frequently at the higher elevations. The sandy upper sediments west of the R34 have been fluvially deposited across much of the area, with lithic inclusions (~6cm in maximum diameter) evident in recently deposited sediments. Indeed, active high-energy deposition of fluvial sediments was evident in some areas while the survey was underway.

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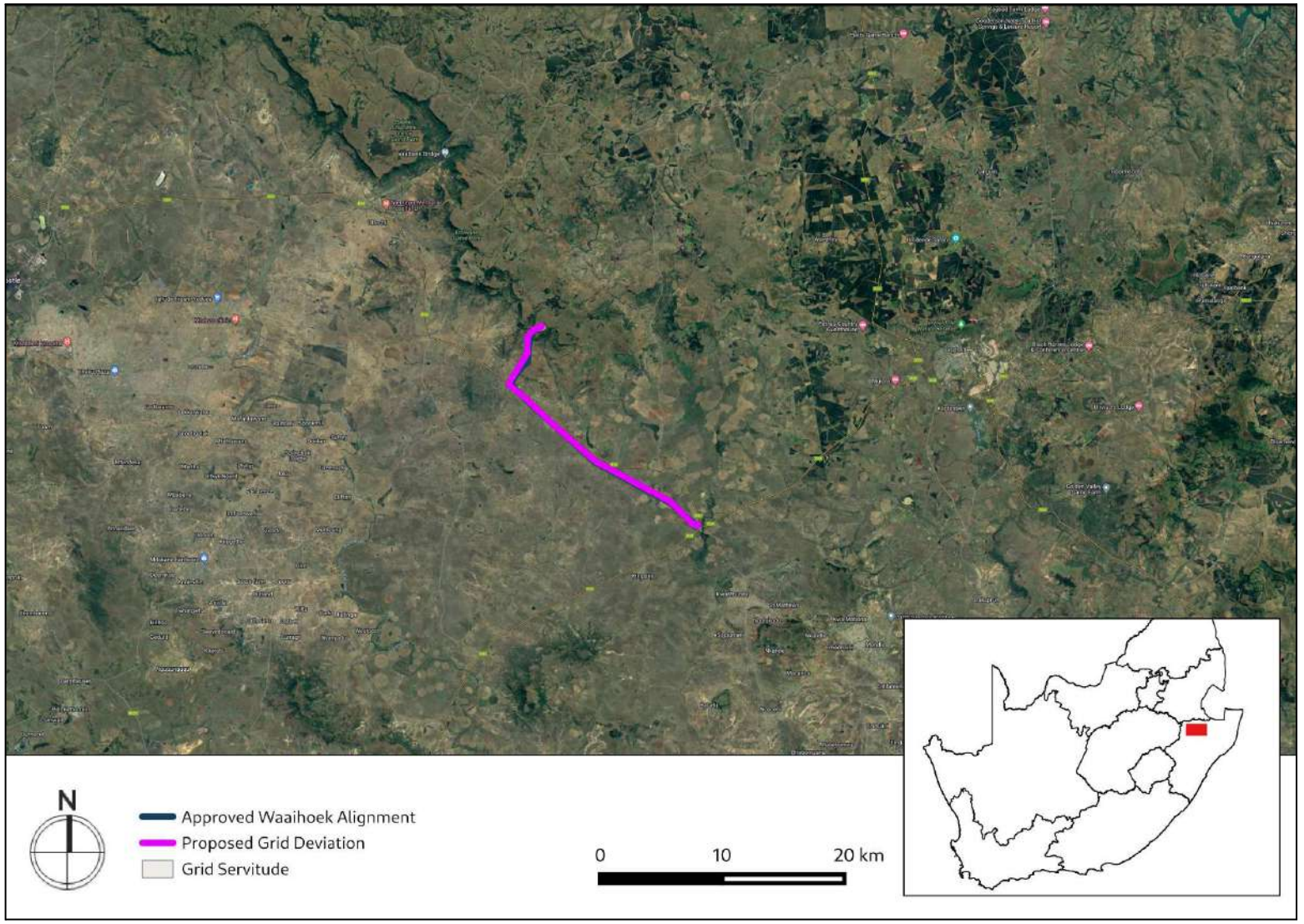

Figure 1.1: Satellite image indicating proposed location of development

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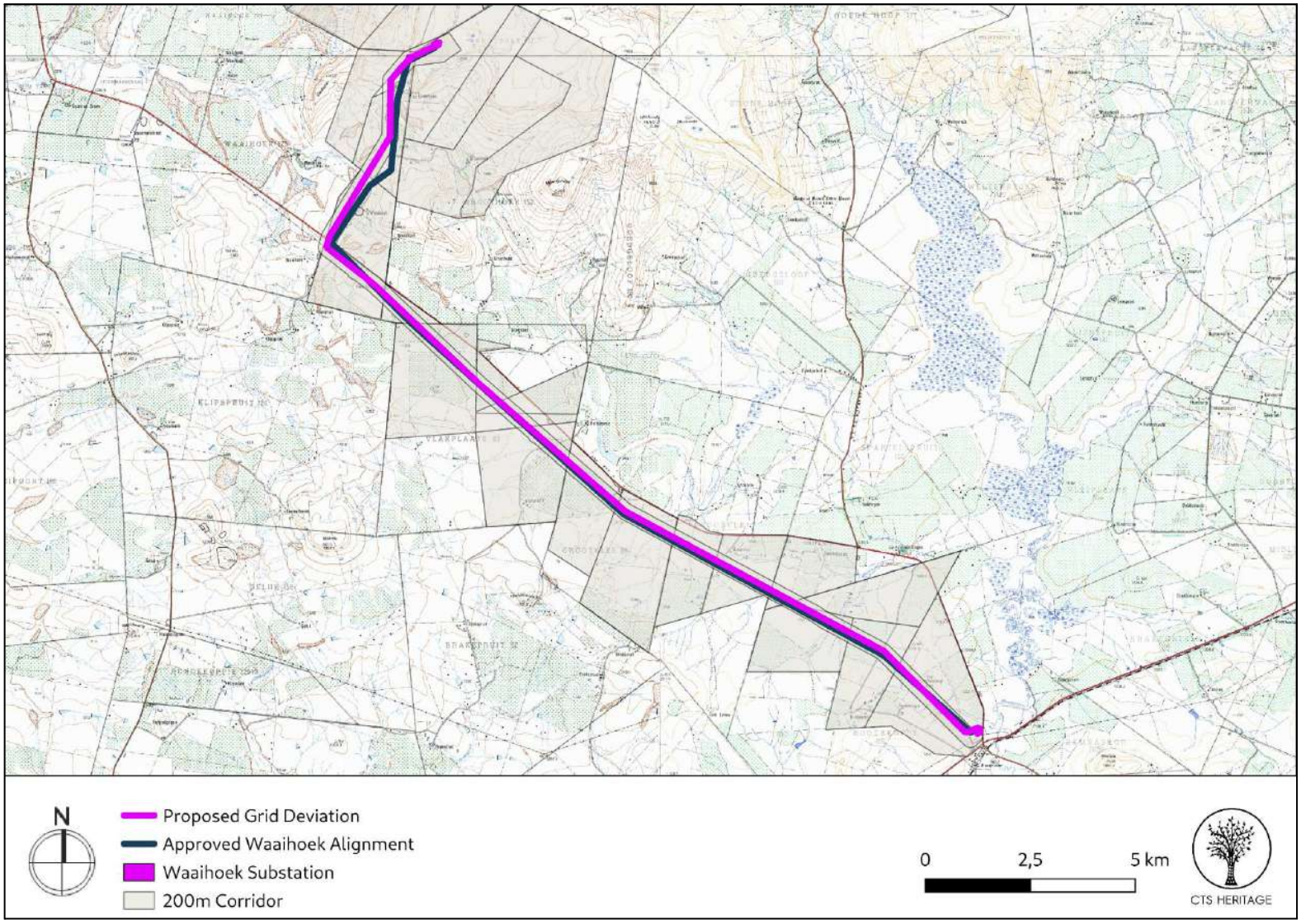

Figure 1.2: Proposed project boundary - Topo Map

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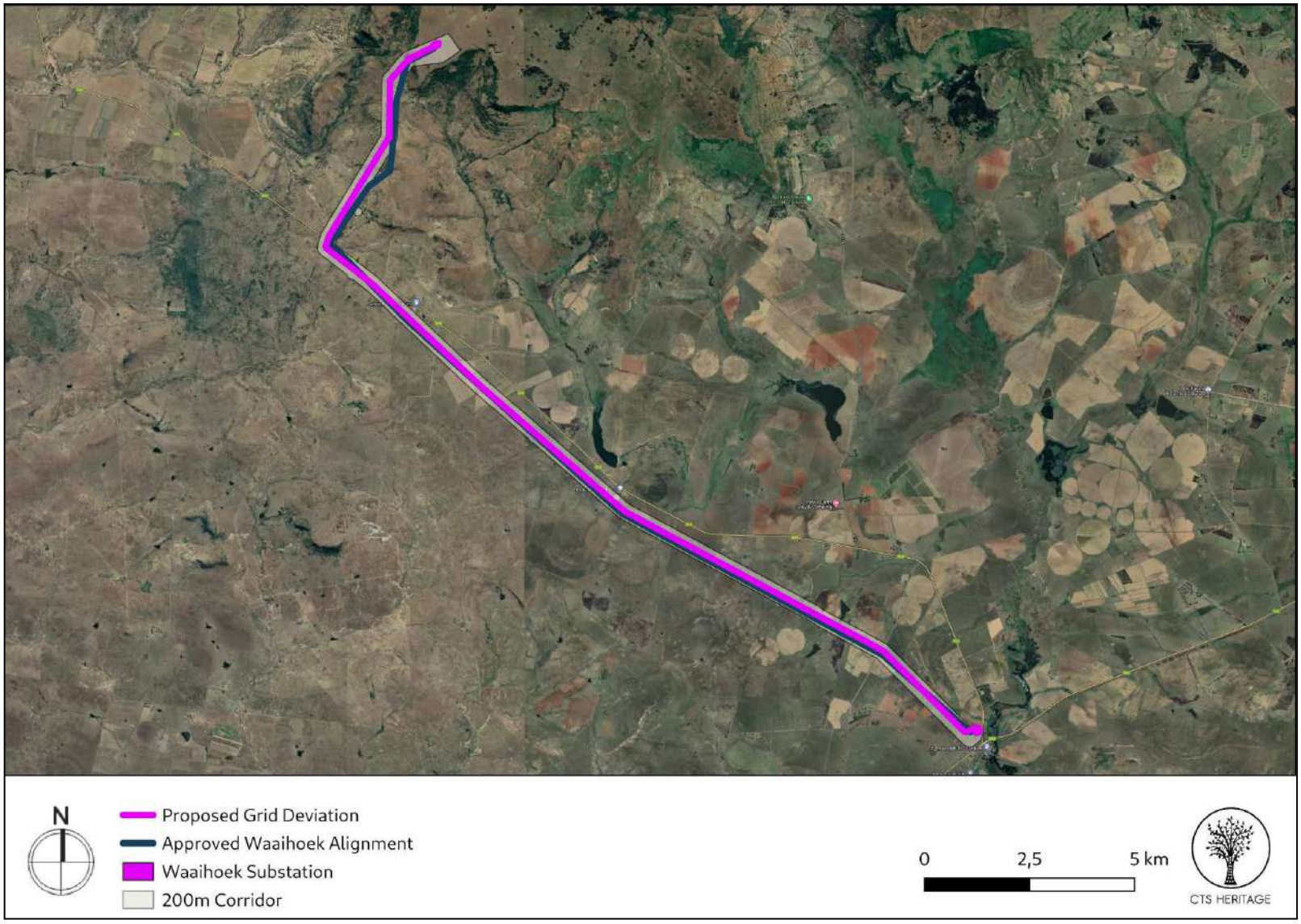

Figure 1.3 Overview Map. Satellite image (2021) indicating the proposed development area

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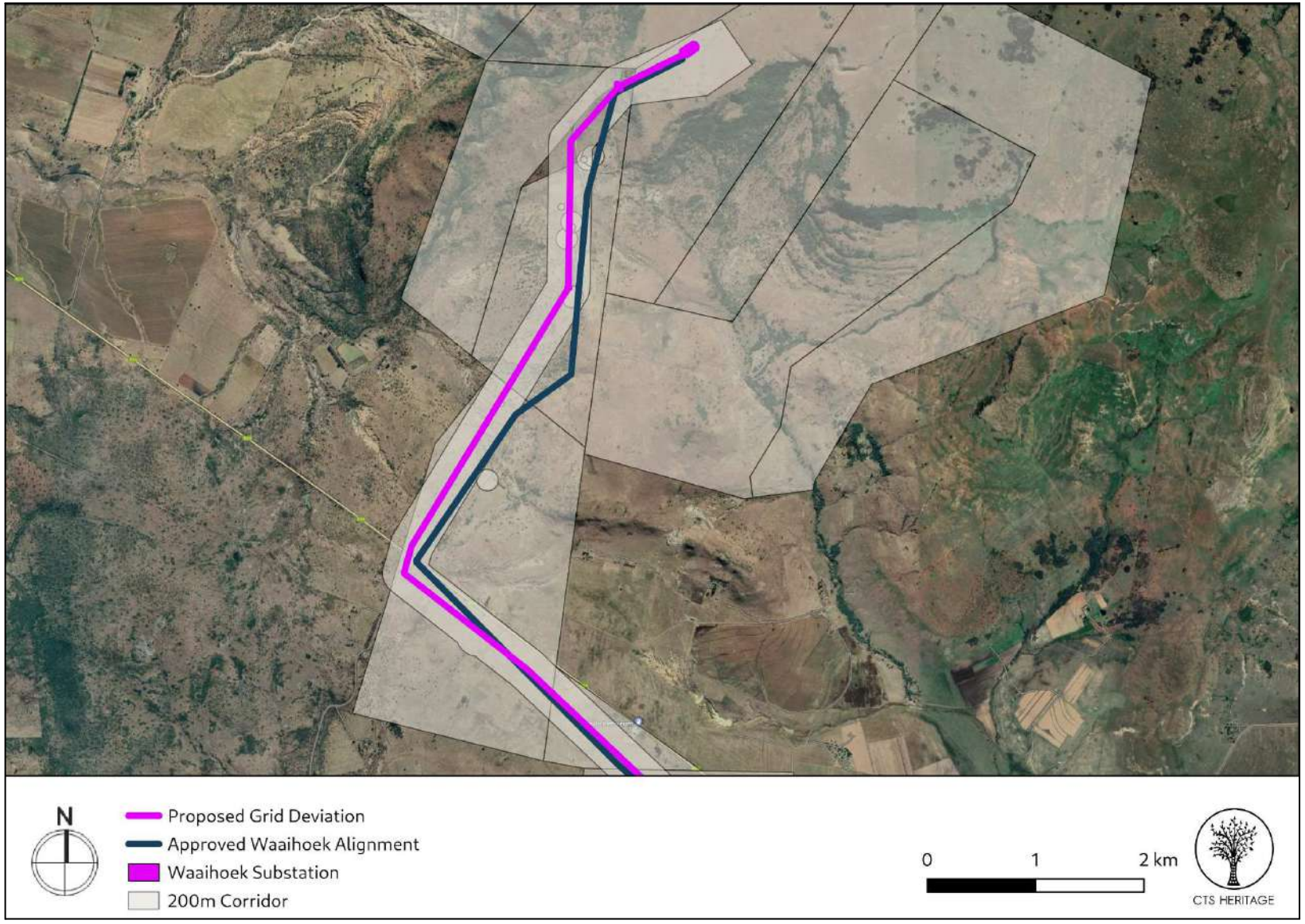

Figure 1.4. Overview Map. Satellite image (2020) indicating the proposed development activities relative to the approved Waaihoek Grid Connection

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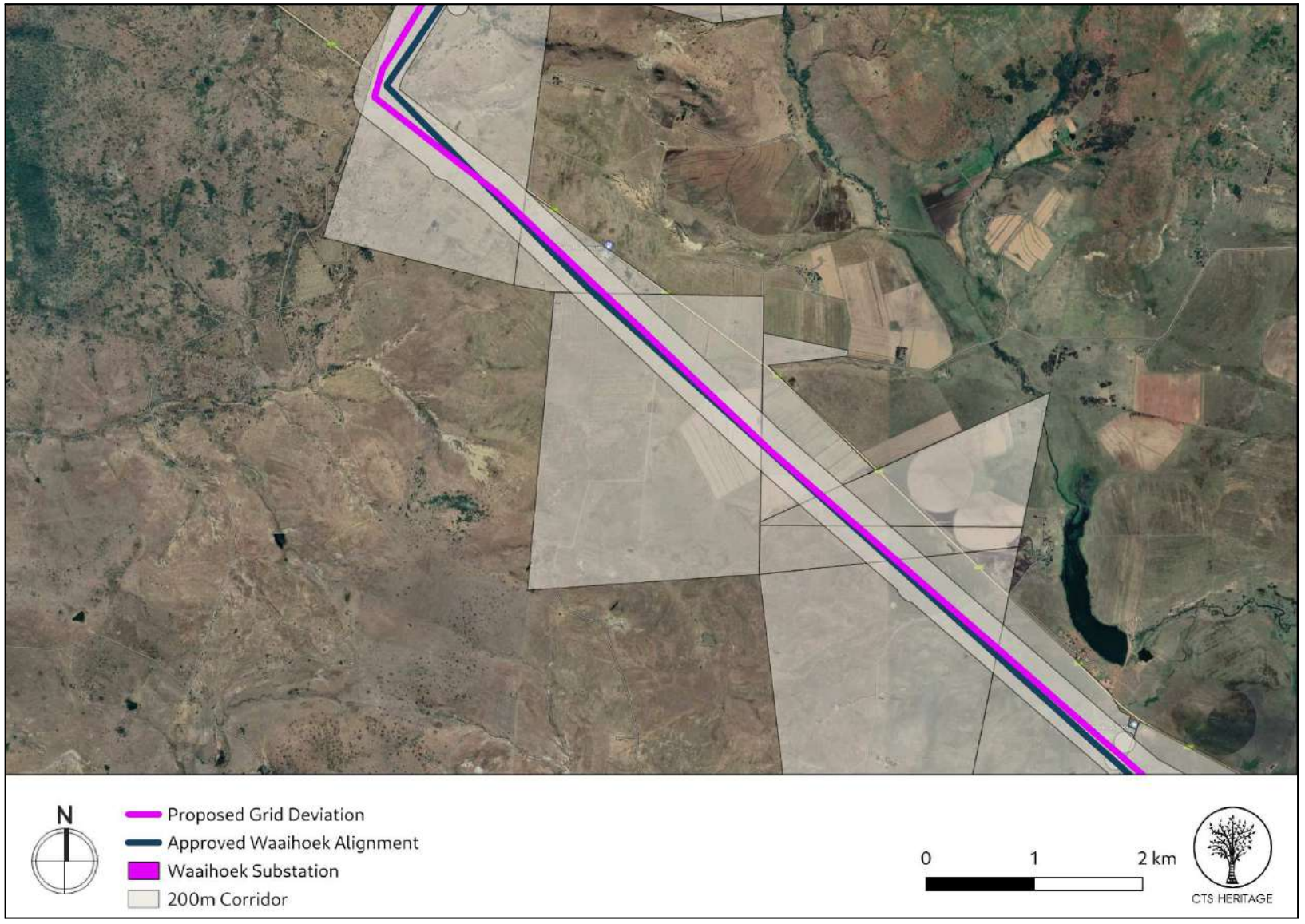

Figure 1.5. Overview Map. Satellite image (2020) indicating the proposed development activities relative to the approved Waaihoek Grid Connection

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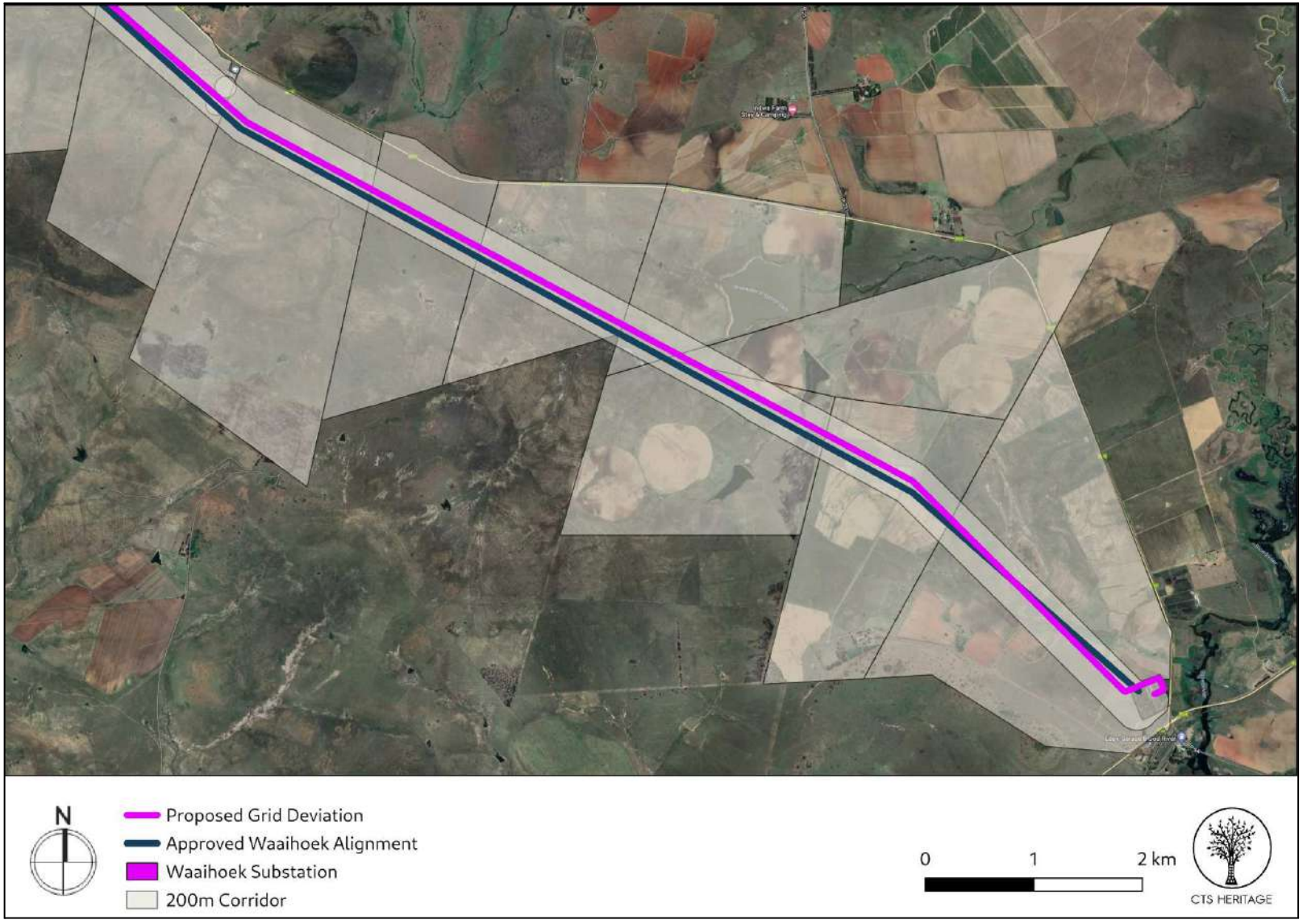

Figure 1.6. Overview Map. Satellite image (2020) indicating the proposed development activities relative to the approved Waaihoek Grid Connection

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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 conducted a survey of the site and its environs from 22 to 24 April 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.

