HERITAGE IMPACT ASSESSMENT

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

Proposed development of the Middelvlei Solar, 120MW Solar PV Project, Gauteng Province

Prepared by CTS Heritage

CTS HERITAGE

For

Savannah Environmental

January 2023

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EXECUTIVE SUMMARY

1. Site Name:

Middelvlei Solar PV

2. Location:

Portion 132 of the Farm Middelvlei 255 IQ

3. Locality Plan:

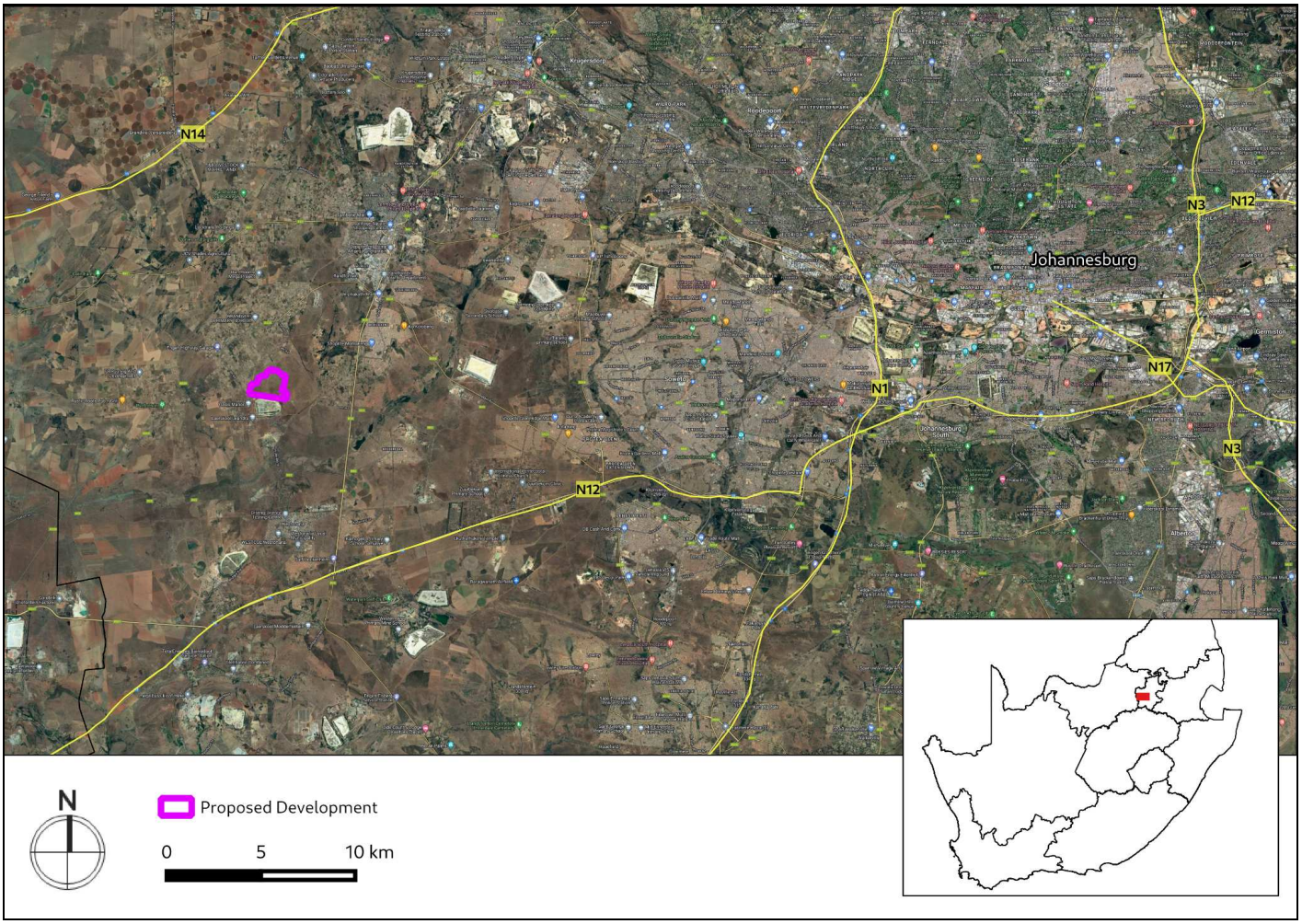

Figure A: Location of the proposed development area

4. Description of Proposed Development:

The Applicant, Portion 132 Middelvlei (Pty) Ltd, a special purpose vehicle (SPV) of Sigma Solar Africa Pty Ltd, is proposing the construction of a photovoltaic (PV) solar energy facility (known as **Middelvlei Solar**) located on a site approximately 7km south-west of the town of Randfontein in the Gauteng Province. The Solar PV facility will be developed on Portion 132 (a portion of portion 6) of the Farm Middelvlei 255 IQ and will comprise several arrays of single axis tracking solar PV panels and associated infrastructure and will have a contracted capacity of up to 120MW. The development area is situated within the Rand West City Local Municipality within the West Rand District Municipality. The site is accessible via existing gravel roads which provide access to the development area.

5. Anticipated Impacts on Heritage Resources:

The survey proceeded with no constraints and limitations, and the project area was comprehensively surveyed for heritage resources. No significant heritage resources fall within the layout for the PV facility provided and as such, no direct impact to significant heritage resources is anticipated.

No fossil exposures were identified within the development area and the palaeontological assessment concludes that the likelihood of impact to significant fossil heritage is low.

The VIA notes that “Neither the Urban or the Rural Landscape Character Areas are scenic landscapes. However they do have qualities that are likely to be important to people that live and work in them. The extent of open space and the distance between residential areas and industry, particularly mining, are probably the most important qualities from this respect.”

The anticipated impacts to the sense of place and landscape character are assessed in detail in the VIA and are not repeated here.

Based on the assessments completed, the proposed development is unlikely to impact on significant heritage resources and as such, there is no objection to the proposed development on heritage grounds.

6. Recommendations:

There is no objection to the proposed development from a heritage perspective on condition that:

- The recommendations in the VIA are implemented
- The attached Chance Fossil Finds Procedure must be implemented for the duration of construction activities
- Should any buried archaeological resources or human remains or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage

Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.

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

The Applicant, Portion 132 Middelvlei (Pty) Ltd, a special purpose vehicle (SPV) of Sigma Solar Africa Pty Ltd, is proposing the construction of a photovoltaic (PV) solar energy facility (known as **Middelvlei Solar**) located on a site approximately 7km south-west of the town of Randfontein in the Gauteng Province. The Solar PV facility will be developed on Portion 132 (a portion of portion 6) of the Farm Middelvlei 255 IQ and will comprise several arrays of single axis tracking solar PV panels and associated infrastructure and will have a contracted capacity of up to 120MW. The development area is situated within the Rand West City Local Municipality within the West Rand District Municipality. The site is accessible via existing gravel roads which provide access to the development area.

The project infrastructure will include:

- Solar PV Plant comprising approximately 220000 PV panels on single axis tracking PV modules
- Inverters and transformers (up to 120MW)
- Cabling between the panels
- Onsite facility substation, including a Twin-Tern Conductor ~379 MVA. Substation capacity - 2x 80 MVA, 132/33 kV substation ~ 50 x 70 m2 - including Eskom metering site.
- Cabling from the onsite substation to the collector substation (either underground or overhead)
- Electrical and auxiliary equipment required at the collector substation that serves the solar energy facility, including switchyard/bay, control building, fences, etc.
- Battery Energy Storage System (BESS)
- Site and internal access roads (up to 8m wide)
- Temporary and permanent laydown area
- Operations Building of ~180 sqm

The property, Portion 132 of the Farm Middelvlei 255 IQ, has an extent of 204.44ha, of which 200ha will be developed for the project. The site is a vacant stand with sufficient space to construct the 120MW PV facility and associated infrastructure. The site will provide the opportunity for the optimal placement of the infrastructure, while ensuring avoidance of major identified environmental sensitivities. To avoid areas of potential sensitivity and to ensure that potential detrimental environmental impacts are minimised as far as possible, the full extent of the project site will be considered in the Scoping Phase, and a development footprint within which the infrastructure of the PV facility and associated infrastructures will be located will be fully assessed during the EIA Phase.

For the purposes of the EIA process, the following terms will be used:

- Project: Project includes the PV facility and all of the associated infrastructures.
- Project Site/Area: The Project Site/Area is the area with an extent of approx. 204.44ha, within which the

Middelvlei Solar PV Facility development footprint will be located.

- Development area: The Development Area is that identified area (located within the Project Site) of ~200ha demarcated within the Affected properties for consideration in the EIA process where the Middelvlei Solar PV Facility and associated infrastructure is planned to be located.
- Development footprint: The development footprint is the defined area (located within the development area) where the PV array and other associated infrastructure for the Middelvlei Solar PV Facility and associated infrastructure is planned to be constructed. This is the actual footprint of the facility, and the area which would be disturbed.

1.2 Description of Property and Affected Environment

The study area consists of a gentle to medium undulating landscape. The terrain slopes gently from the north to the south. The area is densely vegetated with various grass, plant and tree species. Some of the plant species observed appear to belong to the species *of Helichrysum, Helianthus annuus, Hyparrhenia hirta, eragrostis chloromelas, Schizachyrium sanguineum, Eragrostis curvula, Panicum coloratum.* A dried-up water source runs through the property.

The surveyed area was formerly an Asparagus farm, and some crop rows are still visible and evidence of animal grazing was noted. A large hole in the eastern portion of the site (WP - 003) appears to be a sinkhole (currently used as a refuse disposal site). The refuse dumping site appears to be used by the nearby informal settlement. The area is polluted with modern refuse (specifically near the dumping area). Debris from the refuse can be found throughout the site but is most prominent in the eastern portion. The retaining wall remains (WP - 002) can be found near the dried-up water source and are possibly related to previous farming activities. Other human-made related features include boundary markers, a ditch, and a heap of stones (not a grave) which appear to have been placed there through scraping activities.

Another hole was discovered – which appears to be related to illegal mining activity in the southern portion of the property. Various ropes, wires and a tire were found near the hole's entrance.

An informal settlement is located near the northernmost section of the site. There appears to be human foot traffic from the informal settlement through the site (mainly to the refuse dumping area), and several pathways can be found throughout the site. A slimes dam is located near the southernmost section of the property. The possible illegal mine entrance is located approximately 200 m away from the slimes dam (on the property). Another dumping site (albeit much smaller than the first – situated near the northeastern section, just outside of the property) was noted.

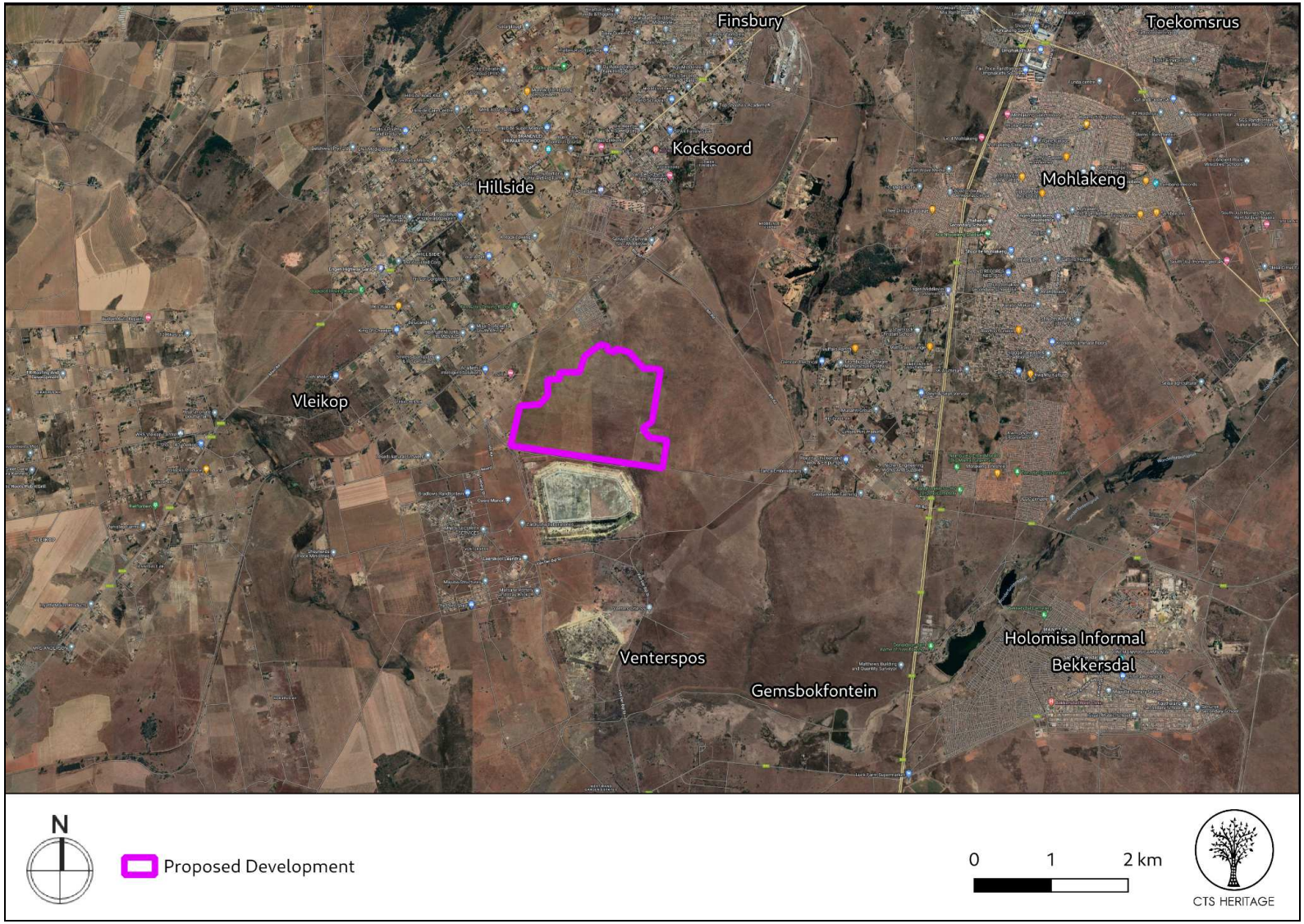

Figure 1.1: The proposed development layout of the Solar PV Facilities

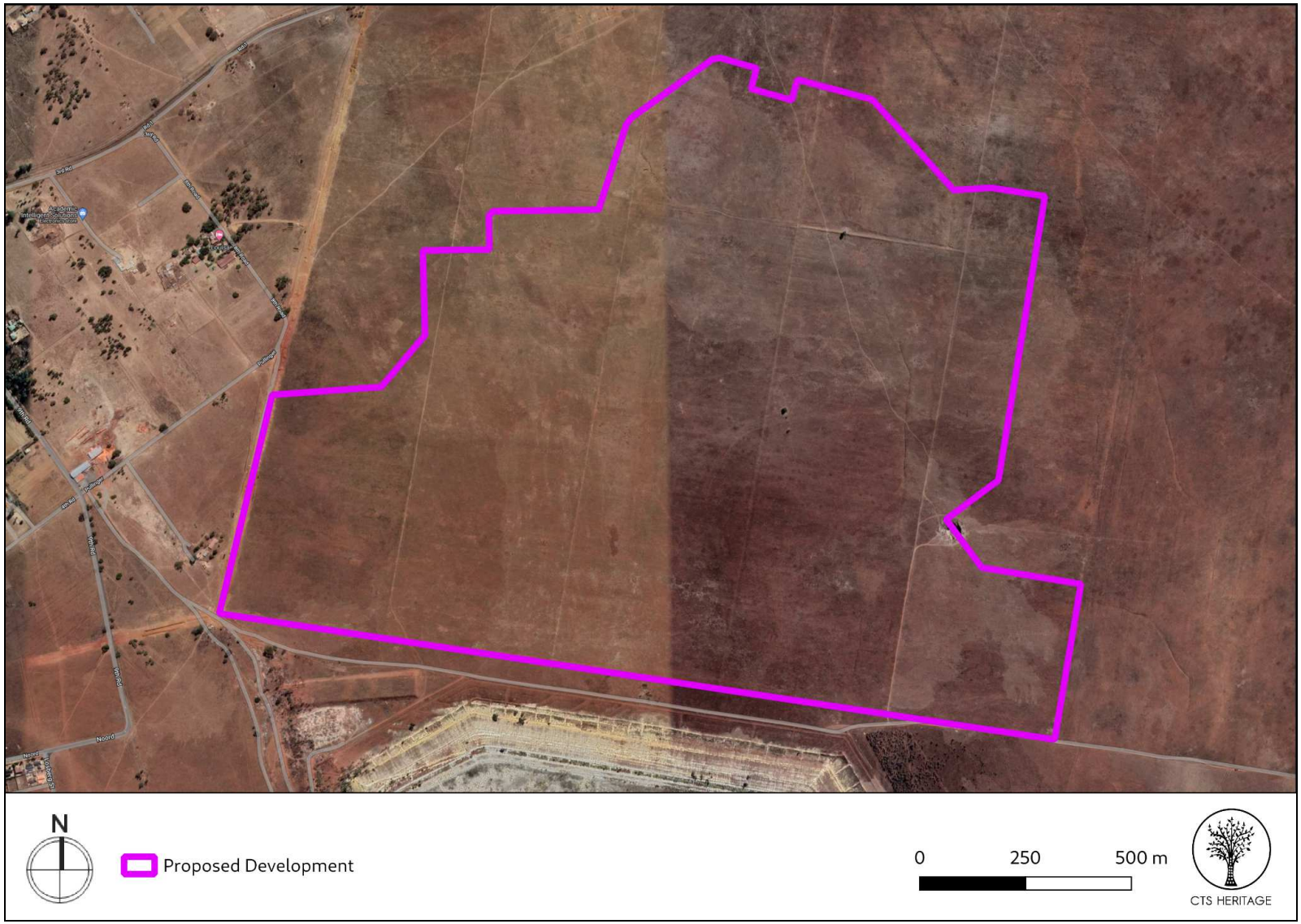

Figure 1.2: The proposed development layout of the PV Facilities on an extract of the 1:50 000 Topo Map

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 on 15 January 2023
- A palaeontologist conducted a field assessment of palaeontological resources likely to be disturbed by the proposed development on 7 February 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

The entire area was surveyed as best as possible and as the vegetation and environment allowed. The site is densely vegetated, severely affecting the surface's visibility. The initial topo maps indicated that the proposed

study area was previously used for crop cultivation. The landowner also confirmed that the entire area was used to cultivate asparagus. Furthermore, there are no gates or fences, and access is available to the whole area.

Despite this, a thorough assessment of the archaeological sensitivity of the area was achieved.

2.5 Savannah Impact Assessment Methodology

Direct, indirect and cumulative impacts of the issues identified through the Basic Assessment process were assessed in terms of the following criteria:

- The nature, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- The extent, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high).
- The duration, wherein it will be indicated whether:
    - The lifetime of the impact will be of a very short duration (0 – 1 years) – assigned a score of 1.
    - The lifetime of the impact will be of a short duration (2 – 5 years) – assigned a score of 2.
    - Medium-term (5 – 15 years) – assigned a score of 3.
    - Long term (> 15 years) – assigned a score of 4.
    - Permanent – assigned a score of 5.
- The consequences (magnitude), quantified on a scale from 0 – 10, where 0 is small and will have no effect on the environment, 2 is minor and will not result in an impact on processes, 4 is low and will cause a slight impact on processes, 6 is moderate and will result in processes continuing but in a modified way, 8 is high (processes are altered to the extent that they temporarily cease), and 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- The probability of occurrence, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale of 1 – 5, where 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but low likelihood), 3 is probable (distinct possibility), 4 is highly probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).
- The significance, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high.
- The status, which will be described as either positive, negative or neutral.
- The degree to which the impact can be reversed.
- The degree to which the impact may cause irreplaceable loss of resources.

- The degree to which the impact can be mitigated.

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

S = (E + D + M) x P

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

The significance weightings for each potential impact are as follows:

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

3. HISTORY AND EVOLUTION OF THE SITE AND CONTEXT

3.1 Desktop Assessment

Background:

This application is for the proposed development of a PV Facility located west of Johannesburg, and directly north of Westonaria, north of the N12 and south of Randfontein. Westonaria was formed in 1948 by the amalgamation of the townships Venterspost, proclaimed in 1937, and Westonaria, proclaimed in 1938. According to Van der Walt (2017), "Westonaria was proclaimed in 1938 as a result of all the mining activities that took place in this area since 1910 when the first shaft – Pullinger Shaft was sunken. Venterspost town was proclaimed in 1937; Hillshaven, Glenharvie, Waterpan and Libanon were established as mining residential areas. Bekkersdal was established in 1945 and administered under Westonaria Town Council." In 1958, Lenasia was established as the "group area" for people of Indian descent living in Johannesburg at the onset of the Group Areas Act (1950). Many of its early residents were forcibly removed under the Group Areas Act from Pageview and the portion of Vrededorp populated by non-whites (jointly known as Fietas) and Fordsburg, areas close to the Johannesburg city centre, to Lenasia. As segregation grew it became the largest place where people of Indian extraction could legally live in the Transvaal Province.

