

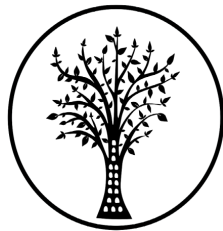
HERITAGE IMPACT ASSESSMENT

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

Proposed development of a cement factory, Middelburg, Eastern Cape

SAHRIS Ref:

Prepared by Jenna Lavin of

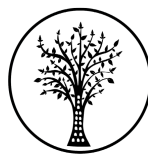


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For

Amathemba Environmental Consultants

January 2022



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EXECUTIVE SUMMARY

Concrete Units (Pty) Ltd is proposing the establishment and operation of a concrete batch plant and pre-cast facility to manufacture components for the towers of the new (approved) Noupoort wind farm cluster. The facility is proposed on Portion 11 of Farm Bultfontyn 128 in Middelburg, Eastern Cape, and will occupy a footprint of approximately 12 hectares and can be located within either the northern or the southern portion of the identified site area.

Palaeontology

The site for development is in the Quaternary sands and the Adelaide Subgroup. According to the updated Karoo biostratigraphy (Smith et al., 2020; Viglietti, 2020) the site lies in the Daptocephalus Assemblage Zone and in particular in the Lystrosaurus maccaigi – Moschorinus Subzone. Lithologically this is the upper Balfour Formation with the Elandsberg Member. The typical vertebrate fossils include fish, amphibians, parareptiles and therapsids (Viglietti, 2020). Typical plant fossils include mosses, sphenophytes, ferns, glossopterids, cordaitaleans and conifer wood (Anderson and Anderson, 1985; Bamford, 2004).

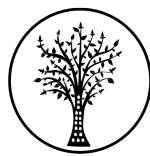
According to the SAHRIS Palaeosensitivity Map (Figure 3a), the area proposed for development is underlain by sediments of moderate sensitivity for the Quaternary sands (Option 1, south) and partly very high for the Adelaide Subgroup (Option 2, north). According to the new map (Appendix 3), the site is not close to the Permo-Triassic boundary (blue-yellow boundary). The palaeontological sensitivity of the area under consideration is presented in Figure 3a.

Quaternary sands do not preserve fossils but they might entrap fossils if there such features as palaeo-pans, palaeo-dunes or palaeo-springs but such features do not extend this far south (Goudie and Wells, 1995). Nor is any such feature visible on the satellite imagery (Figure 1c).

It should be noted that the topography for both options 1 and 2 is on flat land with low vegetation. With reference to Option 2 on the Adelaide Subgroup shales and mudstones, in general Karoo fossils are found on slopes where the underlying rocks are exposed and not covered by soils and alluvium so it is unlikely that fossils, if present, would be visible from the surface. With reference to Option 1 on the Quaternary sands, it is very unlikely that any fossils are present.

Archaeology

The archaeological survey was conducted on foot, and sought to comprehensively assess the presence and significance of archaeological occurrences within the two option areas for the facility (Options 1 and 2). The field assessment documented a substantial number of stone artefact scatters in secondary contexts, and a small



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number of stone features in close to primary context.

Cumulatively these finds suggest the area was occupied or traversed intermittently by Stone Age groups through periods in the Early Stone Age (ESA: ~2.6ma--~300ka), the Middle Stone Age (MSA: ~300ka: 30-40 ka), and the Later Stone Age (LSA: ~40ka- ~2ka), as well as potentially by groups in periods associated with herder and early historical occupations of the region (as indicated by the ephemeral stone structures <2 ka). The relatively more scientifically significant sites/finds are associated with locations MID8 and MID11, which have clear Fauresmith (later Acheulean) and early MSA components of lithics (prepared core technologies), as well as walling structures nearby which should be avoided.

High quality raw-material – indurated shale (hornfels) - was found within the footprint, indicating that the stone artefacts documented were manufactured within the vicinity of the area by prehistoric foragers. The raw-materials exploited were colluvial cobbles of hornfels, or hornfels sourced from primary outcrops which is evidenced by variation in the cortex (naturally weathered crusts) on the nodules and on the artefacts present in the documented sites.

All archaeological finds were documented in what appear to be *ex-situ* surface contexts. However, the absence of evidence for trampling of artefacts suggests that post-depositional effects on surface stone scatters may be only marginal in many locations. Further, the presence of artefacts that are currently deflating out of topsoils suggests that there may be sub-surface archaeological occurrences within the footprint. The potential for finding a preserved and dateable *in-situ* archaeological horizon based on surface observations, however, is low based on the absence of dateable organic materials and the bioturbated nature of sediments partially encompassing some of the artefacts. However the presence of sub-surface contextualized materials cannot be excluded as a possibility. Excavation associated with the development should therefore be aware of the potential for sub-surface archaeological materials.

Conclusion

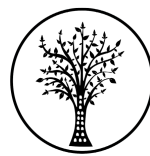
Although Option 2 is preferred in terms of impacts to archaeology, Option 1 is preferred in terms of impacts to palaeontology as well as by the developer. According to the developer, the results of the other specialist assessments also indicate that Option 1 is preferred for the development. Although the identified archaeological significance of the resources located within the Option 1 area is high (MID8 and MID11), impacts to these resources can be mitigated through:

- Permission from SAHRA to conduct the mitigation interventions
- the formal scientific recording and collection of the artefacts located at the surface
- scientific and systematic excavation of these sites if deemed necessary by the archaeologist
- Archaeological monitoring of development activity in the vicinity of the finds by an archaeologist

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- formal scientific write up of the findings for submission to SAHRA for approval

Additionally, suitable buffer areas must be implemented around the sites graded as IIIC (20m). Should Option 2 proceed, no excavation mitigation is recommended however it is possible that significant archaeological heritage may be located beneath the ground surface and may be impacted by the proposed development.

According to the Desktop PIA (Bamford, 2021), “Based on experience and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would be preserved in the soils and sands of the Quaternary. Therefore, Option 1 is the preferred choice for the cement plant as far as the palaeontology is concerned. However, the chance fossil finds protocol should be implemented due to the proximity to the Adelaide Subgroup and possible impacts to palaeontological heritage.

There is a very small chance that fossils may occur on the surface and a better chance of them being revealed once excavations for foundations have commenced (Option 2). On palaeontological grounds, Option 2 is not recommended. However, if for other reasons Option 2 is selected, then a fossil chance finds protocol is strongly recommended... As far as palaeontology is concerned, the project should be authorised.”

There is no objection to the proposed development in terms of impacts to heritage resources on condition that:

Should Option 1 be implemented;

- the mitigation recommended above must be implemented for sites MID8 and MID 11 including surface collection of artefacts and monitoring of development activities in the area
- a 20m no-go development buffer must be implemented around sites MID2_2 and MID3
- Should any buried archaeological resources or human remains or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.

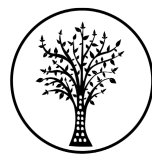
Should Option 2 be implemented;

- a 20m no-go buffer must be implemented around site MID12
- The attached Chance Fossil Finds Procedure is implemented for the duration of construction activities
- Should any buried archaeological resources or human remains or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.

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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 on the Executive Committee 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 80 Heritage Impact Assessments throughout South Africa.

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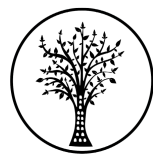
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1. INTRODUCTION

1.1 Background Information on Project

Concrete Units (Pty) Ltd is proposing the establishment and operation of a concrete batch plant and pre-cast facility to manufacture components for the towers of the new (approved) Noupoort wind farm cluster. The facility is proposed on Portion 11 of Farm Bultfontyn 128 in Middelburg, Eastern Cape, and will occupy a footprint of approximately 12 hectares and can be located within either the northern or the southern portion of the identified site area.

These two footprint alternatives will be considered in the Basic Assessment process. The project itself does not constitute a wind energy facility. It involves the construction of pre-cast concrete panels that will be used for the off-site assembly of towers for wind turbines. The proposed facility will comprise of the following key operational areas:

- Site facilities area that will house the administrative offices, ablutions, etc.
- Concrete batch plant area where the cement and aggregate silos / stores will be located and where the concrete will be mixed.
- Warehouse and other raw material (e.g. steel rebars, tying wire) storage area, including the waste management area where waste will be temporarily stored prior to removal off site for disposal.
- Reinforcement and precast area where the cut and bend steel rebars will be assembled into cages and placed into cleaned and oiled moulds with the concrete to cure and set into the required panels.
- Panel storage area from where panels will be loaded onto trucks for delivery to the various approved wind energy facilities in the region.

Associated infrastructure will include internal roadways, stormwater management measures, pipelines to transport water from the existing borehole on the property to the facility and diesel generators that will be used to generate the electricity required by the facility. Diesel storage facilities will therefore also be required. Pipeline and fuel storage infrastructure will however not meet the thresholds considered in related listed activities.

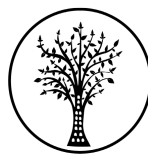
Access to the site will be gained via an existing gravel road (DR02589) that leads off the N9 highway. Upgrades may be required to the access road to accommodate the trucks that will transport the concrete panels to the wind energy facilities. This is currently being deliberated by the appointed traffic engineers, however the engineers confirmed that required upgrades (if needed), will not constitute any of the road related listed activities.

The facility will not be a permanent installation as it will operate only as long as construction on the Noupoort wind farm cluster is ongoing. Given that three of the 5 wind farms in the area have already been awarded to EDF (the renewable power producer that will utilise the concrete panels from the facility), it is anticipated that

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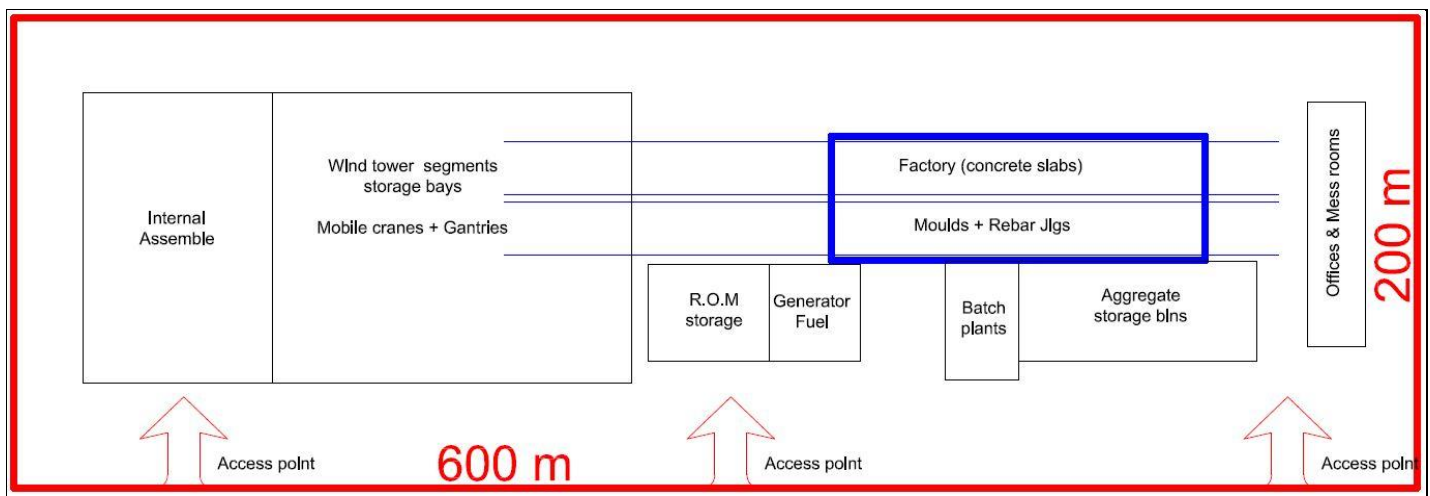
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operations on site will last for approximately 3 years. However, to allow for the potential of the other two projects being awarded in the next renewable energy BID rounds, application will be made for the facility to operate for 5 years. This will be followed by a decommissioning phase, during which time the facility will be closed, structures will be demolished, and rehabilitation will take place. This will all form part of the scope of the application.