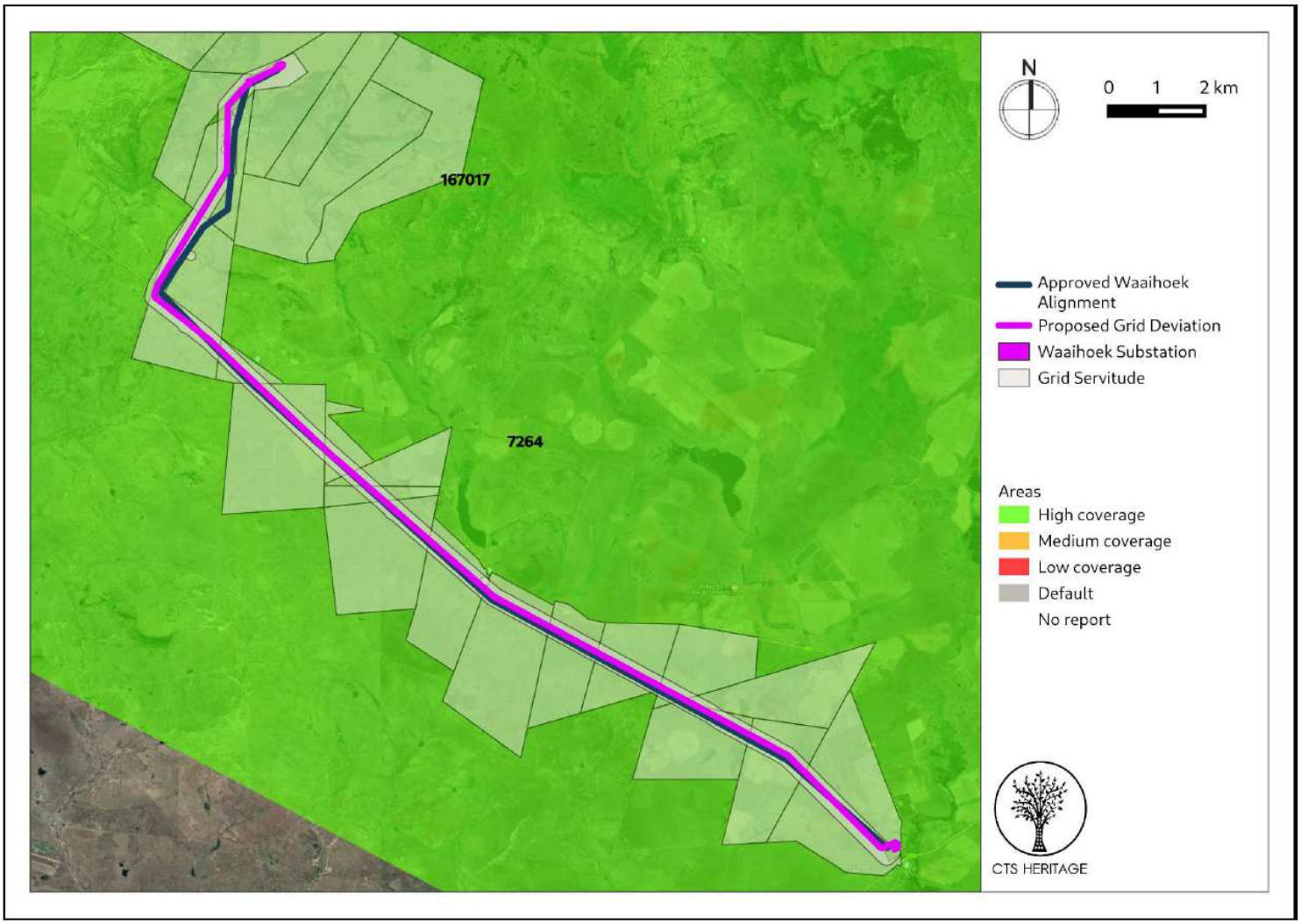

Figure 2: Close up satellite image indicating proposed location of development in relation to heritage studies previously conducted

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2.3 Constraints & Limitations

(1) The survey was conducted on 22-24 April, 2022 at the end of the summer rainfall season, and at a time when KZN has been experiencing active flooding. This is also the time of year when the area has the densest vegetation due to the abundant rainfall. Dense grasses and savanna cover portions of the project area. This coverage significantly inhibited the visibility of surface archaeology in some places (CWH3, CWH4 and CWH12). However, this is not regarded as a substantial problem in relation to the Stone Age archaeological remains, which were exclusively associated with donga formation in the north west region of the footprint. Additionally, even in the few places that had optimal visibility, evidence of archaeology was extremely sparse. Apart from the area that we were prohibited from viewing (6), it is clear that the Stone Age sensitivity and scientific potential of the project area has been comprehensively assessed. However, the inability to assess some of the footprint area at ground surface level due to the abovementioned ecological parameters should be regarded as a constraint to the documentation of potential graves.

(2) The region of KZN experienced catastrophic floods in early 2022 – the survey took place at the end of the rainy season while the effects of flooding in lower lying areas were still evident. This prohibited driving anywhere near the grid deviation, and resulted in some areas being submerged under flood water (CWH 13 and 14).

(3) Previous vegetation clearing activities by farmers may have affected surface archaeology including the possible above-surface presence of material evidence of graves (i.e. the removal of surface stone structures).

(4) Clearly, topsoils are substantially disturbed in and around areas where crops are actively growing or were growing historically (CWH1).

(5) Large herds of cattle (n>100 in some instances) were grazing across substantial portions of the footprint, which potentially resulted in impacts on surface archaeology through trampling.

(6) One relatively small section was not accessible. The archaeologists were actively removed from the property by a landowner who did not consent to the fieldwork going ahead (this is clear from the track paths).

The survey proceeded with several constraints and limitations, yet the project area was comprehensively surveyed for heritage resources apart from a section where a landowner actively removed the archaeologists from the property.

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3. HISTORY AND EVOLUTION OF THE SITE AND CONTEXT

Background:

This application is for the proposed deviation to the approved grid connection infrastructure associated with the Waaihoek Wine Energy Facility. The approved Waaihoek Grid Connection corridor is located approximately 15km southeast of Utrecht in KZN. Utrecht began as a colonial settlement and independent republic formed by the farmers of the Great Trek in 1854 before forming part of the Zuid-Afrikaanse Republiek in 1860. The historic core of Utrecht retains some of its Victorian character. Prior to colonial settlement, this area formed part of the Zulu Kingdom and remains under the domain of Zulu Chiefs.

Archaeology

A comprehensive Heritage Impact Assessment was completed by Anderson and Anderson (2014, SAHRIS NID 167017) for the Waaihoek WEF. This assessment is referred to extensively below. According to Anderson and Anderson (2014), the study area has a rich archaeological and historical record. The known archaeological sites cover the entire Stone Age sequence, the Late Iron Age and the Historical Period. According to Anderson and Anderson (2014), "The history of the area before 1850 ACE has tended to be under exposed. The area has archaeological sites dating to the Late Iron Age from c. 1400 ACE. Prior to the Late Iron Age occupation of the area, there were gatherer-hunters living in the area. There sites were in open areas as well as overhangs. The main evidence for the gather-hunter occupation is in the form of rock paintings and stone tools that occur in the area. The rock paintings are mostly poorly preserved and of little significance. Some of the stone tools noted during the survey may date back to the Middle Stone Age, with a maximum age of 250 000 years ago". The general area is also associated with the Voortrekkers, the Anglo-Zulu War and the Anglo-Boer War. Anderson and Anderson (2014) include a detailed extract of this history from Jones (2005) in their report and as such, it is not repeated here. Anderson and Anderson (2014) identified a number of heritage resources in their assessment for the Waaihoek WEF that are located in the vicinity of the proposed OHL deviation. These include battle sites including the Battle of Blood River and the Battle of Scheepers Nek as well as evidence of stone walling and burial sites. In the field assessment completed for the Waaihoek WEF, Anderson and Anderson (2014) noted that "there are very few settlements, or the remains thereof, on the upper plateau. This would be the southern part of the affected area (near to the proposed OHL deviation). These areas are rockier, have less sand and are more exposed to lightning strikes. When features do occur in these areas, they are either as stone walls or cattle kraals." All of the known heritage resources identified by Anderson and Anderson (2014) have been mapped in Figure 3 and none of these resources will be negatively impacted by the proposed OHL deviation. However, the proposed OHL deviation alignment corridor was not assessed by Anderson and Anderson (2014) and as such, it is likely that, in an area that has this high level of archaeological significance, the proposed deviation may impact on significant archaeology.

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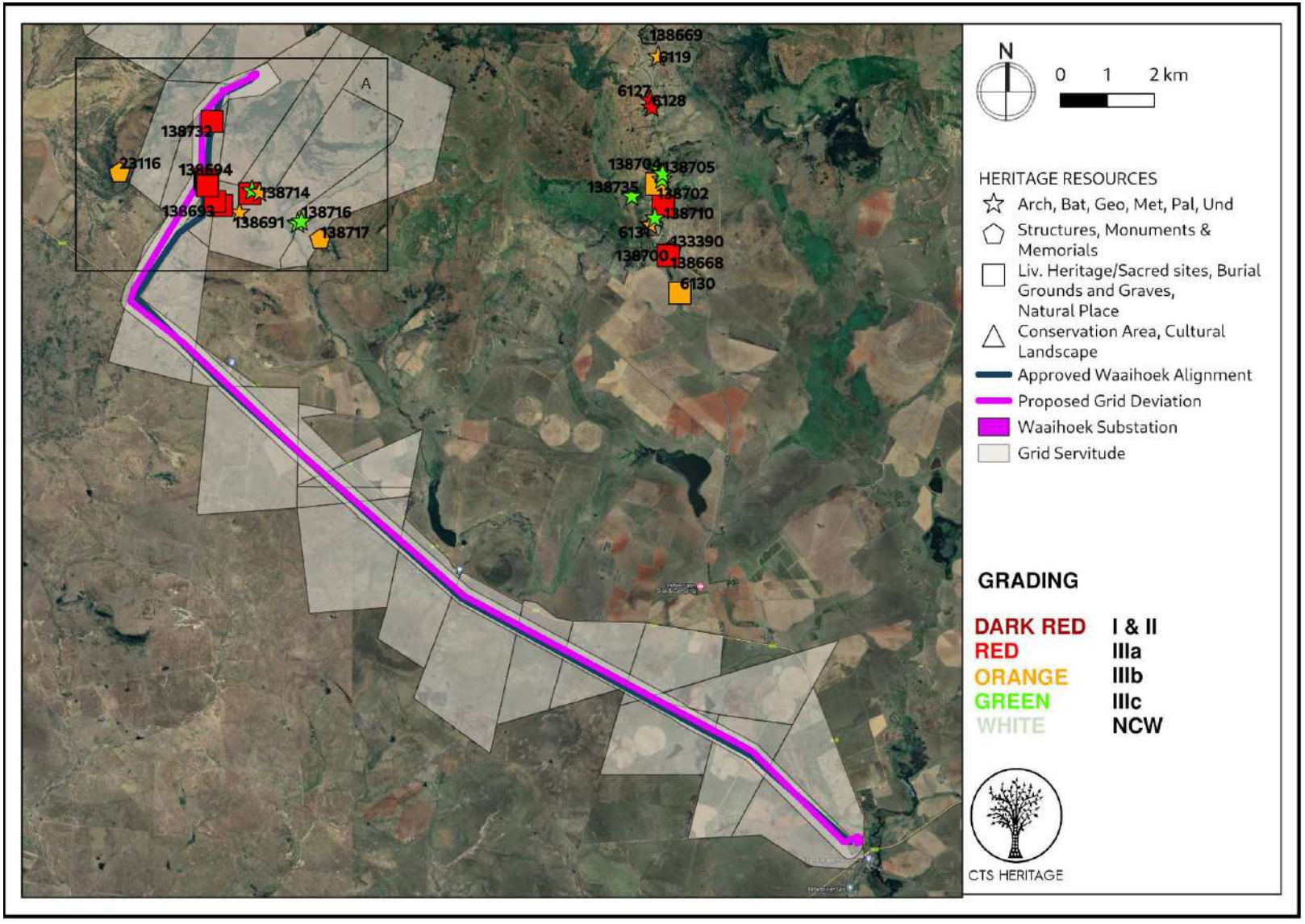

Figure 3. Heritage Resources Map. Heritage Resources previously identified in and near the study area, with SAHRIS Site IDs indicated

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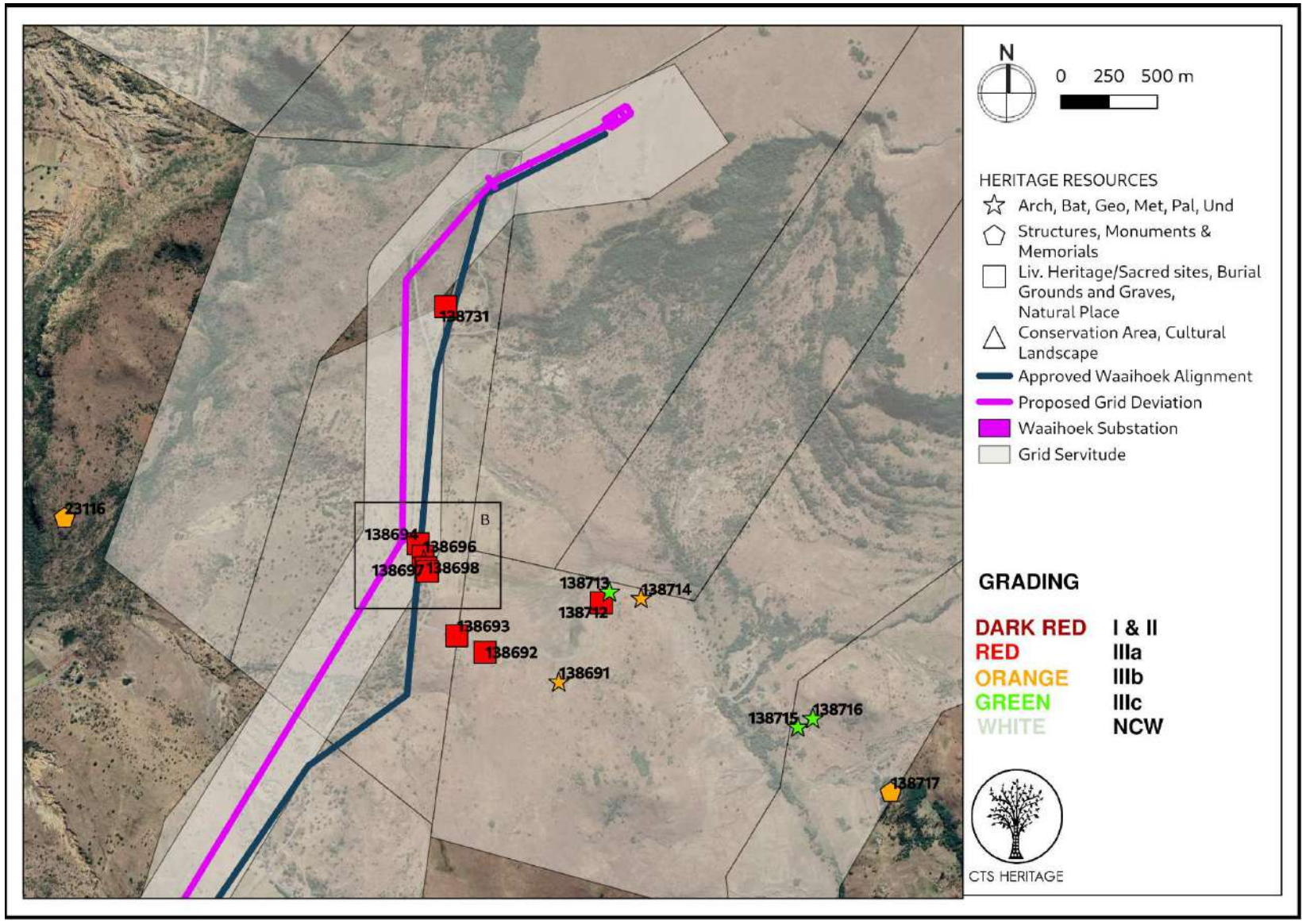

Figure 3.1. Heritage Resources Map Inset A

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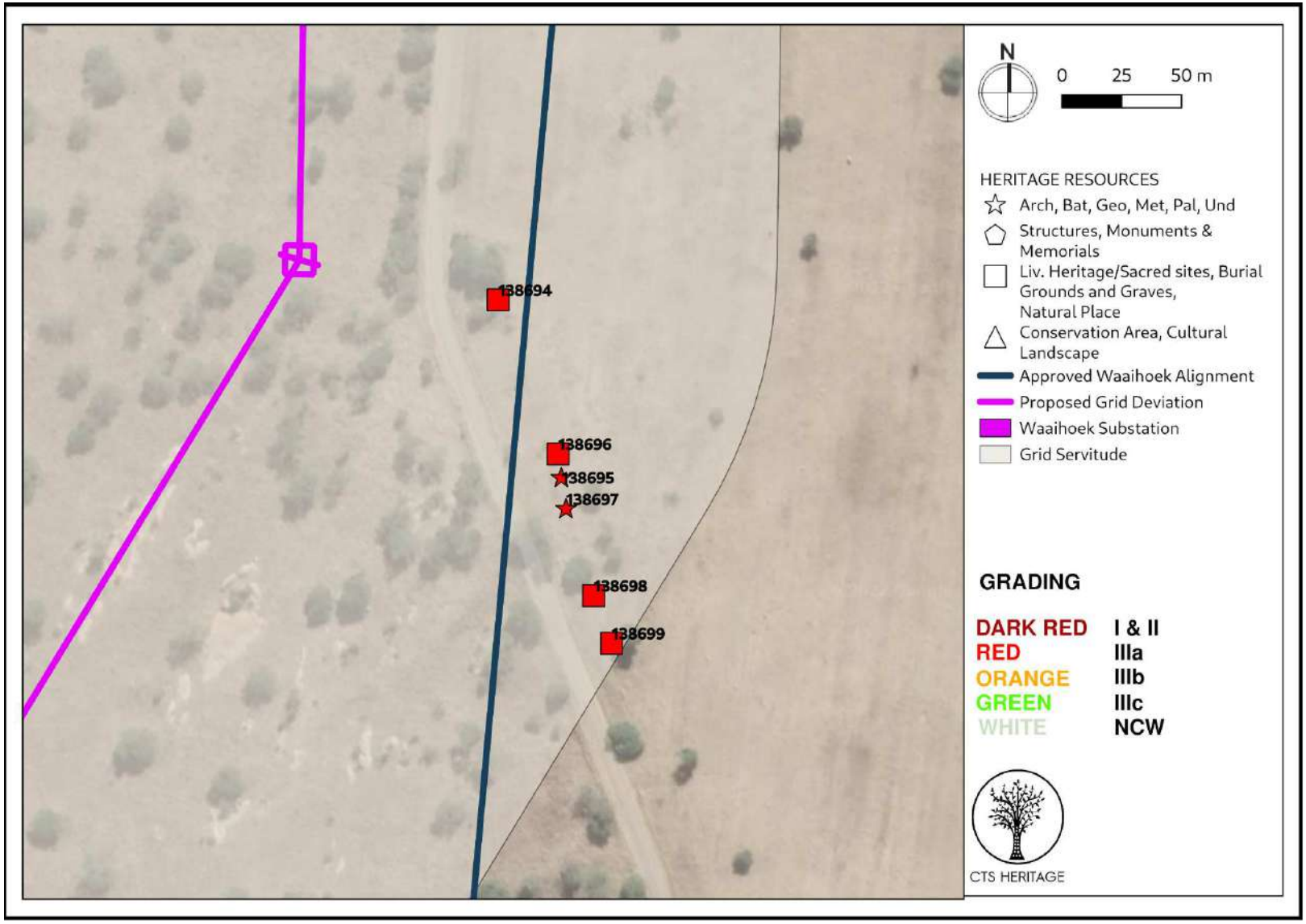

Figure 3.2. Heritage Resources Map Inset B

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4. IDENTIFICATION OF HERITAGE RESOURCES

4.1 Field Assessment

The survey was conducted on foot, and sought to assess the presence and significance of archaeological occurrences within the project area. Field assessment documented a sparse number of isolated stone artefacts in secondary contexts in a donga system, suggesting the area may have been traversed by Stone Age groups potentially through periods in both the Middle Stone Age (MSA – ~300ka:~40ka) and the Later Stone Age (LSA: ~40ka: ~2ka), although only one flake with a faceted platform could be linked unequivocally to a time period (the MSA). The presence of small nodules of artefact-quality sub-volcanic rock in the project area as well as relatively abundant standing water, were likely the resources that attracted groups there, and resulted in them leaving behavioural traces in the form of stone artefacts in the Pleistocene (FIGURE 7.9).

Despite the apparent availability of artefact quality sub-volcanic rock in some localities, evidence of archaeology west of the R34 was extremely sparse. Some ephemeral Stone Age material remains in the form of flakes with faceted platforms (indicating Middle Stone Age lithic production) was identified in dongas east of the R34. The archaeological remains that need to be avoided are predominantly east of the R34 (with a small number of historical stone structures associated with modern dwellings west of the R34) (see table of waypoints below). Several identified stone structures have elongated morphologies indicative of human burials. These need to be entirely avoided (see sensitivity ranking and recommendation).

The intensive current and historical use of substantial portions of the landscape, and remnants of recently abandoned structures on some of the properties in combination with the presence of previously identified graves near the footprint, tie in with current observations of graves and isolated burials (WH1, WH3, WH4, WH7, WH9, WH10, WH14 and WH15) and more amorphous stone structures (WH2, WH5, WH6, WH8, WH11 and WH12) within or near the footprint. Importantly, there would not be evidence of graves within the extensively ploughed areas that comprise the majority of the footprint. However, the dense grass cover and extensively flooded lower lying areas were pertinent constraints to documenting archaeology where these constraints occur. Extensive grass cover and flooded drainages made potential grave locations impossible to exhaustively assess across the project area (particularly in cases where above surface material indicators may have been removed through crop related activities, through trampling related to stock farming or through recent flooding that has affected substantial portions of the KZN region). The contextual images below are ordered from north to south along the alignment.

Figure 4.1: Contextual image taken at the northern-most end of the grid alignment

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Figure 4.2: An example of some of the dense vegetation encountered

Figure 4.3: An example of some of the dense vegetation encountered

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Figure 4.4: Contextual Images of grid corridor

Figure 4.5: Contextual Images indicating existing infrastructure within the grid corridor

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Figure 4.6: Contextual Images of grid corridor

Figure 4.7: Existing grid infrastructure within the 200m grid corridor

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Figure 4.8: Southernmost end of grid corridor

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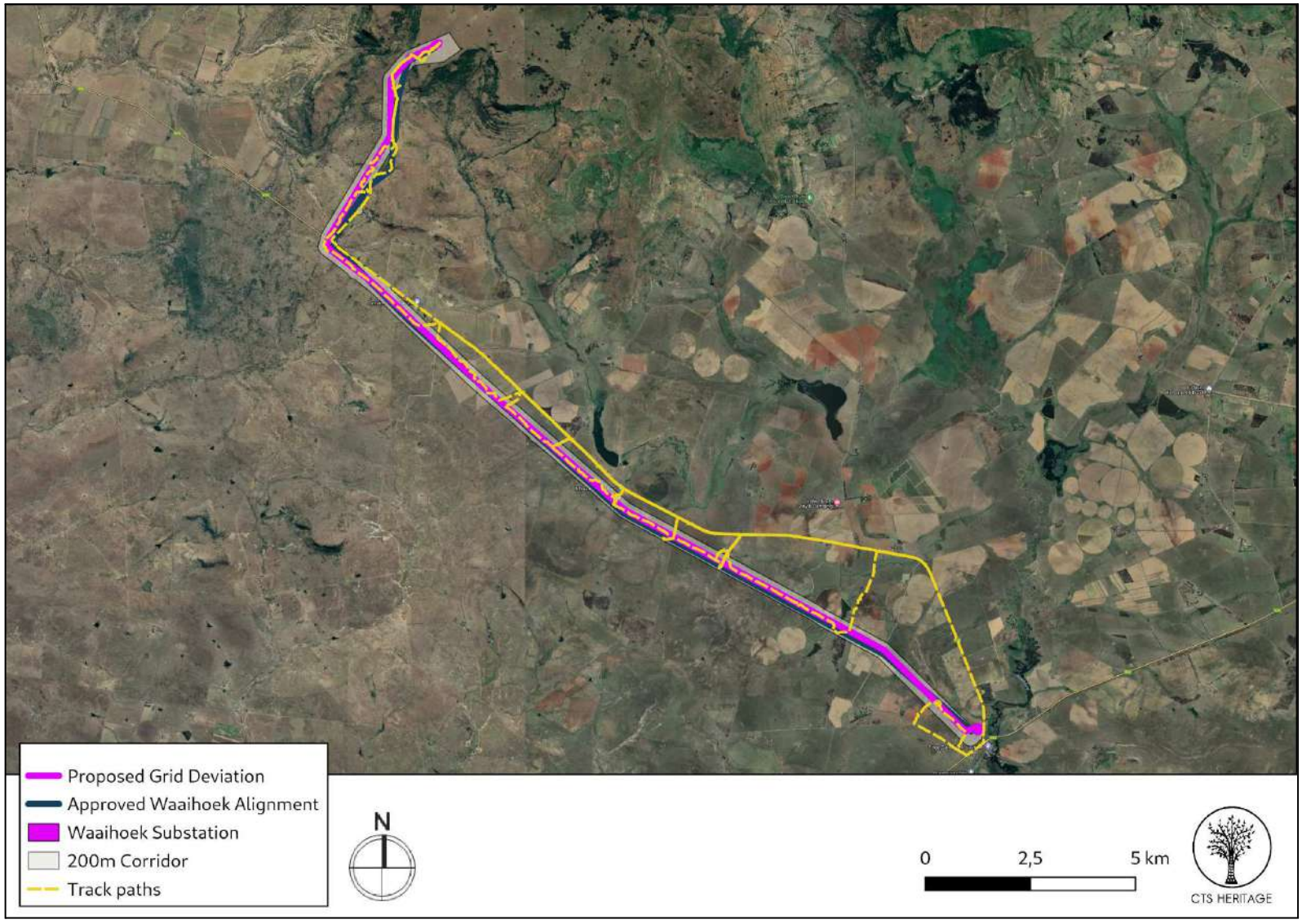