Randfontein was established in 1890 to serve the new mine and was administered by Krugersdorp until it became a municipality in 1929. Apart from having the largest stamp mill in the world, Randfontein, like many of the other outlying areas of Johannesburg, is essentially a rural collection of farms and small holdings in a particularly beautiful part of Gauteng. There are a number of privately owned gold-mining township villages and contractor labour quarters established by the mining companies on land owned by the mines within the broader area. The area surrounding the proposed development is dominated by a cultural landscape that is shaped and defined by the historic and on-going mining activities associated with the Witwatersrand. A detailed archaeological background of the area is provided by Du Pisanie and Nel (2012, SAHRIS NID 104305) and is therefore not repeated here. In general, for the development of PV infrastructure and its associated grid connection infrastructure, it is preferred for such development to be clustered with existing development, such as mining or residential development, in order to reduce the perception of urban and infrastructure sprawl across an otherwise agricultural landscape.

There is a long history of gold and uranium mining in the broader West Rand area with an estimated 1.3 billion tonnes of surface tailings, containing in excess of 170 million pounds of uranium and 11 million ounces of gold. The origins of the South Deep Gold Mine extend to the 1950's when gold-producing conglomerates of the Ventersdorp Contact Reef and the Upper Elsburg were identified near Westonaria. This area has been subject to active mining since that time. As such, the immediate context of the proposed PV development is dominated by mining activities and agriculture. The proposed PV facility can provide a new layer on this complex cultural landscape.

Built Environment & Cultural Landscapes

According to Du Pisanie and Nel (2016, SAHRIS NID 356134), "With the onset of the Transvaal and South African Wars, Gatsrand became a strategic location for British troops who occupied Potchefstroom. This region was located in close proximity to the Western Railway, which provided a tactical advantage. To exploit and protect this advantage, three blockhouses were constructed on the farms Driefontein 113 IQ and Driefontein 355 IQ. These structures were not identified during the pre-disturbance survey and it is assumed that they no longer exist. The next major event to take place on this region was the discovery of gold, which facilitated the establishment of several towns from the 1920s, an increase in population and an increase in services. Early mines established include Venterspost (1934), Libanon (1936), West Driefontein (1945), East Driefontein (1968) and later Kloof (1968). Shaped by these events and activities the study area has through time transformed into a historic mining landscape." In their Heritage Impact Assessment located in an area that somewhat overlaps with the proposed development areas, Du Pisanie and Nel (2016, SAHRIS NID 356134) identified a number of heritage resources, the majority of which were determined to be not conservation-worthy. The nature of the resources identified include burials and burial grounds (graded IIIA) as well as historic and modern farm structures. Similar resources are likely to be present within the proposed development areas.

The broader area has significance resulting from its position along the South-Western Railway line developed to link the Southern Railway Line (1886) to the Rand Tram (1888) and lucrative mines to the east. A built heritage inventory of the infrastructure associated with railway development was completed in 2016 and through this process, a number of significant features were identified. Much of the infrastructure associated with this railway development remains present to the west of the development area and is mapped in Figure 3 above. While this infrastructure clearly has significance for the mining and industrial heritage of South Africa, it is unlikely that each identified feature is a Grade II heritage resource. Rather, all of the railway infrastructure identified through this inventory process may well have sufficient significance as a grouping to warrant Grade II significance. That being understood, it is unlikely that the proposed development of the PV facility will have a negative impact on any significant built environment resources associated with the railway line.

As such, it is not anticipated that any significant built environment or cultural landscape resources will be negatively impacted by the proposed development.

Archaeology

Archaeological sites spanning the Earlier, Middle and Later Stone Age, as well as sites pertaining to Iron Age farming communities have been found in the region despite the extensive agricultural transformation of the area. Archaeological resources from these technological periods have been identified in the vicinity of the project area by Huffman et al (1991), Schoeman and Barry (2004), Du Pisanie (2015), Van der Walt (2017) and De Bruyn (2020).

Du Plsanie (2015) notes that, in the broader area, “Stone Age lithics recorded have been found as surface scatters outside of any discernible context thereby limiting the information potential and overall significance of these resources. Late Farming Community sites within the region have primarily been identified as stone walled settlements classified as Type N and Klipriviersberg.” This finding is reiterated by Van der Walt (2017) who notes that “widely dispersed isolated lithics was recorded. These are made entirely from quartzite and consist of cores and flakes with faceted platforms characteristic of the Middle Stone Age. These artefacts are not in-situ and are scattered too sparsely to be of any significance…”

All of the known heritage resources located within the assessment area have been mapped in Figure 3. Despite the extensive past disturbance of the development area from historic cultivation and grazing, a number of burial ground sare known from the broader area. No known heritage resources are located within the area proposed for development, however, as it is known that significant heritage resources are located in this area, it is possible that there are more heritage resources located here that have not yet been identified. It is therefore possible that these resources will be impacted by the proposed development.

Palaeontology

According to the SAHRIS Palaeosensitivity Map, the Proposed Development Areas are located within areas that have variable palaeontological sensitivity but all areas have sediments that have high and very high palaeontological sensitivity. According to the extract from the Council of GeoScience Map for West Rand 2626, the very highly sensitive formation that may be impacted include the Malmani Formation and the highly sensitive formations that may be impacted include the Ecca Group formations and the Timeball Hill formations. The Malmani Subgroup is known to preserve a range of shallow marine to intertidal stromatolites (domes, columns *etc*), organic-walled microfossils and includes FOSSILIFEROUS LATE CAENOZOIC CAVE BRECCIAS such as in the Cradle of Humankind. Similar concerns exist for the Timeball Hill formation sediments. The Ecca Group formations are known to preserve non-marine trace fossils, vascular plants (including petrified wood) and palynomorphs of *Glossopteris* flora, mesosaurid reptiles, fish (including microvertebrate remains, coprolites), crustaceans, sparse marine shelly invertebrates (molluscs, brachiopods), microfossils (radiolarians *etc*) and insects.

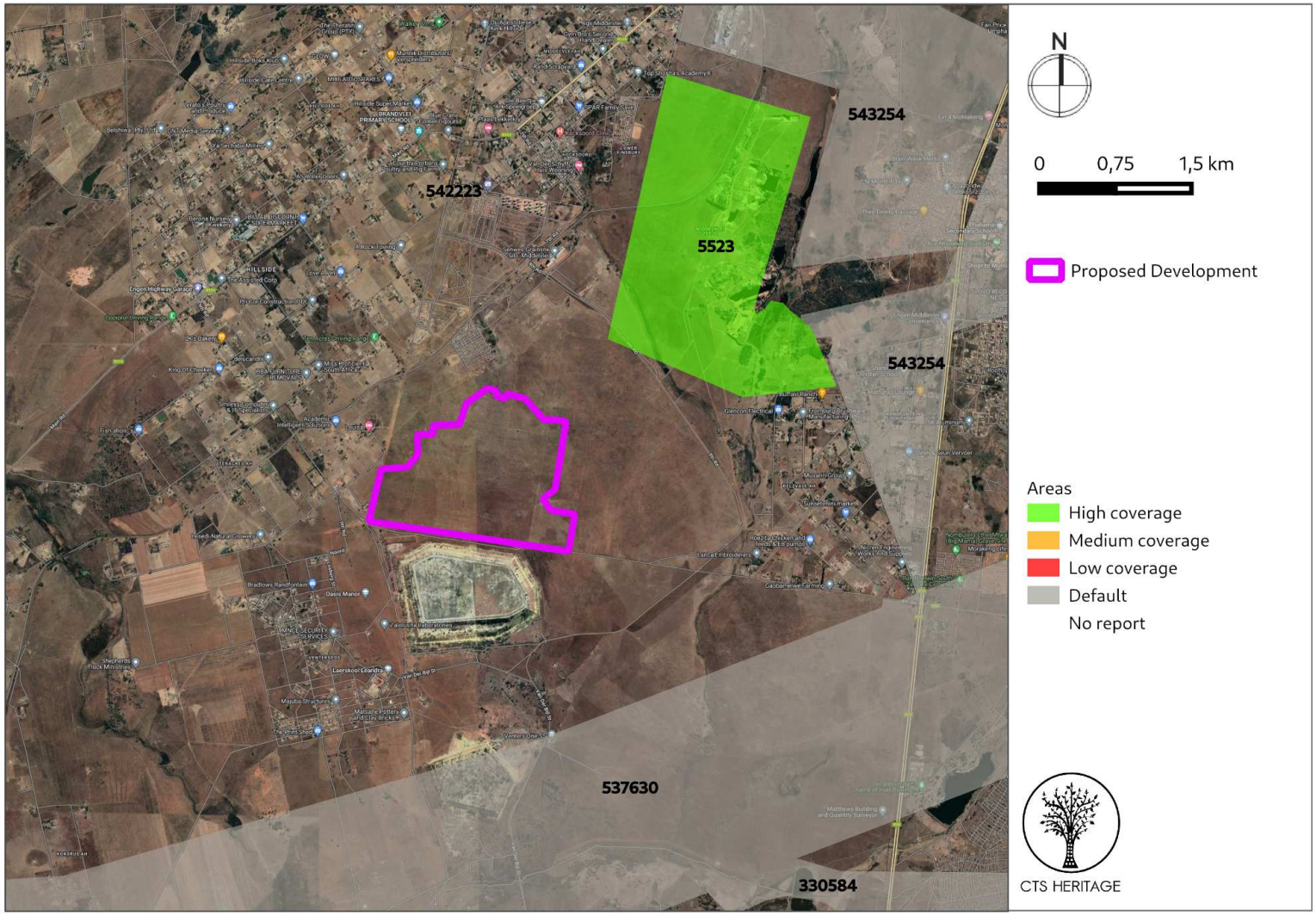

Figure 2: Spatialisation of heritage assessments conducted in proximity to the proposed development

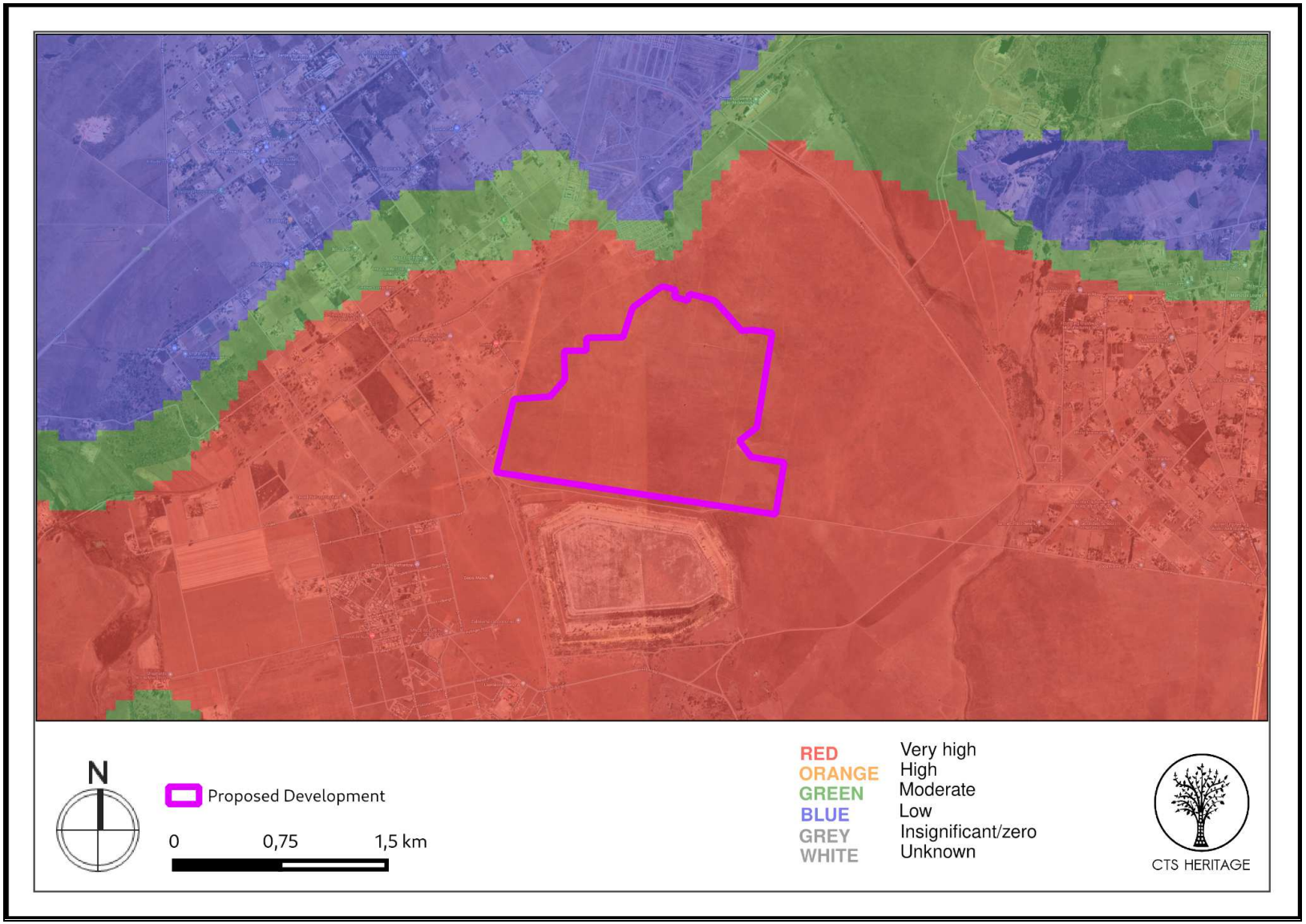

Figure 3.1: Palaeontological sensitivity of the proposed development area

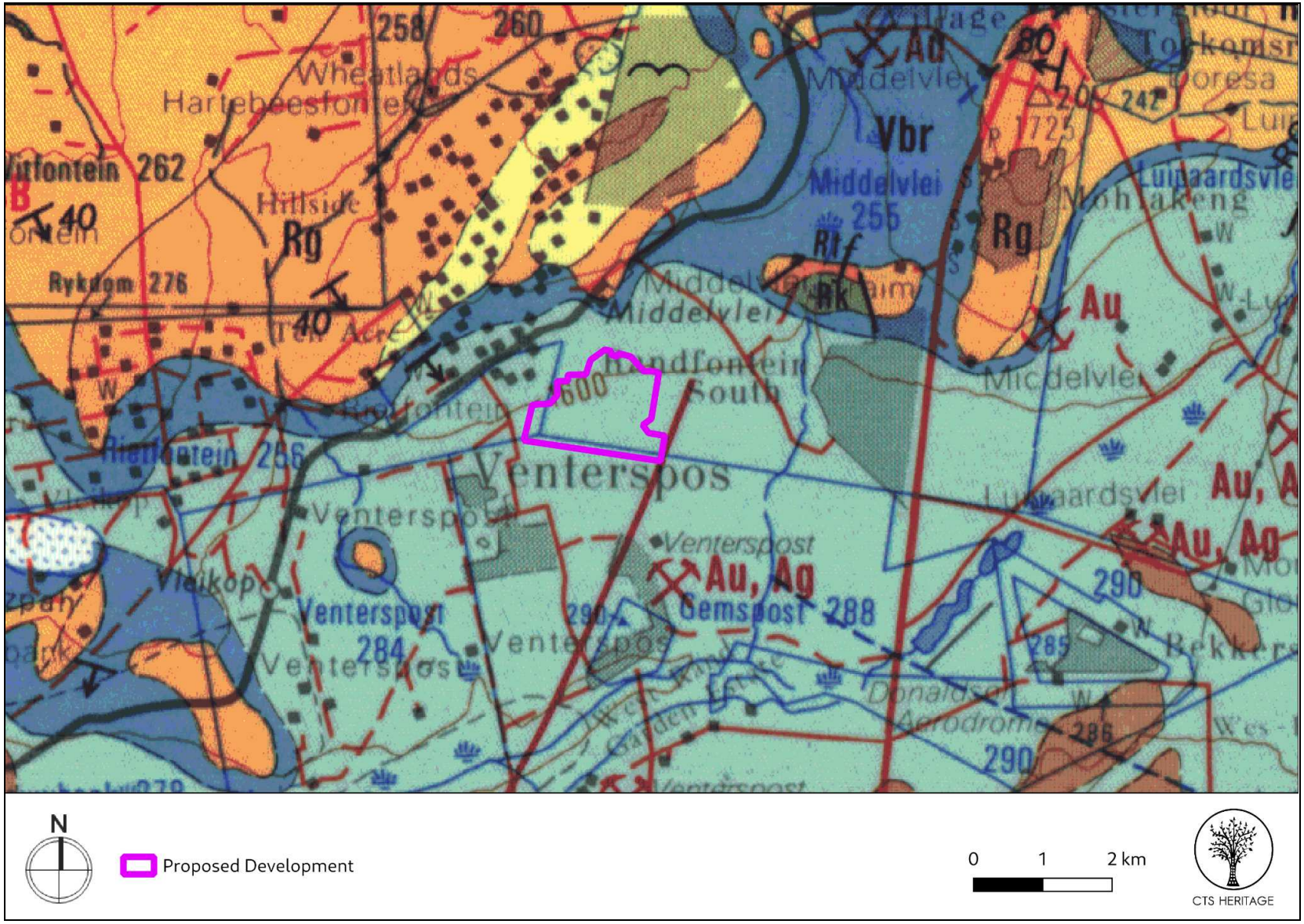

Figure 3.2: Extract from the CGS 2626 West Rand Geology Map indicating that the development area is underlain by Vmd - Malmani Formation of the Chuniespoort Group

4. IDENTIFICATION OF HERITAGE RESOURCES

4.1 Summary of findings of Specialist Reports

Archaeology (Appendix 1)

The field assessment was very thorough over the area proposed for the PV facility and no heritage resources of any significance were identified within the footprint of the PV facility.

One observation was made of the foundations of a broken-down structure which is likely associated with previous agricultural activities on this property. The date of the structure is unknown. However, it does not appear to have any archaeological or cultural significance. Furthermore, the modern material, such as plastic, fibreglass from a truck and plastic wiring, would suggest that the site may have been used recently or has been highly disturbed over the past few years. Therefore, the structure could likely be associated with previous farming activities.

It should be noted, however, that the structure and area around the structure were highly overgrown, thus affecting the surface visibility. Although it is very improbable, a midden or subsurface material may be nearby. The development area was formerly used for cultivation and as such, any surface cultural material would be considered low significance and out of context.

No graves were identified during the survey. The landowner mentioned that graves were recorded on another property towards the north; however, these graves are well outside the proposed development footprint.

Palaeontology (Appendix 2)

The Transvaal Supergroup rocks represent on a very large scale, a sequence of sediments filling the basins under conditions of lacustrine, fluvial, volcanic and glacial cycles in a tectonically active region. The predominantly carbonaceous sediments are evidence of the increase in the atmosphere of oxygen produced by algal colony photosynthesis, the so-called Great Oxygen Event (ca 2.40 – 2.32 Ga) and precursor to an environment where diverse life forms could evolve. The Neoarchean-Paleoproterozoic Transvaal Supergroup in South Africa contains the well-preserved stromatolitic Campbellrand -Malmani carbonate platform (Griqualand West Basin – Transvaal Basin respectively), which was deposited in shallow seawater shortly before the Great Oxidation Event (GOE).

The Transvaal Supergroup comprises one of the world's earliest carbonate platform successions (Beukes, 1987; Eriksson et al., 2006; Zeh et al., 2020). In some areas there are well preserved stromatolites that are evidence of the photosynthetic activity of blue green bacteria and green algae. These microbes formed colonies in warm, shallow seas and deposited layer upon layer of minerals, often in domes or columns. The minerals are predominantly calcium carbonate, calcium sulphate, magnesium carbonate and magnesium sulphate. Only very rarely are the bacteria and algae preserved but the stromatolites are traces of their activity, hence called trace fossils. These fossils are protected by legislation, therefore the Malmani Subgroup palaeosensitivity is very high.

The site walk-through began on the northern margin which is the higher ground and there was a good view of the whole project area as far as the mine dump along the southern margin. The northern margin still has old concrete floors and blocks that are the remnants of the packing shed for the asparagus production.

The land is uniformly sloping down to the mine dump but the soil had been banked into ridges for the rows of asparagus. The entire area was covered in secondary grassland with tall grasses (*Hyparrhenia* sp., *Eragrostis* sp., *Melinis repens*, *Pogonarrthria squarrosa*) and herbs (*Helichrysum* spp and *Cleome maculata*). Along the earth-packed dam wall in the lower southern third of the land, the grasses were shorter.

There were no rocks, no rocky outcrops and no trace fossils such as stromatolites.

