CTS HERITAGE

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

## 1 Introduction

CTS Heritage was appointed by CapeEAPrac to undertake a Site Verification and Sensitivity analysis that forms part of the application for Environmental Authorisation (EA) for the proposed development of the Benya PV Facility and grid connection infrastructure which is situated southwest of Thabazimbi in the Limpopo Province.

As per the DFFE Screening Tool results, various on-site specialist verifications are required to be undertaken to determine the site sensitivity and the associated Environmental Authorisation process to be followed for the proposed BESS Facility.

## 2 Site sensitivity verification

The site sensitivity verification was undertaken as follows:

- A Desktop Study was conducted of relevant reports previously written (please see the reference list for the age and nature of the reports used) including known palaeontological sensitivities
- An archaeologist conducted a survey of the site and its environs on 11 and 12 January 2025 to determine what archaeological resources are likely to be impacted by the proposed development.
- A palaeontologist conducted a desktop study of the site and its environs to determine what palaeontological resources are likely to be impacted by the proposed development.

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

## 3 Outcome

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


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**Archaeology**

Previous Heritage Impact Assessments conducted in the broader area of the proposed development have identified a number of significant archaeological sites. Kruger (2021, SAHRIS NID 33248) notes that "*The cultural historical landscape of the Waterberg area spans million years with evidence of hominin occupation, Stone Age traditions, Iron Age farmers and historical events. Makapansgat, a deep limestone cave near Mokopane has yielded remains of Australopithecus africanus that dates to more than 3 million years BP and also Homo erectus, dating to approximately 1 million years BP. However, Earlier Stone Age (ESA) material is scarce on the Waterberg plateau. The Middle Stone Age (MSA) is abundantly represented in the Waterberg area and archaeological excavations at sites such as the Olieboomspoort Shelter in the northwestern part of the Waterberg have yielded rich MSA deposits which display a large degree of specialisation and skill in stone working (Van der Ryst 1996). These groups occupied open camps which were situated in the proximity of water sources such as pans, lakes or rivers. There is a noticeable gap in the Waterberg between MSA assemblages and material from the Later Stone Age (LSA), suggesting that the Waterberg may not have seen dense human occupation for a long period of time. However, Later Stone Age groups, including the San hunter gatherers and Khoi herders frequented the area in the last few millennia, and numerous LSA sites have been discovered and excavated. Similarly, LSA evidence such as stone implements, ceramics and a wealth of rock paintings and markings are scattered over the plateau.*" Coetzee (2008, SAHRIS NID 7677) identified a scatter of MSA artefacts in his assessment located approximately 10km southeast of this proposed development.

Kruger (2021, SAHRIS NID 33248) goes on to note that "*The Waterberg Plateau is rich in rock art and rock markings and many such sites are still to be described and studied. At many sites "refined" San paintings occur with cruder depictions in red or white paint (sometimes black), painted directly with fingers by later Farmer groups. Numerous paintings of people in trance positions, dance scenes of men and women, men with hunting equipment, a large variety of antelope and other animals, imaginary rain animals, handprints, and geometric designs form part of the contents of the rock art of the Waterberg (Van der Ryst 1998). Two traditions of Rock Art occur in the Waterberg. First the more "naturalised" form of fine-line art, including skilled depictions of animals and people, attributed to San Hunter Gatherers. The second tradition, often called "Late White" art, is characterised by more geometric, schematic illustrations which includes a large amount of finger painting. This tradition is associated with Iron Age farmers.*" Such rick art is usually located in kloofs, caves or overhangs. No such topography is evident within the area proposed for this PV development and as such, direct impact to significant rock art is unlikely.

As noted by Pelser (2022, SAHRIS NID 20893), "*a large number of EIA to LIA sites are known to exist in the larger geographical landscape in which the study area falls. The closest and best known Iron Age site is located at Rooiberg near Thabazimbi to the north of the study area (Bergh 1999: 7). The closest Early Iron Age site is located at Broederstroom near Brits (Bergh 1999: 6). In a band stretching from Pretoria to Brits as many as 125 Late Iron Age sites have been identified and many more between Brits and Rustenburg (Bergh 1999: 7). Tswana chiefdoms flourished in the area during AD 1600 to 1840 (Pistorius 2009: 18). Late Iron Age sites are also known between Brits and Thabazimbi (Bergh 1999: 7). At the beginning of the 19th century different*

*Tswana groups settled in the larger area. It includes the Kwena, Po and Kgatla. During the so-called Difaqane (period of war or stress) they fled to the north-west and the Ndebele of Mzilikazi settled in around the Brits area and further north between 1827 and 1832 (Bergh 1999: 10-11, 106-107, 111; Pistorius 2009: 18- 19).*" Iron Age sites are usually associated with clear topographic features in the landscape such as koppies. A number of significant koppies are located around the proposed development area (Figure 3.4) although none are located within the proposed development area.

In terms of more recent cultural landscape developments, there are also some historical farm werfs located within the project area, as well as existing roads. Both the first edition Topo Map and the current Topo Map indicate the presence of a monument located within the area proposed for development dated 1899-1900. The field assessment confirmed the location of the monument (Site 002) as noted in the desktop review. This monument records the names of a number of victims of armed conflict from 1899 until 1981. Due to the social significance of this monument, it is determined to have high local cultural value and is graded IIIA. It is recommended that a no development buffer of 100m is implemented around this site to ensure its conservation and in order to retain its sense of place.

On condition that the above mitigation measures are adhered to, no impact to significant heritage resources is anticipated as a result of this proposed development.

**Table 1: Observations noted during the archaeology and heritage field assessment**

| POINT ID | Description | Type | Period | Density | Co-ordinates | | Grading | Mitigation |
|---|---|---|---|---|---|---|---|---|
| 002 | 2nd Boer War monument to the deceased at battle of Oerdepoort, 1899. M.N. Ras monument – grave was relocated from this spot. Site visited by tourists | n/a | Memorial | Modern | -24.742778 | 26.551733 | IIIA | 100m Buffer |

## Palaeontology

According to the SAHRIS Palaeosensitivity Map (Figure 2), the area proposed for the development is underlain by rocks that have Insignificant/zero palaeontological sensitivity, low, moderate and very high palaeontological sensitivity. The area proposed for development is underlain by quaternary sediments which have moderate sensitivity, Gaborone Granite, which have insignificant/zero palaeontological sensitivity. The area also contains rocks of the Klipriviersberg Group, Ventersdorp Supergroup which has a low palaeontological sensitivity. These are all very unlikely to preserve significant fossil heritage.

Rocks that may contain fossils form part of the Malmani Subgroup and the Transvaal Supergroup. The Malmani Subgroup contains a range of shallow marine to intertidal stromatolites (domes, columns etc), organic walled microfossils (Groenewald & Groenewald, 2014). The Malmani Subgroup is from the same geological group that has resulted in the preservation of fossil remains at the Cradle of Humankind in its Transvaal

Dolomite outcrop area. More broadly, the Chuniespoort Group is known for its preservation of Stromatolitic carbonates (limestones/dolomites), minor secondary cherts and mudrocks including carbonaceous shales. The presence of any fossils from the Malmani Subgroup in the area has not yet been identified, and are unlikely to be present.

The palaeontological sensitivity of the area proposed for the Benya PV Facility, located in the Limpopo Province, is assessed as **Low** overall, with low (negative) potential impacts on palaeontological heritage resources. This evaluation encompasses all phases of the project, including the construction, operational, and decommissioning stages, along with associated infrastructure such as photovoltaic panels, the LILO corridor, internal and external access roads, substations, and temporary construction yards. While minor disruptions to the subsurface may occur during construction, the likelihood of encountering significant fossil material remains low. Confidence in this assessment is high.