Figure 5.: Trackpaths indicating the path walked by the specialist

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4.2 Archaeological Resources identified

Table 1: Observations noted during the field assessment

POINT ID	Site Name	Period	Description	Co-ordinates		Grading	Mitigation
WH1	Waaihoek 1	Historical	Historical grave	27.78366	30.42686	IIIA	Avoid. No impact anticipated.
WH2	Waaihoek 2	Modern	Possible stone structure (recent)	27.74892	30.4446	NCW	NA
WH3	Waaihoek 3	Historical	Three historical graves	27.75679	30.43677	IIIA	100m Buffer
WH4	Waaihoek 4	Historical	Historical grave	27.75709	30.43626	IIIA	100m Buffer
WH5	Waaihoek 5	Historical	Historical stone hut base	27.75709	30.43589	IIIC	30m Buffer
WH6	Waaihoek 6	Historical	Historical kraal	27.76102	30.4338	IIIC	30m Buffer
WH7	Waaihoek 7	Historical	Historical grave	27.76226	30.43475	IIIA	100m Buffer
WH8	Waaihoek 8	Historical	Historical stone walling (right angle evident)	27.7627	30.43481	IIIC	30m Buffer
WH9	Waaihoek 9	Historical	Historical grave	27.76365	30.43429	IIIA	100m Buffer
WH10	Waaihoek 10	Historical	Possible grave	27.76847	30.43484	IIIA	100m Buffer
WH11	Waaihoek 11	Historical	Historical structure	27.77266	30.43111	IIIC	30m Buffer
WH12	Waaihoek 12	Historical	Possible historical structure	27.77725	30.42817	IIIC	30m Buffer
WH13	Waaihoek 13	MSA	Middle Stone Age artefacts in a donga	27.77961	30.42684	NCW	NA
WH14	Waaihoek 14	Historical	Multiple human graves	27.84483	30.48937	IIIA	100m Buffer
WH15	Waaihoek 15	Historical	Multiple graves and associated structures	27.84627	30.48851	IIIA	100m Buffer

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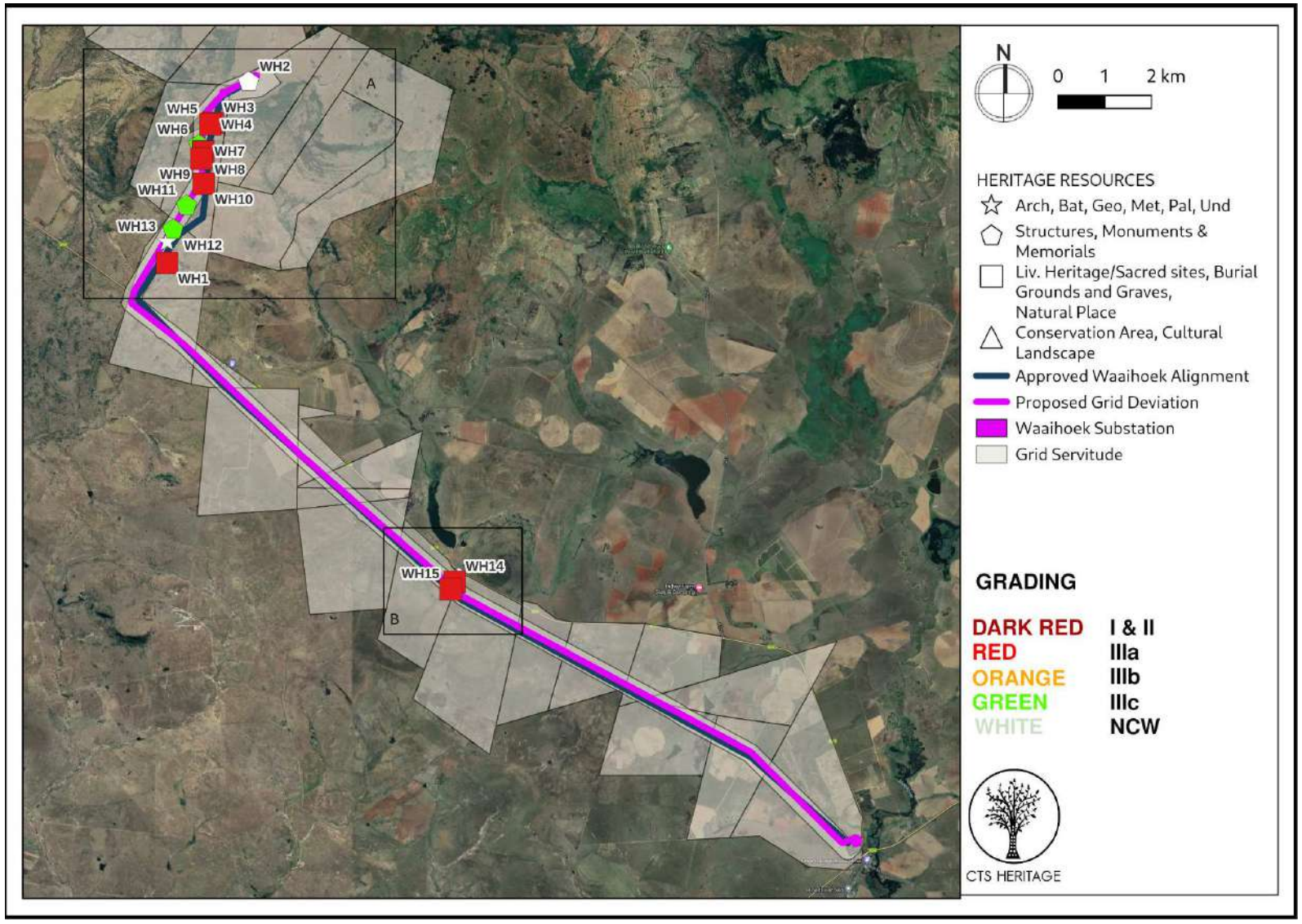

Figure 6: Map of heritage resources identified during the field assessment relative to the proposed development footprint

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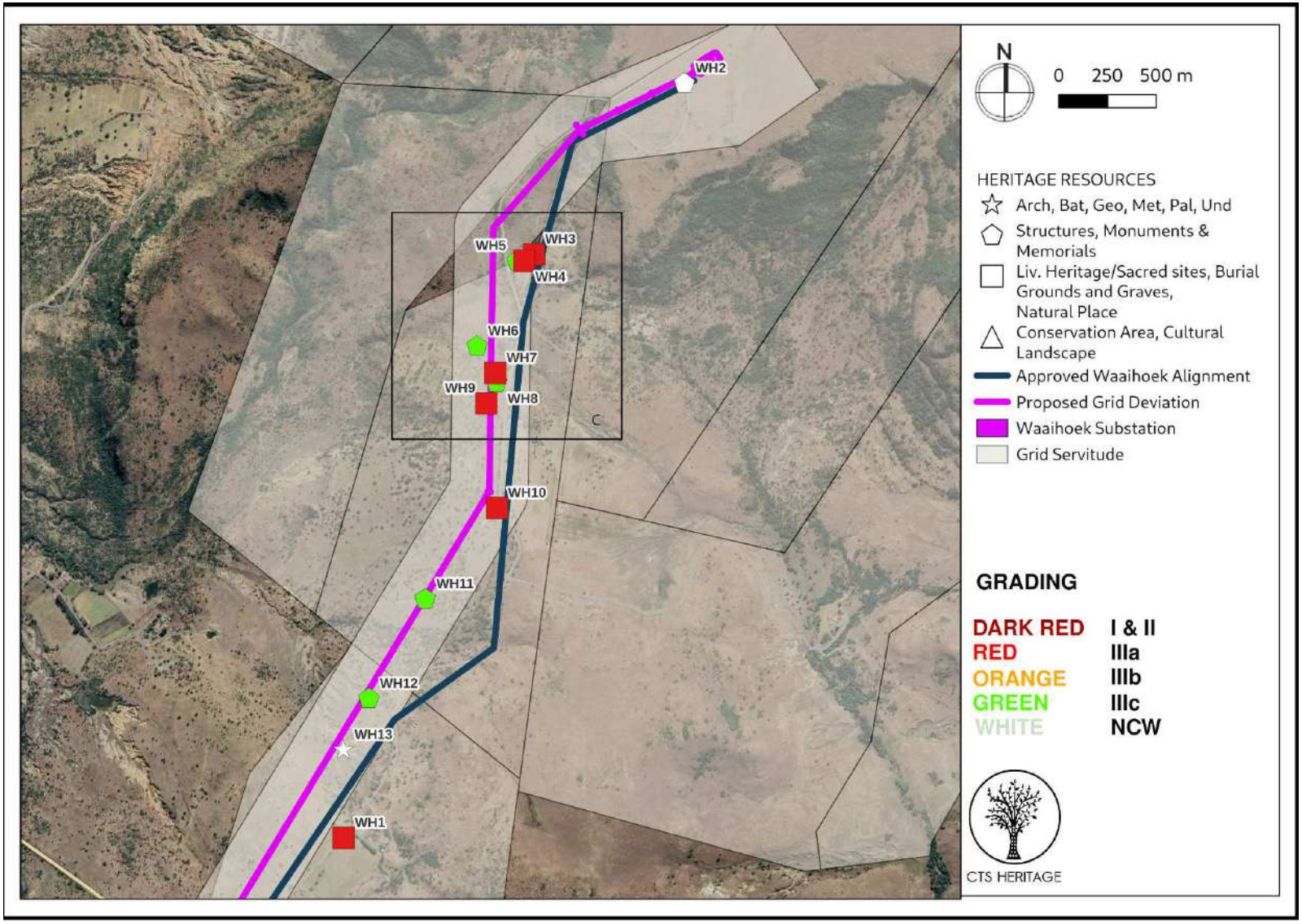

Figure 6.1: Map of heritage resources identified during the field assessment relative to the proposed development footprint - Inset A

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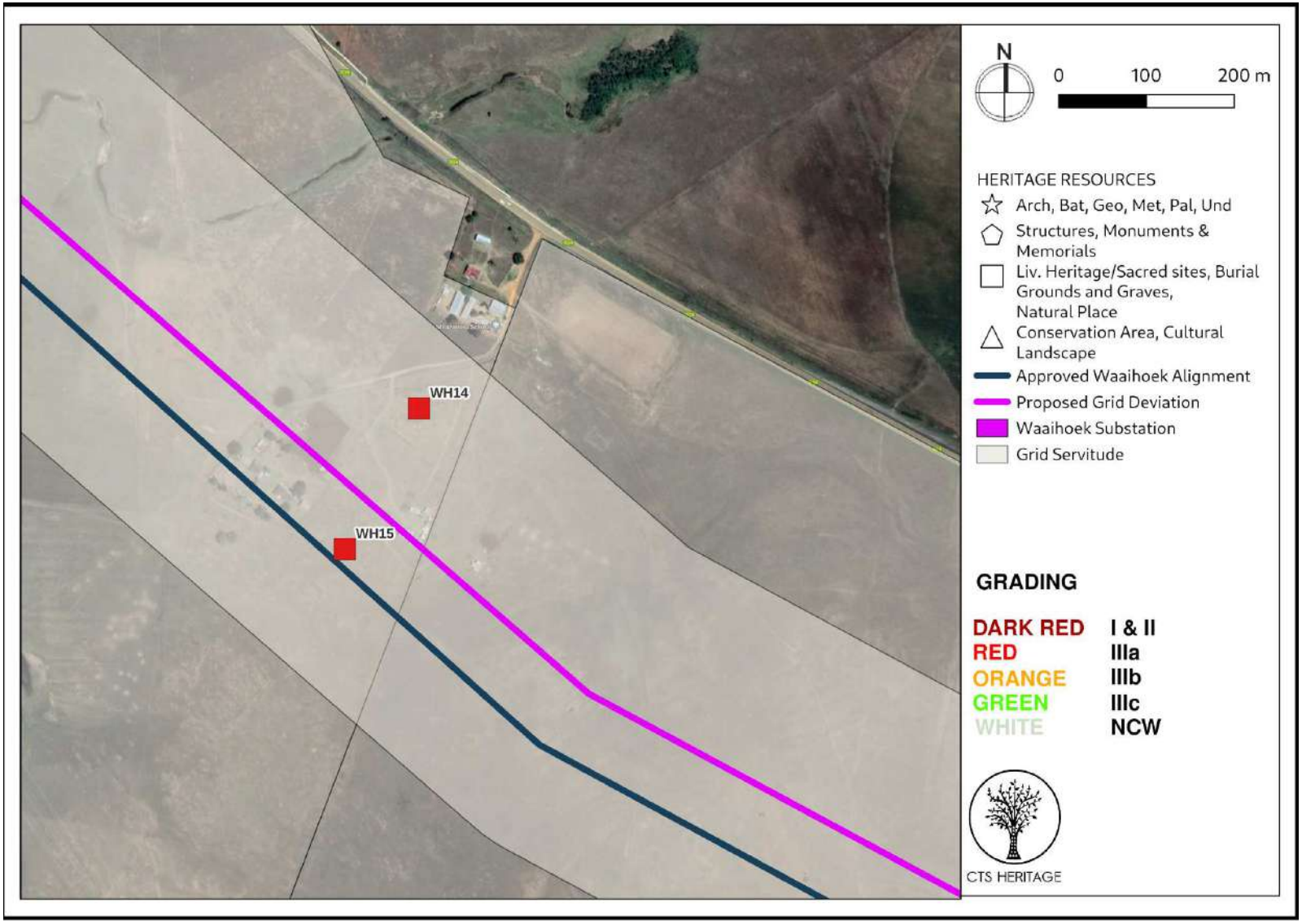

Figure 6.2: Map of heritage resources identified during the field assessment relative to the proposed development footprint - Inset B

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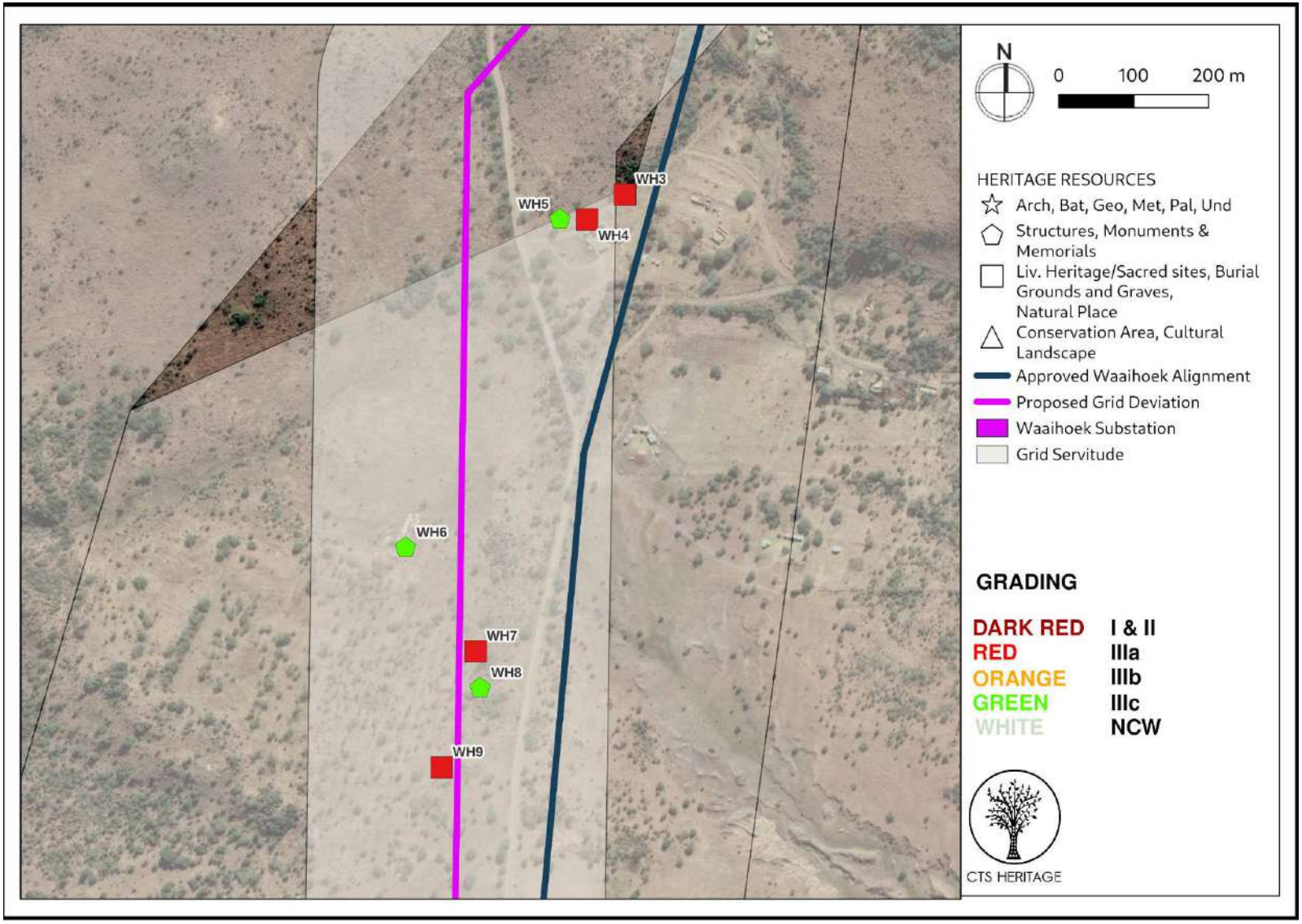

Figure 6.3: Map of heritage resources identified during the field assessment relative to the proposed development footprint - Inset C

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4.3 Selected photographic record

(a full photographic record is available upon request)

Figure 7.1: Observation WH1

Figure 7.2: Observation WH2

Figure 7.3: Observation WH3

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Figure 7.4: Observation WH4

Figure 7.5 Observation WH5

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Figure 7.6 Observation WH6

Figure 7.7 Observation WH7

Figure 7.8 Observation WH8

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Figure 7.9: Observation WH8

Figure 7.9: Observation WH9

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Figure 7.9: Observation WH10

Figure 7.9: Observation WH11

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Figure 7.9: Observation WH12

Figure 7.9: Observation WH13

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Figure 7.9: Observation WH14

Figure 7.9: Observation WH15

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5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

5.1 Assessment of impact to Archaeological Resources

Stone Age Remains

The stone artefacts at WH13 are *ex-situ* and occur in a disturbed deflated context. The proposed development is unlikely to affect the scientific potential of the stone artefacts as they do not occur in contexts that can be dated. However, recent archaeological work in KZN has started to focus more on donga systems exposing Pleistocene sediments, so the potential for a dateable *in-situ* archaeological horizon is a possibility if extensive excavations within the donga system will take place. The documented Stone Age archaeology is classified as scientifically LOW-SIGNIFICANCE.

Concerning the Stone Age archaeology, there are no objections to the authorization of the proposed development, *provided that the recommendations outlined are adhered to*, and provided that if any evidence of human remains are exposed during excavation, that development activities cease in the area of the identified remains.

Stone Structures

Several stone structures were identified that had elongated morphologies and human-like sizes (~2m), potentially representing human burials (WH1, WH3, WH4, WH7, WH9, WH10, WH14 and WH15). Other human made stone structures were identified that had less typical morphologies for human graves, and had a more variable range of sizes and orientations (WH2, WH5, WH6, WH8, WH11 and WH12). The latter were recorded due to their proximity to abandoned building remains and other human made structures, and are considered to be potentially sensitive due to their spatial association to historical human occupation and activity, rather than their morphology and orientation alone. In terms of material form, the latter cannot definitively be identified as graves, however, any development in the vicinity of the less typical stone structures should proceed with extreme caution.

A 30m no-go buffer is recommended for around the historic ruins of structures graded IIIC and a 100m no-go buffer is recommended around the burial sites graded IIIA. This 100m buffer is intended to mitigate the risk of disturbance to human burials and to ensure some preservation of context and sense of place associated with burial practices of past people.

6. CONCLUSION AND RECOMMENDATIONS

Based on this field assessment and on the findings of previous assessments in the area, it is not anticipated that the proposed OHL development will negatively impact on significant archaeological heritage on condition that the recommendations articulated below are implemented.

A small portion of the proposed grid connection was not assessed due to a hostile landowner (Figure 5) and as such, it is not possible to comment on the archaeological sensitivity of this section of the grid alignment. Should any stone structures be present within this unassessed area that are similar to the structures and burials described above, the appropriate recommendations articulated below are applicable.

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Recommendations

Based on the outcomes of this report, it is not anticipated that the proposed development of the grid connection infrastructure will negatively impact on significant archaeological heritage on condition that:

- A no-go 30m buffer must be implemented around sites WH5, WH6, WH8, WH11 and WH12 (graded IIIC) to ensure that no impact takes place (Figure 7.1 to Figure 7.5). The OHL can pass over these structures if necessary.
- A no-go buffer of 100m must be implemented around the burial sites WH1, WH3, WH4, WH7, WH9, WH10, WH14 and WH15 (graded IIIA) to ensure that no impact takes place and to ensure that the sense of place associated with the burials is maintained (Figures 7.1 to Figure 7.5).
- 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 AMAFA must be alerted immediately to determine an appropriate way forward.

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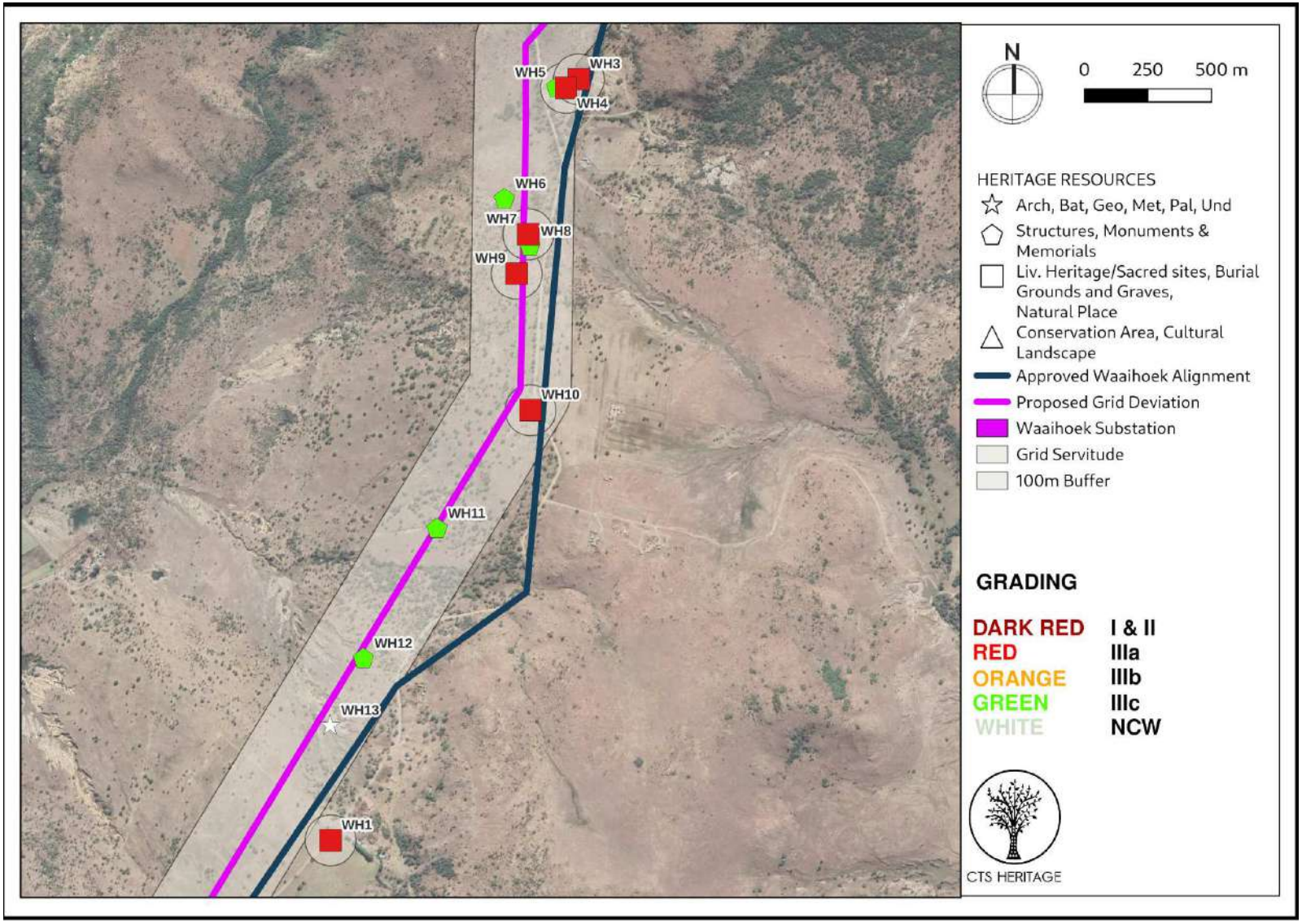

