UPDATED HERITAGE IMPACT ASSESSMENT

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

PROPOSED LESAKA 1 SOLAR ENERGY FACILITY NEAR LOERIESFONTEIN, NORTHERN CAPE

Prepared by CTS Heritage

CTS HERITAGE

For

SiVEST

June 2023

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EXECUTIVE SUMMARY

1. Site Name:

Lesaka 1 Solar Energy Facility

2. Location:

North of Loeriesfontein in the Northern Cape on Farm Kluitjes Kraal No. 264 Portion 0

3. Locality Plan:

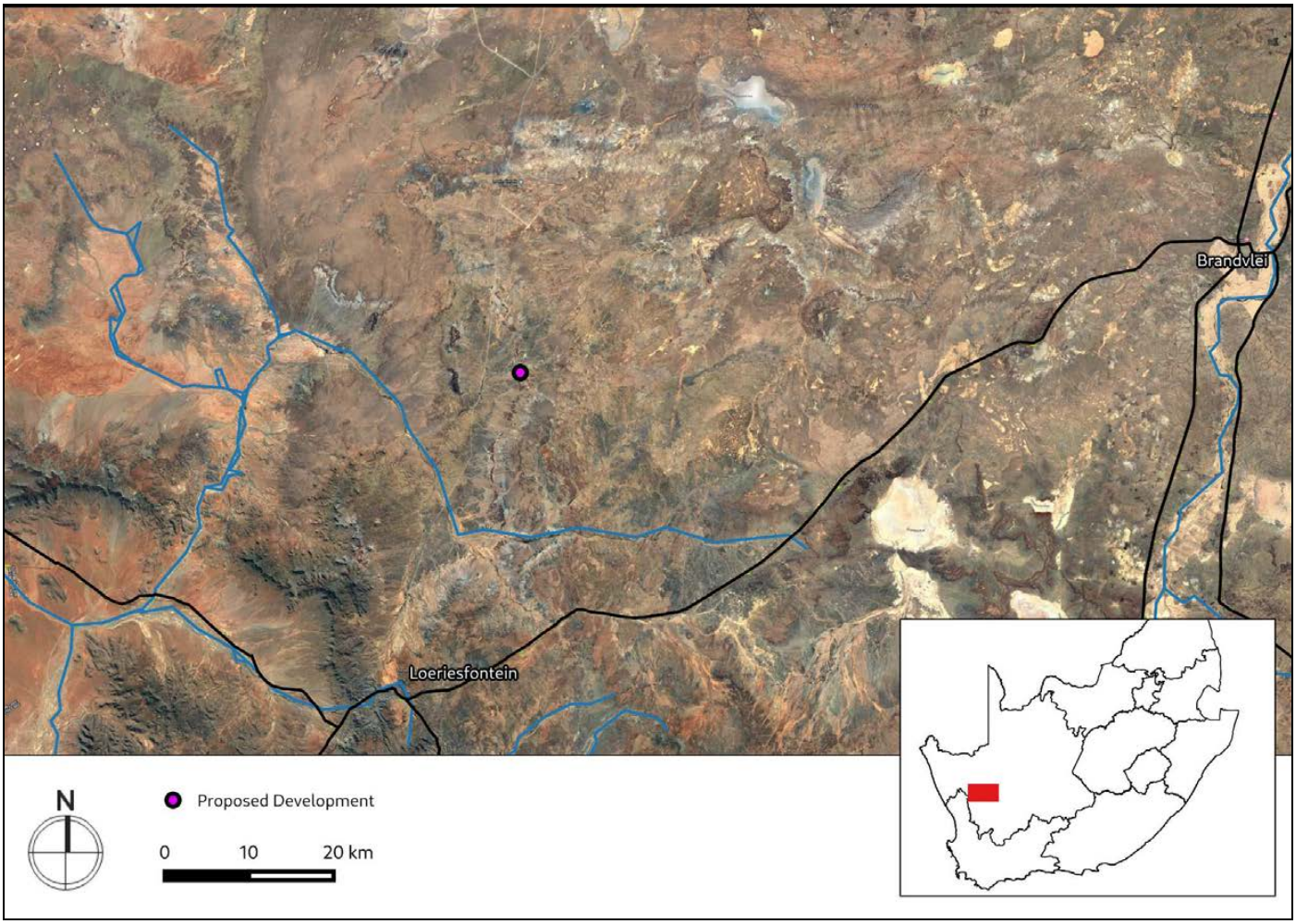

Figure A: Location of the proposed development area

4. Description of Proposed Development:

Enertrag South Africa (Pty) Ltd on behalf of Lesaka 1 Solar Energy Facility (Pty) Ltd has appointed SiVEST Environmental (hereafter referred to as "SiVEST") to undertake the required EIA / BA Processes for the proposed construction of the Lesaka 1 and 2 Solar Energy Facilities (SEF) and associated grid connection infrastructure near

Loeriesfontein in the Northern Cape Province. The distinct EA's that are required for each of the respective Projects and Associated Grid Connection Infrastructure are as follows:

- Lesaka 1 SEF (up to 240MW)
- Lesaka 2 SEF (up to 240MW)

The overall objective of the development is to generate electricity by means of renewable energy technology capturing energy to feed into the National Grid. This HIA assesses the impacts to heritage resources anticipated from the Lesaka 1 PV Facility.

5. Anticipated Impacts on Heritage Resources:

The surveys conducted for impacts to heritage resources including archaeology and palaeontology proceeded with no significant constraints or limitations, and the project area was comprehensively surveyed for heritage resources. An area of higher archaeological sensitivity associated with the stream systems across the development area was identified and mapped. This area must be avoided in the final PV layout in order to ensure that no significant archaeological heritage resources are negatively impacted by the proposed development.

Despite the high sensitivity for impacts to palaeontological heritage resources of sediments in the vicinity of the development, the areas proposed for the Lesaka 1 PV facility and its associated infrastructure consist of dolerite and quaternary sands and as such, the layout as proposed has low sensitivity for impacts to palaeontological sensitivity.

6. Recommendations:

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

- The area of high archaeological sensitivity identified in Figure 5.2 is avoided in the final configuration of the PV layout. The final layout provided complies with this requirement.
- If Palaeontological Heritage is uncovered during surface clearing and excavations ECO should be informed immediately. Fossil discoveries ought to be protected and the ECO/site manager must report to South African Heritage Resources Agency (SAHRA) so that mitigation (recording and collection) can be carried out.
- 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 SAHRA must be alerted immediately to determine an appropriate way forward.

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

Enertrag South Africa (Pty) Ltd on behalf of Lesaka 1 Solar Energy Facility (Pty) Ltd has appointed SiVEST Environmental (hereafter referred to as "SiVEST") to undertake the required EIA / BA Processes for the proposed construction of the Lesaka 1 and 2 Solar Energy Facilities (SEF) and associated grid connection infrastructure near Loeriesfontein in the Northern Cape Province. The distinct EA's that are required for each of the respective Projects and Associated Grid Connection Infrastructure are as follows:

- Lesaka 1 SEF (up to 240MW)
- Lesaka 2 SEF (up to 240MW)
- Lesaka 1 Associated Grid Connection Infrastructure (up to 132kV)
- Lesaka 2 Associated Grid Connection Infrastructure (up to 132kV)

The overall objective of the development is to generate electricity by means of renewable energy technology capturing energy to feed into the National Grid. This HIA assesses the impacts to heritage resources anticipated from the Lesaka 1 PV Facility.

The project aims to supply suitable private off-taker initiatives (direct supply or wheeling agreements, as applicable), or be bid into the government coordinated Renewable Energy Independent Power Producer Procurement Programme ("REIPPPP") or similar procurement program under the Integrated Resource Plan ("IRP"). The Lesaka SEF Cluster Projects will be administered under the respective Project Companies, and the Projects will be require to be composed of the following:

Lesaka 1 Solar Energy Facility (Pty) Ltd

- Lesaka 1 SEF (up to 240MW)
- Battery Energy Storage System ("BESS")
- On-site Independent Power Producer ("IPP") Substation (up to 33/132kV)
- All associated grid infrastructure

The grid connection will be assessed in a separate Basic Assessment process.

1.2 Description of Property and Affected Environment

The project lies around 35km north of Loeriesfontein and lies to the west of the main gravel road linking Loeriesfontein to a prominent cluster of koppies overlooking the Rooiberg River. The Khobab Wind farm lies another 25km further north and the Khobab wind turbines can be seen in the distance from the study site. One has to leave the main gravel road and travel a further 7km northwest along a rocky farm track before reaching the property (Kluitjes Kraal 264). The terrain is extremely arid and sparsely vegetated in the Bokkeveld Sandstone Fynbos region. The Klein Rooiberg, Krom and Rooiberg Rivers are non-perennial streams which join and separate from each other across the property and only contain water temporarily after intermittent rainfall. The Groot Rooiberg and Grootmelkboskop koppies lie prominently on the northeast end of the study area with a smaller koppie, Rooibergdrif se Kop, on the southeastern corner. An even smaller koppie lies on the northwestern corner called Klein Loerkop. The rest of the terrain is undulating to flat and generally suitable for the placement of solar PV farms.

Due to the extreme aridity, even stock farming is limited and no crop irrigation has taken place on this farm even in the historical period. The only structures lie at the Kluitjieskraal werf which mostly consists of a handful of relatively modern buildings, kraals and water tanks for the small-scale sheep farming taking place. The Sishen-Saldanha railway line runs right past the Kluitjieskraal werf before continuing on north-eastwards onto the iron mines near Kuruman.

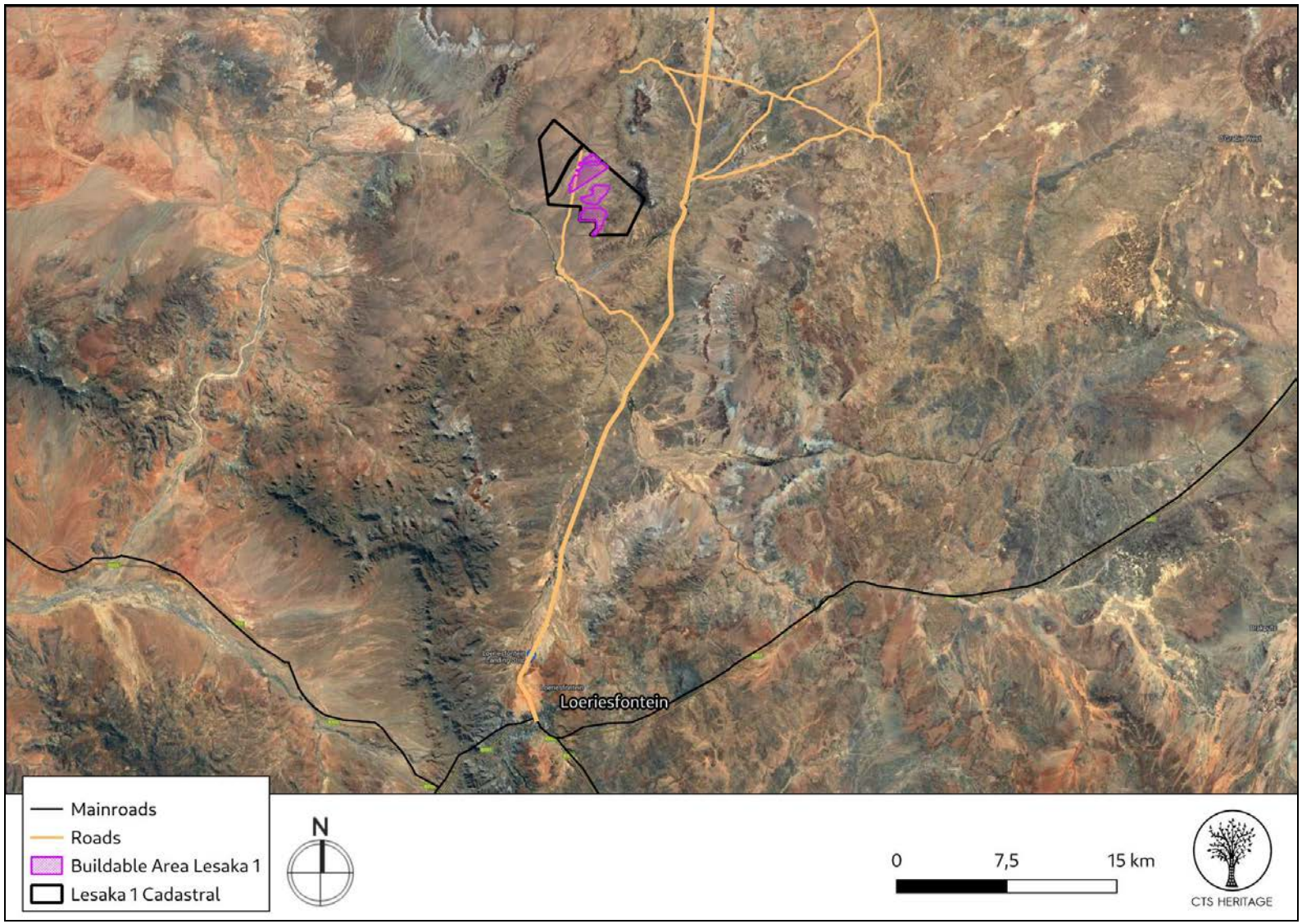

Figure 1.1: The proposed development layout of the Solar PV Facilities

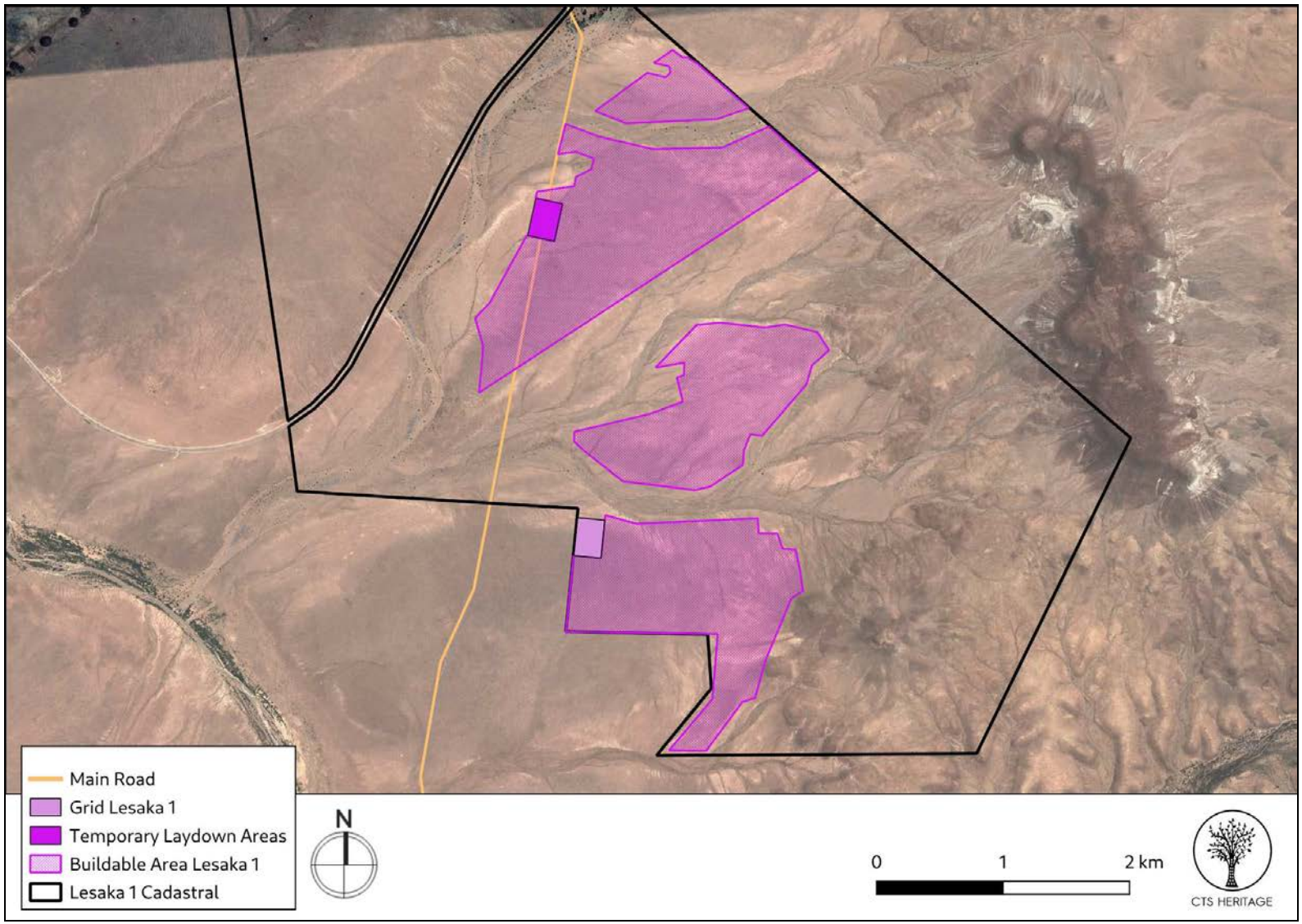

Figure 1.2: The proposed development layout of the Solar PV Facilities

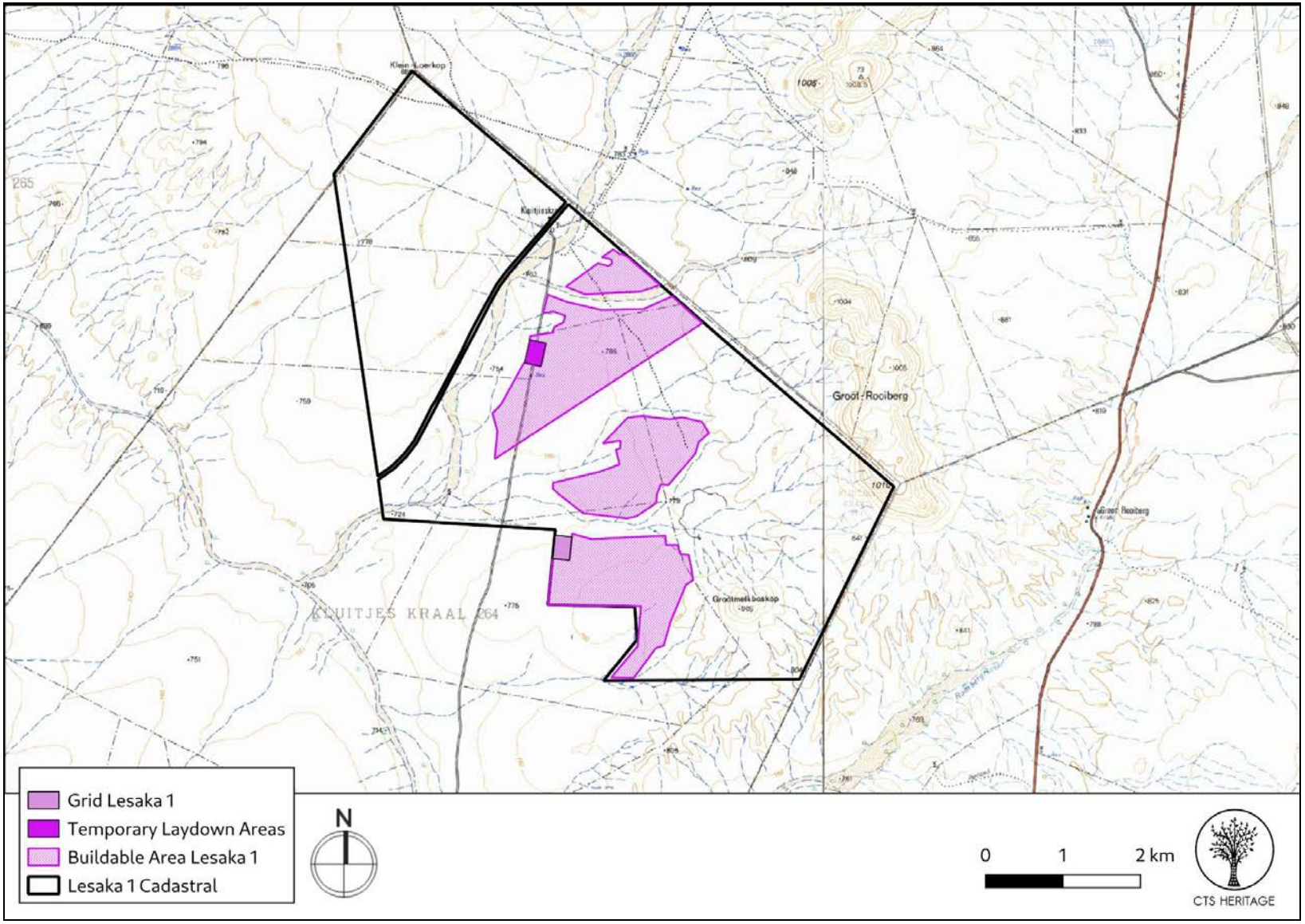

Figure 1.3: The proposed development layout of the PV Facilities on an extract of the 1:50 000 Topo Map

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 archaeologists conducted their site visit from 28 September to 01 October 2022
- A palaeontologist conducted a field assessment of palaeontological resources likely to be disturbed by the proposed development from 17 to 20 January 2023.
- 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

Given the extremely arid conditions prevailing on site, the vegetation posed no hindrance to the archaeological survey and the coverage obtained was excellent. We therefore feel that the survey provided a high level of confidence in the characterisation of the heritage sensitivity present within the study area.

2.5 SiVEST Impact Assessment Methodology

The Environmental Impact Assessment (EIA) Methodology assists in evaluating the overall effect of a proposed activity on the environment. Determining the significance of an environmental impact on an environmental parameter is determined through a systematic analysis.

2.5.1 Determination of Significance of Impacts

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale (i.e. site, local, national or global), whereas intensity is defined by the severity of the impact e.g. the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in **Table 1**.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

2.5.2 Impact Rating System

The impact assessment must take account of the nature, scale and duration of effects on the environment and whether such effects are positive (beneficial) or negative (detrimental). Each issue / impact is also assessed according to the various project stages, as follows:

- Planning;
- Construction;
- Operation; and
- Decommissioning.

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance has also been included.

Rating System Used to Classify Impacts

The rating system is applied to the potential impact on the receiving environment and includes an objective evaluation of the possible mitigation of the impact. Impacts have been consolidated into one (1) rating. In assessing the significance of each issue the following criteria (including an allocated point system) is used:

Table 1: Rating of impacts criteria

ENVIRONMENTAL PARAMETER		
A brief description of the environmental aspect likely to be affected by the proposed activity.		
ISSUE / IMPACT / ENVIRONMENTAL EFFECT / NATURE		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity (e.g. oil spill in surface water).		
EXTENT (E)		
This is defined as the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment of a project in terms of further defining the determined		
1	Site	The impact will only affect the site
2	Local/district	Will affect the local area or district
3	Province/region	Will affect the entire province or region
4	International and National	Will affect the entire country
PROBABILITY (P)		
This describes the chance of occurrence of an impact		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence)
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
REVERSIBILITY (R)		
This describes the degree to which an impact on an environmental parameter can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES (L)		

This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource.	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
DURATION (D)		
This describes the duration of the impacts on the environmental parameter. Duration indicates the lifetime of the impact as a result of the proposed activity		
1	Short term	The impact and its effects will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase (0 – 1 years), or the impact and its effects will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact and its effects will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered transient (Indefinite).
INTENSITY / MAGNITUDE (I / M)		
Describes the severity of an impact (i.e. whether the impact has the ability to alter the functionality or quality of a system permanently or temporarily).		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/ component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired (system collapse). Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
SIGNIFICANCE (S)		
Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. This describes the significance of the impact on the environmental parameter. The calculation of the significance of an impact uses the following formula: **Significance = (Extent + probability + reversibility + irreplaceability + duration) x magnitude/intensity.**		

The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.		
Points	**Impact Significance Rating**	**Description**
5 to 23	Negative Low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
5 to 23	Positive Low impact	The anticipated impact will have minor positive effects.
24 to 42	Negative Medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
24 to 42	Positive Medium impact	The anticipated impact will have moderate positive effects.
43 to 61	Negative High impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
43 to 61	Positive High impact	The anticipated impact will have significant positive effects.
62 to 80	Negative Very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
62 to 80	Positive Very high impact	The anticipated impact will have highly significant positive effects.

3. HISTORY AND EVOLUTION OF THE SITE AND CONTEXT

3.1 Desktop Assessment

Background:

This application is for the proposed development of PV facilities located approximately 40km north of the town of Loeriesfontein in the Northern Cape. The town grew around a general store established in 1894 by a travelling Bible salesman and became a municipality in 1958. The town of Loeriesfontein is within a basin surrounded by mountains and the broader area around the town forms part of Namaqualand, famous for its flower season. This area is recognised as one of the highest yield areas for renewable energy in South Africa, however this area falls outside of a REDZ area. Due to these high yields, there are existing, approved renewable energy facilities located immediately adjacent to the area proposed for development.

Cultural Landscape and Built Environment

According to an impact assessment completed for the neighbouring Loeriesfontein PV Facility (Webley and Halkett, 2012), an adjacent farm is named "Klein Rooiberg" because the northern border of the study area is dominated by outcropping regions ("koppies") which are reddish in colour. The southern area also exhibits these koppies that are elevated above the plains. The assessment goes on to note that "The site is covered by low lying vegetation of the Succulent Karoo Biome. A number of drainage lines were identified crossing the study area… The drainage systems are associated with the Volstruisnesholte River catchment." The study area is considered to be fairly natural succulent Karoo shrubland with low intensity sheep grazing on the site. There is a small concrete farm dam located on the property next to a windmill. Farm fences have been erected. There are two transmission lines near the site, including a 66kV transmission line that runs along the district road towards the substation and a 400kV transmission line that runs to the west of the site in the direction of Klein Rooiberg. There is a district road which runs through the project site. The predominant context of this area is wilderness landscape dominated by topographic features such as koppies and rivers, as well as existing renewable energy facilities. In his assessment of the Kokerboom WEF located 10 kilometres north of this development area, Orton (2021) notes that "The landscape is also considered to be a heritage resource but its cultural component is very limited and a new layer of electrical infrastructure is starting to dominate the landscape…"

As can be seen in Figure 3c, the area proposed for development is scattered with farm werfs and connecting roads. According to Webley and Halkett (2012), "from approximately 1850 onwards, Dutch Trekboers started making seasonal use of the summer grazing around the large pans in the area. Many contemporary farmers in Namaqualand still own two farms, one in the Bushmanland and the other in Namaqualand. The livestock is transported between their farms by truck." Orton (2021) notes that "It is unlikely that many earlier farmsteads (than the earlier 20th Century) would be present because this harsh landscape was only permanently settled in

relatively recent times." Based on the desktop assessment, 5 farm werfs fall within the development area however their heritage value has yet to be ascertained.

Prior to colonial settlement, this region was occupied by San hunter-gatherers and remained here living around the salt pans until they were "forced off the land as the farms were surveyed and made available to European farmers. Some of these "Basters", of mixed descent, travelled north and settled in the southern Richtersveld. Many of the farms were only allocated after the introduction of the wind pump to South Africa in the 1870s made the more arid lands accessible and suitable for grazing." The salt pans of this area therefore have associated cultural landscape value however no salt pans are evident within the area proposed for development.

Archaeology

As a result of the renewable energy facilities proposed in this area, a number of Heritage Impact Assessments have been completed that are relevant here, and a number of significant archaeological resources identified (Figure 3, 3a and 3b). Orton (2021) and Webley and Halkett (2012) both found extensive evidence of Middle and Later Stone Age archaeology in the broader area, noting that MSA artefacts tend to more prevalent on the lowlands and generally attributable to background scatter whereas LSA scatters tend to be associated with topographical features such as koppies, dolerite outcrops, rivers and salt pans. It is likely that this pattern will remain applicable within the development area. These features are therefore considered to be highly sensitive in terms of potential impacts to significant archaeology. Webley and Halkett (2012) identified four sites that they determined have very high levels of regional significance, graded II, located immediately adjacent to the area proposed for development. These are described in the table below. Similar significant archaeological heritage resources are likely to be present within the area proposed for development.

Table 1: Significant archaeological sites in the vicinity of the development from previous assessments

89242	**KNRB001**	Dense LSA scatter on top of a prominent koppie. Large amounts of ostrich eggshell fragments and stone artefacts concentrated on the hilltop. The material includes bladelets, flakes, irregular and single platform cores, 1x miscellaneous retouch piece. No formal artefacts observed. Pottery is present (4-6mm thick; fine temper, no burnish). I x unfinished oes bead suggesting outer diameter of ~6mm. Some bone was also noted (possibly recent). Raw materials include Quartz and quartz crystal, hornfels and CCS (opaline?). No/minimal deposit but rather a single surface scatter. Sites 087-110 are points representing the outer boundary point of 086.
89256	**KNRB015**	Extensive LSA artefact scatter on top of a low koppie. Some MSA elements are present. Most of the LSA material consists of bladelets, flakes and cores on hornfels, while 3 backed blades and a scraper are on the white ccs material. A small amount of ostrich eggshell fragments was observed. A small cairn of the local dolerite rocks (beacon/marker) was noted on the hill (L052). Also some recent glass.
89338	**KNRB041**	Dense LSA artefact scatter on a low koppie immediately overlooking the river. Abundant ostrich eggshell fragments and hornfels and CCS. Chunks, flakes and cores predominate but a formal element is present in the form of side scrapers (2x white ccs), a large segment (white ccs), a backed blade (1x hornfels) and an mrp (silcrete?)

89339	**KNRB042**	Dense LSA artefact scatter on a low koppie immediately overlooking the river. Abundant ostrich eggshell fragments and hornfels and CCS. Chunks, flakes and cores predominate but a formal element is present in the form of side scrapers (2x white ccs), a large segment (white ccs), a backed blade (1x hornfels) and an mrp (silcrete?)

Palaeontology

According to the SAHRIS Palaeosensitivity Map (Figure 4a), the broader development area is underlain by geology of variable palaeontological sensitivity, ranging from very high to zero. According to the Council of GeoScience Map for Loeriesfontein, the area proposed for development is underlain by the Whitehill Formation (very high sensitivity), the Tierberg Formation (high sensitivity) and the Prince Albert Formation (high sensitivity) all of the Ecca Group of the Karoo Supergroup. In a PIA completed on an adjacent property, Almond (2011) concludes that "Important fossil material of aquatic vertebrates (mesosaurid reptiles, fish), invertebrates (e.g. crustaceans) and petrified wood is known from the Whitehill Formation and to a lesser extent from the Prince Albert and Tierberg Formations. However fossils other than trace assemblages are generally sparse and most of the Ecca sediments are of low overall palaeontological sensitivity. Their palaeontological potential may well have been locally compromised by chemical weathering and dolerite intrusion. Furthermore, a substantial portion of the Ecca Group outcrop area is mantled by superficial sediments (downwasted gravels, alluvium etc) of low palaeontological sensitivity." This conclusion is reiterated by Butler (2020) in her palaeontological assessment for the Loeriesfontein BESS located immediately north of the development area.

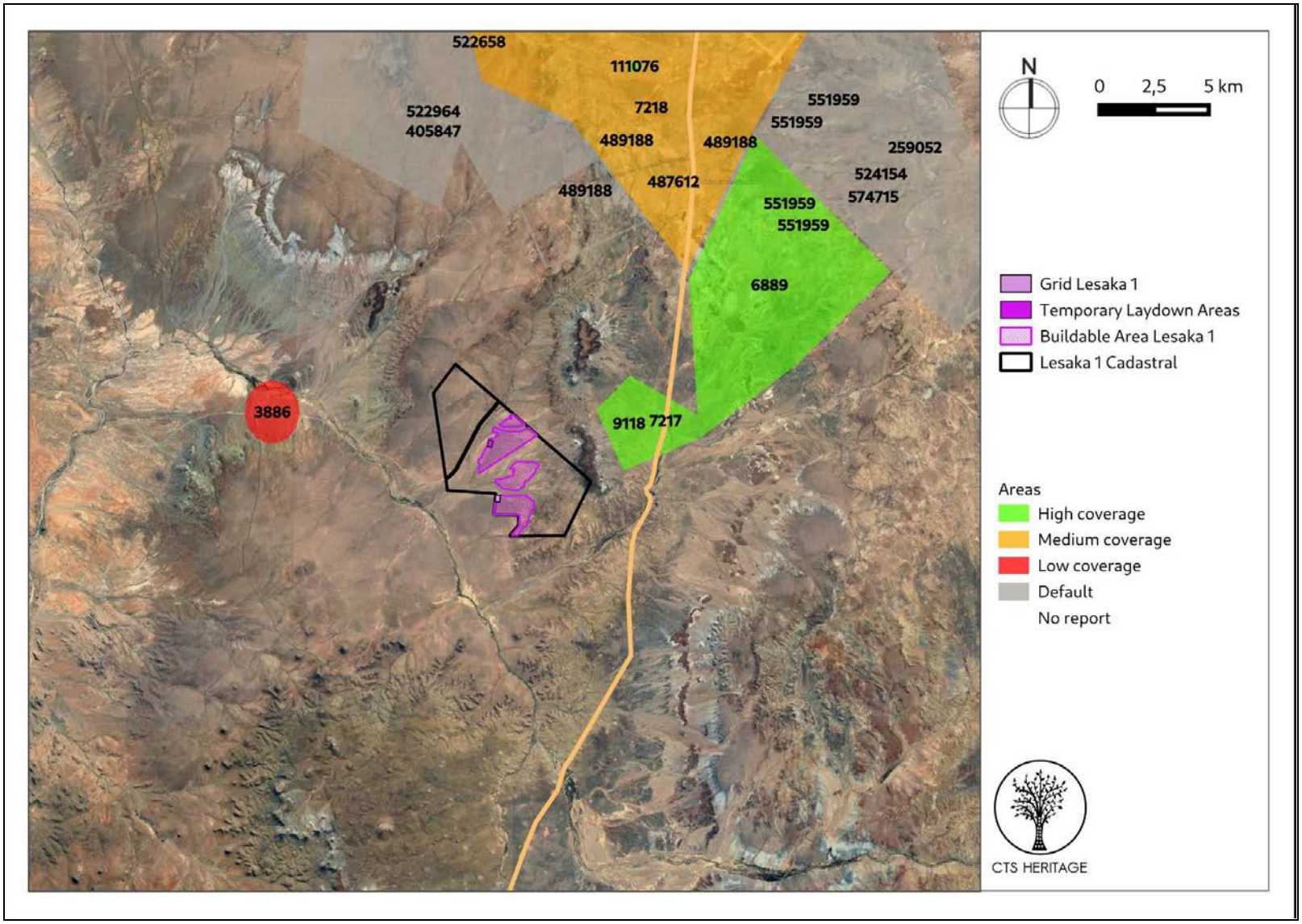

Figure 2.1: Spatialisation of heritage assessments conducted in proximity to the proposed development

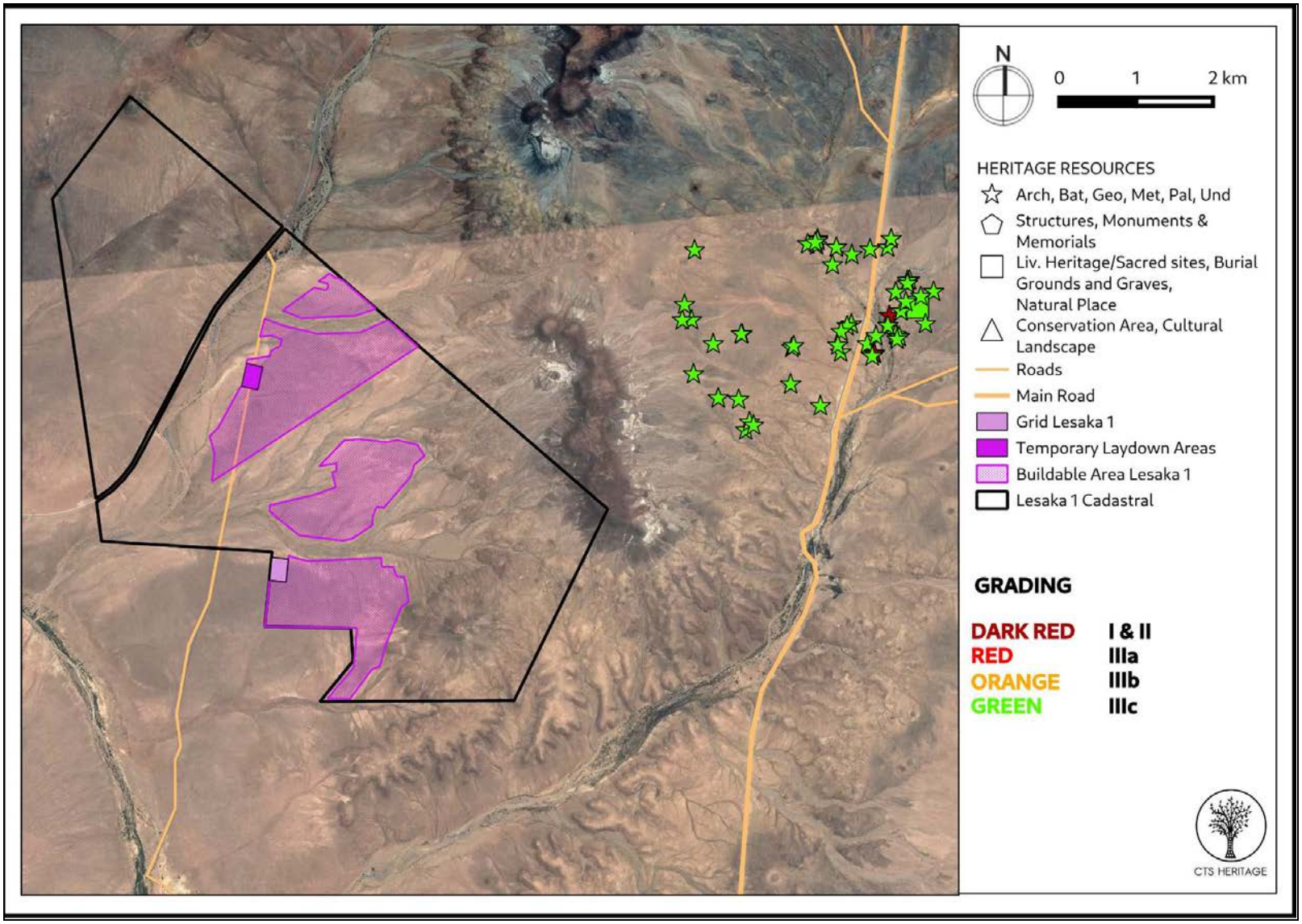

Figure 2.2: Spatialisation of known heritage resources in proximity to the proposed development