4.2 Heritage Resources identified

No significant heritage resources were identified within the area proposed for development, see Table 2 below and Appendix 1 for full descriptions and images.

Table 2: Artefacts identified during the field assessment development area

POINT ID	Description	Density	Co-ordinates		Grading	Mitigation
005	Remains of a broken-down structure surrounded by Glass, plastic and ceramic, cement, brick, and fibreglass from the roof of a truck. The extent of the feature is unknown as it was covered by dense vegetation. It is unclear if the plastic, electrical wiring, and fibreglass may have been disposed of there later (as all material recorded was found on the surface). Due to dense vegetation and overgrowth of the structure and surrounds, it is unclear whether a midden with subsurface material may exist. The structure and recorded material do not appear to have any archaeological or cultural significance.	NA	26°15'29.65"S	27°38'48.89"E	NCW	NA

4.3 Mapping and spatialisation of heritage resources

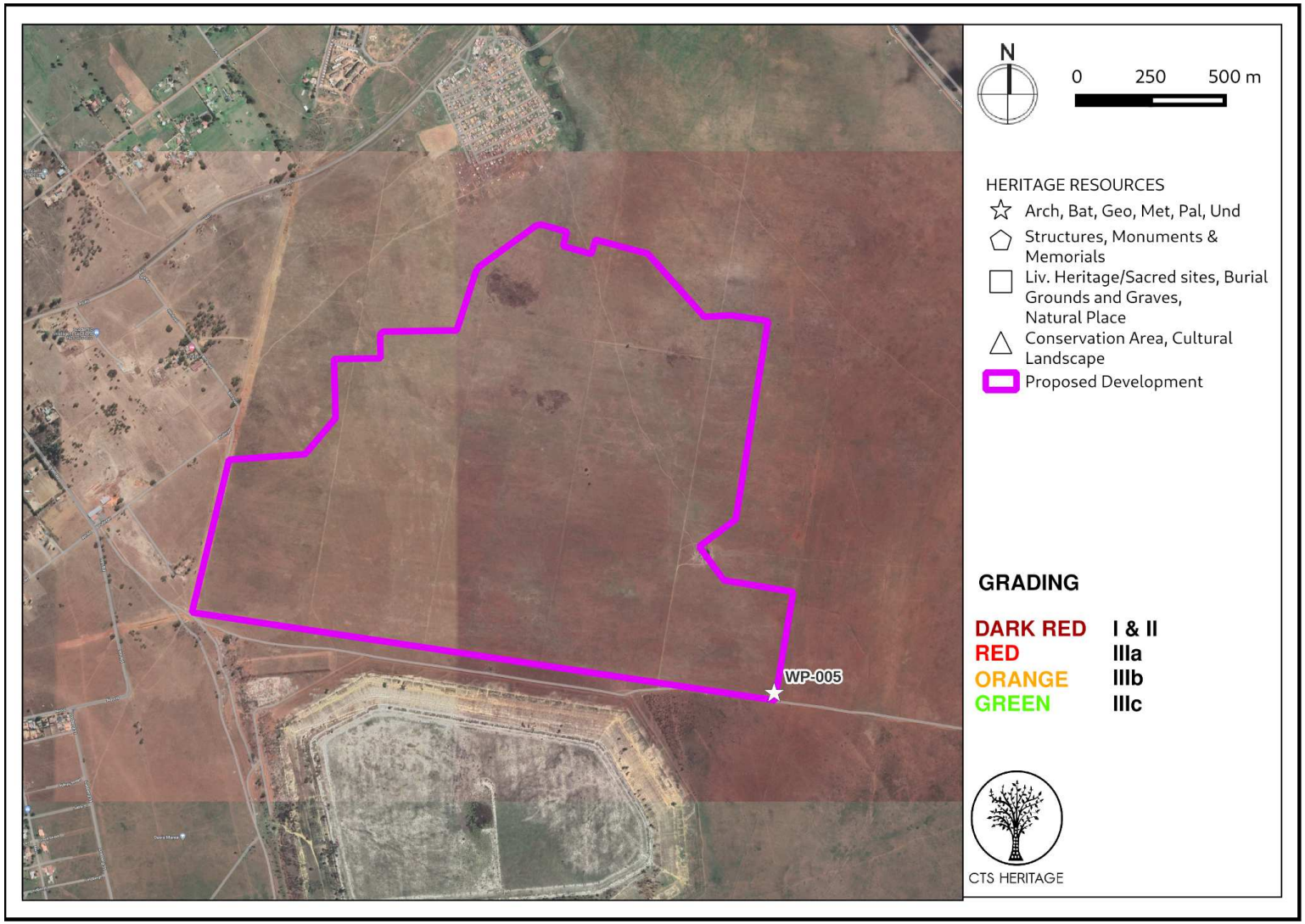

Figure 5.1: All heritage resources within proximity to the development area

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 affected landscape can be broadly divided into the following LCAs that are largely defined by the extent and nature of development.

- **Urban Landscape Character Area** which is dominated by industry and residential development.

  The transition area that is largely comprised of smallholdings is included within the urban LCA. Whilst this area is less densely developed than areas to the east, it is densifying as new housing development is underway in the vicinity of the proposed site.

  Within this area there are numerous large industrial and mining structures that are obvious in the landscape, there are also numerous small scale light industrial operations particularly to the north and north west of the proposed site.

  Within this LCA, VAC is largely provided by building structures. The mine dump directly to the south of the proposed site will also provide screening from the south.

- **Rural Landscape Character Area** which is comprised of areas to the west of the proposed site where commercial cultivation and open natural grassland dominate the landscape. Within this area there are also mining operations as well as smallholdings. The dominant character however is rural in nature.

The VIA notes that “Neither the Urban or the Rural Landscape Character Areas are scenic landscapes. However they do have qualities that are likely to be important to people that live and work in them. The extent of open space and the distance between residential areas and industry, particularly mining, are probably the most important qualities from this respect.”

The anticipated impacts to the sense of place and landscape character are assessed in detail in the VIA and are not repeated here.

5.1.2 Archaeology

No significant heritage resources fall within the area PV layout provided and as such, no direct impact to any heritage resources is anticipated.

The identified structure (005) does not appear to have any archaeological or cultural significance; it has also been disturbed and therefore is considered to be Not Conservation-Worthy from an archaeological perspective – no mitigation is required.

No graves were identified. However, it is not uncommon to find graves in the area. Known graves are situated on other properties nearby. The area was densely vegetated; however, due to the majority of the land being formally utilised for cultivation, it is unlikely that there are any unmarked graves located here. However, all graves are highly significant and should not be disturbed through development activities.

Table 4.1 Impacts of the proposed development to archaeological resources

NATURE: The construction phase of the project will require excavation, which may impact on archaeological heritage resources if present.				
		Without Mitigation		**With Mitigation**
MAGNITUDE	**L (1)**	No archaeological heritage resources of significance were identified within the development footprint	**L (1)**	No archaeological heritage resources of significance were identified within the development footprint
DURATION	**H (5)**	Where an impact to a resource occurs, the impact will be permanent.	**H (5)**	Where an impact to resources occurs, the impact will be permanent.
EXTENT	**L (1)**	Localised within the site boundary	**L (1)**	Localised within the site boundary
PROBABILITY	**L (1)**	It is unlikely that significant heritage resources will be impacted if the layout provided is followed	**L (1)**	It is unlikely that significant heritage resources will be impacted if the layout provided is followed
SIGNIFICANCE	**L**	(1+5+1)x1=7	**L**	(1+5+1)x1=7
STATUS		Neutral		Neutral
REVERSIBILITY	**L**	Any impacts to heritage resources that do occur are irreversible	**L**	Any impacts to heritage resources that do occur are irreversible
IRREPLACEABLE LOSS OF RESOURCES?	**L**	Unlikely	**L**	Unlikely
CAN IMPACTS BE MITIGATED		Yes		Yes
MITIGATION: - Should any buried archaeological resources or human remains or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.				
RESIDUAL RISK: Should any significant resources be impacted (however unlikely) residual impacts may occur, including a negative impact due to the loss of potentially scientific cultural resources.				

5.1.3 Palaeontology

Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks are the correct age and type to preserve fossils. The site visit and walk through confirmed that there were NO FOSSILS in the project footprint. There were no outcrops of dolomite and no stromatolites on any part of the project footprint. Since there is a small chance that below the soil there are trace fossils from the Malmani Subgroup and may be disturbed a Fossil Chance Find Protocol has been added to this report. Taking account of the defined criteria, the potential impact to fossil heritage resources is extremely low.

Table 4.2: Impacts of the proposed development of the PV facilities to palaeontological resources

NATURE: The construction phase of the project will require excavation, which may impact on palaeontological heritage resources if present.				
		Without Mitigation		**With Mitigation**
MAGNITUDE	**H (8)**	The area proposed for development is underlain by sediments of very high palaeontological sensitivity although no specific areas for exclusion have been identified within the development footprint	**H (8)**	The area proposed for development is underlain by sediments of very high palaeontological sensitivity although no specific areas for exclusion have been identified within the development footprint
DURATION	**H (5)**	Where an impact to resources occurs, the impact will be permanent.	**H (5)**	Where an impact to resources occurs, the impact will be permanent.
EXTENT	**L (1)**	Since the only possible fossils within the area would be microscopic blue-green algae in some stromatolites, the spatial scale will be localised within the site boundary.	**L (1)**	Since the only possible fossils within the area would be microscopic blue-green algae in some stromatolites, the spatial scale will be localised within the site boundary.
PROBABILITY	**L (1)**	The potential impact to fossil heritage resources is extremely low	**L (1)**	The potential impact to fossil heritage resources is extremely low
SIGNIFICANCE	**H**	(8+5+1)x1=14	**H**	(8+5+1)x1=14
STATUS		Negative		Positive
REVERSIBILITY	**L**	Any impacts to heritage resources that do occur are irreversible	**L**	Any impacts to heritage resources that do occur are irreversible
IRREPLACEABLE LOSS OF RESOURCES?	**H**	Possible	**H**	Possible
CAN IMPACTS BE MITIGATED		Yes		Yes
MITIGATION: - The attached Chance Fossil Finds Procedure must be implemented				
RESIDUAL RISK: Should any significant resources be impacted (however unlikely) residual impacts may occur, including a negative impact due to the loss of potentially scientific cultural resources.				

5.2 Sustainable Social and Economic Benefit

Based on the SIA completed for the project, on aggregate, the project will have a positive social impact. Based on an assessment of needs as expressed through policies, plans and community survey, it is clear that the local economy requires a catalyst for growth and development. Similarly, the national economy requires new power generation facilities that can increase electricity supply for economic growth without damaging the environment. A solar power plant addresses all these needs. More specifically, this power plant will contribute to the following positive outcomes:

- Reduce South Africa's dependence on fossil fuel resources
- Increase electricity capacity to contribute to the alleviation of SA's energy crisis
- Decentralise energy supply to improve electricity supply stability and reliability
- Meet demand for diversified energy sources
- Ensure the future of sustainable energy use
- Reduce CO2 emissions and the nation's carbon footprint
- Promote environmental, social and economically sustainable development

Based on the outcomes of this heritage assessment, the anticipated socio-economic benefits to be derived from the project outweigh any anticipated negative impacts to heritage resources.

5.3 Proposed development alternatives

No alternative layouts have been assessed as part of this project, however the entire assessment area was surveyed for impacts to heritage resources. The layout provided for the Montrose PV Facility 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 Very High levels of sensitivity for impacts to archaeological and cultural heritage resources. The results of this assessment in terms of site sensitivity are summarised below:

- The cultural value of the broader area has some significance in terms of its mining and agricultural history (Moderate)
- No significant archaeological resources were identified within the broader area (Low)
- No highly significant palaeontological resources were identified within the development area (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 Palaeontology and for Archaeology and Cultural heritage. The verification process has determined that the area has Low sensitivity for impacts to Archaeology

and Cultural Heritage and Low sensitivity for impacts to Palaeontological heritage. This evidence is provided in the body of this report and in the appendices (Appendix 1 and 2).

5.5 Cumulative Impacts

In terms of impacts to heritage resources, it is preferred that this kind of infrastructure development is concentrated in one location and is not sprawled across an otherwise agricultural landscape. The proposed development is therefore likely to result in a change to the sense of place of the area. Mitigation of these impacts is dealt with in the recommendations included in the VIA.

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 survey proceeded with no constraints and limitations, and the project area was comprehensively surveyed for heritage resources. No significant heritage resources fall within the layout for the PV facility provided and as such, no direct impact to significant heritage resources is anticipated.

No fossil exposures were identified within the development area and the palaeontological assessment concludes that the likelihood of impact to significant fossil heritage is low.

The VIA notes that “Neither the Urban or the Rural Landscape Character Areas are scenic landscapes. However they do have qualities that are likely to be important to people that live and work in them. The extent of open space and the distance between residential areas and industry, particularly mining, are probably the most important qualities from this respect.”

The anticipated impacts to the sense of place and landscape character are assessed in detail in the VIA and are not repeated here.

Based on the assessments completed, the proposed development is unlikely to impact on significant heritage resources and as such, there is no objection to the proposed development on heritage grounds.

8. RECOMMENDATIONS

There is no objection to the proposed development from a heritage perspective on condition that:

- The recommendations in the VIA are implemented
- The attached Chance Fossil Finds Procedure must be implemented for the duration of construction activities
- Should any buried archaeological resources or human remains or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.

9. REFERENCES

Heritage Impact Assessments				
Nid	**Report Type**	**Author/s**	**Date**	**Title**
330584	Heritage Scoping	Justin du Piesanie	29/05/2015	Sibanye Gold Limited's West Rand Tailings Retreatment Project Heritage Scoping Report
356134	Heritage Impact Assessment Specialist Reports	Justin du Piesanie, Johan Nel	13/01/2016	Environmental Impact Assessment for Sibanye Gold Limited's West Rand Tailings Retreatment Project - Heritage Impact Assessment
374660	AIA Phase 1	Jaco van der Walt	13/10/2016	ARCHAEOLOGICAL IMPACT ASSESSMENT FOR THE PROPOSED MOHLAKENG X16 - TOWNSHIP DEVELOPMENT, GAUTENG PROVINCE
537630	HIA Phase 1	Wouter Fourie et al.	31/01/2019	Heritage Impact Assessment (HIA) for the new 400-kV Transmission line from the Pluto Substation to the Westgate Substation and for the loop ins/outs connecting the Hera-Westgate 400-kV line. West Rand District Municipality, Gauteng
590003	PIA Phase 2	Marion Bamford	11/09/2021	Palaeontological Impact Assessment for the proposed Eskom West Rand Strengthening Project Phase 2 Pluto Substation to Westgate Substation, Gauteng Province
543254	HIA Phase 1	Shannon Hardwick, Justin du Pisanie	26/10/2020	Heritage Impact Assessment: Basic Assessment Process for the Closure of the Cooke Underground Operations
5523	AIA Phase 1	Polke Birkholtz	08/04/2003	Cultural Heritage Assessment as Part of the EMP Report for the Proposed Impafa/Pamodzi OpenCape Archaeological Survey CCt Gold Mine on the Farm Middelvlei 255 IQ
407548	Jaco van der Walt	14/08/2017	HIA Phase 1	HERITAGE IMPACT ASSESSMENT (REQUIRED UNDER SECTION 38(8) OF THE NHRA (No. 25 OF 1999) FOR THE PROPOSED SOUTH DEEP SOLAR PV PROJECT, WESTONARIA, GAUTENG PROVINCE

APPENDICES

APPENDIX 1: Archaeological Assessment (2023)

ARCHAEOLOGICAL SPECIALIST STUDY

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

Proposed development of the Middelvlei Solar, 120MW Solar PV Project, Gauteng Province

Prepared by

CTS HERITAGE

Jenna Lavin and

Sky-Lee Fairhurst of Ubique Heritage Consultants

In Association with

Savannah Environmental

January 2023

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EXECUTIVE SUMMARY

The Applicant, Portion 132 Middelvlei (Pty) Ltd, a special purpose vehicle (SPV) of Sigma Solar Africa Pty Ltd, is proposing the construction of a photovoltaic (PV) solar energy facility (known as **Middelvlei Solar**) located on a site approximately 7km south-west of the town of Randfontein in the Gauteng Province. The Solar PV facility will be developed on Portion 132 (a portion of portion 6) of the Farm Middelvlei 255 IQ and will comprise several arrays of single axis tracking solar PV panels and associated infrastructure and will have a contracted capacity of up to 120MW. The development area is situated within the Rand West City Local Municipality within the West Rand District Municipality. The site is accessible via existing gravel roads which provide access to the development area.

The survey proceeded with some constraints and limitations, yet the project area was comprehensively surveyed for heritage resources. No significant heritage resources fall within the layout for the PV facility provided and as such, no direct impact to significant heritage resources is anticipated.

In order to ensure that no impact to the identified resources occurs during the construction or operational phases of the development, a number of recommendations are made below.

Recommendations

There is no objection to the proposed development from an archaeological perspective on condition that:

- Should any buried archaeological resources or human remains or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.

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CONTENTS

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1. INTRODUCTION

1.1 Background Information on Project

The Applicant, Portion 132 Middelvlei (Pty) Ltd, a special purpose vehicle (SPV) of Sigma Solar Africa Pty Ltd, is proposing the construction of a photovoltaic (PV) solar energy facility (known as **Middelvlei Solar**) located on a site approximately 7km south-west of the town of Randfontein in the Gauteng Province. The Solar PV facility will be developed on Portion 132 (a portion of portion 6) of the Farm Middelvlei 255 IQ and will comprise several arrays of single axis tracking solar PV panels and associated infrastructure and will have a contracted capacity of up to 120MW. The development area is situated within the Rand West City Local Municipality within the West Rand District Municipality. The site is accessible via existing gravel roads which provide access to the development area.

The project infrastructure will include:

- Solar PV Plant comprising approximately 220000 PV panels on single axis tracking PV modules
- Inverters and transformers (up to 120MW)
- Cabling between the panels
- Onsite facility substation, including a Twin-Tern Conductor ~379 MVA. Substation capacity - 2x 80 MVA, 132/33 kV substation ~ 50 x 70 m2 - including Eskom metering site.
- Cabling from the onsite substation to the collector substation (either underground or overhead)
- Electrical and auxiliary equipment required at the collector substation that serves the solar energy facility, including switchyard/bay, control building, fences, etc.
- Battery Energy Storage System (BESS)
- Site and internal access roads (up to 8m wide)
- Temporary and permanent laydown area
- Operations Building of ~180 sqm

The property, Portion 132 of the Farm Middelvlei 255 IQ, has an extent of 204.44ha, of which 200ha will be developed for the project. The site is a vacant stand with sufficient space to construct the 120MW PV facility and associated infrastructure. The site will provide the opportunity for the optimal placement of the infrastructure, while ensuring avoidance of major identified environmental sensitivities. To avoid areas of potential sensitivity and to ensure that potential detrimental environmental impacts are minimised as far as possible, the full extent of the project site will be considered in the Scoping Phase, and a development footprint within which the infrastructure of the PV facility and associated infrastructures will be located will be fully assessed during the EIA Phase.

For the purposes of the EIA process, the following terms will be used:

- Project: Project includes the PV facility and all of the associated infrastructures.
- Project Site/Area: The Project Site/Area is the area with an extent of approx. 204.44ha, within which the Middelvlei Solar PV Facility development footprint will be located.
- Development area: The Development Area is that identified area (located within the Project Site) of ~200ha demarcated within the Affected properties for consideration in the EIA process where the Middelvlei Solar PV Facility and associated infrastructure is planned to be located.

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- Development footprint: The development footprint is the defined area (located within the development area) where the PV array and other associated infrastructure for the Middelvlei Solar PV Facility and associated infrastructure is planned to be constructed. This is the actual footprint of the facility, and the area which would be disturbed.

1.2 Description of Property and Affected Environment

The study area consists of a gentle to medium undulating landscape. The terrain slopes gently from the north to the south. The area is densely vegetated with various grass, plant and tree species. Some of the plant species observed appear to belong to the species *of Helichrysum, Helianthus annuus, Hyparrhenia hirta, eragrostis chloromelas, Schizachyrium sanguineum, Eragrostis curvula, Panicum coloratum.* A dried-up water source runs through the property.

The surveyed area was formerly an Asparagus farm, and some crop rows are still visible and evidence of animal grazing was noted. A large hole in the eastern portion of the site (WP - 003) appears to be a sinkhole (currently used as a refuse disposal site). The refuse dumping site appears to be used by the nearby informal settlement. The area is polluted with modern refuse (specifically near the dumping area). Debris from the refuse can be found throughout the site but is most prominent in the eastern portion. The retaining wall remains (WP - 002) can be found near the dried-up water source and are possibly related to previous farming activities. Other human-made related features include boundary markers, a ditch, and a heap of stones (not a grave) which appear to have been placed there through scraping activities.

Another hole was discovered – which appears to be related to illegal mining activity in the southern portion of the property. Various ropes, wires and a tire were found near the hole's entrance.