The Basic Assessment Report will include more details on the manufacturing process itself. Structures and infrastructure will comprise of cement silos, aggregate stores, batch plant, warehouse structure for pre-cast activities, admin offices, laydown / storage areas, fuel store and generators, sewage and stormwater infrastructure, etc.

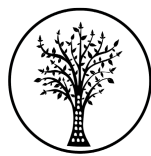


Proposed development layout

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1.2 Description of Property and Affected Environment

The footprint of the proposed concrete batch plant and pre-cast facility as well as its associated infrastructure is located across several agricultural camps approximately 6.09 km south-south-east of the town of Middelberg, in the Eastern Cape Province of South Africa.

Arid and semi-arid Nama-Karoo shrub and grassland typical of the Nama-Karoo Biome are prevalent throughout the two options for the footprint of the facility (Options 1 and 2). The survey was conducted in December (2021) at the beginning of the summer rainfall season, when average regional monthly precipitation is significantly higher than in the preceding April-October. Thus moderate vegetation coverage due to recent rains was evident during the survey (see also **Constraints and Limitations**). The two option areas have a gradually undulating topography. Both options have reasonable archaeological visibility, but have significant differences in the presence of archaeological material. In locations more exposed to grazing, the initiation of marginal donga formation is evident where vegetation has been completely removed. Although evidence of grazing and animal activity is evident across much of the potential development footprint, bioturbation of the topsoil through stock aggregation appears to be minimal.

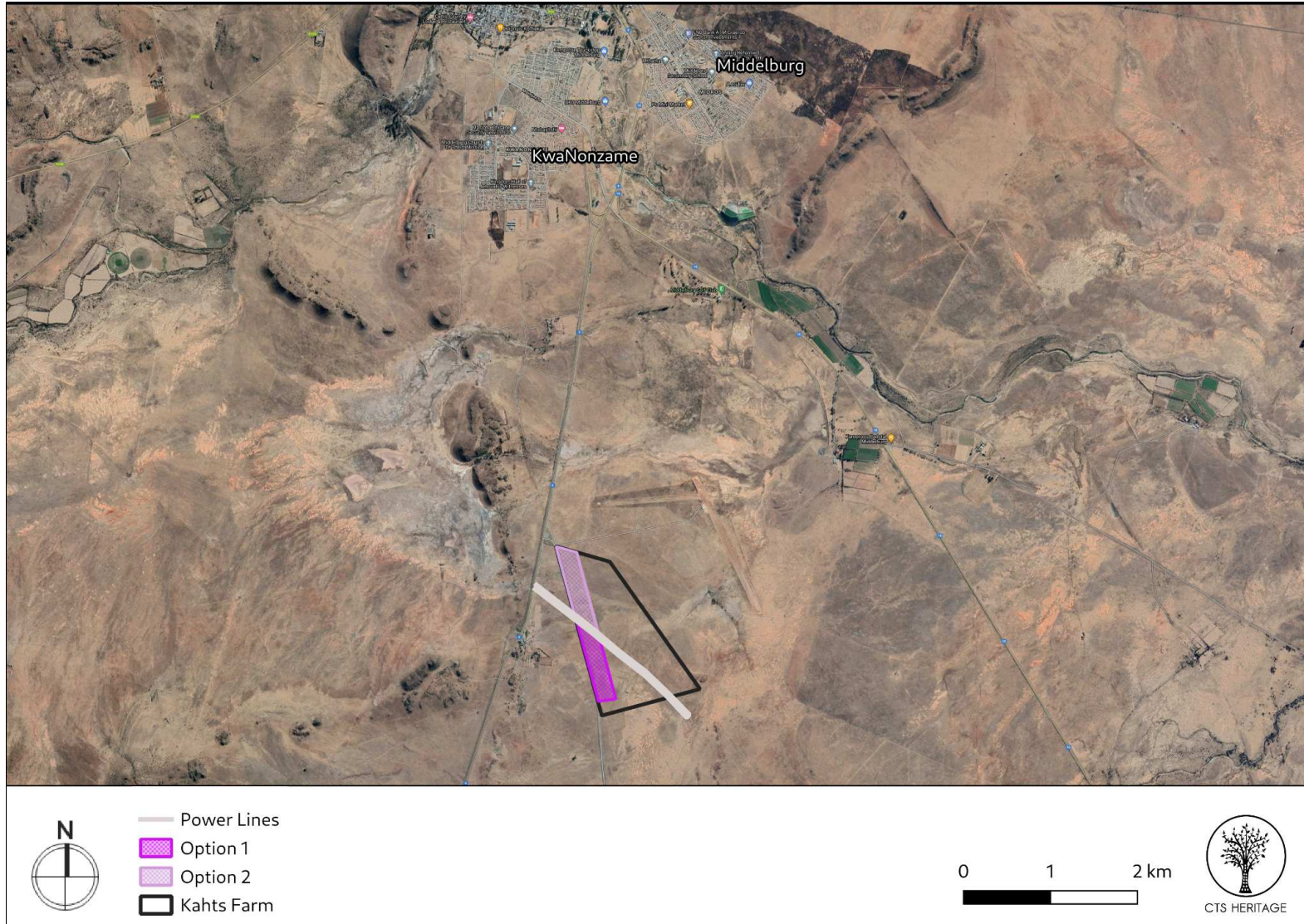
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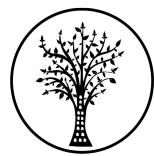
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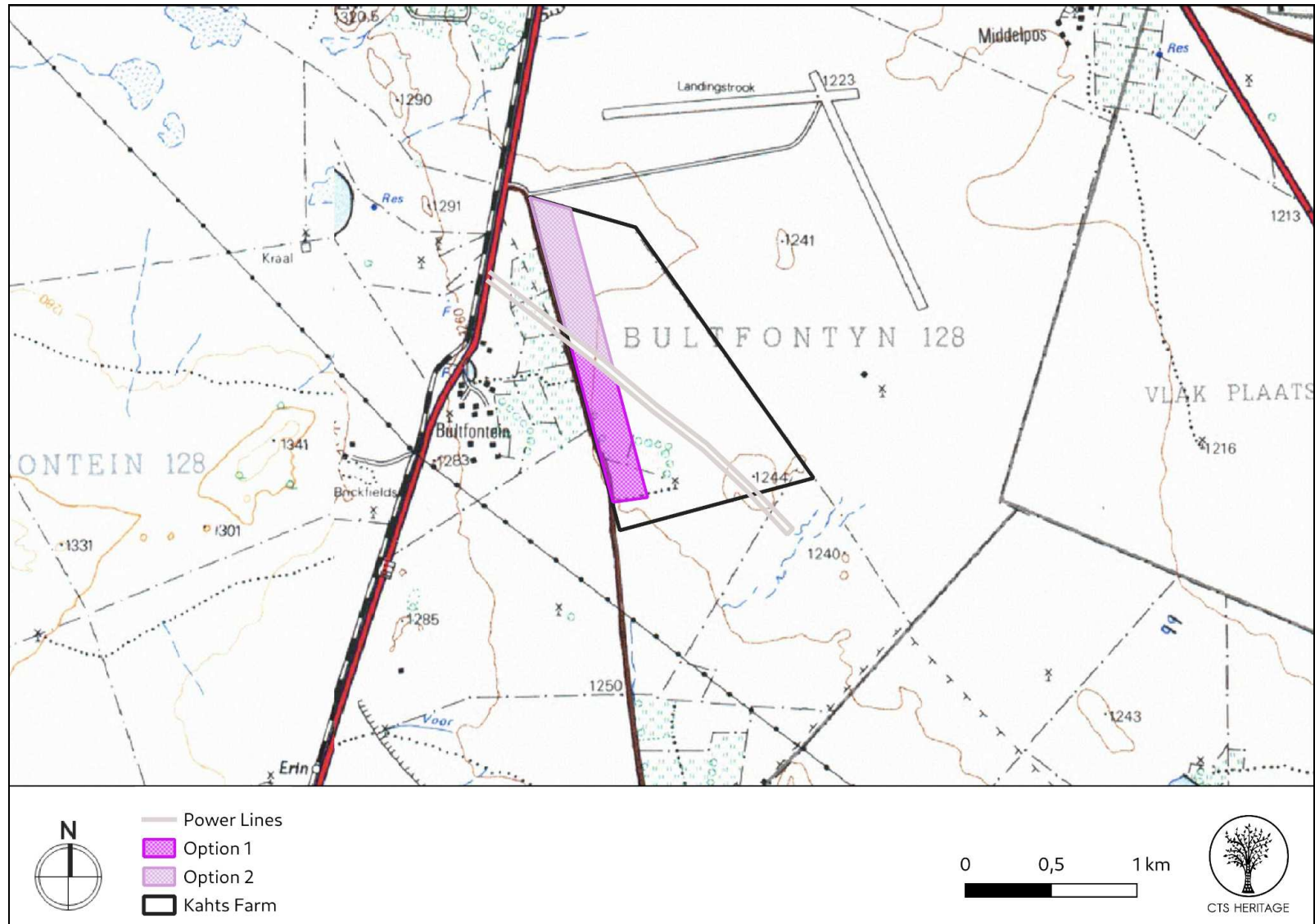
Map 1a: The proposed development relative to Middelburg