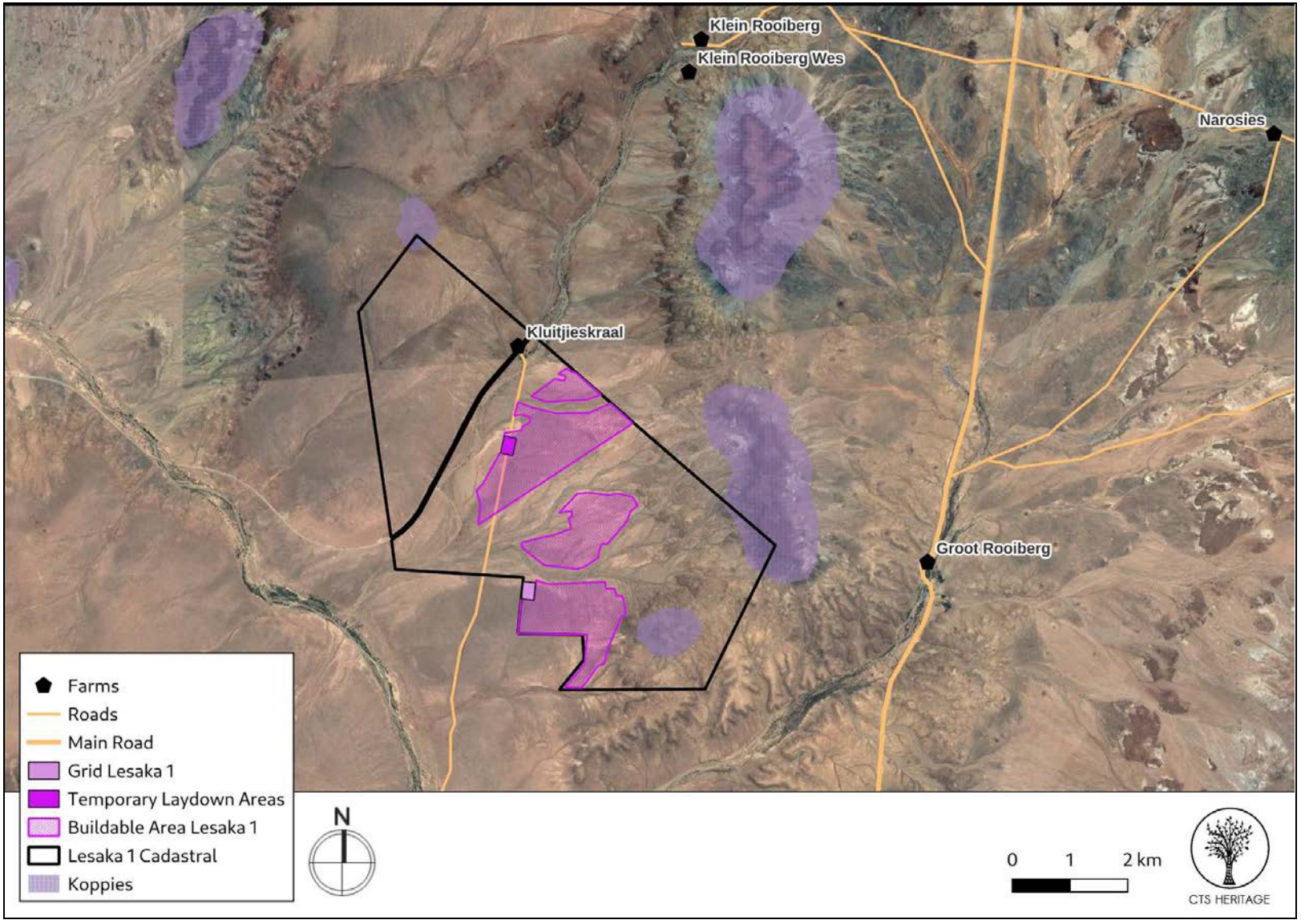

Figure 2.3. Heritage Resources Map showing potential heritage sensitivities near the proposed development

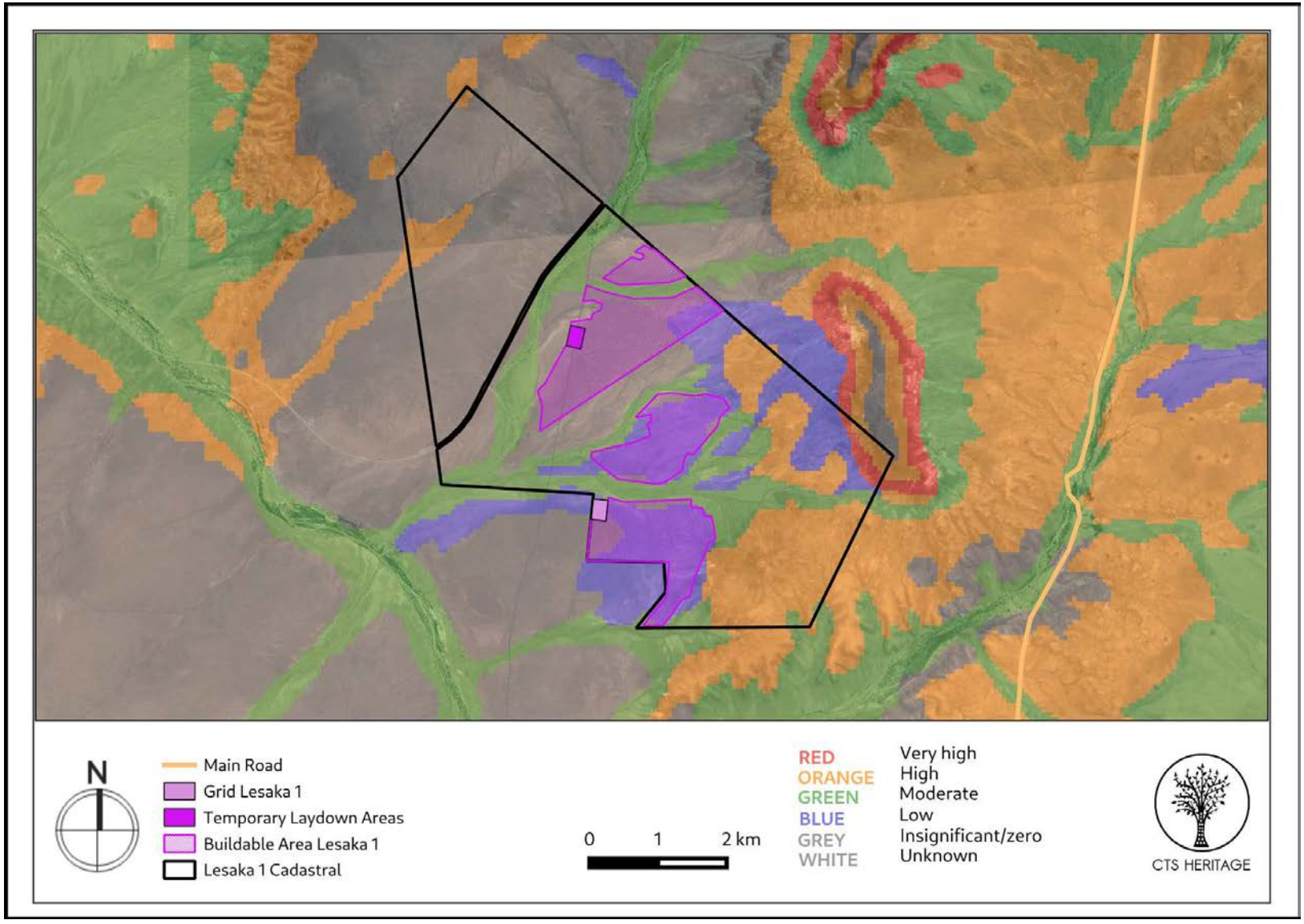

Figure 3.1: Palaeontological sensitivity of the proposed development area

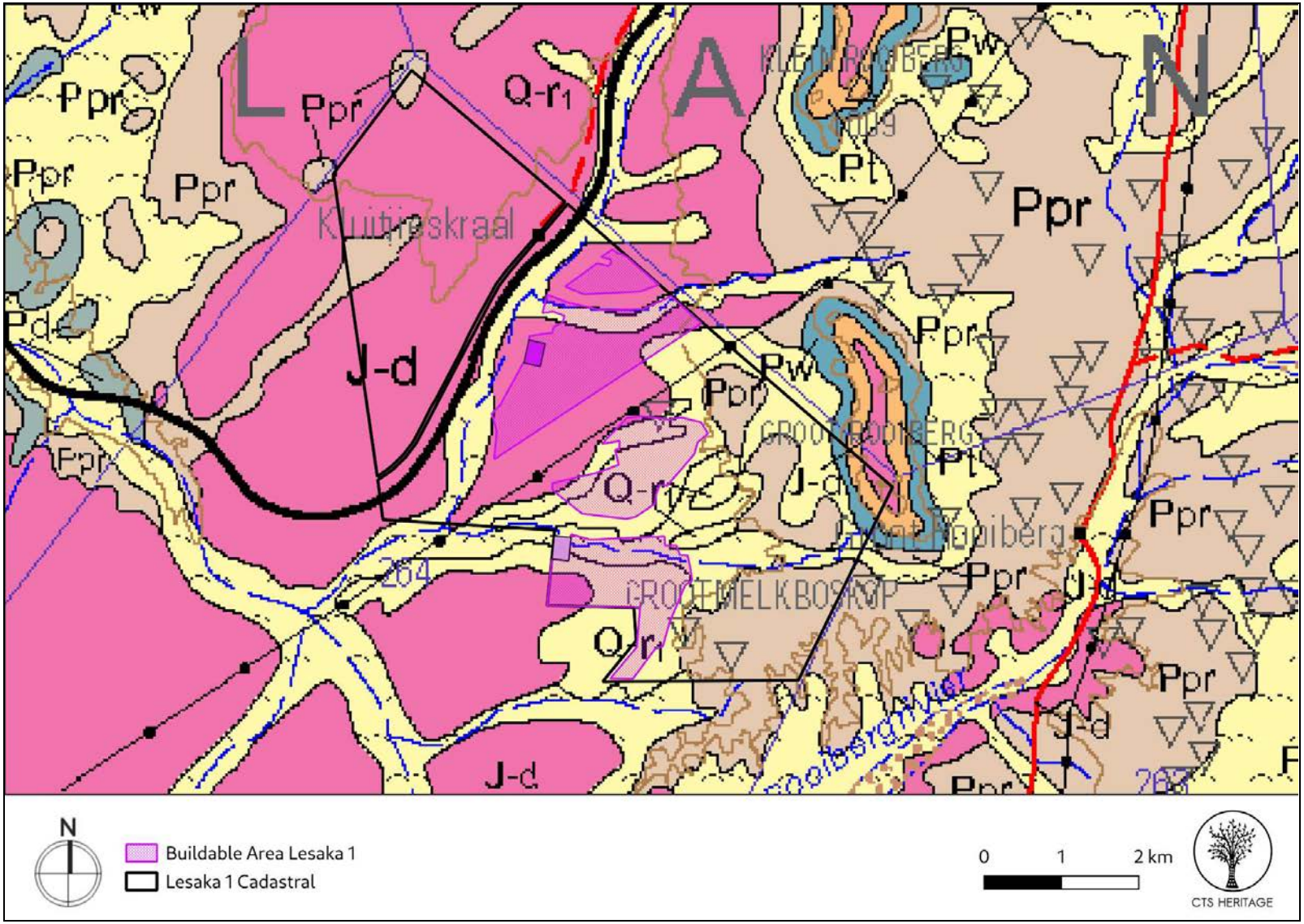

Figure 3.2: Extract from the CGS 3018 Loeriesfontein Map indicating that the development area is underlain by Quaternary Sands, Jd - Jurassic Dolerite, Pw - Whitehill Formation, Pt - Tierberg Formation, and Ppr - Prince Albert Formation

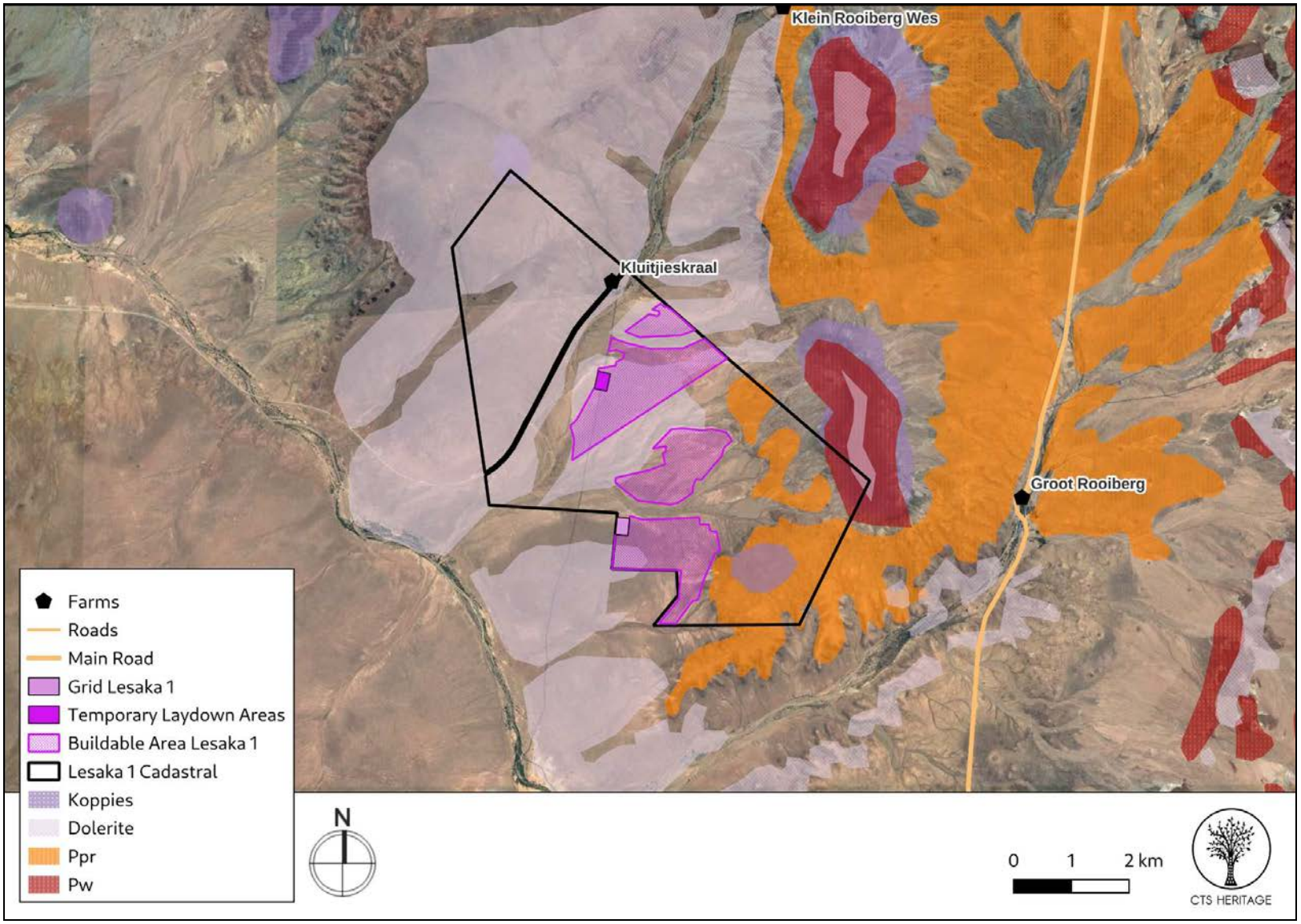

Figure 4. Cumulative Heritage Sensitivity Map.

4. IDENTIFICATION OF HERITAGE RESOURCES

4.1 Summary of findings of Specialist Reports

Archaeology (Appendix 1)

58 observations were made during the survey which added to the growing database of recorded heritage resources in the area that have been conducted during various impact assessments. As mentioned earlier, no significant built environment heritage was found on Kluitjes Kraal but extensive remains of Stone Age material was found. These date both to the Middle Stone Age generally spread across the entire study area as well as Later Stone Age and terminal LSA/historical period where ceramics, metal and glass items appear in the assemblages.

The riverine floodplain systems contain the bulk of the sites located and much of MSA is likely buried in the terraces overlooking the three non-perennial streams crisscrossing the farm. More significant LSA material similar to those observed by Halkett and Webley to the north east of Kluitjes Kraal (on the eastern side of Groot Rooiberg) was found with the local white opaline CCS/chert, hornfels and quartzite assemblages. These sites lie within a band of more sensitive ground buffering the stream systems and can easily be avoided by placing the solar PV infrastructure outside of a minimum distance from these streams.

We are also aware of the fact that a field rating of Grade II was given by Halkett & Webley to the sites found closer to the Helios station but these were presumably given due to the possible association of these sites with the Bleek and Lloyd informants (Deacon & Forster, 2005). In researching the farms further ahead of this survey and consulting Dr Deacon it is clear these areas are not the ones referenced in the reports and we would instead suggest a Grade IIIa rating for those sites is more appropriate pending further research in the future which may warrant such a high grading.

Palaeontology (Appendix 2)

According to the PIA completed for this project (Butler, 2023), "The geology of the proposed Lesaka 1 and 2 Solar Energy Facilities (SEF) and associated grid connection infrastructure near Loeriesfontein in the Northern Cape Province is depicted on the 1: 250 000 Loeriesfontein 3018 (2010) Geological Map (Council for Geosciences, Pretoria). The proposed development is underlain by the Quaternary sandy soil (Q-r1, yellow), Quaternary alluvium, (single bird figure), Jurassic Dolerite (J-d; pink) with a tiny portion in the east underlain by the Prince Albert Formation (Ecca Group)."

Butker (2023) goes on to note that "The quaternary sediments contain fossils that represent terrestrial plants and animals with a close resemblance to living forms. Fossil assemblages include bivalves, diatoms, gastropod shells, ostracods and trace fossils. The palaeontology of the Quaternary superficial deposits has been relatively neglected in the past. Late Cenozoic calcrete may comprise of bones, horn corns as well as mammalian teeth (Klein, 1984). Tortoise remains have also been uncovered as well as trace fossils which includes termite and insect's burrows and mammalian trackways. Amphibian and crocodile skeletons have been uncovered where the depositional settings in the past were wetter.

The Gordonia dune sands are dated as Late Pliocene/Early Pleistocene to Recent times by the Middle to Later Stone Age stone tools recovered from them (Dingle *et al.,* (1983). The boundary of the Pliocene-Pleistocene has been extended back from 1.8 Ma to 2.588 Ma placing the Gordonia Formation almost entirely within the Pleistocene Epoch. The pan sediments of the area originated from the Gordonia Formation and contains white to brown fine-grained silts, sands and clays. Some of the pans consist of clayey material mixed with evaporates that shows seasonal effects of shallow saline groundwaters (De Witt et al., 2000; Johnsen *et al*, 2006).

Dolerite mantles a large area of the development footprint. The dolerite present in the development belongs to the Karoo Igneous Province that is a classic continental flood basalt province formed during the Early Jurassic. This province occurs over a large area in southern Africa and comprises a widespread system well developed igneous bodies (dykes, sills) that invaded the sediments of the Main Karoo Basin. Flood basalts do not typically form any visible volcanic structures, but with a series of outbursts form a suite of fissures of sub-horizontal lava flows that may vary in thickness. The Karoo is an old flood basalt province and is preserved today as erosional remnants of a more extensive lava cap that covered much of southern Africa in the geological past. As this Suite consist of igneous rocks it is unfossiliferous. According to the PalaeoMap of South African Heritage Resources Information System the Palaeontological Sensitivity of the Karoo Dolerite is zero.

The Prince Albert Formation consists of marine to hyposaline basin plain mudrocks that occur with minor volcanic ashes, iron stones and phosphates. Post-glacial mudrocks is present at the base of the Prince Albert Formation.

The fossil assemblage of the Prince Albert Formation is known for its rich assemblages of plant fossils known as the *Glossopteris* flora. This includes petrified wood, roots and palynomorphs which include spores and acritarchs.

Body fossils of insects have been recovered; but is rare. Moderately diverse trace fossil assemblages can be present of which many can be assigned to fish or non-marine arthropod groups like crustaceans, king crabs and predatory water scorpions which could have reached lengths of two meters or more.

This trace fossil assemblage of the non-marine *Mermia* Ichnofacies, is dominated by the ichnogenera *Umfolozia* (arthropod trackways) and *Undichna* (fish swimming trails). Fish coprolites have also been described from this formation. A low diversity of marine invertebrates (bivalves brachiopods, nautiloids), palaeoniscoid fish, sharks and protozoans have been uncovered. There is also a possibility that stromatolites and oolites are preserved. Well-preserved skeletons of the well-known aquatic mesosaurids have been uncovered while amphibians are also recorded from the uppermost Ecca beds (Almond, 2011)."

4.2 Heritage Resources identified

In terms of the heritage resources identified in the archaeological field assessment, see Table 2 below and Appendix 1 for full descriptions and images.

Table 2: Artefacts identified during the field assessment development area

Site No.	Description	Type	Period	Density	Co ords		Grade	Mitigation
001	Groot Rooiberg werf, late Victorian/Edwardian building with hipped corrugated iron roof. Stone walling kraals and additional ruins closer to Rooiberg River	Structure	Historic	n/a	-30.62246805	19.53500846	IIIB	NA - Outside of development area
003	Opaline CCS cores, flakes, hornfels flakes	Artefacts	LSA, MSA	30+	-30.58809	19.46048	IIIB	Avoid - sensitive area
004	Quartz and CCS flakes, some hornfels and a few dolerite flakes	Artefacts	LSA	30+	-30.5878	19.45835	IIIC	Avoid - sensitive area
006	Siltstone triangular flake with edge retouched; CCS and quartz cores and flakes	Artefacts	LSA	30+	-30.58582	19.45324	IIIC	Avoid - sensitive area
007	Siltstone flakes, quartz flakes and cores	Artefacts	LSA, MSA	10 to 30	-30.58416	19.44767	IIIC	Avoid - sensitive area
022	Quartz, CCS and siltstone flakes, cores	Artefacts	LSA	10 to 30	-30.6069649	19.44838371	IIIC	Avoid - sensitive area
031	Hornfels blade production, debitage, flakes, core	Artefacts	MSA	10 to 30	-30.64979	19.49039	IIIC	Avoid - sensitive area

4.3 Mapping and spatialisation of heritage resources

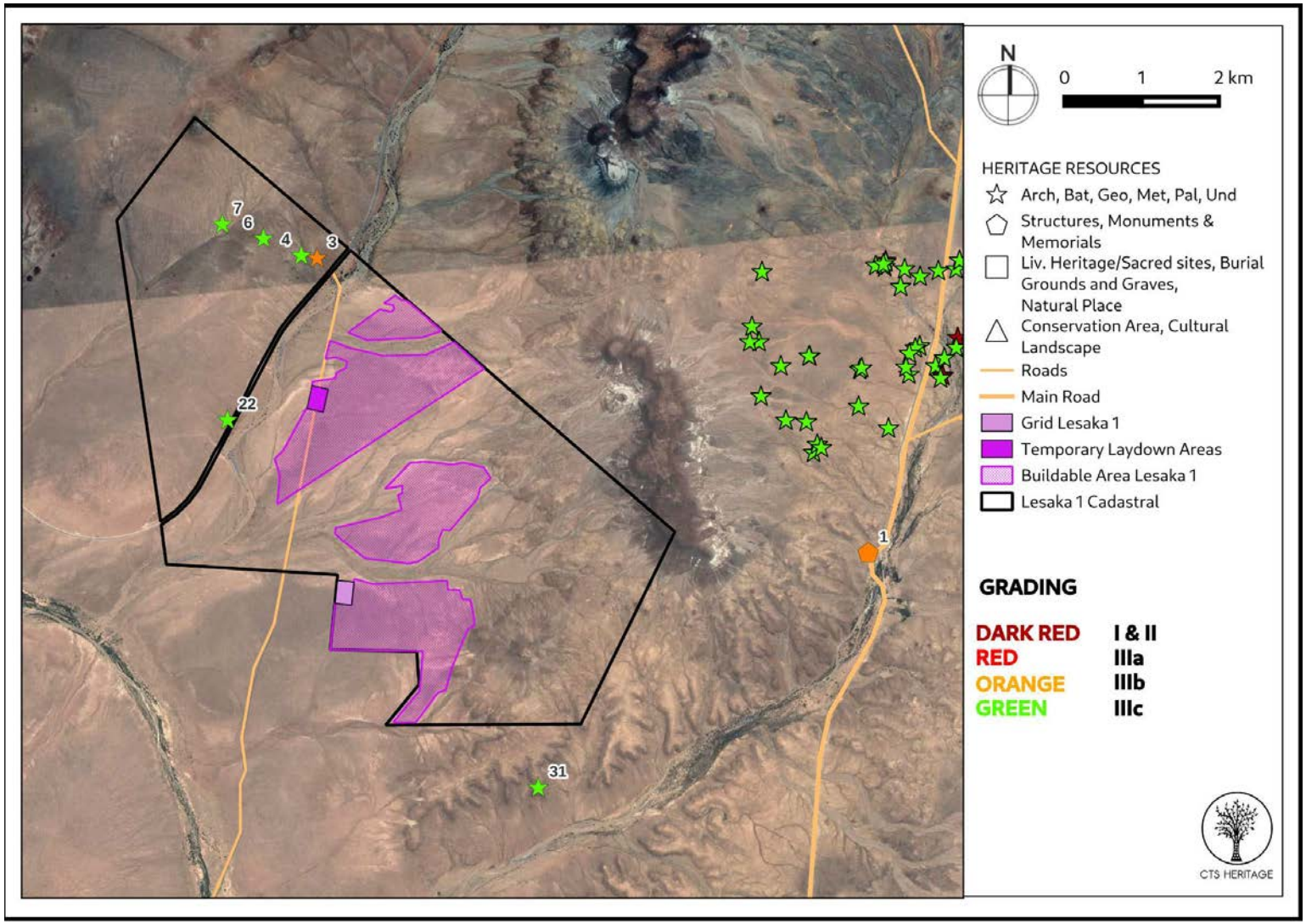

Figure 5.1: All heritage resources identified within the development area

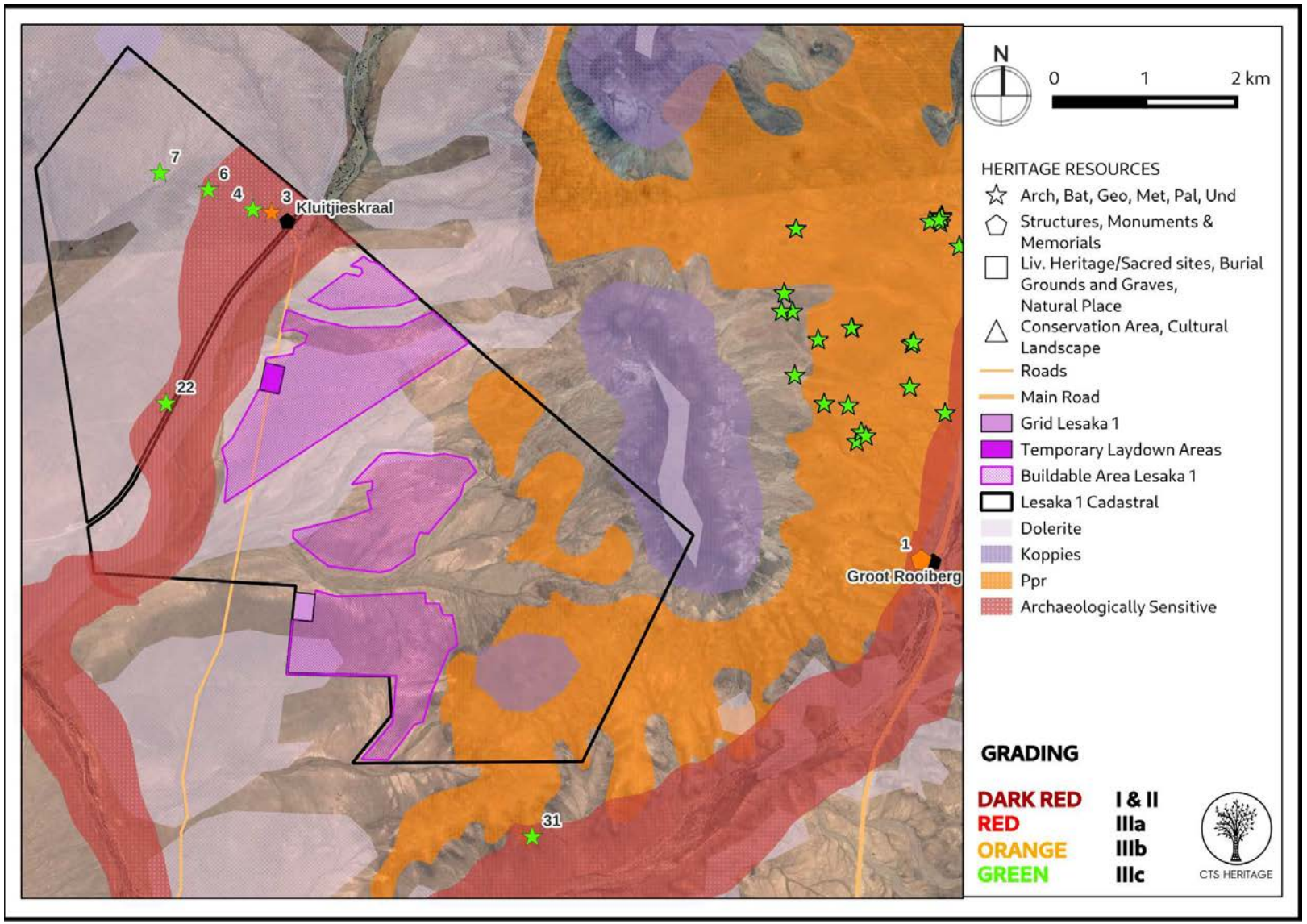

Figure 5.2: Map of heritage resources identified within the PV development area

Table 3: Impacts Table

Lesaka 1 PV Facility																				
		ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION										ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S	RECOMMENDED MITIGATION MEASURES	E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Construction Phase																				
Impacts to archaeological heritage resources	Construction activities that take place near to archaeological resources may result in their destruction	1	3	4	4	4	3	48	(-)	Negative High	No development activities within the high archaeological sensitivity area identified Should any previously unknown archaeological resources be impacted during construction, work must cese in the vicinity of the find and the relevant heritage authority must be contacted	1	1	4	4	4	1	14	(-)	Negative Low
Impacts to palaeontological resources	Construction activities that take place near to palaeontological resources may result in their destruction	1	2	4	4	4	1	15	(-)	Negative Low	Implementation of the Chance Fossil Finds Protocol	1	2	4	4	4	1	15	(-)	Negative Low
Impacts to the cultural ladscape	Construction activities that take place near to cultural landscape elements may result in their destruction	1	2	1	3	1	3	24	(-)	Negative Medium	Implementation of the recommendations included in the VIA	1	1	4	1	4	1	11	(-)	Negative Low
Operational Phase																				
Impacts to archaeological heritage resources	Operational activities that take place near to archaeological resources may result in their destruction	1	1	4	2	4	3	36	(-)	Negative Medium	No development activities within the high archaeological sensitivity area identified Should any previously unknown archaeological resources be impacted during construction, work must cese in the vicinity of the find and the relevant heritage authority must be contacted	1	1	4	1	4	1	11	(-)	Negative Low
Impacts to palaeontological resources	Operational activities that take place near to palaeontological resources may result in their destruction	1	1	4	1	4	3	33	(-)	Negative Medium	Implementation of the Chance Fossil Finds Protocol	1	1	4	1	4	1	11	(-)	Negative Low
Impacts to the cultural landscape	Operational activities that take place near to cultural landscape elements may result in their destruction	2	3	4	3	3	3	45	(-)	Negative High	Implementation of the recommendations included in the VIA	1	1	4	1	4	1	11	(-)	Negative Low
Decommissioning Phase																				

Impacts to archaeological heritage resources	Decommissioning activities that take place near to archaeological resources may result in their destruction	1	3	4	4	4	3	48	(-)	Negative High	No development activities within the high archaeological sensitivity area identified Should any previously unknown archaeological resources be impacted during construction, work must cese in the vicinity of the find and the relevant heritage authority must be contacted	1	1	4	4	4	1	14	(-)	Negative Low
Impacts to palaeontological resources	Decommissioning activities that take place near to palaeontological resources may result in their destruction	1	2	4	4	4	1	15	(-)	Negative Low	Implementation of the Chance Fossil Finds Protocol	1	2	4	4	4	1	15	(-)	Negative Low
Impacts to the cultural landscape	Decommissioning activities that take place near to cultural landscape elements may result in their destruction	1	2	1	3	1	3	24	(-)	Negative Medium	Implementation of the recommendations included in the VIA	1	1	4	1	4	1	11	(-)	Negative Low
Cumulative																				
Impacts to archaeological heritage resources	Cumulative destruction of significant archaeological heritage	1	2	4	3	4	3	42	(-)	Negative Medium	No development activities within the high archaeological sensitivity area identified Should any previously unknown archaeological resources be impacted during construction, work must cese in the vicinity of the find and the relevant heritage authority must be contacted	1	1	4	1	4	1	11	(-)	Negative Low
Impacts to palaeontological resources	Cumulative destruction of significant palaeontological heritage	1	2	4	3	4	3	42	(-)	Negative Medium	Implementation of the Chance Fossil Finds Protocol	1	1	4	1	4	1	11	(-)	Negative Low
Impacts to the cultural landscape	Cumulative impact to the cultural landscape	1	2	4	3	4	3	42	(-)	Negative Medium	Implementation of the recommendations included in the VIA	1	1	4	1	4	1	11	(-)	Negative Low

5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

5.1 Assessment of impact to Heritage Resources

5.1.1 Cultural Landscape and VIA

A VIA was completed for the proposed development, the results of which are summarised below.

"The landscape character is the description of the pattern of the landscape resulting from the combinations of the natural (geology, topography and vegetation) and cultural (land use) characteristics. The property lies at an elevation of ~750 m amsl and is mostly flat. Elevation increases towards the northern and southern boundaries of the property and a fairly prominent ridge is located on the eastern boundary of the property. Regionally, elevation ranges more significantly, particularly to the south-west and south-east. Isolated koppies, ridgelines and escarpments are a feature of the surrounding landscape.

The area around the SEF property and powerline corridor is predominantly characterised by grazing lands (natural vegetation), with supporting infrastructure (roads, powerlines and a railway line). A road (AP 2972) extends northwards from Loeriesfontein and to the east of the SEF property. The Sishen-Saldanha railway line is routed adjacent to the Klein-Rooiberg River bisecting the northern portion of the SEF property. Existing large-scale powerlines are also present around the SEF property and powerline corridor, increasing in concentration nearer the existing Helios MTS. Approximately 13 approved renewable energy projects within ~5 km north of the SEF property, some of which are located on some of the 132 kV powerline corridor properties.

The visual character of the project area is provided by the topography, vegetation and land use of the area which is a rural environment characterised by the sparsely vegetated prominences and ridgelines separated by often, wide flat expanses interspersed with farmstead and some infrastructure. The project area can therefore be defined as a natural transition landscape as it is mostly rural with few isolated farmsteads and some powerlines, roads and railway line visible in the landscape.

The visual quality of the area can be experienced through long closed views across plains of low vegetation and prominences, escarpments and ridgelines defining the horizon. Though there are limited anthropogenic features (road, fences, powerlines and railway line), they impact significantly on the visual quality of the area as they interrupt views and are discordant with the natural landscape. Though not always visible, the very long, noisy trains using the railway line bisecting the property, detract significantly from visual quality.

Based on the surrounding land uses, the receptors have been identified; viz. farmstead residents and motorists and tourists. The farmsteads are interspersed throughout the area surrounding the SEF and the powerline corridor properties, none, however are identified within the foreground of the project. Two roads are located in close proximity to the project site. The AP 2972 is routed to the east of the property and an unnamed gravel road branches off the AP 2972 towards the site to the west..

The region has scenic value in terms of the rugged natural landscape and large portions of agricultural land. The sense of place of the surrounding area is strongly influenced by the surrounding land use, which can generally be described as a natural agricultural area, on natural grazing land, i.e. not managed (irrigated) pastures."

The VIA notes that "*The total combined development footprint of the SEF is ~ 795 ha. The development of this PV array may be perceived as conflicting with the current undeveloped, inhospitable agricultural landscape. Across the landscape there is evidence of anthropogenic influence such as the Sishen-Saldanha railway line, fence lines, AP 2972, operational WEFs and construction of a SEF. Nevertheless, the proposed PV array is expected to degrade views, and negatively impact the sense of place and present as a visual intrusion across the landscape.*"

5.1.2 Archaeology

Impacts to archaeological resources are most likely during the construction phase of development. As noted above, the riverine floodplain systems contain the bulk of the sites located and much of MSA is likely buried in the terraces overlooking the three non-perennial streams crisscrossing the farm. More significant LSA material similar to those observed by Halkett and Webley to the north east of Kluitjes Kraal (on the eastern side of Groot Rooiberg) was found with the local white opaline CCS/chert, hornfels and quartzite assemblages. These sites lie within a band of more sensitive ground buffering the stream systems and can easily be avoided by placing the solar PV infrastructure outside of a minimum distance from these streams.

The more sensitive archaeological areas surrounding the streams have been mapped in figure 8 below. It is therefore recommended that the PV layout avoid the identified sensitive archaeological area to prevent negative impacts to significant archaeological heritage.

Should the final amended layout adhere to the recommendations above, no negative impact to significant archaeological resources are anticipated from the development of the proposed PV facility.

5.1.3 Palaeontology

Impacts to palaeontological resources are most likely during the construction phase of development. No fossiliferous outcrop was detected in the proposed Lesaka Solar Renewable Energy Facility and grid connection development area. A LOW Palaeontological Significance has been allocated to the development. It is therefore considered that the proposed development will not lead to damaging impacts on the palaeontological resources of the area. The construction of the development may thus be permitted in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources.

Loss of fossil heritage will have a negative impact. Only the site will be affected by the proposed development. The expected duration of the impact is assessed as potentially permanent to long term. In the absence of mitigation procedures, the damage or destruction of any palaeontological materials will be permanent. Impacts

on palaeontological heritage during the construction phase could potentially occur. A negative medium Significance has been allocated to the proposed development.

5.2 Sustainable Social and Economic Benefit

The anticipated socio-economic benefits to be derived from this project have been assessed in a SIA for the project. The results of this assessment are summarised below:

Potential positive impacts in the construction Phase

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

The construction phase will extend over a period of approximately 18-24 months and create in the region of 200-250 employment opportunities. The total wage bill will be in the region of R 20 million (2022 Rand values). A percentage of the low and semi-skilled employment opportunities will benefit residents from local towns in the HM, specifically Loeriesfontein and Calvinia. Most of the beneficiaries are likely to be historically disadvantaged (HD) members of the community. This would represent a short term positive social benefit in an area with limited employment opportunities. A percentage of the wage bill will be spent in the local economy which will also create opportunities for local businesses.

The capital expenditure for each SEF will be ~R2 billion (2022 Rand values) and will create opportunities for the local and regional and local economy. The sector of the local economy most likely to benefit from the proposed development is the local service industry. The potential opportunities for the local service sector would be linked to accommodation, catering, cleaning, transport, and security, etc. associated with the construction workers on the site. However, given the relatively small scale of the development and short construction period the benefits will be limited.

Potential positive impacts in the Operational Phase

- The establishment of infrastructure to improve energy security and support the renewable sector.
- Creation of employment opportunities.
- Benefits for local landowners.
- Benefits associated with socio-economic contributions to community development.

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

The findings of the SIA indicate that the proposed Lesaka 1 PV SEF and associated infrastructure will result in several social and socio-economic benefits, including creation of employment and business opportunities during

both the construction and operational phase. The project will also contribute to local economic development though socio-economic development (SED) contributions. In addition, the development will improve energy security and reduce the carbon footprint associated with energy generation.

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

5.3 Proposed development alternatives

The entire assessment area was surveyed for impacts to heritage resources. The final layout provided for the Lesaka 1 PV Facility has been determined through the sensitivity verification process undertaken by the various specialists on the project.

Alternative locations are considered for the Temporary Laydown areas and these are mapped throughout the document. There is no preferred alternative from a heritage perspective. The layout as proposed is unlikely to negatively impact on significant heritage resources and as such, no alternatives are proposed from a heritage perspective.

5.4 Site Verification Statement

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

- The cultural value of the broader area has some significance in terms of its sense of place and scenic qualities (Moderate)
- Some significant archaeological resources were identified within the broader area (Moderate)
- No highly significant palaeontological resources were identified within the development area and the sediments underlying the development area have zero palaeontological sensitivity (Low)

As per the findings of this assessment, and its supporting documentation, the outcome of the sensitivity verification disputes the results of the DFFE Screening Tool for Cultural Heritage, Archaeology and Palaeontology.

5.5 Cumulative Impacts

In terms of impacts to heritage resources, the cumulative impact of developments such as this largely pertains to cumulative impacts to the cultural landscape. In general, it is preferred that this kind of infrastructure development is concentrated in one location and is not sprawled across an otherwise rural or wilderness landscape.

In this instance, the cumulative assessment completed in the VIA is relevant;

"WEFs are generally more visually intrusive structures within the landscape due to their height and form. SEFs have a lower visual impact to the surrounding region due to their low vertical profile and therefore, lower visibility across vistas in the landscape, when compared to projects such as WEFs or power stations. Nevertheless, both WEFs and SEFs result in change to the visual character of a large footprint / area, and therefore can alter the sense of place to visual receptors near the site. Powerlines, BESS's and substations are typical components of renewable energy facilities. Despite the rural location of the project and surrounding area the region has a high concentration of approved renewable energy projects located around the Helios MTS. Only two WEFs of the 13 facilities appear to be operational, while another SEF is under construction. As more of these facilities are constructed and enter their operational phase, the visual landscape is expected to be significantly transformed detracting from the visual quality of the region. As SEFs and WEFs proliferate, impacts will accumulate towards an unknowable threshold."