The proposed development area is underlain by geological formations of varying palaeontological significance. The Ventersdorp Supergroup (Klipriviersberg Group) and the Gaborone Granite Complex, which form the primary geological units of the site, are predominantly volcanic and granitic in origin, respectively, and thus have low to negligible fossil preservation potential. However, the Malmani Subgroup of the Transvaal Supergroup, present in some portions of the site, contains carbonate rocks known for preserving stromatolitic structures and microfossils, warranting a classification of high palaeontological sensitivity in these specific contexts. Tertiary to Quaternary deposits, consisting of black and red soils, ferricrete, calcrete, and surface conglomerates, may occasionally yield fossil remains, though the likelihood of significant discoveries is minimal.

Previous palaeontological investigations in the region, such as those conducted by Groenewald and Groenewald (2014), have documented a limited occurrence of fossils within similar geological contexts. Stromatolites and organic-walled microfossils recorded in the Malmani Subgroup highlight the potential for scientific discovery but are unlikely to be impacted significantly by the proposed development. Furthermore, the cumulative impact of alternative energy developments in the region remains low, given the largely unfossiliferous nature of the broader geological formations.

**Stromatolites - fossilized microbial structures - hold scientific value as they provide evidence for stratigraphic and biostratigraphic correlation, aiding in the higher resolution correlation of geological strata across different regions. These structures also provide insights into palaeoenvironmental settings. The scientific significance of stromatolites is further emphasised when discovered in poorly studied areas. Their presence in such contexts can substantially enhance understanding of the region's geological history.*

The development area is mapped relative to significant heritage resources including cultural landscape elements, archaeology and palaeontology in Figure 1 and 2 below.

# 4 National Environmental Screening Tool

**Table 2: SSVR Table**

| Theme | DFFE Screening Tool Report Sensitivity | Specialist Sensitivity | Rating Confirmed/ disputed and Reasons | Compliance Statement or Full Assessment |
|---|---|---|---|---|
| Cultural Heritage | LOW | MEDIUM | ***Disputed*** The cultural value of the broader area has significance in terms of its settler and agricultural history, with intact cultural landscape resources located within the development footprint (Monument) | Full Assessment |
| Archaeology | LOW | LOW | ***Confirmed*** Some stone age archaeological resources of low significance were identified within the development footprint | Full Assessment |
| Palaeontology | VERY HIGH | HIGH | ***Disputed*** The palaeontological sensitivity of the area proposed for the Benya PV Facility, located in the Limpopo Province, is assessed as **Low** overall | Full Assessment |