Figure 7.1: Map of recommended mitigation measures as per the recommendations

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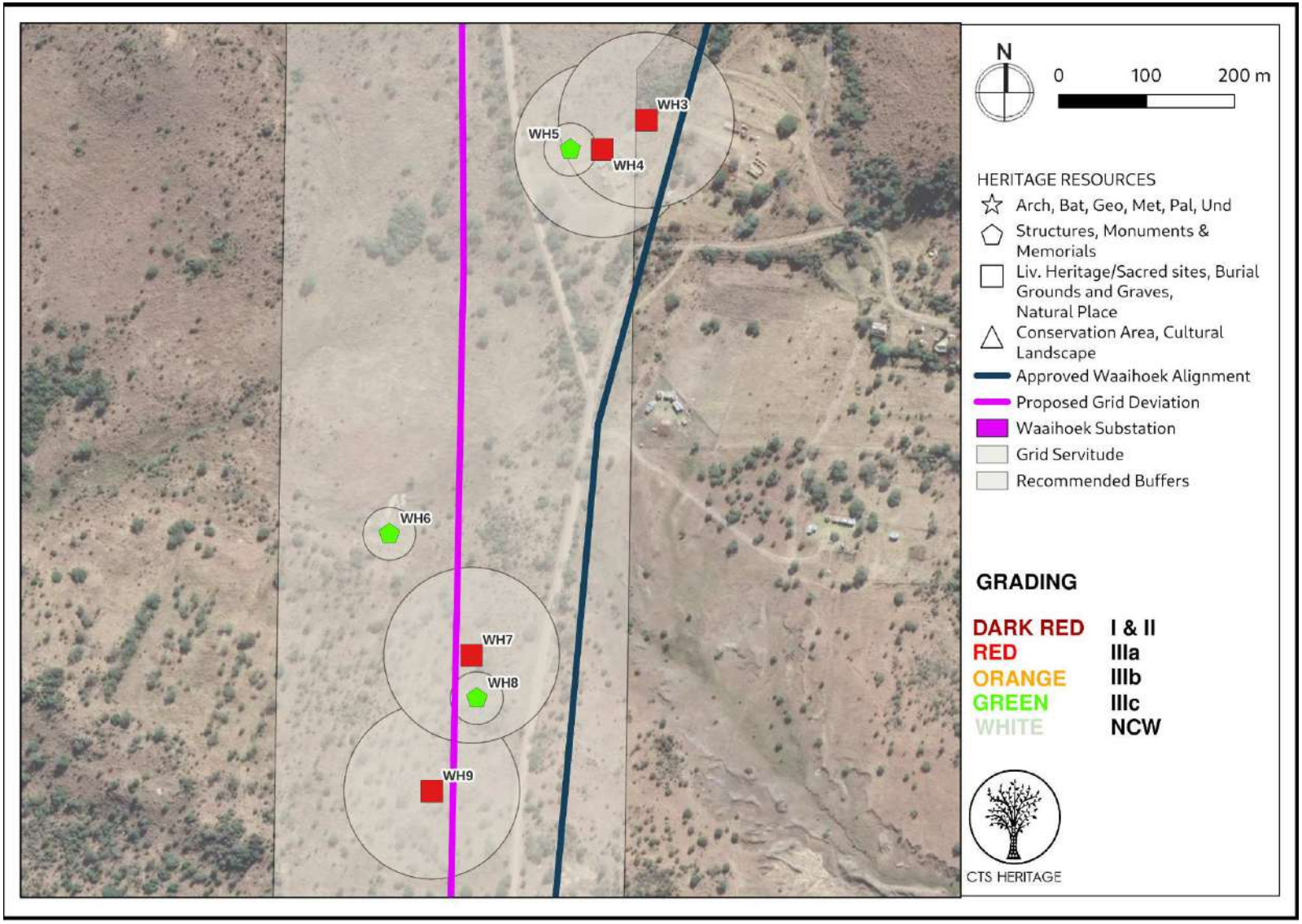

Figure 7.2: Map of recommended mitigation measures as per the recommendations

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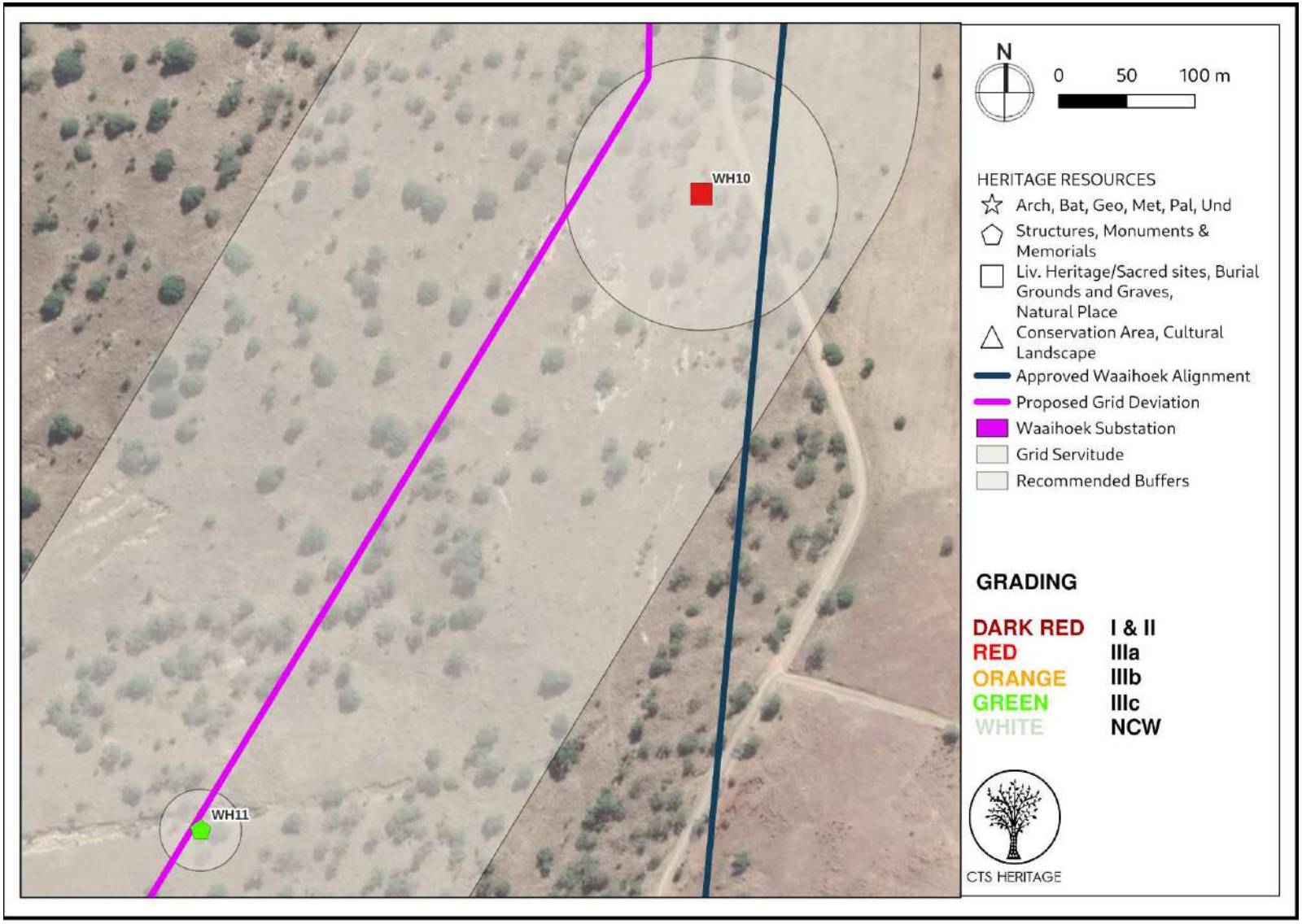

Figure 7.3: Map of recommended mitigation measures as per the recommendations

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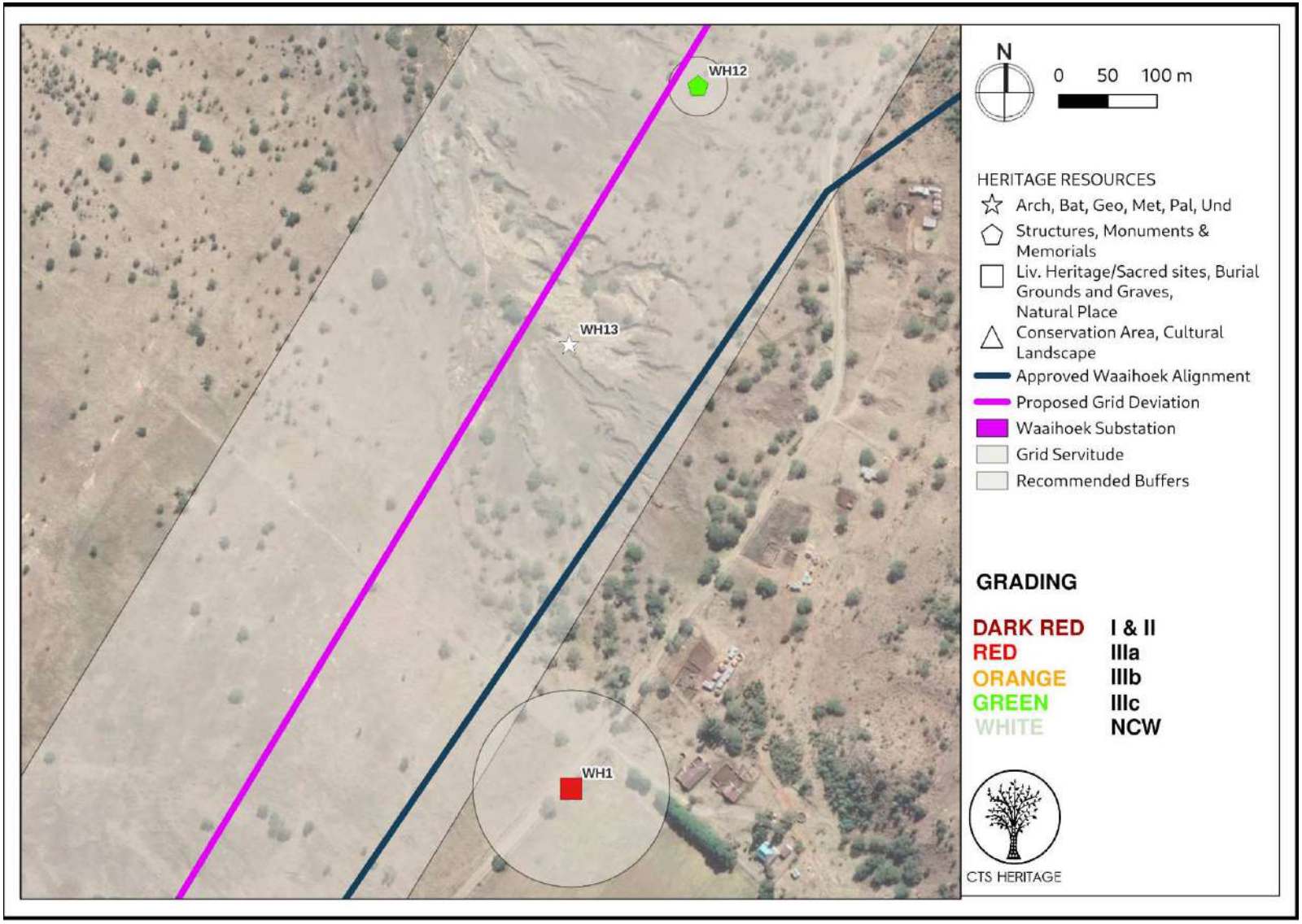

Figure 7.4: Map of recommended mitigation measures as per the recommendations

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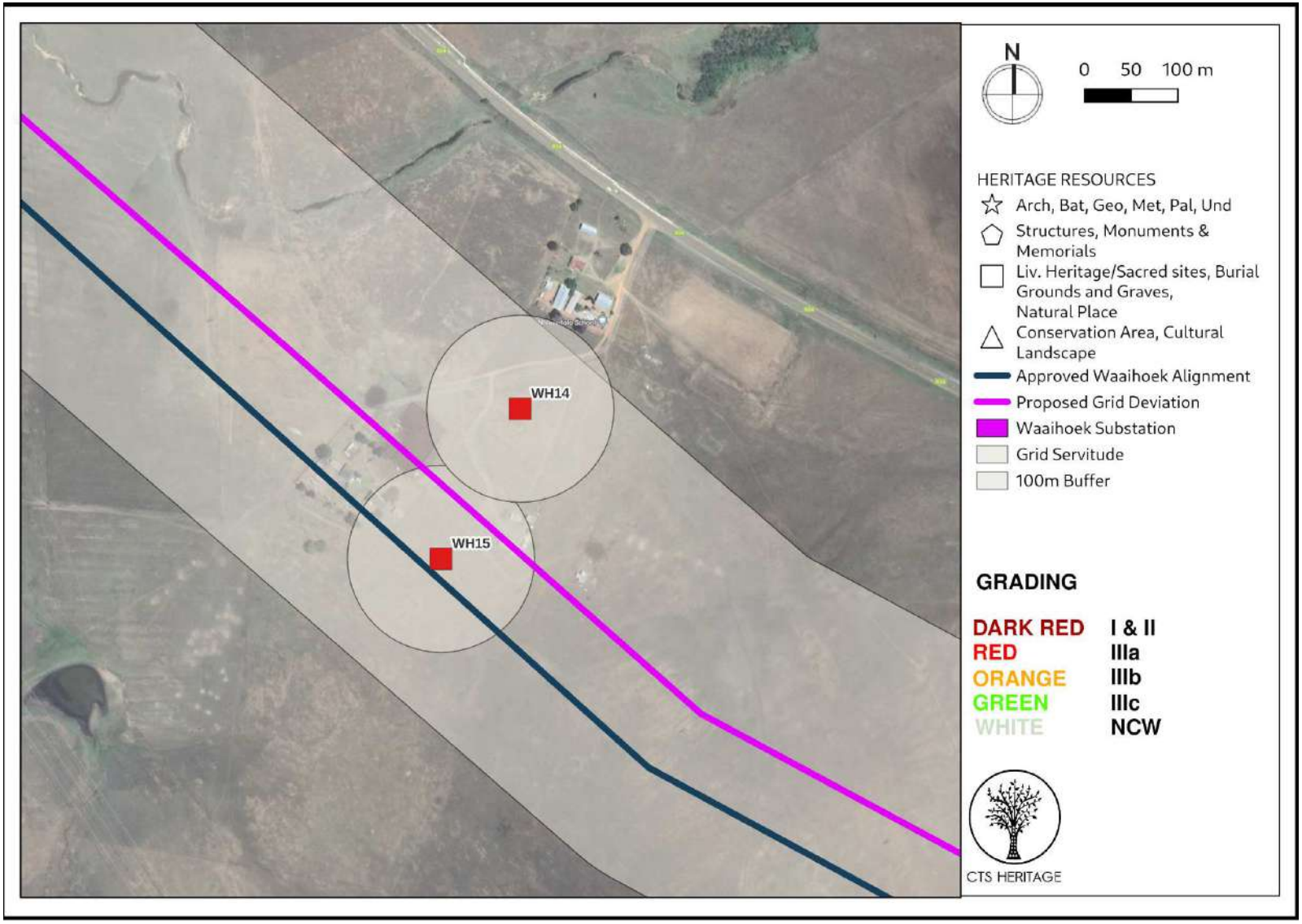

Figure 7.5: Map of recommended mitigation measures as per the recommendations

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7. REFERENCES

Heritage Impact Assessments				
Nid	**Report Type**	**Author/s**	**Date**	**Title**
167013	PIA Phase 1	Gideon Groenewald	18/03/2014	PALAEONTOLOGICAL IMPACT ASSESSMENT REPORT Waaihoek Wind Energy Facility (WEF) Utrecht, Kwa-Zulu Natal Province
167017	AIA Phase 1	Gavin Anderson, Louise Anderson	19/05/2014	HERITAGE SURVEY OF THE PROPOSED WAAIHOEK WIND ENERGY FACILITY, UTRECHT, KWAZULU-NATAL
7264	AIA Phase 1	Len van Schalkwyk	10/05/2006	Heritage Impact Assessment for the Majuba-Umfolozi 765 kV Transmission Line, in Mpumalanga and Kwazulu Natal

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APPENDIX 2: Palaeontological Assessment (2014)

PALAEONTOLOGICAL IMPACT ASSESSMENT REPORT

Waaihoek Wind Energy Facility (WEF)

Utrecht, Kwa-Zulu Natal Province

FOR

Coastal and Environmental Services

by

Gideon Groenewald

18 March 2014

EXECUTIVE SUMMARY

Gideon Groenewald was appointed to undertake a Phase 1 Palaeontological Impact Assessment, assessing the potential palaeontological impact of the proposed Waaihoek Wind Energy Facility near Utrecht, Kwa-Zulu Natal Province. The purpose of this Palaeontological Impact Assessment is to identify exposed and potential palaeontological heritage on the site of the proposed development, to assess the impact the development may have on this resource, and to make recommendations as to how this impact might be mitigated.

This report forms part of the Basic Environmental Impact Assessment for the proposed development of a wind farm and complies with the requirements for the South African National Heritage Resource Act No 25 of 1999. In accordance with Section 38 (Heritage Resources Management), a Palaeontological Impact Assessment is required to assess any potential impacts to palaeontological heritage within the development footprint of the proposed Waaihoek Wind Energy Facility.

South Africa Mainstream Renewable Power Developments (Pty) Ltd. (Mainstream) is proposing to construct a Wind Energy Facility (WEF), with a maximum capacity of 160MW, to be developed approximately 8km east and south-east of Utrecht in the Emadlangeni Local Municipality, KwaZulu Natal Province.

The proposed Waaihoek WEF may host up to 90 wind turbines each generating between 1.5 – 4MW of power, with a total maximum output capacity of 160MW. The number and placement of turbines has not yet been finalised, and this will be based on the outcome of ongoing environmental and technical inputs, e.g. an initial environmental sensitivity assessment and the results of on-site wind resource monitoring.

Extensive parts of the study area are underlain by a prominent Jurassic aged Dolerite Sill, with smaller areas underlain by sedimentary rocks of the Permian aged Vryheid and Volksrust Formations of the Ecca Group, Karoo Supergroup.

The potential palaeontology of a rock unit relates directly to the geology of the area. The desktop survey includes the comparison of relevant referenced geological maps and locality maps and/or waypoints provided for the development project.

Gideon Groenewald, Sue Groenewald and David Groenewald, experienced fieldworkers, visited the site of the proposed Waaihoek Wind Energy Facility during the week of Monday 10 March 2014 to Friday 14 March 2014. The topography of the area forms part of the escarpment and consists of hills and cliffs in regions where outcrops of Vryheid Formation sandstone and mudstone are intruded by a thick dolerite sill. The larger part of the study area is underlain by deeply weathered dolerite. Fossils are restricted to outcrops of the Vryheid Formation.

A survey of a representative sample of turbine points was done where a total of 49 proposed turbine sites were visited, to groundproof expected geological information at each of the individual turbine sites as well as to look for the presence of fossils in outcrops of sensitive geological units. Turbine points that convincingly fell on dolerite outcrops from both the desktop study and field observations were not individually visited due to time constraints and because dolerite will not yield fossils.

No fossils were observed at any of the visited turbine sites. This is either due to lack of exposure of Vryheid or Volkrust Formations or the presence of dolerite. It is however important to note that where outcrops of the Vryheid and Volkrust Formations are present, fossils were observed.

Exposures on the farm Paardepoort yielded well preserved trace fossils on mudstone bedding planes and stromatolites associated with carbonate concretions.

The proposed alternative powerline routes were also inspected during the field visit and fossil sites were recorded photographically, with GPS references.

Outcrops of the Vryheid and Volksrust Formations are restricted to specific areas on the escarpment and in road cuttings. Extensive areas are underlain by dolerite.

It is recommended that:

- The PEA and CEO be made aware of the possibility of finding fossils in the Vryheid and Volksrust Formation sediments during excavation of the foundations for the turbines and other infrastructure.
- A professional palaeontologist must be appointed to monitor possible palaeontological finds during excavation of turbine foundations, road foundations and trenches, where turbine positions or infrastructure fall on Vryheid and Volksrust Formation sediments.
- No further action is needed in all areas underlain by dolerite.

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1. INTRODUCTION

Gideon Groenewald was appointed to undertake a Phase 1 Palaeontological Impact Assessment, assessing the potential palaeontological impact of the proposed Waaihoek Wind Energy Facility near Utrecht, Kwa-Zulu Natal Province. The purpose of this Palaeontological Impact Assessment is to identify exposed and potential palaeontological heritage on the site of the proposed development, to assess the impact the development may have on this resource, and to make recommendations as to how this impact might be mitigated.

1.1. Legal Requirements

This report forms part of the Environmental Impact Assessment for the proposed development of a wind farm and complies with the requirements for the South African National Heritage Resource Act No 25 of 1999. In accordance with Section 38 (Heritage Resources Management), a Palaeontological Impact Assessment is required to assess any potential impacts to palaeontological heritage within the development footprint of the proposed Waaihoek Wind Energy Facility.

Categories of heritage resources recognised as part of the National Estate in Section 3 of the Heritage Resources Act, and which therefore fall under its protection, include:

- geological sites of scientific or cultural importance;
- objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens; and
- objects with the potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage.

2. AIMS AND METHODOLOGY

A Phase 1 investigation is often the last opportunity to record the fossil heritage within the development footprint. These records are very important to understand the past and form an important part of South Africa's National Estate.

Following the "SAHRA APM Guidelines: Minimum Standards for the Archaeological & Palaeontological Components of Impact Assessment Reports" the aims of the palaeontological impact assessment were:

- to identifying exposed and subsurface rock formations that are considered to be palaeontologically significant;
- to assess the level of palaeontological significance of these formations;
- to comment on the impact of the development on these exposed and/or potential fossil resources and
- to make recommendations as to how the developer should conserve or mitigate damage to these resources.

Prior to the field investigation a preliminary assessment (desktop study) of the topography and geology of the study area was made using appropriate 1:250 000 geological maps in conjunction with Google Earth. Potential fossiliferous rock units (groups, formations etc) were identified within the study area and the known fossil heritage within each rock unit was inventoried from the published scientific literature, previous palaeontological impact studies in the same region and the author's field experience.

Priority palaeontological areas were identified within the development footprint to focus the field investigator's time and resources. The aim of the fieldwork was to document any exposed fossil

material and to assess the palaeontological potential of the region in terms of the type and extent of rock outcrop in the area.

The likely impact of the proposed development on local fossil heritage was determined on the basis of the palaeontological sensitivity of the rock units concerned and the nature and scale of the development itself, most notably the minimal extent of fresh bedrock excavation envisaged. The different sensitivity classes used are explained in Table 2.1 below.

Table 2.1 Palaeontological sensitivity analysis outcome classification

Sensitivity	Description
Low Sensitivity	Areas where there is likely to be a negligible impact on the fossil heritage. This category is reserved largely for areas underlain by igneous rocks. However, development in fossil bearing strata with shallow excavations or with deep soils or weathered bedrock can also form part of this category.
Moderate Sensitivity	Areas where fossil bearing rock units are present but fossil finds are localised or within thin or scattered sub-units. Pending the nature and scale of the proposed development the chances of finding fossils are moderate. The developer should be made aware of the potential for finding fossils. If fossil material is later discovered it must be appropriately protected and the discovery reported to the appropriate Heritage Authority so that any appropriate mitigation by a palaeontological specialist can be considered and implemented, at the developer's expense.
High Sensitivity	Areas where fossil bearing rock units are present with a very high possibility of finding fossils of a specific assemblage zone. Fossils will most probably be present in outcrops and exposed bedrock. The chances of finding fossils during excavations by a professional palaeontologist are high. Palaeontological mitigation measures need to be incorporated into the Environmental Management Plan. The mitigation should involve the comprehensive recording and collection of surface and embedded fossils along and close to the development footprint by a professional palaeontologist.

When rock units of moderate to high palaeontological sensitivity are present within the development footprint, palaeontological mitigation measures should be incorporated into the Environmental Management Plan.

2.1. Scope and Limitations of the Phase 1 Investigation

The scope of a phase 1 Investigation includes:

- an analysis of the area's stratigraphy, age and depositional setting of fossil-bearing units;
- a review of all relevant palaeontological and geological literature, including geological maps, and previous palaeontological impact reports;
- data on the proposed development provided by the developer (e.g. location of footprint, depth and volume of bedrock excavation envisaged) and
- where feasible, location and examination of any fossil collections from the study area (e.g. museums).
- do an on-site investigation to assess the identified palaeontological sensitive areas within the development footprint/study area rather than formal palaeontological collection. The investigation should focus on the sites where bedrock excavations would definitely require palaeontological monitoring.

The results of the field investigation are then used to predict the potential of buried fossil heritage within the development footprint. In some investigations this involves the examination of similar accessible bedrock exposures, such as road cuttings and quarries, along roads that run parallel to or across the development footprint.