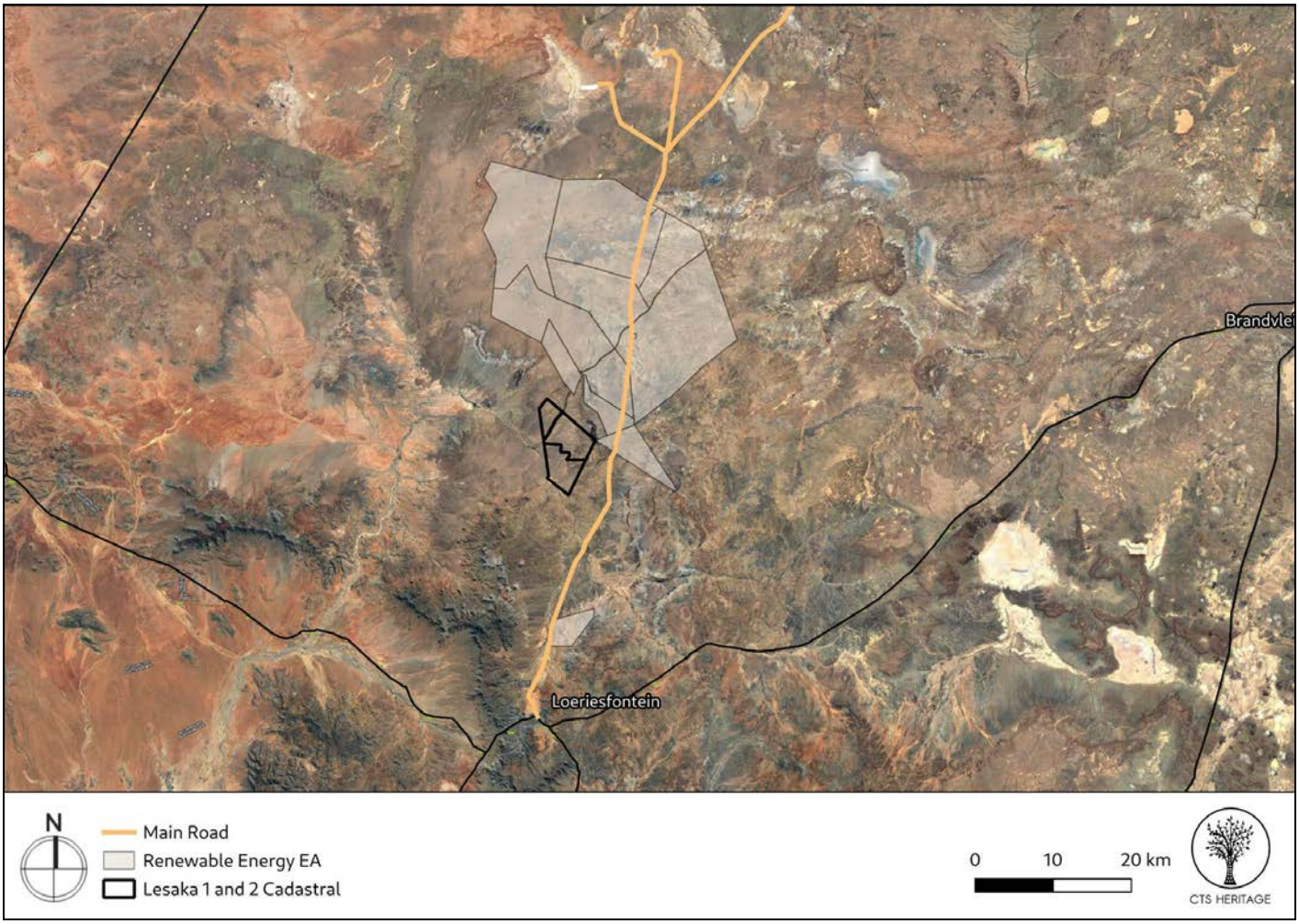

Figure 6: Approved REF projects within 20km of the proposed development area

6. RESULTS OF PUBLIC CONSULTATION

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

7. CONCLUSION

The surveys conducted for impacts to heritage resources including archaeology and palaeontology proceeded with no significant constraints or limitations, and the project area was comprehensively surveyed for heritage resources. An area of higher archaeological sensitivity associated with the stream systems across the development area was identified and mapped. This area must be avoided in the final PV layout in order to ensure that no significant archaeological heritage resources are negatively impacted by the proposed development.

Despite the high sensitivity for impacts to palaeontological heritage resources of sediments in the vicinity of the development, the areas proposed for the Lesaka 1 PV facility and its associated infrastructure consist of dolerite and quaternary sands and as such, the layout as proposed has low sensitivity for impacts to palaeontological sensitivity.

8. RECOMMENDATIONS

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

- The area of high archaeological sensitivity identified in Figure 5.2 is avoided in the final configuration of the PV layout. The final layout provided complies with this recommendation.
- If Palaeontological Heritage is uncovered during surface clearing and excavations ECO should be informed immediately. Fossil discoveries ought to be protected and the ECO/site manager must report to South African Heritage Resources Agency (SAHRA) so that mitigation (recording and collection) can be carried out.
- 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 SAHRA must be alerted immediately to determine an appropriate way forward.

Table 4: Input to the EMPr for the Construction Phase

Impact/Aspect	Mitigation/Management Actions	Responsibility	Methodology	Mitigation/Management Objectives and Outcomes	Frequency
Impact to significant archaeology	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 SAHRA must be alerted immediately to determine an appropriate way forward.	ECO	NA	Conservation of significant resources	Daily
Impact to significant palaeontology	If Palaeontological Heritage is uncovered during surface clearing and excavations ECO should be informed immediately. Fossil discoveries ought to be protected and the ECO/site manager must report to South African Heritage Resources Agency (SAHRA) so that mitigation (recording and collection) can be carried out.	ECO	NA	Conservation of significant resources	Daily

9. REFERENCES

Heritage Impact Assessments				
Nid	**Report Type**	**Author/s**	**Date**	**Title**
259052	Palaeontological Specialist Reports	John Almond	18/10/2016	Palaeontological heritage assessment: combined desktop and field-based scoping study for the proposed Kokerboom 1 Wind Farm near Loeriesfontein, Namaqua District Municipality, Northern Cape.
375092	AIA Phase 1	David Morris	01/01/2007	Archaeological Specialist Input with Respect to Upgrading Railway Infrastructure on the Saldanha Ore Line in the Vicinity of New Loop 7A near Loeriesfontein
3886	AIA Phase 1	Jaco van der Walt, Marlize Lombard	06/01/2012	AIA for the proposed Hantam PV Solar Energy Facility on the Farm Narosies 228, Loeriesfontein, Northern Cape Province
6889	AIA Phase 1	Lita Webley, Dave Halkett	01/05/2012	HERITAGE IMPACT ASSESSMENT: PROPOSED LOERIESFONTEIN PHOTO-VOLTAIC SOLAR POWER PLANT ON PORTION 5 OF THE FARM KLEIN ROOIBERG 227, NORTHERN CAPE PROVINCE
7217	AIA Phase 1	Johnny Van Schalkwyk	29/02/2012	HIA for the proposed establishment of a wind farm and PV facility by mainstream renewable power in the Loeriesfontein region, Northern Cape Province
7218	PIA Phase 1	John E Almond	01/06/2011	Proposed mainstream wind farm near Loeriesfontein, namaqua District Municipality, Northern Cape Province.
8961	HIA Phase 1	Lita Webley, Dave Halkett, John Pether	01/05/2012	Heritage Impact Assessment: Proposed Loeriesfontein Photo-voltaic Solar Power Plant on Portion 5 of the Farm Klein Rooiberg 227, Northern Cape Province

Deacon, J. & Forster, C. 2005. My Heart Stands in the Hill. Struik Publishers.

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APPENDICES

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APPENDIX 1: Archaeological Assessment (2022)

ARCHAEOLOGICAL SPECIALIST STUDY

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

PROPOSED LESAKA SOLAR ENERGY FACILITY NEAR LOERIESFONTEIN, NORTHERN CAPE

Prepared by

CTS HERITAGE

Jenna Lavin
And Nic Wiltshire

In Association with

SiVEST

September 2022

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EXECUTIVE SUMMARY

Enertrag South Africa (Pty) Ltd on behalf of Lesaka 1 Solar Energy Facility (Pty) Ltd has appointed SiVEST Environmental (hereafter referred to as "SiVEST") to undertake the required EIA / BA Processes for the proposed construction of the Lesaka 1 and 2 Solar Energy Facilities (SEF) and associated grid connection infrastructure near Loeriesfontein in the Northern Cape Province.

The survey proceeded with no significant constraints or limitations, and the project area was comprehensively surveyed for heritage resources. An area of higher archaeological sensitivity associated with the stream systems across the development area was identified and mapped. This area must be avoided in the final PV layout in order to ensure that no significant archaeological heritage resources are negatively impacted by the proposed development.

Recommendations

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

- The area of high archaeological sensitivity identified in Figure 8 is avoided in the final configuration of the PV layout.
- 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 SAHRA must be alerted immediately to determine an appropriate way forward.

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CONTENTS

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1. INTRODUCTION

1.1 Background Information on Project

Enertrag South Africa (Pty) Ltd on behalf of Lesaka 1 Solar Energy Facility (Pty) Ltdhas appointed SiVEST Environmental (hereafter referred to as "SiVEST") to undertake the required EIA / BA Processes for the proposed construction of the Lesaka 1 and 2 Solar Energy Facilities (SEF) and associated grid connection infrastructure near Loeriesfontein in the Northern Cape Province. The distinct EA's that are required for each of the respective Projects and Associated Grid Connection Infrastructure are as follows:

- Lesaka 1 SEF (up to 240MW)
- Lesaka 2 SEF (up to 240MW)
- Lesaka 1 Associated Grid Connection Infrastructure (up to 132kV)
- Lesaka 2 Associated Grid Connection Infrastructure (up to 132kV)

The overall objective of the development is to generate electricity by means of renewable energy technology capturing energy to feed into the National Grid.

The project aims to supply suitable private off-taker initiatives (direct supply or wheeling agreements, as applicable), or be bid into the government coordinated Renewable Energy Independent Power Producer Procurement Programme ("REIPPPP") or similar procurement program under the Integrated Resource Plan ("IRP"). The Lesaka SEF Cluster Projects will be administered under the respective Project Companies, and the Projects will be require to be composed of the following:

Lesaka 1 Solar Energy Facility (Pty) Ltd

- Lesaka 1 SEF (up to 240MW)
- Battery Energy Storage System ("BESS")
- On-site Independent Power Producer ("IPP") Substation (up to 33/132kV)
- All associated grid infrastructure

Lesaka 2 Solar Energy Facility (Pty) Ltd

- Lesaka 2 SEF (up to 240MW)
- BESS
- On-site IPP Substation (up to 33/132kV)
- All associated grid infrastructure

Grid Connection Infrastructure

- (Up to x2) Up to 132kV Switching Stations
- Up to 132kV Overhead Power Line ("OHL") from Lesaka 1 SEF Switching Station to Lesaka 2 SEF Switching Station (if needed)
- Up to 132kV OHL to the Helios Main Transmission Substation ("MTS")

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The Projects will connect to the Helios MTS owned by Eskom, which is approximately 21km to the northeast of the Project Site. The Lesaka SEFs will be located over one farm portion and the collective site extent is approximately 4 894.93 ha. It is proposed that the Projects will connect to the Eskom grid by routing Low Voltage ("LV") and Medium Voltage ("MV") cables underground through to the respective 132kV onsite IPP Substations which in turn connect to the respective 132kV Switching Station(s). A single or double circuit OHL will run from the 132kV Switching Station to the Helios MTS

1.2 Description of Property and Affected Environment

The project lies around 35km north of Loeriesfontein and lies to the west of the main gravel road linking Loeriesfontein to a prominent cluster of koppies overlooking the Rooiberg River. The Khobab Wind farm lies another 25km further north and the Khobab wind turbines can be seen in the distance from the study site. One has to leave the main gravel road and travel a further 7km northwest along a rocky farm track before reaching the property (Kluitjes Kraal 264). The terrain is extremely arid and sparsely vegetated in the Bokkeveld Sandstone Fynbos region. The Klein Rooiberg, Krom and Rooiberg Rivers are non-perennial streams which join and separate from each other across the property and only contain water temporarily after intermittent rainfall. The Groot Rooiberg and Grootmelkboskop koppies lie prominently on the northeast end of the study area with a smaller koppie, Rooibergdrif se Kop, on the southeastern corner. An even smaller koppie lies on the northwestern corner called Klein Loerkop. The rest of the terrain is undulating to flat and generally suitable for the placement of solar PV farms.

Due to the extreme aridity, even stock farming is limited and no crop irrigation has taken place on this farm even in the historical period. The only structures lie at the Kluitjieskraal werf which mostly consists of a handful of relatively modern buildings, kraals and water tanks for the small-scale sheep farming taking place. The Sishen-Saldanha railway line runs right past the Kluitjieskraal werf before continuing on north-eastwards onto the iron mines near Kuruman.

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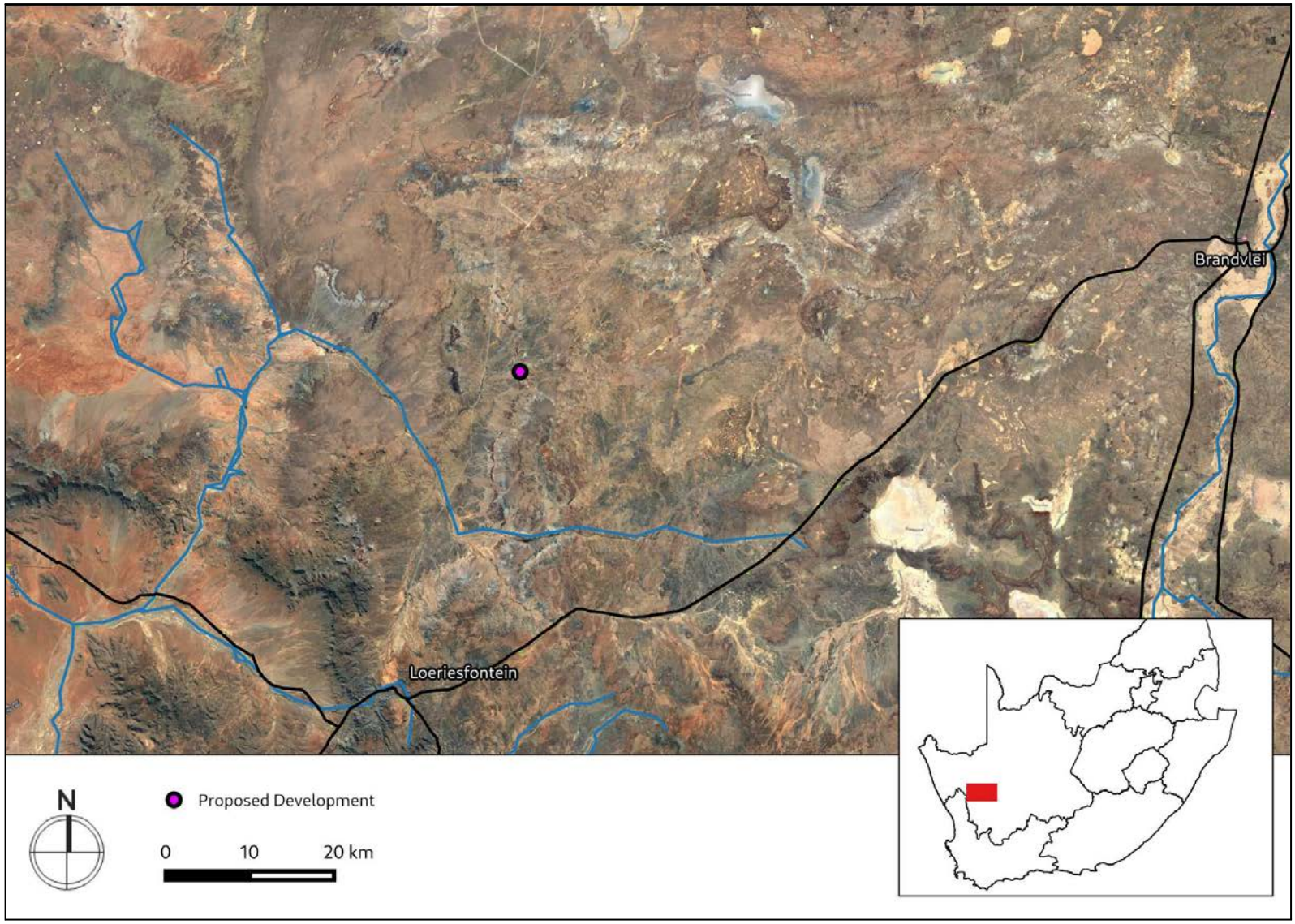

Figure 1.1: Satellite image indicating proposed location of development

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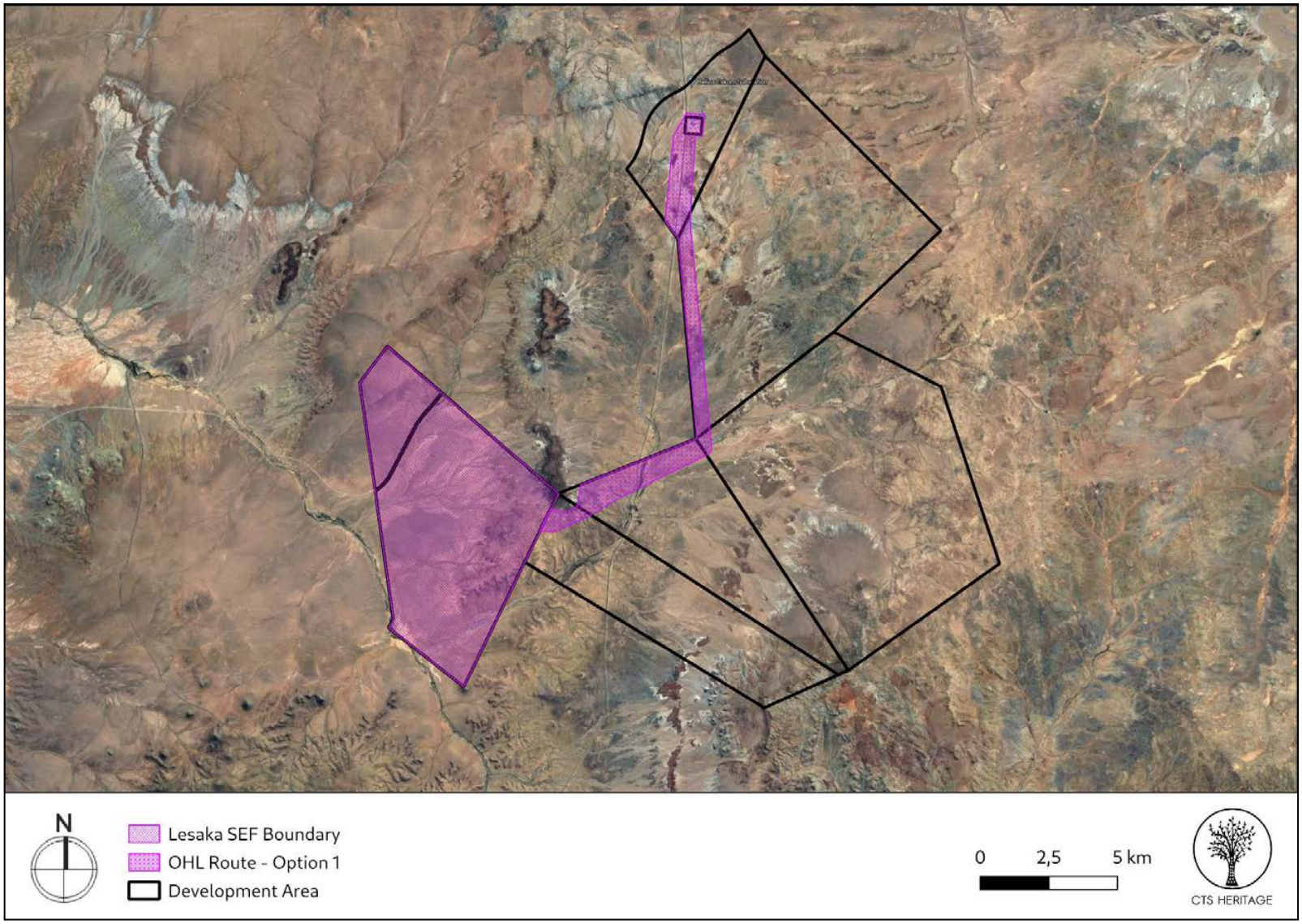

Figure 1.2: Proposed project boundary

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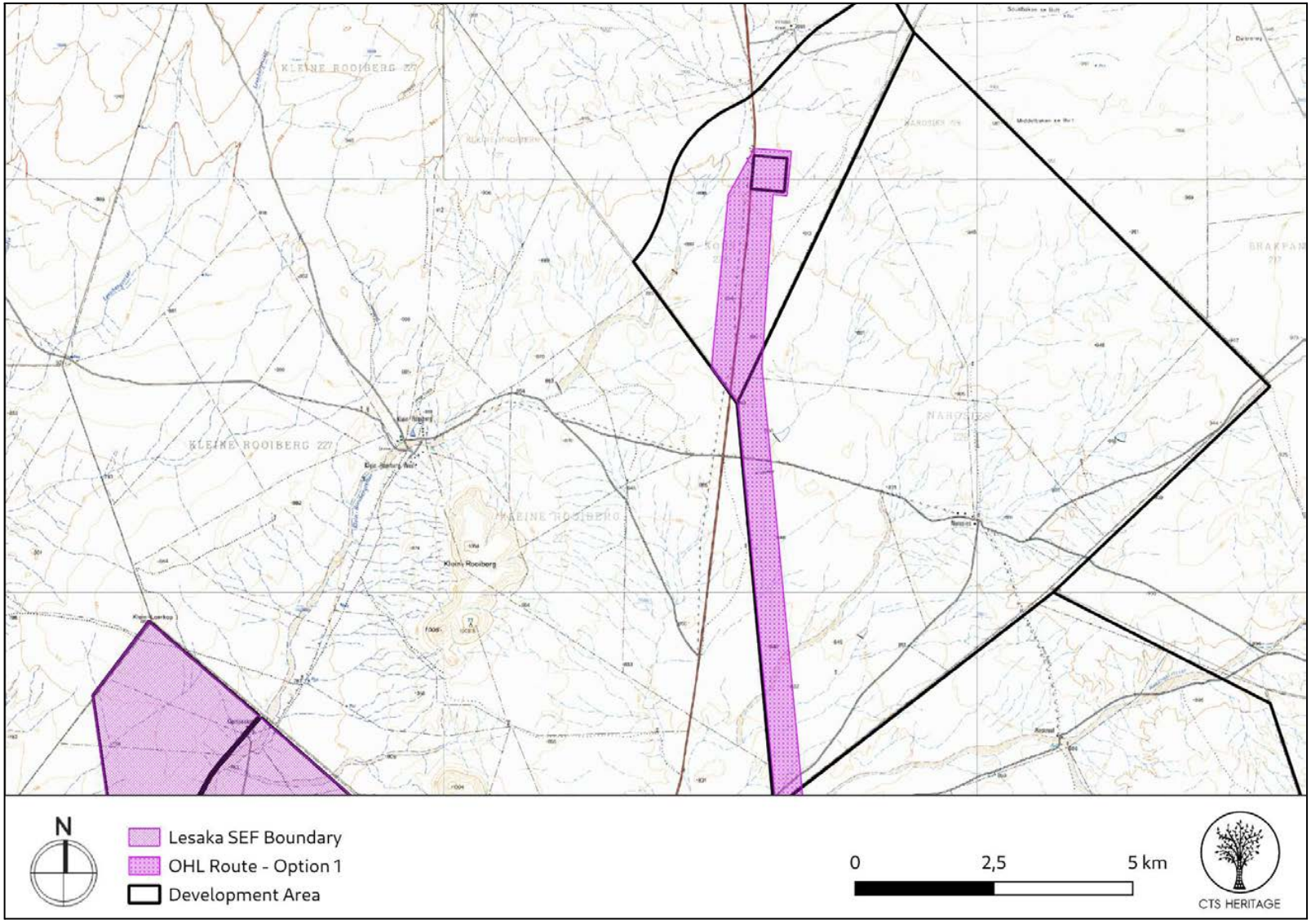

Figure 1.3: Proposed project boundary on the extract from the 1:50 000 Topo Map

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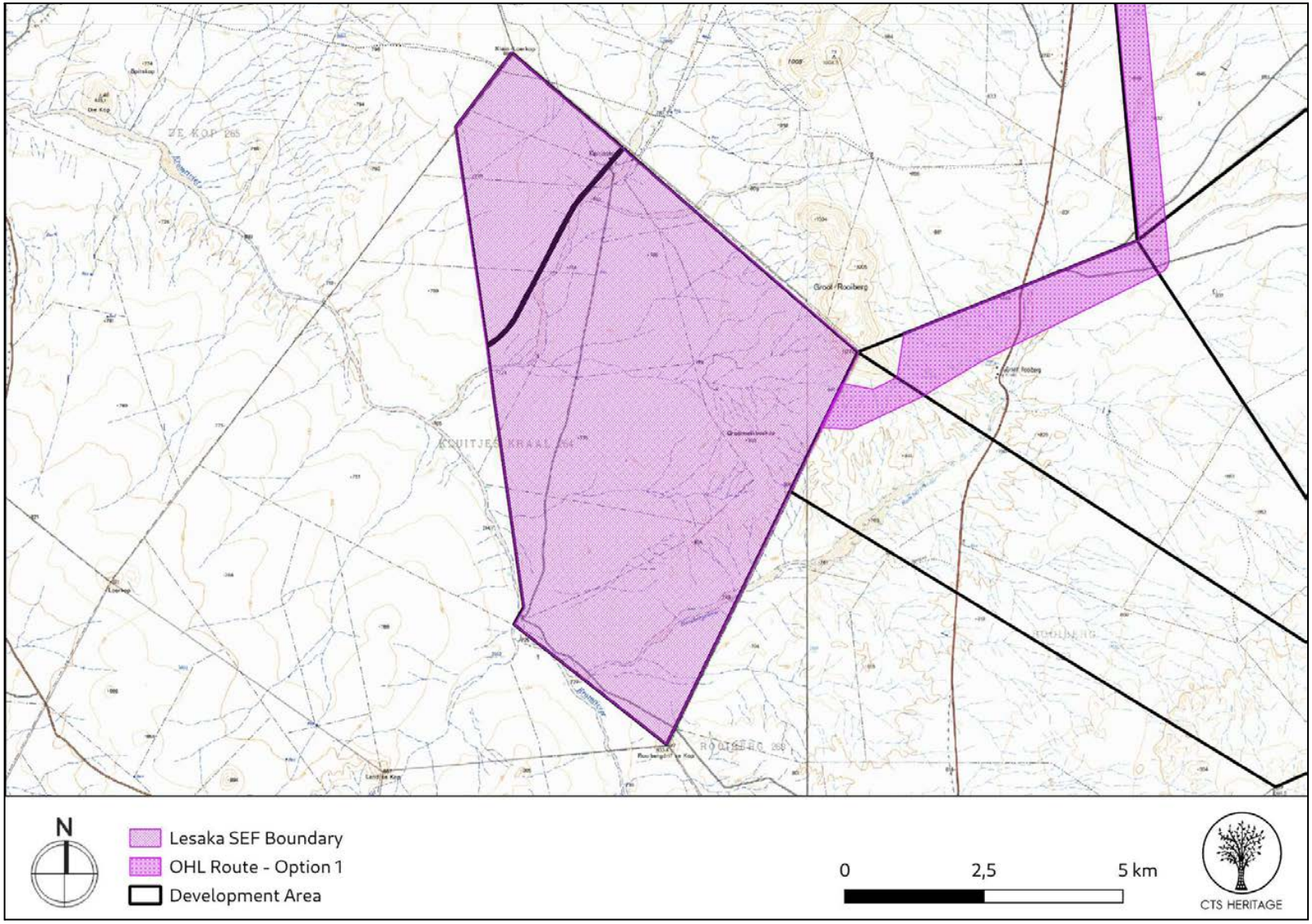

Figure 1.4: Proposed project boundary on the extract from the 1:50 000 Topo Map

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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 on 28 September to 01 October 2022 to determine what archaeological resources are likely to be impacted by the proposed development.
- The area proposed for development was assessed on foot, photographs of the context and finds were taken, and tracks were recorded using a GPS.
- The identified resources were assessed to evaluate their heritage significance in terms of the grading system outlined in section 3 of the NHRA (Act 25 of 1999).
- Alternatives and mitigation options were discussed with the Environmental Assessment Practitioner.

2.3 Constraints & Limitations

Given the extremely arid conditions prevailing on site, the vegetation posed no hindrance to the archaeological survey and the coverage obtained was excellent. We therefore feel that the survey provided a high level of confidence in the characterisation of the heritage sensitivity present within the study area.

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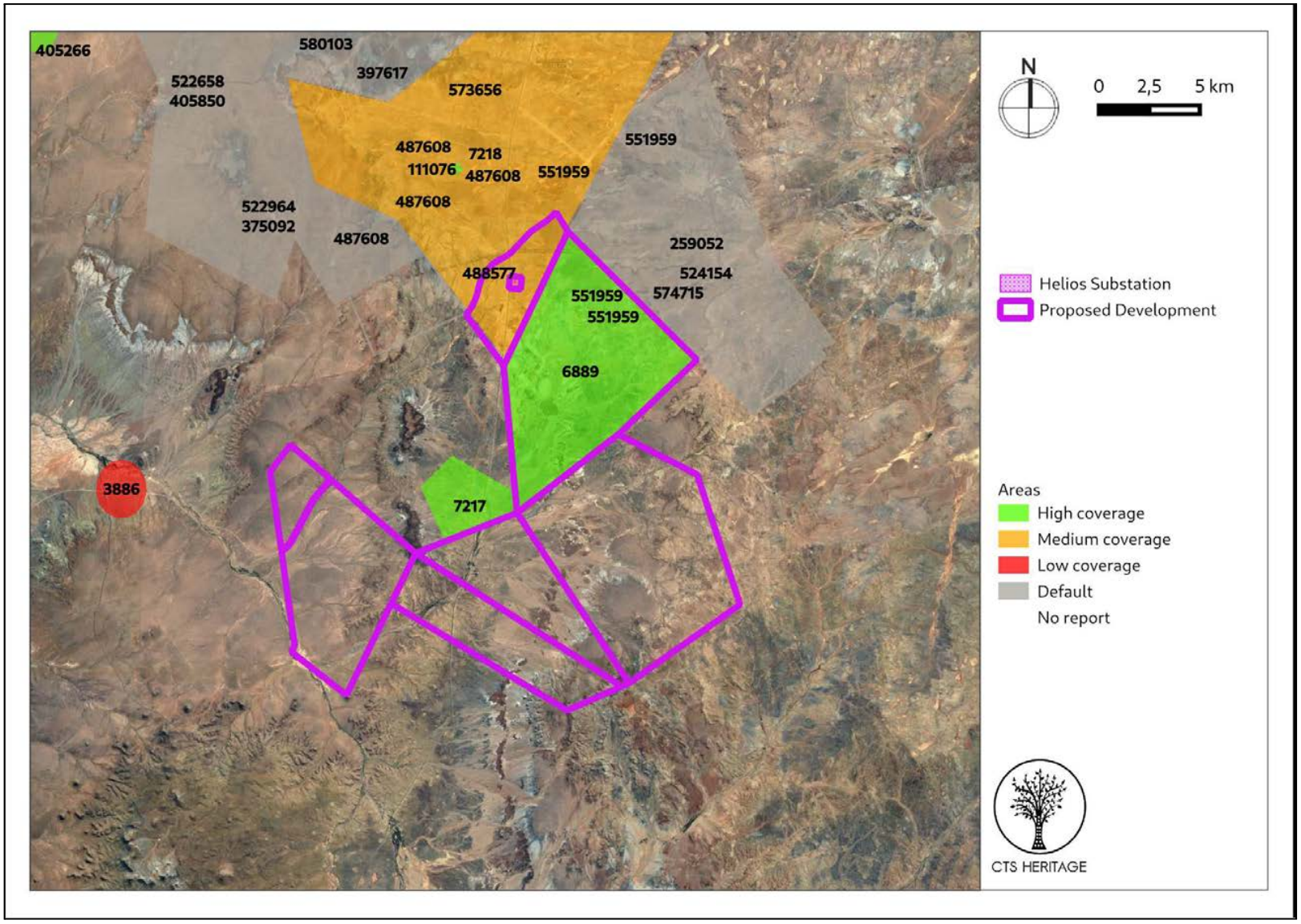

Figure 2: Close up satellite image indicating proposed location of development in relation to heritage studies previously conducted

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3. HISTORY AND EVOLUTION OF THE SITE AND CONTEXT

Background:

This application is for the proposed development of PV facilities located approximately 40km north of the town of Loeriesfontein in the Northern Cape. The town grew around a general store established in 1894 by a travelling Bible salesman and became a municipality in 1958. The town of Loeriesfontein is within a basin surrounded by mountains and the broader area around the town forms part of Namaqualand, famous for its flower season. This area is recognised as one of the highest yield areas for renewable energy in South Africa, however this area falls outside of a REDZ area. Due to these high yields, there are existing, approved renewable energy facilities located immediately adjacent to the area proposed for development.

Cultural Landscape and Built Environment

According to an impact assessment completed for the neighbouring Loeriesfontein PV Facility (Webley and Halkett, 2012), an adjacent farm is named "Klein Rooiberg" because the northern border of the study area is dominated by outcropping regions ("koppies") which are reddish in colour. The southern area also exhibits these koppies that are elevated above the plains. The assessment goes on to note that "The site is covered by low lying vegetation of the Succulent Karoo Biome. A number of drainage lines were identified crossing the study area… The drainage systems are associated with the Volstruisnesholte River catchment." The study area is considered to be fairly natural succulent Karoo shrubland with low intensity sheep grazing on the site. There is a small concrete farm dam located on the property next to a windmill. Farm fences have been erected. There are two transmission lines near the site, including a 66kV transmission line that runs along the district road towards the substation and a 400kV transmission line that runs to the west of the site in the direction of Klein Rooiberg. There is a district road which runs through the project site. The predominant context of this area is wilderness landscape dominated by topographic features such as koppies and rivers, as well as existing renewable energy facilities. In his assessment of the Kokerboom WEF located 10 kilometres north of this development area, Orton (2021) notes that "The landscape is also considered to be a heritage resource but its cultural component is very limited and a new layer of electrical infrastructure is starting to dominate the landscape…"

As can be seen in Figure 3c, the area proposed for development is scattered with farm werfs and connecting roads. According to Webley and Halkett (2012), "from approximately 1850 onwards, Dutch Trekboers started making seasonal use of the summer grazing around the large pans in the area. Many contemporary farmers in Namaqualand still own two farms, one in the Bushmanland and the other in Namaqualand. The livestock is transported between their farms by truck." Orton (2021) notes that "It is unlikely that many earlier farmsteads (than the earlier 20th Century) would be present because this harsh landscape was only permanently settled in relatively recent times." Based on the desktop assessment, 5 farm werfs fall within the development area however their heritage value has yet to be ascertained.

Prior to colonial settlement, this region was occupied by San hunter-gatherers and remained here living around the salt pans until they were "forced off the land as the farms were surveyed and made available to European farmers. Some of these "Basters", of mixed descent, travelled north and settled in the southern Richtersveld. Many of the farms were

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only allocated after the introduction of the wind pump to South Africa in the 1870s made the more arid lands accessible and suitable for grazing." The salt pans of this area therefore have associated cultural landscape value however no salt pans are evident within the area proposed for development.

Archaeology

As a result of the renewable energy facilities proposed in this area, a number of Heritage Impact Assessments have been completed that are relevant here, and a number of significant archaeological resources identified (Figure 3, 3a and 3b). Orton (2021) and Webley and Halkett (2012) both found extensive evidence of Middle and Later Stone Age archaeology in the broader area, noting that MSA artefacts tend to more prevalent on the lowlands and generally attributable to background scatter whereas LSA scatters tend to be associated with topographical features such as koppies, dolerite outcrops, rivers and salt pans. It is likely that this pattern will remain applicable within the development area. These features are therefore considered to be highly sensitive in terms of potential impacts to significant archaeology. Webley and Halkett (2012) identified four sites that they determined have very high levels of regional significance, graded II, located immediately adjacent to the area proposed for development. These are described in the table below. Similar significant archaeological heritage resources are likely to be present within the area proposed for development.

Table 1: Significant archaeological sites in the vicinity of the development from previous assessments

89242	**KNRB001**	Dense LSA scatter on top of a prominent koppie. Large amounts of ostrich eggshell fragments and stone artefacts concentrated on the hilltop. The material includes bladelets, flakes, irregular and single platform cores, 1x miscellaneous retouch piece. No formal artefacts observed. Pottery is present (4-6mm thick; fine temper, no burnish). I x unfinished oes bead suggesting outer diameter of ~6mm. Some bone was also noted (possibly recent). Raw materials include Quartz and quartz crystal, hornfels and CCS (opaline?). No/minimal deposit but rather a single surface scatter. Sites 087-110 are points representing the outer boundary point of 086.
89256	**KNRB015**	Extensive LSA artefact scatter on top of a low koppie. Some MSA elements are present. Most of the LSA material consists of bladelets, flakes and cores on hornfels, while 3 backed blades and a scraper are on the white ccs material. A small amount of ostrich eggshell fragments was observed. A small cairn of the local dolerite rocks (beacon/marker) was noted on the hill (L052). Also some recent glass.
89338	**KNRB041**	Dense LSA artefact scatter on a low koppie immediately overlooking the river. Abundant ostrich eggshell fragments and hornfels and CCS. Chunks, flakes and cores predominate but a formal element is present in the form of side scrapers (2x white ccs), a large segment (white ccs), a backed blade (1x hornfels) and an mrp (silcrete?)
89339	**KNRB042**	Dense LSA artefact scatter on a low koppie immediately overlooking the river. Abundant ostrich eggshell fragments and hornfels and CCS. Chunks, flakes and cores predominate but a formal element is present in the form of side scrapers (2x white ccs), a large segment (white ccs), a backed blade (1x hornfels) and an mrp (silcrete?)