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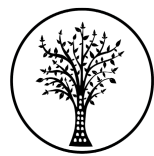
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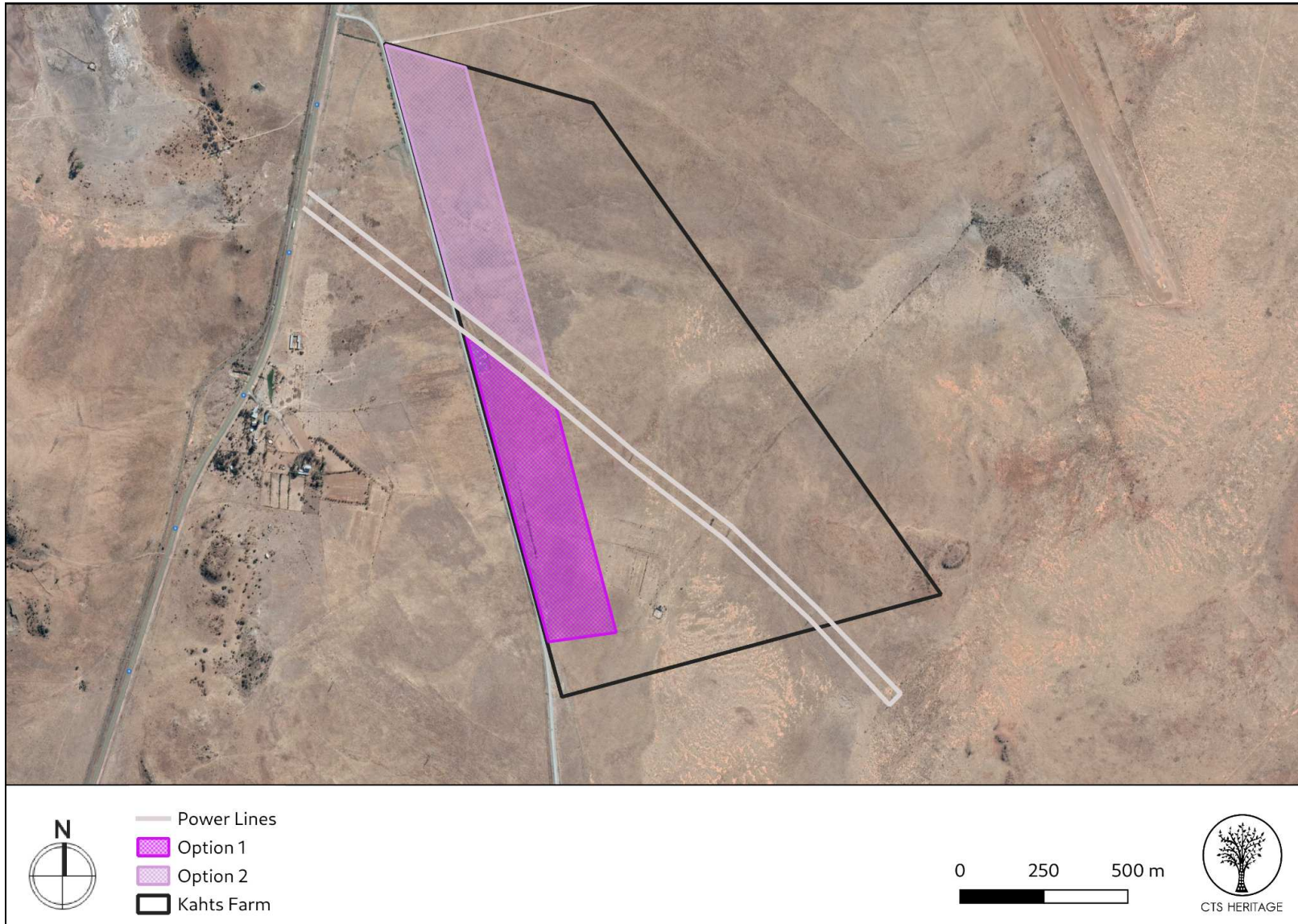
Map 1b: The proposed development area reflected on the 1:50 000 Topo Map

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Map 1c: The proposed layout area

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2. METHODOLOGY

2.1 Purpose of HIA

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

2.2 Summary of steps followed

- A Desktop Study was conducted of relevant reports previously written (please see the reference list for the age and nature of the reports used) (Appendix 1)
- Two archaeologists conducted a survey of the site and its environs on 19 December 2021 for approximately 8 hours to determine what archaeological resources are likely to be impacted by the proposed development (Appendix 2)
- A desktop palaeontological assessment was completed (Appendix 3)
- The identified resources were assessed to evaluate their heritage significance
- Alternatives and mitigation options were discussed with the Environmental Assessment Practitioner

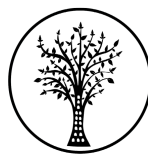
2.3 Assumptions and uncertainties

- 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

The survey was conducted on the 19th of December, 2021 at the start of the summer rainfall season. Scattered lightning storms inhibited foot survey for brief periods throughout the day. Although the entirety of the footprint was comprehensively surveyed, conditions in terms of lighting - with regard to identifying ephemeral surface archaeology - were not optimal when there was substantial cloud cover (Fig. 4.2).



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In the southern portions of the footprint that appear to have been utilized recently for stock farming/grazing, grass and bush cover moderately thick in several places, making surveying ground level archaeological exposures more challenging, although substantial archaeological occurrences were documented nonetheless. We are thus confident that the archaeological sensitivity and scientific potential of the project area has been comprehensively assessed.

3. HISTORY AND EVOLUTION OF THE SITE AND CONTEXT

3.1 Desktop Assessment

Cultural Landscape

The area proposed for development is located approximately 6km south of Middelburg in the Eastern Cape. In 1837 the Cape Colony government proclaimed the district of Colesberg, and established the Town of Middelburg in 1852, so named since it is midway between Graaff-Reinet and Colesberg. (It is also approximately halfway between Port Elizabeth and Bloemfontein, as well as between Johannesburg and Cape Town.) The town and surrounding areas are rich in history from the Anglo Boer War. In addition, prior to colonial settlement, the Middelburg area would have been home to Stone Age peoples as evidenced by Early, Middle and Later Stone Age (ESA, MSA and LSA) artefacts found in the area and later, Khoe herders and San hunter-gatherers. Rock art has been identified in the broader Middelburg area, and the Sneeuwberg range to the south of Middelburg, was a haven for the San where they hunted and gathered plants, bulbs and fruit for food.

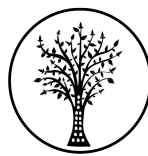
Archaeology and Built Environment Heritage

Booth (2012) completed an HIA for a nearby project (SAHRIS ID 384513, Figure 2). Booth (2012) notes that “The Albany Museum database includes records of occurrences of Acheulian handaxes between Middelburg and the Camdeboo National Park near Graaff Reinet, Sampson (1985) located a large number of sites and there is also a collection in the Albany Museum from the Cradock area.” Booth (2012) also notes that “The Albany Museum database holds records of the occurrence of Middle Stone Age stone artefacts around the Cradock area and the Department of Archaeology has curated Middle Stone Age stone artefacts in its collection from the Cradock area including Highlands Rock Shelter excavated by H.J. Deacon during the 1970’s. Relevant archaeological impact assessments conducted by the Archaeology Contracts Office of the National Bloemfontein Museum in 2006 (Van Ryneveld & Koortzen 2006) and the Albany Museum in 2008 have recorded surface scatters of Middle Stone Age stone artefacts in the Cradock vicinity (Binneman & Booth 2008). Middle Stone Age stone artefacts (long blades and points) are found throughout the region, but because these are found in the open areas it is difficult to know where they fit into the cultural time sequence. At Highlands Rock Shelter MSA stone artefacts, possibly a Howieson’s Poort Industry, was dated older than 30 000 years (Deacon 1976). Sampson on the other hand reported many open-air MSA sites which he assigned to the Orangian Industry (dating between 128 000 - 75 000 years old), Florisbad and Zeekoegat Industries dating between 64 000 and 32 000 years old.” In her assessment,

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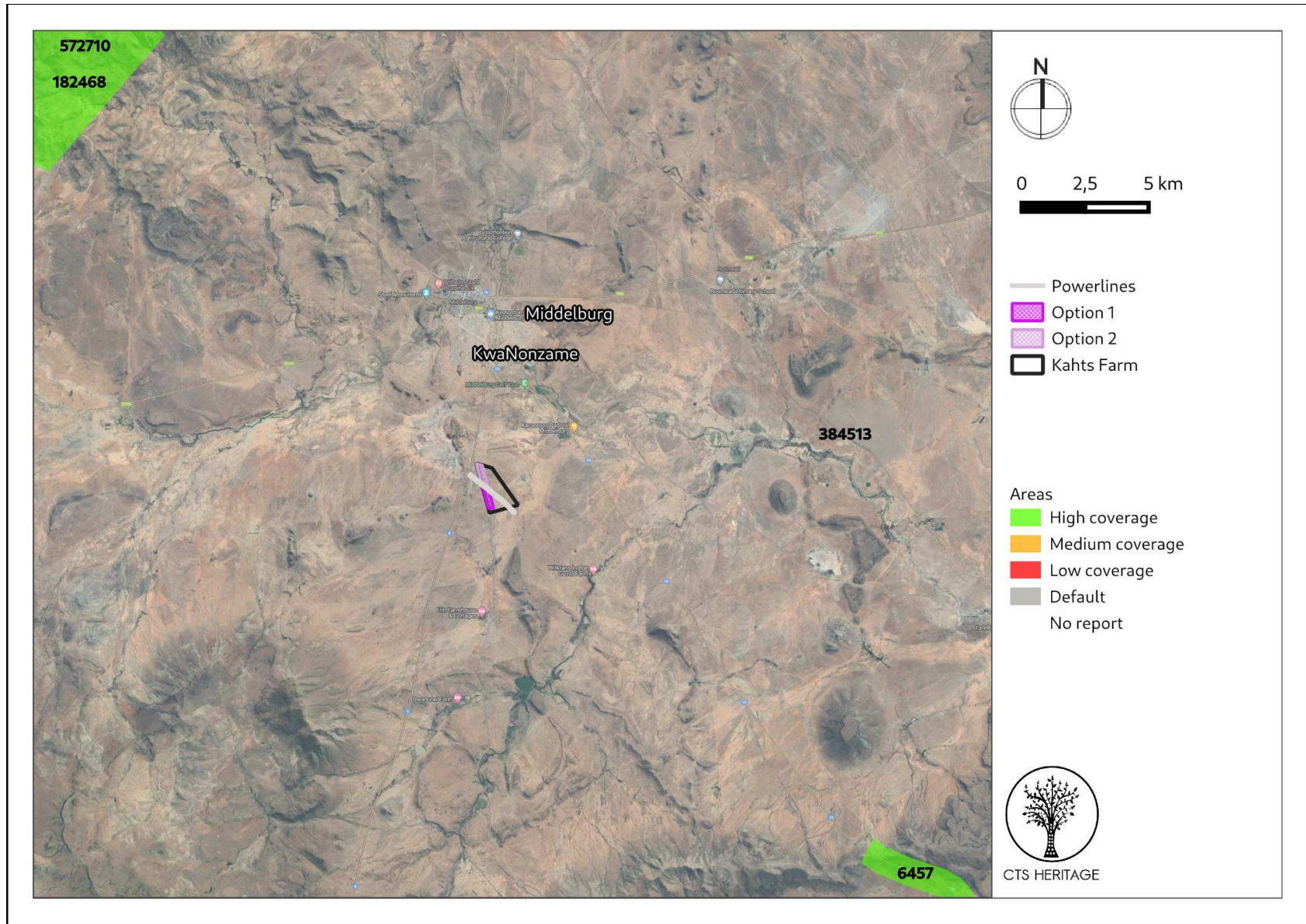
Booth (2012) identified predominantly MSA artefacts within the area surveyed in her assessment, most of which are not in situ. It is likely that similar archaeological heritage is present within the area proposed for the development of the cement factory.