# 5 Conclusion

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

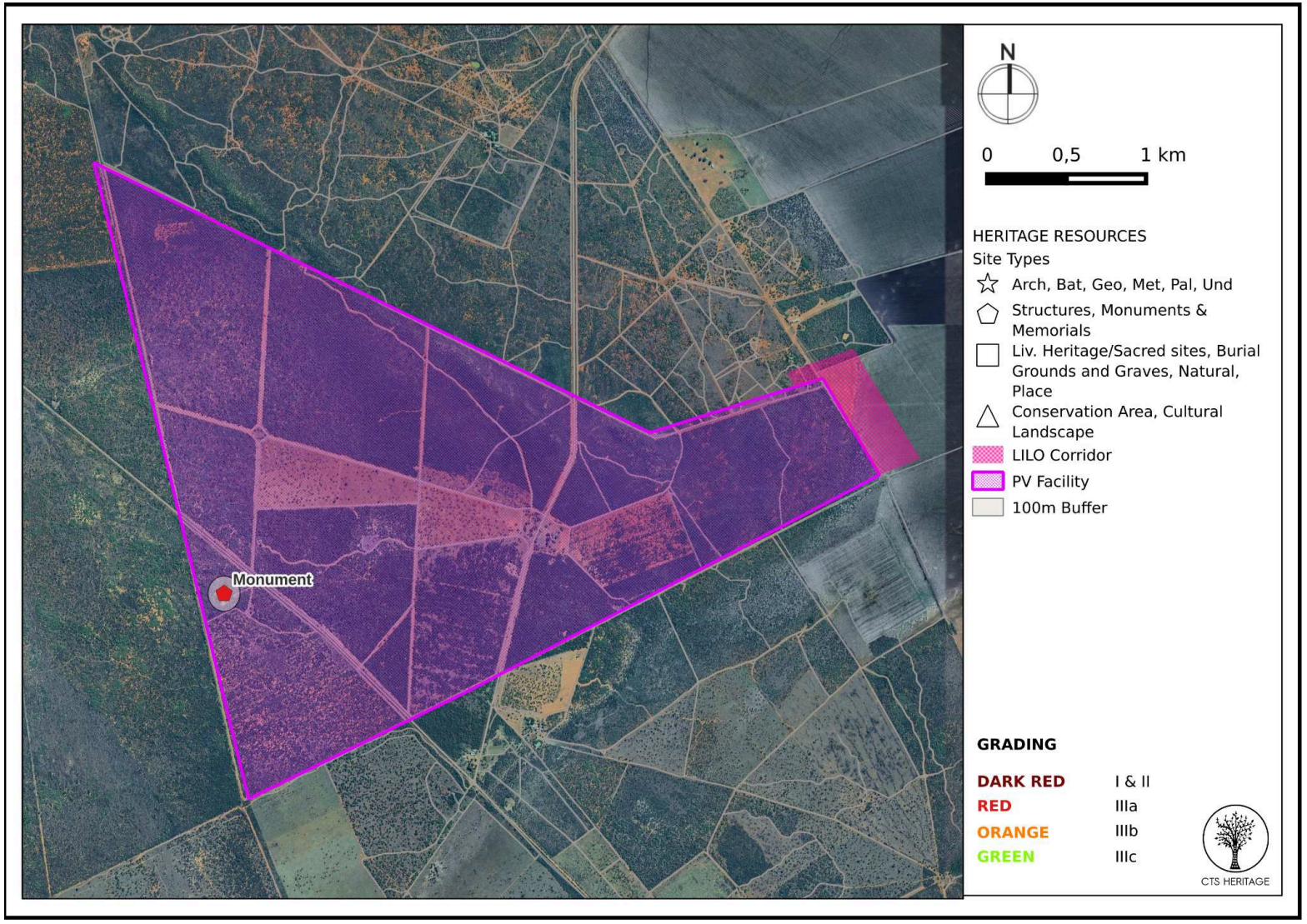


**Figure 1.1: All heritage resources within proximity to the development area**

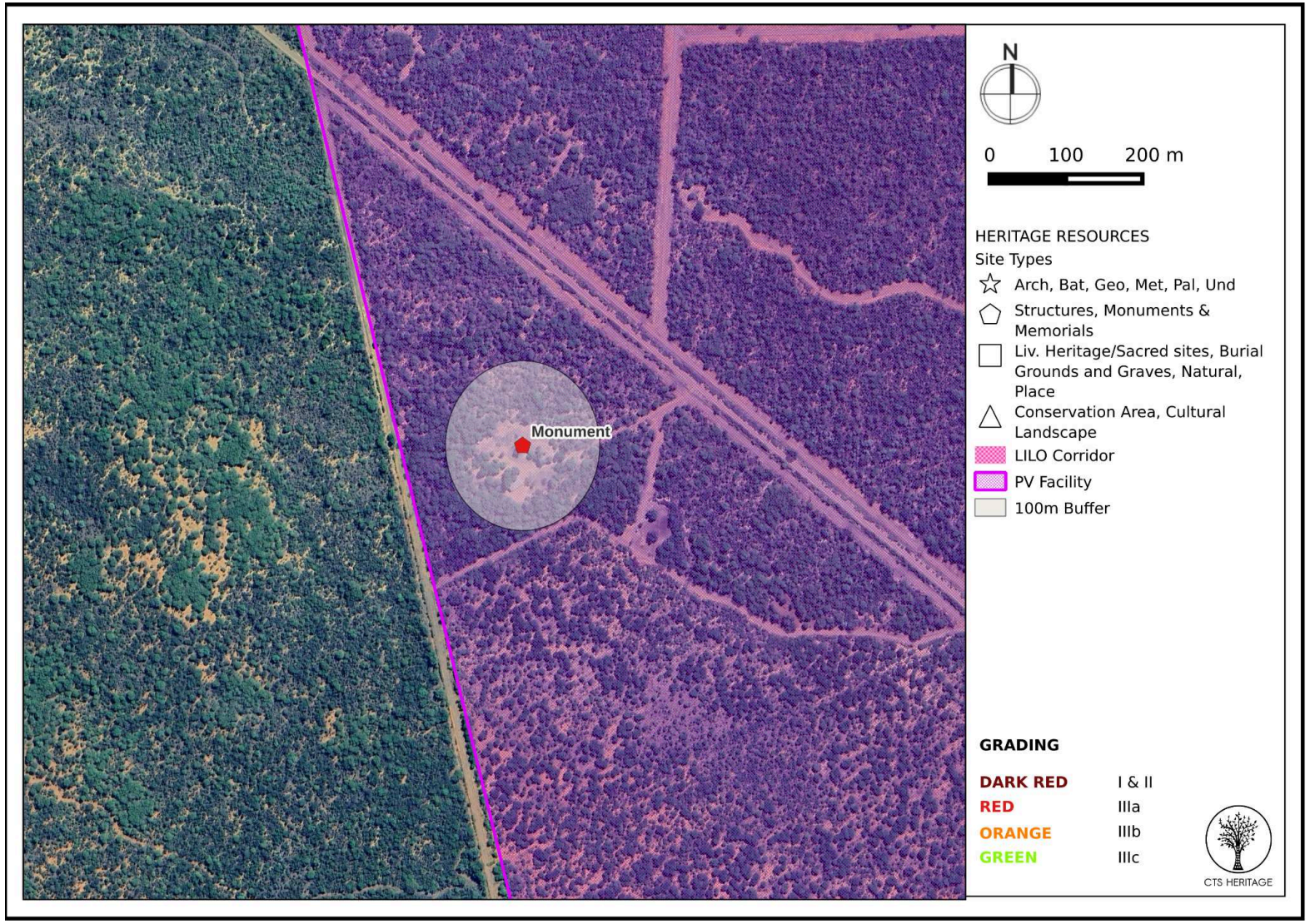


**Figure 1.2: Inset Map A of heritage resources identified near the development area**

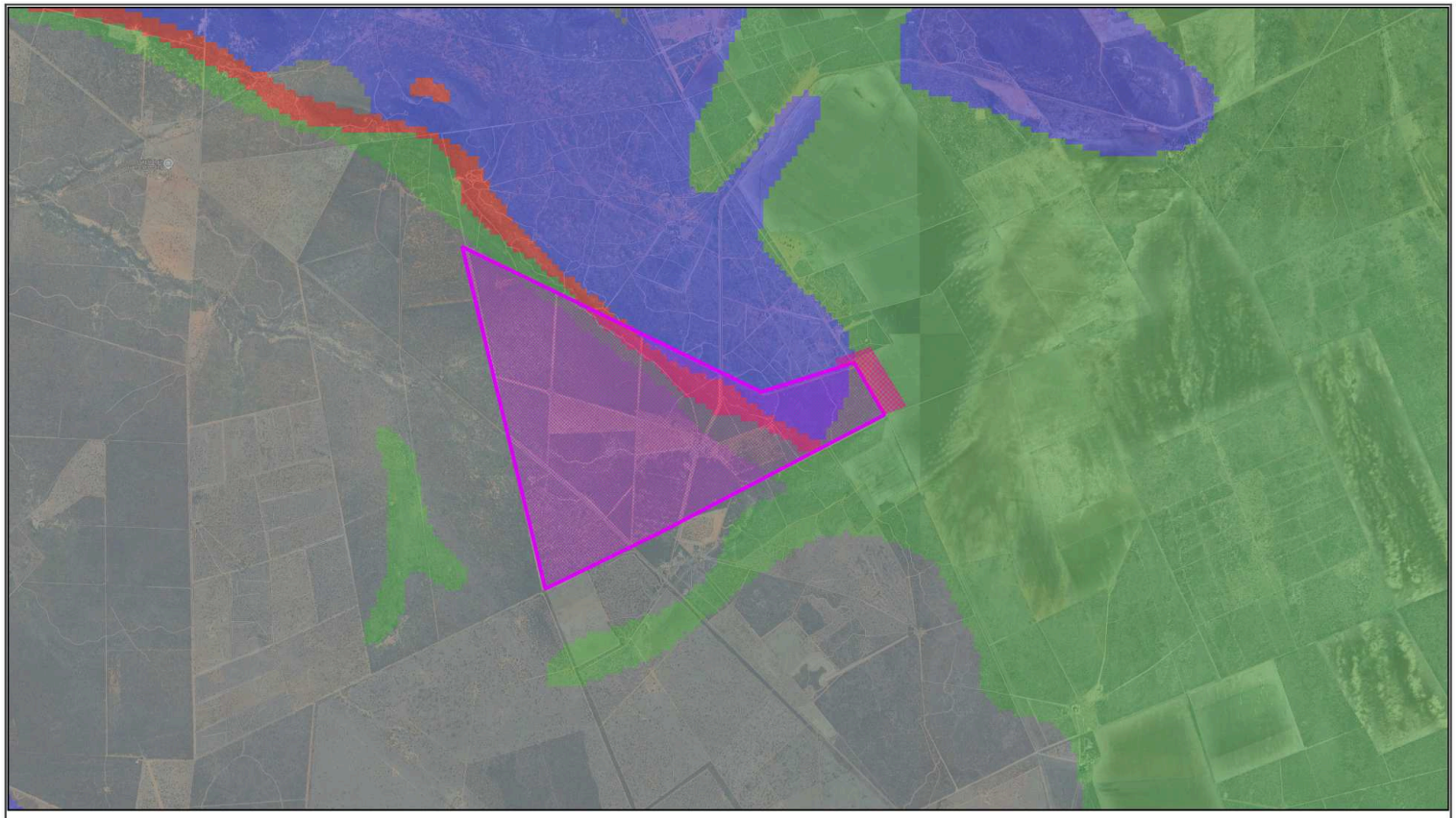


**Figure 2.1: Palaeontological sensitivity of the development area from SAHRIS**

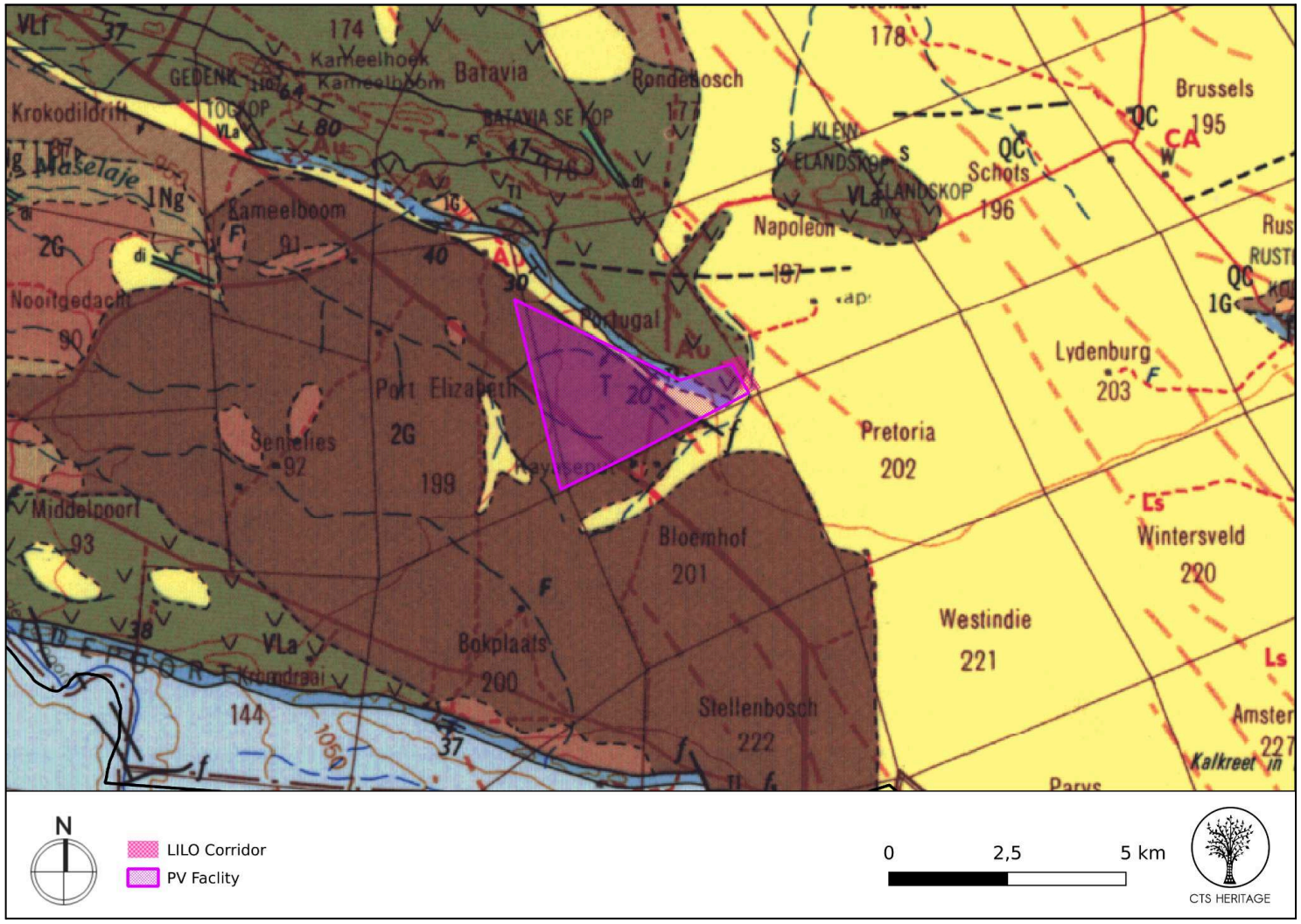


**Figure 2.2. Geology Map. Extract from the CGS 2426 Thabazimbi Geology Map indicating that the grid is underlain by 2G - Gaborone Granite Complex, QC - Quaternary Sands, VLa - Ventersdorp Supergroup and T1 - Malmani Subgroup of the Transvaal Supergroup**

# PALAEONTOLOGICAL SPECIALIST STUDY

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

## Proposed Benya PV Facility


**Prepared by**

CTS HERITAGE

And

Ryan Nel

In Association with

**Cape EAPrac**


January 2024

## EXECUTIVE SUMMARY

This Palaeontological Impact Assessment (PIA) was conducted for the proposed Benya PV Facility in Limpopo Province, South Africa, to evaluate the palaeontological sensitivity of the development area. The study was carried out to meet the requirements of Section 38(8) of the National Heritage Resources Act (NHRA, Act 25 of 1999) and assess the potential impact of the project on significant palaeontological heritage.

The development area is underlain by geological formations with varied fossil preservation potential. The Gaborone Granite Complex comprises Archean-aged granitic rocks, which have no fossil-bearing potential, resulting in negligible palaeontological sensitivity. Similarly, the Ventersdorp Supergroup (Klipriviersberg Group) consists of predominantly volcanic rocks, classified as having low sensitivity. In contrast, the Transvaal Supergroup (Malmani Subgroup) is notable for containing stromatolites and microfossils, indicating high palaeontological sensitivity; however, the likelihood of significant fossil discoveries being impacted by the development is minimal. Lastly, the Tertiary to Quaternary deposits may sporadically yield fossils, though these are typically of limited significance, contributing to the overall low sensitivity of the area.