An informal settlement is located near the northernmost section of the site. There appears to be human foot traffic from the informal settlement through the site (mainly to the refuse dumping area), and several pathways can be found throughout the site. A slimes dam is located near the southernmost section of the property. The possible illegal mine entrance is located approximately 200 m away from the slimes dam (on the property). Another dumping site (albeit much smaller than the first – situated near the northeastern section, just outside of the property) was noted.

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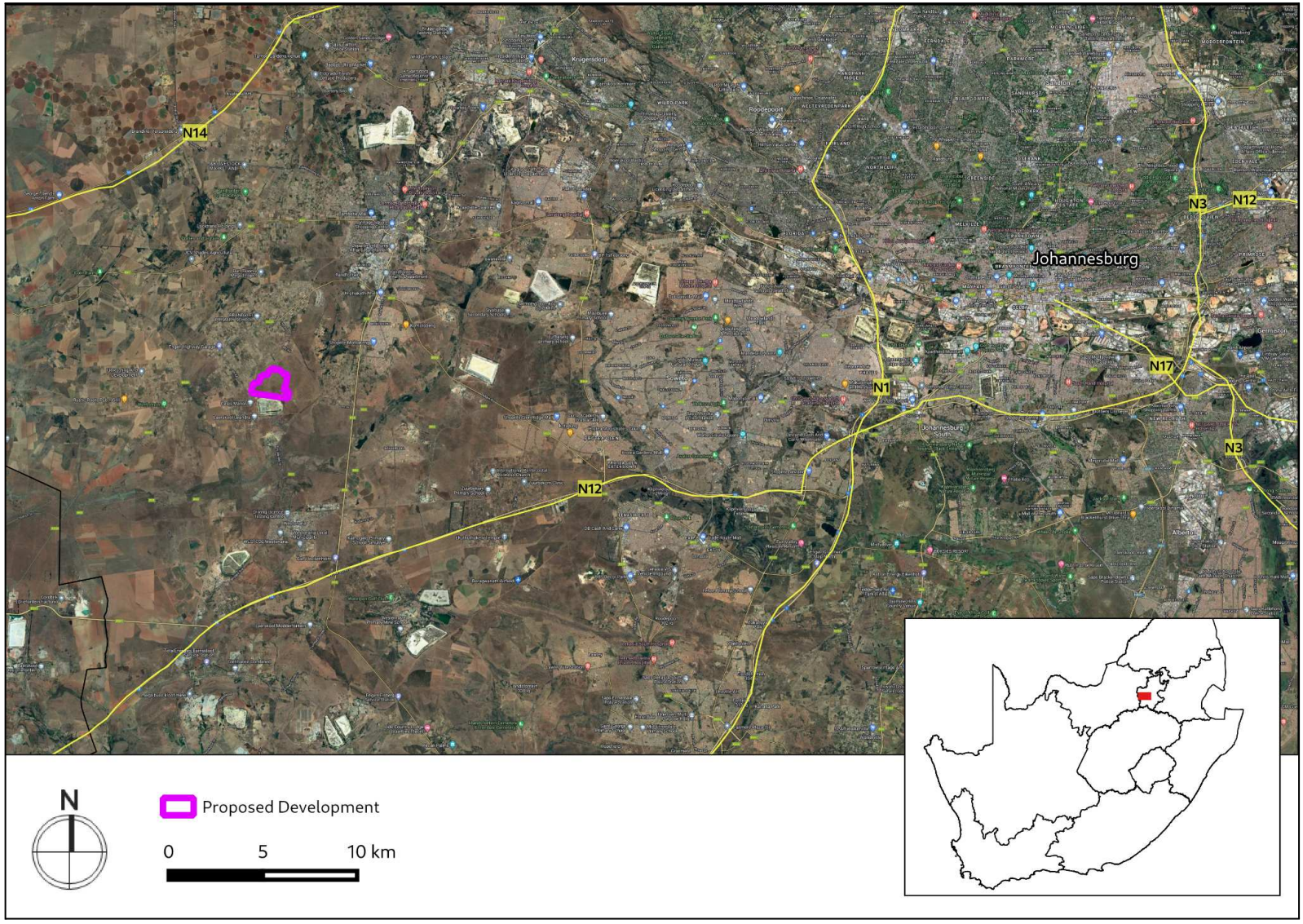

Figure 1.1: Satellite image indicating proposed location of development

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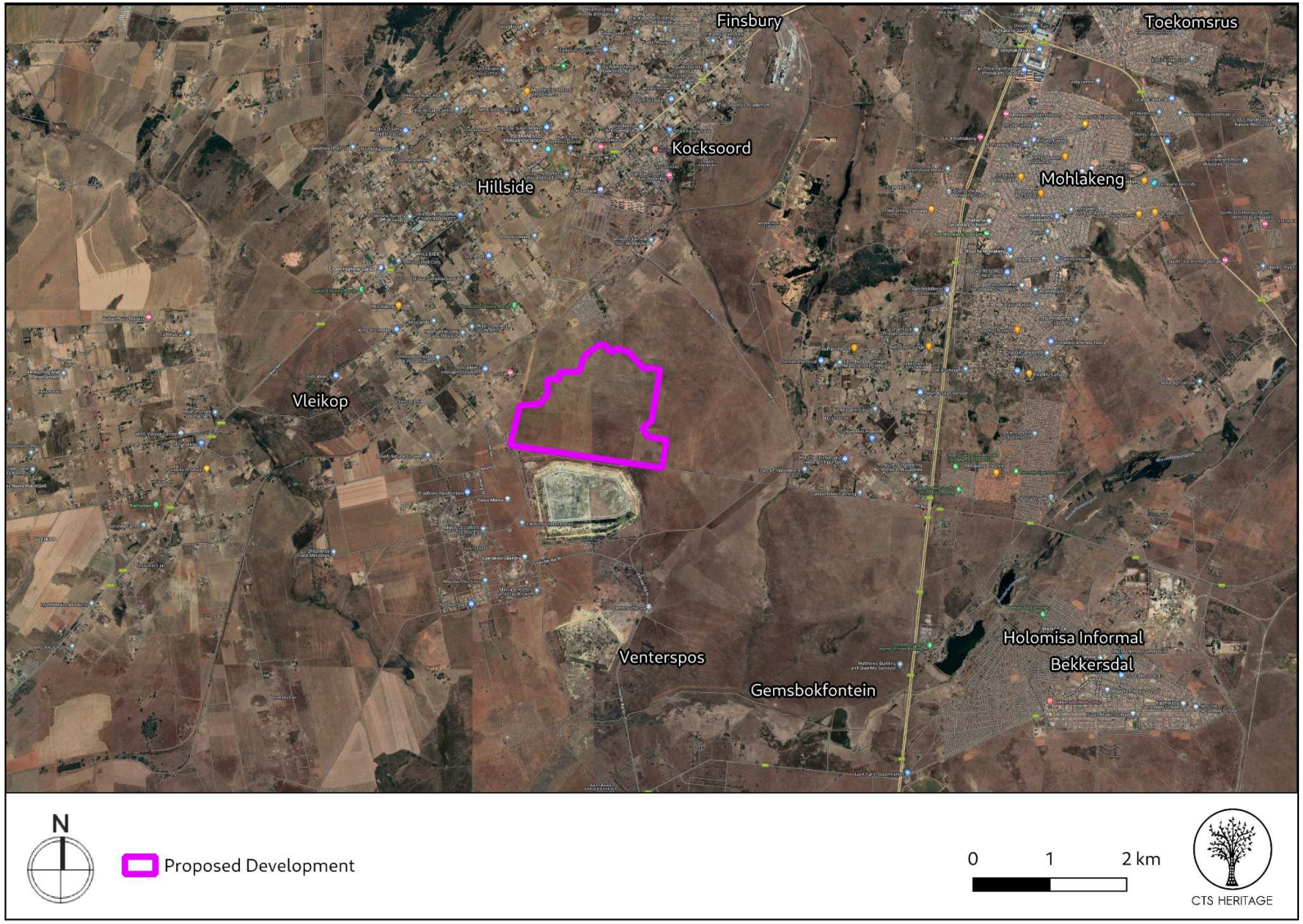

Figure 1.2: Proposed project boundary

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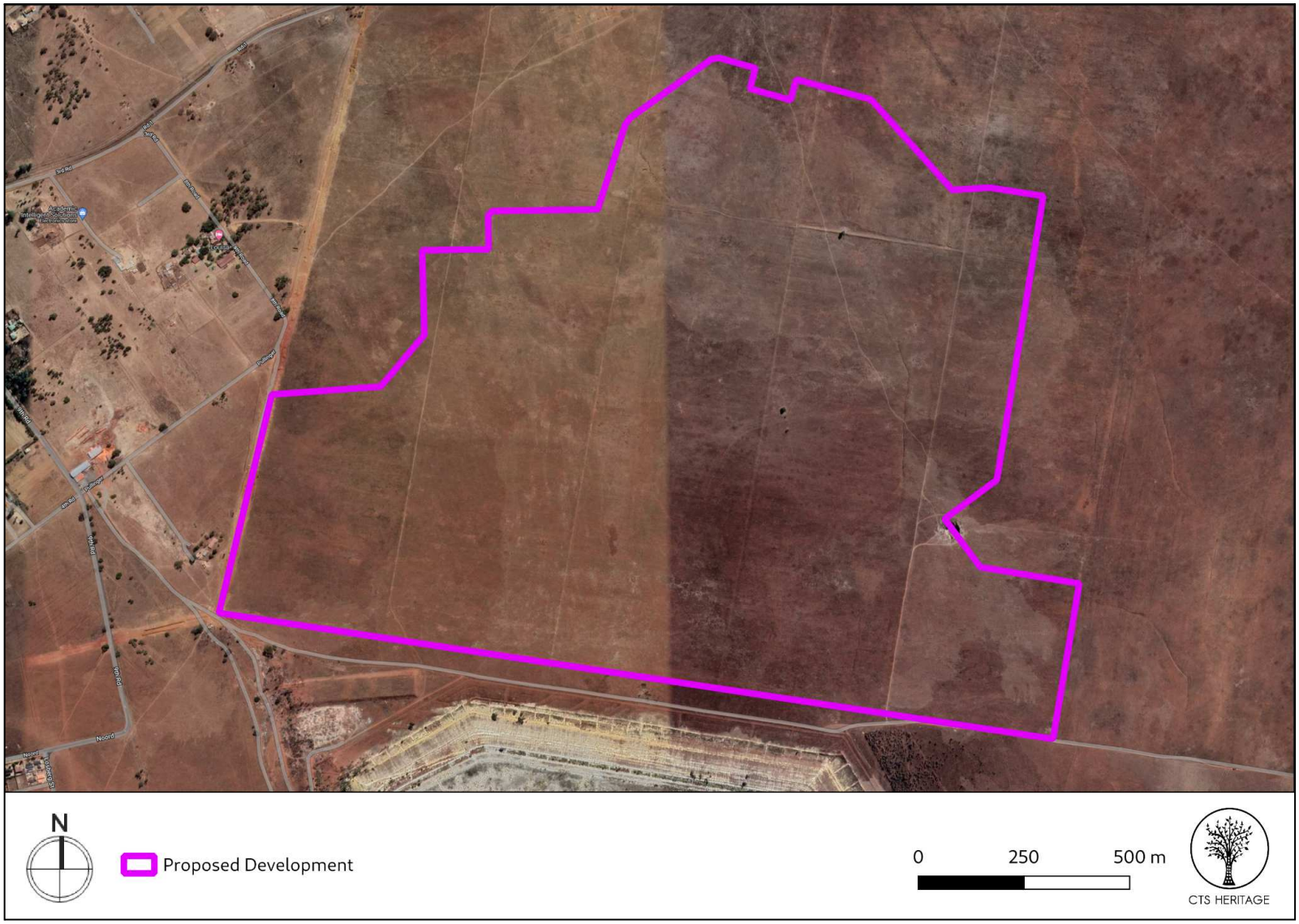

Figure 1.3: Proposed project boundary

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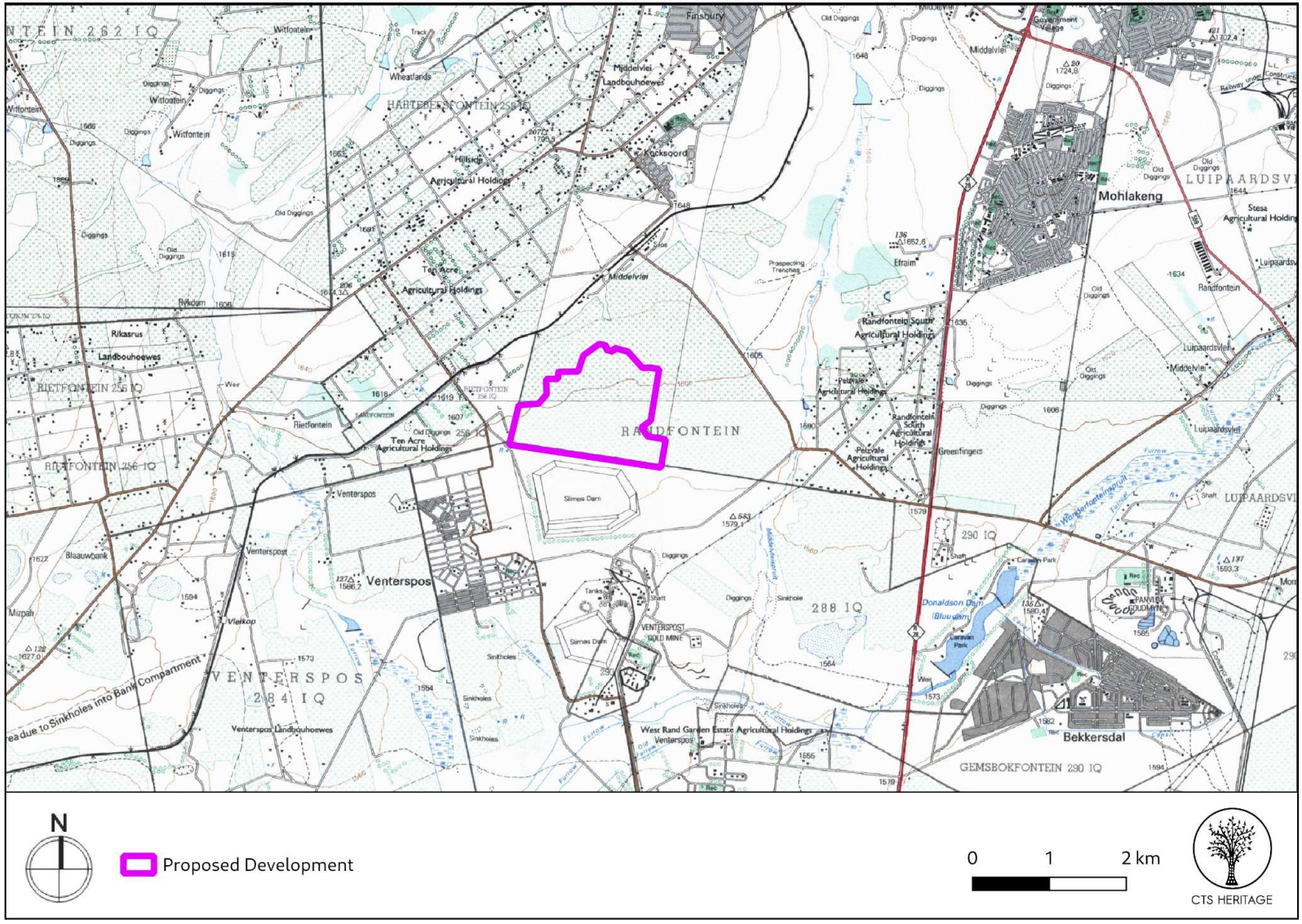

Figure 1.4: Proposed project boundary indicated on the 1:50 000 Topo Map

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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 15 January 2023 to determine what archaeological resources are likely to be impacted by the proposed development of the PV facility and grid connection.
- The area proposed for development was assessed on foot, photographs of the context and finds were taken, and tracks were recorded using a GPS.
- The identified resources were assessed to evaluate their heritage significance in terms of the grading system outlined in section 3 of the NHRA (Act 25 of 1999).
- Alternatives and mitigation options were discussed with the Environmental Assessment Practitioner.

2.3 Constraints & Limitations

The entire area was surveyed as best as possible and as the vegetation and environment allowed. The site is densely vegetated, severely affecting the surface's visibility. The initial topo maps indicated that the proposed study area was previously used for crop cultivation. The landowner also confirmed that the entire area was used to cultivate asparagus. Furthermore, there are no gates or fences, and access is available to the whole area.

Despite this, a thorough assessment of the archaeological sensitivity of the area was achieved.

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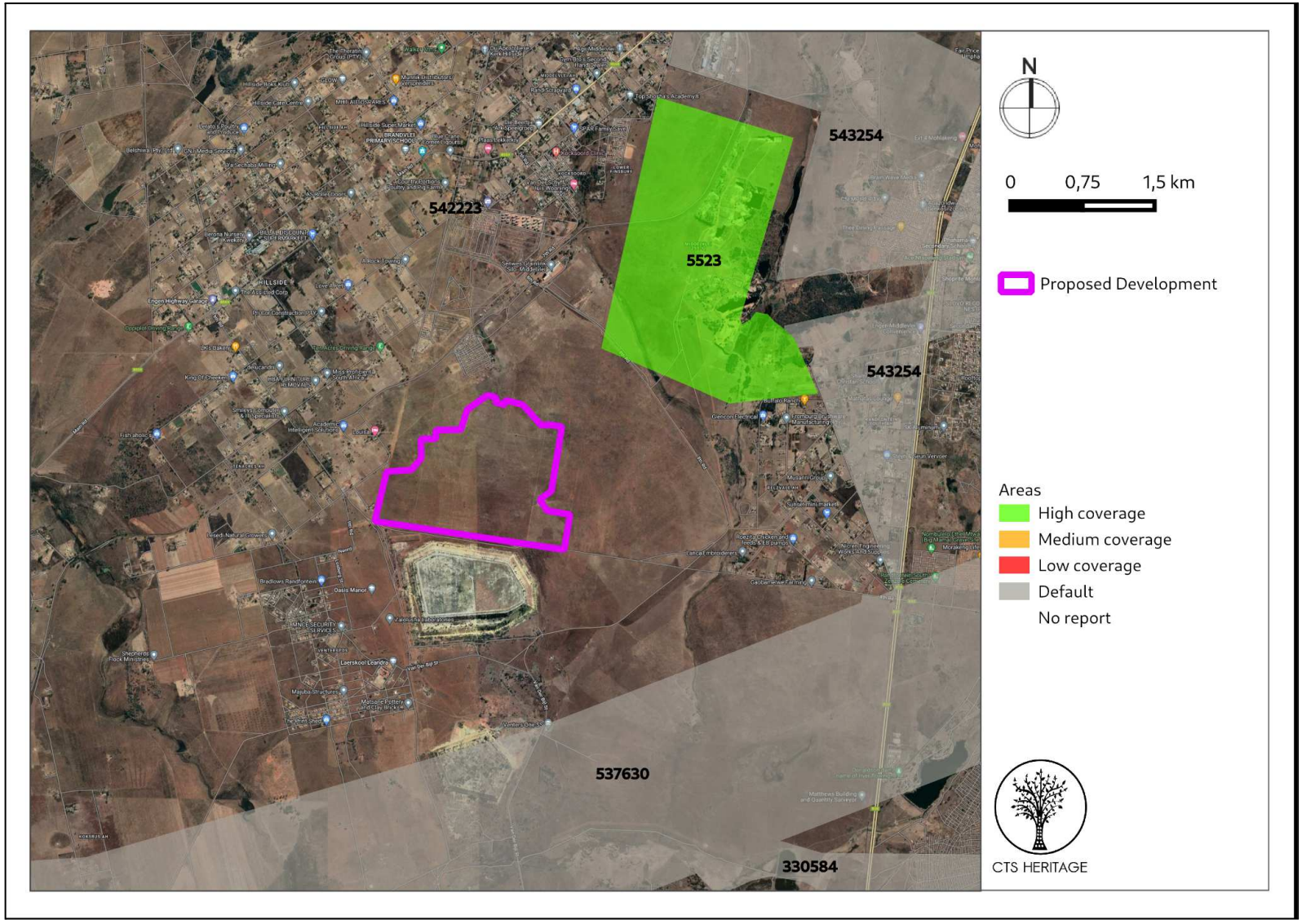

Figure 2: Close up satellite image indicating proposed location of development in relation to heritage studies previously conducted

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3. HISTORY AND EVOLUTION OF THE SITE AND CONTEXT

Background:

This application is for the proposed development of a PV Facility located west of Johannesburg, and directly north of Westonaria, north of the N12 and south of Randfontein. Westonaria was formed in 1948 by the amalgamation of the townships Venterspost, proclaimed in 1937, and Westonaria, proclaimed in 1938. According to Van der Walt (2017), "Westonaria was proclaimed in 1938 as a result of all the mining activities that took place in this area since 1910 when the first shaft – Pullinger Shaft was sunken. Venterspost town was proclaimed in 1937; Hillshaven, Glenharvie, Waterpan and Libanon were established as mining residential areas. Bekkersdal was established in 1945 and administered under Westonaria Town Council." In 1958, Lenasia was established as the "group area" for people of Indian descent living in Johannesburg at the onset of the Group Areas Act (1950). Many of its early residents were forcibly removed under the Group Areas Act from Pageview and the portion of Vrededorp populated by non-whites (jointly known as Fietas) and Fordsburg, areas close to the Johannesburg city centre, to Lenasia. As segregation grew it became the largest place where people of Indian extraction could legally live in the Transvaal Province.