3. PROPOSED DEVELOPMENT DESCRIPTION

South Africa Mainstream Renewable Power Developments (Pty) Ltd. (Mainstream) is proposing to construct a Wind Energy Facility (WEF), with a maximum capacity of 160MW, to be developed approximately 8km east and south-east of Utrecht in the Emadlangeni Local Municipality, KwaZulu Natal Province (Figure 3.1).

A wind energy facility, or wind farm, consists of one or more wind turbines. The wind turbine is made up of a tower, a generator and rotor blades (see diagram below). When the wind blows, the rotor blades rotate and the generator converts the movement into electricity, which can then be transmitted for use. The energy created is considered renewable and clean.

Turbine models have different output capacity (e.g. a 1MW or 4MW turbine). The main features that differ are the hub height (can be between 80-120 metres high) and rotor blade length (can be between 40-70 metres long).

The proposed Waaihoek WEF may host up to 90 wind turbines each generating between 1.5 – 4MW of power, with a total maximum output capacity of 160MW. The number and placement of turbines has not yet been finalised, and this will be based on the outcome of ongoing environmental and technical inputs, e.g. an initial environmental sensitivity assessment and the results of on-site wind resource monitoring.

Two overhead powerline corridor alternatives are proposed to transmit the electricity from the WEF to the Eskom Bloedrivier substation. One corridor will follow the R34 while the alternative will follow the gravel road on the eastern boundary of the WEF site (Figure 3.1). In addition, the option of utilising an abandoned 88kV powerline servitude to the south of the site and connecting directly into the existing 88kV line running parallel to the R34 is also being considered.

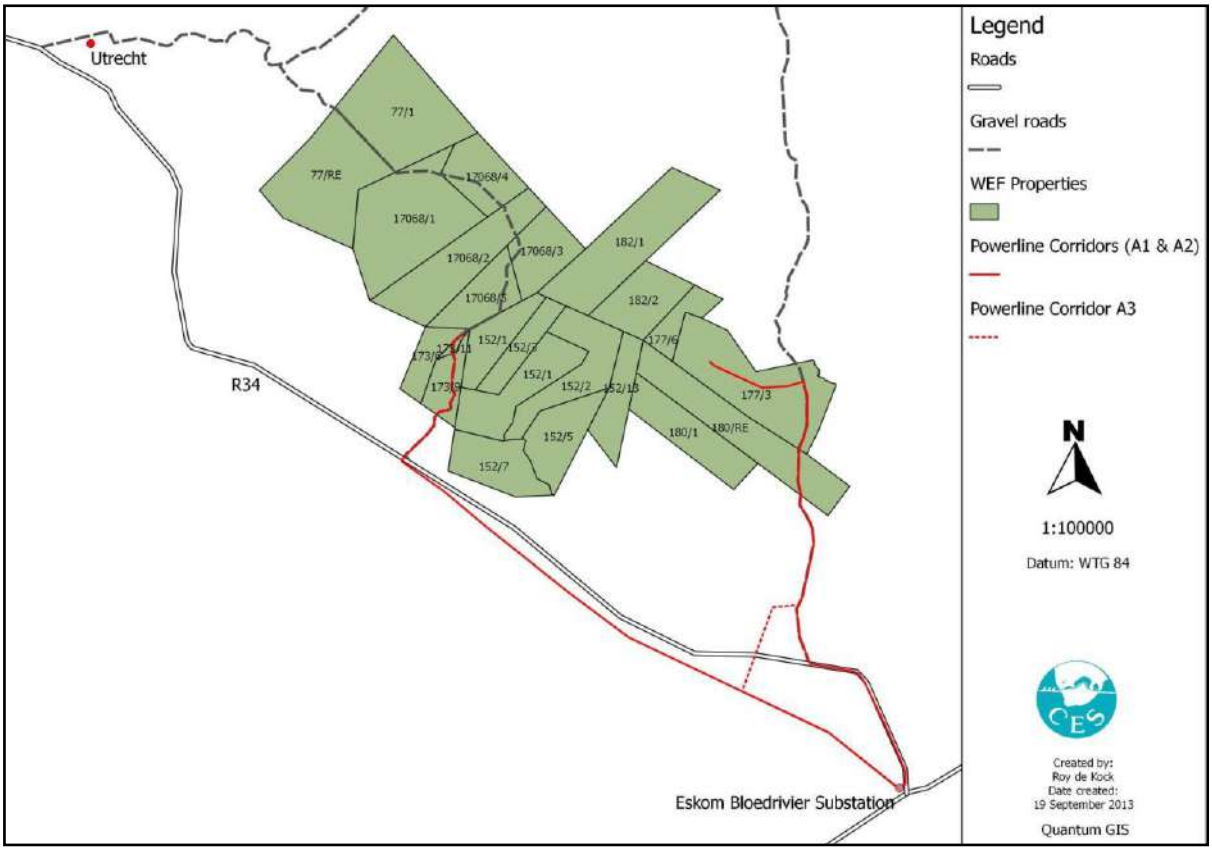


Figure 3.1 Locality of the Waaihoek Wind Energy Facility in relation to Utrecht and the powerline corridors under consideration (Courtesy of Roy de Kock (CES))

4. GEOLOGY OF THE AREA

Extensive parts of the study area are underlain by a prominent Jurassic aged Dolerite Sill, with smaller areas underlain by sedimentary rocks of the Permian aged Vryheid and Volksrust Formations of the Ecca Group, Karoo Supergroup (Figure 4.1).

4.1. Vryheid Formation (Pv)

In the study area the Vryheid Formation consists mainly of interbedded coarse-grained sandstone and mudstone, interpreted as deltaic deposits. The Vryheid Formation contains numerous coal seams that are of economic importance (Johnson et al, 2006).

4.2. Volksrust Formation (Pvo)

The Volksrust Formation consists of a monotonous sequence of grey mudstone and it is interpreted as a deeper water deposit (Johnson et al, 2006; Groenewald, 1996).

4.3. Dolerite

A very prominent dolerite sill underlies a large part of the study area and represents magma intrusions into the Karoo Supergroup sediments during the Jurassic volcanic episode. This occurred during the breakup of Gondwanaland.

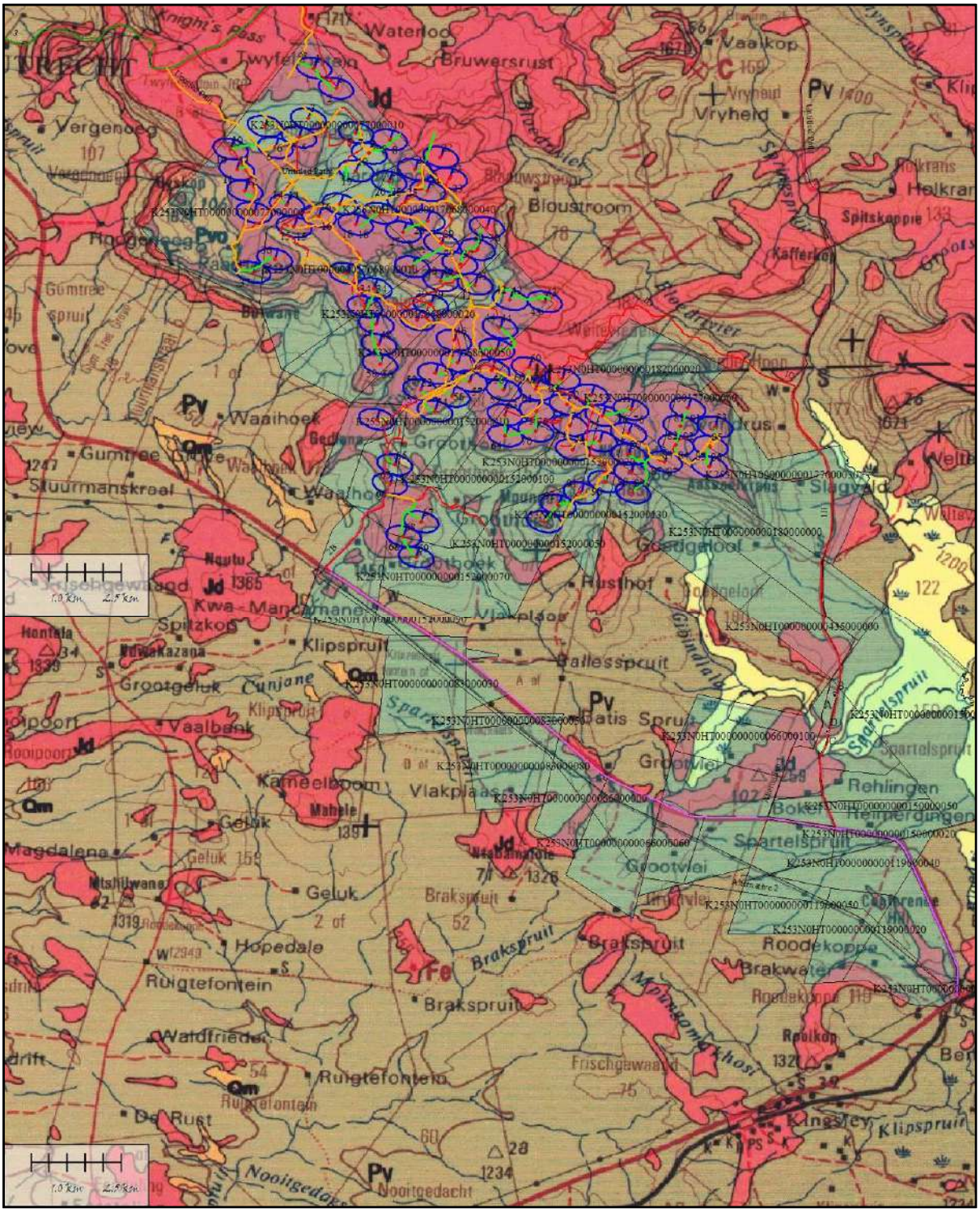
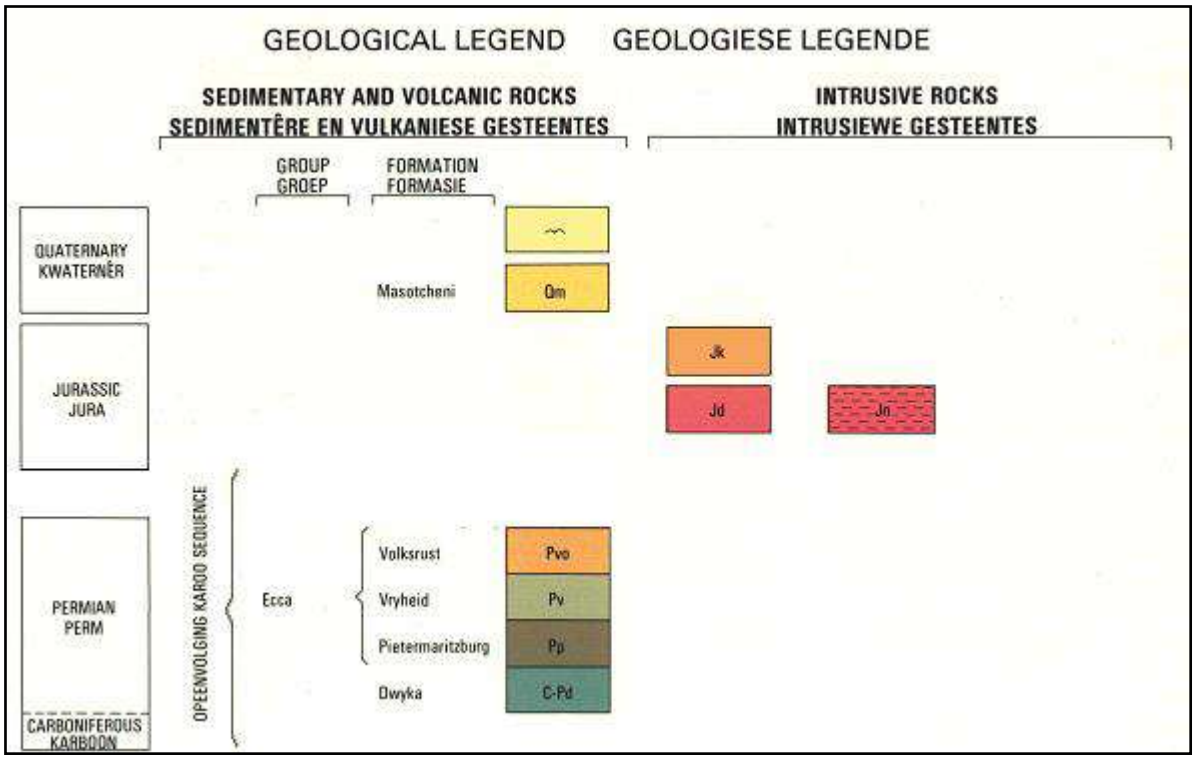


Figure 4.1 Map of the geology of the study area.



5. PALAEONTOLOGY OF THE AREA

The potential palaeontology of a rock unit relates directly to the geology of the area. The desktop survey includes the comparison of relevant referenced geological maps and locality maps and/or waypoints provided for the development project.

5.1. Vryheid Formation (Pv)

The Ecca Group is not known to contain body fossils of vertebrates, but trace and plant fossils have been described from the group. Fossils include plant fossils of the *Glossopteris* assemblage and trace fossils (Johnson et al, 2006).The Vryheid Formation is well-known for the occurrence of coal beds that resulted from the accumulation of plant material over long periods of time. Plant fossils described by Bamford (2011) from the Vryheid Formation are; *Azaniodendron fertile, Cyclodendron leslii, Sphenophyllum hammanskraalensis, Annularia sp., Raniganjia sp., Asterotheca spp., Liknopetalon enigmata, Glossopteris > 20 species, Hirsutum 4 spp., Scutum 4 spp., Ottokaria 3 spp., Estcourtia sp., Arberia 4 spp., Lidgetonnia sp., Noeggerathiopsis sp. and Podocarpidites sp.*

5.2. Volksrust Formation (Pvo)

The Volkrust Formation contains assemblages of trace fossils and the bivalve *Megadesmus* has been described from the Formation (Bamford 2011).

5.3. Karoo Dolerite (Jd)

Due to the igneous character of these rocks they do not contain fossils.

6. PRELIMINARY ASSESSMENT RESULTS

The palaeontological sensitivity was predicted after identifying potentially fossiliferous rock units; ascertaining the fossil heritage from the literature and evaluating the nature and scale of the development itself. The palaeontological sensitivity can be described as significant due to the

potential abundance of Permian trace and plant fossils known to occur within the Vryheid and Volkrust Formations.

7. FIELD INVESTIGATION

Gideon Groenewald, Sue Groenewald and David Groenewald, experienced fieldworkers, visited the site of the proposed Waaihoek Wind Farm during the week of Monday 10 March 2014 to Friday 14 March 2014. The topography of the area forms part of the escarpment and consists of hills and cliffs in regions where outcrops of Vryheid Formation sandstone and mudstone are intruded by a thick dolerite sill. The larger part of the study area is underlain by deeply weathered dolerite.

A survey of a representative sample of turbine points was done where a total of 49 proposed turbine sites were visited, to groundproof expected geological information at each of the individual turbine sites as well as to look for the presence of fossils in outcrops of sensitive geological units. Turbine points that convincingly fell on dolerite outcrop from both the desktop study and field observations from a distance were not individually visited due to time constraints and the fact that dolerite will not yield fossils.

The data from the field visits to the turbine sites is contained in Table 7.1 below.

Table 7.1 Table of the visited proposed turbine sites, their coordinates, geology, palaeontological significance and photo.

Turbine number	GPS Coordinates	Geology	Palaeontological significance	Photo
3	S27 40 41.3 E30 24 57.9	Vryheid	No Outcrop.	
4	S27 40 48.2 E30 24 19.0	Vryheid	No Outcrop.	

5	S27 40 58.2 E30 24 49.6	Vryheid	No Outcrop.	
6	S27 41 07.7 E30 24 28.0	Vryheid	No Outcrop.	
7	S27 40 54.1 E30 25 40.6	Vryheid	No Outcrop.	
8	S27 41 00.3 E30 26 11.2	Dolerite	None	

9	S27 41 12.6 E30 25 52.6	Vryheid	No Outcrop.	
15	S27 42 18.5 E30 24 44.7	Dolerite	None	
17	S27 41 58.2 E30 25 26.4	Vryheid	No Outcrop.	
19	S27 41 28.6 E30 25 40.7	Vryheid	No Outcrop.	

20	S27 41 38.3 E30 26 10.4	Vryheid	No Outcrop.	
26	S27 42 06.4 E30 26 02.6	Dolerite	None	
27	S27 42 23.4 E30 26 23.3	Dolerite	None	
28	S27 42 13.1 E30 26 44.8	Dolerite	None	

29	S27 42 33.4 E30 26 57.6	Dolerite	None	
32	S27 42 51.8 E30 27 14.2	Dolerite	None	
36	S27 42 47.6 E30 24 27.7	Dolerite	None	
37	S27 42 59.9 E30 24 08.3	Dolerite	None	

39	S27 43 28.0 E30 26 48.3	Vryheid	No Outcrop.	
40	S27 43 07.1 E30 26 56.8	Dolerite	None	
46	S27 44 00.5 E30 27 08.6	Dolerite	None	
53	S27 44 44.6 E30 26 38.6	Dolerite	None	

54	S27 45 04.1 E30 26 51.7	Dolerite	None	
55	S27 45 11.6 E30 25 59.2	Dolerite	None	
56	S27 44 50.4 E30 27 07.1	Dolerite	None	
57	S27 44 37.4 E30 27 22.7	Dolerite	None	

58	S27 44 27.2 E30 27 42.5	Dolerite	None	
59	S27 44 45.2 E30 27 53.6	Dolerite	None	
60	S27 44 25.0 E30 28 16.1	Dolerite	None	
61	S27 44 44.5 E30 28 22.2	Dolerite	None	

63	S27 45 07.4 E30 27 54.5	Dolerite	None	
64	S27 45 26.2 E30 27 54.8	Dolerite	None	
65	S27 45 52.0 E30 26 15.7	Vryheid	No Fossils observed. Benthic Clay indication of possible coal seam.	
66	S27 46 09.2 E30 26 11.2	Vryheid	No fossils observed	

67	S27 46 43.1 E30 26 39.2	Dolerite	None	
68	S27 46 56.3 E30 26 23.4	Dolerite	None	
69	S27 47 15.1 E30 26 34.7	Dolerite	None	
70	S27 45 04.0 E30 28 23.1	Dolerite	None	

71	S27 45 04.0 E30 28 23.1	Dolerite	None	
72	S27 44 58.3 E30 28 50.3	Dolerite	None	
75	S27 45 08.1 E30 29 22.3	Dolerite	None	
77	S27 45 23.8 E30 29 45.8	Dolerite	None	

81	S27 45 01.4 E30 30 38.8	Dolerite	None	
82	S27 45 17.4 E30 30 32.6	Dolerite	None	
83	S27 45 18.1 E30 31 03.3	Dolerite	None	
84	S27 45 34.1 E30 30 28.1	Dolerite	None	

85	S27 45 35.8 E30 30 59.0	Dolerite	None	
86	S27 45 53.9 E30 30 58.2	Dolerite	None	
87	S27 45 49.3 E30 30 18.0	Dolerite	None	

No fossils were observed at any of the visited turbine sites. This is either due to lack of exposure of Vryheid or Volkrust Formations or the presence of Dolerite. It is however important to note that where outcrops of the Vryheid and Volkrust Formations are present, fossils were observed. Exposures on the farm Paardepoort yielded well preserved trace fossils on mudstone bedding planes and stromatolites associated with carbonate concretions. The localities and photos of observed fossils are summarised in Table 7.2 below.

Table 7.2 Table of observed fossils in Vryheid and Volksrust Formation exposures

GPS Coordinates	Identification	Photo
S27 42 45.1 E30 23 35.8	Stromatolites	
S27 42 57.8 E30 23 41.1	Fossil Plant Fragments	
S27 42 57.3 E30 23 40.0	Trace Fossils and bioturbation	

S27 42 58.4 E30 23 37.0	Large Stromatolite structure in sandstone	
S27 42 56.7 E30 23 38.3	Trace Fossils and bioturbation in sandstone	
S27 43 04.8 E30 23 58.5	Trace Fossils and bioturbation as well as fossil plant fossil fragments	

The proposed alternative powerline routes were also inspected during the field visit and points of interest to palaeontology were recorded photographically, with GPS references. No exposures of Vryheid Formation were observed along the Alternative 2 route of the powerline.

An inspection was done of the exposures to the South East of the initial sections of Alternatives 1 and 3 where outcrops of the Vryheid Formation can be seen, forming prominent sandstone cliffs and ledges, interbedded with mudstone. Table 7.3 below summarises some of the recordings of fossils in the Vryheid Formation.

Table 7.3 Observed fossils in Vryheid Formation outcrops near Alternative 1 and 3 route of Powerline, Goedgeloof Farm

GPS Coordinates	Identification	Photo
S27 46 25.6 E30 31 56.8	Bioturbation	
S27 46 24.3 E30 31 55.6	Verticle burrows (“*Scolithos”)* in sandstone	
S27 46 21.5 E30 31 50.1	Horizontal burrows (“*Planolites”)* in mudstone	
S27 46 21.9 E30 31 47.5	Multiple Bioturbation in sandstone	

S27 46 21.8 E30 31 46.5	Coal seam	 
S27 46 38.8 E30 31 41.7	Horizontal burrows (“*Planolites*”)	
S27 46 08.2 E30 31 59.4	Vertical burrows (“*Scolithos*”) in sandstone	

S27 46 19.1 E30 31 58.6	Horizontal burrows ("*Planolites*") in mudstone	

8. PALAEONTOLOGICAL SIGNIFICANCE AND RATING

The predicted palaeontological impact of the development is based on the initial mapping assessment and literature reviews as well as information gathered during the field investigation.

The palaeontological significance and rating is summarised in Table 8.1 and 8.2 and the Palaeontological sensitivity is shown in Figure 8.1. The methodology for assessing the significance of impacts can be found in Appendix A.

Table 8.1 Palaeontological Significance of Geological Units on Site

Geological Unit	Rock Type and Age	Fossil Heritage	Vertebrate Biozone	Palaeontological Sensitivity
Volksrust Formation	Deep water mudstone	Trace fossils		High sensitivity
Vryheid Formation	Deltaic sandstone and mudstone *PERMIAN*	Plant fossils of the *Glossopteris* assemblage and trace fossils		High sensitivity
Dolerite	Dolerite *JURASSIC*	None		Not applicable

Table 8.2 Significance Rating Table as Per CES Template

Rock Unit	Temporal Scale (duration of impact)	Spatial Scale (area in which impact will have an effect)	Degree of confidence (confidence with which one has predicted the significance of an impact)	Impact severity (severity of negative impacts, or how beneficial positive impacts would be)		Overall Significance (The combination of all the other criteria as an overall significance)	
				With mitigation	Without mitigation	With mitigation	Without mitigation
Volksrust Formation	Permanent	International	Definite	Beneficial	Very Severe	Beneficial	High negative
Vryheid Formation	Permanent	International	Definite	Beneficial	Very severe	Beneficial	High negative

9. PALAEONTOLOGICAL IMPACT AND MITIGATION

The predicted palaeontological impact of the development is based on the initial mapping assessment and literature reviews as well as information gathered during the field investigation. The field investigation confirms that the area is underlain by a prominent and extensive dolerite sill, with smaller areas underlain by Vryheid and Volksrust Formations of the Ecca Group.

The Volksrust Formation consists mostly of mudstone. The Vryheid Formation consists of inter-bedded very coarse-grained sandstone and mudstone that yields plant and trace fossils as well as some prominent coal seams.

A colour coding method was developed to classify the palaeontological sensitivity of a development area (Table 2.1) :

- Red colouration indicates a very high possibility of finding fossils of a specific assemblage zone. Fossils will most probably be present in all outcrops on the site/route and the chances of finding fossils during the construction phase are very high.
- Orange colouration indicates a possibility of finding fossils of a specific assemblage zone either in outcrops or in bedrock on the site/route and the chances of finding fossils during the construction phase is possible.
- Green colouration indicates that there is no possibility of finding fossils in that section of the site/route development.