3.2 Palaeontology

According to the SAHRIS Palaeosensitivity Map (Figure 5), the area proposed for development is underlain by sediments of moderate (Option 1) and very high (Option 2) palaeontological sensitivity. According to the extract from the Council of Geoscience Map for Middelburg, the development area is underlain by the Adelaide Formation (very high). According to a report by Gess (2012, SAHRIS ID 384514), “The uppermost Balfour Formation (Adelaide Subgroup, Beaufort Group, Karoo Supergroup) mudstones within the area comprise the Palingkloof Member. The Permian boundary is situated within the Palingkloof Member, apparently at the top of the first purple mudstone. The Permian boundary reflects a massive extinction event that decimated life. In the Karoo Basin it is reflected in the biotic changes separating the underlying Dicynodon from the overlying Lystrosaurus assemblage Zones. The after effects of this extinction event led to a change in sedimentary patterns, possibly due to the extinction of the dominant Glossopteris flora. A change from meandering river systems to more high energy braided river systems is reflected in a change in lithology from the mudstone dominated upper Balfour Formation to the sandstone dominated lithology of the Katberg Formation (lower Tarkastad Subgroup, Beaufort Group, Karoo Supergroup).” As such, Option 2 is not preferred in terms of potential impacts to palaeontological heritage. Option 1 is underlain by Quaternary sands which is far less sensitive for impacts to palaeontological heritage.



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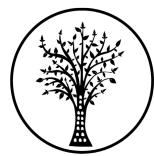


Map 2a: Spatialisation of heritage assessments conducted in proximity to the broader study area

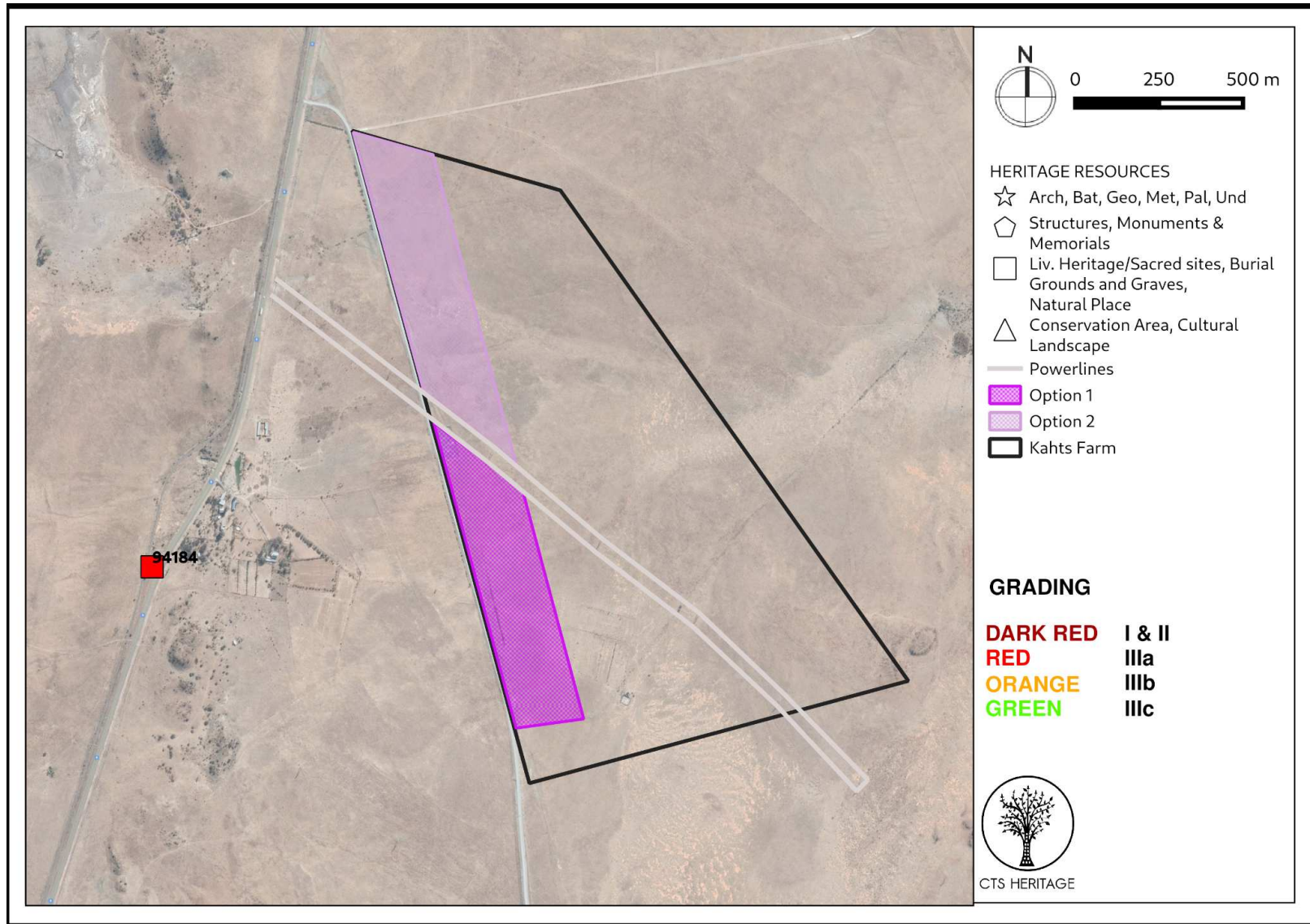
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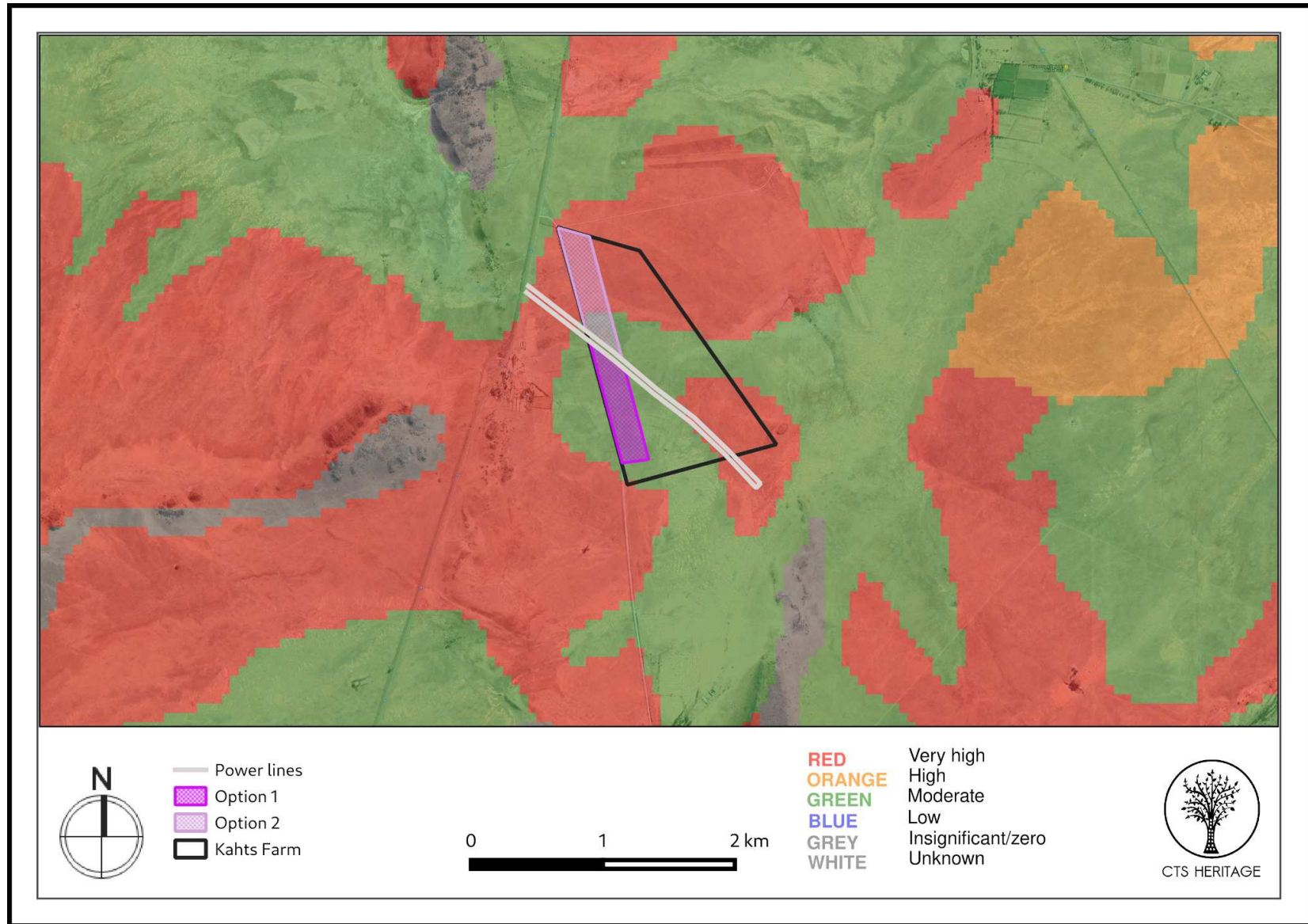
Map 2b: Spatialisation of heritage resources known in proximity to the broader study area

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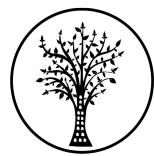


Map 3a: Palaeontological sensitivity of the area surrounding the broader study area