Randfontein was established in 1890 to serve the new mine and was administered by Krugersdorp until it became a municipality in 1929. Apart from having the largest stamp mill in the world, Randfontein, like many of the other outlying areas of Johannesburg, is essentially a rural collection of farms and small holdings in a particularly beautiful part of Gauteng. There are a number of privately owned gold-mining township villages and contractor labour quarters established by the mining companies on land owned by the mines within the broader area. The area surrounding the proposed development is dominated by a cultural landscape that is shaped and defined by the historic and on-going mining activities associated with the Witwatersrand. A detailed archaeological background of the area is provided by Du Pisanie and Nel (2012, SAHRIS NID 104305) and is therefore not repeated here. In general, for the development of PV infrastructure and its associated grid connection infrastructure, it is preferred for such development to be clustered with existing development, such as mining or residential development, in order to reduce the perception of urban and infrastructure sprawl across an otherwise agricultural landscape.

There is a long history of gold and uranium mining in the broader West Rand area with an estimated 1.3 billion tonnes of surface tailings, containing in excess of 170 million pounds of uranium and 11 million ounces of gold. The origins of the South Deep Gold Mine extend to the 1950's when gold-producing conglomerates of the Ventersdorp Contact Reef and the Upper Elsburg were identified near Westonaria. This area has been subject to active mining since that time. As such, the immediate context of the proposed PV development is dominated by mining activities and agriculture. The proposed PV facility can provide a new layer on this complex cultural landscape.

Built Environment & Cultural Landscapes

According to Du Pisanie and Nel (2016, SAHRIS NID 356134), "With the onset of the Transvaal and South African Wars, Gatsrand became a strategic location for British troops who occupied Potchefstroom. This region was located in close proximity to the Western Railway, which provided a tactical advantage. To exploit and protect this advantage, three blockhouses were constructed on the farms Driefontein 113 IQ and Driefontein 355 IQ. These structures were not

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identified during the pre-disturbance survey and it is assumed that they no longer exist. The next major event to take place on this region was the discovery of gold, which facilitated the establishment of several towns from the 1920s, an increase in population and an increase in services. Early mines established include Venterspost (1934), Libanon (1936), West Driefontein (1945), East Driefontein (1968) and later Kloof (1968). Shaped by these events and activities the study area has through time transformed into a historic mining landscape." In their Heritage Impact Assessment located in an area that somewhat overlaps with the proposed development areas, Du Pisanie and Nel (2016, SAHRIS NID 356134) identified a number of heritage resources, the majority of which were determined to be not conservation-worthy. The nature of the resources identified include burials and burial grounds (graded IIIA) as well as historic and modern farm structures. Similar resources are likely to be present within the proposed development areas.

The broader area has significance resulting from its position along the South-Western Railway line developed to link the Southern Railway Line (1886) to the Rand Tram (1888) and lucrative mines to the east. A built heritage inventory of the infrastructure associated with railway development was completed in 2016 and through this process, a number of significant features were identified. Much of the infrastructure associated with this railway development remains present to the west of the development area and is mapped in Figure 3 above. While this infrastructure clearly has significance for the mining and industrial heritage of South Africa, it is unlikely that each identified feature is a Grade II heritage resource. Rather, all of the railway infrastructure identified through this inventory process may well have sufficient significance as a grouping to warrant Grade II significance. That being understood, it is unlikely that the proposed development of the PV facility will have a negative impact on any significant built environment resources associated with the railway line.

As such, it is not anticipated that any significant built environment or cultural landscape resources will be negatively impacted by the proposed development.

Archaeology

Archaeological sites spanning the Earlier, Middle and Later Stone Age, as well as sites pertaining to Iron Age farming communities have been found in the region despite the extensive agricultural transformation of the area. Archaeological resources from these technological periods have been identified in the vicinity of the project area by Huffman et al (1991), Schoeman and Barry (2004), Du Pisanie (2015), Van der Walt (2017) and De Bruyn (2020). Du PIsanie (2015) notes that, in the broader area, "Stone Age lithics recorded have been found as surface scatters outside of any discernible context thereby limiting the information potential and overall significance of these resources. Late Farming Community sites within the region have primarily been identified as stone walled settlements classified as Type N and Klipriviersberg." This finding is reiterated by Van der Walt (2017) who notes that "widely dispersed isolated lithics was recorded. These are made entirely from quartzite and consist of cores and flakes with faceted platforms characteristic of the Middle Stone Age. These artefacts are not in-situ and are scattered too sparsely to be of any significance…"

All of the known heritage resources located within the assessment area have been mapped in Figure 3. Despite the

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extensive past disturbance of the development area from historic cultivation and grazing, a number of burial ground sare known from the broader area. No known heritage resources are located within the area proposed for development, however, as it is known that significant heritage resources are located in this area, it is possible that there are more heritage resources located here that have not yet been identified. It is therefore possible that these resources will be impacted by the proposed development.

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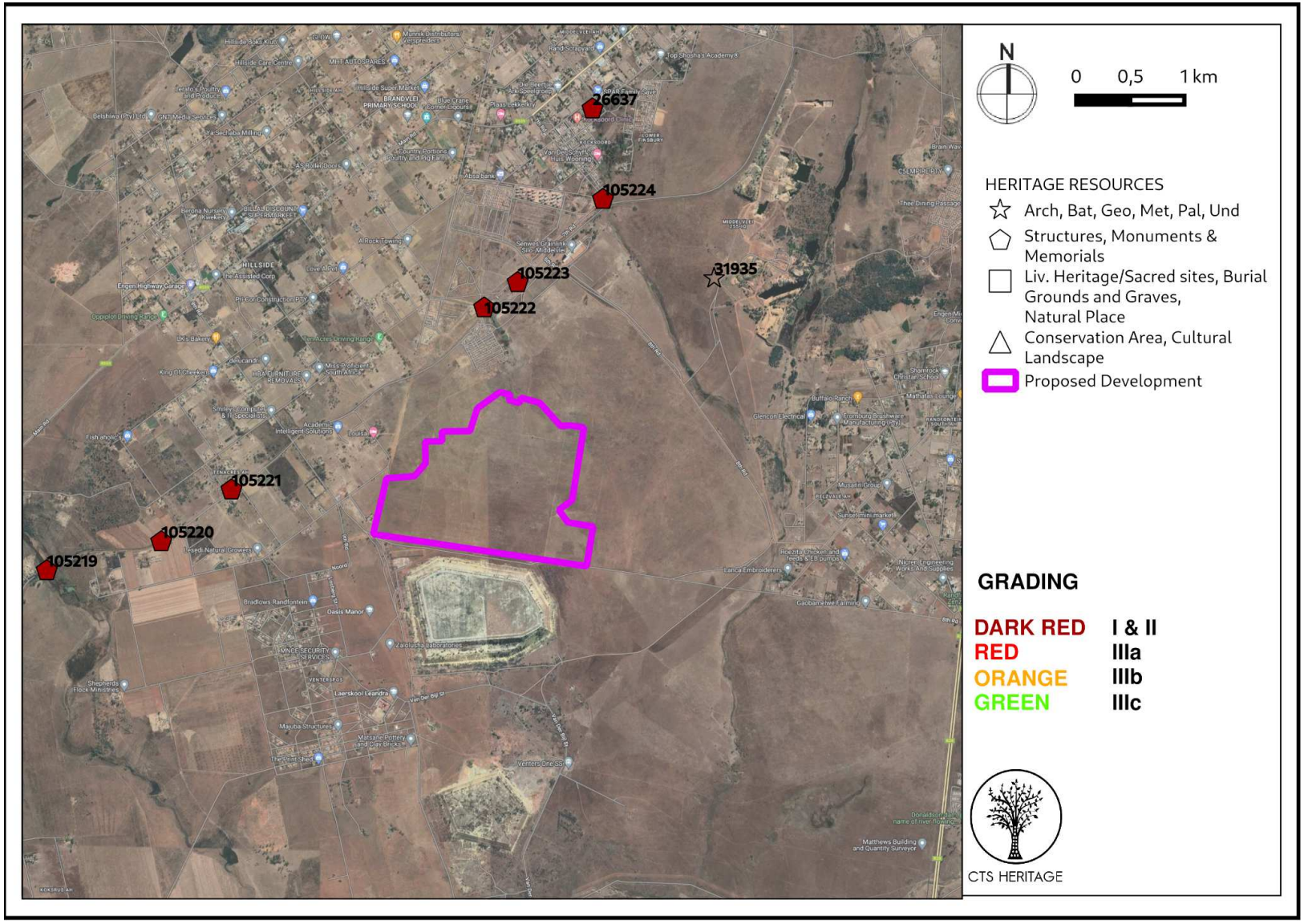

Figure 3. Heritage Resources Map. Heritage Resources previously identified in and near the study area, with SAHRIS Site IDs indicated

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4. IDENTIFICATION OF HERITAGE RESOURCES

4.1 Field Assessment

The field assessment was very thorough over the area proposed for the PV facility and no heritage resources of any significance were identified within the footprint of the PV facility.

One observation was made of the foundations of a broken-down structure which is likely associated with previous agricultural activities on this property. The date of the structure is unknown. However, it does not appear to have any archaeological or cultural significance. Furthermore, the modern material, such as plastic, fibreglass from a truck and plastic wiring, would suggest that the site may have been used recently or has been highly disturbed over the past few years. Therefore, the structure could likely be associated with previous farming activities.

It should be noted, however, that the structure and area around the structure were highly overgrown, thus affecting the surface visibility. Although it is very improbable, a midden or subsurface material may be nearby. The development area was formerly used for cultivation and as such, any surface cultural material would be considered low significance and out of context.

No graves were identified during the survey. The landowner mentioned that graves were recorded on another property towards the north; however, these graves are well outside the proposed development footprint.

Figure 4.1 Contextual Images - dried up water-source

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Figure 4.2 Contextual Images of informal settlement located adjacent to the site

Figure 4.3 Contextual Images of informal settlement located adjacent to the site

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Figure 4.4 Contextual Images - visible old crop rows

Figure 4.5 Contextual Images - illegal mining activity

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Figure 4.6 Contextual Images - refuse site 1

Figure 4.7 Contextual Images - refuse site 2

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Figure 4.8 Contextual Images - farm related features

Figure 4.9 Contextual Images - farm related features

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Figure 4.10 Contextual Images

Figure 4.11 Contextual Images

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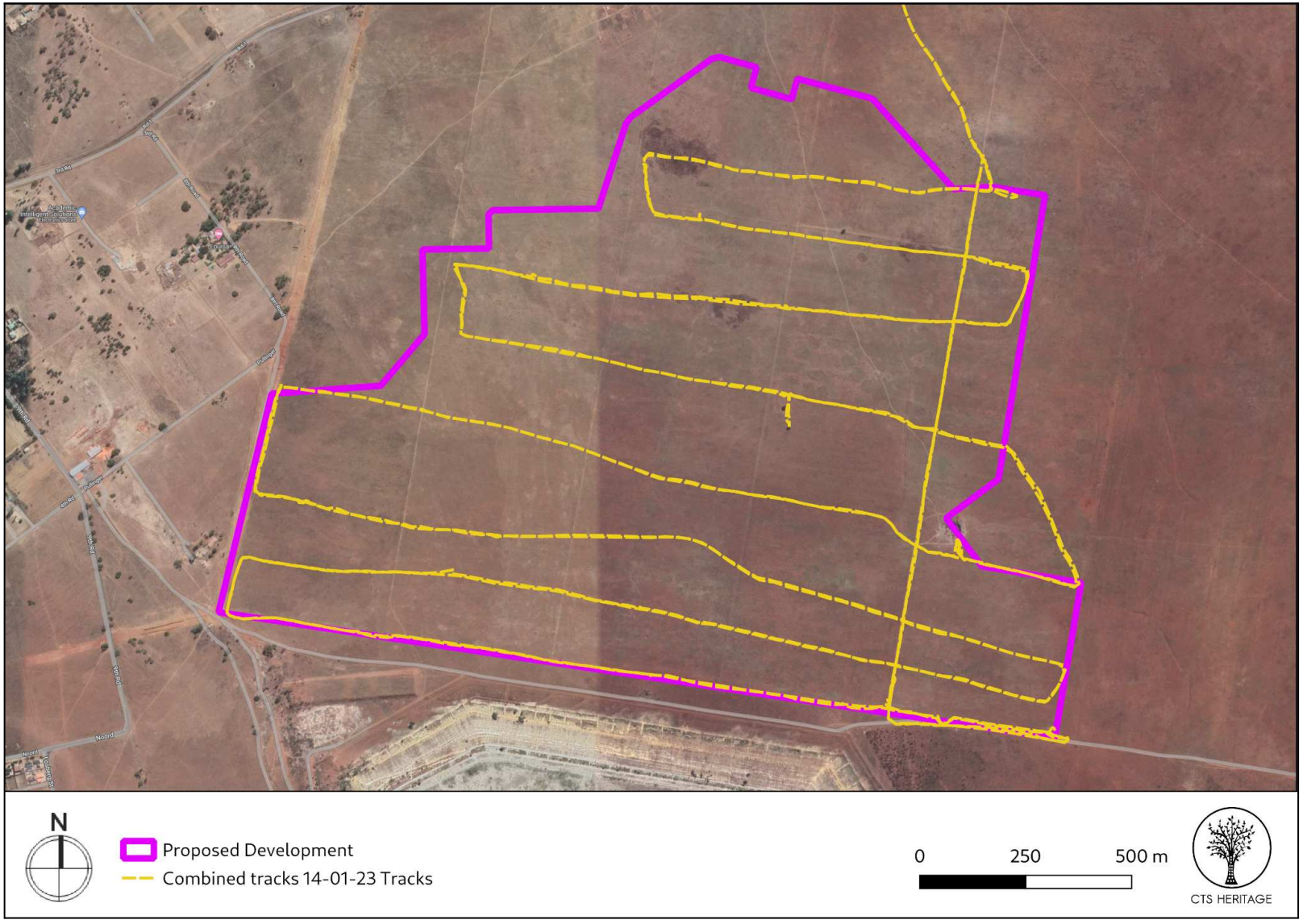

Figure 5.1. Track paths of archaeological field assessment

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4.2 Archaeological Resources identified

Table 1: Observations noted during the field assessment

POINT ID	Description	Density	Co-ordinates		Grading	Mitigation
005	Remains of a broken-down structure surrounded by Glass, plastic and ceramic, cement, brick, and fibreglass from the roof of a truck. The extent of the feature is unknown as it was covered by dense vegetation. It is unclear if the plastic, electrical wiring, and fibreglass may have been disposed of there later (as all material recorded was found on the surface). Due to dense vegetation and overgrowth of the structure and surrounds, it is unclear whether a midden with subsurface material may exist. The structure and recorded material do not appear to have any archaeological or cultural significance.	NA	26°15'29.65"S	27°38'48.89"E	NCW	NA

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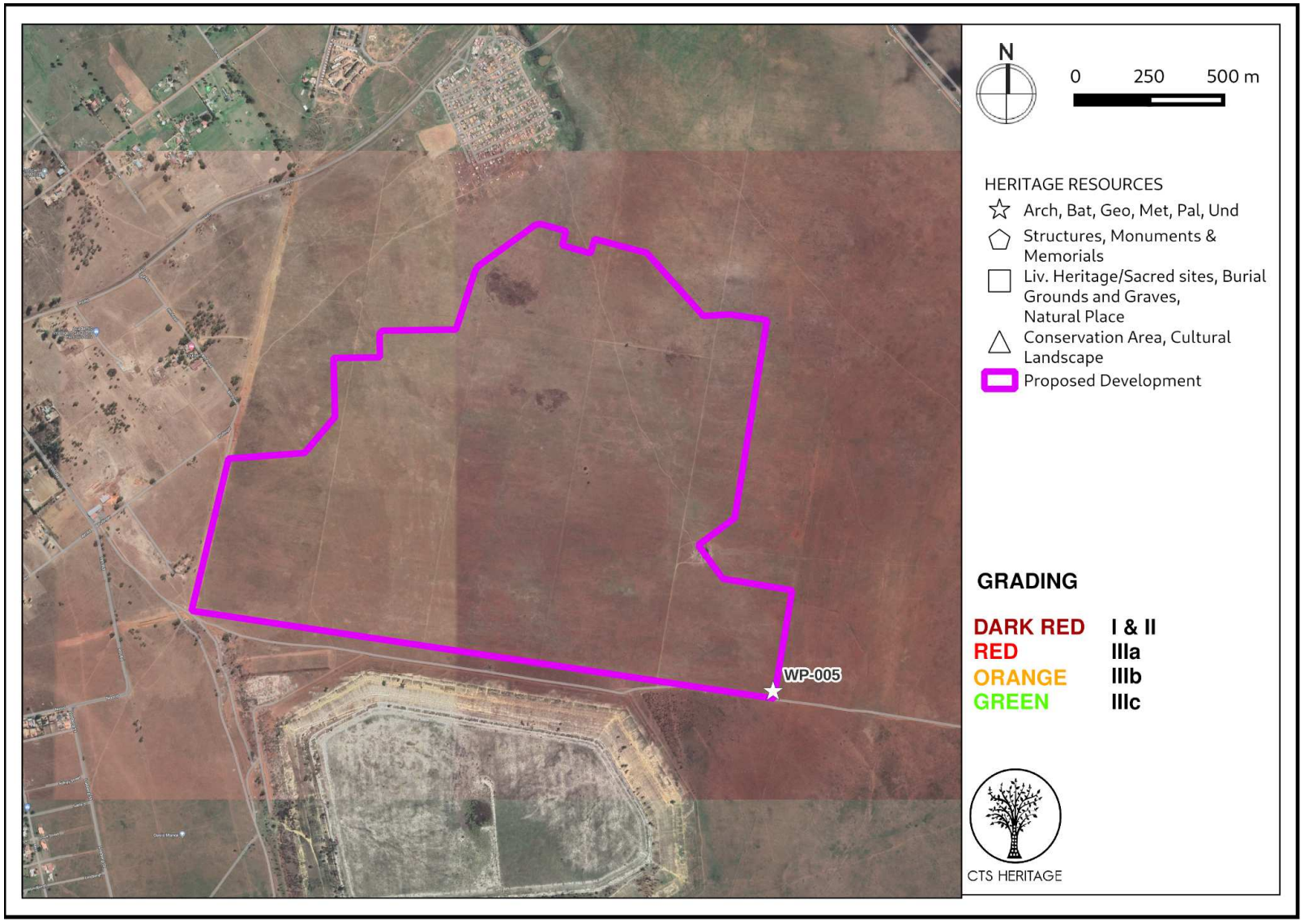

Figure 6.1: Map of all sites and observations noted within the development area

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4.3 Selected photographic record

(a full photographic record is available upon request)

Figure 7.1 005

Figure 7.2 005

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Figure 7.3 005

Figure 7.4 005

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Figure 7.5 005

Figure 7.6 005

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5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

5.1 Assessment of impact to Archaeological Resources

No significant heritage resources fall within the area PV layout provided and as such, no direct impact to any heritage resources is anticipated.

The identified structure (005) does not appear to have any archaeological or cultural significance; it has also been disturbed and therefore is considered to be Not Conservation-Worthy from an archaeological perspective – no mitigation is required.

No graves were identified. However, it is not uncommon to find graves in the area. Known graves are situated on other properties nearby. The area was densely vegetated; however, due to the majority of the land being formally utilised for cultivation, it is unlikely that there are any unmarked graves located here. However, all graves are highly significant and should not be disturbed through development activities.

6. CONCLUSION AND RECOMMENDATIONS

The survey proceeded with no constraints and limitations, and the project area was comprehensively surveyed for heritage resources. No significant heritage resources fall within the layout for the PV facility provided and as such, no direct impact to significant heritage resources is anticipated.

In order to ensure that no impact to the identified resources occurs during the construction or operational phases of the development, recommendations are made below.

Recommendations

There is no objection to the proposed development from an archaeological perspective on condition that:

- Should any buried archaeological resources or human remains or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.