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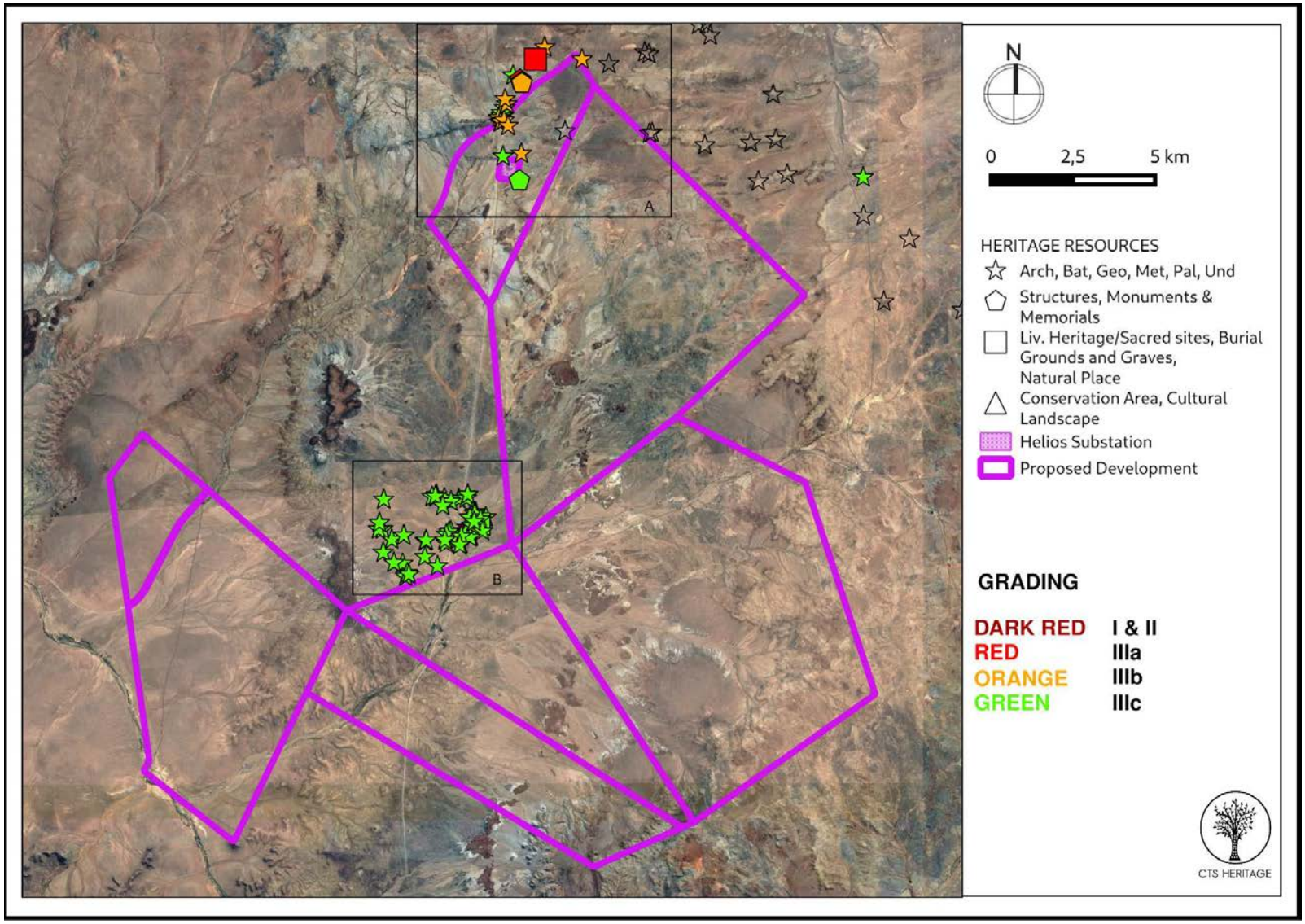

Figure 3.1. Heritage Resources Map. Heritage Resources previously identified in and near the study area, with SAHRIS Site IDs indicated

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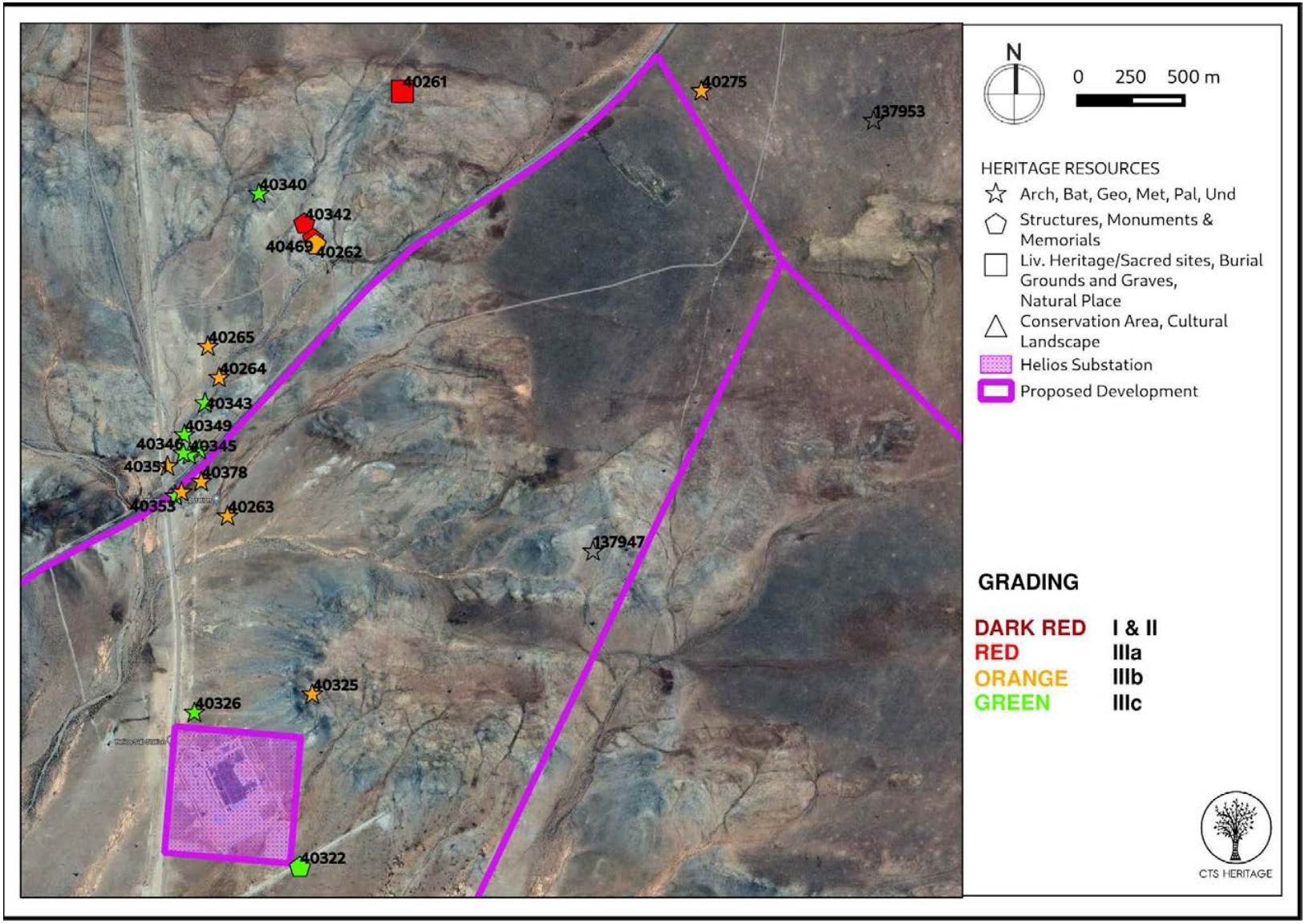

Figure 3.2. Heritage Resources Map showing heritage resources near the proposed development

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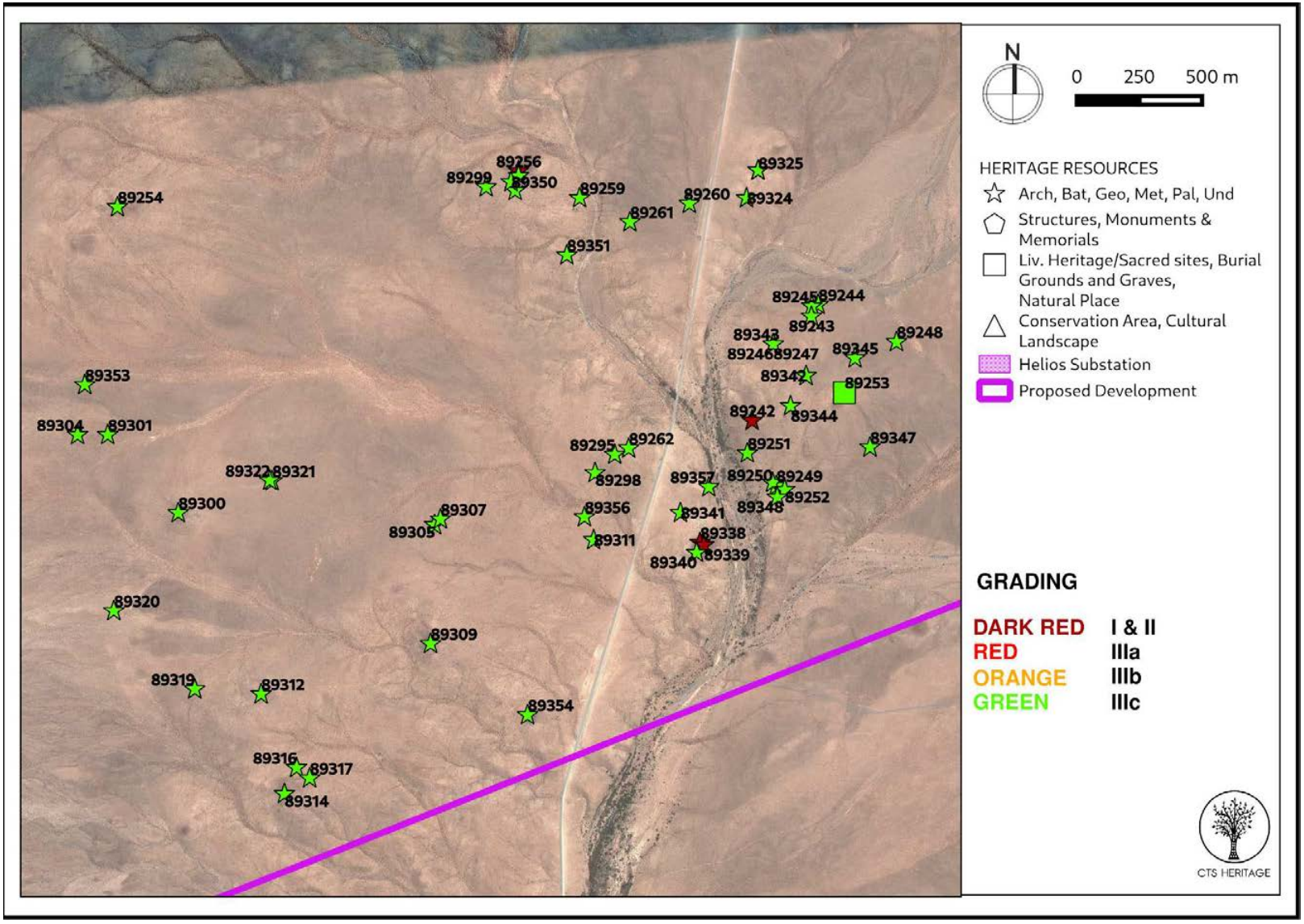

Figure 3.3. Heritage Resources Map showing heritage resources near the proposed development

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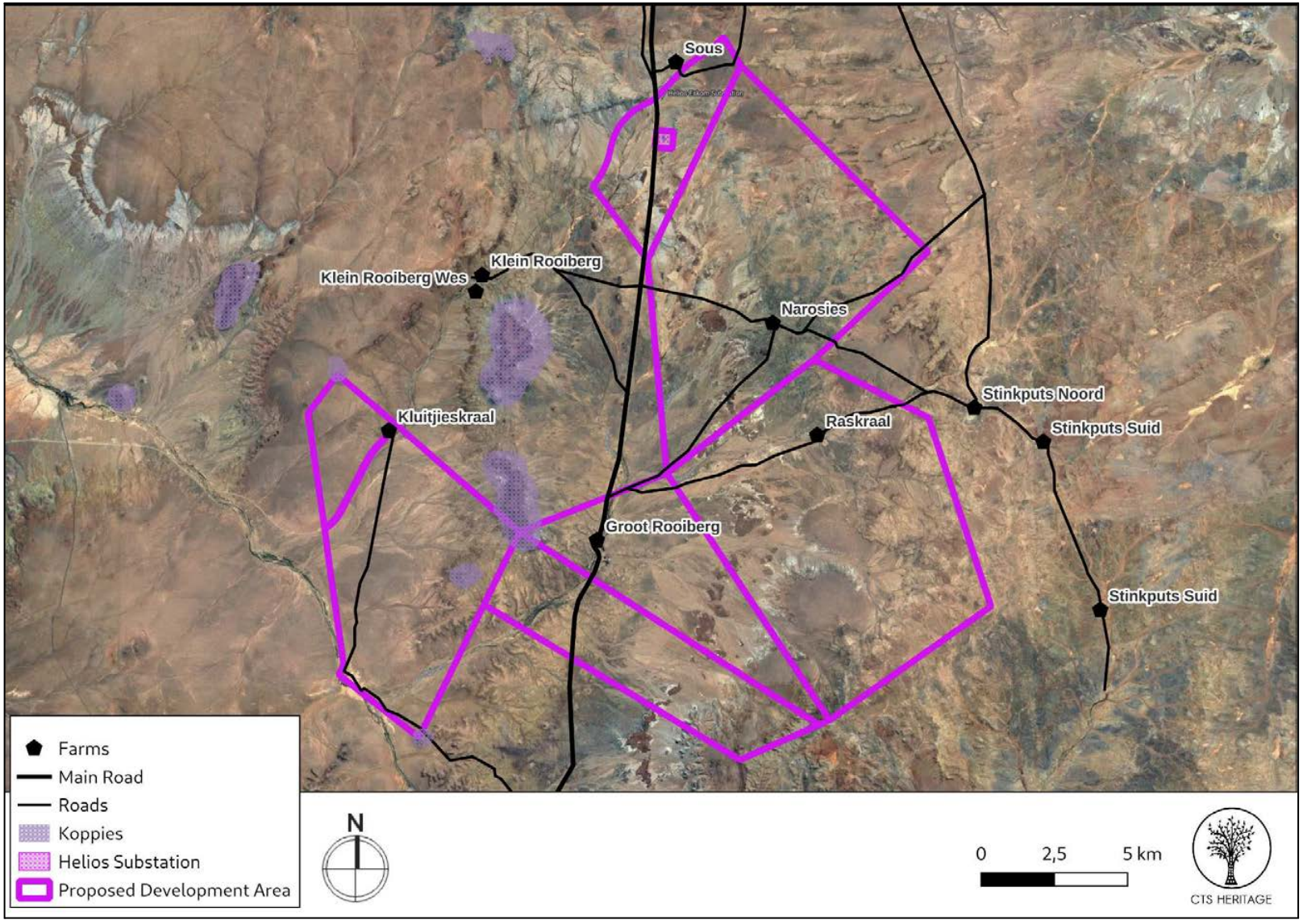

Figure 3.4. Heritage Resources Map. Potential heritage resources identified from the 1:50 000 Topo Map

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4. IDENTIFICATION OF HERITAGE RESOURCES

4.1 Field Assessment

58 observations were made during the survey which added to the growing database of recorded heritage resources in the area that have been conducted during various impact assessments. As mentioned earlier, no significant built environment heritage was found on Kluitjes Kraal but extensive remains of Stone Age material was found. These date both to the Middle Stone Age generally spread across the entire study area as well as Later Stone Age and terminal LSA/historical period where ceramics, metal and glass items appear in the assemblages.

The riverine floodplain systems contain the bulk of the sites located and much of MSA is likely buried in the terraces overlooking the three non-perennial streams crisscrossing the farm. More significant LSA material similar to those observed by Halkett and Webley to the north east of Kluitjes Kraal (on the eastern side of Groot Rooiberg) was found with the local white opaline CCS/chert, hornfels and quartzite assemblages. These sites lie within a band of more sensitive ground buffering the stream systems and can easily be avoided by placing the solar PV infrastructure outside of a minimum distance from these streams.

We are also aware of the fact that a field rating of Grade II was given by Halkett & Webley to the sites found closer to the Helios station but these were presumably given due to the possible association of these sites with the Bleek and Lloyd informants (Deacon & Forster, 2005). In researching the farms further ahead of this survey and consulting Dr Deacon it is clear these areas are not the ones referenced in the reports and we would instead suggest a Grade IIIa rating for those sites is more appropriate pending further research in the future which may warrant such a high grading.

Figure 4.1: View of Groot Rooiberg koppie in the background with the main gravel road in the foreground.

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Figure 4.2: Extremely arid conditions found on site with sparse vegetation cover.

Figure 4.3: View looking northwest across the study site showing the generally level ground and Klein Loerkop in the distance.

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Figure 4.4: View of study site looking south.

Figure 4.5: Contextual photo from the westernmost proposed PV area looking eastwards to Groot Rooiberg and Groot Melkboskop.

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Figure 4.6: View of Rooibergdrif se Kop in the distance.

Figure 4.7: View of the study site standing on the undulating slopes that form towards the eastern half of the study area.

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Figure 4.8: View of the floodplain typical in the Rooiberg and Krom River beds.

Figure 4.9: View from rockier ground near Grootmelkboskop looking northeast over the Rooiberg River area.

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Figure 4.10: Elevated view looking down onto the plains from the top of Grootmelkboskop.

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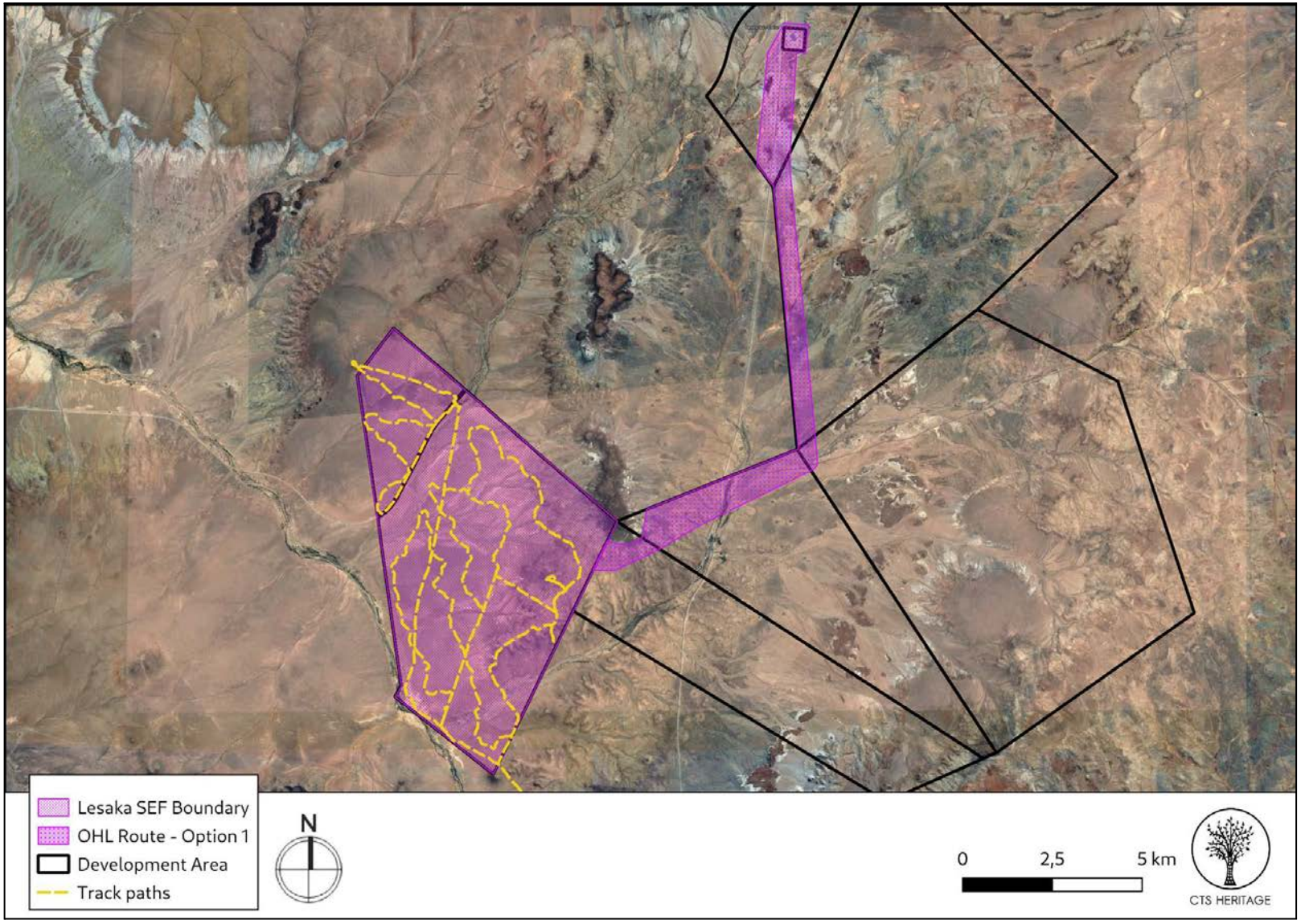

Figure 5: Overall track paths of foot survey for development

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4.2 Archaeological Resources identified

Table 2: Results of archaeological field assessment

Site No.	Description	Type	Period	Density	Co ords		Grade	Mitigation
001	Groot Rooiberg werf, late Victorian/Edwardian building with hipped corrugated iron roof. Stone walling kraals and additional ruins closer to Rooiberg River	Structure	Historic	n/a	-30.62246805	19.53500846	IIIB	NA - Outside of development area
002	Kluitjieskraal houses and kraals. Mostly modern buildings overlaid on an older stock post footprint. Railway line carrying iron ore and another building on the western side of the line	Structure	Modern	n/a	-30.59048503	19.46228309	NCW	NA
003	Opaline CCS cores, flakes, hornfels flakes	Artefacts	LSA, MSA	30+	-30.58809	19.46048	IIIB	Avoid - sensitive area
004	Quartz and CCS flakes, some hornfels and a few dolerite flakes	Artefacts	LSA	30+	-30.5878	19.45835	IIIC	Avoid - sensitive area
005	MSA blade flake	Artefacts	MSA	0 to 5	-30.58716	19.45601	NCW	NA
006	Siltstone triangular flake with edge retouched; CCS and quartz cores and flakes	Artefacts	LSA	30+	-30.58582	19.45324	IIIC	Avoid - sensitive area
007	Siltstone flakes, quartz flakes and cores	Artefacts	LSA, MSA	10 to 30	-30.58416	19.44767	IIIC	Avoid - sensitive area
008	Quartz and siltstone cores and flakes	Artefacts	MSA	5 to 10	-30.5801	19.43265	NCW	NA
009	Weathered siltstone and hornfels cores, flakes on small hill	Artefacts	MSA	10 to 30	-30.5809	19.43221	NCW	NA
010	Weathered siltstone flake	Artefacts	MSA	0 to 5	-30.584594	19.43899008	NCW	NA
011	Dolerite core	Artefacts	MSA	0 to 5	-30.58754527	19.44263766	NCW	NA
012	Dolerite flake	Artefacts	MSA	0 to 5	-30.58900381	19.44432646	NCW	NA
013	Weathered siltstone flake	Artefacts	MSA	0 to 5	-30.58973963	19.44761165	NCW	NA
014	Siltstone flake blank	Artefacts	LSA	0 to 5	-30.59121931	19.45112741	NCW	NA
015	Hornfels and quartz flakes, core	Artefacts	LSA	5 to 10	-30.59398219	19.45512366	NCW	NA
016	Quartz cores	Artefacts	LSA	0 to 5	-30.59588754	19.455101	NCW	NA
017	Quartz core	Artefacts	LSA	0 to 5	-30.59610234	19.4534702	NCW	NA
018	Siltstone flake	Artefacts	MSA	0 to 5	-30.59537816	19.44486485	NCW	NA
019	Siltstone point, retouched	Artefacts	MSA	0 to 5	-30.59630982	19.43633218	NCW	NA
020	Quartz core	Artefacts	LSA	0 to 5	-30.60026874	19.44273574	NCW	NA
021	Hornfels thinned MSA flake with some retouched along sides	Artefacts	MSA	0 to 5	-30.6033485	19.44464416	NCW	NA
022	Quartz, CCS and siltstone flakes, cores	Artefacts	LSA	10 to 30	-30.6069649	19.44838371	IIIC	Avoid - sensitive area
023	Quartz and CCS cores	Artefacts	LSA	5 to 10	-30.6101611	19.4458881	NCW	NA
024	Quartz and ccs flakes, cores	Artefacts	LSA	5 to 10	-30.67184	19.47931	NCW	NA
025	Dark brown hornfels point	Artefacts	LSA	0 to 5	-30.66692	19.47874	NCW	NA
026	Quartz flakes in higher ground above floodplain	Artefacts	LSA	10 to 30	-30.66214	19.47547	NCW	NA

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027	Siltstone outcrop with flakes	Artefacts	MSA	0 to 5	-30.65983	19.47343	NCW	NA
028	Granite flakes	Artefacts	MSA	0 to 5	-30.65556	19.4734	NCW	NA
029	Siltstone core	Artefacts	MSA	0 to 5	-30.65041	19.47736	NCW	NA
030	Shale flakes	Artefacts	MSA	0 to 5	-30.64647	19.48521	NCW	NA
031	Hornfels blade production, debitage, flakes, core	Artefacts	MSA	10 to 30	-30.64979	19.49039	IIIC	Avoid - sensitive area
032	Hornfels blank and siltstone flake	Artefacts	MSA	0 to 5	-30.63428	19.48786	NCW	NA
033	Patinated hornfels flakes	Artefacts	MSA	0 to 5	-30.63887	19.48392	NCW	NA
034	Siltstone flakes	Artefacts	MSA	0 to 5	-30.63578	19.47908	NCW	NA
035	Siltstone core	Artefacts	MSA	0 to 5	-30.61631	19.4762	NCW	NA
036	Hornfels point	Artefacts	MSA	0 to 5	-30.5993	19.4658	NCW	NA
037	Dolerite core	Artefacts	MSA	0 to 5	-30.61167	19.45729	NCW	NA
038	Quartz cores	Artefacts	LSA	0 to 5	-30.62217	19.46089	NCW	NA
039	Hornfels point	Artefacts	LSA	0 to 5	-30.63421	19.46382	NCW	NA
040	Quartz core, OES	Artefacts	LSA	5 to 10	-30.66292	19.4609	NCW	NA
041	Hornfels point	Artefacts	MSA	0 to 5	-30.66236	19.45333	NCW	NA
042	Patinated hornfels flake	Artefacts	MSA	0 to 5	-30.65223	19.45049	NCW	NA
043	Siltstone flake	Artefacts	MSA	0 to 5	-30.64332	19.44608	NCW	NA
044	Quartz core flake	Artefacts	LSA	0 to 5	-30.62871	19.44711	NCW	NA
045	Hornfels and quartzite flakes, quartz core	Artefacts	LSA	5 to 10	-30.61859	19.45152	NCW	NA
046	Hornfels point	Artefacts	MSA	0 to 5	-30.62835	19.4556	NCW	NA
047	Patinated hornfels flakes and points	Artefacts	MSA	0 to 5	-30.6353	19.45541	NCW	NA
048	Siltstone core; hornfels point	Artefacts	MSA	0 to 5	-30.64399	19.46021	NCW	NA
049	Hornfels point, elongated from blade form	Artefacts	MSA	0 to 5	-30.6513	19.46364	NCW	NA
050	Hornfels blade flake	Artefacts	MSA	0 to 5	-30.6639	19.4682	NCW	NA
051	Siltstone cores	Artefacts	MSA	0 to 5	-30.67357	19.46811	NCW	NA
052	Quartz core	Artefacts	LSA	0 to 5	-30.67634	19.47213	NCW	NA
053	Siltstone core	Artefacts	MSA	0 to 5	-30.62019	19.48555	NCW	NA
054	Hornfels core with dorsal scars	Artefacts	MSA	0 to 5	-30.61209	19.48622	NCW	NA
055	CCS cores and flakes	Artefacts	LSA	5 to 10	-30.60535	19.48032	NCW	NA
056	Hornfels flake, backed	Artefacts	MSA	0 to 5	-30.60431	19.47594	NCW	NA
057	Quartz core, hornfels flakes	Artefacts	LSA	0 to 5	-30.59689	19.47145	NCW	NA
058	Quartz core	Artefacts	LSA	0 to 5	-30.60476	19.46836	NCW	NA

Table 3: Significant archaeological sites in the vicinity of the development from previous assessments on SAHRIS

SAHRIS ID	Site Name	Description	Grade	Mitigation
40322	LOE008	Four small stone, brick and cement structures no doubt related to the airstrip.	IIIC	NA
40325	LOE009	LSA site on hilltop. Cryptocrystalline silica (CCS), quartz, hornfels, ostrich eggshell, cores, blades, 1 adze, 20 m diameter.	IIIB	No impact - outside development area
40326	LOE010	Ephemeral background scatter of heavily weathered stone artefacts, probably pertaining to the MSA	IIIC	NA

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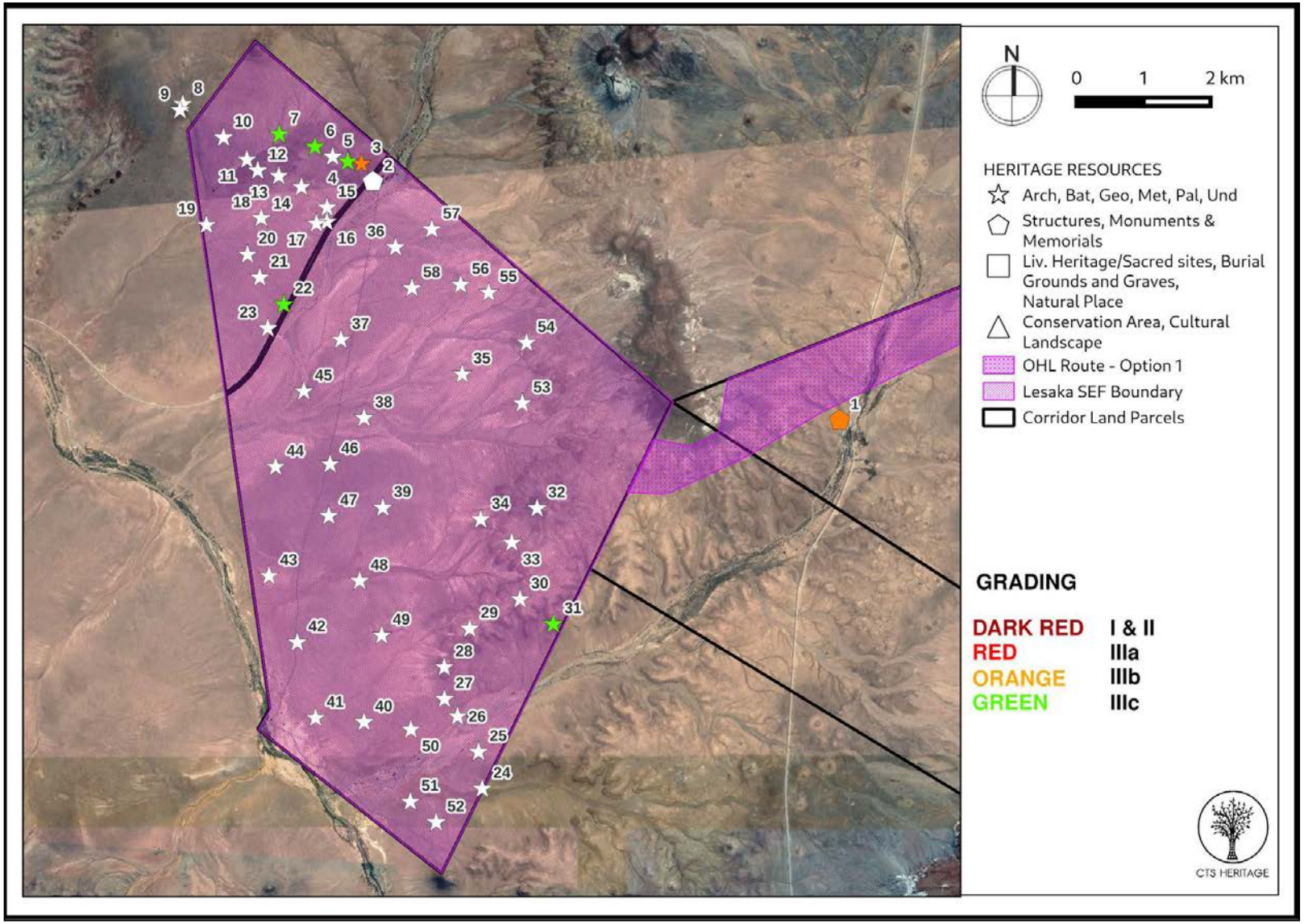

Figure 6: Heritage Observations made during field assessment

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4.3 Selected Photographic Record

A full photographic record is available on request

Figure 7.1: Observation 001

Figure 7.2: Observation 002

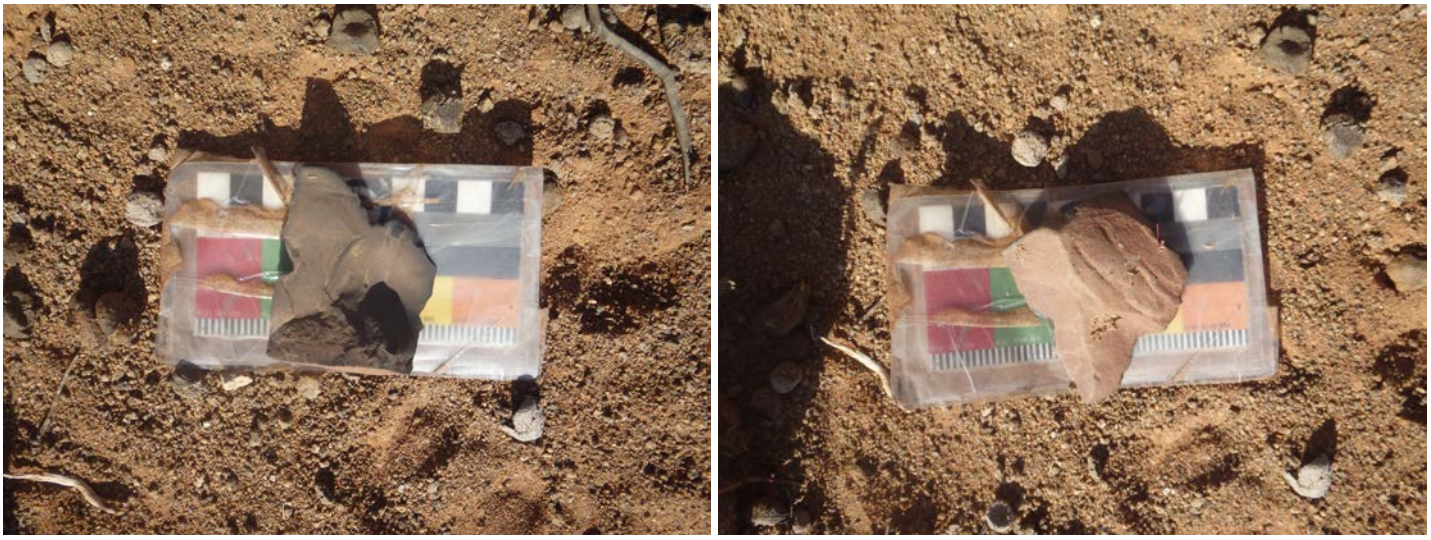

Figure 7.3: Observation 003

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Figure 7.4: Observation 004

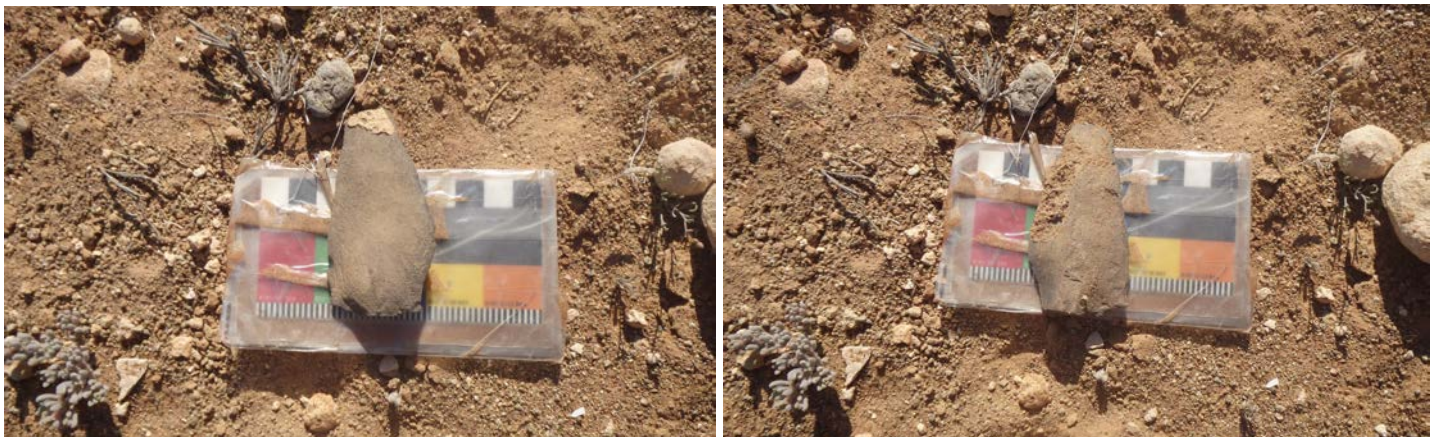

Figure 7.5: Observation 005

Figure 7.6: Observation 006

Figure 7.7: Observation 007

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Figure 7.8: Observation 014 and 015

Figure 7.9: Observation 022

Figure 7.10: Observation 031

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Figure 7.11: Observation 047

Figure 7.12: Observation 054

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5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

5.1 Assessment of impact to Archaeological Resources

As noted above, the riverine floodplain systems contain the bulk of the sites located and much of MSA is likely buried in the terraces overlooking the three non-perennial streams crisscrossing the farm. More significant LSA material similar to those observed by Halkett and Webley to the north east of Kluitjes Kraal (on the eastern side of Groot Rooiberg) was found with the local white opaline CCS/chert, hornfels and quartzite assemblages. These sites lie within a band of more sensitive ground buffering the stream systems and can easily be avoided by placing the solar PV infrastructure outside of a minimum distance from these streams.

The more sensitive archaeological areas surrounding the streams have been mapped in figure 8 below. It is therefore recommended that the PV layout avoid the identified sensitive archaeological area to prevent negative impacts to significant archaeological heritage.

Should the final amended layout adhere to the recommendations above, no negative impact to significant archaeological resources are anticipated from the development of the proposed PV facility.

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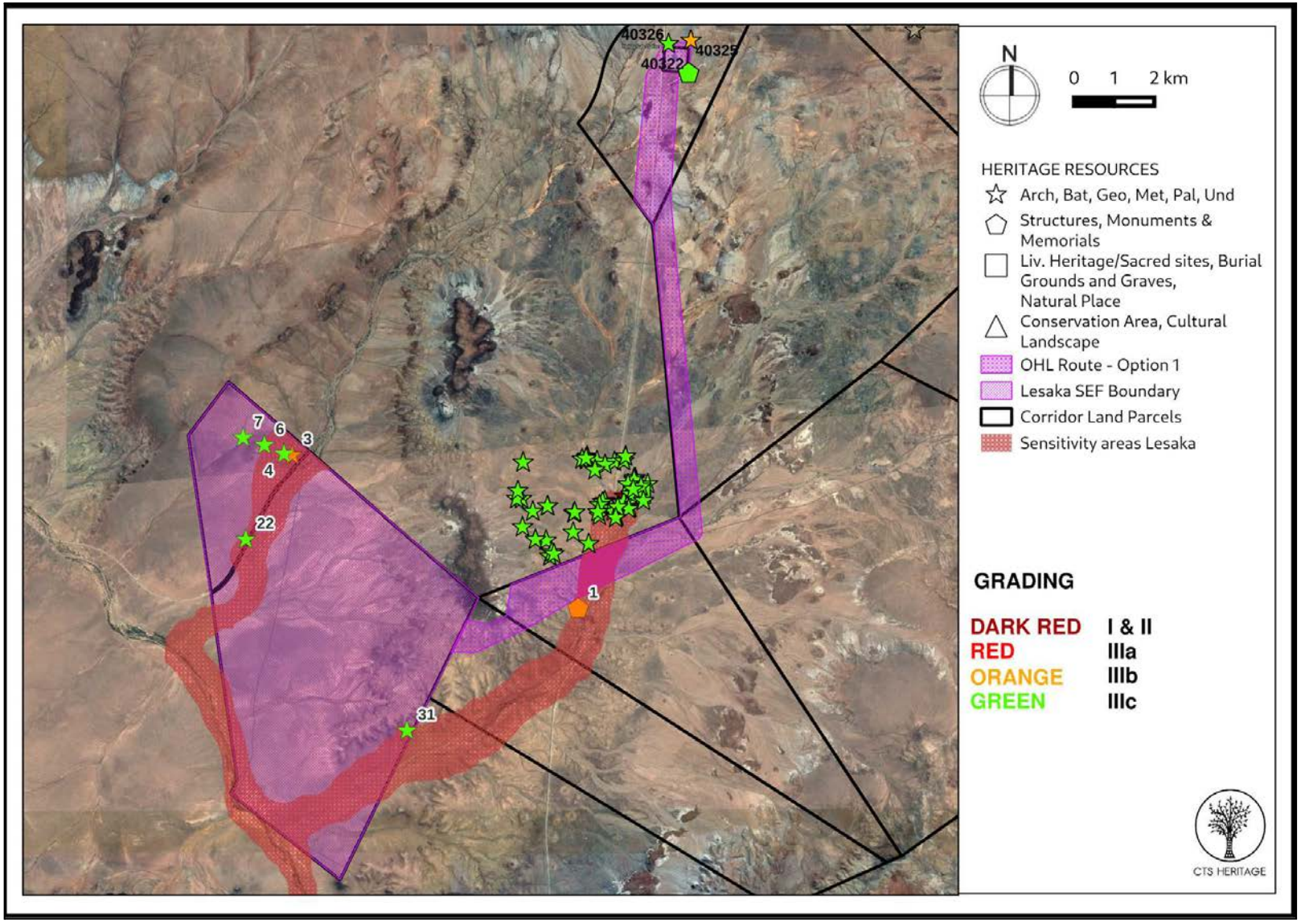

Figure 8: Heritage Observations made during field assessment with recommended mitigation measures

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6. CONCLUSION AND RECOMMENDATIONS

The survey proceeded with no significant constraints or limitations, and the project area was comprehensively surveyed for heritage resources. An area of higher archaeological sensitivity associated with the stream systems across the development area was identified and mapped. This area must be avoided in the final PV layout in order to ensure that no significant archaeological heritage resources are negatively impacted by the proposed development.