The potential impact of the proposed development on palaeontological resources is assessed as low. Construction, operational, and decommissioning activities, including site clearing and infrastructure installation, are unlikely to disturb significant fossil material. This conclusion is supported by high-confidence desktop research, geological mapping, and prior palaeontological studies in the region.

To ensure the protection of potential palaeontological resources, it is recommended that a Chance Fossil Finds Procedure be implemented.



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# CONTENTS





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# 1. INTRODUCTION

## 1.1 Background Information on Project

This report is drafted for the proposed development of the Benya PV facility and associated grid infrastructure in the Limpopo province.

## 1.2 Description of Property and Affected Environment

The proposed development site is situated in the Limpopo Province, near its western border, about 17 km southwest of the South African-Botswana border. It lies southwest of Thabazimbi and south of Supingstad (Figure 1.1). The area is predominantly rural, comprising agricultural fields and undeveloped landscapes (Figures 1.1–1.3). Key access routes include the N4 highway near Supingstad and the R510 road connecting to Thabazimbi (Figure 1.1).

The site's topography is relatively flat, with an elevation around 960 meters above mean sea level (amsl) across most of the area. A higher elevation zone, peaking at approximately 1066 meters amsl, is located in the southwestern portion of the development area. There is a gradual decrease in elevation from the northwest towards the southeast and from the northeast towards the central site (obtained from the elevation profile on Google Earth).

The development footprint includes a photovoltaic (PV) facility and a LILO Corridor for power transmission (Figures 1.2 & 1.3). The PV facility, outlined in pink, occupies existing agricultural land. To the south of the development area lies Molatedi village. The surrounding region features a mix of cultivated fields and natural vegetation.



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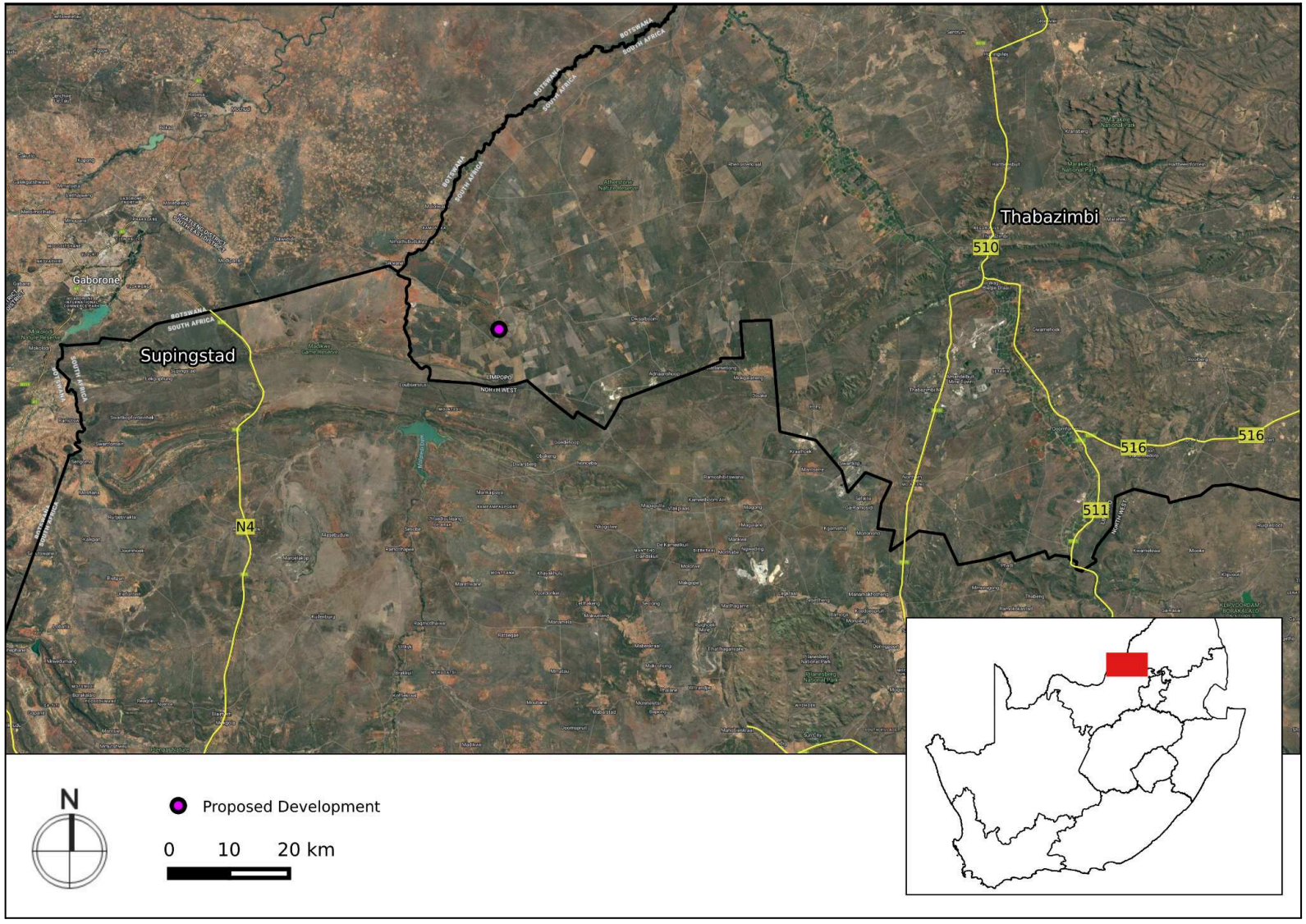