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7. REFERENCES

Heritage Impact Assessments				
Nid	**Report Type**	**Author/s**	**Date**	**Title**
330584	Heritage Scoping	Justin du Piesanie	29/05/2015	Sibanye Gold Limited's West Rand Tailings Retreatment Project Heritage Scoping Report
356134	Heritage Impact Assessment Specialist Reports	Justin du Piesanie, Johan Nel	13/01/2016	Environmental Impact Assessment for Sibanye Gold Limited's West Rand Tailings Retreatment Project - Heritage Impact Assessment
374660	AIA Phase 1	Jaco van der Walt	13/10/2016	ARCHAEOLOGICAL IMPACT ASSESSMENT FOR THE PROPOSED MOHLAKENG X16 - TOWNSHIP DEVELOPMENT, GAUTENG PROVINCE
537630	HIA Phase 1	Wouter Fourie et al.	31/01/2019	Heritage Impact Assessment (HIA) for the new 400-kV Transmission line from the Pluto Substation to the Westgate Substation and for the loop ins/outs connecting the Hera-Westgate 400-kV line. West Rand District Municipality, Gauteng
590003	PIA Phase 2	Marion Bamford	11/09/2021	Palaeontological Impact Assessment for the proposed Eskom West Rand Strengthening Project Phase 2 Pluto Substation to Westgate Substation, Gauteng Province
543254	HIA Phase 1	Shannon Hardwick, Justin du Pisanie	26/10/2020	Heritage Impact Assessment: Basic Assessment Process for the Closure of the Cooke Underground Operations
5523	AIA Phase 1	Polke Birkholtz	08/04/2003	Cultural Heritage Assessment as Part of the EMP Report for the Proposed Impafa/Pamodzi OpenCape Archaeological Survey CCt Gold Mine on the Farm Middelvlei 255 IQ
407548	Jaco van der Walt	14/08/2017	HIA Phase 1	HERITAGE IMPACT ASSESSMENT (REQUIRED UNDER SECTION 38(8) OF THE NHRA (No. 25 OF 1999) FOR THE PROPOSED SOUTH DEEP SOLAR PV PROJECT, WESTONARIA, GAUTENG PROVINCE

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FIELD NOTES

Phase 1 Archaeological/Heritage Impact Assessment

Site ID: SAVANNAH PV Middelvlei Solar, Gauteng Province

Phase 1 survey conducted				
CRM Archaeologist	Sky-Lee Fairhurst		Date/s	14-01-2023
Additional surveyors	Francois Booyse			
Type of survey	Pedestrian/Vehicular		Transects	Dictated by landscape
Technical equipment	GPS	Locus App	Camera	Canon EOS 1300D

PROJECT PARTICULARS

Technical information

Project description	
Project name	**CTS22_253 Savannah** Montrose
Description	Proposed development of the Middelvlei Solar, 120MW Solar PV Project, Gauteng Province
Developer	
Development type	Solar Power Infrastructure
Consultants	
Environmental	Savannah
Heritage and archaeological	CTS Heritage and UBIQUE Heritage Consultants
Paleontological	
Property details	
Province	Gauteng
District municipality	West rand
Local municipality	Rand West City
Topo-cadastral map	2627BA and 2627BC
Farm name	Portion 132 (a portion of portion 6) of the Farm Middelvlei 255 IQ
Closest town	Randfontein
GPS Co-ordinates	26°15'4.04"S 27°38'15.03"E
Development footprint size	204.44 ha
Land use	

Previous	Agriculture
Current	Agriculture
Rezoning required	No
Sub-division of land	No

Development criteria in terms of Section 38(1) NHRA	Yes/No
Construction of a road, wall, power line, pipeline, canal or other linear forms of development or barrier exceeding 300m in length.	Yes
Construction of bridge or similar structure exceeding 50m in length.	No
Construction exceeding 5000m ^{2}.	No
Development involving three or more existing erven or subdivisions.	No
Development involving three or more erven or divisions that have been consolidated within the past five years.	No
Rezoning of site exceeding 10 000m ^{2}.	No
Any other development category, public open space, squares, parks, recreation grounds.	No

GENERAL ENVIRONMENT, INFRASTRUCTURE AND LANDSCAPE

Site description

Description of the general area affected by development	
Type of environment	
Carletonville Dolomite Grassland	
Terrain description	
The study area consists of a gentle to medium undulating landscape. The terrain slopes gently from the north to the south.	
Geology	
Dolomite and chert of the Malmani Subgroup.	
Vegetation	
The area is densely vegetated with various grass, plant and tree species. Some of the plant species observed appear to belong to the species *of Helichrysum, Helianthus annuus, Hyparrhenia hirta, eragrostis chloromelas, Schizachyrium sanguineum, Eragrostis curvula, Panicum coloratum.*	
Waterways/sources	
A dried-up water source runs through the property.	
Site boundaries	
Dirt roads and farmlands bound the site to the north, south, east and west. A slimes dam is located south of the site, and an informal settlement is to the north.	
Site access	GPS Co-ordinates
The site can be accessed via a dirt road from the south. Furthermore, there are no gates or fences, and access is available to the whole area.	26°15'28.80"S 27°38'35.38"E

Disturbances	
Natural erosion	Animal grazing. The surveyed area was formerly an Asparagus farm, and some crop rows are still visible. A large hole in the eastern portion of the site (WP - 003) appears to be a sinkhole (currently used as a refuse disposal site). A dried-up water source runs through the property.
Human-made	The refuse dumping site appears to be used by the nearby informal settlement. The area is polluted with modern refuse (specifically near the dumping area). Debris from the refuse can be found throughout the site but is most prominent in the eastern portion. Another hole was discovered – which appears to be related to illegal mining activity in the southern portion of the property. Various ropes, wires and a tire were found near the hole's entrance. The retaining wall remains (WP - 002) can be found near the dried-up water source and are possibly related to previous farming activities. Other human-made related features include boundary markers, a ditch, and a heap of stones (not a grave) which appear to have been placed there through scraping activities.
Notes	
The entire area was surveyed as best as possible and as the vegetation and environment allowed. The site is densely vegetated, severely affecting the surface's visibility. The initial topo maps indicated that the proposed study area was previously used for crop cultivation. The landowner also confirmed that the entire area was used to cultivate asparagus. An informal settlement is located near the northernmost section of the site. There appears to be human foot traffic from the informal settlement through the site (mainly to the refuse dumping area), and several pathways can be found throughout the site. A slimes dam is located near the southernmost section of the property. The possible illegal mine entrance is located approximately 200 m away from the slimes dam (on the property). Another dumping site (albeit much smaller than the first – situated near the northeastern section, just outside of the property) was noted.	

Environmental recording

Way point	Photo number	Description	Location
Site-specific points of interest/ natural significance			
N/A	Folder Environment	Due to the similarity of the environment throughout the study area, a sample of representative photographs is provided.	**Various**
WP - 003	Folder Environmental disturbances/Refuse site 1	The sinkhole and refuse dumping site	**26°15'16.19"S** **27°38'41.45"E**

WP - 004	Folder Environmental disturbances/Illegal mining activity	Possible illegal mining activity	**26°15'21.16"S 27°38'19.42"E**
WP - 001	Folder Environment/Informal settlement	Informal settlement – can also be seen on Google Earth. However, it does appear to have expanded more from the time the Google Earth satellite images were taken	**26°14'32.61"S 27°38'12.49"E**
N/A	Folder Farm-related features/8651	Various boundary markers were noted, specifically near the slimes dam.	**26°15'28.48"S 27°38'39.40"E** **26°15'26.90"S 27°38'27.01"E** **26°15'25.14"S 27°38'14.88"E** **26°15'23.48"S 27°38'2.80"E** **26°15'21.87"S 27°37'50.04"E**
WP - 002	Folder Farm-related features/8564, and 8567	Remains of a retaining wall	**26°14'49.97"S 27°38'19.25"E**
WP - 007	Folder Environmental disturbances/Refuse site 2	Second dumping site	**26°15'28.95"S 27°38'39.93"E**
N/A	Folder Environment/Dried up water source	Dried-up water source	**Various**
N/A	Folder Environment/Visible old crop rows	Example of some of the more prominent crop rows (found throughout the property)	**N/A**
N/A	Folder Environmental disturbances/8547, 8577, 8578	Human disturbances, such as refuse found throughout the site	**N/A**
WP-008	Folder Environmental disturbances/8687-8690	Ceramic insulator debris	**26°15'27.45"S 27°38'35.04"E**

HERITAGE RESOURCES RECORDING

Stone Age Resources Identified

Point ID & Site #	Photo #	Description		Period	Location	Field rating/ Significance / Recommended Mitigation
N/A		Type lithic/s				
		Raw material				
		N in m².				
		Context				
		Additional				

Historical Period/Modern Resources Identified

Point ID & Site #	Photo #	Description		Period	Location	Field rating/ Significance / Recommended Mitigation
WP-005 AND 006	8660-8681	Type of feature	Remains of a broken-down structure	Unknown	26°15'29.65"S 27°38'48.89"E 26°15'29.22"S 27°38'49.38"E	NCW
		Material	Glass, plastic and ceramic, cement, brick, and fibreglass from the roof of a truck.			
		N in m².	The extent of the feature is unknown as it was covered by dense vegetation.			
		Context	The structure could have been associated with previous farming activities.			
		Additional	It is unclear if the plastic, electrical wiring, and fibreglass may have been disposed of there later (as all material recorded was found on the surface). Due to dense vegetation and overgrowth of the structure and surrounds, it is unclear whether a midden with subsurface material may exist. The structure and recorded material do not appear to have any archaeological or cultural significance.			

Iron Age/ Agri-pastoral Early Farming Communities Resources Identified

Point ID & Site #	Photo #	Description		Period	Location	Field rating/ Significance / Recommended Mitigation
N/A		Type of feature				
		Material				
		N in m².				
		Context				
		Additional				

Graves Identified

Point ID & Site #	Photo #	Description		Period	Location	Field rating/ Significance/ Recommended Mitigation
N/A		Grave markers				
		Inscription				
		Graves' Orientation				
		Dimensions/ Extent				
		Additional				

Intangible Heritage Resources/ Cultural Landscape Identified

Point ID & Site #	Photo #	Description		Period	Location	Field rating/ Significance/ Recommended Mitigation
N/A		Nature				
		Cultural evidence				
		Access				
		Affected community				
		Additional				

IDENTIFIED HERITAGE RESOURCES DISCUSSION

Specialist comments

Stone Age finds
N/A
Iron Age/ Agri-pastoralist Early Farming communities finds
N/A
Historical finds
The date of the structure is unknown. However, it does not appear to have any archaeological or cultural significance. Furthermore, the modern material, such as plastic, fibreglass from a truck and plastic wiring, would suggest that the site may have been used recently or has been highly disturbed over the past few years. Therefore, the structure could likely be associated with previous farming activities. It should be noted, however, that the structure and area around the structure were highly overgrown, thus affecting the surface visibility. Although it is very improbable, a midden or subsurface material may be nearby.
Identified graves
No graves were identified during the survey. The landowner mentioned that graves were recorded on another property towards the north; however, these graves are well outside the proposed development footprint.
Intangible Heritage/ Cultural Landscape
N/A
Other
The area was formerly used for cultivation. Therefore, any surface cultural material would be considered low significance and out of context.

IDENTIFIED HERITAGE RESOURCES MITIGATION

Specialist recommendations

Stone Age finds
N/A
Iron Age/ Agri-pastoralist Early Farming communities finds
N/A
Historical finds

The structure does not appear to have any archaeological or cultural significance; it has also been disturbed and therefore is considered low significance – no mitigation is required.
Identified graves
No graves were identified. However, it is not uncommon to find graves in the area. Known graves are situated on other properties nearby. The area was densely vegetated; however, due to the majority of the land being formally utilised for cultivation, it is unlikely that there are any unmarked graves. However, all graves are highly significant. Therefore, we recommend that a Protocol for the Chance Finds of Human Remains be compiled to recognise and deal with unmarked graves that may be unearthed by excavation and construction activities.
Intangible Heritage/ Cultural Landscape
N/A
Other
The topo maps (of 2002) indicate that the entire area was cultivated, which was also confirmed by the landowner.

ADDITIONAL NOTES AND RESOURCES

Attached Field Data

Filename	File type	Description
FIELD SURVEY MONTROSE>PHOTOS	Folder, jpg.	Folders named "Environment", "Structural feature", "Environmental disturbances", and "farm-related features" with photographs of the surveyed area and cultural material found.
FIELD SURVEY RIETFONTEIN>WAYPOINTS AND TRACKS>Combined tracks 14-01-23	KML	Survey tracks of the study area, combined files from tracks recorded on Samsung A10 and Samsung A52 with the Locus Map app.
FIELD SURVEY RIETFONTEIN>WAYPOINTS AND TRACKS>POSSIBLE HERITAGE RESOURCES>WP 005-006	KML	Waypoints recorded cultural material found.
FIELD SURVEY RIETFONTEIN>WAYPOINTS AND TRACKS>HERITAGE>ADDITIONAL WAYPOINTS>WP 001-004, 007-008	KML	Additional waypoints of additional features recorded on the property.
Additional Notes		
The area was surveyed as best as possible and as vegetation growth and erosion allowed. The survey tracks followed the landscape. Although the area was densely vegetated, the fact that the entire area was initially cultivated land, with certain portions being highly disturbed due to refuse dumping, would suggest that any above-ground material is out of context and thus considered to be not conservation worthy.		

UBIQUE
HERITAGE CONSULTANTS

SKY-LEE FAIRHURST
ARCHAEOLOGIST
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Declaration of independence:

I, Sky-Lee Fairhurst, hereby confirm my independence as a heritage specialist and declare that:

- I am suitably qualified and accredited to act as an independent specialist in this application;
- I do not have any vested interests (either business, financial, personal or other) in the proposed development project other than remuneration for the heritage assessment and heritage management services performed;
- The work was conducted objectively and ethically, in accordance with a professional code of conduct and within the framework of South African heritage legislation.

Signed: 

S. Fairhurst

Date: 2023-01-17

UBIQUE Heritage Consultants

SKY-LEE FAIRHURST

CRM ARCHAEOLOGIST

Sky-Lee Fairhurst has been part of UBIQUE Heritage Consultants since 2019. She is responsible for research, desktop studies, report compilation and surveys. Miss Fairhurst obtained her BA in Archaeology and Biblical archaeology in 2016 and her BA Hons in Archaeology (*cum laude*) at the University of South Africa (UNISA) in 2018, focussing on research themes such as gender, households and Late Iron Age settlements. She is currently pursuing her interest in southern African agropastoral societies as an MA Archaeology student at the University of South Africa (UNISA). She is skilled at artefacts and archaeological illustrations. Over the past nine years, she has obtained considerable excavation and survey experience and worked on various sites, including Historical, Iron Age, and Palaeontological sites.

APPENDIX 2: Palaeontological Assessment (2023)

Palaeontological Impact Assessment for the proposed Montrose Solar Energy Facility near Venterspos, Gauteng Province

CTS22_253_Savannah_Montrose

Site Visit Report (Phase 2)

For

CTS Heritage

10 February 2023

Prof Marion Bamford
Palaeobotanist
P Bag 652, WITS 2050
Johannesburg, South Africa
Marion.bamford@wits.ac.za

Expertise of Specialist

The Palaeontologist Consultant: Prof Marion Bamford
Qualifications: PhD (Wits Univ, 1990); FRSSAf, ASSAf
Experience: 34 years research; 26 years PIA studies

Declaration of Independence

This report has been compiled by Professor Marion Bamford, of the University of the Witwatersrand, sub-contracted by CTS Heritage, Simons Town, South Africa. The views expressed in this report are entirely those of the author and no other interest was displayed during the decision making process for the Project.

Specialist: Prof Marion Bamford

Signature: 

Executive Summary

A Palaeontological Impact Assessment was completed for the Middelvlei Solar Energy Facility on Portion 132 (a portion of portion 6) of the Farm Middelvlei 255 IQ, (known as Middelvlei Solar) located on a site approximately 7km south-west of the town of Randfontein in the Gauteng Province. The Applicant is Portion 132 Middelvlei (Pty) Ltd, a special purpose vehicle (SPV) of Sigma Solar Africa Pty Ltd. It will have a contracted capacity of up to 120MW. The development area is situated within the Rand West City Local Municipality within the West Rand District Municipality.

To comply with the regulations of the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA), a site visit (Phase 2) Palaeontological Impact Assessment (PIA) was completed for the proposed development.

The proposed site lies on the potentially fossiliferous Malmani Subgroup (Transvaal Supergroup) that could preserve trace fossils such as stromatolites or microbialites in the dolomites. The site visit and walk through in early February 2023 (summer) by the palaeontologists confirmed that the entire area is covered in soils and secondary grassland. There were no dolomites visible and no stromatolites. The SEF footprint has been planted for asparagus in the past so the land is slightly sloping but with regular ridges for the crop. Nonetheless, a Fossil Chance Find Protocol should be added to the EMPr. Based on this information it is recommended that no further palaeontological impact assessment is required unless fossils are found by the contractor, developer, environmental officer or other designated responsible person once excavations for pole foundations or solar collectors and infrastructure have commenced. Since the impact will be low, as far as the palaeontology is concerned, the project should be authorised.

Table of Contents

1. Background

The Applicant, Portion 132 Middelvlei (Pty) Ltd, a special purpose vehicle (SPV) of Sigma Solar Africa Pty Ltd, is proposing the construction of a photovoltaic (PV) solar energy
facility (known as Middelvlei Solar) located on a site approximately 7km south-west of the town of Randfontein in the Gauteng Province. The Solar PV facility will be developed on Portion 132 (a portion of portion 6) of the Farm Middelvlei 255 IQ and will comprise several arrays of single axis tracking solar PV panels and associated infrastructure. It will have a contracted capacity of up to 120MW. The development area is situated within the Rand West City Local Municipality within the West Rand District Municipality (Figures 1-3).

The site is accessible via existing gravel roads that provide access to the development area. The project infrastructure will include:

- Solar PV Plant comprising approximately 220 000 PV panels on single axis tracking PV modules
- Inverters and transformers (up to 120MW)
- Cabling between the panels
- Onsite facility substation, including
    - a Twin-Tern Conductor ~379 MVA.
    - Substation capacity - 2x 80 MVA,
    - 132/33 kV substation ~ 50 x 70 m2 - including Eskom metering site.
- Cabling from the onsite substation to the collector substation (either underground or overhead)
- Electrical and auxiliary equipment required at the collector substation that serves the solar energy facility, including switchyard/bay, control building, fences, etc.
- Battery Energy Storage System (BESS)
- Site and internal access roads (up to 8m wide)
- Temporary and permanent laydown area
- Operations Building of ~180 sqm

The property, Portion 132 of the Farm Middelvlei 255 IQ, has an extent of 204.44ha, of which 200ha will be developed for the project. The site is a vacant stand with sufficient space to construct the 120MW PV facility and associated infrastructure. The site will provide the opportunity for the optimal placement of the infrastructure, while ensuring avoidance of major identified environmental sensitivities. To avoid areas of potential sensitivity and to ensure that potential detrimental environmental impacts are minimised as far as possible, the full extent of the project site will be considered in the Scoping Phase, and a development footprint within which the infrastructure of the PV facility and associated infrastructures will be located will be fully assessed during the EIA Phase.

A Palaeontological Impact Assessment was requested for the Montrose-Middelvlei Solar PV 1 project. To comply with the regulations of the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA), a site visit and walkthrough (Phase 2) Palaeontological

Impact Assessment (PIA) was completed for the proposed development and is reported herein.

Table 1: National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and Environmental Impact Assessment (EIA) Regulations, 2014 (as amended) - Requirements for Specialist Reports (Appendix 6).

	A specialist report prepared in terms of the Environmental Impact Regulations of 2017 must contain:	**Relevant section in report**
ai	Details of the specialist who prepared the report,	Appendix B
aii	The expertise of that person to compile a specialist report including a curriculum vitae	Appendix B
b	A declaration that the person is independent in a form as may be specified by the competent authority	Page
c	An indication of the scope of, and the purpose for which, the report was prepared	Section 1
ci	An indication of the quality and age of the base data used for the specialist report: SAHRIS palaeosensitivity map accessed – date of this report	Yes
cii	A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change	Section 5
d	The date and season of the site investigation and the relevance of the season to the outcome of the assessment	N/A
e	A description of the methodology adopted in preparing the report or carrying out the specialised process	Section 2
f	The specific identified sensitivity of the site related to the activity and its associated structures and infrastructure	Section 4
g	An identification of any areas to be avoided, including buffers	N/A
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;	N/A
i	A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 5
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 4
k	Any mitigation measures for inclusion in the EMPr	Section 8, Appendix A
l	Any conditions for inclusion in the environmental authorisation	N/A
m	Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 8, Appendix A

	A specialist report prepared in terms of the Environmental Impact Regulations of 2017 must contain:	**Relevant section in report**
ni	A reasoned opinion as to whether the proposed activity or portions thereof should be authorised	Section 6
nii	If the opinion is that the proposed activity 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	Sections 6, 8
o	A description of any consultation process that was undertaken during the course of carrying out the study	N/A
p	A summary and copies of any comments that were received during any consultation process	N/A
q	Any other information requested by the competent authority.	N/A
2	Where a government notice gazetted 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.	N/A

Figure 1: Google Earth map of the proposed development showing the Montrose SEF cluster area (red) and the relevant landmarks.