Recommendations

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

- The area of high archaeological sensitivity identified in Figure 8 is avoided in the final configuration of the PV layout.
- 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 SAHRA must be alerted immediately to determine an appropriate way forward.

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Bon Esperance, 283 Queens Road, Simons Town
Email: info@ctsheritage.com **Web:** www.ctsheritage.com

7. REFERENCES

Heritage Impact Assessments				
Nid	**Report Type**	**Author/s**	**Date**	**Title**
259052	Palaeontological Specialist Reports	John Almond	18/10/2016	Palaeontological heritage assessment: combined desktop and field-based scoping study for the proposed Kokerboom 1 Wind Farm near Loeriesfontein, Namaqua District Municipality, Northern Cape.
375092	AIA Phase 1	David Morris	01/01/2007	Archaeological Specialist Input with Respect to Upgrading Railway Infrastructure on the Saldanha Ore Line in the Vicinity of New Loop 7A near Loeriesfontein
3886	AIA Phase 1	Jaco van der Walt, Marlize Lombard	06/01/2012	AIA for the proposed Hantam PV Solar Energy Facility on the Farm Narosies 228, Loeriesfontein, Northern Cape Province
6889	AIA Phase 1	Lita Webley, Dave Halkett	01/05/2012	HERITAGE IMPACT ASSESSMENT: PROPOSED LOERIESFONTEIN PHOTO-VOLTAIC SOLAR POWER PLANT ON PORTION 5 OF THE FARM KLEIN ROOIBERG 227, NORTHERN CAPE PROVINCE
7217	AIA Phase 1	Johnny Van Schalkwyk	29/02/2012	HIA for the proposed establishment of a wind farm and PV facility by mainstream renewable power in the Loeriesfontein region, Northern Cape Province
7218	PIA Phase 1	John E Almond	01/06/2011	Proposed mainstream wind farm near Loeriesfontein, namaqua District Municipality, Northern Cape Province.
8961	HIA Phase 1	Lita Webley, Dave Halkett, John Pether	01/05/2012	Heritage Impact Assessment: Proposed Loeriesfontein Photo-voltaic Solar Power Plant on Portion 5 of the Farm Klein Rooiberg 227, Northern Cape Province

Deacon, J. & Forster, C. 2005. My Heart Stands in the Hill. Struik Publishers.

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CTS HERITAGE

APPENDIX 2: Palaeontological Assessment (2023)

BANZAI ENVIRONMENTAL

PALAEONTOLOGICAL IMPACT ASSESSMENT

PROPOSED LESAKA 1 and 2 SOLAR ENERGY FACILITIES AND GRID CONNECTION NEAR LOERIESFONTEIN IN THE NORTHERN CAPE PROVINCE

2023

COMPILED for: CTS HERITAGE

BANZAI ENVIRONMENTAL (PTY) LTD.
Reg No. 2015/332235/07 |

Declaration of Independence

I, Elize Butler, declare that –

General declaration:

- I act as the independent palaeontological specialist in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favorable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting palaeontological impact assessments, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in section 38 of the NHRA when preparing the application and any report relating to the application;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;

- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favorable to the applicant or not
- All the particulars furnished by me in this form are true and correct;
- I will perform all other obligations as expected a palaeontological specialist in terms of the Act and the constitutions of my affiliated professional bodies; and
- I realize that a false declaration is an offense in terms of regulation 71 of the Regulations and is punishable in terms of section 24F of the NEMA.

Disclosure of Vested Interest

I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations.

PALAEONTOLOGICAL CONSULTANT: Banzai Environmental (Pty) Ltd

CONTACT PERSON: Elize Butler

Tel: +27 844478759

Email: elizebutler002@gmail.com

SIGNATURE:

This Palaeontological Impact Assessment (PIA) report has been compiled considering the National Environmental Management Act 1998 (NEMA) and Environmental Impact Regulations 2014 as amended, requirements for specialist reports, Appendix 6, as indicated in the table below.

Table 1: Checklist for Specialist studies conformance with Appendix 6 of the EIA Regulations of 2014 (as amended)

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	**The relevant section in the report**	**Comment where not applicable.**
1.(1) (a) (i) Details of the specialist who prepared the report	Page ii and Section 2 of Report – Contact details and company and Appendix A	-
(ii) The expertise of that person to compile a specialist report including a curriculum vita	Section 2 – refer to **Appendix A**	-
(b) A declaration that the person is independent in a form as may be specified by the competent authority	Page ii of the report	-
(c) An indication of the scope of, and the purpose for which, the report was prepared	Section 4 – Objective	-
(cA) An indication of the quality and age of base data used for the specialist report	Section 5 – Geological and Palaeontological history	-
(cB) a description of existing impacts on the site, cumulative impacts of the proposed	Section 10	-

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	**The relevant section in the report**	**Comment where not applicable.**
development and levels of acceptable change;		
(d) The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 1;9 & 11	
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Section 7 Approach and Methodology	-
(f) details of an assessment of the specifically identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Section 1; & 11	
(g) An identification of any areas to be avoided, including buffers	Section 1 & 11	
(h) A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Section 5 – Geological and Palaeontological history	
(i) A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 7.1 – Assumptions and Limitation	-
(j) A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment	Section 1 and 11	

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	**The relevant section in the report**	**Comment where not applicable.**
(k) Any mitigation measures for inclusion in the EMPr	Section 12	
(l) Any conditions for inclusion in the environmental authorisation	Section 12	
(m) Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 12	
(n)(i) A reasoned opinion as to whether the proposed activity, activities or portions thereof should be authorised and	Section 1 & 11	
(n)(iA) A reasoned opinion regarding the acceptability of the proposed activity or activities; and		
(n)(ii) If the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Section 1 and 11	-
(o) A description of any consultation process that was undertaken during the course of carrying out the study	N/A	Not applicable. A public consultation process was handled as part of the Environmental Impact

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	**The relevant section in the report**	**Comment where not applicable.**
		Assessment (EIA) and Environmental Management Plan (EMP) process.
(p) A summary and copies of any comments that were received during any consultation process	N/A	Not applicable. To date, no comments regarding heritage resources that require input from a specialist have been raised.
(q) Any other information requested by the competent authority.	N/A	Not applicable.
(2) Where a government notice by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	Section 3 compliance with SAHRA guidelines	

EXECUTIVE SUMMARY

Banzai Environmental was appointed by CTS Heritage to conduct the Palaeontological Impact Assessment (PIA) to assess the proposed Lesaka 1 and 2 Solar Energy Facilities and grid connection near Loeriesfontein in the Northern Cape Province. In accordance with the National Environmental Management Act 107 of 1998 (NEMA) and to comply with the National Heritage Resources Act (No 25 of 1999, section 38) (NHRA), this PIA is necessary to confirm if fossil material could potentially be present in the planned development area, to evaluate the potential impact of the proposed development on the Palaeontological Heritage and to mitigate possible damage to fossil resources.

The proposed Lesaka 1 and 2 Solar Energy Facilities (SEF) and associated grid connection infrastructure near Loeriesfontein in the Northern Cape Province is underlain by Quaternary sandy soil, Quaternary alluvium,, Jurassic Dolerite with a tiny portion in the east underlain by the Prince Albert Formation (Ecca Group). The PalaeoMap of the South African Heritage Resources Information System (SAHRIS) indicates that the Palaeontological Sensitivity of Quaternary Sandy soils are Low, that of Quaternary alluvium is Moderate, while the Palaeontological Sensitivity of the Jurassic Dolerite is Zero and that of the Prince Albert Formation (Ecca Group) is High (Almond and Pether, 2009; Almond *et al*., 2013, Groenewald et al 2014). Updated Geology (Council of Geosciences Pretoria) indicates that the development is underlain by the Jurassic Dolerite as well as the Prince Albert Formation of the Ecca

A site-specific field survey of the development footprint was conducted on foot and by motor vehicle on 17-20 January 2023. No fossiliferous outcrop was detected in the proposed Lesaka 1 and 2 Solar Energy Facilities and grid connection development area. A LOW Palaeontological Significance has been allocated to the development. It is therefore considered that the proposed development will not lead to damaging impacts on the palaeontological resources of the area. The construction of the development may thus be permitted in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources.

If Palaeontological Heritage is uncovered during surface clearing and excavations ECO should be informed immediately. Fossil discoveries ought to be protected and the ECO/site manager must report to South African Heritage Resources Agency (SAHRA) (Contact details: Eastern Cape Provincial Heritage Resources Authority (ECPHRA), 16 Commissioner Street,

East London, 5201, South Africa. Tel: 043 745 0888. Fax: 043 745 0889., email: info@ecphra.org.za; Web: https://www.ecphra.org.za/) so that mitigation (recording and collection) can be carried out.

Before any fossil material can be collected from the development site the specialist involved would need to apply for a collection permit from SAHRA. Fossil material must be housed in an official collection (museum or university), while all reports and fieldwork should meet the minimum standards for palaeontological impact studies proposed by SAHRA (2012).

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Appendix A: CV

1 INTRODUCTION

Enertrag South Africa (Pty) Ltd on behalf of Lesaka 1 Solar Energy (Pty) Ltd and Lesaka 2 Solar Energy Facility (Pty) Ltd has appointed SiVEST Environmental (hereafter referred to as "SiVEST") to undertake the required EIA / BA Processes for the proposed construction of the Lesaka 1 and 2 Solar Energy Facilities (SEF) and associated grid connection infrastructure near Loeriesfontein in the Northern Cape Province. The distinct EA's that are required for each of the respective Projects and Associated Grid Connection Infrastructure are as follows:

- Lesaka 1 SEF (up to 240MW)
- Lesaka 2 SEF (up to 240MW)
- Lesaka 1 Associated Grid Connection Infrastructure (up to 132kV)
- Lesaka 2 Associated Grid Connection Infrastructure (up to 132kV)

The overall objective of the development is to generate electricity by means of renewable energy technology capturing energy to feed into the National Grid. The project aims to supply suitable private off-taker initiatives (direct supply or wheeling agreements, as applicable), or be bid into the government coordinated Renewable Energy Independent Power Producer Procurement Programme ("REIPPPP") or similar procurement program under the Integrated Resource Plan ("IRP"). The Lesaka SEF Cluster Projects will be administered under the respective Project Companies, and the Projects will be require to be composed of the following:

Lesaka 1 Solar Energy Facility (Pty) Ltd

- Lesaka 1 SEF (up to 240MW)
- Battery Energy Storage System ("BESS")
- On-site Independent Power Producer ("IPP") Substation (up to 33/132kV)
- All associated grid infrastructure

Lesaka 2 Solar Energy Facility (Pty) Ltd

- Lesaka 2 SEF (up to 240MW)
- BESS
- On-site IPP Substation (up to 33/132kV)
- All associated grid infrastructure

Grid Connection Infrastructure

- (Up to x2) Up to 132kV Switching Stations
- Up to 132kV Overhead Power Line ("OHL") from Lesaka 1 SEF Switching Station to Lesaka 2 SEF Switching Station (if needed)
- Up to 132kV OHL to the Helios Main Transmission Substation ("MTS")

This application is for the proposed development of PV facilities located approximately 40km north of the town of Loeriesfontein in the Northern Cape. The town of Loeriesfontein is within a basin surrounded by mountains and the broader area around the town forms part of Namaqualand, famous for its flower season. This area is recognized as one of the highest yield areas for renewable energy in South Africa, however this area falls outside of a REDZ area. Due to these high yields, there are existing, approved renewable energy facilities located immediately adjacent to the area proposed for development.

The Projects will connect to the Helios MTS owned by Eskom, which is approximately 21km to the northeast of the Project Site. The Lesaka SEFs will be located over one farm portion and the collective site extent is approximately 4 894.93 ha. It is proposed that the Projects will connect to the Eskom grid by routing Low Voltage ("LV") and Medium Voltage ("MV") cables underground through to the respective 132kV onsite IPP Substations which in turn connect to the respective 132kV Switching Station(s). A single or double circuit OHL will run from the 132kV Switching Station to the Helios MTS[1].

[1]Information provided by CTS Heritage

Table 2: General Property information

Description of affected farm portion	Farm Kluitjes Kraal No. 264 Portion 0 (SEF and grid) Farm Sous No. 226 Portion 1 (Grid) Farm Sous No. 226 Portion 0 (Grid) Farm Narosies No. 228 Portion 0 (Grid) Farm Ras Kraal No. 262 Portion 0 (Grid) Farm Rooiberg No. 263 Portion 4 (Grid) Farm Rooiberg No. 263 Portion 3 (Grid)
Local Municipality	Hantam
District Municipality	Namakwa

Province	Northern Cape
Current Use	Agriculture
Current Zoning	Agriculture

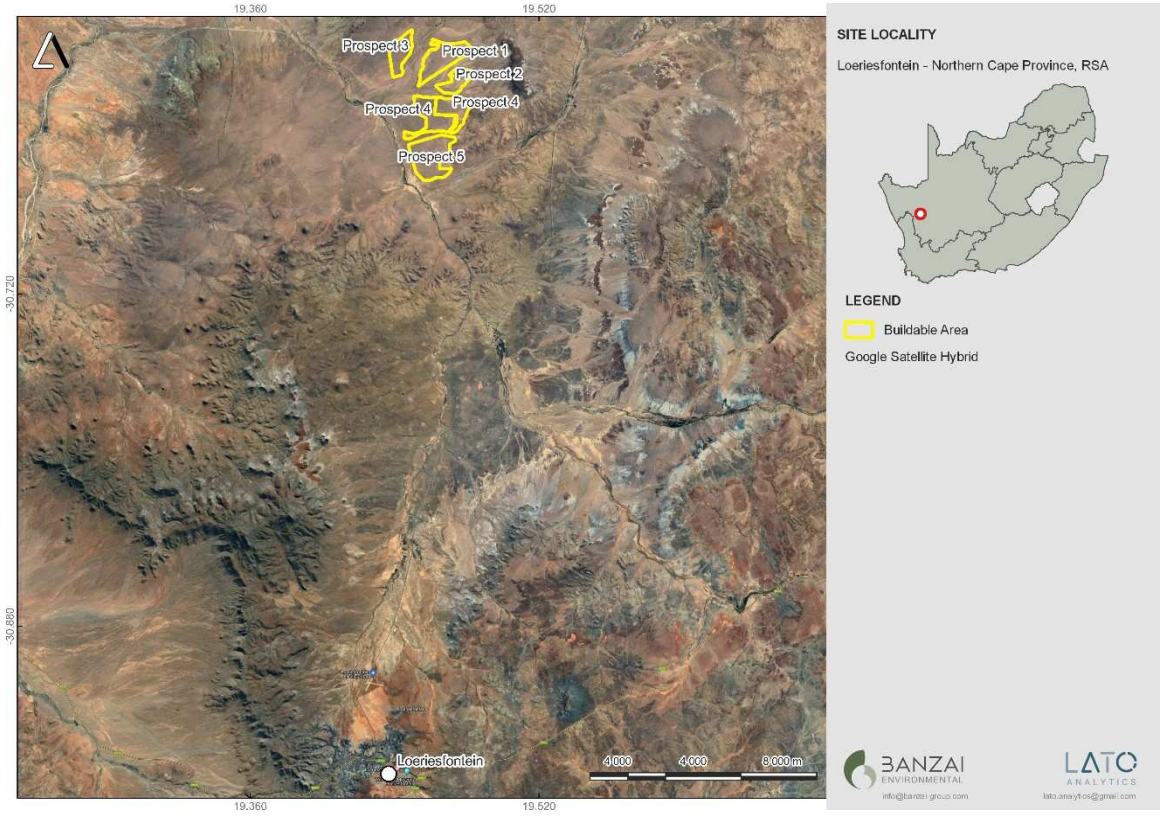


Figure 1:*Site locality of the proposed* Lesaka 1 and 2 Solar Energy Facilities (SEF) and associated grid connection infrastructure near Loeriesfontein in the Northern Cape Province

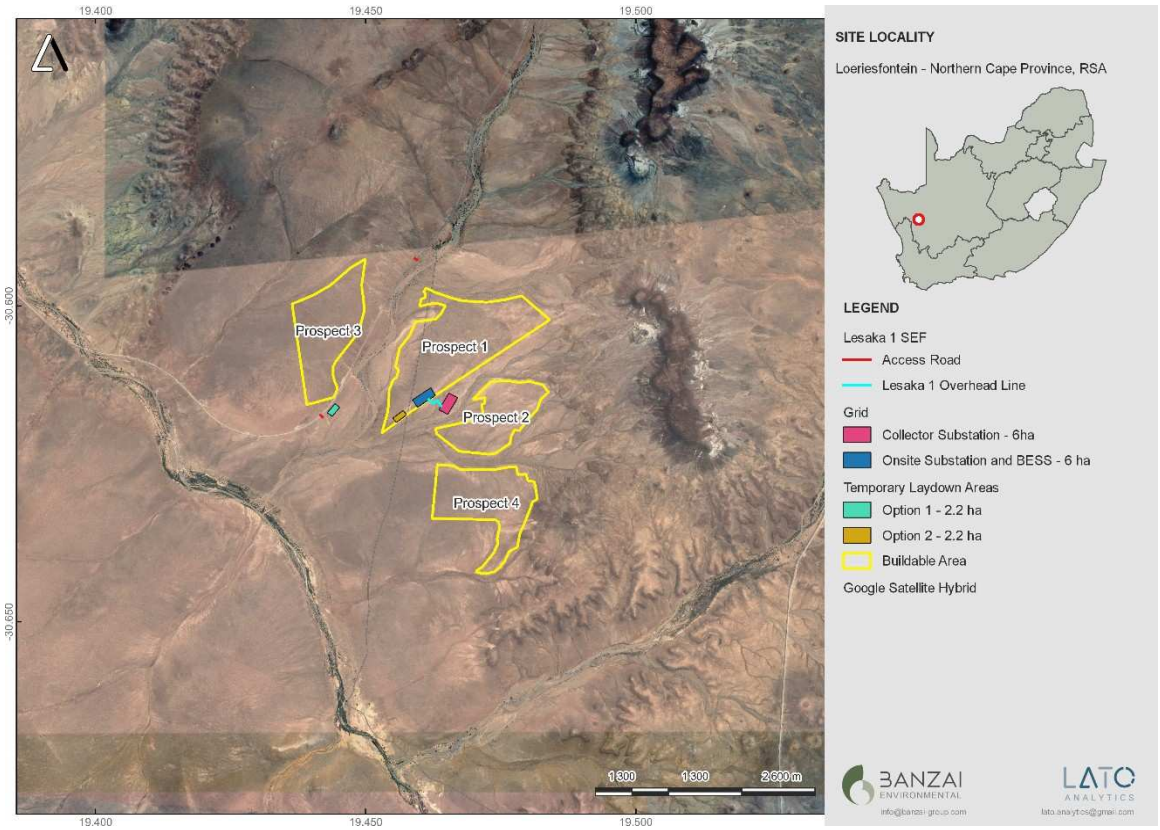


Figure 2:*Site locality of the proposed* Lesaka 1 SEF and associated grid connection infrastructure near Loeriesfontein in the Northern Cape Province

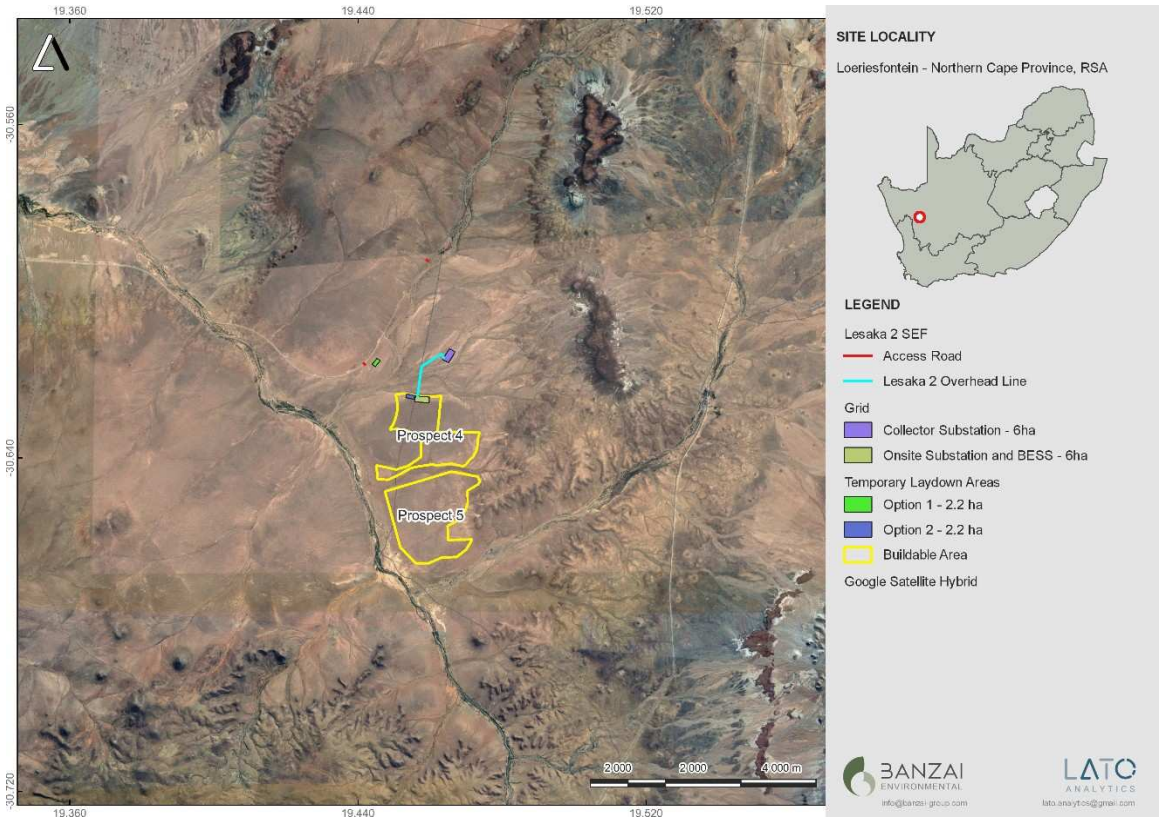


Figure 3:*Site locality of the proposed* Lesaka 2 SEF and associated grid connection infrastructure near Loeriesfontein in the Northern Cape Province.

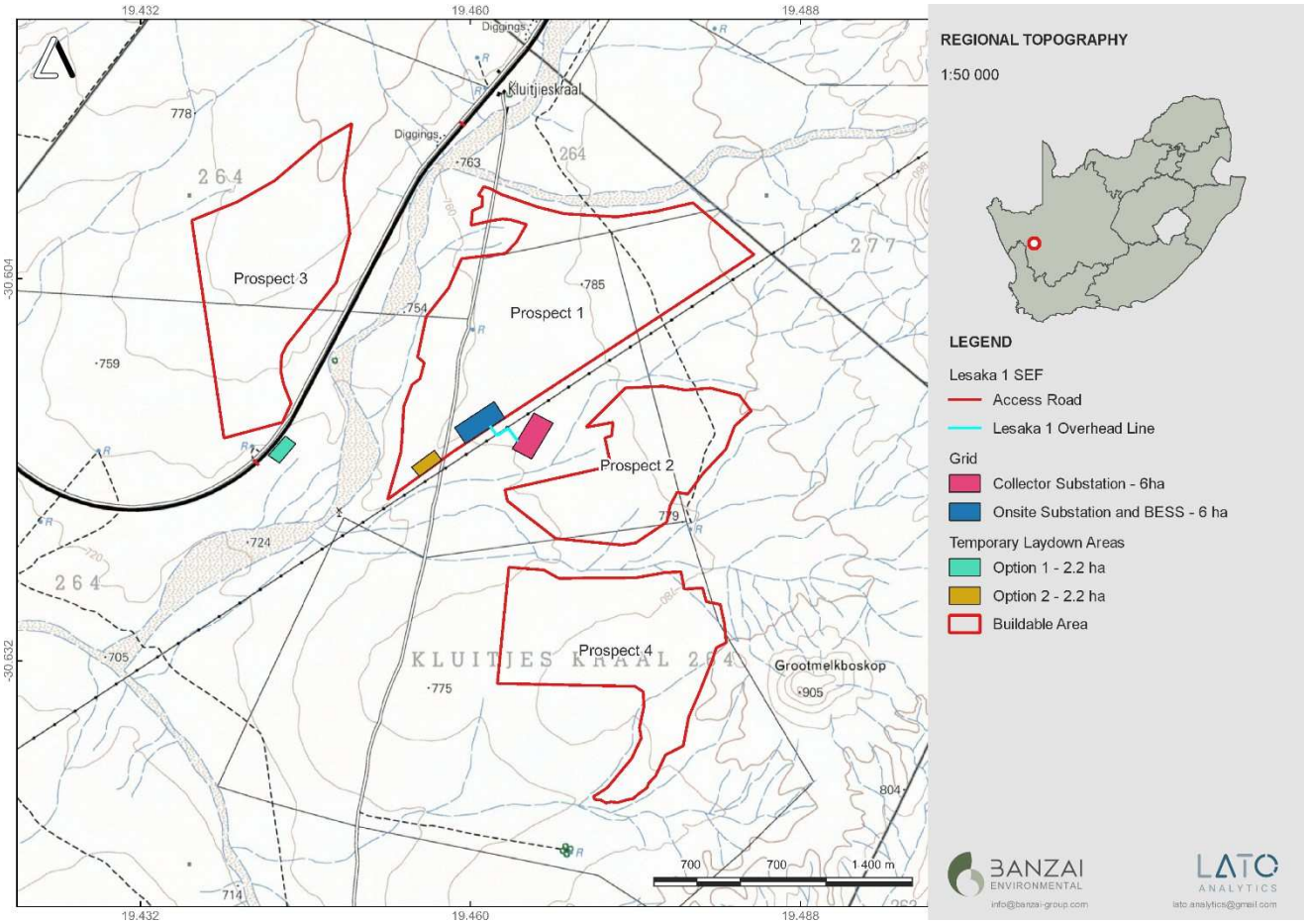


Figure 4:*Topocadastral image of the proposed* Lesaka 1 SEF and associated grid connection infrastructure near Loeriesfontein in the Northern Cape Province.

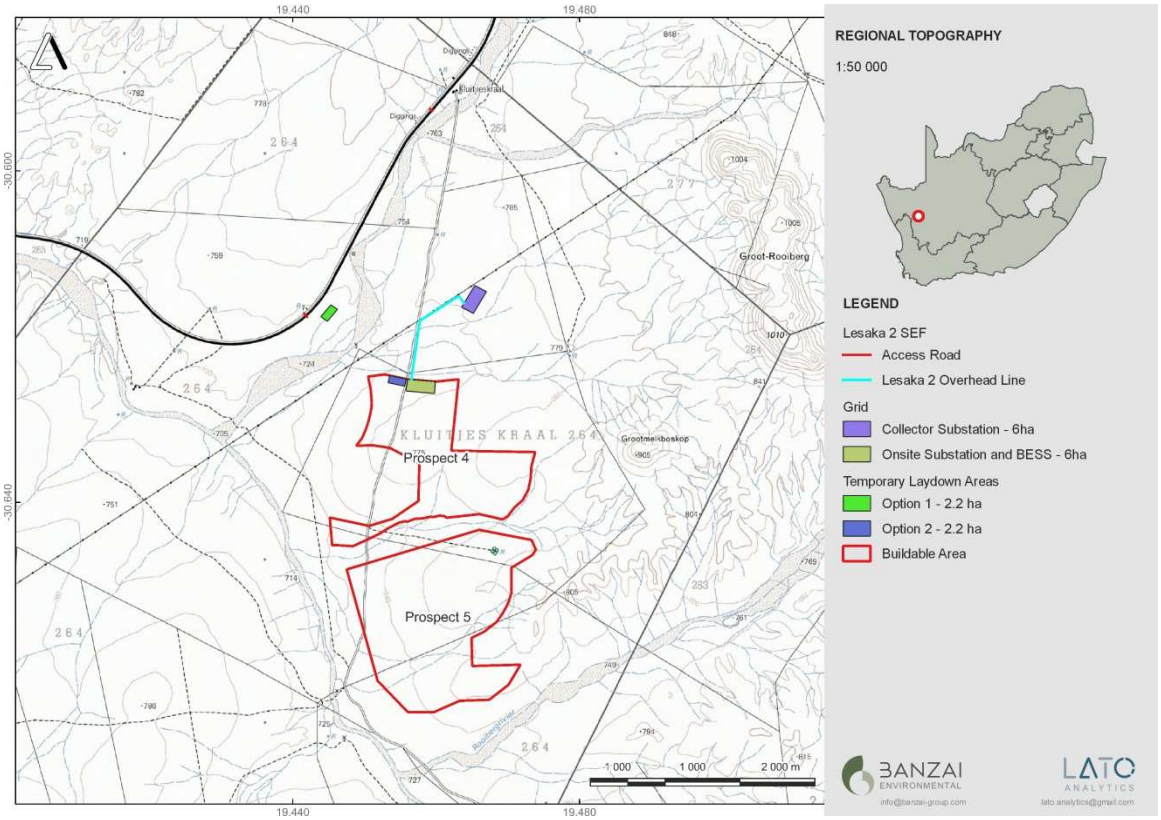


Figure 5:*Topocadastral image of the proposed* Lesaka 2 SEF and associated grid connection infrastructure near Loeriesfontein in the Northern Cape Province.

2 QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR

This study has been conducted by Mrs Elize Butler. She has conducted approximately 400 palaeontological impact assessments for developments in the Free State, KwaZulu-Natal, Eastern, Central, and Northern Cape, Northwest, Gauteng, Limpopo, and Mpumalanga. She has an MSc (*cum laude*) in Zoology (specializing in Palaeontology) from the University of the Free State, South Africa and has been working in Palaeontology for more than twenty-eight years. She has experience in locating, collecting, and curating fossils. She has been a member of the Palaeontological Society of South Africa (PSSA) since 2006 and has been conducting PIAs since 2014.

3. LEGISLATION

National Heritage Resources Act (25 of 1999)

Cultural Heritage in South Africa, includes all heritage resources, is protected by the National Heritage Resources Act (Act 25 of 1999) (NHRA). Heritage resources as defined in Section 3 of the Act include **"all objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens**".

The identification, evaluation and assessment of any cultural heritage site, artefact or finds in the South African context is required and governed by the following legislation:

- National Environmental Management Act (NEMA) Act 107 of 1998
- National Heritage Resources Act (NHRA) Act 25 of 1999
- Minerals and Petroleum Resources Development Act (MPRDA) Act 28 of 2002
- Notice 648 of the Government Gazette 45421- general requirements for undertaking an initial site sensitivity verification where no specific assessment protocol has been identified.

The next section in each Act is directly applicable to the identification, assessment, and evaluation of cultural heritage resources.

GNR 982 (Government Gazette 38282, 14 December 2014) promulgated under the National Environmental Management Act (NEMA) Act 107 of 1998

- Basic Assessment Report (BAR) – Regulations 19 and 23
- Environmental Impacts Assessment (EIA) – Regulation 23
- Environmental Scoping Report (ESR) – Regulation 21

- Environmental Management Programme (EMPr) – Regulations 19 and 23

National Heritage Resources Act (NHRA) Act 25 of 1999

- Protection of Heritage Resources – Sections 34 to 36
- Heritage Resources Management – Section 38

MPRDA Regulations of 2014

Environmental reports to be compiled for application of mining right – Regulation 48

- Contents of scoping report – Regulation 49
- Contents of environmental impact assessment report – Regulation 50
- Environmental management programme – Regulation 51
- Environmental management plan – Regulation 52

The NEMA (No 107 of 1998) states that an integrated EMP should (23:2 (b)) "*…identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage*".

In agreement with legislative requirements, EIA rating standards as well as SAHRA policies the following comprehensive and legally compatible PIA report have been compiled.

Palaeontological heritage is exceptional and non-renewable and is protected by the NHRA. Palaeontological resources and may not be unearthed, broken moved, or destroyed by any development without prior assessment and without a permit from the relevant heritage resources authority as per section 35 of the NHRA.

This Palaeontological Impact assessment forms part of the Heritage Impact Assessment (HIA) and adhere to the conditions of the Act. According to **Section 38 (1)**, an HIA is required to assess any potential impacts to palaeontological heritage within the development footprint where:

- the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length.
- the construction of a bridge or similar structure exceeding 50 m in length.
- any development or other activity which will change the character of a site—
- (Exceeding 5 000 m^2 in extent; or
- involving three or more existing erven or subdivisions thereof; or
- involving three or more erven or divisions thereof which have been consolidated within the past five years; or
- the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority
- the re-zoning of a site exceeding 10 000 m^2 in extent.

- or any other category of development provided for in regulations by SAHRA or a Provincial heritage resources authority.

4. OBJECTIVE

The objective of a Palaeontological Impact Assessment (PIA) is to determine the impact of the development on potential palaeontological material at the site.

According to the "SAHRA APM Guidelines: Minimum Standards for the Archaeological and Palaeontological Components of Impact Assessment Reports" the aims of the PIA are: 1) to **identify** the palaeontological status of the exposed as well as rock formations just below the surface in the development footprint 2) to estimate the **palaeontological importance** of the formations 3) to determine the **impact** on fossil heritage; and 4) to recommend how the developer ought to protect or mitigate damage to fossil heritage.

The terms of reference of a PIA are as follows:

General Requirements:

- Adherence to the content requirements for specialist reports in accordance with Appendix 6 of the EIA Regulations 2014, as amended;
- Adherence to all applicable best practice recommendations, appropriate legislation and authority requirements;
- Submit a comprehensive overview of all appropriate legislation, guidelines;
- Description of the proposed project and provide information regarding the developer and consultant who commissioned the study,
- Description and location of the proposed development and provide geological and topographical maps
- Provide palaeontological and geological history of the affected area.
- Identification of sensitive areas to be avoided (providing shapefiles/kmls) in the proposed development;
- Evaluation of the significance of the planned development during the Pre-construction, Construction, Operation, Decommissioning Phases and Cumulative impacts. Potential impacts should be rated in terms of the direct, indirect and cumulative:
    a. **Direct impacts** are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity.

b. **Indirect impacts** of an activity are indirect or induced changes that may occur as a result of the activity.

c. **Cumulative impacts** are impacting that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities.

- Fair assessment of alternatives (infrastructure alternatives have been provided):
- Recommend mitigation measures to minimise the impact of the proposed development; and
- Implications of specialist findings for the proposed development (such as permits, licenses etc).

5. GEOLOGICAL AND PALAEONTOLOGICAL HISTORY

The geology of the proposed Lesaka 1 and 2 Solar Energy Facilities (SEF) and associated grid connection infrastructure near Loeriesfontein in the Northern Cape Province is depicted on the 1: 250 000 Loeriesfontein 3018 (2010) Geological Map (Council for Geosciences, Pretoria) (**Figure 7-9,**). The proposed development is underlain by the Quaternary sandy soil (Q-r1, yellow), Quaternary alluvium, (single bird figure), Jurassic Dolerite (J-d; pink) with a tiny portion in the east underlain by the Prince Albert Formation (Ecca Group). The PalaeoMap of the South African Heritage Resources Information System (SAHRIS) (**Figure 10-12,**) indicates that the Palaeontological Sensitivity of Quaternary Sandy soils are Low, that of Quaternary alluvium is Moderate, while the Palaeontological Sensitivity of the Jurassic Dolerite is Zero and that of the Prince Albert Formation (Ecca Group) is High (Almond and Pether, 2009; Almond *et al*., 2013, Groenewald et al 2014. Updated Geology (Council of Geosciences Pretoria) (**Figure 13-15**) indicates that the development is underlain by the Jurassic Dolerite as well as the Prince Albert Formation of the Ecca.

The quaternary sediments contain fossils that represent terrestrial plants and animals with a close resemblance to living forms. Fossil assemblages include bivalves, diatoms, gastropod shells, ostracods and trace fossils. The palaeontology of the Quaternary superficial deposits has been relatively neglected in the past. Late Cenozoic calcrete may comprise of bones, horn corns as well as mammalian teeth (Klein, 1984). Tortoise remains have also been uncovered as well as trace fossils which includes termite and insect's burrows and mammalian trackways. Amphibian and crocodile skeletons have been uncovered where the depositional settings in the past were wetter.

The Gordonia dune sands are dated as Late Pliocene/Early Pleistocene to Recent times by the Middle to Later Stone Age stone tools recovered from them (Dingle *et al.,* (1983). The boundary of the Pliocene-Pleistocene has been extended back from 1.8 Ma to 2.588 Ma placing the Gordonia Formation almost entirely within the Pleistocene Epoch. The pan sediments of the area originated from the Gordonia Formation and contains white to brown fine-grained silts, sands and clays. Some of the pans consist of clayey material mixed with evaporates that shows seasonal effects of shallow saline groundwaters (De Witt et al., 2000; Johnsen *et al*, 2006).

Dolerite mantles a large area of the development footprint. The dolerite present in the development belongs to the Karoo Igneous Province that is a classic continental flood basalt province formed during the Early Jurassic. This province occurs over a large area in southern Africa and comprises a widespread system well developed igneous bodies (dykes, sills) that invaded the sediments of the Main Karoo Basin. Flood basalts do not typically form any visible volcanic structures, but with a series of outbursts form a suite of fissures of sub-horizontal lava flows that may vary in thickness. The Karoo is an old flood basalt province and is preserved today as erosional remnants of a more extensive lava cap that covered much of southern Africa in the geological past. As this Suite consist of igneous rocks it is unfossiliferous. According to the PalaeoMap of South African Heritage Resources Information System the Palaeontological Sensitivity of the Karoo Dolerite is zero.

The Prince Albert Formation consists of marine to hyposaline basin plain mudrocks that occur with minor volcanic ashes, iron stones and phosphates. Post-glacial mudrocks is present at the base of the Prince Albert Formation.

The fossil assemblage of the Prince Albert Formation is known for its rich assemblages of plant fossils known as the *Glossopteris* flora. This includes petrified wood, roots and palynomorphs which include spores and acritarchs. Body fossils of insects have been recovered; but is rare. Moderately diverse trace fossil assemblages can be present of which many can be assigned to fish or non-marine arthropod groups like crustaceans, king crabs and predatory water scorpions which could have reached lengths of two meters or more.

This trace fossil assemblage of the non-marine *Mermia* Ichnofacies, is dominated by the ichnogenera *Umfolozia* (arthropod trackways) and *Undichna* (fish swimming trails). Fish coprolites have also been described from this formation. A low diversity of marine invertebrates (bivalves brachiopods, nautiloids), palaeoniscoid fish, sharks and protozoans have been uncovered. There is also a possibility that stromatolites and oolites are

preserved. Well-preserved skeletons of the well-known aquatic mesosaurids have been uncovered while amphibians are also recorded from the uppermost Ecca beds (Almond, 2011).