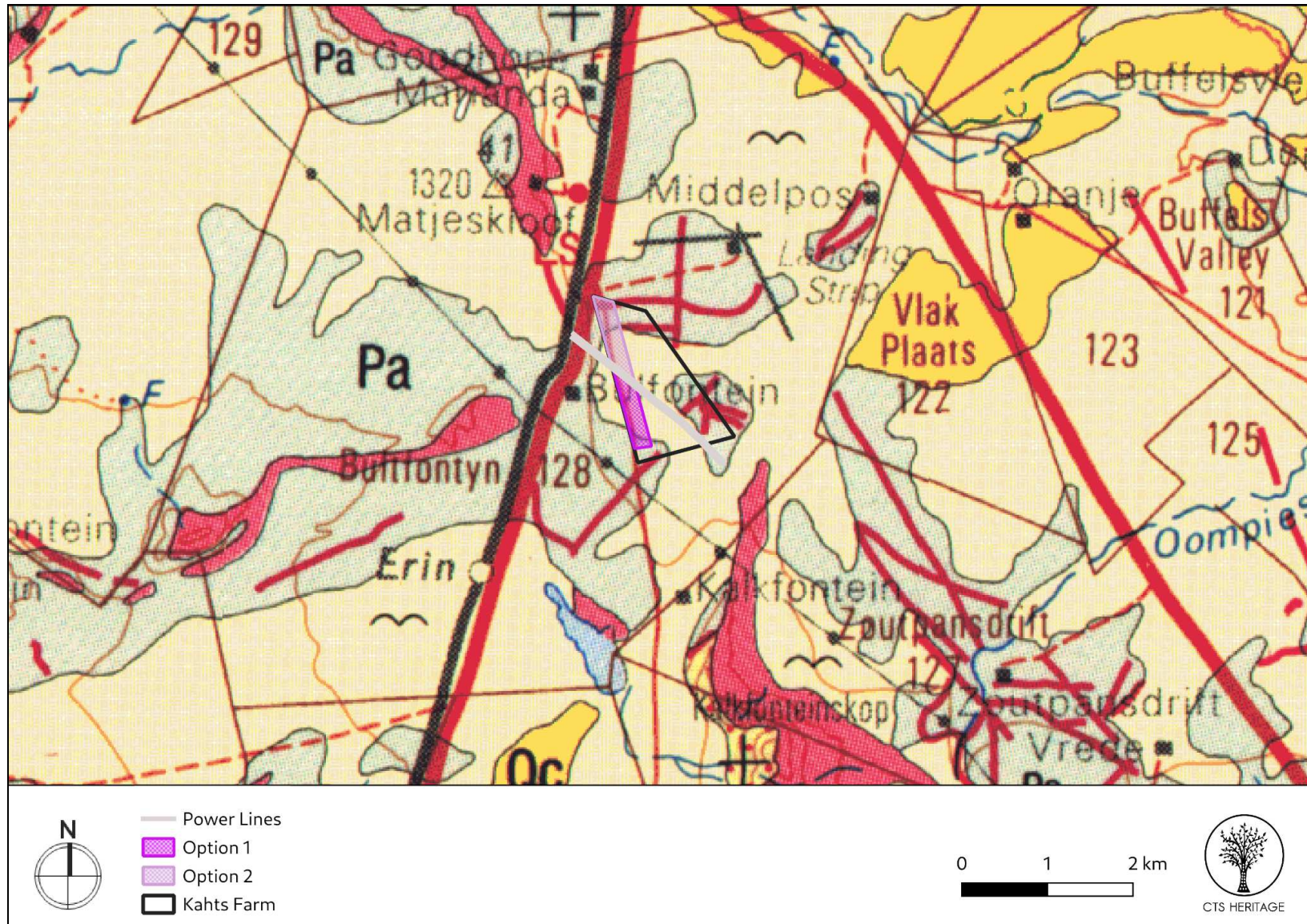
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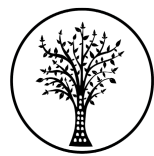
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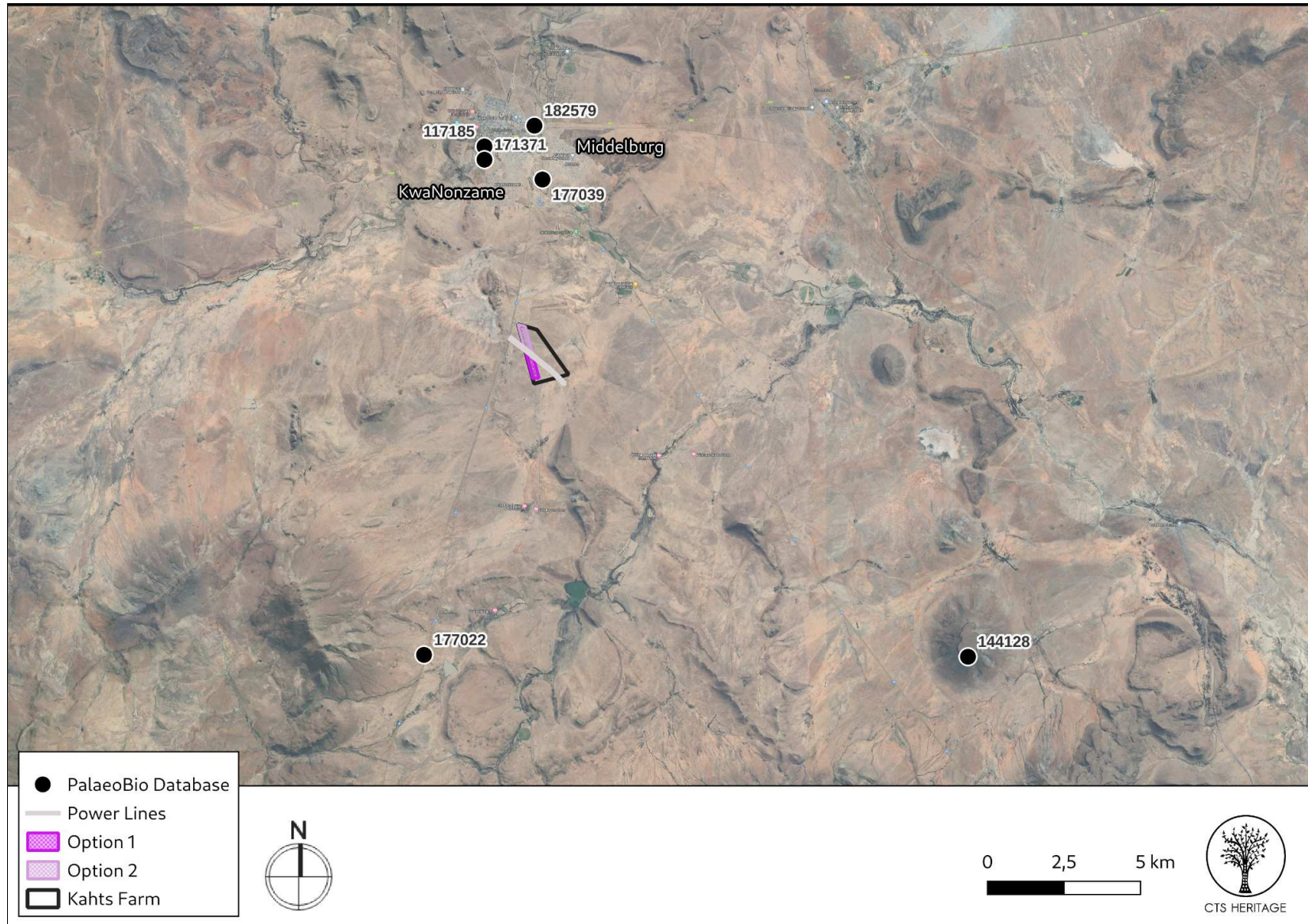
Map 3b: Geology Map. Indicating the underlying geology across the study area through overlaying the geology maps from the CGS series 3124 Middelburg - Pa: Adelaide Formation of the Beaufort Group of the Karoo Subgroup and Quaternary Sands

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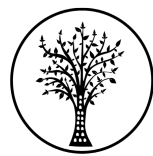


Map 3c. Map of known Palaeontological Sites. Extracted from the Palaeobiology Database (PBDB - <https://paleobiodb.org/#/>) More detail in Appendix 1

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4. IDENTIFICATION OF HERITAGE RESOURCES

4.1 Summary of findings of Specialist Reports

Palaeontology

The site for development is in the Quaternary sands and the Adelaide Subgroup. According to the updated Karoo biostratigraphy (Smith et al., 2020; Viglietti, 2020) the site lies in the Daptocephalus Assemblage Zone and in particular in the Lystrosaurus maccaigi – Moschorinus Subzone. Lithologically this is the upper Balfour Formation with the Elandsberg Member. The typical vertebrate fossils include fish, amphibians, parareptiles and therapsids (Viglietti, 2020). Typical plant fossils include mosses, sphenophytes, ferns, glossopterids, cordaitaleans and conifer wood (Anderson and Anderson, 1985; Bamford, 2004).

According to the SAHRIS Palaeosensitivity Map (Figure 3a), the area proposed for development is underlain by sediments of moderate sensitivity for the Quaternary sands (Option 1, south) and partly very high for the Adelaide Subgroup (Option 2, north). According to the new map (Appendix 3), the site is not close to the Permo-Triassic boundary (blue-yellow boundary). The palaeontological sensitivity of the area under consideration is presented in Figure 3a.

Quaternary sands do not preserve fossils but they might entrap fossils if there such features as palaeo-pans, palaeo-dunes or palaeo-springs but such features do not extend this far south (Goudie and Wells, 1995). Nor is any such feature visible on the satellite imagery (Figure 1c).

It should be noted that the topography for both options 1 and 2 is on flat land with low vegetation. With reference to Option 2 on the Adelaide Subgroup shales and mudstones, in general Karoo fossils are found on slopes where the underlying rocks are exposed and not covered by soils and alluvium so it is unlikely that fossils, if present, would be visible from the surface. With reference to Option 1 on the Quaternary sands, it is very unlikely that any fossils are present.

Archaeology

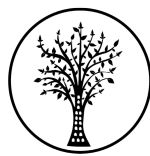
The archaeological survey was conducted on foot, and sought to comprehensively assess the presence and significance of archaeological occurrences within the two option areas for the facility (Options 1 and 2). The field assessment documented a substantial number of stone artefact scatters in secondary contexts, and a small number of stone features in close to primary context.

Cumulatively these finds suggest the area was occupied or traversed intermittently by Stone Age groups through periods in the Early Stone Age (ESA: ~2.6ma--~300ka), the Middle Stone Age (MSA: ~300ka: 30-40 ka), and the Later Stone Age (LSA: ~40ka- ~2ka), as well as potentially by groups in periods associated with herder and early historical occupations of the region (as indicated by the ephemeral stone structures <2 ka). The relatively more

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scientifically significant sites/finds are associated with locations MID8 and MID11, which have clear Fauresmith (later Acheulean) and early MSA components of lithics (prepared core technologies), as well as walling structures nearby which should be avoided.

High quality raw-material - indurated shale (hornfels) - was found within the footprint, indicating that the stone artefacts documented were manufactured within the vicinity of the area by prehistoric foragers. The raw-materials exploited were colluvial cobbles of hornfels, or hornfels sourced from primary outcrops which is evidenced by variation in the cortex (naturally weathered crusts) on the nodules and on the artefacts present in the documented sites.