**Figure 1.1: Close up satellite image indicating proposed location of study area**



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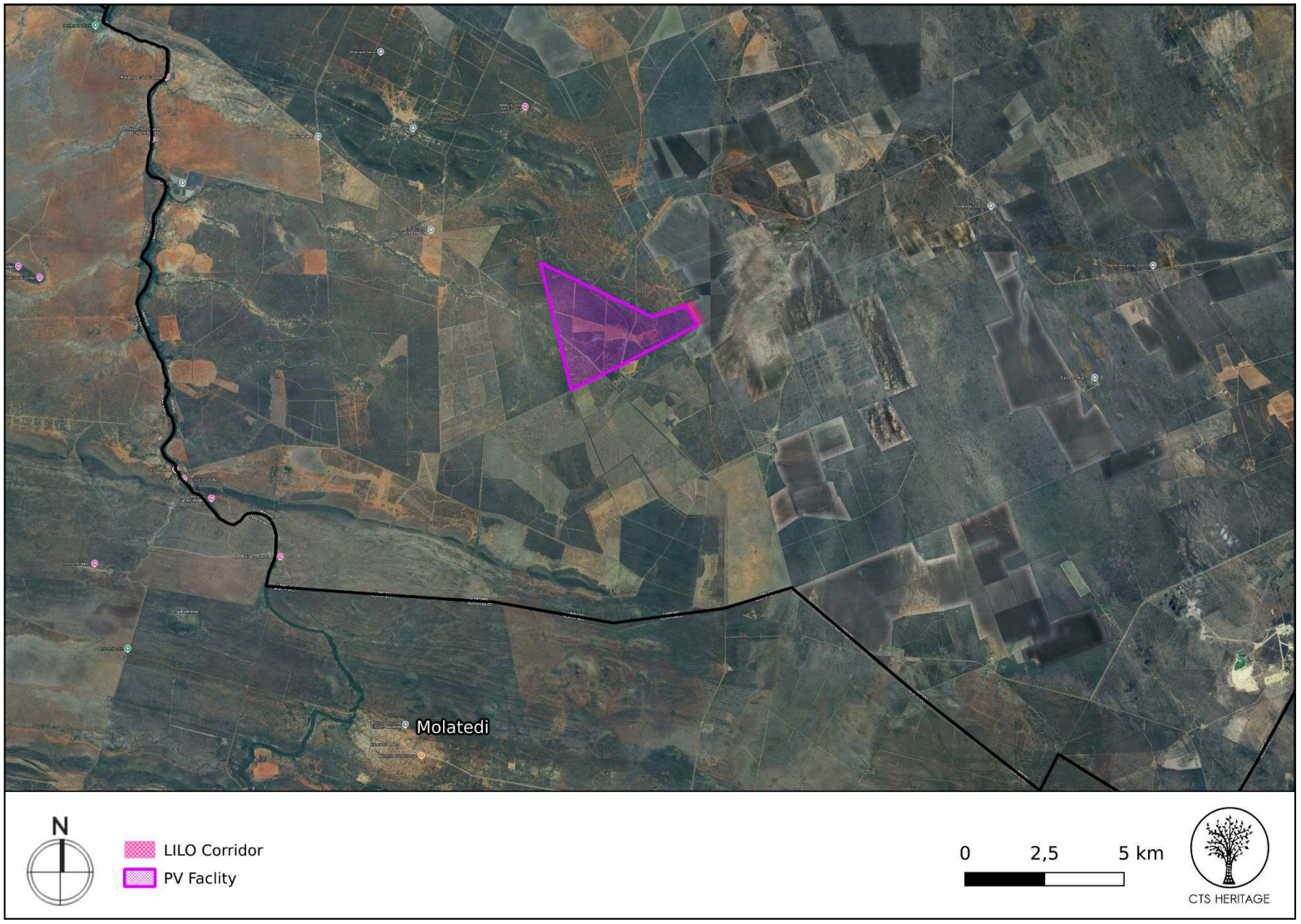


**Figure 1.2: Study Area**



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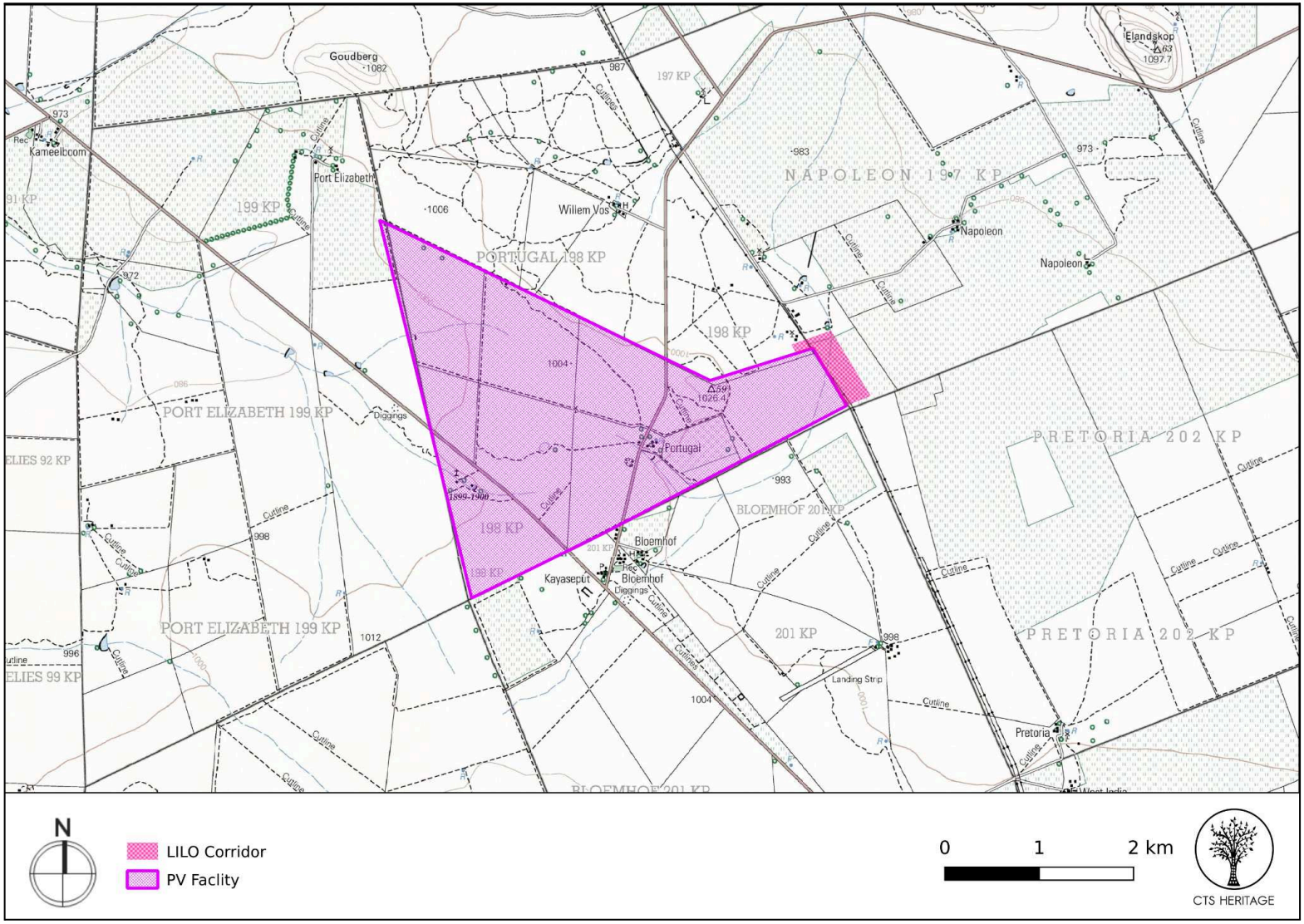