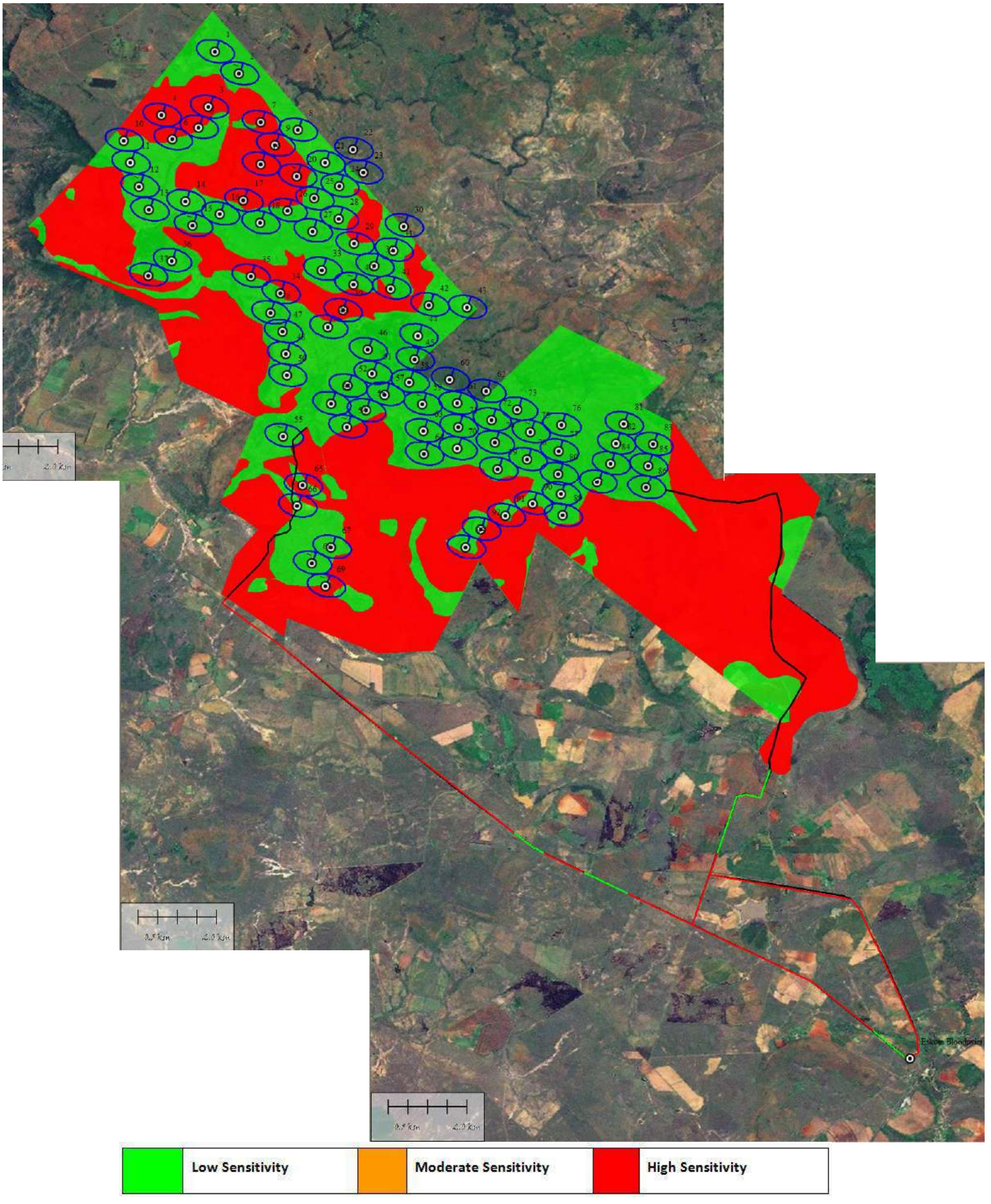


Figure 9.1 Palaeosensivivty for Waaihoek Wind Energy Facility

10. CONCLUSION

The development site for the proposed Waaihoek Wind Energy Facility is underlain by the Permian Vryheid and Volksrust Formations of the Ecca Group as well as a thick dolerite sill.

Outcrops of the Vryheid and Volksrust Formations are restricted to specific areas on the escarpment and in road cuttings. Extensive areas are underlain by dolerite.

It is recommended that:

- The PEA and CEO be made aware of the possibility of finding fossils in the Vryheid and Volksrust Formation sediments during excavation of the foundations for the turbines and other infrastructure.
- A professional palaeontologist is appointed to monitor possible palaeontological finds during excavation of turbine foundations and infrastructure where turbine positions and infrastructure fall on Vryheid and Volksrust Formation sediments.
- No further action is needed in all areas underlain by dolerite.

11. REFERENCES

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McCarthy, T. and Rubidge, B.S. 2005. The Story of Earth and Life. Struik Publishers, Cape T

Rubidge, B.S. (Ed.). 1995. Biostratigraphy of the Beaufort Group (Karoo Supergroup). SACS Biostratigraphic Series, vol. 1.

12. QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR

Dr Gideon Groenewald has a PhD in Geology from the University of Port Elizabeth (Nelson Mandela Metropolitan University) (1996) and the National Diploma in Nature Conservation from Technicon RSA (the University of South Africa) (1989). He specialises in research on South African Permian and Triassic sedimentology and macrofossils with an interest in biostratigraphy, and palaeoecological aspects. He has extensive experience in the locating of fossil material in the Karoo Supergroup and has more than 20 years of experience in locating, collecting and curating fossils, including exploration field trips in search of new localities in the southern, western, eastern and north-eastern parts of the country. His publication record includes multiple articles in internationally recognized journals. Dr Groenewald is accredited by the Palaeontological Society of Southern Africa (society member for 25 years).

13. DECLARATION OF INDEPENDENCE

I, Gideon Groenewald, declare that I am an independent specialist consultant and have no financial, personal or other interest in the proposed development, nor the developers or any of their subsidiaries, apart from fair remuneration for work performed in the delivery of palaeontological heritage assessment services. There are no circumstances that compromise the objectivity of my performing such work.

Dr Gideon Groenewald
Geologist

APPENDIX A - METHODOLOGY FOR ASSESSING THE SIGNIFICANCE OF IMPACTS

Although specialists will be given relatively free rein on how they conduct their research and obtain information, they will be required to provide their reports to the EAP in a specific layout and structure, so that a uniform specialist report volume can be produced.

To ensure a direct comparison between various specialist studies, a standard rating scale has been defined and will be used to assess and quantify the identified impacts. This is necessary since impacts have a number of parameters that need to be assessed. Four factors need to be considered when assessing the significance of impacts, namely:

1. Relationship of the impact to **temporal** scales - the temporal scale defines the significance of the impact at various time scales, as an indication of the duration of the impact.

2. Relationship of the impact to **spatial** scales - the spatial scale defines the physical extent of the impact.

3. The severity of the impact - the **severity/beneficial** scale is used in order to scientifically evaluate how severe negative impacts would be, or how beneficial positive impacts would be on a particular affected system (for ecological impacts) or a particular affected party.

   The severity of impacts can be evaluated with and without mitigation in order to demonstrate how serious the impact is when nothing is done about it. The word 'mitigation' means not just 'compensation', but also the ideas of containment and remedy. For beneficial impacts, optimization means anything that can enhance the benefits. However, mitigation or optimization must be practical, technically feasible and economically viable.

4. The **likelihood** of the impact occurs - the likelihood of impacts taking place as a result of project actions differs between potential impacts. There is no doubt that some impacts would occur (e.g. loss of vegetation), but other impacts are not as likely to occur (e.g. vehicle accident), and may or may not result from the proposed development. Although some impacts may have a severe effect, the likelihood of them occurring may affect their overall significance.

The ***environmental significance*** scale is an attempt to evaluate the importance of a particular impact. This evaluation needs to be undertaken in the relevant context, as an impact can either be ecological or social, or both. The evaluation of the significance of an impact relies heavily on the values of the person making the judgment. For this reason, impacts of especially a social nature need to reflect the values of the affected society.

Negative impacts that are ranked as being of "**VERY HIGH**" and "**HIGH**" significance will be investigated further to determine how the impact can be minimised or what alternative activities or mitigation measures can be implemented. These impacts may also assist decision makers i.e. lots of **HIGH** negative impacts may bring about a negative decision.

For impacts identified as having a negative impact of "**MODERATE**" significance, it is standard practice to investigate alternate activities and/or mitigation measures. The most effective and practical mitigations measures will then be proposed.

For impacts ranked as "**LOW**" significance, no investigations or alternatives will be considered. Possible management measures will be investigated to ensure that the impacts remain of low significance.

Table 9-1: Criterion used to rate the significance of an impact

Significance Rating Table	
Temporal Scale (The duration of the impact)	
Short term	Less than 5 years (Many construction phase impacts are of a short duration)
Medium term	Between 5 and 20 years
Long term	Between 20 and 40 years (From a human perspective almost permanent).
Permanent	Over 40 years or resulting in a permanent and lasting change that will always be there
Spatial Scale (The area in which any impact will have an affect)	
Individual	Impacts affect an individual.
Localised	Impacts affect a small area, often only a portion of the project area.
Project Level	Impacts affect the entire project area.
Surrounding Areas	Impacts that affect the area surrounding the development
Municipal	Impacts affect either the Local Municipality, or any towns within them.
Regional	Impacts affect the wider district municipality or the province as a whole.
National	Impacts affect the entire country.
International/Global	Impacts affect other countries or have a global influence.
Will definitely occur	Impacts will definitely occur.
Degree of Confidence or Certainty (The confidence to predicted the significance of an impact)	
Definite	More than 90% sure of a particular fact. Should have substantial supportive data.
Probable	Over 70% sure of a particular fact, or of the likelihood of that impact occurring.
Possible	Only over 40% sure of a particular fact or of the likelihood of an impact occurring.
Unsure	Less than 40% sure of a particular fact or of the likelihood of an impact occurring.

Table 9-2: The severity rating scale

Impact severity (The severity of negative impacts, or how beneficial positive impacts would be on a particular affected system or party)	
Very severe	**Very beneficial**
An irreversible and permanent change to the affected system(s) or party(ies) which cannot be mitigated. For example the permanent loss of land.	A permanent and very substantial benefit to the affected system(s) or party(ies), with no real alternative to achieving this benefit. For example the vast improvement of sewage effluent quality.
Severe	**Beneficial**
Long term impacts on the affected system(s) or party(ies) that could be mitigated. However, this mitigation would be difficult, expensive or time consuming, or some combination of these. For example, the clearing of forest vegetation.	A long term impact and substantial benefit to the affected system(s) or party(ies). Alternative ways of achieving this benefit would be difficult, expensive or time consuming, or some combination of these. For example an increase in the local economy.
Moderately severe	**Moderately beneficial**
Medium to long term impacts on the affected system(s) or party (ies), which could be mitigated. For example constructing the sewage treatment facility where there was vegetation with a low conservation value.	A medium to long term impact of real benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are equally difficult, expensive and time consuming (or some combination of these), as achieving them in this way. For example a 'slight' improvement in sewage effluent quality.
Slight	**Slightly beneficial**
Medium or short term impacts on the affected system(s) or party(ies). Mitigation is very easy, cheap, less time consuming or not necessary. For example a temporary fluctuation in the water table due to water abstraction.	A short to medium term impact and negligible benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are easier, cheaper and quicker, or some combination of these.
No effect	**Don't know/Can't know**
The system(s) or party(ies) is not affected by the proposed development.	In certain cases it may not be possible to determine the severity of an impact

Table 3: Overall significance appraisal

Overall Significance (The combination of all the above criteria as an overall significance)	
VERY HIGH NEGATIVE	**VERY BENEFICIAL**
These impacts would be considered by society as constituting a major and usually permanent change to the (natural and/or social) environment, and usually result in **severe** or **very severe** effects, or **beneficial** or **very beneficial** effects. **Example:** The loss of a species would be viewed by informed society as being of VERY HIGH significance. **Example:** The establishment of a large amount of infrastructure in a rural area, which previously had very few services, would be regarded by the affected parties as resulting in benefits with VERY HIGH significance.	
HIGH NEGATIVE	**BENEFICIAL**
These impacts will usually result in long term effects on the social and/or natural environment. Impacts rated as HIGH will need to be considered by society as constituting an important and usually long term change to the (natural and/or social) environment. Society would probably view these impacts in a serious light. **Example:** The loss of a diverse vegetation type, which is fairly common elsewhere, would have a significance rating of HIGH over the long term, as the area could be rehabilitated. **Example:** The change to soil conditions will impact the natural system, and the impact on affected parties (such as people growing crops in the soil) would be HIGH.	
MODERATE NEGATIVE	**SOME BENEFITS**
These impacts will usually result in medium to long term effects on the social and/or natural environment. Impacts rated as MODERATE will need to be considered by society as constituting a fairly important and usually medium term change to the (natural and/or social) environment. These impacts are real but not substantial. **Example:** The loss of a sparse, open vegetation type of low diversity may be regarded as MODERATELY significant.	
LOW NEGATIVE	**FEW BENEFITS**
These impacts will usually result in medium to short term effects on the social and/or natural environment. Impacts rated as LOW will need to be considered by the public and/or the specialist as constituting a fairly unimportant and usually short term change to the (natural and/or social) environment. These impacts are not substantial and are likely to have little real effect. **Example:** The temporary change in the water table of a wetland habitat, as these systems is adapted to fluctuating water levels. **Example:** The increased earning potential of people employed as a result of a development would only result in benefits of LOW significance to people who live some distance away.	
NO SIGNIFICANCE	
There are no primary or secondary effects at all that are important to scientists or the public. **Example:** A change to the geology of a particular formation may be regarded as severe from a geological perspective, but is of NO significance in the overall context.	
DON'T KNOW	
In certain cases it may not be possible to determine the significance of an impact. For example, the significance of the primary or secondary impacts on the social or natural environment given the available information. **Example:** The effect of a particular development on people's psychological perspective of the environment.	

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APPENDIX 3: 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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APPENDIX 4: Heritage Screening Assessment

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HERITAGE SCREENER

CTS Reference Number:	**CTS21_167**
SAHRIS Reference:	
Client:	**Nala Environmental Consulting Firm**
Date:	**March 2022**
Title:	**HERITAGE SCREENING ASSESSMENT FOR THE PROPOSED DEVIATION TO THE APPROVED WAAIHOEK GRID CONNECTION**

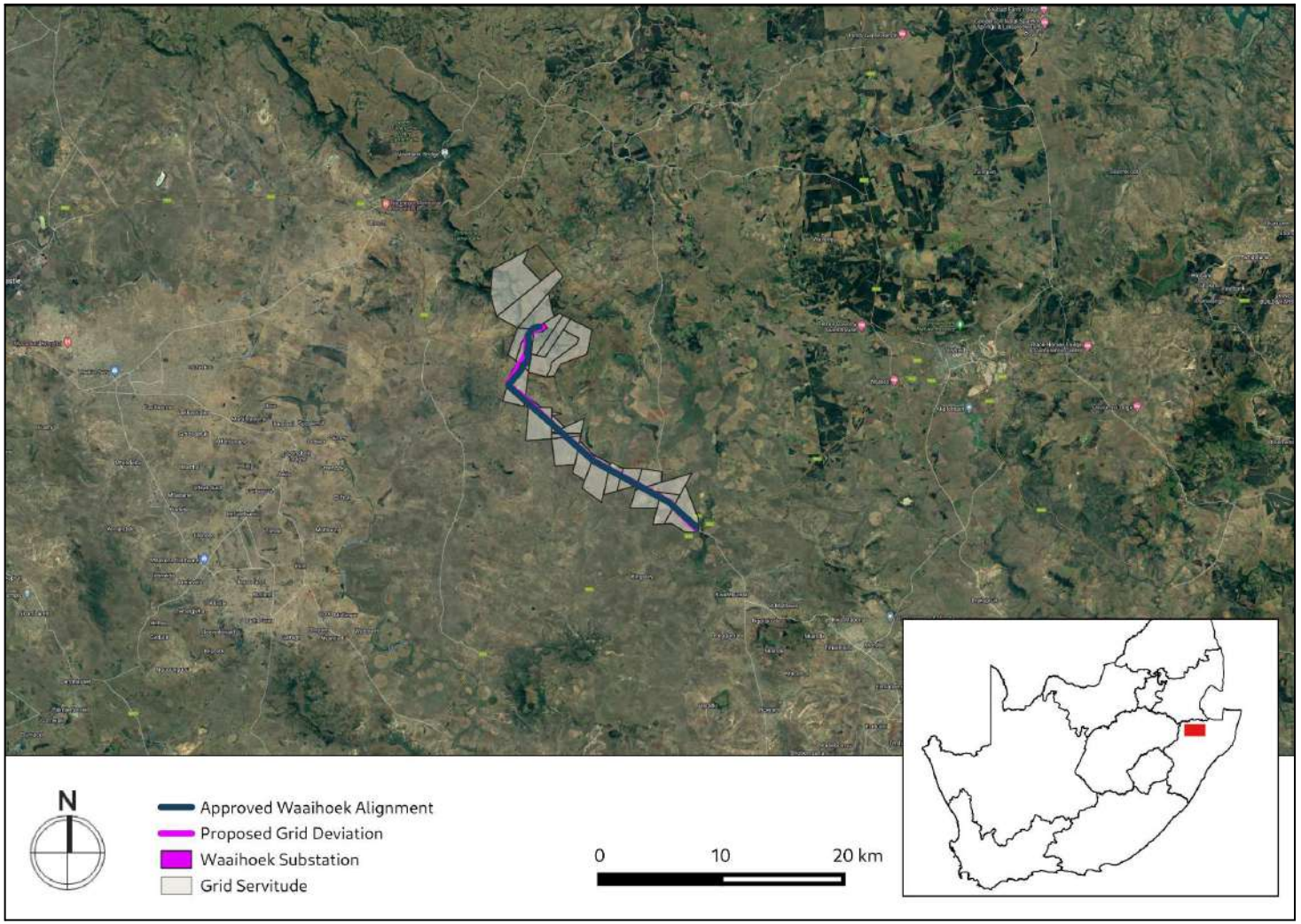

Figure 1a. Satellite map indicating the location of the proposed development in KwaZulu Natal

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Tel: +27 (0)87 073 5739 **Email:** info@ctsheritage.com **Web:** www.ctsheritage.com

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1. Proposed Development Summary

Waaihoek Wind Farm (Pty) Ltd, is proposing a powerline deviation route from the authorised 88kV powerline for the Waaihoek Wind Energy Facility (WEF). The authorised WEF is located south-east of Utrecht in the Emadlangeni Local Municipality, KwaZulu-Natal Province approximately 25km south west of the town of Vryheid.

The developer bid the wind energy facility and associated infrastructure into the Renewable Energy IPP Procurement Programme (REIPPPP) Bid Window 5 for the procurement of up to 1 600MW of onshore wind energy technologies. On the 28th October 2021, the Minister of the Department of Mineral Resources and Energy, Mr Gwede Mantashe, announced the Preferred Bidders of the Fifth Bid Submission of the Renewable Energy Independent Power Producer Procurement Programme, of which Waaihoek Wind Farm (Pty) Ltd has received Preferred Bidder Status. The 25.5km power line infrastructure for the authorised Waaihoek Wind Energy Facility had previously been authorised (DEA Ref:. 14/12/16/3/3/2/654), however following consultation with Eskom and landowners, the powerline routing is proposed to be deviated outside of the previously assessed servitude in order to optimise the routing for associated with the final layout of the Waaihoek Wind Energy Facility. The proponent now proposes a deviation from this authorised route along the entire length of the powerline for approximately 25,4km. The deviation of the grid connection infrastructure is proposed in order to meet the requirements of the Bid Window 5 and meet financial close as the project has been selected as a preferred bidder. A Basic Assessment process will be undertaken to assess the powerline route deviation. It is noted that more than one feasible alternative may become viable following the appointment of the EAP and specialists.

The infrastructure and key components considered as part of this Basic Assessment process includes:

- Deviation of the authorised powerline, the deviation will occur along the length of the authorised route as portions of this new optimised routing falls outside of the previously authorised and assessed 50-70m servitude.
- The length of the powerline will be approximately 25,4km
- Jeep tracks of up to 4m wide and water crossing will be constructed along the powerline route to allow for construction and maintenance activities and will be assessed within a 400m along the length of the powerline route for approximately 25,2km
- A grid corridor of approximately 400m (200m on either side) will be assessed for the length of the powerline route.
- The Eskom portion of the 88kV switching station with a footprint of 50m x 50m. The on-site substation has been authorised for the Waaihoek Wind Energy, however it must noted that should the Environmental Authorisation for this powerline deviation and Eskom switching be granted, it will be ceded over to Eskom during the operation phase of the project.

2. Application References

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

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3. Property Information

Latitude / Longitude	27°52'42.83"S 30°34'23.64"E
Erf number / Farm number	Portion 5 of the Farm Roodekoppe 119 Portion 4 of the Farm Roodekoppe 119 Portion 3 of the Farm Spartelspuit 150 Portion 12 of the Farm Grootvlei 66 Portion 13 of the Farm Grootvlei 66 Portion 6 of the Farm Grootvlei 66 Remainder of the Farm Grootvlei 66 Portion 5 of the Farm Vlakplaats 83 Portion 8 of the Farm Vlakplaats 83 Portion 9 of the Farm Vlakplaats 83 Portion 10 of the Farm Vlakplaats 83 Portion 3 of the Farm Vlakplaats 83 Portion 9 of the Farm Groothoek 152 Portion 4 of the Farm Waaihoek 173 Portion 9 of the Farm Waaihoek 173 Portion 1 of the Farm Groothoek 152 Portion 6 of the Farm Waaihoek 173 Portion 11 of the Farm Waaihoek 173 Portion 5 of the Farm Wijdgelegen 17068
Local Municipality	eMadlageni
District Municipality	Amajuba
Province	KwaZulu Natal
Current Use	Agriculture
Current Zoning	Agriculture

4. Nature of the Proposed Development

Total Area	10160ha (grid corridor and switching station)
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
x	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-
	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

- Jeep tracks of up to 4m wide and watercourse crossings will be constructed along the powerline to allow for construction and maintenance activities within the 400m grid corridor.
- The Eskom portion of the 88kV switching station with a footprint of 50m x50m.