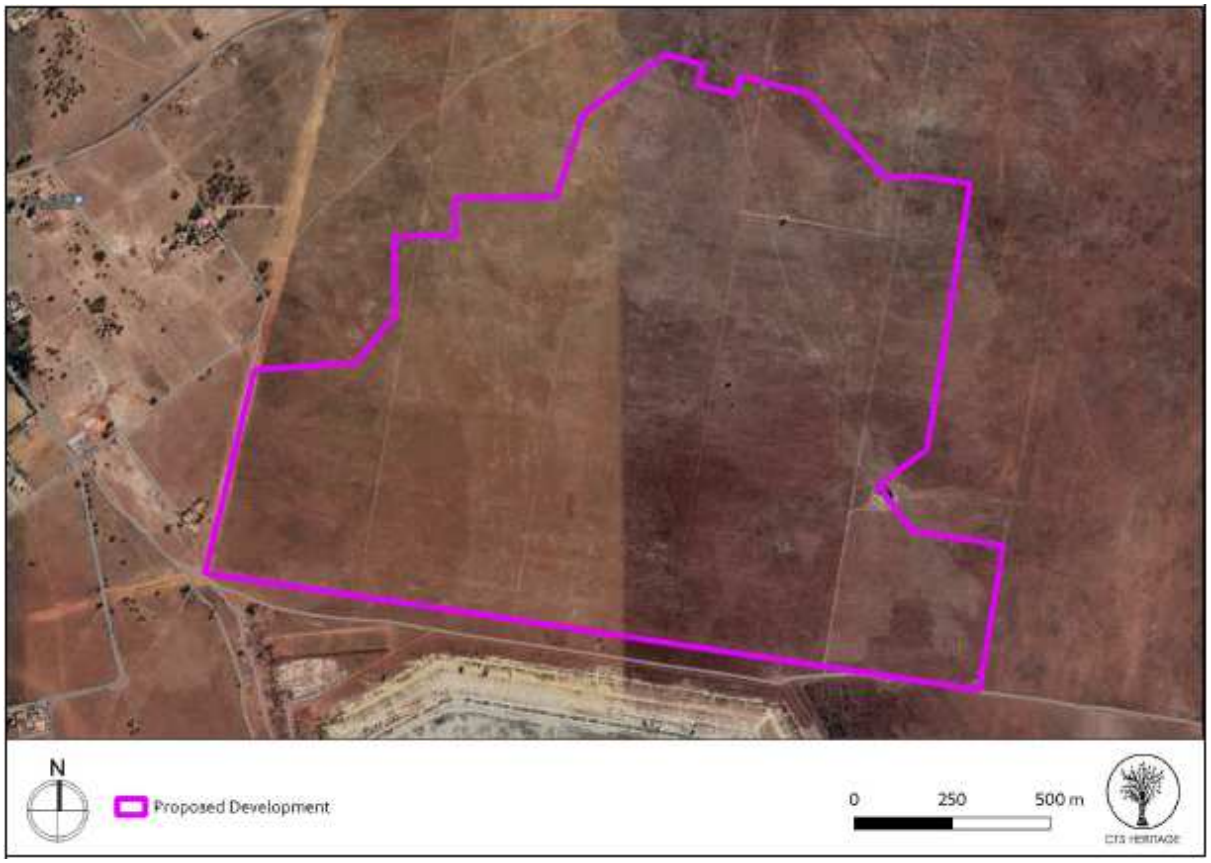

Figure 2: Google Earth map for the proposed Montrose PV site (lilac outline) on the Farm Middelvlei. (Map from the CTS22_235 heritage screener).

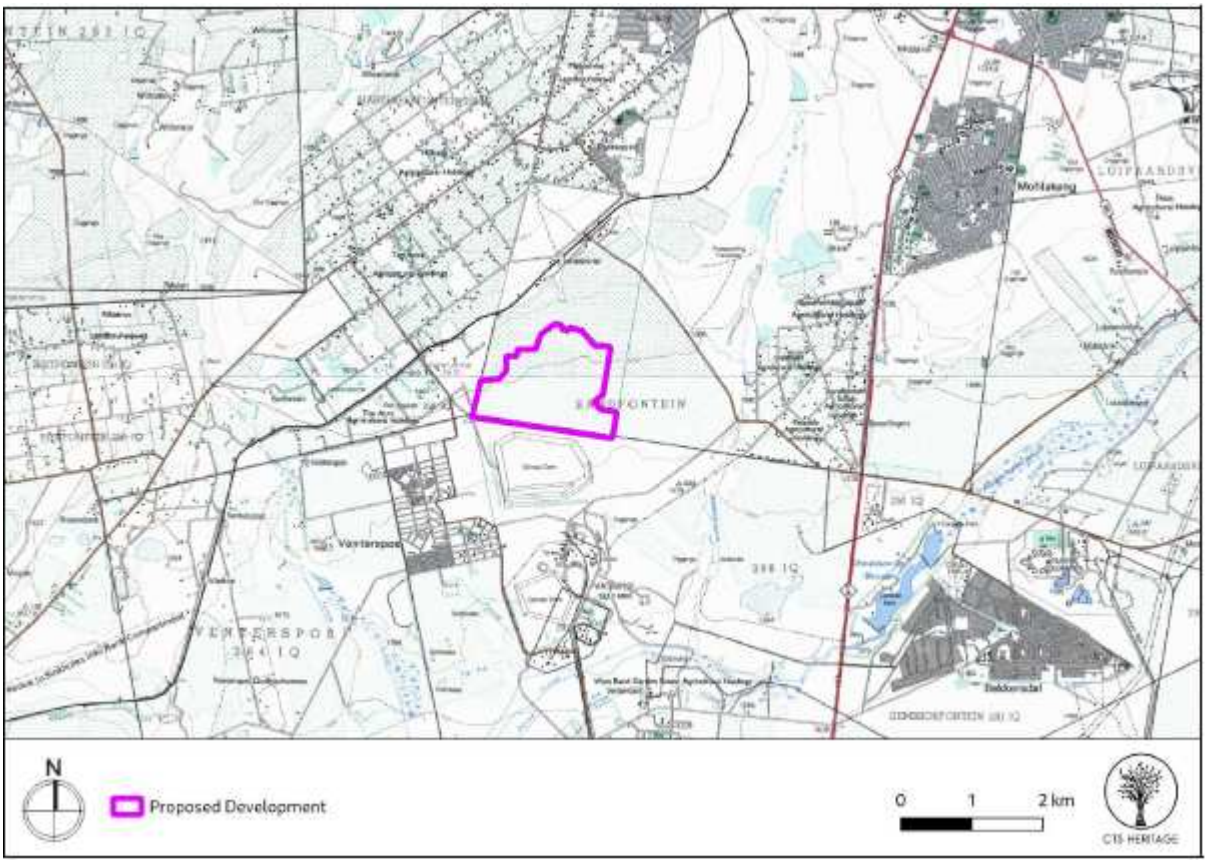

Figure 3: Topographic map to show the extent of the proposed Montrose/Middelvlei SEF (lilac outline).

2. Methods and Terms of Reference

The Terms of Reference (ToR) for this study were to undertake a PIA and provide feasible management measures to comply with the requirements of SAHRA.
The methods employed to address the ToR included:

1. Consultation of geological maps, literature, palaeontological databases, published and unpublished records to determine the likelihood of fossils occurring in the affected areas. Sources included records housed at the Evolutionary Studies Institute at the University of the Witwatersrand and SAHRA databases;
2. Where necessary, site visits by a qualified palaeontologist to locate any fossils and assess their importance, as is the case here;
3. Where appropriate, collection of unique or rare fossils with the necessary permits for storage and curation at an appropriate facility (*not applicable to this assessment*); and
4. Determination of fossils' representivity or scientific importance to decide if the fossils can be destroyed or a representative sample collected (*not applicable to this assessment*).

3. Geology and Palaeontology

i. Project location and geological context

Figure 4: Geological map of the area around the Farm Middelvlei 255 IQ with the project footprint indicated by the lilac outline. Abbreviations of the rock types are explained in Table 2. Map enlarged from the Geological Survey 1: 250 000 map 2626 West Rand.

Table 2: Explanation of symbols for the geological map and approximate ages (Johnson et al., 2006; Partridge et al., 2006; Zeh et al., 2020). SG = Supergroup; Fm = Formation; Ma = million years; grey shading = formations impacted by the project.

Symbol	Group/Formation	Lithology	Approximate Age
Qs	Quaternary	Alluvium, sand, calcrete	Neogene, ca 2.5 Ma to present
Vdi	diabase	Diabase	Post-Transvaal SG
Vh	Hekpoort Fm, Pretoria Group, Transvaal SG	Andesite, agglomerate, tuff	
Vt	Timeball Hill Fm Pretoria Group, Transvaal SG	Quartzite	< 2420 Ma
Vmd	Malmani Subgroup, Chuniespoort Group, Transvaal SG	Dolomite, chert	Ca 2750 – 2650 Ma
Vbr	Black Reef Fm, Transvaal SG	Quartzite, conglomerate, shale, basalt	Ca 2650 – 2640 Ma
R-Vr	Rietgat Fm, Platberg Group, Ventersdorp SG	Amygdaloidal lava, agglomerate, tuff	Mesoarchaean Ca 2720 Ma

Symbol	Group/Formation	Lithology	Approximate Age
Rg	Government Subgroup, West Rand Group, Witwatersrand SG	Quartzite, shale, greywacke, conglomerate	Mesoarchaean Ca 2890 Ma

The project lies in the south western part of the Transvaal Basin where the lower rocks of the Transvaal Supergroup are exposed, in particular the dolomites of the Malmani Subgroup (Chuniespoort Group, Transvaal Supergroup; ca 2585-2480 Ma), (Figure 4).

The Late Archaean to early Proterozoic Transvaal Supergroup is preserved in three structural basins on the Kaapvaal Craton (Eriksson et al., 2006). In South Africa are the Transvaal and Griqualand West Basins, and the Kanye Basin is in southern Botswana. The Griqualand West Basin is divided into the Ghaap Plateau sub-basin and the Prieska sub-basin. Sediments in the lower parts of the basins are very similar but they differ somewhat higher up the sequences. Several tectonic events have greatly deformed the south western portion of the Griqualand West Basin between the two sub-basins

In the Transvaal Basin the Transvaal Supergroup is divided into two Groups, the lower Chuniespoort Group and the upper Pretoria Group (with ten formations; Eriksson et al., 2006). The Chuniespoort Group is divided into the basal Malmani Subgroup that comprises dolomites and limestones and is divided into five formations based on chert content, stromatolitic morphology, intercalated shales and erosion surfaces. The top of the Chuniespoort Group has the Penge Formation and the Duitschland Formation.

Making up the lower Pretoria Group are the Timeball Hill Formation and the Boshoek Formation. The Hekpoort, Dwaalheuwel, Strubenkop and Daspoort Formations form a sequence as the middle part of the Pretoria Group, Transvaal Supergroup, and represent rocks that are over 2060 million years old. The Hekpoort Formation is a massive lava deposit and is overlain by the rest of the Transvaal Supergroup.

The Transvaal sequence has been interpreted as three major cycles of basin infill and tectonic activity with the first deep basin sediments forming the Chuniespoort Group, the second cycle deposited the lower Pretoria Group, and the sediments in this area are from the interim lowstand that preceded the third cycle. These sediments were deposited in shallow lacustrine, alluvial fan and braided stream environments (Eriksson et al., 2012).

ii. Palaeontological context

The palaeontological sensitivity of the area under consideration is presented in Figure 5. The site for development is in the very highly sensitive Malmani Subgroup (Transvaal Supergroup).

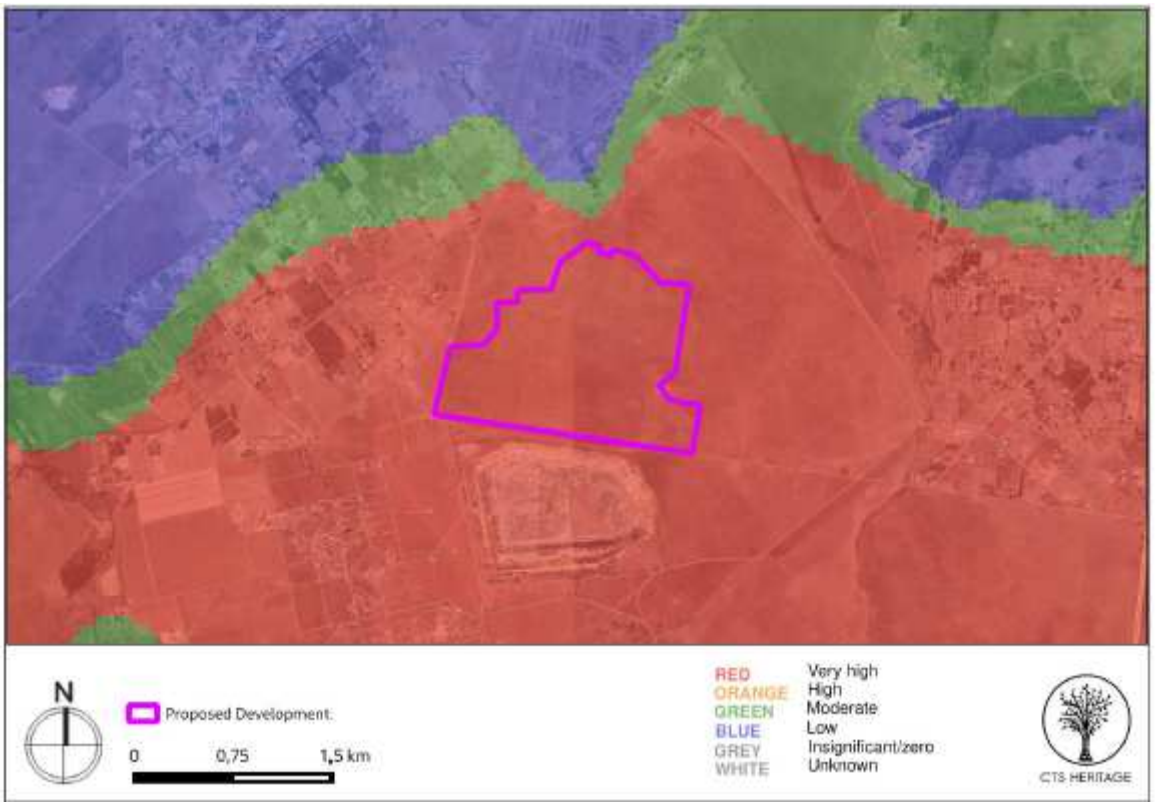

Figure 5: SAHRIS palaeosensitivity map for the site for the proposed Montrose/ Middelvlei PV facility (lilac). Background colours indicate the following degrees of sensitivity: red = very highly sensitive; orange/yellow = high; green = moderate; blue = low; grey = insignificant/zero.

The Transvaal Supergroup rocks represent on a very large scale, a sequence of sediments filling the basins under conditions of lacustrine, fluvial, volcanic and glacial cycles in a tectonically active region. The predominantly carbonaceous sediments are evidence of the increase in the atmosphere of oxygen produced by algal colony photosynthesis, the so-called Great Oxygen Event (ca 2.40 – 2.32 Ga) and precursor to an environment where diverse life forms could evolve. The Neoarchean-Paleoproterozoic Transvaal Supergroup in South Africa contains the well-preserved stromatolitic Campbellrand -Malmani carbonate platform (Griqualand West Basin – Transvaal Basin respectively), which was deposited in shallow seawater shortly before the Great Oxidation Event (GOE).

The Transvaal Supergroup comprises one of world's earliest carbonate platform successions (Beukes, 1987; Eriksson et al., 2006; Zeh et al., 2020). In some areas there are well preserved stromatolites that are evidence of the photosynthetic activity of blue green bacteria and green algae. These microbes formed colonies in warm, shallow seas and deposited layer upon layer of minerals, often in domes or columns. The minerals are predominantly calcium carbonate, calcium sulphate, magnesium carbonate and magnesium sulphate. Only very rarely are the bacteria and algae preserved but the stromatolites are traces of their activity, hence called trace fossils. These fossils are

protected by legislation, therefore the Malmani Subgroup palaeosensitivity is very high (red; Figure 4, SAHRIS).

iii. Site visit observations

The site walk-through began on the northern margin which is the higher ground and there was a good view of the whole project area as far as the mine dump along the southern margin. The northern margin still has old concrete floors and blocks that are the remnants of the packing shed for the asparagus production.

The land is uniformly sloping down to the mine dump but the soil had been banked into ridges for the rows of asparagus. The entire area was covered in secondary grassland with tall grasses (Hyparrhenia sp., Eragrostis sp., Melinis repens, Pogonarrthria squarrosa and herbs (Helichrysum spp and Cleome maculata). Along the earth-packed dam wall in the lower southern third of the land, the grasses were shorter. Figures 6-7).

There were no rocks, no rocky outcrops and no trace fossils such as stromatolites.

Figure 6: General view of the land from the centre looking to the southern margin and the mine dump.

Figure 7: Site visit photographs for the Montrose Middelvlei SEF. A – top or northern margin looking north towards the silo and railway line. B – view from the north towards the centre of the project area. C- close-up of the soils and grasses with no dolomite. D – central section looking westwards. E – close-up of the soils and grasses. F – view along the old dam wall towards the east. No dolomite and no fossils.

4. Impact assessment

An assessment of the potential impacts to possible palaeontological resources considers the criteria encapsulated in Table 4:

Table 4a: Criteria for assessing impacts

PART A: DEFINITION AND CRITERIA		
Criteria for ranking of the SEVERITY/NATURE of environmental impacts	**H**	Substantial deterioration (death, illness or injury). Recommended level will often be violated. Vigorous community action.
	M	Moderate/ measurable deterioration (discomfort). Recommended level will occasionally be violated. Widespread complaints.
	L	Minor deterioration (nuisance or minor deterioration). Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints.
	L+	Minor improvement. Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints.
	M+	Moderate improvement. Will be within or better than the recommended level. No observed reaction.
	H+	Substantial improvement. Will be within or better than the recommended level. Favourable publicity.
Criteria for ranking the DURATION of impacts	**L**	Quickly reversible. Less than the project life. Short term
	M	Reversible over time. Life of the project. Medium term
	H	Permanent. Beyond closure. Long term.
Criteria for ranking the SPATIAL SCALE of impacts	**L**	Localised - Within the site boundary.
	M	Fairly widespread – Beyond the site boundary. Local
	H	Widespread – Far beyond site boundary. Regional/ national
PROBABILITY (of exposure to impacts)	**H**	Definite/ Continuous
	M	Possible/ frequent
	L	Unlikely/ seldom

Table 4b: Impact Assessment

PART B: Assessment		
SEVERITY/NATURE	**H**	-
	M	-
	L	Soils do not preserve plant fossils; so far there are no records from the Malmani Subgroup of trace fossils of stromatolites in this region so it is very unlikely that fossils occur on the site. The impact would be very unlikely.
	L+	-
	M+	-

PART B: Assessment		
	H+	-
DURATION	**L**	-
	M	-
	H	Where manifest, the impact will be permanent.
SPATIAL SCALE	**L**	Since the only possible fossils within the area would be trace fossils such as stromatolites in the dolomites, the spatial scale will be localised within the site boundary.
	M	-
	H	-
PROBABILITY	**H**	**-**
	M	**-**
	L	It is extremely unlikely that any fossils would be found in the loose sand that will be excavated but there might be stromatolites in the dolomites. Therefore, a Fossil Chance Find Protocol should be added to the eventual EMPr.

Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks are the correct age and type to preserve fossils. The site visit and walk through confirmed that there were NO FOSSILS in the project footprint. There were no outcrops of dolomite and no stromatolites on any part of the project footprint. Since there is a small chance that below the soil there are trace fossils from the Malmani Subgroup and may be disturbed a Fossil Chance Find Protocol has been added to this report. Taking account of the defined criteria, the potential impact to fossil heritage resources is extremely low.

5. Assumptions and uncertainties

Based on the geology of the area and the palaeontological record as we know it, it can be assumed that the formation and layout of the dolomites, sandstones, shales and sands are typical for the country and only some contain trace fossils, fossil plant, insect, invertebrate and vertebrate material. The site visit and walk through on 07 February 2023 (summer) by palaeontologists confirmed that there are NO FOSSILS in the proposed solar collector site and associated infrastructure. The overlying sands and soils of the Quaternary period would not preserve fossils.

6. Recommendation

Based on the fossil record but confirmed by the site visit and walk through there are NO FOSSILS of the project footprint. There were no dolomites visible in the proposed solar collector area. Although stromatolites have been recorded from some exposures of the Malmani Subgroup, enabling the recognition of the Formations within this group, stromatolites, oolitic and algal dolomite are generally absent from this region. It is

extremely unlikely that any fossils would be preserved in the overlying soils and sands of the Quaternary.