All archaeological finds were documented in what appear to be *ex-situ* surface contexts. However, the absence of evidence for trampling of artefacts suggests that post-depositional effects on surface stone scatters may be only marginal in many locations. Further, the presence of artefacts that are currently deflating out of topsoils suggests that there may be sub-surface archaeological occurrences within the footprint. The potential for finding a preserved and dateable *in-situ* archaeological horizon based on surface observations, however, is low based on the absence of dateable organic materials and the bioturbated nature of sediments partially encompassing some of the artefacts. However the presence of sub-surface contextualized materials cannot be excluded as a possibility. Excavation associated with the development should therefore be aware of the potential for sub-surface archaeological materials.

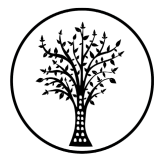


Figure 4.1: Example of optimal visibility area with a high density of archaeological finds, mostly stone tools.

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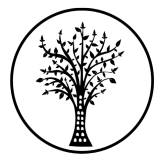
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Figure 4.2: Poor visibility where substantial shrub and grass cover has inhibited survey.



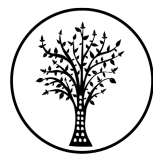
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Figure 4.3: Area with good visibility and low densities of archaeological finds.

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4.2 Heritage Resources identified

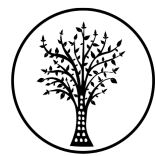
Table 1: Significant heritage resources identified in the study area (see Archaeology Report for comprehensive list)

Site No.	Site Name	Option	Description	Density m ²	Period	Co-ordinates		Grading	Mitigation
3	MID2_2	1	Historical structure, possibly remnants of a kraal. Overlaps with MSA artefacts. Possible structure is unclear and poorly preserved.	NA	Historical	31,56206	25,01626	IIIC	20m Buffer
4	MID3	1	Historical structure, possibly remnants of a kraal.	NA	Historical	31,56306	25,0173	IIIC	20m Buffer
9	MID8	1	A concentration of Acheulean-Fauresmith artefacts eroding on the surface due to bioturbation.	~4-20/m ²	later ESA	31,56584	25,01717	IIIB	Surface collection of key finds required
12	MID11	1	Levallois flake, probably the same site as MID8. A palimpsest of MSA-LSA artefacts.	NA	MSA-late ESA	31,56593	25,01734	IIIB	Surface collection of key finds required
13	MID12	2	Historical structure, possibly a wall.	NA	Historical	31,5569	25,01406	IIIC	20m Buffer

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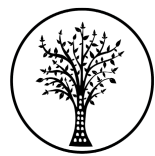
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Figure 5.1: Relatively recent historical structure (MID12)



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Figure 5.2: A concentration (MID8) of Acheulean-Fauresmith artefacts (ESA period) eroding on the surface

4.3 Mapping and spatialisation of heritage resources

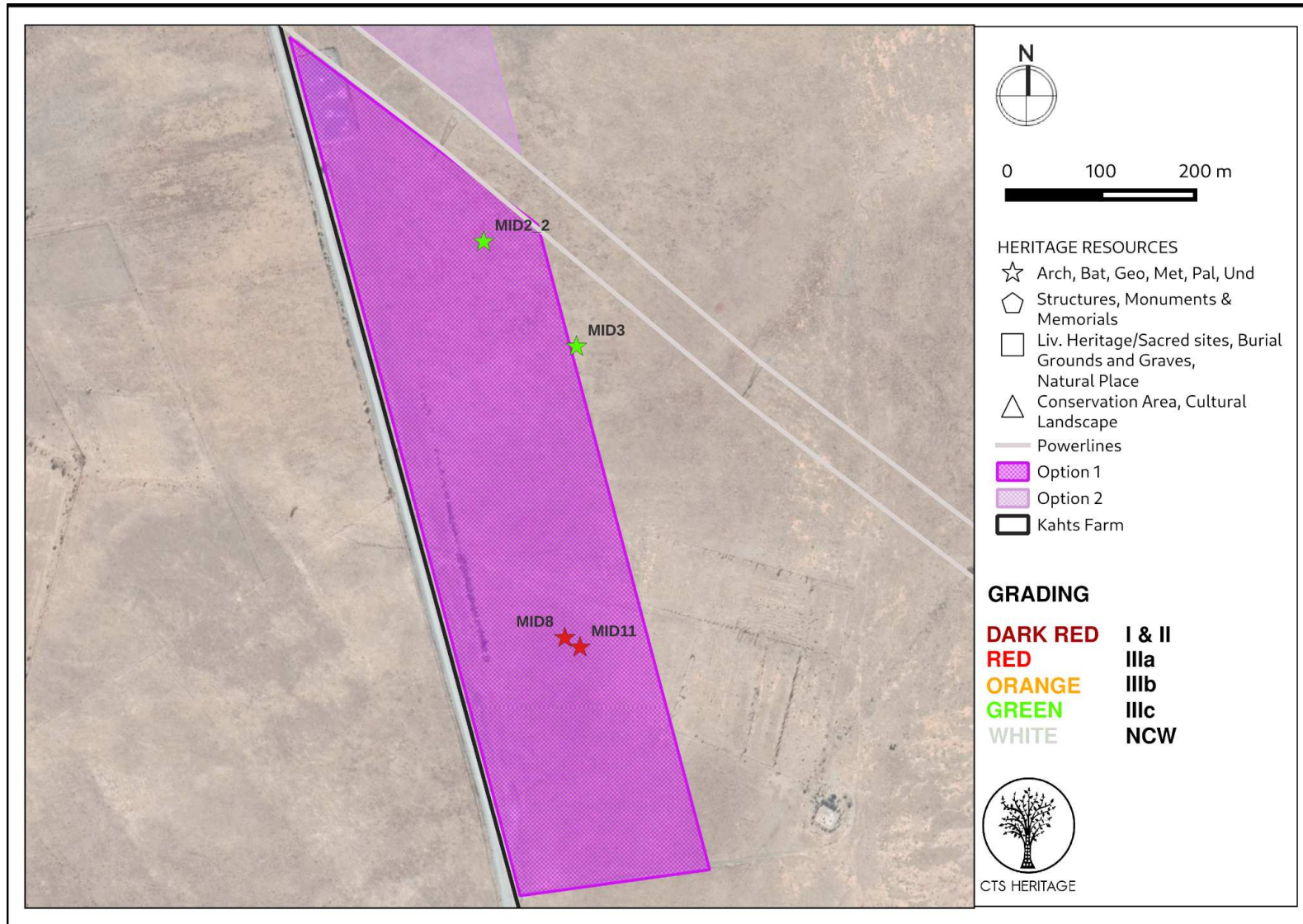
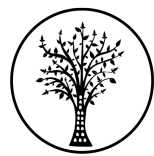
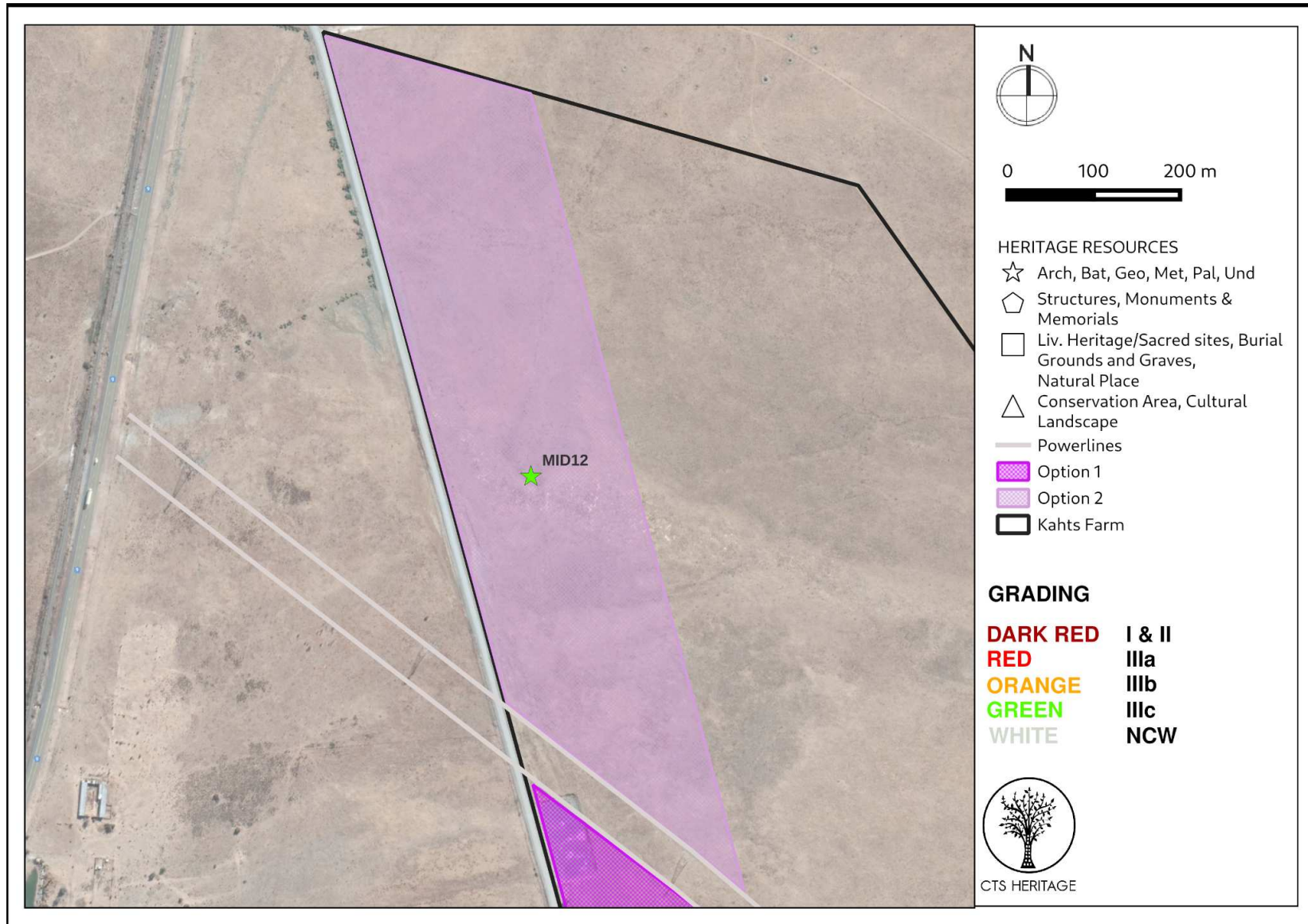


Figure 6a: Map of heritage resources identified during the field assessment, relative to the proposed development - Option 1



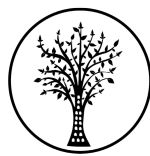
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Map 4a: Map of heritage resources identified during the field assessment, relative to the proposed development - Option 2

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5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

5.1 Assessment of impact to Heritage Resources

Palaeontology

Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks are the correct age and type to contain fossils. Surface soils and sands, however, do not preserve fossils. Since there is a small chance that fossils from the Adelaide Subgroup may be disturbed a Fossil Chance Find Protocol has been added to this report. Taking account of the defined criteria, the potential impact to fossil heritage resources is low.