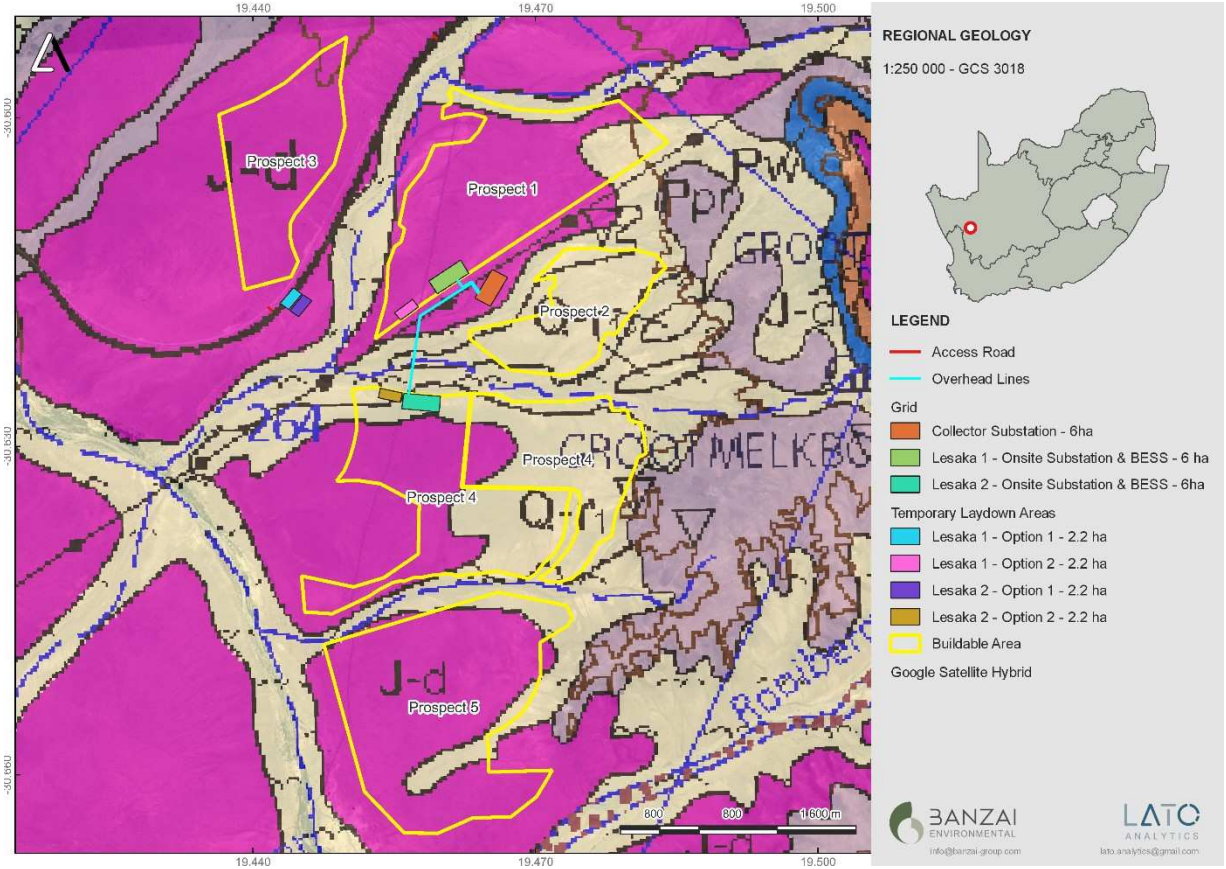


***Figure 1**: Extract of the 1: 250 000 Loeriesfontein 3018 (2010) Geological Map (Council for Geosciences, Pretoria) indicating the geology of the proposed Lesaka 1 and 2 SEF and associated grid connection infrastructure near Loeriesfontein in the Northern Cape Province. The proposed development is underlain by Quaternary sands (Q-r1, beige) as well as Jurassic Dolerite (J-d) and the Prince Albert Formation of the Ecca Group.*

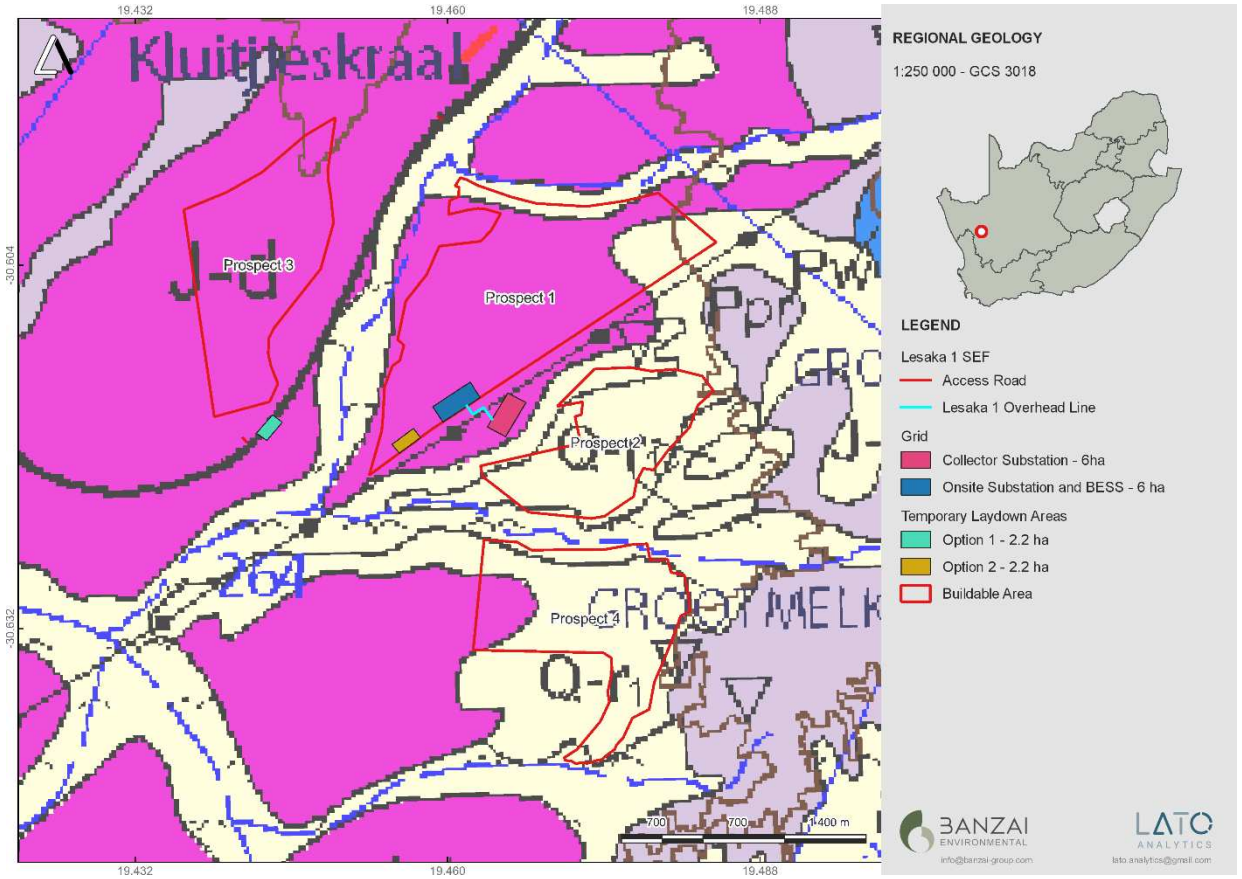


***Figure 2**: Extract of the 1: 250 000 Loeriesfontein 3018 (2010) Geological Map (Council for Geosciences, Pretoria) indicating the geology of the proposed Lesaka 1 SEF and associated grid connection infrastructure near Loeriesfontein in the Northern Cape Province. The proposed development is underlain by Quaternary sands (Q-r1, beige) as well as Jurassic Dolerite (J-d) and the Prince Albert Formation of the Ecca Group*

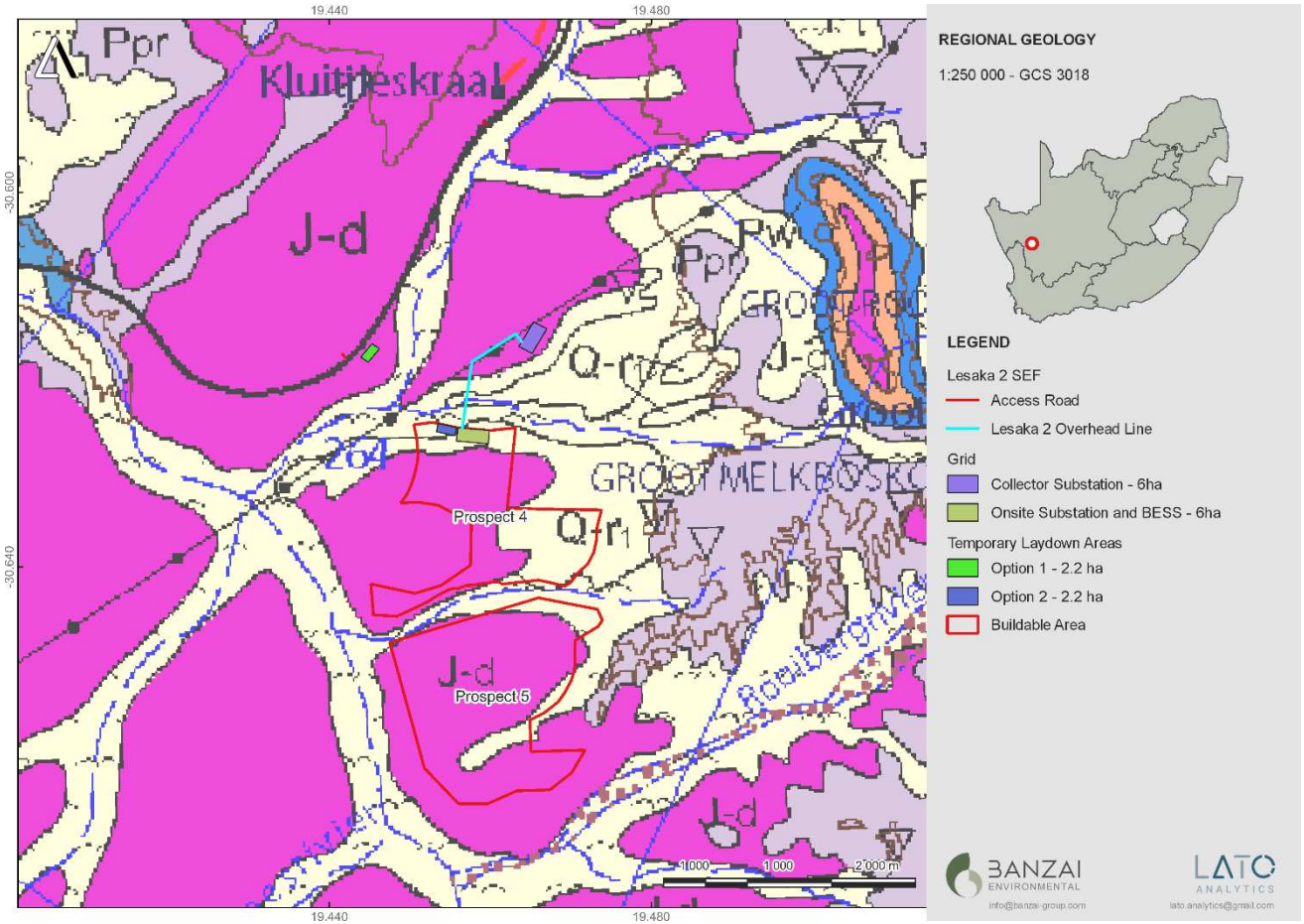
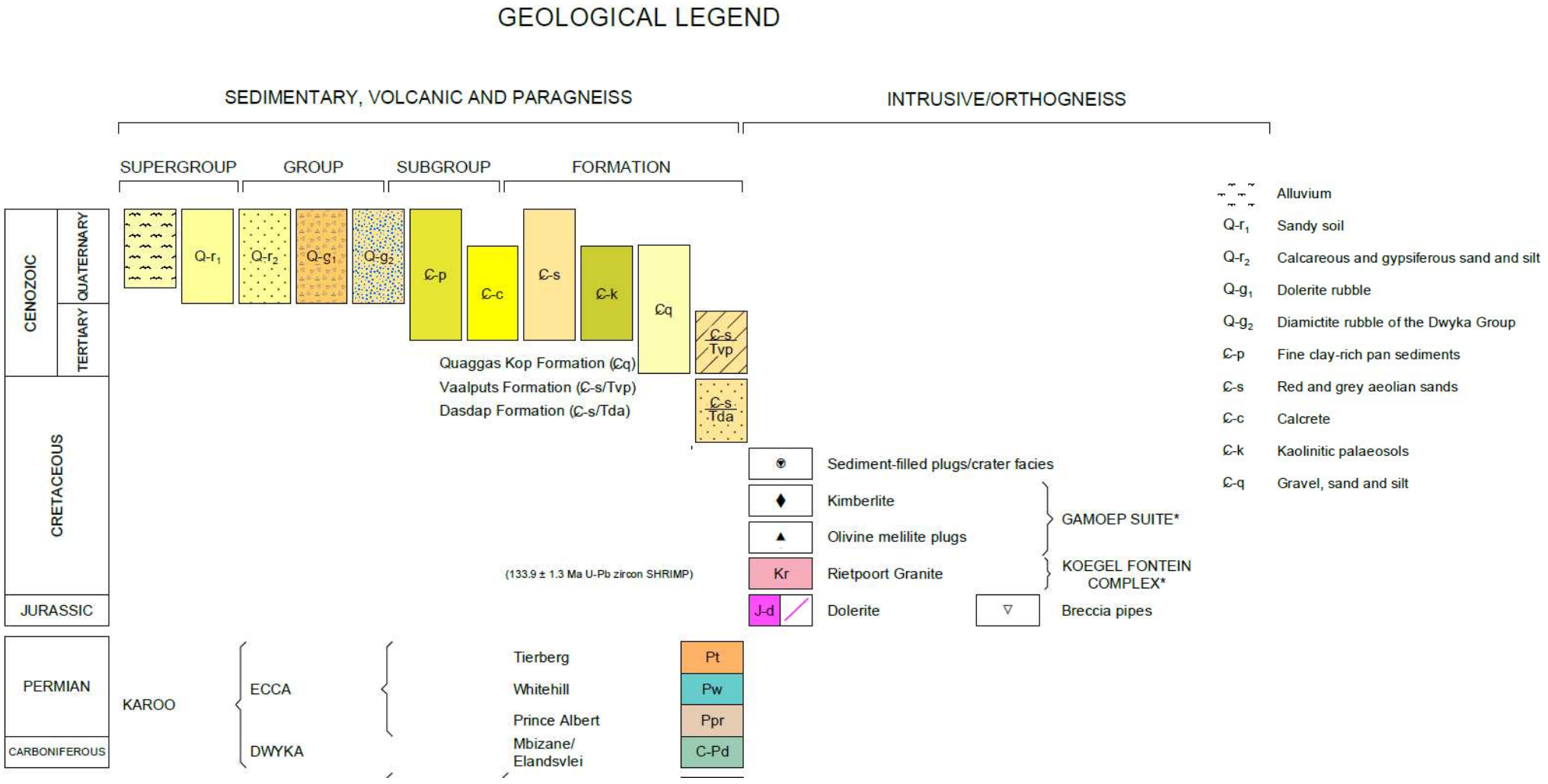

19.440
19.480
-30.600
-30.640
Ppr
Kluitjieskraal
J-d
Pw
Ppr
Q-r
J-d
GROOT MELKBOSEC
Prospect 4
Q-r
J-d
Prospect 5
J-d
1000
1 000
2 000 m
REGIONAL GEOLOGY
1:250 000 - GCS 3018
LEGEND
Lesaka 2 SEF
Access Road
Lesaka 2 Overhead Line
Grid
Collector Substation - 6ha
Onsite Substation and BESS - 6ha
Temporary Laydown Areas
Option 1 - 2.2 ha
Option 2 - 2.2 ha
Buildable Area
BANZAI ENVIRONMENTAL
info@banzai-group.com
LATO ANALYTICS
lato.analytics@gmail.com

***Figure 3**: Extract of the 1: 250 000 Loeriesfontein 3018 (2010) Geological Map (Council for Geosciences, Pretoria) indicating the geology of the proposed Lesaka 2 SEF and associated grid connection infrastructure near Loeriesfontein in the Northern Cape Province. The proposed development is underlain by Quaternary sands (Q-r1, beige) as well as Jurassic Dolerite (J-d) and the Prince Albert Formation of the Ecca Group.*

Table 3: Legend to the 1: 250 000 Loeriesfontein 3018 (2010) Geological Map (Council for Geosciences, Pretoria)

Relevant sediments are indicated in a red square.



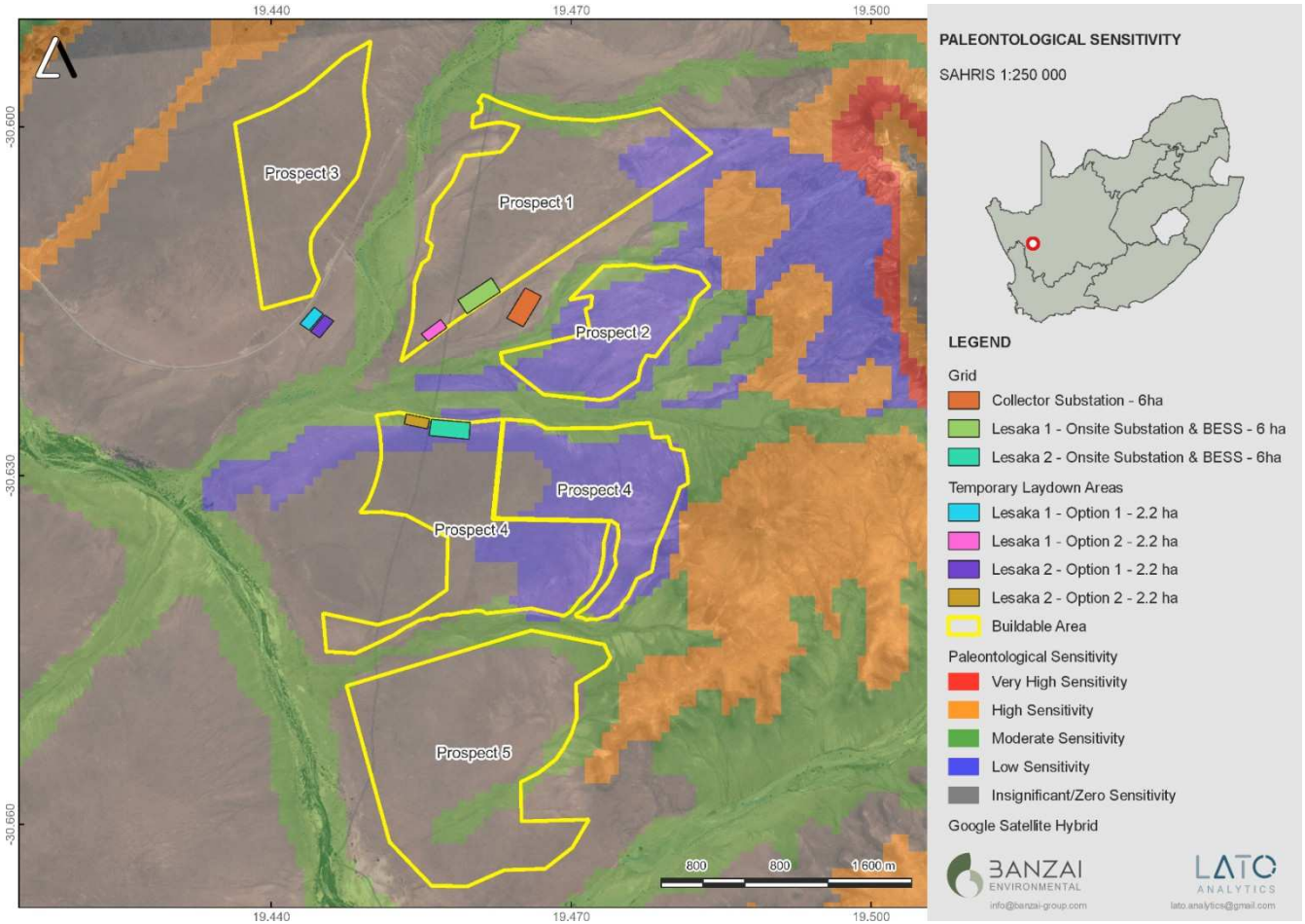


***Figure 4**: Extract of the 1 in 250 000 SAHRIS PalaeoMap (Council of Geosciences) indicating the proposed Lesaka SEF and associated grid connection Solar PV development in the Northern Cape.*

Table 4: Palaeontological Sensitivity according to the SAHRIS PalaeoMap (Almond et al, 2013; SAHRIS website.

Colour	Sensitivity	Required Action
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	LOW	No palaeontological studies are required however a protocol for finds is required
GREY	INSIGNIFICANT/ZERO	No palaeontological studies are required
WHITE/CLEAR	UNKNOWN	These areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

The SAHRIS Palaeosensitivity map (**Figure 9**) indicates that the proposed development is underlain by sediments with a High (orange), Moderate (green) and Low (blue) Palaeontological Sensitivity.

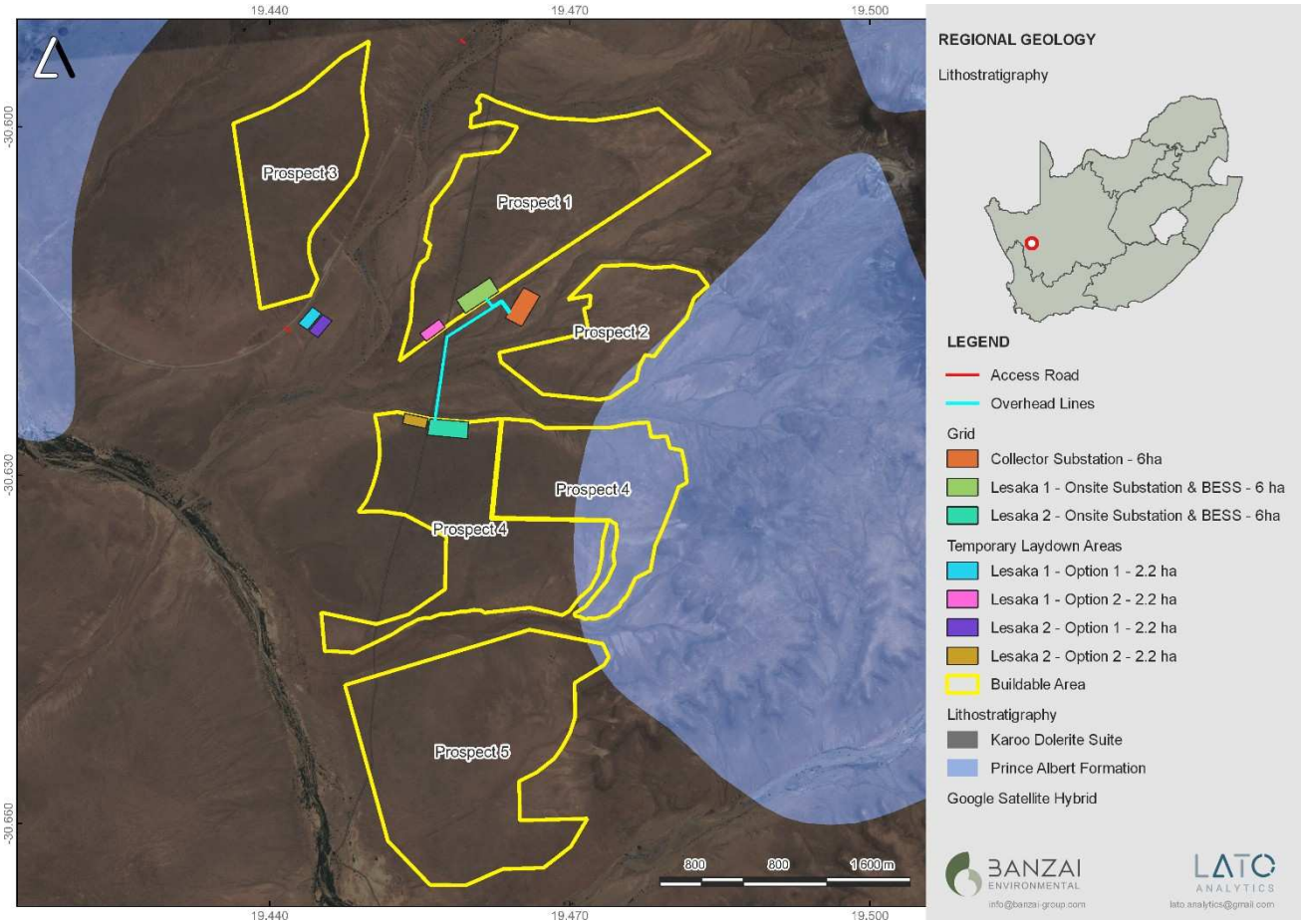


Figure 5: *Updated Geology (Council of Geosciences, Pretoria) of the proposed Lesaka SEF and associated grid connection Solar PV development in the Northern Cape.*

6. GEOGRAPHICAL LOCATION OF THE SITE

The proposed development is located about 40km north of the town of Loeriesfontein in the Northern Cape. The town of Loeriesfontein is within a basin surrounded by mountains. This area is recognized as one of the highest yield areas for renewable energy in South Africa, however this area falls outside of a REDZ area. Due to these high yields, there are existing, approved renewable energy facilities located immediately adjacent to the area proposed for development.

The Projects will connect to the Helios MTS owned by Eskom, which is approximately 21km to the northeast of the Project Site. The Lesaka SEFs will be located over one farm portion and the collective site extent is approximately 4 894.93 ha. It is proposed that the Projects will connect to the Eskom grid by routing Low Voltage ("LV") and Medium Voltage ("MV") cables underground through to the respective

132kV onsite IPP Substations which in turn connect to the respective 132kV Switching Station(s). A single or double circuit OHL will run from the 132kV Switching Station to the Helios MTS **(Figure 1-2**).

7. METHODS

The aim of a desktop study is to evaluate the possible risk to palaeontological heritage in the proposed development. This includes all trace fossils as well as all fossils in the proposed footprint. All possible information is consulted to compile a desktop study, and this includes the following: all Palaeontological Impact Assessment reports in the same area; aerial photos and Google Earth images, topographical as well as geological maps.

7.1 Assumptions and Limitations

The focal point of geological maps is the geology of the area and the sheet explanations of the Geological Maps were not meant to focus on palaeontological heritage. Many inaccessible regions of South Africa have never been reviewed by palaeontologists and data is generally based on aerial photographs alone. Locality and geological information of museums and universities databases have not been kept up to date or data collected in the past have not always been accurately documented.

Comparable Assemblage Zones in other areas is also used to provide information on the existence of fossils in an area which has not documented in the past. When using similar Assemblage Zones and geological formations for Desktop studies it is generally **assumed** that exposed fossil heritage is present within the footprint. A field-assessment was conducted to improve the accuracy of the desktop assessment.

8. ADDITIONAL INFORMATION CONSULTED

In compiling this report the following sources were consulted:

- Geological map 1:100 000, Geology of the Republic of South Africa (Visser 1984)
- A Google Earth map with polygons of the proposed development was obtained from SiVEST.
- 1:250 000 Loeriesfontein 3018 (2010) Geological Map (Council for Geosciences, Pretoria)
- Updated geological shape files (Council for Geosciences, Pretoria)

9. SITE VISIT

A site-specific field survey of the development footprint was conducted on foot and by motor vehicle on the 17 January 2023. No fossiliferous outcrops were identified during the site visit.

Figure 11:General view of the proposed development indicates an extremely low topography with low vegetation, calcretes are frequently exposed.

Figure 12:Dolerite outcrop present in the foreground.

10. ASSESSMENT METHODOLOGT

10.1 Method of Environmental Assessment

The environmental assessment aims to identify the various possible environmental impacts that could results from the proposed activity. Different impacts need to be evaluated in terms of its significance and in doing so highlight the most critical issues to be addressed.
Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale i.e., site, local, national, or global whereas intensity is defined by the severity of the impact e.g., the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in Table below.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

10.2 Impact Rating System

Impact assessment must take account of the nature, scale, and duration of impacts on the environment whether such impacts are positive or negative. Each impact is also assessed according to the project phases:

- planning
- construction
- operation
- decommissioning

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance should also be included. The rating system is applied to the potential impacts on the receiving environment and

includes an objective evaluation of the mitigation of the impact. In assessing the significance of each impact, the following criteria is used:

Table 5:The rating system

NATURE		
The Nature of the Impact is the possible destruction of fossil heritage		
GEOGRAPHICAL EXTENT		
This is defined as the area over which the impact will be experienced.		
1	Site	The impact will only affect the site.
2	Local/district	Will affect the local area or district.
3	Province/region	Will affect the entire province or region.
4	International and National	Will affect the entire country.
PROBABILITY		
This describes the chance of occurrence of an impact.		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
DURATION		
This describes the duration of the impacts. Duration indicates the lifetime of the impact as a result of the proposed activity.		

1	Short term	The impact will either disappear with mitigation or will be mitigated through natural processes in a span shorter than the construction phase (0 – 1 years), or the impact will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered indefinite.
INTENSITY/ MAGNITUDE		
Describes the severity of an impact.		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/

		component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired. Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
REVERSIBILITY		
This describes the degree to which an impact can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures.
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.

3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
CUMULATIVE EFFECT		
This describes the cumulative effect of the impacts. A cumulative impact is an effect which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.		
1	Negligible cumulative impact	The impact would result in negligible to no cumulative effects.
2	Low cumulative impact	The impact would result in insignificant cumulative effects.
3	Medium cumulative impact	The impact would result in minor cumulative effects.
4	High cumulative impact	The impact would result in significant cumulative effects
SIGNIFICANCE		
Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The calculation of the significance of an impact uses the following formula: [(**Extent (1) + probability (4) + reversibility (4) + irreplaceability (4) + duration (4) + cumulative effect (1)] x magnitude/intensity (2).** The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.		
Points	Impact significance rating	Description
6 to 28	Negative low impact	The anticipated impact will have negligible negative

		effects and will require little to no mitigation.
6 to 28	Positive low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative high impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive high impact	The anticipated impact will have significant positive effects.
74 to 96	Negative very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive very high impact	The anticipated impact will have highly significant positive

(Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity

Table 6: Summary of Impacts.

Impacts	*Extent*	*Duration*	*Magnitude*	*Reversibility*	*Irreplaceable loss*	*Cumulative effect*	*Impact*

Pre-mitigation	*1*	*4*	*2*	*4*	*4*	*2*	*20*
Post mitigation	*1*	*4*	*1*	*4*	*4*	*2*	*15*

Loss of fossil heritage will be a negative impact. Only the site will be affected by the proposed development. The expected duration of the impact is assessed as potentially permanent to long term. In the absence of mitigation procedures, the damage or destruction of any palaeontological materials will be permanent. Impacts on palaeontological heritage during the construction phase could potentially occur. A negative medium Significance has been allocated to the proposed development.

11. FINDINGS AND RECOMMENDATIONS

The proposed Lesaka 1 and 2 Solar Energy Facilities (SEF) and associated grid connection infrastructure near Loeriesfontein in the Northern Cape Province is underlain by ~~by~~ the Quaternary sandy soil, Quaternary alluvium,, Jurassic Dolerite with a tiny portion in the east underlain by the Prince Albert Formation (Ecca Group). The PalaeoMap of the South African Heritage Resources Information System (SAHRIS) indicates that the Palaeontological Sensitivity of Quaternary Sandy soils are Low, that of Quaternary alluvium is Moderate, while the Palaeontological Sensitivity of the Jurassic Dolerite is Zero and that of the Prince Albert Formation (Ecca Group) is High (Almond and Pether, 2009; Almond *et al*., 2013, Groenewald et al 2014). Updated Geology (Council of Geosciences Pretoria) indicates that the development is underlain by the Jurassic Dolerite as well as the Prince Albert Formation of the Ecca

A site-specific field survey of the development footprint was conducted on foot and by motor vehicle on 17 January 2023. No fossiliferous outcrop was detected in the proposed Lesaka Solar Renewable Energy Facility and grid connection development area. A LOW Palaeontological Significance has been allocated to the development. It is therefore considered that the proposed development will not lead to damaging impacts on the palaeontological resources of the area. The construction of the development may thus be permitted in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources.

If Palaeontological Heritage is uncovered during surface clearing and excavations ECO should be informed immediately. Fossil discoveries ought to be protected and the ECO/site manager must report to South African Heritage Resources Agency (SAHRA) (Contact details: Eastern Cape Provincial Heritage Resources Authority (ECPHRA), 16 Commissioner Street, East London, 5201, South Africa. Tel: 043 745

0888. Fax: 043 745 0889., email: info@ecphra.org.za; Web: https://www.ecphra.org.za/) so that mitigation (recording and collection) can be carried out.

Before any fossil material can be collected from the development site the specialist involved would need to apply for a collection permit from SAHRA. Fossil material must be housed in an official collection (museum or university), while all reports and fieldwork should meet the minimum standards for palaeontological impact studies proposed by SAHRA (2012).

12. CHANCE FIND PROTOCOL

The following procedure will only be followed if fossils are uncovered during the excavation phase of the development.

Legislation

Cultural Heritage in South Africa (includes all heritage resources) is protected by the **National Heritage Resources Act (Act No 25 of 1999) (NHRA).** According to Section 3 of the Act, all Heritage resources include **"all objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens**".

Palaeontological heritage is unique and non-renewable and is protected by the NHRA and are the property of the State. It is thus the responsibility of the State to manage and conserve fossils on behalf of the citizens of South Africa. Palaeontological resources may not be excavated, broken, moved, or destroyed by any development without prior assessment and without a permit from the relevant heritage resources authority as per section 35 of the NHRA.

A fossil is the naturally preserved remains (or traces thereof) of plants or animals embedded in rock. These organisms lived millions of years ago. Fossils are extremely rare and irreplaceable. By studying fossils, it is possible to determine the environmental conditions that existed in a specific geographical area millions of years ago.

This informational document is intended for workmen and foremen on construction sites. It describes the actions to be taken when mining or construction activities accidentally uncovers fossil material.

It is the responsibility of the Environmental Site Officer (ESO) or site manager of the project to train the workmen and foremen in the procedure to follow when a fossil is accidentally uncovered. In the

absence of the ESO, a member of the staff must be appointed to be responsible for the proper implementation of the chance find protocol as not to compromise the conservation of fossil material.

Chance Find Procedure

- If a chance find is made the person responsible for the find must immediately **stop working** and all work that could impact that finding must cease in the immediate vicinity of the find.
- The person who made the find must immediately **report** the find to his/her direct supervisor which in turn must report the find to his/her manager and the ESO or site manager. The ESO or site manager must report the find to the relevant Heritage Agency (South African Heritage Research Agency, SAHRA). (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa.
- Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za). The information to the Heritage Agency must include photographs of the find, from various angles, as well as the GPS co-ordinates.
- A preliminary report must be submitted to the Heritage Agency within **24 hours** of the find and must include the following: 1) date of the find; 2) a description of the discovery and a 3) description of the fossil and its context (depth and position of the fossil), GPS co-ordinates.
- Photographs (the more the better) of the discovery must be of high quality, in focus, accompanied by a scale. It is also important to have photographs of the vertical section (side) where the fossil was found.
- Upon receipt of the preliminary report, the Heritage Agency will inform the ESO (or site manager) whether a rescue excavation or rescue collection by a palaeontologist is necessary.
- The site must be secured to protect it from any further damage. **No attempt** should be made to remove material from their environment. The exposed finds must be stabilized and covered by a plastic sheet or sand bags. The Heritage agency will also be able to advise on the most suitable method of protection of the find.
- If the fossil cannot be stabilized the fossil may be collected with extreme care by the ESO. Fossils finds must be stored in tissue paper and in an appropriate box while due care must be taken to remove all fossil material from the rescue site.
- Once the Heritage Agency has issued the written authorization, the developer may continue with the development on the affected area.

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APPENDIX A

CURRICULUM VITAE

ELIZE BUTLER

PROFESSION:	Palaeontologist
YEARS' EXPERIENCE:	30 years in Palaeontology
EDUCATION:	B.Sc Botany and Zoology, 1988
	University of the Orange Free State
	B. Sc (Hons) Zoology, 1991
	University of the Orange Free State
	Management Course, 1991
	University of the Orange Free State
	M. Sc. *Cum laude* (Zoology), 2009 University of the Free State

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MEMBERSHIP

Palaeontological Society of South Africa (PSSA)	2006-currently

EMPLOYMENT HISTORY

Part time Laboratory assistant	Department of Zoology & Entomology University of the Free State Zoology 1989-1992
Part time laboratory assistant	Department of Virology University of the Free State Zoology 1992
Research Assistant	National Museum, Bloemfontein 1993 – 1997

Principal Research Assistant	National Museum, Bloemfontein
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Butler, E., 2022. Palaeontological Impact Assessment for the proposed Hoekplaas WEF near Victoria West in the Northern Cape. Banzai Environmental (Pty) Ltd, Bloemfontein.
Butler, E., 2022. Palaeontological Desktop Assessment (PDA) assessing the proposed Prospecting Right Application without bulk sampling for the Prospecting of Diamonds Alluvial (DA), Diamonds General (D), Diamonds in Kimberlite (DK) & Diamonds (DIA) on the Remaining Extent of the Farm Goede Hoop 547, Remaining Extent of the Farm 548, Remaining Extent of Portion 2 and Portion 3 of the Farm Skeyfontein 536, Registration Division: Hay, Northern Cape Province. Banzai Environmental (Pty) Ltd, Bloemfontein.
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Butler, E., 2022. Proposed Mimosa Residential Development and Associated Infrastructure on Fairview Erven, in Gqeberha (Port Elizabeth), Nelson Mandela Bay Metropolitan Municipality, Eastern Cape Province. Banzai Environmental (Pty) Ltd, Bloemfontein.
Butler, E., 2022. Palaeontological Impact Assessment for the Witteberge Sand Mine on the remainder of farm Elandskrag Plaas 269 located in the Magisterial District of Laingsburg and Central Karoo District Municipality in the Western Cape. Banzai Environmental (Pty) Ltd, Bloemfontein.
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Butler. E., 2022.Palaeontological Desktop Assessment to assess the proposed Dominion 3 Solar Park, located on the Remaining Extent of Portion 11 of Farm 425, and Remaining Extent of Portion 31 of Farm 425 near Klerksdorp within the North-West Province

Butler. E., 2022. Palaeontological Impact Assessment to assess the Delta Solar Power Plant on the remaining extent of the farm Kareefontein No. 340, Dr Ruth Segomotsi Mompati District Municipality, Lekwa-Teemane Local Municipality near Bloemhof in the North West Province

Butler. E., 2022. Palaeontological Impact Assessment to assess the Sonneblom Solar Power Plant (SPP) on Portion 1 of the farm Blydschap No. 504 within the Mangaung Metropolitan Municipality, southeast of Bloemfontein in the Free State.

Butler. E., 2022. Palaeontological Impact Assessment for the proposed Naos Solar PV One Project near Viljoenskroon in the Free State.

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Butler. E., 2022.Palaeontological Impact Assessment for the proposed Naos Solar PV Two Project near Viljoenskroon in the Free State

Butler. E., 2022.Palaeontological Impact Assessment for the Ngwedi Solar Power near Viljoenskroon in the Free State.

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Butler. E., 2022. Palaeontological Impact Assessment of the Kentani, Braklaagte, Klipfontein, Klipfontein 2, Leliehoek and Sonoblomo PV Facilities located near Dealsville in the Free State Province

Butler. E., 2022. Palaeontological Impact Assessment for the proposed Harvard 1 Solar Photovoltaic (PV) facility on Portion 5 of Farm Spes Bona no 2355, Mangaung Metropolitan Municipality in the Free State.

Butler. E., 2022. Palaeontological Impact Assessment for proposed Harvard 2 Solar Photovoltaic (PV) facility on Portion 8 of Farm Spes Bona No 2355, Mangaung Metropolitan Municipality in the Free State.