**Figure 1.3: Study Area reflected on the 1:50 000 Topo Map**



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## 2. METHODOLOGY

### 2.1 Purpose of Palaeontological Study

According to the SAHRIS Palaeosensitivity Map (Figure 2), the area proposed for development is underlain by rocks of zero to very high palaeontological sensitivity. The purpose of this palaeontological 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 palaeontological resources.

### 2.2 Summary of Steps Followed

- Primary research literature was consulted for detailed accounts of the geology and palaeontological representation across the study area. References of these primary research articles are provided.
- Geological maps (provided at various scales by CTS heritage and the South African Council for Geosciences) were consulted to identify represented geological contexts within the study area.
- Where possible, other PIAs were consulted to provide additional information on local geomorphological, geological and palaeontological contexts. These often provide valuable additional information to primary research publications and formal geological maps, which can lack resolution at a local scale and it is important that discussions regarding alternative stratigraphic attributions of exposed rocks are noted and considered.

### 2.3 Constraints and Limitations

- Constraints: The desktop component of a Palaeontological Impact Assessment (PIA) involves extrapolating fossil data from analogous rock units in other regions, as most areas in South Africa have limited palaeontological studies. This approach is constrained by several factors:
    - Comparable rock units outside the project site, such as riverbanks, gullies, and burrowing pits, can offer insights into the underlying strata but are not always accessible.
    - Many fossils are preserved in subsurface strata, often concealed by overlying deposits of soil, vegetation, or other surface materials. This obscures their presence and limits direct observation.
    - Data from distant exposures may be required, reducing the resolution of site-specific interpretations..
- Limitations: There are several factors limit the effectiveness of Palaeontological Impact Assessments, particularly during desktop studies:
    - The absence of a comprehensive South African fossil heritage database.
    - Varying accuracy levels in geological maps, affecting the reliability and precision of desktop studies.
    - Insufficient explanations accompanying geological maps and availability of published palaeontological materials.
    - Neglecting on-site walkovers during PIA desktop studies, can undermine the reliability and precision.
    - Limited palaeontological studies conducted in most regions of South Africa, leading to reliance on extrapolation from other locations.



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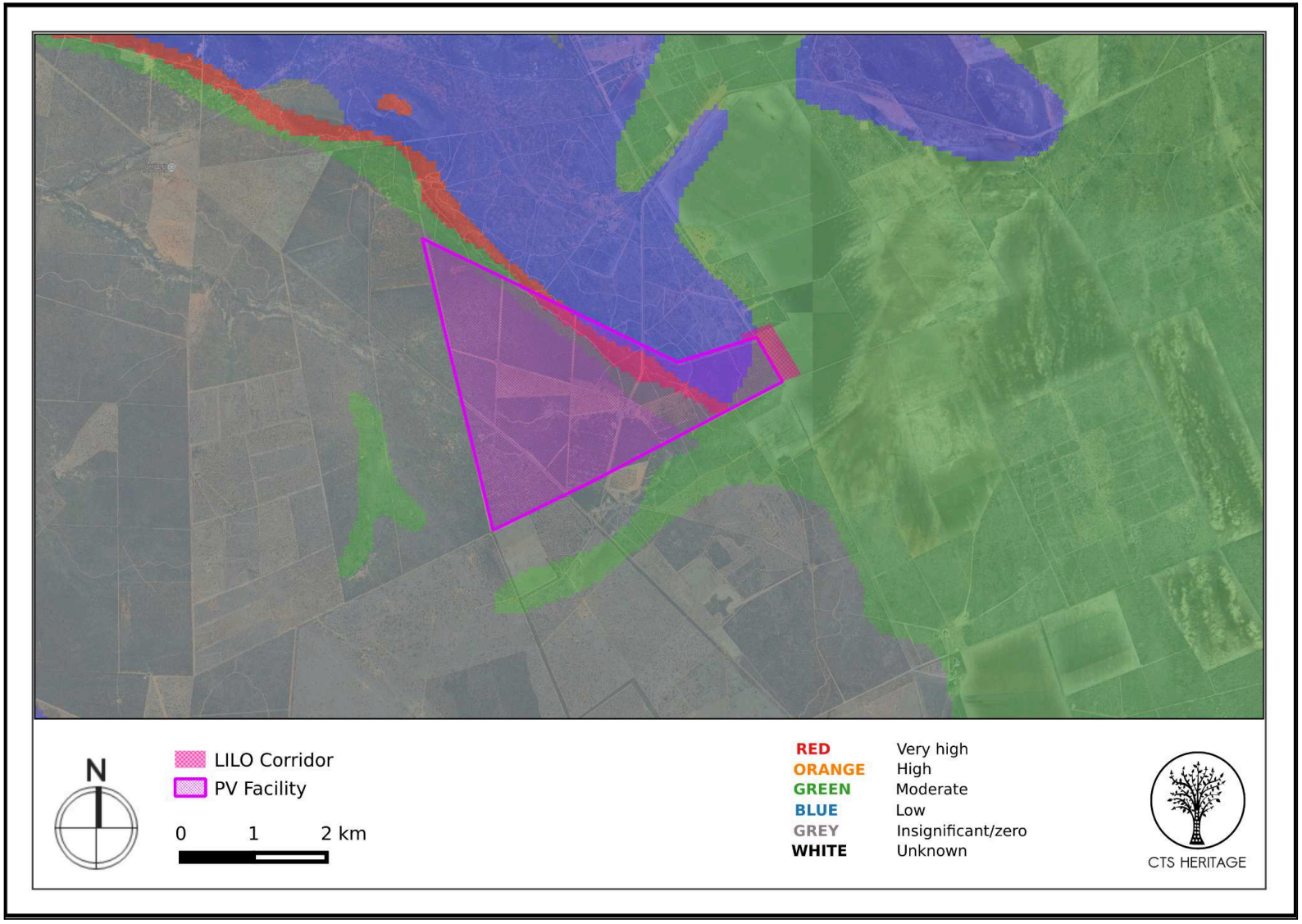


**Figure 2: Palaeontological sensitivity of the development area from the SAHRIS PalaeoMap**



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## 3. SITE SENSITIVITY

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Rocks that may contain fossils form part of the Malmani Subgroup and the Transvaal Supergroup. The Malmani Subgroup contains a range of shallow marine to intertidal stromatolites (domes, columns etc), organic walled microfossils (Groenewald & Groenewald, 2014). The Malmani Subgroup is from the same geological group that has resulted in the preservation of fossil remains at the Cradle of Humankind in its Transvaal Dolomite outcrop area. More broadly, the Chuniespoort Group is known for its preservation of Stromatolitic carbonates (limestones/dolomites), minor secondary cherts and mudrocks including carbonaceous shales. The presence of any fossils from the Malmani Subgroup in the area has not yet been identified, and are unlikely to be present.