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

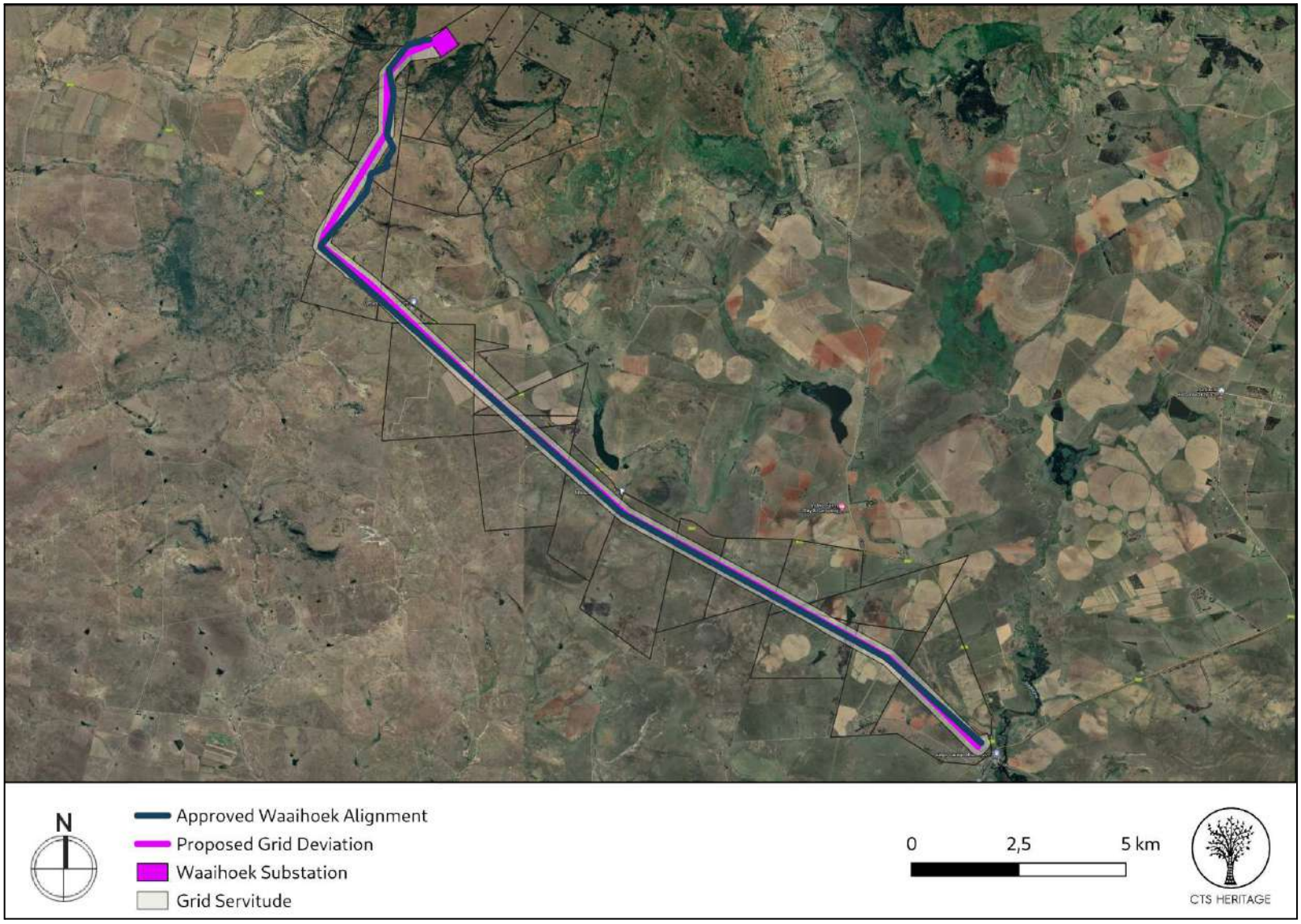

Figure 1b. Overview Map. Satellite image (2020) indicating the proposed development area

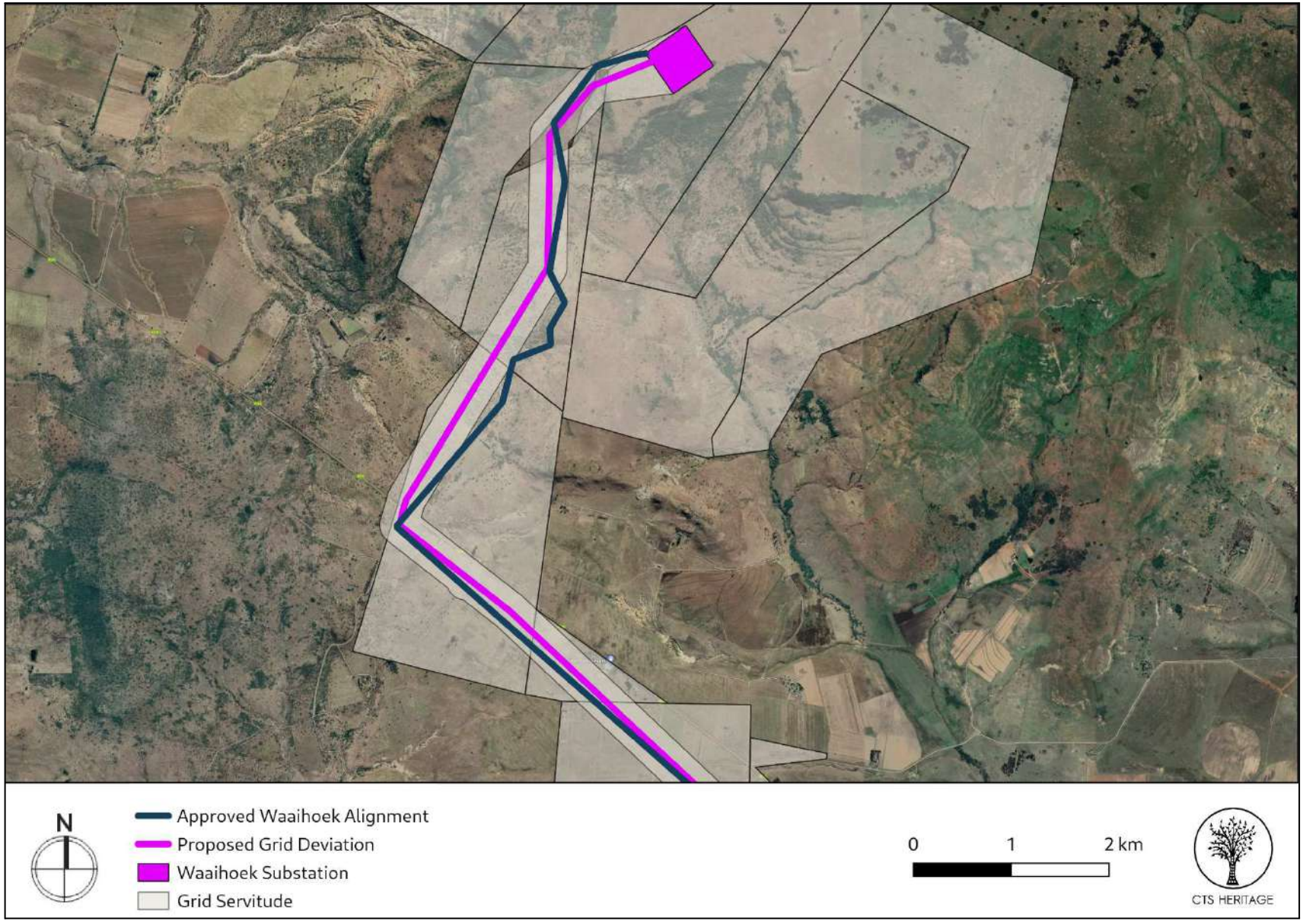

Figure 1c. Overview Map. Satellite image (2020) indicating the proposed development activities relative to the approved Waaihoek Grid Connection

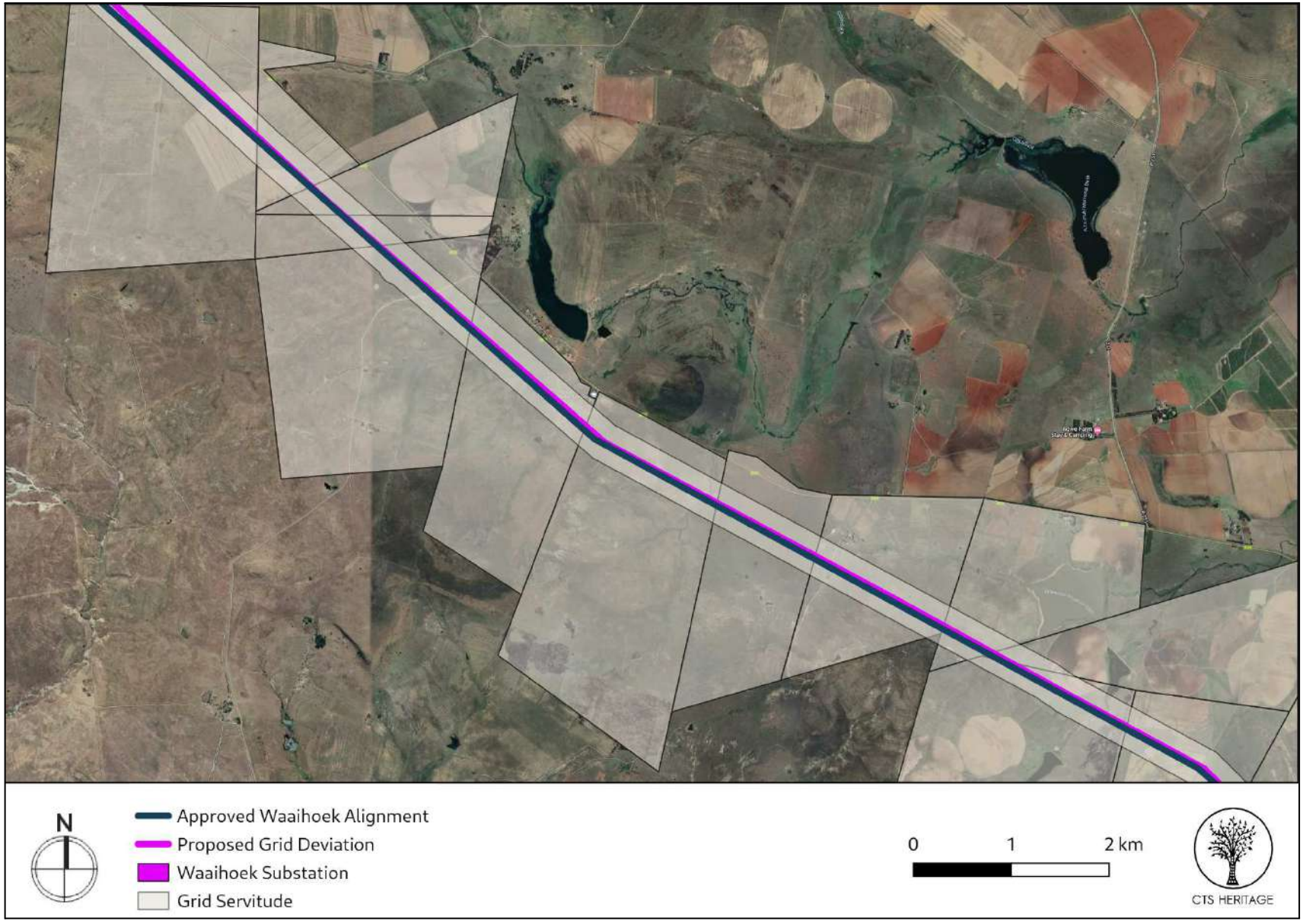

Figure 1d. Overview Map. Satellite image (2020) indicating the proposed development activities relative to the approved Waaihoek Grid Connection

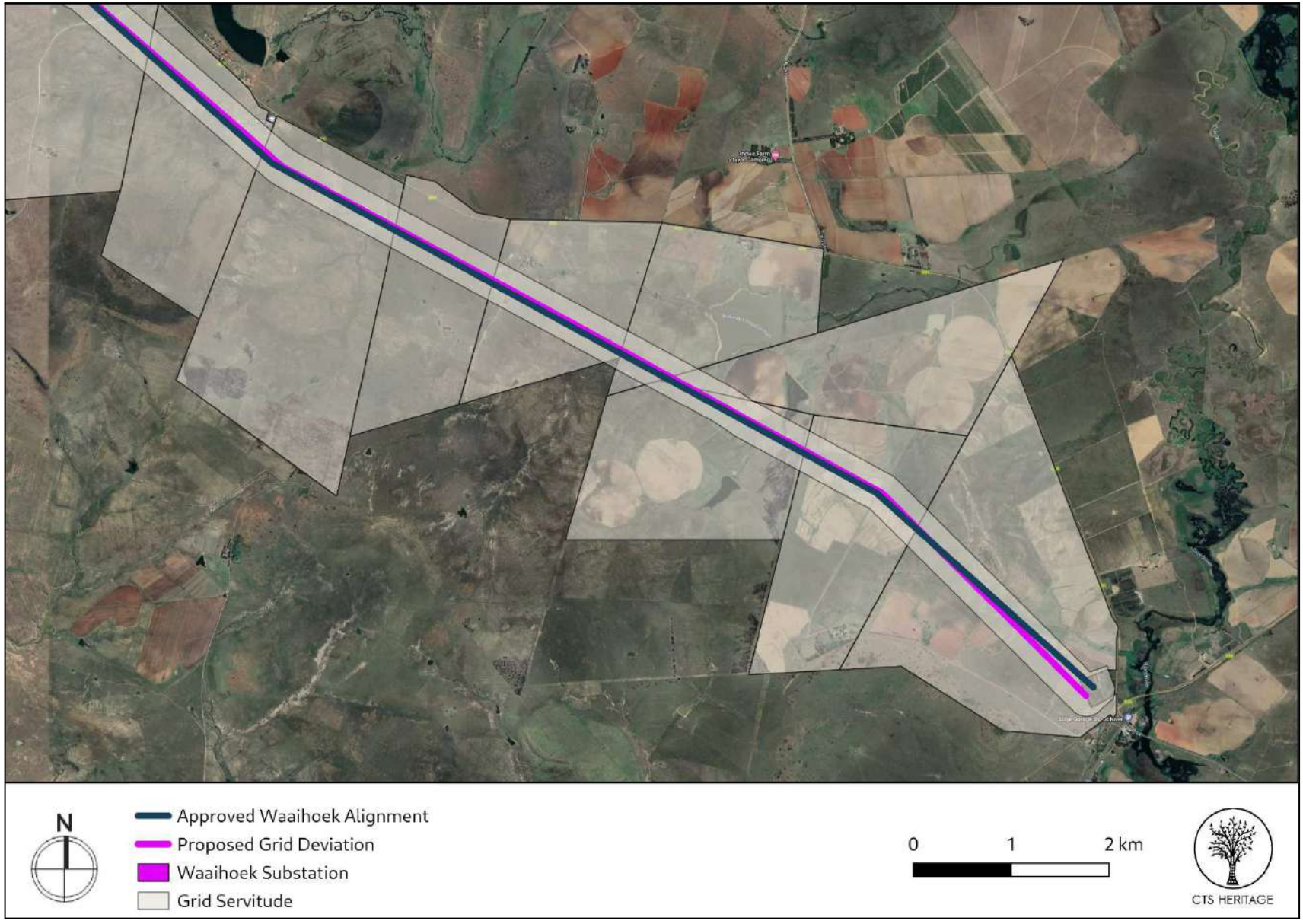

Figure 1e. Overview Map. Satellite image (2020) indicating the proposed development activities relative to the approved Waaihoek Grid Connection

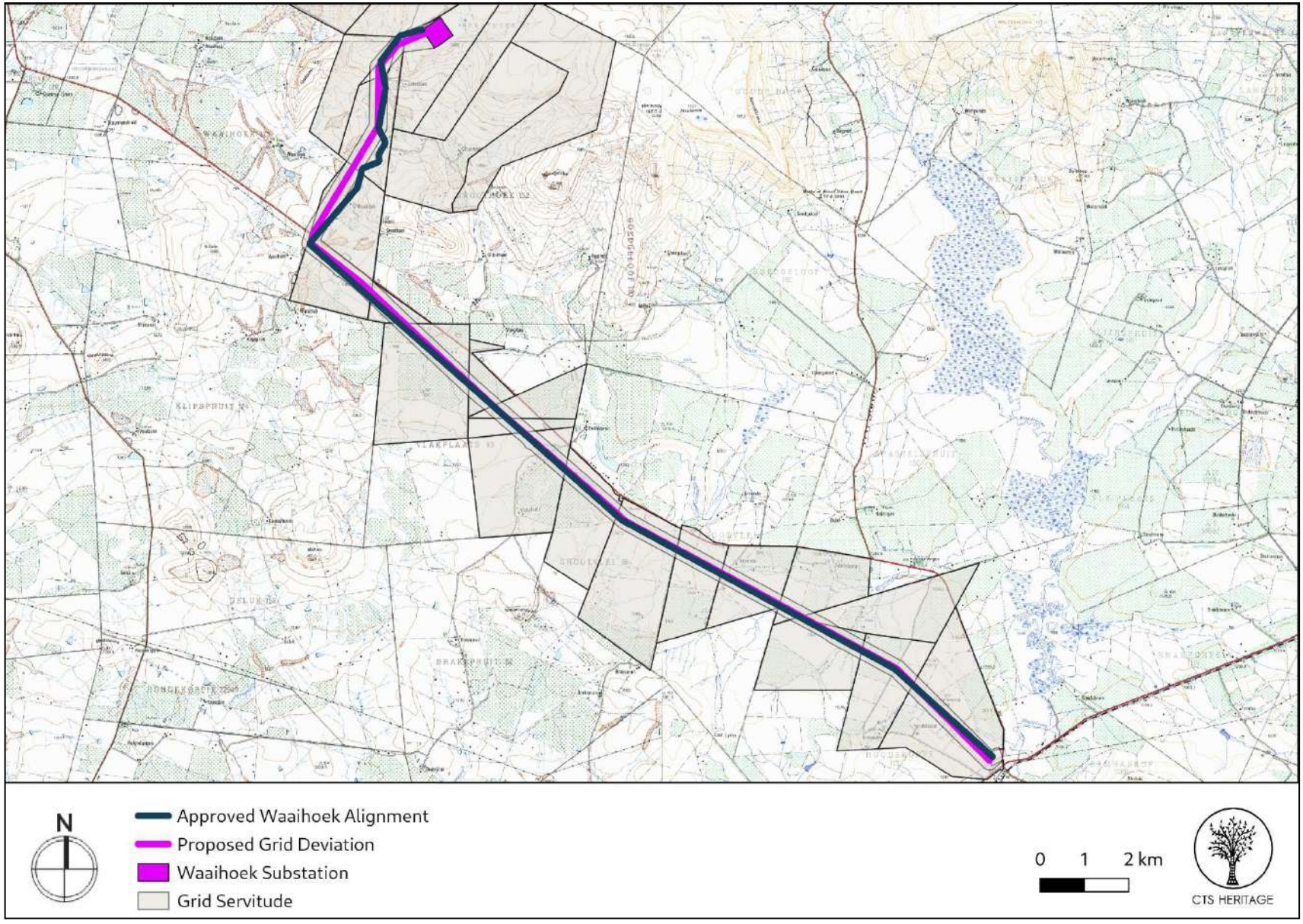

Figure 1f. Overview Map. Extract from 1:50 000 Topo

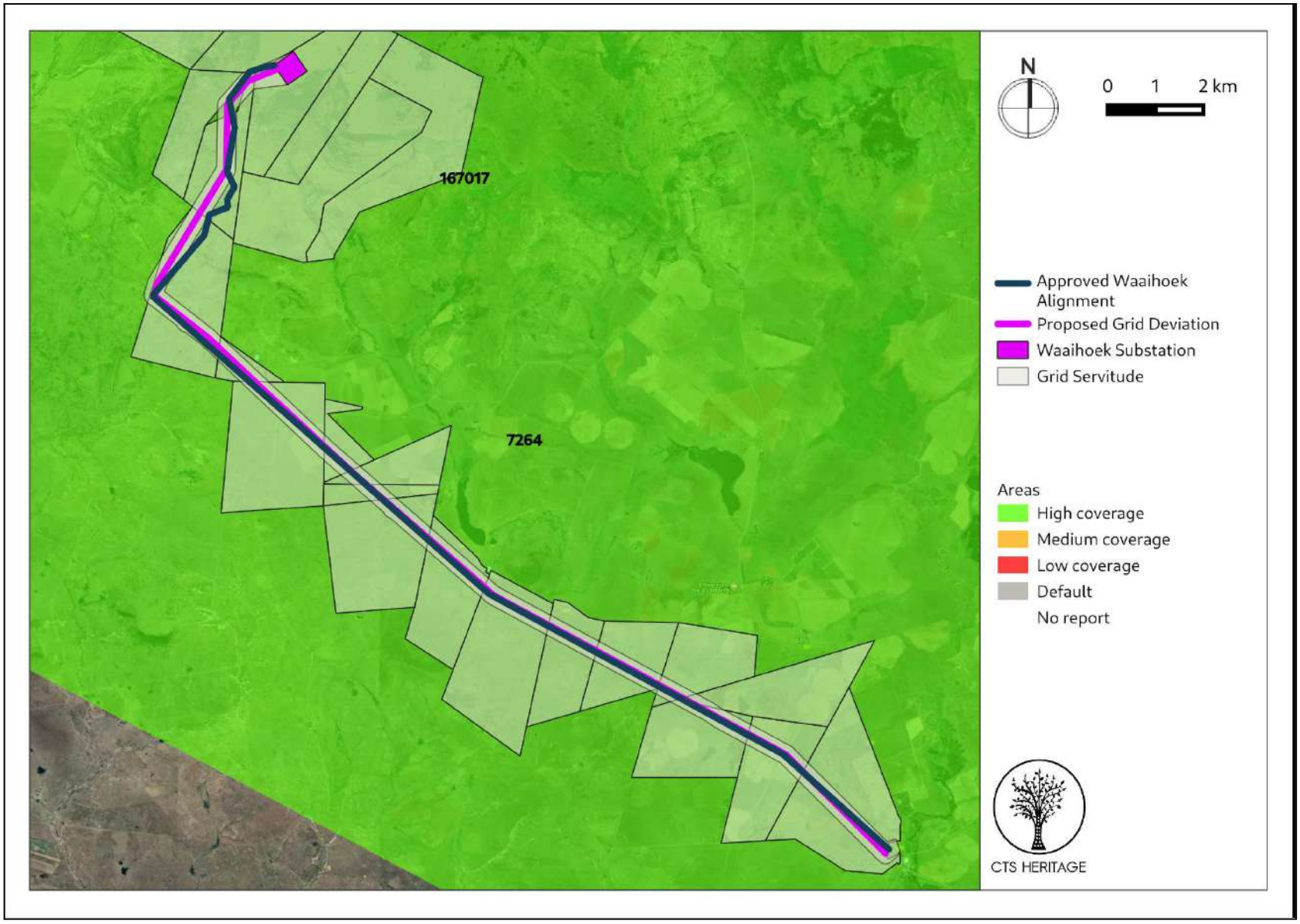

Figure 2. Previous HIAs Map. Previous Heritage Impact Assessments covering the proposed development area with SAHRIS NIDS indicated. Please see Appendix 2 for a full reference list.

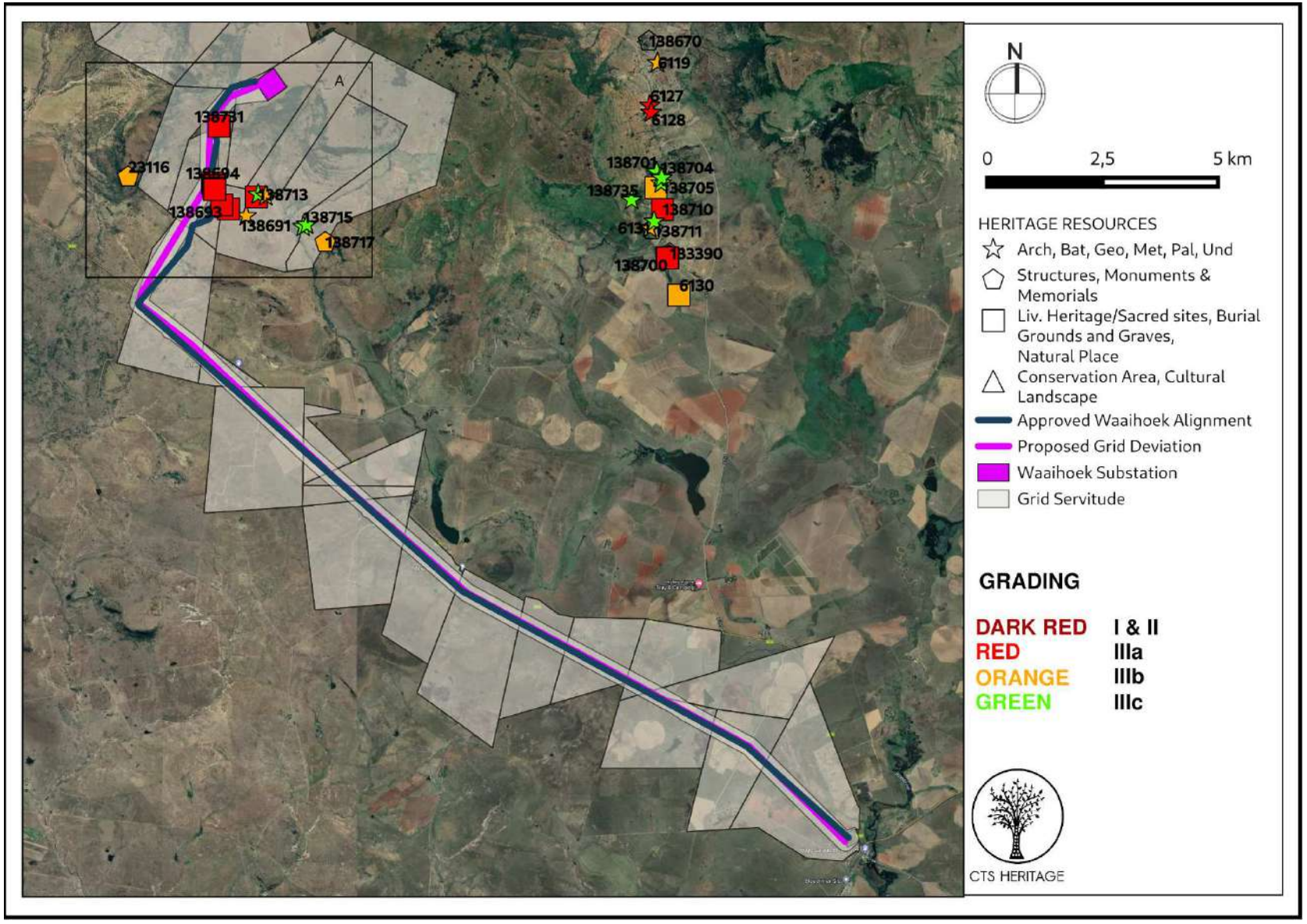

Figure 3. Heritage Resources Map. Heritage Resources previously identified within the study area, with SAHRIS Site IDs indicated. Please See Appendix 4 for full description of heritage resource types.