There is a very small chance that fossils may occur on the surface and a better chance of the them being revealed once excavations for foundations have commenced (Option 2). On palaeontological grounds, Option 2 is not recommended. However, if for other reasons Option 2 is selected, then a fossils chance find protocol is strongly recommended. If fossils are found by the environmental officer, or other responsible person, on the surface or once excavations have commenced then they should be rescued and a palaeontologist called to assess and collect a representative sample (Section 8, Appendix A).

Table 2a: Impacts of the proposed development to palaeontological resources - Option 1

NATURE: It is possible that buried palaeontological resources may be impacted by the proposed development of Option 1				
		Without Mitigation		With Mitigation
MAGNITUDE	L (4)	According to the SAHRIS Palaeosensitivity Map, the area proposed for development is underlain by sediments that have moderate palaeontological sensitivity.	L (4)	According to the SAHRIS Palaeosensitivity Map, the area proposed for development is underlain by sediments that have moderate palaeontological sensitivity.
DURATION	H (5)	Where manifest, the impact will be permanent.	H (5)	Where manifest, the impact will be permanent.
EXTENT	L (1)	Limited to the development footprint	L (1)	Limited to the development footprint
PROBABILITY	L (1)	It is unlikely that significant fossils will be impacted	L (1)	It is unlikely that significant fossils will be impacted
SIGNIFICANCE	L	(4+5+1)x1=10	L	(4+5+1)x1=10
STATUS		Negative		Negative
REVERSIBILITY	L	Any impacts to heritage resources that do occur are irreversible	L	Any impacts to heritage resources that do occur are irreversible
IRREPLACEABLE LOSS OF RESOURCES?	L	Not Likely	L	Not Likely
CAN IMPACTS BE MITIGATED		NA		
MITIGATION:				
<ul style="list-style-type: none"> No impact likely and therefore no mitigation is necessary 				
RESIDUAL RISK:				
None				



Table 2b: Impacts of the proposed development to palaeontological resources - Option 2

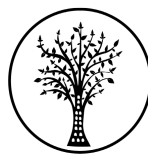
NATURE: It is possible that buried palaeontological resources may be impacted by the proposed development of Option 2				
		Without Mitigation		With Mitigation
MAGNITUDE	H (8)	According to the SAHRIS Palaeosensitivity Map, the area proposed for development is underlain by sediments that have very high palaeontological sensitivity.	H (8)	According to the SAHRIS Palaeosensitivity Map, the area proposed for development is underlain by sediments that have very high palaeontological sensitivity.
DURATION	H (5)	Where manifest, the impact will be permanent.	H (5)	Where manifest, the impact will be permanent.
EXTENT	L (1)	Limited to the development footprint	L (1)	Limited to the development footprint
PROBABILITY	H (5)	It is likely that significant fossils will be negatively impacted	L (1)	It is likely that significant fossils will be negatively impacted
SIGNIFICANCE	H	$(8+5+1) \times 5 = 70$	L	$(8+5+1) \times 1 = 14$
STATUS		Negative		Negative
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?	P	Possible	L	Not Likely
CAN IMPACTS BE MITIGATED		Yes		
MITIGATION:				
<ul style="list-style-type: none"> The attached Chance Fossil Finds procedure must be implemented during the course of construction activities 				
RESIDUAL RISK:				
None				

Archaeology

Archaeological sites and isolated individual artefacts were documented throughout the footprint of the two option areas for the potential development (Options 1 and 2). Archaeological sites were documented across Options 1 and 2, but are more frequent in the Option 1 area. Cumulatively these findings indicate cultural evidence for ESA, MSA, LSA, as well as later historical occupations of the area.

The majority of finds were identified in disturbed surface geoarchaeological contexts, and could not be tied chrono-culturally to a particular prehistoric period. However, several occurrences were relatively less affected by post-depositional processes and may have been exposed relatively recently. In addition, several sites had more typical MSA and ESA technological evidence including the relatively rare occurrence of a Fauresmith site with substantial artefacts in the southern area (Option 1), which should preferably be avoided entirely or should be properly mitigated prior to destruction.

Historical stone structures should be avoided, and a 5 meter buffer zone around the structures should be implemented where possible.



From a Stone Age archaeological perspective, no mitigation is recommended for the archaeology present in Option 2. However, if Option 1 is selected for development, several sites will require further mitigation, which will entail the collection and analysis of reflective samples of artefacts from the sites to be affected by the development. Given the variable extent of Stone Age sites such as MID11 and MID8 across the footprint, a buffering zone is unlikely to be an appropriate response measure to the conservation of the Stone Age sites identified as MODERATE in Option 1, and mitigation is recommended.

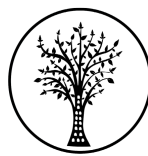
The documented Stone Age archaeology is classified as scientifically LOW SIGNIFICANCE in the Option 2 area, and of MODERATE SIGNIFICANCE in the Option 1 area.

Table 2c: Impacts of the proposed development to archaeological resources - Option 1

NATURE: It is possible that significant archaeological resources may be impacted by the proposed development of Option 1				
		Without Mitigation		With Mitigation
MAGNITUDE	H (8)	4 archaeological sites of low and moderate scientific significance were identified within the area proposed for development	L (3)	4 archaeological sites of low and moderate scientific significance were identified within the area proposed for development
DURATION	H (5)	Where manifest, the impact will be permanent.	H (5)	Where manifest, the impact will be permanent.
EXTENT	L (1)	Limited to the development footprint	L (1)	Limited to the development footprint
PROBABILITY	H (53)	It is possible that significant archaeological resources will be impacted	L (1)	It is unlikely that significant archaeological resources will be negatively impacted
SIGNIFICANCE	M	$(8+5+1) \times 5 = 70$	L	$(3+5+1) \times 1 = 8$
STATUS		Negative		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?	P	Possible	L	Not Likely
CAN IMPACTS BE MITIGATED		Yes		
MITIGATION:				
<ul style="list-style-type: none"> • Surface collection of significant artefacts from MID8 and MID11 • Archaeological monitoring of construction activities within the vicinity of MID8 and MID11 • Buffer zone of 20m around MID2_2 and MID3 • Should any buried archaeological resources or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward. 				
RESIDUAL RISK:				
None				

Table 2d: Impacts of the proposed development to archaeological resources - Option 2

NATURE: It is possible that significant archaeological resources may be impacted by the proposed development of Option 2				
		Without Mitigation		With Mitigation
MAGNITUDE	L (2)	1 archaeological site of low scientific significance were identified within the area proposed for	L (2)	1 archaeological site of low scientific significance were identified within the area proposed for



		development		development
DURATION	H (5)	Where manifest, the impact will be permanent.	H (5)	Where manifest, the impact will be permanent.
EXTENT	L (1)	Limited to the development footprint	L (1)	Limited to the development footprint
PROBABILITY	M (3)	It is possible that significant archaeological resources will be impacted	L (1)	It is unlikely that significant archaeological resources will be impacted
SIGNIFICANCE	M	$(2+5+1) \times 3 = 24$	L	$(2+5+1) \times 1 = 8$
STATUS		Negative		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?	P	Possible	L	Not Likely
CAN IMPACTS BE MITIGATED		Yes		
MITIGATION:				
<ul style="list-style-type: none"> • Buffer zone of 20m around MID12 • Should any buried archaeological resources or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward. 				

5.2 Sustainable Social and Economic Benefit

The anticipated socio-economic benefits to be derived from the project will be creation of employment opportunities, positive impact on GDP due to CAPEX investment, positive impact on household income and positive impact on government revenue due to ongoing taxes. Furthermore, this facility is proposed to support the approved renewable energy development in the area and as such, contributes to the socio-economic benefits to be derived from clean energy in this regard as well.

5.3 Proposed development alternatives

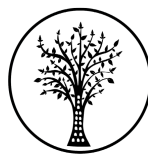
The following alternatives are investigated in this assessment:

Option 1

- Preferred in terms of impacts to palaeontology
- Not preferred in terms of impacts to archaeological heritage due to impacts to significant archaeological sites however these impacts can be suitably mitigated through collection of artefacts and monitoring of development activities by an archaeologist

Option 2

- Not preferred in terms of impacts to palaeontology, however these impacts can be suitably mitigated through the implementation of the Chance Fossil Finds Procedure for the duration of construction activities



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- Although impact to archaeological sites is anticipated, these sites have lower levels of significance than MID8 and MID11 and as such, this option is preferred in terms of impacts to archaeological heritage. The anticipated impacts can be mitigated through the implementation of suitable buffer areas (20m) around the identified archaeological sites.

No-Go Option

- In this option, the status quo remains and no impacts to heritage resources are anticipated.

6. RESULTS OF PUBLIC CONSULTATION

The public consultation process will be undertaken by the EAP during the EIA. No heritage-related comments have been received to-date. SAHRA is required to comment on this HIA and make recommendations prior to the granting of the Environmental Authorisation.

7. CONCLUSION

Although Option 2 is preferred in terms of impacts to archaeology, Option 1 is preferred in terms of impacts to palaeontology as well as by the developer. According to the developer, the results of the other specialist assessments also indicate that Option 1 is preferred for the development. Although the identified archaeological significance of the resources located within the Option 1 area is high (MID8 and MID11), impacts to these resources can be mitigated through:

- Permission from SAHRA to conduct the mitigation interventions
- the formal scientific recording and collection of the artefacts located at the surface
- scientific and systematic excavation of these sites if deemed necessary by the archaeologist
- Archaeological monitoring of development activity in the vicinity of the finds by an archaeologist
- formal scientific write up of the findings for submission to SAHRA for approval

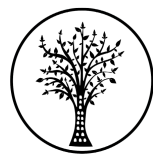
Additionally, suitable buffer areas must be implemented around the sites graded as IIIC (20m). Should Option 2 proceed, no excavation mitigation is recommended however it is possible that significant archaeological heritage may be located beneath the ground surface and may be impacted by the proposed development.

According to the Desktop PIA (Bamford, 2021), "Based on experience and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would be preserved in the soils and sands of the Quaternary. Therefore, Option 1 is the preferred choice for the cement plant as far as the palaeontology is concerned. However, the chance fossil finds protocol should be implemented due to the proximity to the Adelaide Subgroup and possible impacts to palaeontological heritage.

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There is a very small chance that fossils may occur on the surface and a better chance of them being revealed once excavations for foundations have commenced (Option 2). On palaeontological grounds, Option 2 is not recommended. However, if for other reasons Option 2 is selected, then a fossil chance finds protocol is strongly recommended... As far as palaeontology is concerned, the project should be authorised.”