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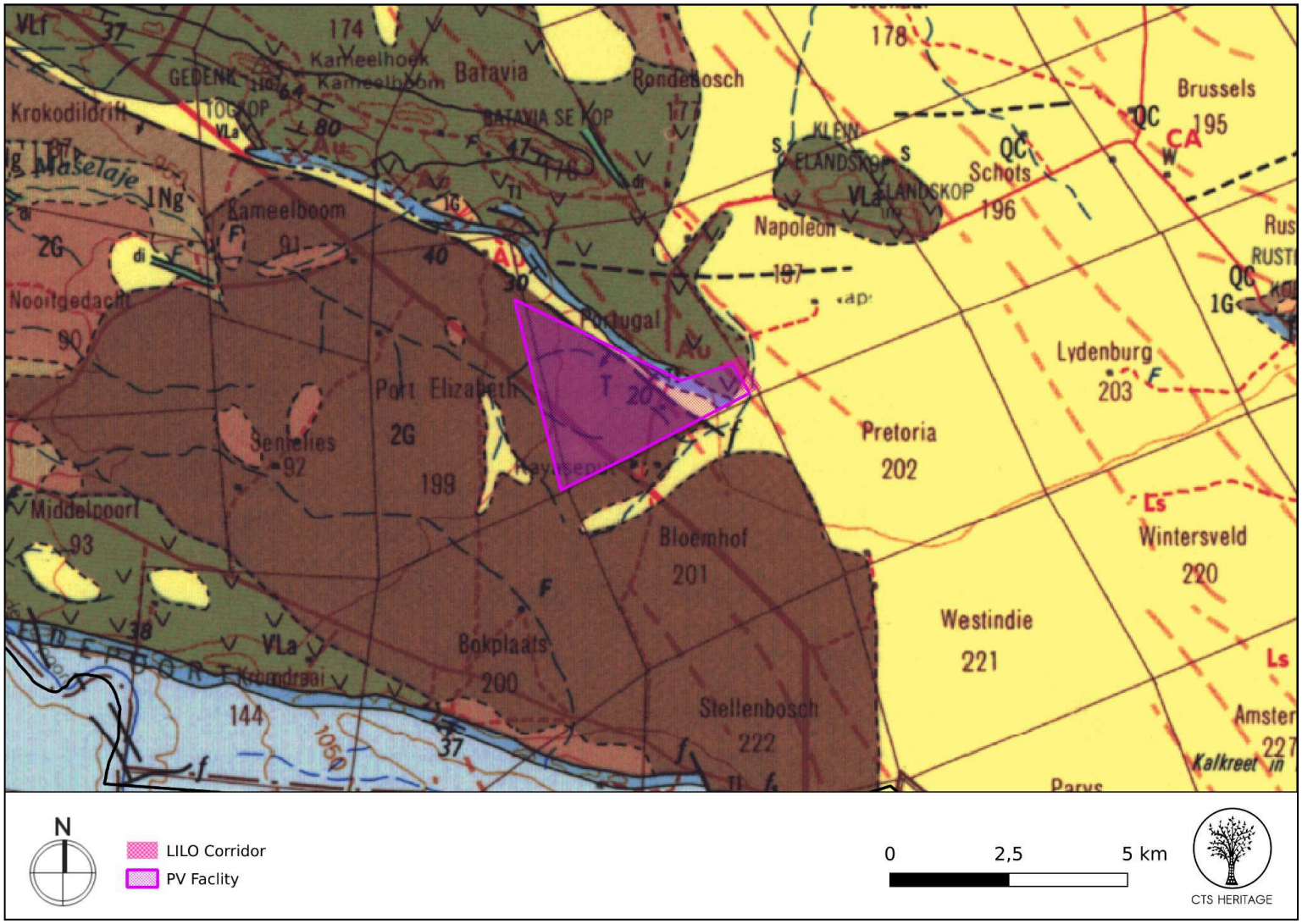


**Figure 3. Geology Map. Extract from the CGS 2426 Thabazimbi Geology Map indicating that the grid is underlain by 2G - Gaborone Granite Complex, QC - Quaternary Sands, VLa - Ventersdorp Supergroup and T1 - Malmani Subgroup of the Transvaal Supergroup**



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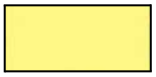
**Table 1: Geological Summary Table**

| Geological unit | Age | Lithology | Symbol on Figure 3 | Fossil Heritage (Groenewald & Groenewald, 2014) | Palaeontological sensitivity | Recommended Mitigation |
|---|---|---|---|---|---|---|
| Tertiary to Quaternary | Tertiary to Quaternary | Black soil, red soil, ferricrete (Qrf), surface conglomerate or breccia and fanglomerate (QR), calcrete, surface limestone (Qc). |  | Very wide range of possible fossil remains, though these are often sparse, such as: mammalian bones and teeth, tortoise remains, ostrich eggshells, non-marine mollusc shells, ostracods, diatoms and other microfossil groups, trace fossils (e.g. calcretised termitaria, rhizoliths, burrows, vertebrate tracks), freshwater stromatolites, plant material such as peats, foliage, wood, pollens. Fossil leaves and palynomorphs within calc tufa | Moderate | Chance Fossil Finds Procedure |
| Transvaal Supergroup, Malmani Subgroup | Vaalian | Stromatolitic carbonates (limestones / dolomites), minor secondary cherts, mudrocks including carbonaceous shales |  | Range of shallow marine to intertidal stromatolites (domes, columns etc), organic walled microfossils | Very High | Chance Fossil Finds Procedure. |
| Ventersdorp Supergroup, Klipriviersberg Group | Randian | Andesitic lava with acid lava, quartzite. |  | Lacustrine stromatolites are recorded within the upper Ventersdorp Supergroup (Platberg Group) in the Free State but this younger succession is not mapped in Limpopo | Low | None |
| Gaborone Granite Complex | Archean complex | Granite, aplogranite, rapakivi granite, foliated granite, quartz porphyry, quartz felsite. |  | None | Zero | None |



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## 4. IDENTIFICATION OF HERITAGE RESOURCES

### 4.1 Underlying geology of development area

The geology in the proposed development area is shown on the 1:250 000 scale, Thabazimbi, 2426 Geological map (Council for Geoscience, Pretoria) (Figure 3). The area is underlain by rocks from the Archean-aged Gaborone Granite Complex (2G), comprising granite, aplogranite, rapakivi granite, foliated granite, quartz porphyry, and quartz felsite. The Ventersdorp Supergroup rocks are characterized by andesitic lava with acid lava and quartzite (VLa), and the Transvaal Supergroup, Malmani Subgroup, consisting of quartzite, grit, conglomerate, and shale (T1). The youngest deposits are of Tertiary to Quaternary age, comprising black soil, red soil, ferricrete, surface conglomerate or breccia, calcrete, and surface limestone (Qc). Faulting and brittle deformation are also prominent structural features in the area.

***Gaborone Granite Suite***

The Gaborone-Kanye igneous terrane covers approximately 36000 km² in the northwestern Kaapvaal Craton, spanning the North West and Limpopo Provinces of South Africa and extending into Botswana (Johnson et al., 2006). This terrane encompasses the Gaborone Granite Suite, a plutonic complex composed of A-type rapakivi granite, leucogranite, microgranite, porphyritic monzogranite, and minor gabbro-anorthosite (Sibiya, 1988; Moore et al., 1993). Additionally, it features a volcanic sequence of pyroclastics and flow-banded rhyolite known as the Kanye Formation. In South Africa, only a small section of this complex surfaces beneath the Transvaal Supergroup north of Mafikeng (Johnson et al., 2006).