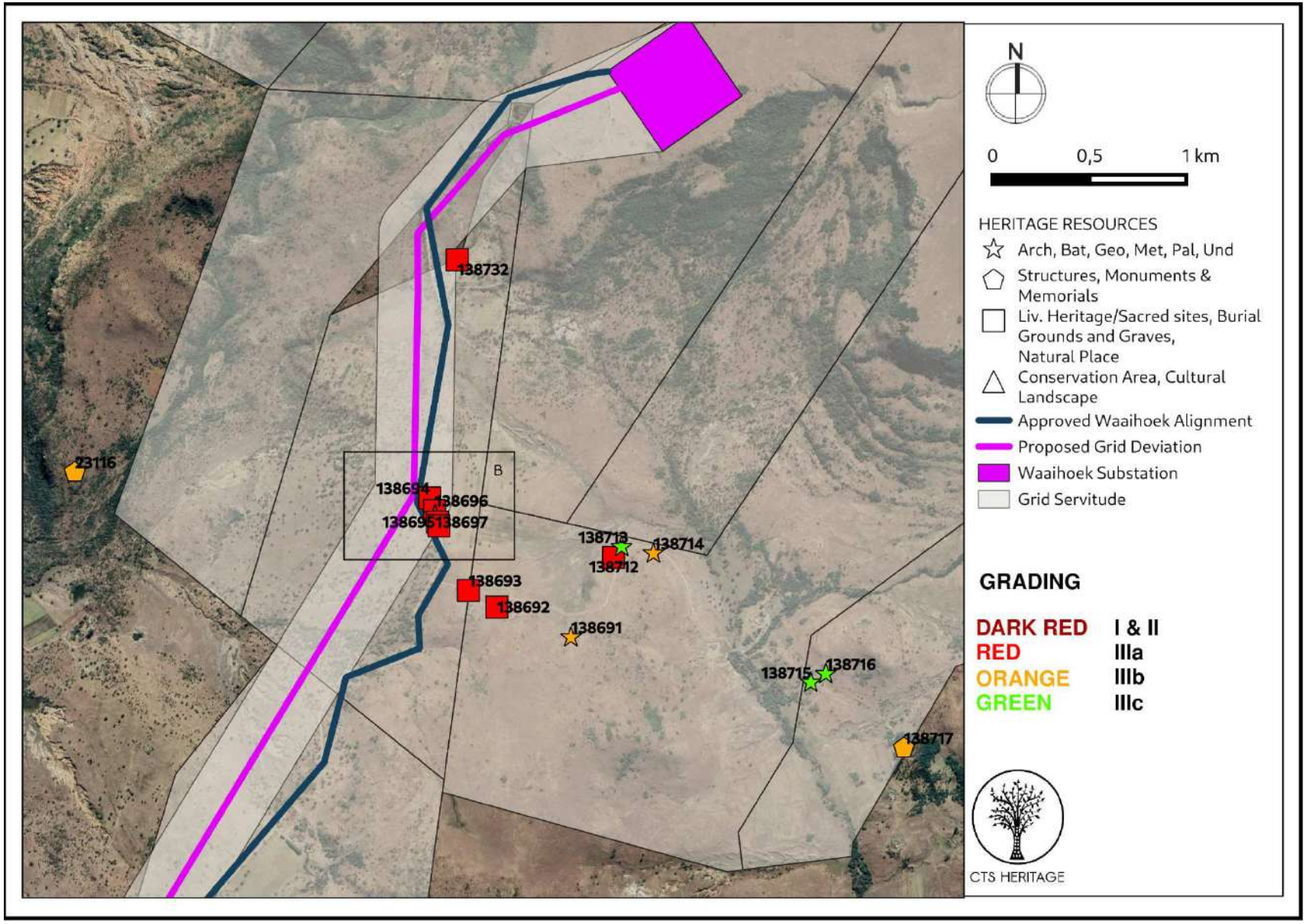

Figure 3a. Heritage Resources Map. Heritage Resources inset A

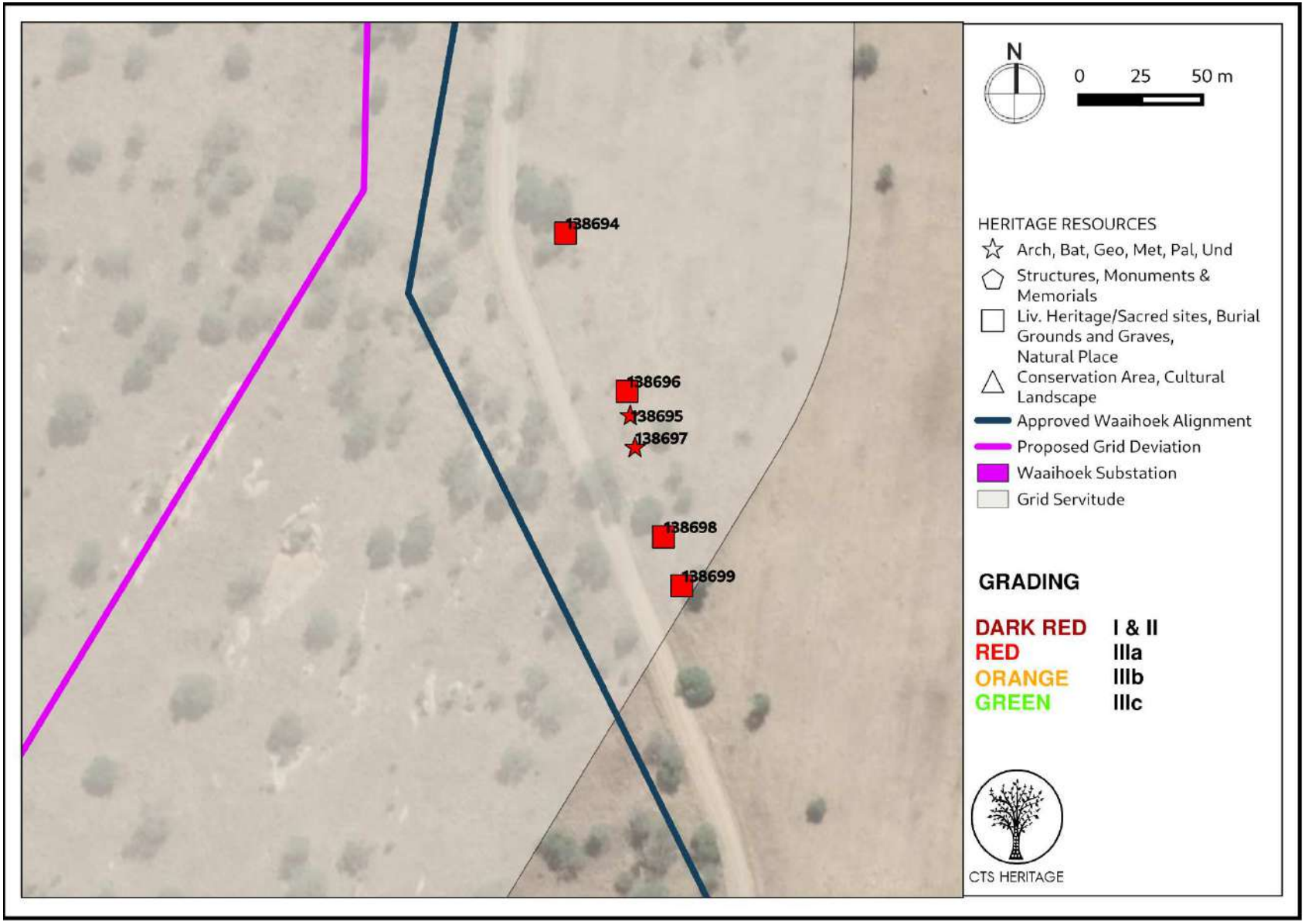

Figure 3b. Heritage Resources Map. Heritage Resources Inset B

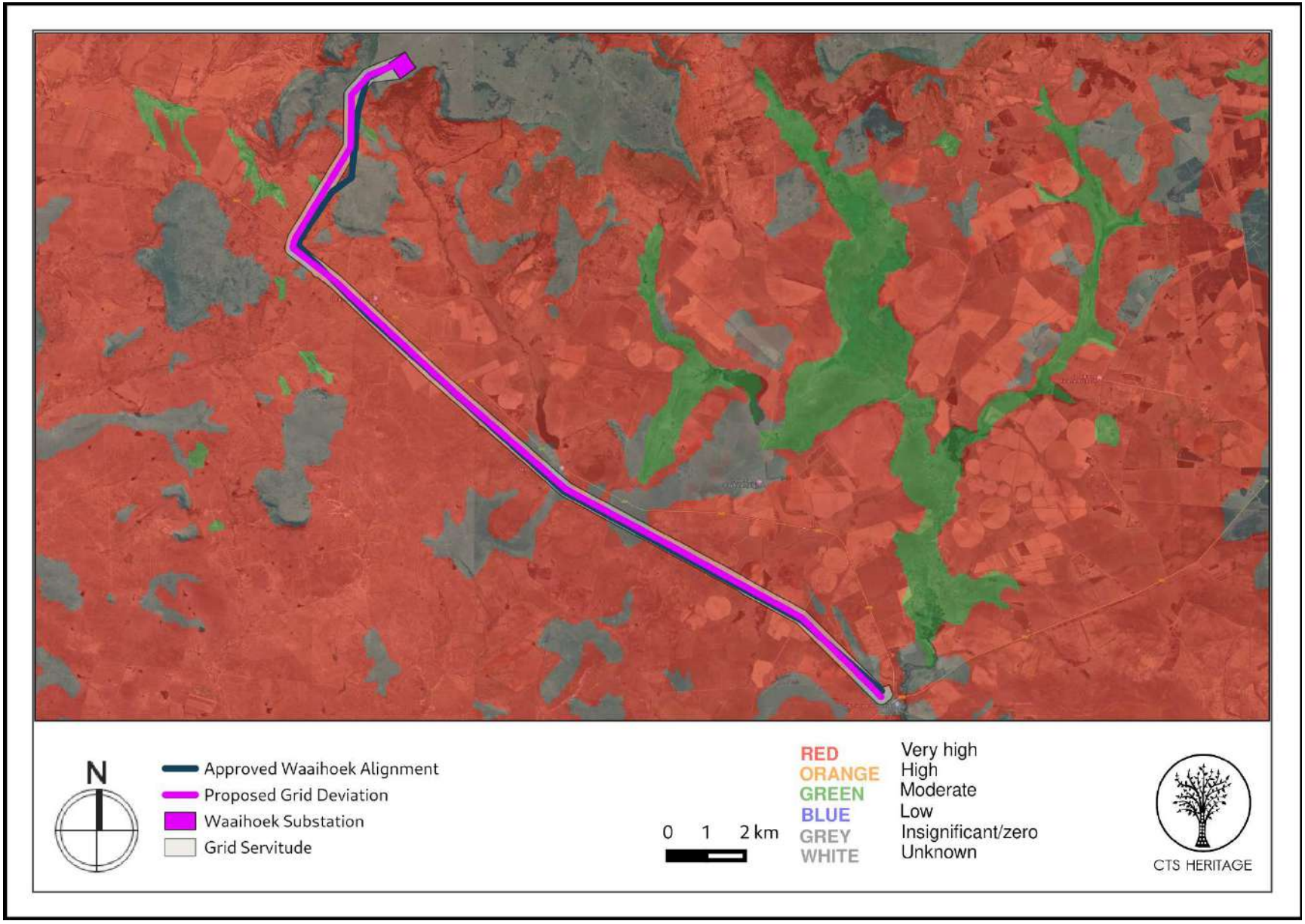

Figure 4a. Palaeosensitivity Map. Indicating fossil sensitivity underlying the study area. Please See Appendix 3 for a full guide to the legend.

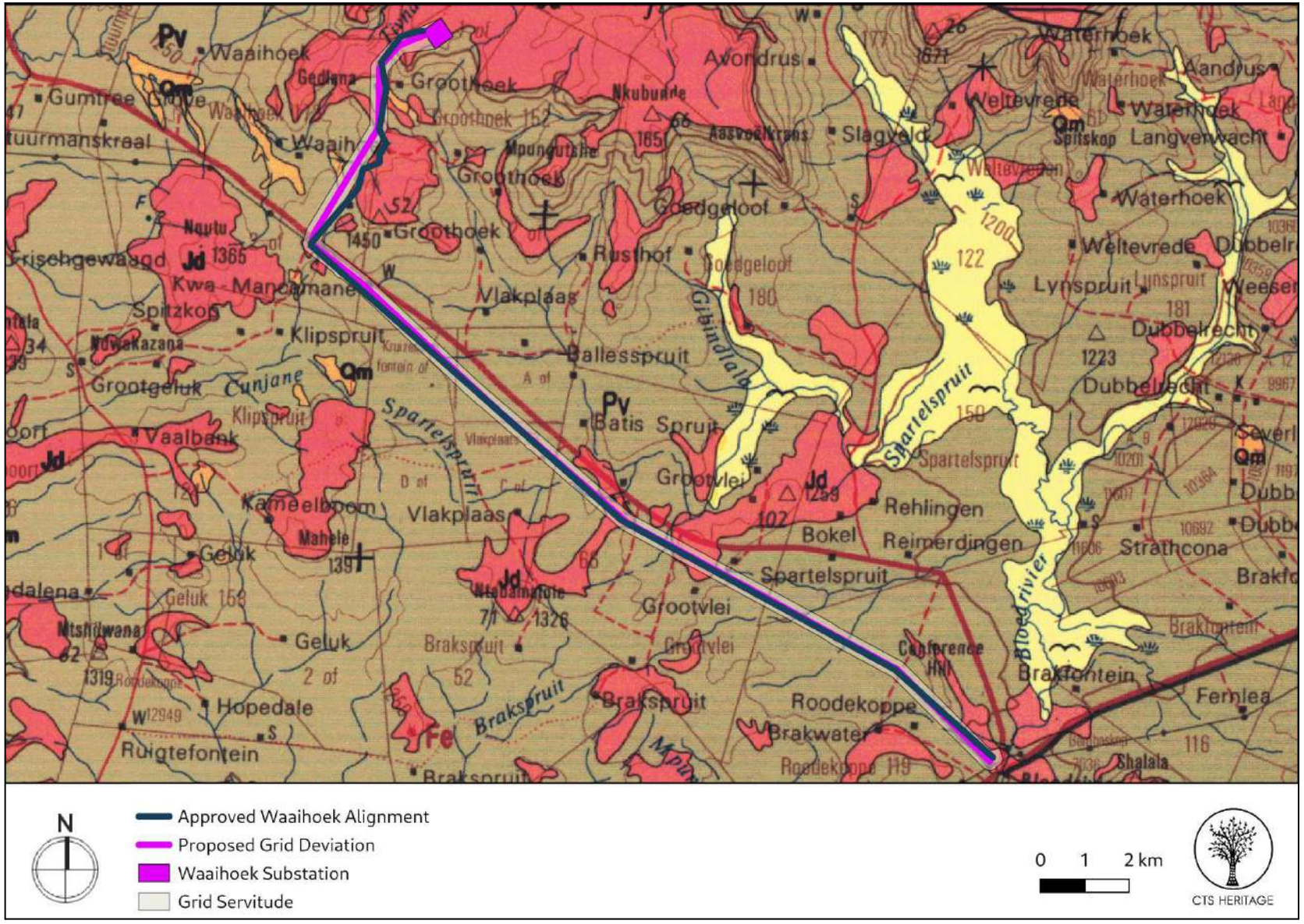

Figure 4b. Geology Map. Extract from the CGS 2730 Vryheid Map indicating that the development area is underlain by sediments of the Vryheid Formation (Pv) of the Ecca Group as well as non-fossiliferous Jurassic Dolerites (Jd).

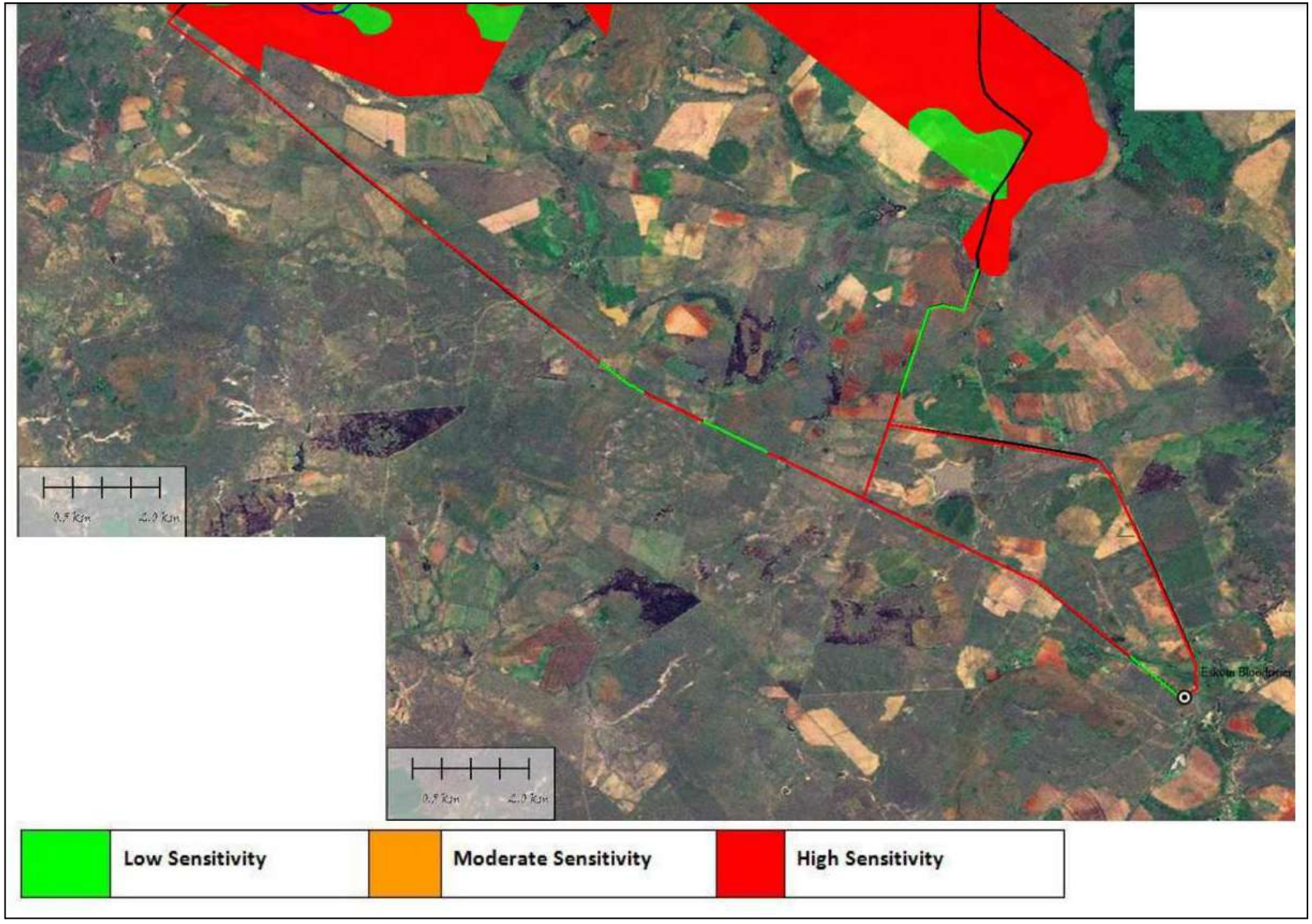

Figure 4c. Palaeontology Map. Extract from Figure 9.1 on page 26 of the PIA for the Waaihoek WEF (Groenewald, 2014)

8. Heritage Assessment

This application is for the proposed deviation to the approved grid connection infrastructure associated with the Waaihoek Wine Energy Facility. The approved Waaihoek Grid Connection corridor is located approximately 15km southeast of Utrecht in KZN. Utrecht began as a colonial settlement and independent republic formed by the farmers of the Great Trek in 1854 before forming part of the Zuid-Afrikaanse Republiek in 1860. The historic core of Utrecht retains some of its Victorian character. Prior to colonial settlement, this area formed part of the Zulu Kingdom and remains under the domain of Zulu Chiefs.

A comprehensive Heritage Impact Assessment was completed by Anderson and Anderson (2014, SAHRIS NID 167017) for the Waaihoek WEF. This assessment is referred to extensively below. According to Anderson and Anderson (2014), the study area has a rich archaeological and historical record. The known archaeological sites cover the entire Stone Age sequence, the Late Iron Age and the Historical Period. According to Anderson and Anderson (2014), “The history of the area before 1850 ACE has tended to be under exposed. The area has archaeological sites dating to the Late Iron Age from c. 1400 ACE. Prior to the Late Iron Age occupation of the area, there were gatherer-hunters living in the area. There sites were in open areas as well as overhangs. The main evidence for the gather-hunter occupation is in the form of rock paintings and stone tools that occur in the area. The rock paintings are mostly poorly preserved and of little significance. Some of the stone tools noted during the survey may date back to the Middle Stone Age, with a maximum age of 250 000 years ago”. The general area is also associated with the Voortrekkers, the Anglo-Zulu War and the Anglo-Boer War. Anderson and Anderson (2014) include a detailed extract of this history from Jones (2005) in their report and as such, it is not repeated here. Anderson and Anderson (2014) identified a number of heritage resources in their assessment for the Waaihoek WEF that are located in the vicinity of the proposed OHL deviation. These include battle sites including the Battle of Blood River and the Battle of Scheepers Nek as well as evidence of stone walling and burial sites. In the field assessment completed for the Waaihoek WEF, Anderson and Anderson (2014) noted that “there are very few settlements, or the remains thereof, on the upper plateau. This would be the southern part of the affected area (near to the proposed OHL deviation). These areas are rockier, have less sand and are more exposed to lightning strikes. When features do occur in these areas, they are either as stone walls or cattle kraals.” All of the known heritage resources identified by Anderson and Anderson (2014) have been mapped in Figure 3 and none of these resources will be negatively impacted by the proposed OHL deviation. However, the proposed OHL deviation alignment corridor was not assessed by Anderson and Anderson (2014) and as such, it is likely that, in an area that has this high level of archaeological significance, the proposed deviation may impact on significant archaeology.

According to the SAHRIS Palaeosensitivity Map, the area proposed for the OHL deviation is underlain by sediments of zero, moderate and very high palaeontological sensitivity (Figure 4a). According to the extract from the Council of Science Map for Vryheid 2730 (Figure 4b), the palaeontologically sensitive geology of the area is ascribed to the Vryheid Formation of the Ecca Group of sediments. Groenewald (2014, SAHRIS NID 167013) completed a field-based palaeontological assessment for the Waaihoek WEF. In this assessment, Groenewald (2014) notes that “The Vryheid Formation consists of interbedded very coarse-grained sandstone and mudstone that yields plant and trace fossils as well as some prominent coal seams.” In this assessment, Groenewald (2014) characterises the area proposed for the OHL deviation as having high sensitivity for impacts to palaeontology (Figure 4c). Groenewald (2014) recommends that “The PEA and CEO be made aware of the possibility of finding fossils in the Vryheid and Volksrust Formation sediments during excavation of the foundations for the turbines and other infrastructure. A professional palaeontologist is appointed to monitor possible palaeontological finds during excavation of turbine foundations and infrastructure where turbine positions and infrastructure fall on Vryheid and Volksrust Formation sediments.” It is recommended that these requirements also apply to the proposed OHL deviation due to its high sensitivity.

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APPENDIX 1

List of heritage resources within proximity of the proposed development (Figure 3)

Site ID	Site no	Full Site Name	Site Type	Grading
23116	AMAFA2000	Mooiplaats	Building	Grade IIIb
138691	WHK-021	WAAIHOEK	Stone walling	Grade IIIb
138692	WHK-022	WAAIHOEK	Stone walling, Burial Grounds & Graves	Grade IIIa
138693	WHK-023	WAAIHOEK	Burial Grounds & Graves, Stone walling	Grade IIIa
138694	WHK-024	WAAIHOEK	Burial Grounds & Graves	Grade IIIa
138695	WHK-025	WAAIHOEK	Stone walling	Grade IIIa
138696	WHK-026	WAAIHOEK	Burial Grounds & Graves	Grade IIIa
138697	WHK-027	WAAIHOEK	Stone walling	Grade IIIa
138698	WHK-028	WAAIHOEK	Burial Grounds & Graves	Grade IIIa
138699	WHK-029	WAAIHOEK	Burial Grounds & Graves	Grade IIIa
138712	WHK-042	WAAIHOEK	Burial Grounds & Graves, Settlement	Grade IIIa
138713	WHK-043	WAAIHOEK	Settlement	Grade IIIc
138714	WHK-044	WAAIHOEK	Stone walling	Grade IIIb
138715	WHK-045	WAAIHOEK	Stone walling	Grade IIIc
138716	WHK-046	WAAIHOEK	Stone walling	Grade IIIc

138717	WHK-047	WAAIHOEK	Building	Grade IIIb
138731	WHK-061	WAAIHOEK	Burial Grounds & Graves	
138732	WHK-061	WAAIHOEK	Burial Grounds & Graves	Grade IIIa

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APPENDIX 2

Reference List with relevant AIAs and PIAs

Heritage Impact Assessments				
Nid	**Report Type**	**Author/s**	**Date**	**Title**
167013	PIA Phase 1	Gideon Groenewald	18/03/2014	PALAEONTOLOGICAL IMPACT ASSESSMENT REPORT Waaihoek Wind Energy Facility (WEF) Utrecht, Kwa-Zulu Natal Province
167017	AIA Phase 1	Gavin Anderson, Louise Anderson	19/05/2014	HERITAGE SURVEY OF THE PROPOSED WAAIHOEK WIND ENERGY FACILITY, UTRECHT, KWAZULU-NATAL
7264	AIA Phase 1	Len van Schalkwyk	10/05/2006	Heritage Impact Assessment for the Majuba-Umfolozi 765 kV Transmission Line, in Mpumalanga and Kwazulu Natal

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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)
DEA	Department of Environmental Affairs (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 -Summary of Specialist Expertise

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 since 2016, and has a wealth of experience in the heritage management sector. Jenna's previous position as the Assistant Director for Policy, Research and Planning at Heritage Western Cape has provided her with an in-depth understanding of national and international heritage legislation. 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 100 Heritage Impact Assessments and Screening Assessments throughout South Africa.