Butler. E., 2022. Palaeontological Impact Assessment for the proposed Doornrivier Solar 1, southwest of Matjhabeng (formerly Virginia) in the Free State

Butler. E., 2022. Palaeontological Desktop Assessment for the proposed Leeuwbosch PV solar photovoltaic (PV) plant and associated infrastructure on Portion 37 of the Farm Leeuwbosch No. 44 near Leeudoringstad within the Maquassi Hills Local Municipality in the Dr Kenneth Kaunda District

CTS HERITAGE

APPENDIX 3: Heritage Screening Assessment

CTS HERITAGE

HERITAGE SCREENER

CTS Reference Number:	**CTS22_126**
SAHRIS Reference:	
Client:	**SiVEST**
Date:	**September 2022**
Title:	**Proposed Lesaka Solar Energy Facility and grid connection near Loeriesfontein, Northern Cape**

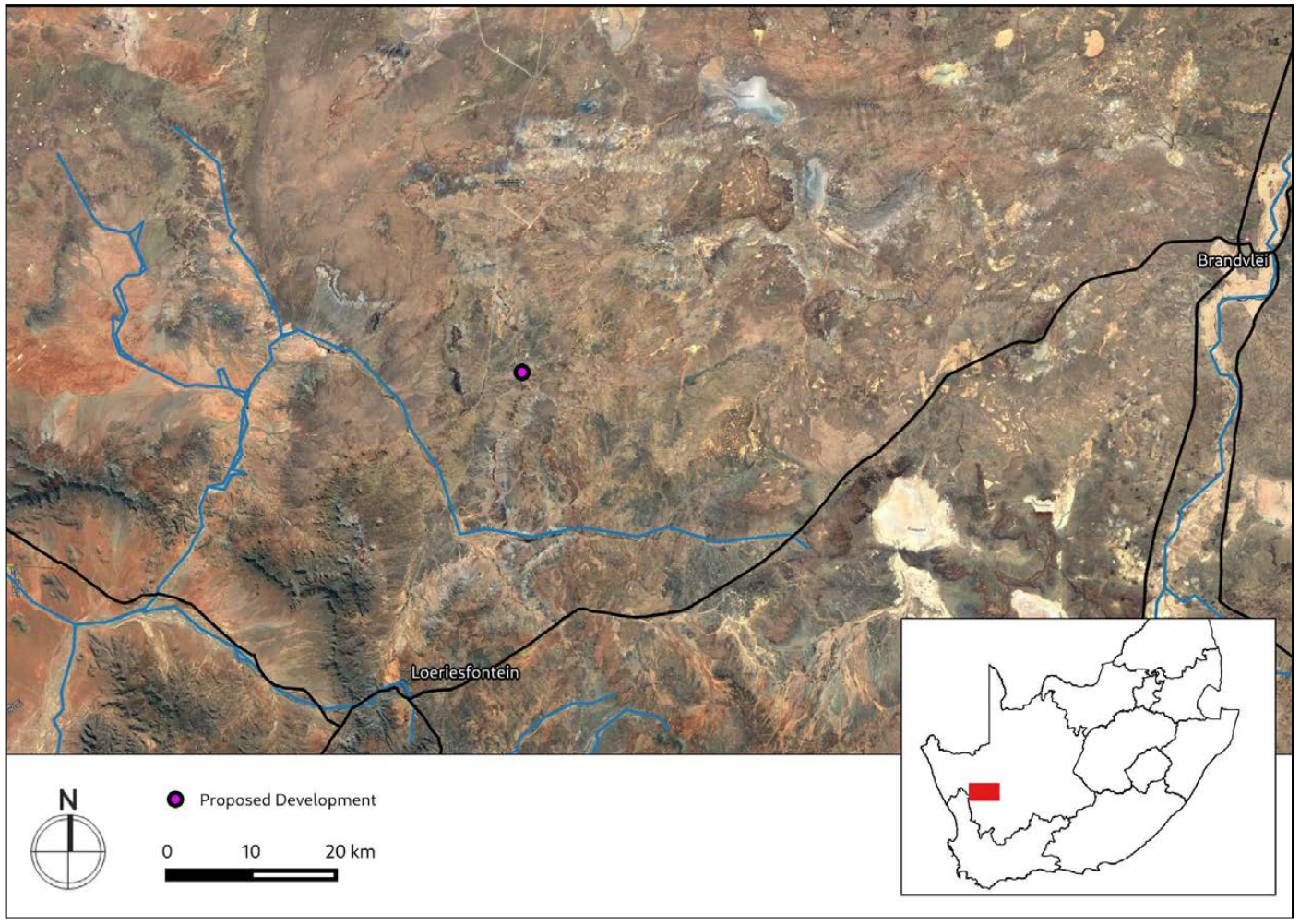

Figure 1a. Satellite map indicating the location of the proposed development in the Northern Cape

RECOMMENDATION
It is likely that the proposed development will impact significant archaeological and palaeontological heritage and as such, it is recommended that a heritage impact assessment be completed that assesses these impacts as per section 38(3) of the NHRA.

CTS HERITAGE

1. Proposed Development Summary

Enertrag South Africa (Pty) Ltd on behalf of Lesaka 1 Solar Energy Facility (Pty) Ltd has appointed SiVEST Environmental (hereafter referred to as “SiVEST”) to undertake the required EIA / BA Processes for the proposed construction of the Lesaka 1 and 2 Solar Energy Facilities (SEF) and associated grid connection infrastructure near Loeriesfontein in the Northern Cape Province. The distinct EA’s that are required for each of the respective Projects and Associated Grid Connection Infrastructure are as follows:

▪ Lesaka 1 SEF (up to 240MW)
▪ Lesaka 2 SEF (up to 240MW)
▪ Lesaka 1 Associated Grid Connection Infrastructure (up to 132kV)
▪ Lesaka 2 Associated Grid Connection Infrastructure (up to 132kV)

The overall objective of the development is to generate electricity by means of renewable energy technology capturing energy to feed into the National Grid.

The project aims to supply suitable private off-taker initiatives (direct supply or wheeling agreements, as applicable), or be bid into the government coordinated Renewable Energy Independent Power Producer Procurement Programme (“REIPPPP”) or similar procurement program under the Integrated Resource Plan (“IRP”). The Lesaka SEF Cluster Projects will be administered under the respective Project Companies, and the Projects will be require to be composed of the following:

Lesaka 1 Solar Energy Facility (Pty) Ltd

- Lesaka 1 SEF (up to 240MW)
- Battery Energy Storage System (“BESS”)
- On-site Independent Power Producer (“IPP”) Substation (up to 33/132kV)
- All associated grid infrastructure

Lesaka 2 Solar Energy Facility (Pty) Ltd

- Lesaka 2 SEF (up to 240MW)
- BESS
- On-site IPP Substation (up to 33/132kV)
- All associated grid infrastructure

Grid Connection Infrastructure

- (Up to x2) Up to 132kV Switching Stations
- Up to 132kV Overhead Power Line (“OHL”) from Lesaka 1 SEF Switching Station to Lesaka 2 SEF Switching Station (if needed)
- Up to 132kV OHL to the Helios Main Transmission Substation (“MTS”)

The Projects will connect to the Helios MTS owned by Eskom, which is approximately 21km to the northeast of the Project Site. The Lesaka SEFs will be located over one farm portion and the collective site extent is approximately 4 894.93 ha. It is proposed that the Projects will connect to the Eskom grid by routing Low Voltage ("LV") and Medium Voltage ("MV") cables underground through to the respective 132kV onsite IPP Substations which in turn connect to the respective 132kV Switching Station(s). A single or double circuit OHL will run from the 132kV Switching Station to the Helios MTS.

2. Application References

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

3. Property Information

Latitude / Longitude	30°38'25.78"S 19°29'10.00"E
Erf number / Farm number	Farm Kluitjes Kraal No. 264 Portion 0 (SEF and grid) Farm Sous No. 226 Portion 1 (Grid) Farm Sous No. 226 Portion 0 (Grid) Farm Narosies No. 228 Portion 0 (Grid) Farm Ras Kraal No. 262 Portion 0 (Grid) Farm Rooiberg No. 263 Portion 4 (Grid) Farm Rooiberg No. 263 Portion 3 (Grid)
Local Municipality	Hantam
District Municipality	Namakwa
Province	Northern Cape
Current Use	Agriculture
Current Zoning	Agriculture

CTS HERITAGE

4. Nature of the Proposed Development

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

5. Category of Development

x	**Triggers: Section 38(8) of the National Heritage Resources Act**
	Triggers: Section 38(1) of the National Heritage Resources Act
	1. Construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier over 300m in length.
	2. Construction of a bridge or similar structure exceeding 50m in length.
	3. Any development or activity that will change the character of a site-
x	a) exceeding 5 000m^2 in extent
	b) involving three or more existing erven or subdivisions thereof
	c) involving three or more erven or divisions thereof which have been consolidated within the past five years
	4. Rezoning of a site exceeding 10 000m^2
	5. Other (state):

6. Additional Infrastructure Required for this Development

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

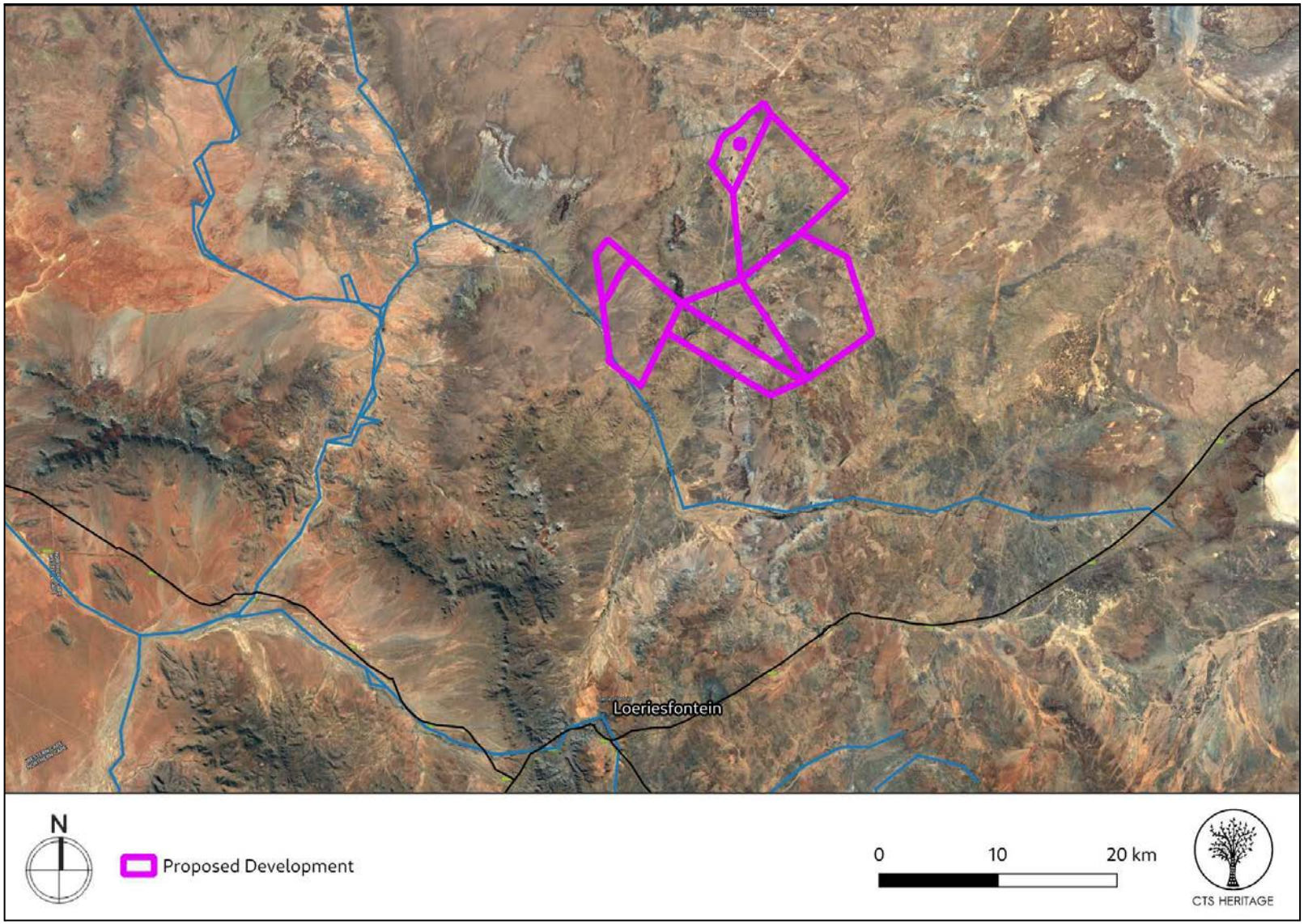

Figure 1b. Overview Map. Satellite image (2020) indicating the proposed development area

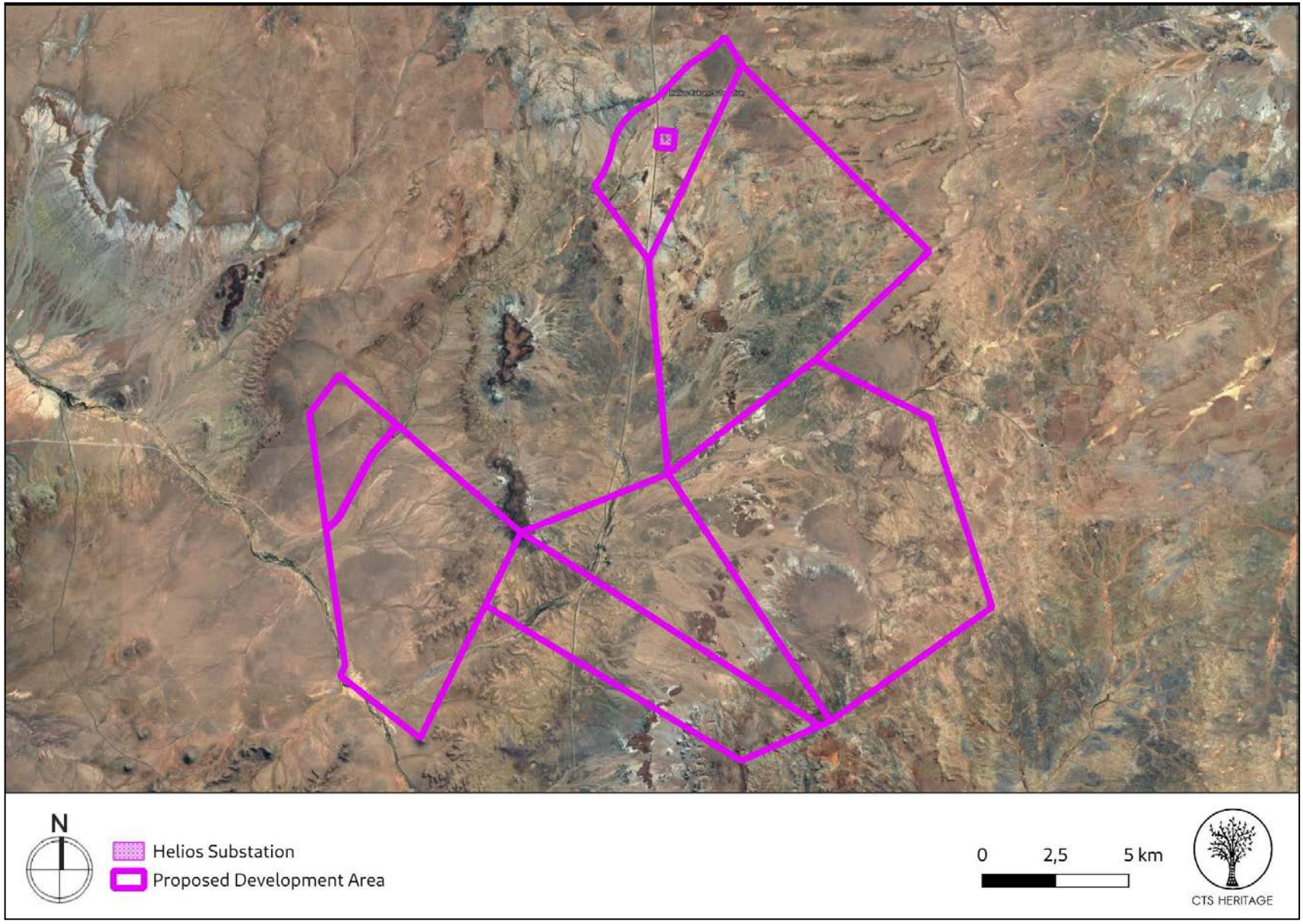

Figure 1c. Overview Map. Satellite image (2020) indicating the proposed development area

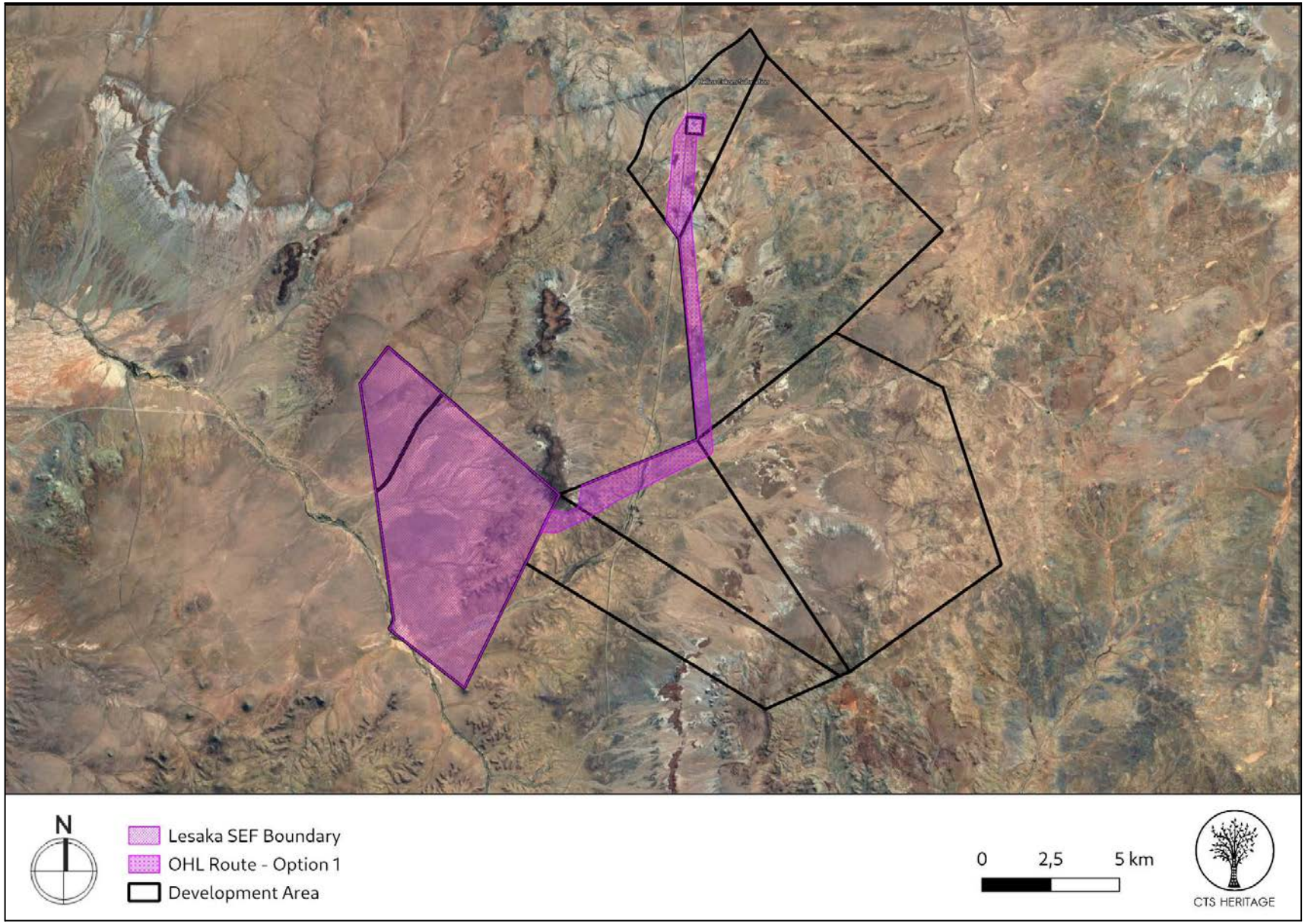

Figure 1d. Overview Map. Satellite image (2020) indicating the proposed development area

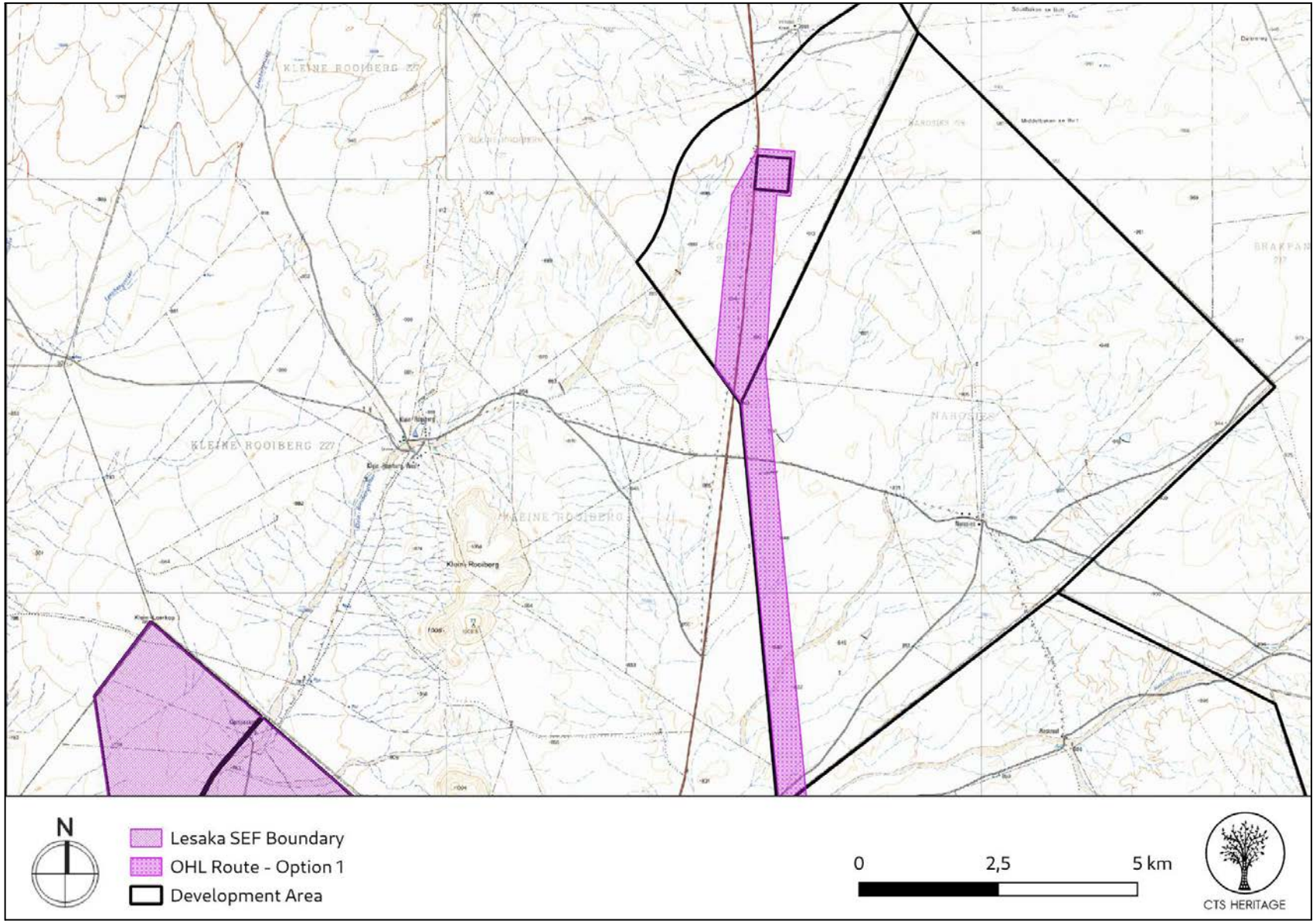

Figure 1e. Overview Map. Extract from 1:50 000 Topo

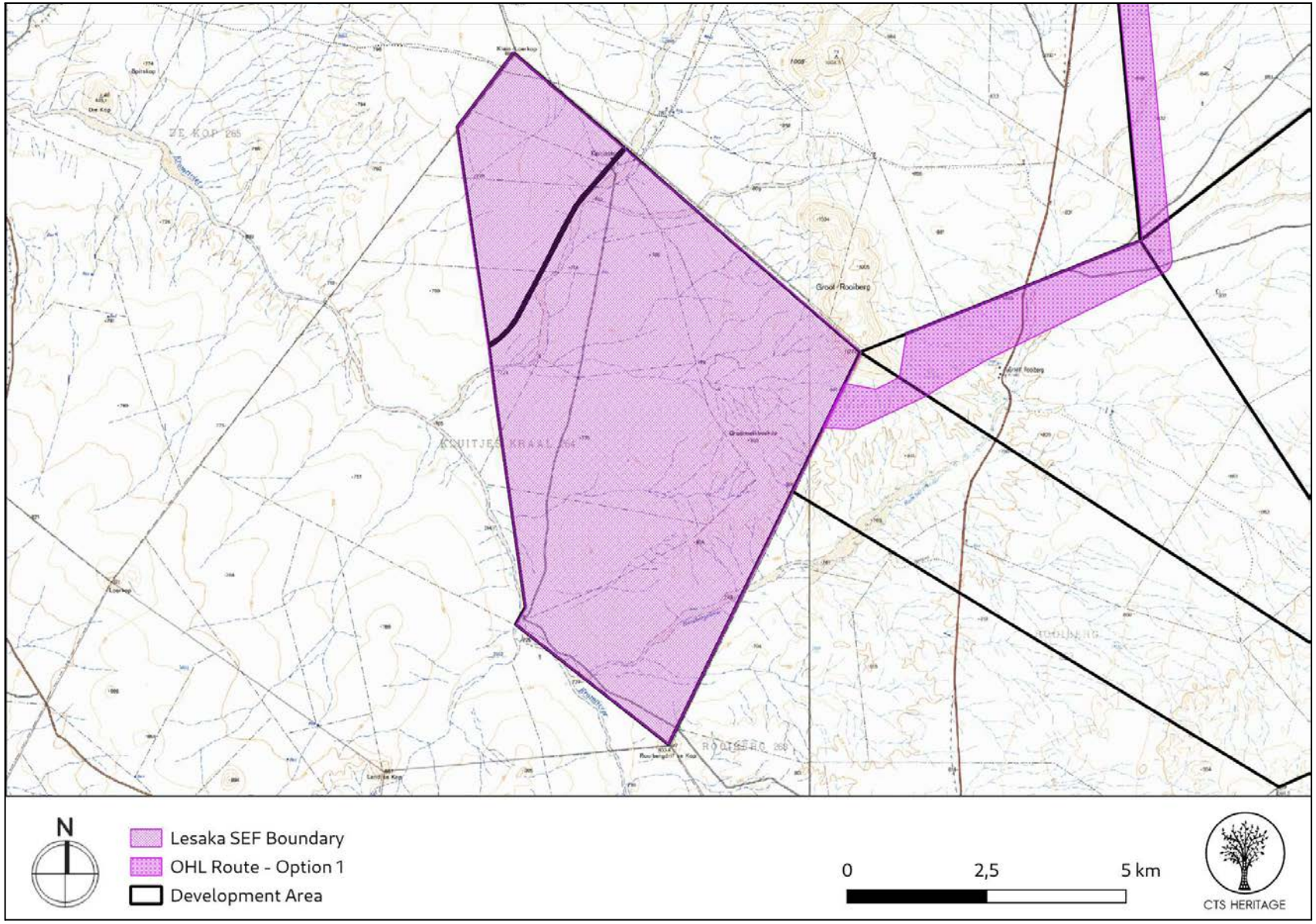

Figure 1f. Overview Map. Extract from 1:50 000 Topo

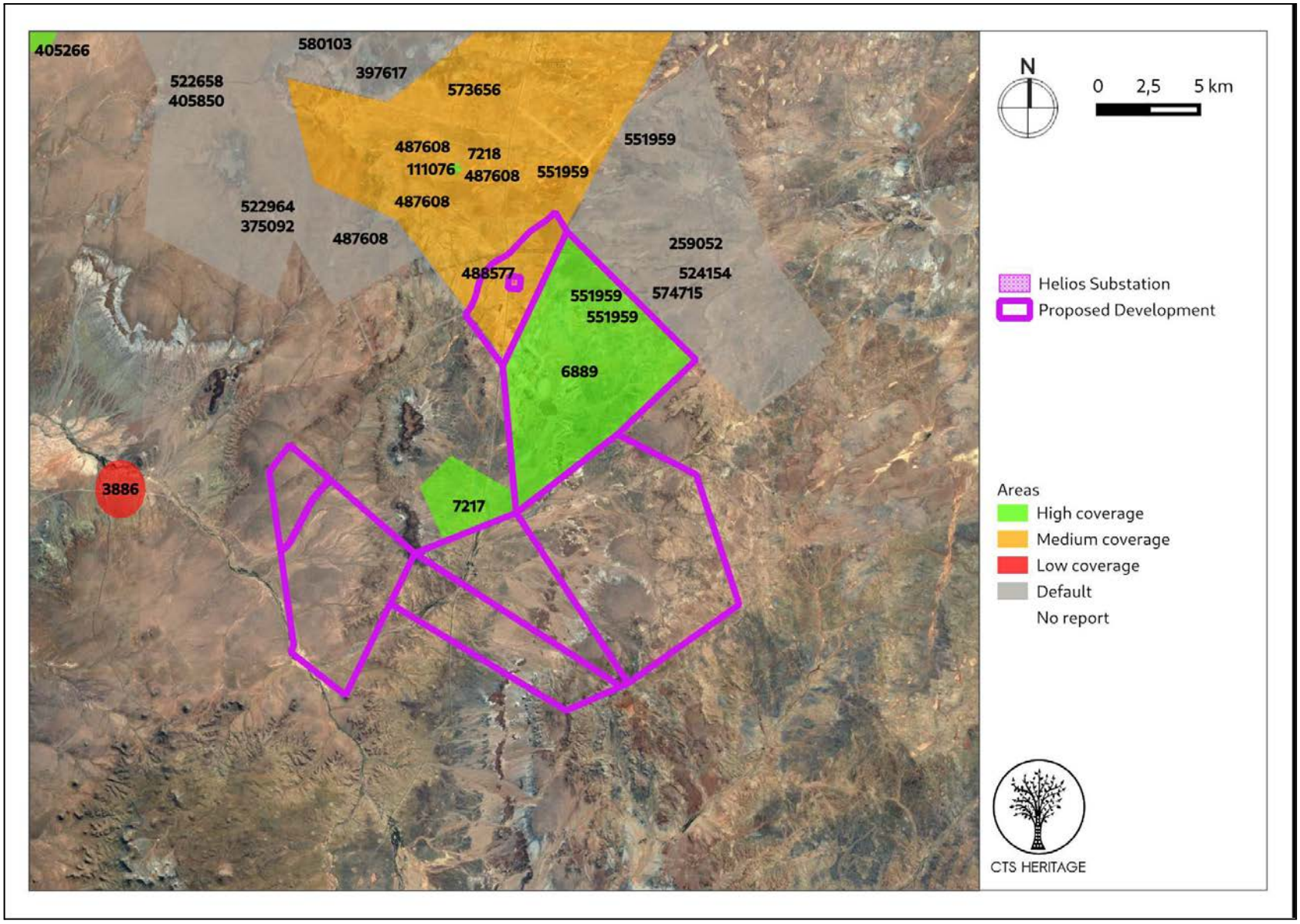

Figure 2a. Previous HIAs Map. Previous Heritage Impact Assessments covering the proposed development area with SAHRIS NIDS indicated. Please see Appendix 2 for a full reference list.

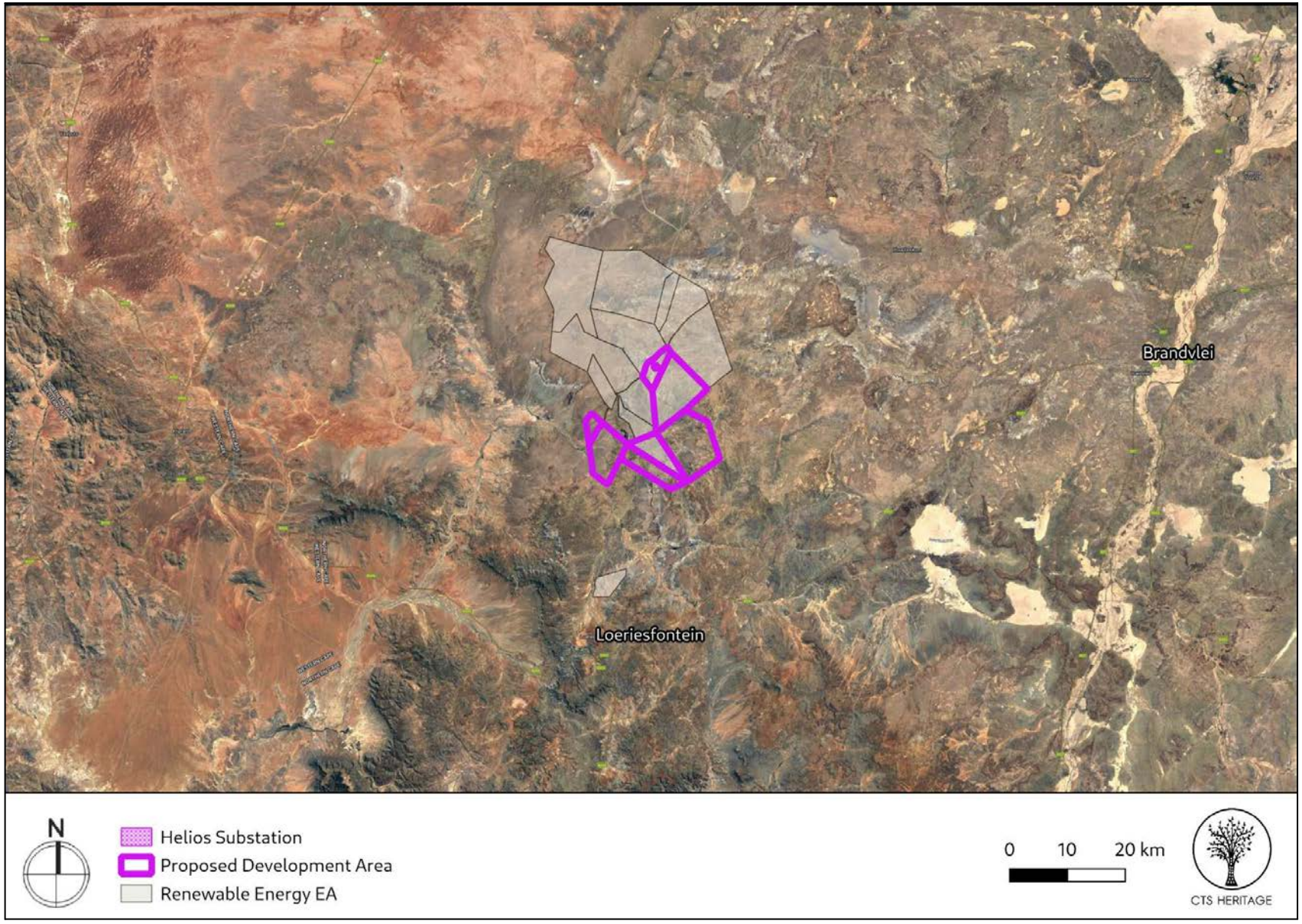

Figure 2b. Renewable Energy EA. Existing EAs for REPs, outside of a REDZ area

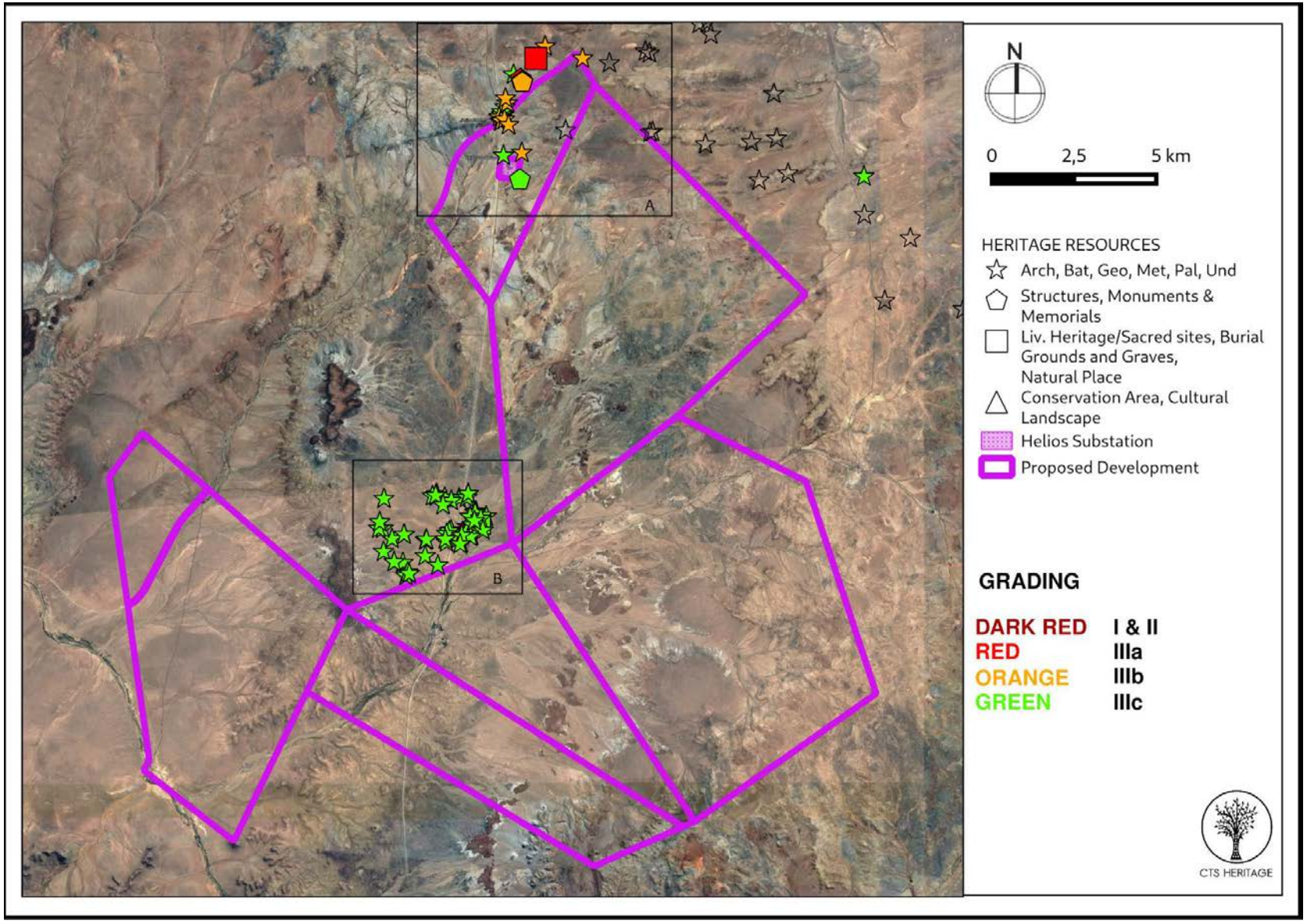

Figure 3. Heritage Resources Map. Heritage Resources previously identified within the study area, with SAHRIS Site IDs indicated in the insets below. Please See Appendix 4 for full description of heritage resource types.