8. RECOMMENDATIONS

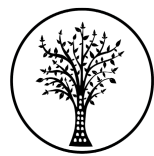
There is no objection to the proposed development in terms of impacts to heritage resources on condition that:

Should Option 1 be implemented;

- the mitigation recommended above must be implemented for sites MID8 and MID 11 including surface collection of artefacts and monitoring of development activities in the area
- a 20m no-go development buffer must be implemented around sites MID2_2 and MID3
- Should any buried archaeological resources or human remains or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.

Should Option 2 be implemented;

- a 20m no-go buffer must be implemented around site MID12
- The attached Chance Fossil Finds Procedure is implemented for the duration of construction activities
- Should any buried archaeological resources or human remains or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.



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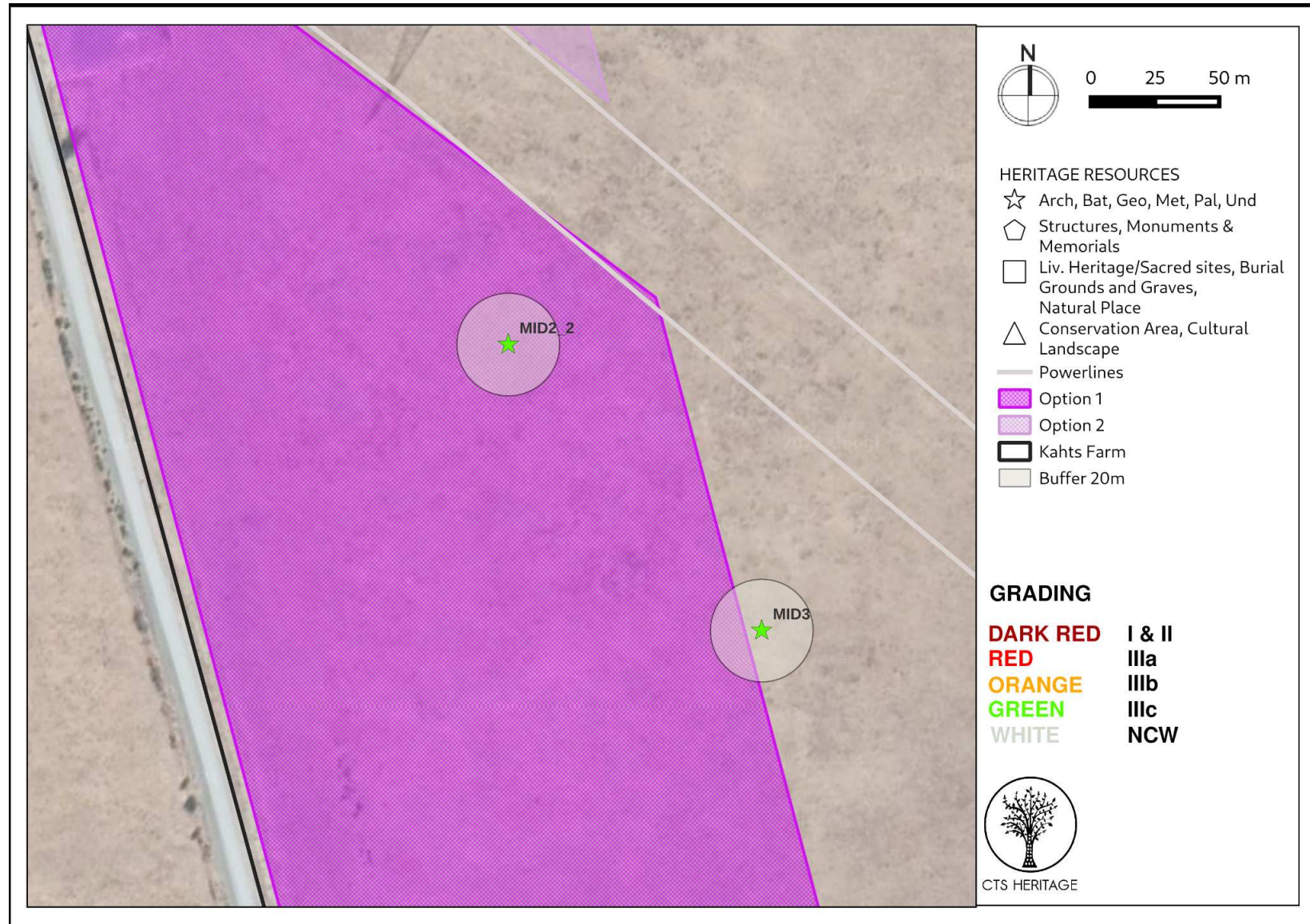
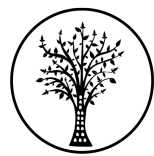


Figure 7a: Map of heritage resources identified during the field assessment, with recommended 20m buffer - Option 1

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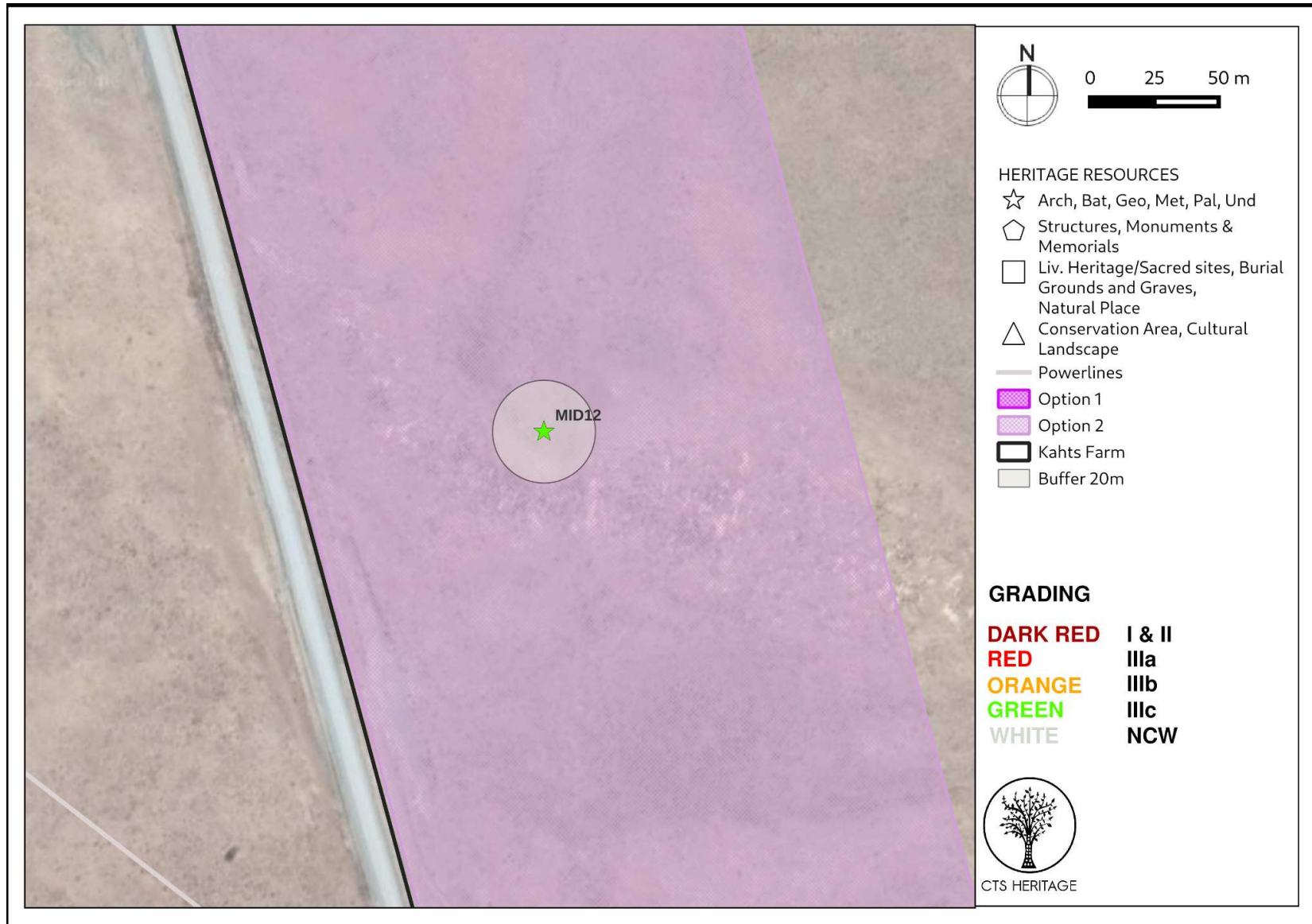
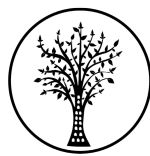


Figure 7b: Map of heritage resources identified during the field assessment, with recommended 20m buffer - Option 2

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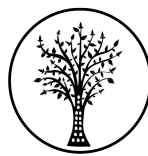
9. REFERENCES

Heritage Impact Assessments				
NID	Author(s)	Date	Type	Title
182468	AIA Desktop	Gavin Anderson	27/10/2014	HERITAGE SURVEY OF THE UMSOBOMVU WIND ENERGY FACILITY, EASTERN AND NORTHERN CAPE
384513	AIA Phase 1	Celeste Booth	03/11/2012	A PHASE 1 ARCHAEOLOGICAL IMPACT ASSESSMENT (AIA) FOR THE PROPOSED 75 MW COLLETT PHOTOVOLTAIC POWER STATION AND ASSOCIATED INFRASTRUCTURE AT COLLETT SUBSTATION, ON FARMS 335/0 AND FARM 180/0, NEAR MIDDLEBURG, EASTERN CAPE PROVINCE
384514	PIA Phase 1	Robert Gess	01/12/2012	Palaeontological impact assessment for Proposed construction of a photovoltaic solar power station near Collett Substation, Middleburg, Eastern Cape
6457	AIA Phase 1	Loudine Philip, C Koortzen, Zoe Henderson	08/07/2008	Assessment of Area of Proposed Construction, Operation and Maintenance of the Cypress Grove to Tafelberg Road (Chris Hani Magisterial District, Inxuba Yethemba Municipality, Eastern Cape) in Terms of Archaeological and Other Heritage Sites

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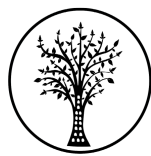
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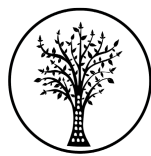
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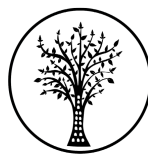
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APPENDIX 1: Heritage Screening Assessment (2021)



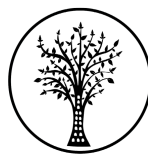
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APPENDIX 2: Archaeological Assessment (2022)



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APPENDIX 3: Palaeontological Assessment (2021)



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APPENDIX 4: Chance Fossil Finds Procedure