***Ventersdorp Supergroup***

The Ventersdorp Supergroup covers an elliptical area of approximately 300 000 km², that extends along a northeast axis from the Britstown District of the Northern Cape Province to Derdepoort in the North West Province (Johnson et al., 2006). There is only a small outcrop present in the Limpopo Province. The Ventersdorp Supergroup formed during the later part of the Archaean Eon. This period was marked by extensive volcanic and sedimentary activity within localized basins on the Kaapvaal Craton. These basins likely formed during tectonic events, possibly related to the collision between the Kaapvaal and Zimbabwe Cratons (Johnson et al., 2006; Groenewald & Groenewald, 2014). The Ventersdorp Supergroup has been subdivided into the Klipriviersberg and Platberg Groups. The Platberg Group comprises the sedimentary rocks of the Bothaville Formation and the Allanridge Formation (Johnson et al., 2006). The current development area falls within the Klipriviersberg Group (see Figure 4 in Johnson et al., 2006, pg. 191).

***Klipriviersberg Group***

The Klipriviersberg Group represents flood basaltic lava covering 100 000 km², with an average thickness of 1500 to 2000 m (Johnson et al., 2006).

***Transvaal Supergroup***

The siliciclastic and carbonate rocks present in the current development area are assigned to the Chuniespoort Group of the Transvaal Basin, Malmani Subgroup. It should be noted that the subclassification of the Malmani Subgroup in the current project area is uncertain.



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***Malmani Subgroup***

The Malmani Subgroup consists of a 2000-meter-thick succession, subdivided into five formations based on chert content, stromatolite morphology, interbedded shales, and erosional surfaces (Button, 1973b; Eriksson and Truswell, 1974). For the purposes of this report, the individual formations will not be discussed further.

***Tertiary-Quaternary deposits***

The Tertiary to the Quaternary period deposits consist of black soil and red soil, accompanied by ferricrete, which is a hardened layer of soil rich in iron oxides. Surface conglomerates or breccias, which are coarse-grained clastic rocks composed of angular fragments, are also found, along with fanglomerates, which are sediments deposited by streams at the base of mountain ranges. Calcrete, a hardened deposit of calcium carbonate, is present alongside surface limestone.

### 4.2 Palaeontological Sensitivity of the Development Area

The palaeontological sensitivity of the proposed development area (Figure 2), corresponds to the geological units as mapped on the 1:250000 Thabazimbi Geological Map (2426, Council for Geoscience, Pretoria), comprising Archean-age rocks from the Gaborone Granite Complex, the Ventersdorp Supergroup, the Transvaal Supergroup (Malmani Subgroup), and Tertiary-Quaternary deposits. The palaeontological sensitivity of these formations therefore also varies significantly due to differences in their geological and depositional contexts.

***Gaborone Granite Complex***

The plutonic complex is characterized by granitic rocks, including rapakivi granite, leucogranite, and quartz porphyry, as well as volcanic sequences from the Kanye Formation. Due to their igneous origin, these rocks lack any fossil-bearing potential, resulting in an **insignificant/zero** palaeontological sensitivity as indicated on the SAHRIS palaeosensitivity map (Figure 2).

***Ventersdorp Supergroup (Klipriviersberg Group)***

The Ventersdorp Supergroup comprises predominantly andesitic and basaltic lavas. These rocks, being of volcanic origin, do not typically preserve fossils, and the SAHRIS palaeosensitivity map classifies this unit as having **low** palaeontological sensitivity.

***Transvaal Supergroup (Malmani Subgroup)***

The Malmani Subgroup consists of a thick succession of carbonate and siliciclastic rocks. These deposits are known for containing shallow marine and intertidal stromatolites, as well as organic-walled microfossils (Groenewald & Groenewald, 2014). This unit is classified as having **high** palaeontological sensitivity according to the SAHRIS palaeosensitivity map, however the likelihood of fossil discovery being affected by the proposed development is **low**.



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***Tertiary-Quaternary Deposits***

These deposits include black and red soils, ferricrete, surface conglomerate, breccia, calcrete, and limestone. While some of these units may occasionally preserve fossils, their palaeontological sensitivity is generally regarded as **low.** The potential for yielding fossils of scientific importance in the project area is limited.

Only the Malmani Subgroup and the Tertiary-Quaternary sediments hold potential for fossil preservation, with the latter unlikely to yield fossils of significance. Based on these factors, the overall palaeontological sensitivity of the project area can be classified as **low** for this development.



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## 5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

### 5.1 Assessment of impact to Palaeontological Resources

The palaeontological sensitivity of the area proposed for the Benya PV Facility, located in the Limpopo Province, is assessed as **Low** overall, with low (negative) potential impacts on palaeontological heritage resources. This evaluation encompasses all phases of the project, including the construction, operational, and decommissioning stages, along with associated infrastructure such as photovoltaic panels, the LILO corridor, internal and external access roads, substations, and temporary construction yards. While minor disruptions to the subsurface may occur during construction, the likelihood of encountering significant fossil material remains low. Confidence in this assessment is high.

The proposed development area is underlain by geological formations of varying palaeontological significance. The Ventersdorp Supergroup (Klipriviersberg Group) and the Gaborone Granite Complex, which form the primary geological units of the site, are predominantly volcanic and granitic in origin, respectively, and thus have low to negligible fossil preservation potential. However, the Malmani Subgroup of the Transvaal Supergroup, present in some portions of the site, contains carbonate rocks known for preserving stromatolitic structures and microfossils, warranting a classification of high palaeontological sensitivity in these specific contexts. Tertiary to Quaternary deposits, consisting of black and red soils, ferricrete, calcrete, and surface conglomerates, may occasionally yield fossil remains, though the likelihood of significant discoveries is minimal.

Previous palaeontological investigations in the region, such as those conducted by Groenewald and Groenewald (2014), have documented a limited occurrence of fossils within similar geological contexts. Stromatolites and organic-walled microfossils recorded in the Malmani Subgroup highlight the potential for scientific discovery but are unlikely to be impacted significantly by the proposed development. Furthermore, the cumulative impact of alternative energy developments in the region remains low, given the largely unfossiliferous nature of the broader geological formations.

**Stromatolites - fossilized microbial structures - hold scientific value as they provide evidence for stratigraphic and biostratigraphic correlation, aiding in the higher resolution correlation of geological strata across different regions. These structures also provide insights into palaeoenvironmental settings. The scientific significance of stromatolites is further emphasised when discovered in poorly studied areas. Their presence in such contexts can substantially enhance understanding of the region's geological history.*

## 6. CONCLUSION AND RECOMMENDATIONS

The palaeontological sensitivity of the proposed Benya PV Facility development area in the Limpopo Province is assessed as low. The geological units underlying the site, including the Ventersdorp Supergroup (Klipriviersberg Group) and the Gaborone Granite Complex, possess negligible fossil preservation potential due to their volcanic and granitic origins. While the Malmani Subgroup of the Transvaal Supergroup has a high potential for fossil preservation, particularly stromatolites and organic-walled microfossils, the likelihood of significant fossil finds being affected by this development is minimal. Similarly, Tertiary to Quaternary deposits may sporadically yield fossils of limited significance, further supporting the low-impact assessment.



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The construction, operational, and decommissioning phases are unlikely to disturb palaeontological resources significantly. This assessment is made with a high degree of confidence based on desktop studies, previous regional research, and the geological context of the development area.

**Recommendations:**

The attached Chance Fossil Finds Procedure is recommended for implementation within the deposits of the Malmani Subgroup (T1). This procedure should be in place to handle any unexpected fossil discoveries during construction..



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## Appendix 1: Chance Fossil Finds Procedure



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