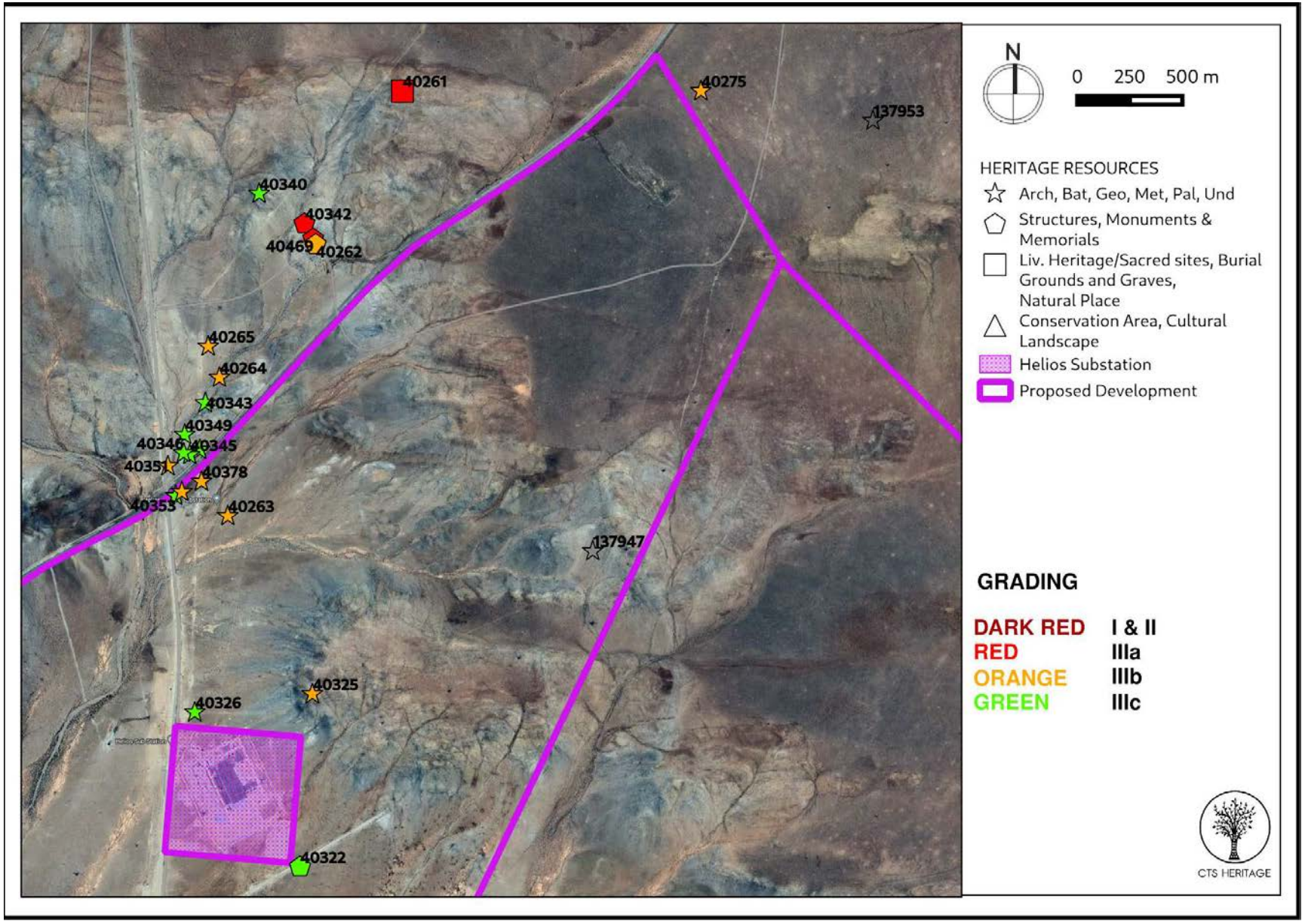

Figure 3a. Heritage Resources Map showing heritage resources near the proposed development

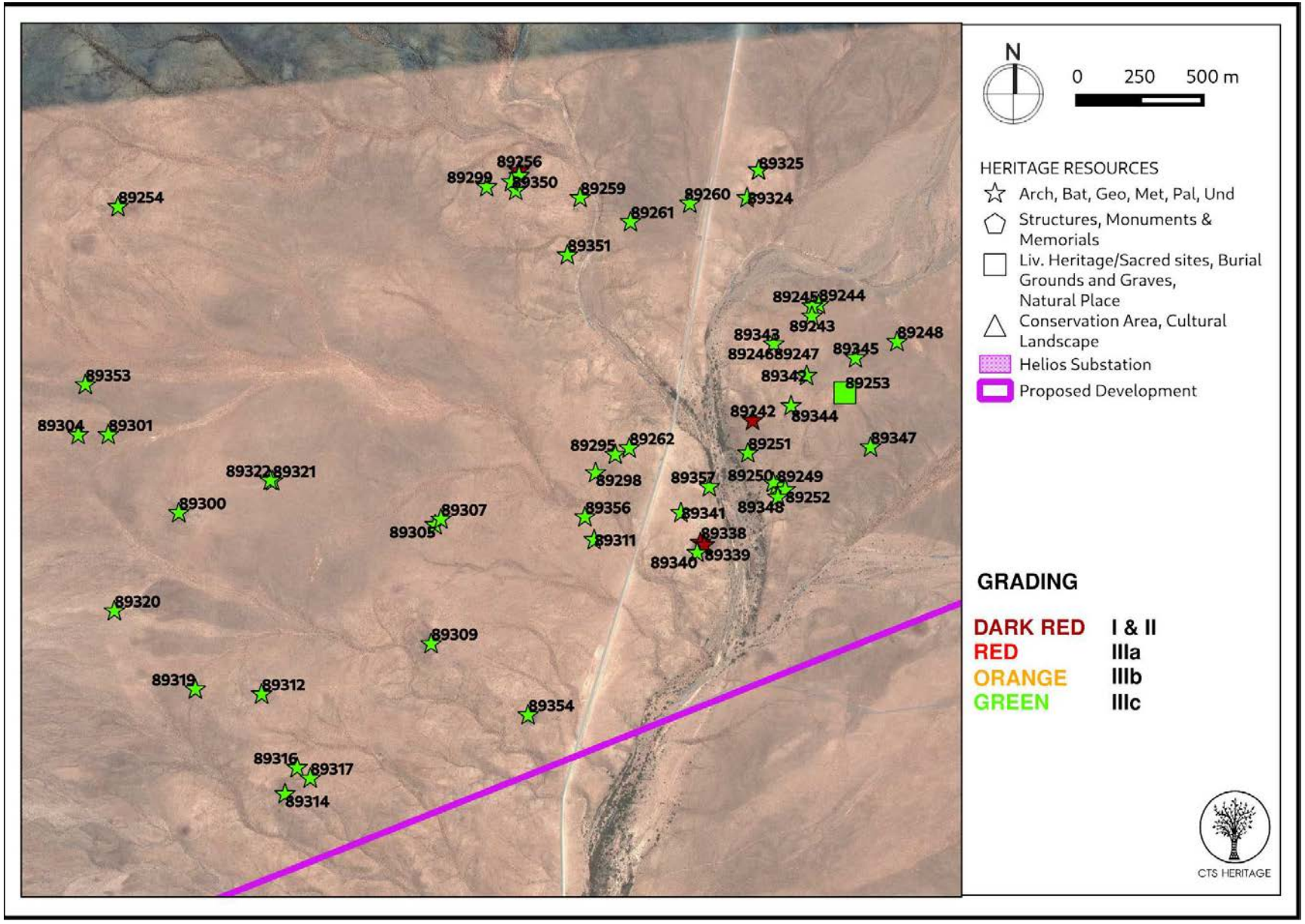

Figure 3b. Heritage Resources Map showing heritage resources near the proposed development

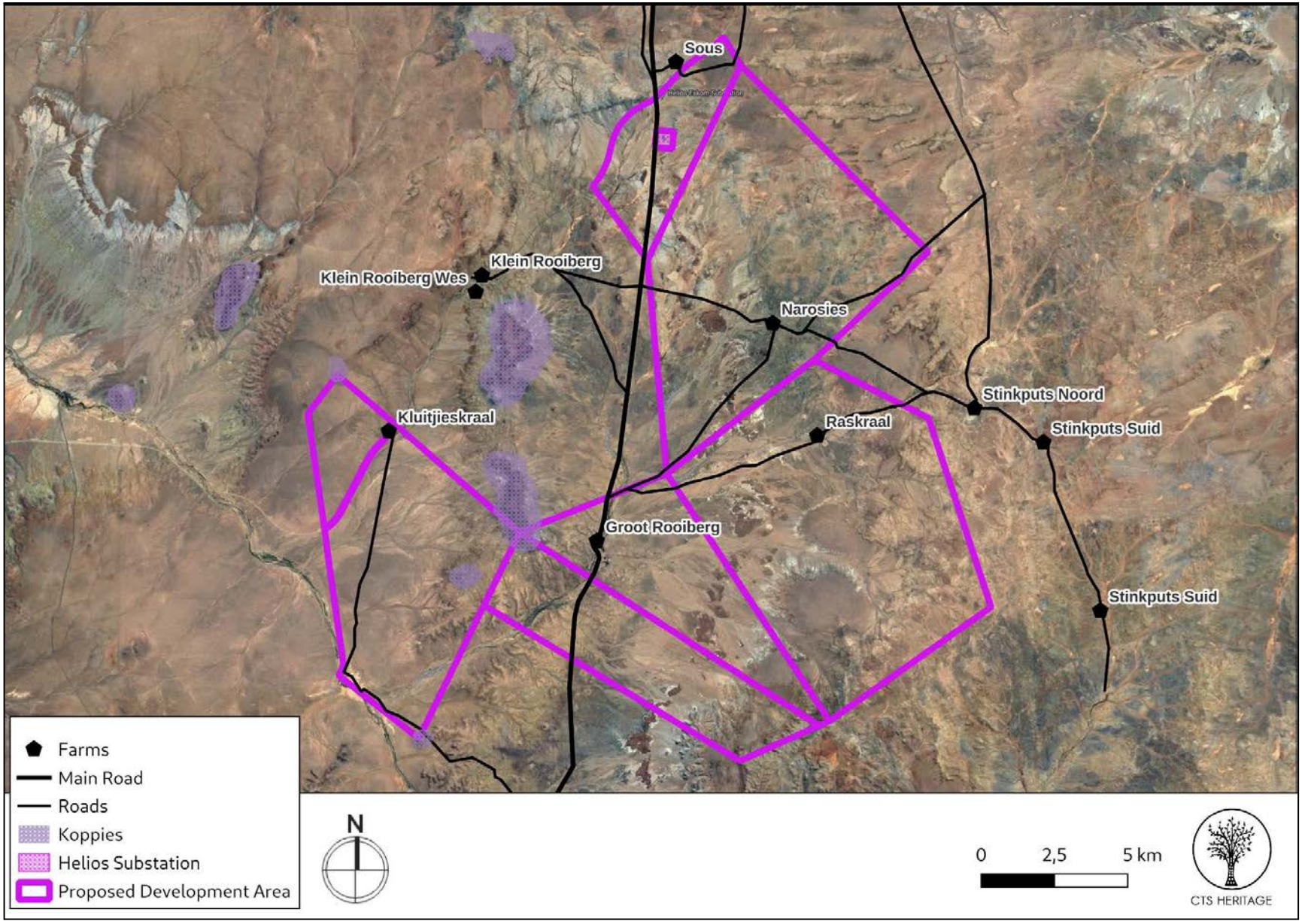

Figure 3c. Heritage Resources Map showing potential heritage resources near the proposed development

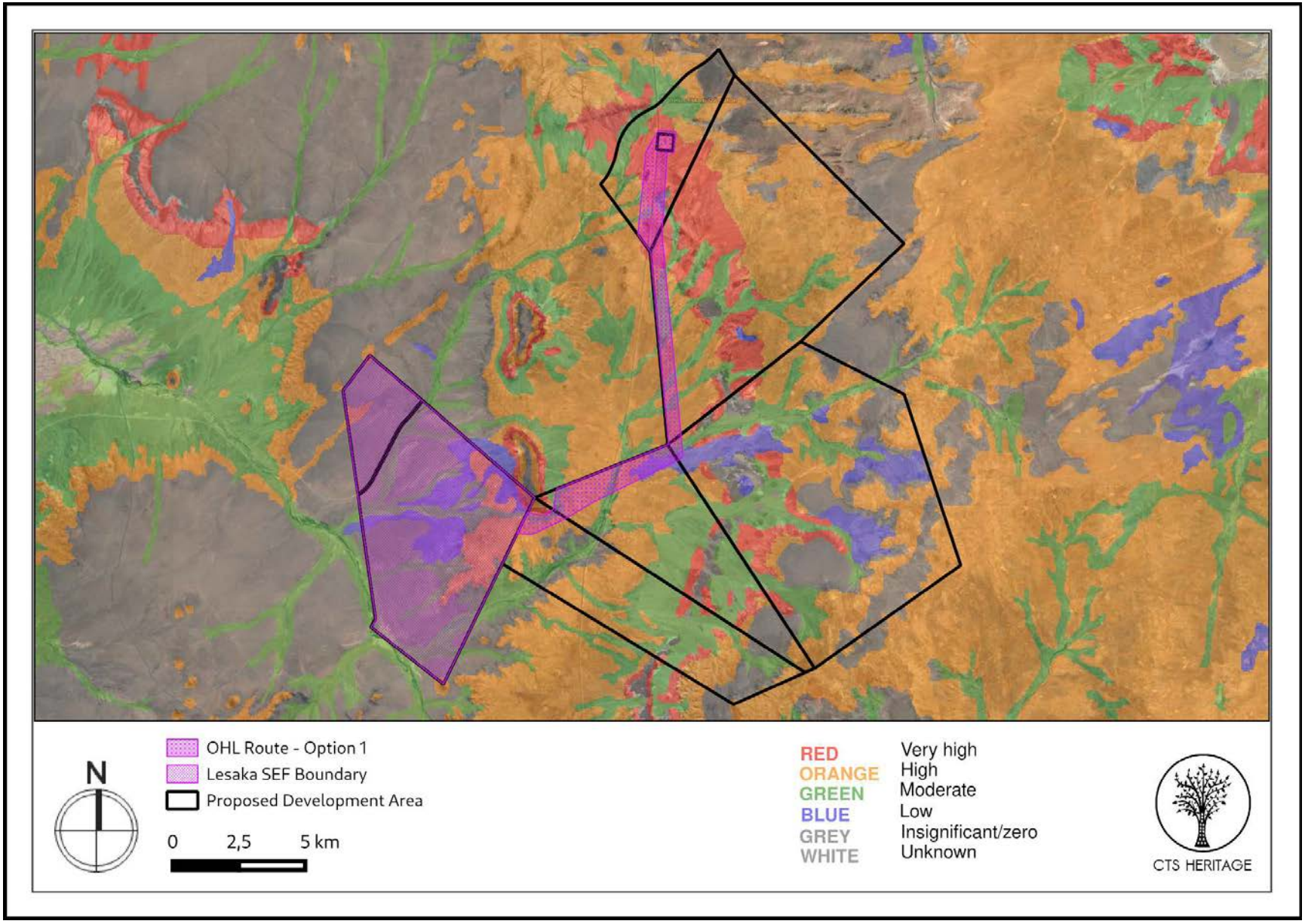

Figure 4a. Palaeosensitivity Map. Indicating fossil sensitivity underlying the study area. Please See Appendix 3 for a full guide to the legend.

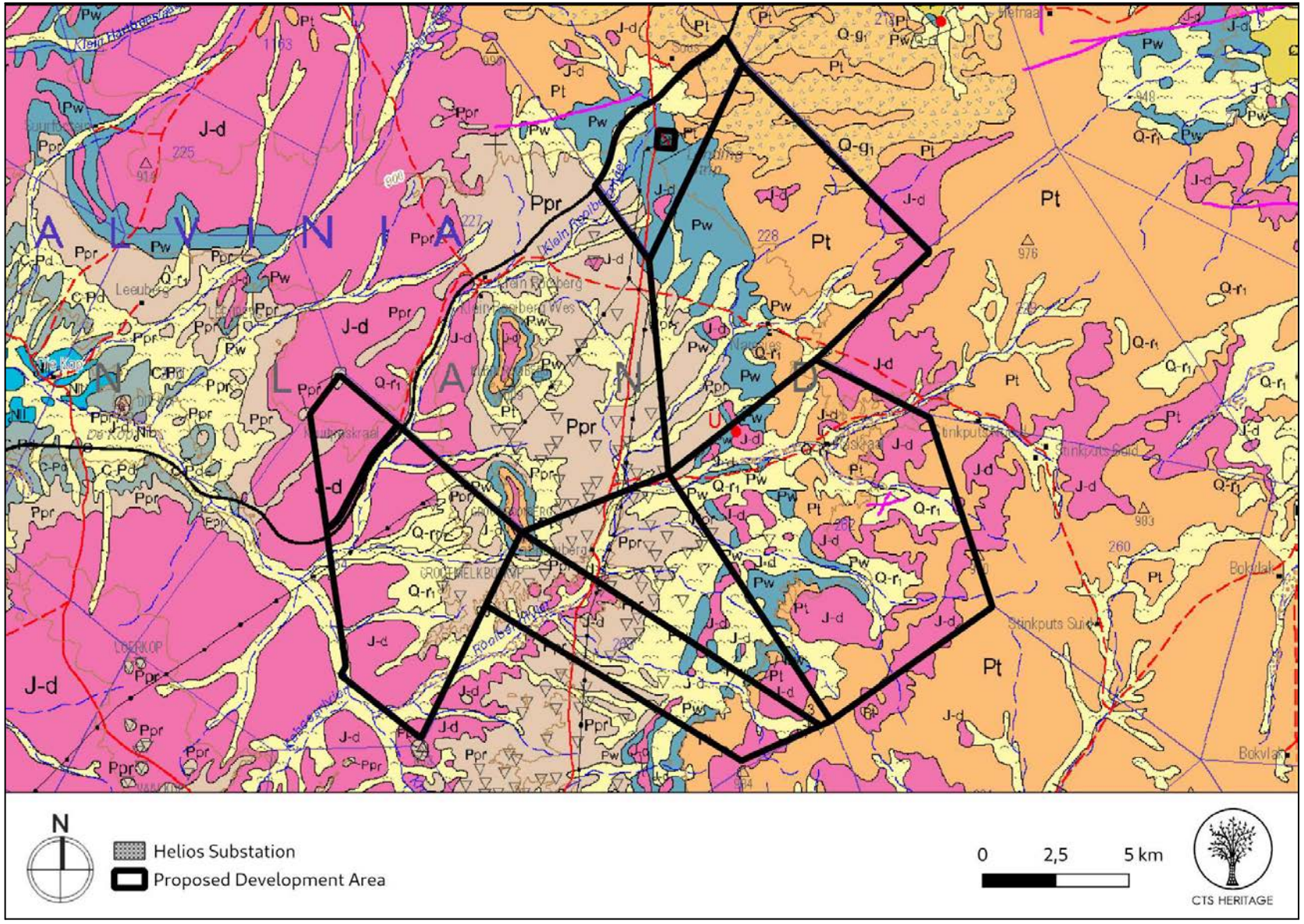

Figure 4b. Geology Map. Extract from the CGS 3018 Loeriesfontein Map indicating that the development area is underlain by Quaternary Sands, Jd - Jurassic Dolerite, Pw - Whitehill Formation, Pt - Tierberg Formation, and Ppr - Prince Albert Formation

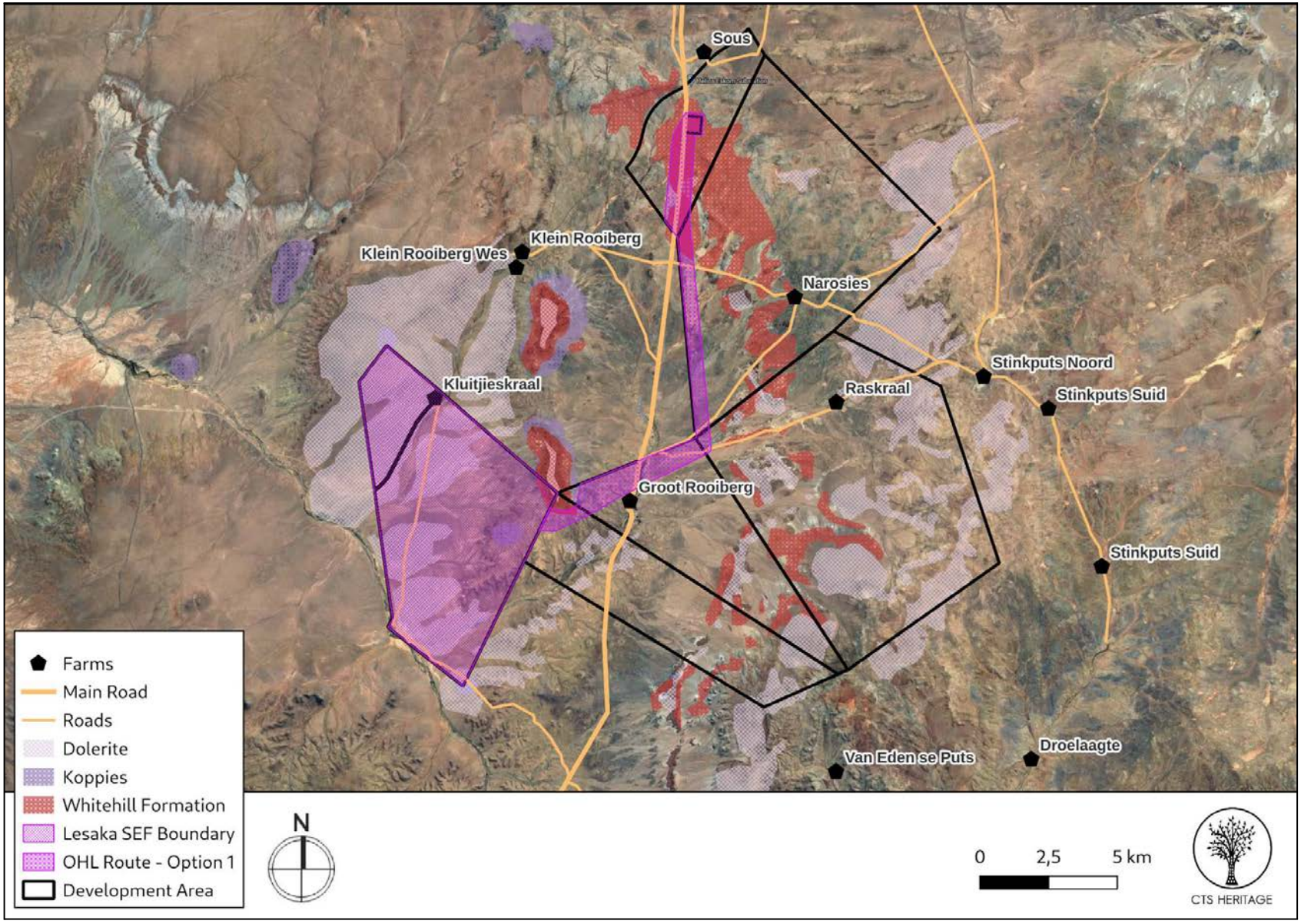

Figure 5. Cumulative Heritage Sensitivity Map.

8. Heritage Assessment

Background

This application is for the proposed development of PV facilities located approximately 40km north of the town of Loeriesfontein in the Northern Cape. The town grew around a general store established in 1894 by a travelling Bible salesman and became a municipality in 1958. The town of Loeriesfontein is within a basin surrounded by mountains and the broader area around the town forms part of Namaqualand, famous for its flower season. This area is recognised as one of the highest yield areas for renewable energy in South Africa, however this area falls outside of a REDZ area. Due to these high yields, there are existing, approved renewable energy facilities located immediately adjacent to the area proposed for development.

Cultural Landscape and Built Environment

According to an impact assessment completed for the neighbouring Loeriesfontein PV Facility (Webley and Halkett, 2012), an adjacent farm is named “Klein Rooiberg” because the northern border of the study area is dominated by outcropping regions (“koppies”) which are reddish in colour. The southern area also exhibits these koppies that are elevated above the plains. The assessment goes on to note that “The site is covered by low lying vegetation of the Succulent Karoo Biome. A number of drainage lines were identified crossing the study area… The drainage systems are associated with the Volstruisnesholte River catchment.” The study area is considered to be fairly natural succulent Karoo shrubland with low intensity sheep grazing on the site. There is a small concrete farm dam located on the property next to a windmill. Farm fences have been erected. There are two transmission lines near the site, including a 66kV transmission line that runs along the district road towards the substation and a 400kV transmission line that runs to the west of the site in the direction of Klein Rooiberg. There is a district road which runs through the project site. The predominant context of this area is wilderness landscape dominated by topographic features such as koppies and rivers, as well as existing renewable energy facilities. In his assessment of the Kokerboom WEF located 10 kilometres north of this development area, Orton (2021) notes that “The landscape is also considered to be a heritage resource but its cultural component is very limited and a new layer of electrical infrastructure is starting to dominate the landscape…”

As can be seen in Figure 3c, the area proposed for development is scattered with farm werfs and connecting roads. According to Webley and Halkett (2012), “from approximately 1850 onwards, Dutch Trekboers started making seasonal use of the summer grazing around the large pans in the area. Many contemporary farmers in Namaqualand still own two farms, one in the Bushmanland and the other in Namaqualand. The livestock is transported between their farms by truck.” Orton (2021) notes that “It is unlikely that many earlier farmsteads (than the earlier 20th Century) would be present because this harsh landscape was only permanently settled in relatively recent times.” Based on the desktop assessment, 5 farm werfs fall within the development area however their heritage value has yet to be ascertained.

Prior to colonial settlement, this region was occupied by San hunter-gatherers and remained here living around the salt pans until they were “forced off the land as the farms were surveyed and made available to European farmers. Some of these “Basters”, of mixed descent, travelled north and settled in the southern Richtersveld. Many of the farms were only allocated after the introduction of the wind pump to South Africa in the 1870s made the more arid lands accessible and suitable for grazing.” The salt pans of this area therefore have associated cultural landscape value however no salt pans are evident within the area proposed for development.

Archaeology

As a result of the renewable energy facilities proposed in this area, a number of Heritage Impact Assessments have been completed that are relevant here, and a number of significant archaeological resources identified (Figure 3, 3a and 3b). Orton (2021) and Webley and Halkett (2012) both found extensive evidence of Middle and Later Stone Age archaeology in the broader area, noting that MSA artefacts tend to more prevalent on the lowlands and generally attributable to background scatter whereas LSA scatters tend to be associated with topographical features such as koppies, dolerite outcrops, rivers and salt pans. It is likely that this pattern will remain applicable within the development area. hese features are therefore considered to be highly sensitive in terms of potential impacts to significant archaeology. Webley and Halkett (2012) identified four sites that they determined have very high

levels of regional significance, graded II, located immediately adjacent to the area proposed for development. These are described in the table below. Similar significant archaeological heritage resources are likely to be present within the area proposed for development.

89242	**KNRB001**	Dense LSA scatter on top of a prominent koppie. Large amounts of ostrich eggshell fragments and stone artefacts concentrated on the hilltop. The material includes bladelets, flakes, irregular and single platform cores, 1x miscellaneous retouch piece. No formal artefacts observed. Pottery is present (4-6mm thick; fine temper, no burnish). I x unfinished oes bead suggesting outer diameter of ~6mm. Some bone was also noted (possibly recent). Raw materials include Quartz and quartz crystal, hornfels and CCS (opaline?). No/minimal deposit but rather a single surface scatter. Sites 087-110 are points representing the outer boundary point of 086.
89256	**KNRB015**	Extensive LSA artefact scatter on top of a low koppie. Some MSA elements are present. Most of the LSA material consists of bladelets, flakes and cores on hornfels, while 3 backed blades and a scraper are on the white ccs material. A small amount of ostrich eggshell fragments was observed. A small cairn of the local dolerite rocks (beacon/marker) was noted on the hill (L052). Also some recent glass.
89338	**KNRB041**	Dense LSA artefact scatter on a low koppie immediately overlooking the river. Abundant ostrich eggshell fragments and hornfels and CCS. Chunks, flakes and cores predominate but a formal element is present in the form of side scrapers (2x white ccs), a large segment (white ccs), a backed blade (1x hornfels) and an mrp (silcrete?)
89339	**KNRB042**	Dense LSA artefact scatter on a low koppie immediately overlooking the river. Abundant ostrich eggshell fragments and hornfels and CCS. Chunks, flakes and cores predominate but a formal element is present in the form of side scrapers (2x white ccs), a large segment (white ccs), a backed blade (1x hornfels) and an mrp (silcrete?)

Palaeontology

According to the SAHRIS Palaeosensitivity Map (Figure 4a), the area proposed for development is underlain by geology of variable palaeontological sensitivity, ranging from very high to zero. According to the Council of GeoScience Map for Loeriesfontein, the area proposed for development is underlain by the Whitehill Formation (very high sensitivity), the Tierberg Formation (high sensitivity) and the Prince Albert Formation (high sensitivity) all of the Ecca Group of the Karoo Supergroup. In a PIA completed on an adjacent property, Almond (2011) concludes that “Important fossil material of aquatic vertebrates (mesosaurid reptiles, fish), invertebrates (e.g. crustaceans) and petrified wood is known from the Whitehill Formation and to a lesser extent from the Prince Albert and Tierberg Formations. However fossils other than trace assemblages are generally sparse and most of the Ecca sediments are of low overall palaeontological sensitivity. Their palaeontological potential may well have been locally compromised by chemical weathering and dolerite intrusion. Furthermore, a substantial portion of the Ecca Group outcrop area is mantled by superficial sediments (downwasted gravels, alluvium etc) of low palaeontological sensitivity.” This conclusion is reiterated by Butler (2020) in her palaeontological assessment for the Loeriesfontein BESS located immediately north of the development area.

RECOMMENDATION

It is likely that the proposed development will impact significant archaeological and palaeontological heritage and as such, it is recommended that a heritage impact assessment be completed that assesses these impacts as per section 38(3) of the NHRA.

9. Scoping Assessment Impact Table

Impact

- Impact to archaeological resources
- Impact to palaeontological resources
- Impact to Cultural Landscape
- Cumulative Impact

Desktop Sensitivity Analysis of the Site

- Impact to significant archaeological resources such as Stone Age artefact scatters, burial grounds and graves, historical artefacts, historical structures and rock art engravings through destruction during the development phase and disturbance during the operational phase is possible.
- Impacts to palaeontological resources are possible.
- Due to the nature of the development and its context, cumulative impact and negative impact to the cultural landscape is possible

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

Gaps in knowledge & recommendations for further study

- It is likely that the proposed development will impact significant archaeological and palaeontological heritage and as such, it is recommended that a heritage impact assessment be completed that assesses these impacts as per section 38(3) of the NHRA.

CTS HERITAGE

APPENDIX 1

List of heritage resources within the development area

Site ID	Site no	Full Site Name	Site Type	Grading
89320	KNRB036	KLEIN ROOIBERG 227/ 036	Artefacts	Grade IIIc
89242	**KNRB001**	**KLEIN ROOIBERG 227/ 001**	**Artefacts**	**Grade II**
89321	KNRB037	KLEIN ROOIBERG 227/ 037	Artefacts	Grade IIIc
40322	LOE008	Loeriesfontein 008	Structures	Grade IIIc
89252	KNRB011	KLEIN ROOIBERG 227/ 011	Artefacts	Grade IIIc
89253	KNRB012	KLEIN ROOIBERG 227/ 012	Burial Grounds & Graves	Grade IIIc
33961	KRB9	Klein Rooiberg 9	Artefacts	Grade IIIb
89341	KNRB044	KLEIN ROOIBERG 227/ 044	Artefacts	Grade IIIc
89343	KNRB046	KLEIN ROOIBERG 227/ 046	Artefacts	Grade IIIc
89344	KNRB047	KLEIN ROOIBERG 227/ 047	Archaeological	Grade IIIc
40325	LOE009	Loeriesfontein 009	Artefacts	Grade IIIb
40326	LOE010	Loeriesfontein 010	Artefacts	Grade IIIc
40340	LOE019	Loeriesfontein 019	Artefacts	Grade IIIc
40342	**LOE020**	**Loeriesfontein 020**	**Artefacts, Building**	**Grade IIIa**
40343	LOE021	Loeriesfontein 021	Artefacts	Grade IIIc
40344	LOE022	Loeriesfontein 022	Artefacts	Grade IIIc
40345	LOE023	Loeriesfontein 023	Artefacts	Grade IIIc

40346	LOE024	Loeriesfontein 024	Artefacts	Grade IIIc
40349	LOE025	Loeriesfontein 025	Artefacts	Grade IIIc
40351	LOE026	Loeriesfontein 026	Artefacts	Grade IIIb
40353	LOE027	Loeriesfontein 027	Artefacts	Grade IIIc
40377	LOE028	Loeriesfontein 028	Artefacts	Grade IIIb
40378	LOE029	Loeriesfontein 029	Artefacts	Grade IIIb
40469	KHO004	Khobab 004	Building	Grade IIIa
89357	KNRB058	KLEIN ROOIBERG 227/ 058	Artefacts	Grade IIIc
40262	HEL02	Helios 02	Structures	Grade IIIb
40263	HEL03	Helios 03	Artefacts	Grade IIIb
40264	HEL04	Helios 04	Artefacts	Grade IIIb
40265	HEL05	Helios 05	Artefacts	Grade IIIb
40266	HEL06	Helios 06	Artefacts	Grade IIIb
40275	HEL08	Helios 08	Artefacts	Grade IIIb
89305	KNRB027	KLEIN ROOIBERG 227/ 027	Artefacts	Grade IIIc
89307	KNRB028	KLEIN ROOIBERG 227/ 028	Archaeological	Grade IIIc
89311	KNRB030	KLEIN ROOIBERG 227/ 030	Artefacts	Grade IIIc
40261	**HEL01**	**Helios 01**	**Burial Grounds & Graves**	**Grade IIIa**
137940	DRG-002	Dwarsrug	Artefacts	Grade IV
137941	DRG-003	Dwarsrug	Artefacts	Grade IV

137942	DRG-004	Dwarsrug	Artefacts	Grade IV
137943	DRG-005	Dwarsrug	Artefacts	Grade IV
137944	DRG-006	Dwarsrug	Artefacts	Grade IV
137947	DRG-009	Dwarsrug	Artefacts	Grade IV
137948	DRG-010	Dwarsrug	Artefacts	Grade IV
137949	DRG-011	Dwarsrug	Artefacts	Grade IV
137950	DRG-012	Dwarsrug	Artefacts	Grade IV
89244	KNRB003	KLEIN ROOIBERG 227/ 003	Artefacts	Grade IIIc
89245	KNRB004	KLEIN ROOIBERG 227/ 004	Artefacts	Grade IIIc
137951	DRG-013	Dwarsrug	Artefacts	Grade IV
89246	KNRB005	KLEIN ROOIBERG 227/ 005	Artefacts	Grade IIIc
89247	KNRB006	KLEIN ROOIBERG 227/ 006	Artefacts	Grade IIIc
137952	DRG-014	Dwarsrug	Artefacts	Grade IV
89248	KNRB007	KLEIN ROOIBERG 227/ 007	Artefacts	Grade IIIc
89249	KNRB008	KLEIN ROOIBERG 227/ 008	Artefacts	Grade IIIc
137953	DRG-015	Dwarsrug	Artefacts	Grade IV
89250	KNRB009	KLEIN ROOIBERG 227/ 009	Artefacts	Grade IIIc
89255	KNRB014	KLEIN ROOIBERG 227/ 014	Artefacts	Grade IIIc
137954	DRG-016	Dwarsrug	Artefacts	Grade IV
89256	**KNRB015**	**KLEIN ROOIBERG 227/ 015**	**Artefacts**	**Grade II**

137955	DRG-017	Dwarsrug	Artefacts	Grade IV
89258	KNRB016	KLEIN ROOIBERG 227/ 016	Artefacts	Grade IIIc
89259	KNRB017	KLEIN ROOIBERG 227/ 017	Artefacts	Grade IIIc
89260	KNRB018	KLEIN ROOIBERG 227/ 018	Artefacts	Grade IIIc
89261	KNRB019	KLEIN ROOIBERG 227/ 019	Artefacts	Grade IIIc
89262	KNRB020	KLEIN ROOIBERG 227/ 020	Artefacts	Grade IIIc
89243	KNRB002	KLEIN ROOIBERG 227/ 002	Artefacts	Grade IIIc
89251	KNRB010	KLEIN ROOIBERG 227/ 010	Artefacts	Grade IIIc
89254	KNRB013	KLEIN ROOIBERG 227/ 013	Artefacts	Grade IIIc
137958	DRG-020	Dwarsrug	Artefacts	Grade IV
137959	DRG-021	Dwarsrug	Artefacts	Grade IV
137960	DRG-022	Dwarsrug	Artefacts	Grade IV
137961	DRG-023	Dwarsrug	Artefacts	Grade IIIc
89295	KNRB021	KLEIN ROOIBERG 227/ 021	Artefacts	Grade IIIc
89300	KNRB024	KLEIN ROOIBERG 227/ 024	Artefacts	Grade IIIc
89301	KNRB025	KLEIN ROOIBERG 227/ 025	Artefacts	Grade IIIc
89304	KNRB026	KLEIN ROOIBERG 227/ 026	Artefacts	Grade IIIc
89312	KNRB031	KLEIN ROOIBERG 227/ 031	Artefacts	Grade IIIc
89314	KNRB032	KLEIN ROOIBERG 227/ 032	Artefacts	Grade IIIc
89322	KNRB038	KLEIN ROOIBERG 227/ 038	Artefacts	Grade IIIc

89324	KNRB039	KLEIN ROOIBERG 227/ 039	Artefacts	Grade IIIc
89325	KNRB040	KLEIN ROOIBERG 227/ 040	Artefacts	Grade IIIc
89326	KNRB040		Artefacts	Ungraded
89298	KNRB022	KLEIN ROOIBERG 227/ 022	Artefacts	Grade IIIc
89299	KNRB023	KLEIN ROOIBERG 227/ 023	Artefacts	Grade IIIc
89309	KNRB029	KLEIN ROOIBERG 227/ 029	Artefacts	Grade IIIc
89316	KNRB033	KLEIN ROOIBERG 227/ 033	Archaeological	Grade IIIc
89317	KNRB034	KLEIN ROOIBERG 227/ 034	Artefacts	Grade IIIc
89319	KNRB035	KLEIN ROOIBERG 227/ 035	Artefacts	Grade IIIc
89338	**KNRB041**	**KLEIN ROOIBERG 227/ 041**	**Artefacts**	**Grade II**
89339	**KNRB042**	**KLEIN ROOIBERG 227/ 042**	**Artefacts**	**Grade II**
89345	KNRB048	KLEIN ROOIBERG 227/ 048	Artefacts	Grade IIIc
89347	KNRB049	KLEIN ROOIBERG 227/ 049	Artefacts	Grade IIIc
89348	KNRB050	KLEIN ROOIBERG 227/ 050	Artefacts	Grade IIIc
89350	KNRB051	KLEIN ROOIBERG 227/ 051	Artefacts	Grade IIIc
89351	KNRB054	KLEIN ROOIBERG 227/ 054	Artefacts	Grade IIIc
89354	KNRB056	KLEIN ROOIBERG 227/ 056	Artefacts	Grade IIIc
89356	KNRB057	KLEIN ROOIBERG 227/ 057	Artefacts	Grade IIIc
89340	KNRB043	KLEIN ROOIBERG 227/ 043	Artefacts	Grade IIIc
89342	KNRB045	KLEIN ROOIBERG 227/ 045	Artefacts	Grade IIIc

89353	KNRB055	KLEIN ROOIBERG 227/ 055	Artefacts	Grade IIIc

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APPENDIX 2

Reference List with relevant AIAs and PIAs

Heritage Impact Assessments				
Nid	**Report Type**	**Author/s**	**Date**	**Title**
259052	Palaeontological Specialist Reports	John Almond	18/10/2016	Palaeontological heritage assessment: combined desktop and field-based scoping study for the proposed Kokerboom 1 Wind Farm near Loeriesfontein, Namaqua District Municipality, Northern Cape.
375092	AIA Phase 1	David Morris	01/01/2007	Archaeological Specialist Input with Respect to Upgrading Railway Infrastructure on the Saldanha Ore Line in the Vicinity of New Loop 7A near Loeriesfontein
3886	AIA Phase 1	Jaco van der Walt, Marlize Lombard	06/01/2012	AIA for the proposed Hantam PV Solar Energy Facility on the Farm Narosies 228, Loeriesfontein, Northern Cape Province
6889	AIA Phase 1	Lita Webley, Dave Halkett	01/05/2012	HERITAGE IMPACT ASSESSMENT: PROPOSED LOERIESFONTEIN PHOTO-VOLTAIC SOLAR POWER PLANT ON PORTION 5 OF THE FARM KLEIN ROOIBERG 227, NORTHERN CAPE PROVINCE
7217	AIA Phase 1	Johnny Van Schalkwyk	29/02/2012	HIA for the proposed establishment of a wind farm and PV facility by mainstream renewable power in the Loeriesfontein region, Northern Cape Province
7218	PIA Phase 1	John E Almond	01/06/2011	Proposed mainstream wind farm near Loeriesfontein, namaqua District Municipality, Northern Cape Province.
8961	HIA Phase 1	Lita Webley, Dave Halkett, John Pether	01/05/2012	Heritage Impact Assessment: Proposed Loeriesfontein Photo-voltaic Solar Power Plant on Portion 5 of the Farm Klein Rooiberg 227, Northern Cape Province

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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, 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 throughout South Africa.