There is a very small chance that trace fossils may occur in below the ground surface in the dolomites of the Malmani Subgroup so a Fossil Chance Find Protocol should be added to the EMPr. If fossils are found by the contractor, environmental officer or other responsible person once excavations and drilling have commenced, then they should be rescued and a palaeontologist called to assess and collect a representative sample.

Since there is an extremely small chance of fossils being impacted by this project, as far as the palaeontology is concerned, the project should be authorised

7. References

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Eriksson, P.G., Altermann, W., Hartzer, F.J., 2006. The Transvaal Supergroup and its pre-cursors. In: Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J., (Eds). The Geology of South Africa. Geological Society of South Africa, Johannesburg / Council for Geoscience, Pretoria. pp 237-260.

Plumstead, E.P., 1969. Three thousand million years of plant life in Africa. Geological Society of southern Africa, Annexure to Volume LXXII. 72pp + 25 plates.

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8. Chance Find Protocol

Monitoring Programme for Palaeontology – to commence once the excavations / drilling activities begin.

1. The following procedure is only required if fossils are seen on the surface and when drilling/excavations commence.
2. When excavations begin the rocks and discard must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (trace fossils, fossils of plants, insects, bone or coalified material) should be put aside in a suitably protected place. This way the project activities will not be interrupted.

3. Photographs of similar fossils must be provided to the developer to assist in recognizing the fossil plants, vertebrates, invertebrates or trace fossils in the shales and mudstones (for example see Figure 8). This information will be built into the EMP's training and awareness plan and procedures.
4. Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.
5. If there is any possible fossil material found by the developer/environmental officer then a qualified palaeontologist sub-contracted for this phase of the project, should visit the site to inspect the selected material and check the dumps where feasible.
6. Trace fossils, fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.
7. If no good fossil material is recovered then no site inspections by the palaeontologist will be necessary. A final report by the palaeontologist must be sent to SAHRA once the project has been completed and only if there are fossils.
8. If no fossils are found and the excavations have finished then no further monitoring is required.

Appendix A – Examples of fossils from the Malmani Subgroup

Figure 8: Photographs of dolomite and stromatolites as seen in the field.

9. Appendix B – Details of specialists

Curriculum vitae (short) - Marion Bamford PhD
January 2023

Present employment:		Professor; Director of the Evolutionary Studies Institute. Member Management Committee of the NRF/DSI Centre of Excellence Palaeosciences, University of the Witwatersrand, Johannesburg, South Africa
Telephone	:	+27 11 717 6690
Cell	:	082 555 6937
E-mail	:	marion.bamford@wits.ac.za ; marionbamford12@gmail.com

ii) **Academic qualifications**
Tertiary Education: All at the University of the Witwatersrand:
1980-1982: BSc, majors in Botany and Microbiology. Graduated April 1983.
1983: BSc Honours, Botany and Palaeobotany. Graduated April 1984.
1984-1986: MSc in Palaeobotany. Graduated with Distinction, November 1986.
1986-1989: PhD in Palaeobotany. Graduated in June 1990.

iii) **Professional qualifications**
Wood Anatomy Training (overseas as nothing was available in South Africa):
1994 - Service d'Anatomie des Bois, Musée Royal de l'Afrique Centrale, Tervuren, Belgium, by Roger Dechamps
1997 - Université Pierre et Marie Curie, Paris, France, by Dr Jean-Claude Koeniguer
1997 - Université Claude Bernard, Lyon, France by Prof Georges Barale, Dr Jean-Pierre Gros, and Dr Marc Philippe

iv) **Membership of professional bodies/associations**
Palaeontological Society of Southern Africa
Royal Society of Southern Africa - Fellow: 2006 onwards
Academy of Sciences of South Africa - Member: Oct 2014 onwards
International Association of Wood Anatomists - First enrolled: January 1991
International Organization of Palaeobotany – 1993+
Botanical Society of South Africa
South African Committee on Stratigraphy – Biostratigraphy - 1997 - 2016
SASQUA (South African Society for Quaternary Research) – 1997+
PAGES - 2008 –onwards: South African representative
ROCEEH / WAVE – 2008+
INQUA – PALCOMM – 2011+onwards

v) **Supervision of Higher Degrees**

All at Wits University

Degree	Graduated/completed	Current
Honours	13	0
Masters	13	3
PhD	13	7
Postdoctoral fellows	14	4

vi) **Undergraduate teaching**
Geology II – Palaeobotany GEOL2008 – average 65 students per year
Biology III – Palaeobotany APES3029 – average 25 students per year
Honours – Evolution of Terrestrial Ecosystems; African Plio-Pleistocene Palaeoecology; Micropalaeontology – average 12 - 20 students per year.

vii) **Editing and reviewing**
Editor: Palaeontologia africana: 2003 to 2013; 2014 – Assistant editor
Guest Editor: Quaternary International: 2005 volume
Member of Board of Review: Review of Palaeobotany and Palynology: 2010 –
Associate Editor: Cretaceous Research: 2018-2020

Associate Editor: Royal Society Open: 2021 -
Review of manuscripts for ISI-listed journals: 30 local and international journals

viii) **Palaeontological Impact Assessments**
25 years' experience in PIA site and desktop projects

- Selected from recent projects only – list not complete:
- Skeerpoort Farm Mast 2020 for HCAC
- Vulindlela Eco village 2020 for 1World
- KwaZamakhule Township 2020 for Kudzala
- Sunset Copper 2020 for Digby Wells
- McCarthy-Salene 2020 for Prescali
- VLNR Lodge 2020 for HCAC
- Madadeni mixed use 2020 for EnviroPro
- Frankfort-Windfield Eskom Powerline 2020 for 1World
- Beaufort West PV Facility 2021 for ACO Associates
- Copper Sunset MR 2021 for Digby Wells
- Sannaspos PV facility 2021 for CTS Heritage
- Smithfield-Rouxville-Zastron PL 2021 for TheroServe
- Glosam Mine 2022 for AHSA
- Wolf-Skilpad-Grassridge OHPL 2022 for Zutari
- Iziduli and Msenge WEFs 2022 for CTS Heritage
- Hendrina North and South WEFs & SEFs 2022 for Cabanga
- Dealesville-Springhaas SEFs 2022 for GIBB Environmental
- Vhuvhili and Mukondeleli SEFs 2022 for CSIR
- Chemwes & Stilfontein SEFs 2022 for CTS Heritage
- Equestria Exts housing 2022 for Beyond Heritage
- Zeerust Salene boreholes 2022 for Prescali
- Tsakane Sewer upgrade 2022 for Tsimba
- Transnet MPP inland and coastal 2022 for ENVASS
- Ruighoek PRA 2022 for SLR Consulting (Africa)
- Namli MRA Steinkopf 2022 for Beyond Heritage

ix) **Research Output**
Publications by M K Bamford up to January 2022 peer-reviewed journals or scholarly books: over 170 articles published; 5 submitted/in press; 14 book chapters.
Scopus h-index = 30; Google Scholar h-index = 39; -i10-index = 116 based on 6568 citations.
Conferences: numerous presentations at local and international conferences.

CV of Alisoun Valentine House *Jan 2023*

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KEY SKILLS AND ATTRIBUTES

- The stamina and ability to work effectively under pressure.
- Highly developed social and interpersonal skills.

- Good communication skills, both oral and written.
- The ability to be creative and innovative and to find workable strategies to achieve stated aims.
- Excellent organisational skills.
- The ability to analyse situations, behaviour and thinking and respond with patience and understanding.
- Research and scientific writing.

WORK HISTORY

Postdoc Fellow – Evolutionary Studies Institute
January 2019 – December 2020
January 2018 – December 2018
January 2017 – December 2020
January 2021 – December 2023 – Honorary Research Associate ESI
Analysis of archaeological charcoal from a Middle Stone Age and Early Iron Age sites
Host: Professor Marion Bamford

Sessional position – School of Animal, Plant and Environmental Sciences
March 2016 – November 2016
Academic support for postgraduate students

Short term internship – University of the Witwatersrand
August – November 2015

Assistant to Editor for 'Flora of the Witwatersrand' – University of the Witwatersrand
September 2008 – February 2010
Assisted with editing and preparing the Flora for publication

Tutor at the College of Science – University of the Witwatersrand
Academic years 2000 – 2003
Responsibilities included teaching general biology to first and second year students in the College of Science; as well as marking essays and assignments.

P.A. to Director/Manager of Cowling Davies (Small Advertising/Design Studio)
April 1992 – December 1992
Responsibilities included reception work; office administration; preparation of quotations; booking media advertisements and general assistance.

Herbarium Technician - University of the Witwatersrand
October 1991 – March 1992
Responsibilities included identification, pressing and mounting of plant specimens; capturing and maintaining data in the Herbarium computer system; maintaining the collection; filing; acting as librarian for the reference book collection and assisting students with research.

EDUCATION

Doctor of Philosophy (PhD) University of the Witwatersrand (2015)
Title: Systematic Applications of Pollen Grain Morphology and Development in the Acanthaceae
Supervisor: Professor Kevin Balkwill

Master of Science (MSc) University of the Witwatersrand (1991)
Title: A developmental study of *Nephroselmis viridis* (Inouye, Suda et Pienaar) Prasinophyceae
Supervisor: Professor Richard Pienaar
Degree awarded with Distinction.

Bachelor of Science with Honours (B.Sc. Hon.) University of the Witwatersrand (1987)
Awarded the Florence D. Hancock prize for a Dissertation in Phycology (1988)

Higher Diploma in Education (Postgraduate) for Secondary Education University of the Witwatersrand (1985)
Teaching subjects: Biology and Science

Bachelor of Science (B.Sc.) University of Witwatersrand (1984)
Major: Botany
Sub-majors: Microbiology and Zoology

Matriculation Certificate Hyde Park High School (1979)
Subjects passed: English, Afrikaans, Biology, Mathematics, Geography, Home Economics

PUBLICATIONS
Young A.V. and Pienaar R.N. 1989. The ultrastructure of a new species of *Nephroselmis* (Prasinophyceae). Proceedings of the Electron Microscopy Society of Southern Africa. 19: 113–114.

House A. and Balkwill K. 2013. FIB-SEM: An Additional Technique for Investigating Internal Structure of Pollen Walls. Microscopy & Microanalysis 19: 1535–1541.

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House, A., Bamford, M.K., 2019. Investigating the utilisation of woody plant species at an Early Iron Age site in KwaZulu-Natal, South Africa, by means of identifying archaeological charcoal. Archaeological and Anthropological Sciences 11, 6737-6750. https://doi.org/10.1007/s12520-019-00939-9

House, A., Bamford, M.K., Chikumbirike, J., 2022. Charcoal from Holocene deposits at Wonderwerk Cave, South Africa: A source of palaeoclimate information. Special issue on WW, in Quaternary International 614, 73-63. https://doi.org/10.1016/j.quaint.2020.10.039

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McCullum DA, House AV, Balkwill K (Eds).The Flora of the Witwatersrand. (Vol. 3). Dicotyledons – Oleaceae to Compositae. NiSC IN PRESS, (Publishing date-December 2019).

House A. and Bamford M.K. (in revision). Furnaces, hearths, rituals and construction: investigating the utilisation of woody plant species at an Early Iron Age site by means of identifying archaeological charcoal.

PALAEONTOLOGICAL IMPACT FIELD EXPERIENCE

May 2018 – SARAO Williston and Carnarvon for Digby Wells
August 2019 – Idlanga Coal MR, Rietvlei, Vryheid area – Digby Wells
September 2019 – Schmidtsdrift PR for Thaya Environmental Specialist
September 2019 – Estcourt Pvt Hospital for EnviroPro
September 2019 – Vulindlela BWS for KSEMS
November 2019 – Derseley outfall sewer for Digby Wells
June-Nov 2020 – Frankfort-Windfield 88kV line for Eskom and 1World.
October 2020 – Salene-McCarthy Manganese mine for Prescali
November 2020 – Universal Coal Ubuntu Colliery for HCAC
March 2021 – Doornhoek & Kaspersnek agriculture for Kudzala
July 2021 – Smithfield-Rouxville-Zastron Eskom PL for TheroServ
August 2021 – Dawn Park for iSquare
September 2021 – Hennops River Farm 489 for Archaeological and Heritage Services Africa (Pty) Ltd
November 2021 – Glossam Mine for Archaeological and Heritage Services (Pty) Ltd
February 2022 – Wolf-Skilpad-Grassridge 132 kV OHPL for Zutari.
September 2022 – Highveld SEFs Potchefstroom for CTS
October 2022 – Chemwes SEFs Stilfontein for CTS

APPENDIX 3: Heritage Screening Assessment (2022)

CTS HERITAGE

HERITAGE SCREENER

CTS Reference Number:	**CTS22_253**
SAHRIS CaseID:	
Client:	**Savannah**
Date:	**December 2022**
Title:	**Proposed development of the Middelvlei Solar, 120MW Solar PV Project, Gauteng Province**

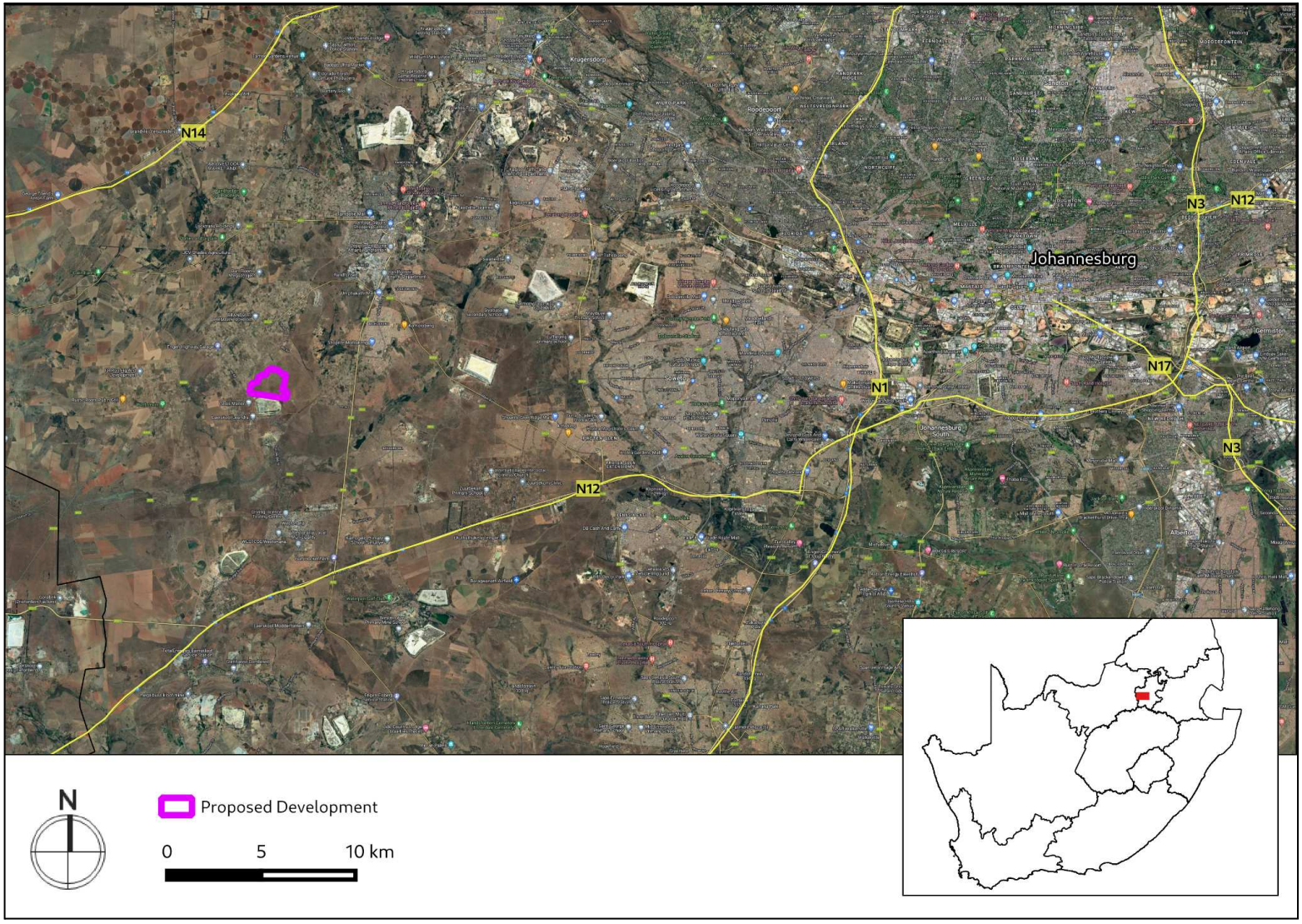

Figure 1a. Satellite map indicating the location of the proposed development in the Gauteng Province.

CTS Heritage
Bon Esperance, 238 Queens Road, Simons Town
Email: info@ctsheritage.com **Web:** www.ctsheritage.com

CTS HERITAGE

1. Proposed Development Summary

The Applicant, Portion 132 Middelvlei (Pty) Ltd, a special purpose vehicle (SPV) of Sigma Solar Africa Pty Ltd, is proposing the construction of a photovoltaic (PV) solar energy facility (known as **Middelvlei Solar**) located on a site approximately 7km south-west of the town of Randfontein in the Gauteng Province. The Solar PV facility will be developed on Portion 132 (a portion of portion 6) of the Farm Middelvlei 255 IQ and will comprise several arrays of single axis tracking solar PV panels and associated infrastructure and will have a contracted capacity of up to 120MW. The development area is situated within the Rand West City Local Municipality within the West Rand District Municipality. The site is accessible via existing gravel roads which provide access to the development area.

The project infrastructure will include:

- Solar PV Plant comprising approximately 220000 PV panels on single axis tracking PV modules
- Inverters and transformers (up to 120MW)
- Cabling between the panels
- Onsite facility substation, including a Twin-Tern Conductor ~379 MVA. Substation capacity - 2x 80 MVA, 132/33 kV substation ~ 50 x 70 m2 - including Eskom metering site.
- Cabling from the onsite substation to the collector substation (either underground or overhead)
- Electrical and auxiliary equipment required at the collector substation that serves the solar energy facility, including switchyard/bay, control building, fences, etc.
- Battery Energy Storage System (BESS)
- Site and internal access roads (up to 8m wide)
- Temporary and permanent laydown area
- Operations Building of ~180 sqm

The property, Portion 132 of the Farm Middelvlei 255 IQ, has an extent of 204.44ha, of which 200ha will be developed for the project. The site is a vacant stand with sufficient space to construct the 120MW PV facility and associated infrastructure. The site will provide the opportunity for the optimal placement of the infrastructure, while ensuring avoidance of major identified environmental sensitivities. To avoid areas of potential sensitivity and to ensure that potential detrimental environmental impacts are minimised as far as possible, the full extent of the project site will be considered in the Scoping Phase, and a development footprint within which the infrastructure of the PV facility and associated infrastructures will be located will be fully assessed during the EIA Phase.

For the purposes of the EIA process, the following terms will be used:

- Project: Project includes the PV facility and all of the associated infrastructures.
- Project Site/Area: The Project Site/Area is the area with an extent of approx. 204.44ha, within which the Middelvlei Solar PV Facility development footprint will be located.
- Development area: The Development Area is that identified area (located within the Project Site) of ~200ha demarcated within the Affected properties for consideration in the EIA process where the Middelvlei Solar PV Facility and associated infrastructure is planned to be located.
- Development footprint: The development footprint is the defined area (located within the development area) where the PV array and other associated infrastructure for the Middelvlei Solar PV Facility and associated infrastructure is planned to be constructed. This is the actual footprint of the facility, and the area which would be disturbed.

CTS HERITAGE

2. Application References

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

3. Property Information

Latitude / Longitude	26°15'4.04"S 27°38'15.03"E
Erf number / Farm number	Portion 132 (a portion of portion 6) of the Farm Middelvlei 255 IQ
Local Municipality	Rand West City
District Municipality	West Rand
Province	Gauteng
Current Use	Agriculture
Current Zoning	Agriculture

4. Nature of the Proposed Development

Total Surface Area of development	204.44ha
Depth of excavation (m)	
Height of development (m)	

5. Category of Development

X	**Triggers: Section 38(8) of the National Heritage Resources Act**
	Triggers: Section 38(1) of the National Heritage Resources Act
x	1. Construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier over 300m in length.
	2. Construction of a bridge or similar structure exceeding 50m in length.

	3. Any development or activity that will change the character of a site-
	a) exceeding 5 000m^2 in extent
	b) involving three or more existing erven or subdivisions thereof
	c) involving three or more erven or divisions thereof which have been consolidated within the past five years
	4. Rezoning of a site exceeding 10 000m^2
	5. Other (state):

6. Additional Infrastructure Required for this Development

TBA

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

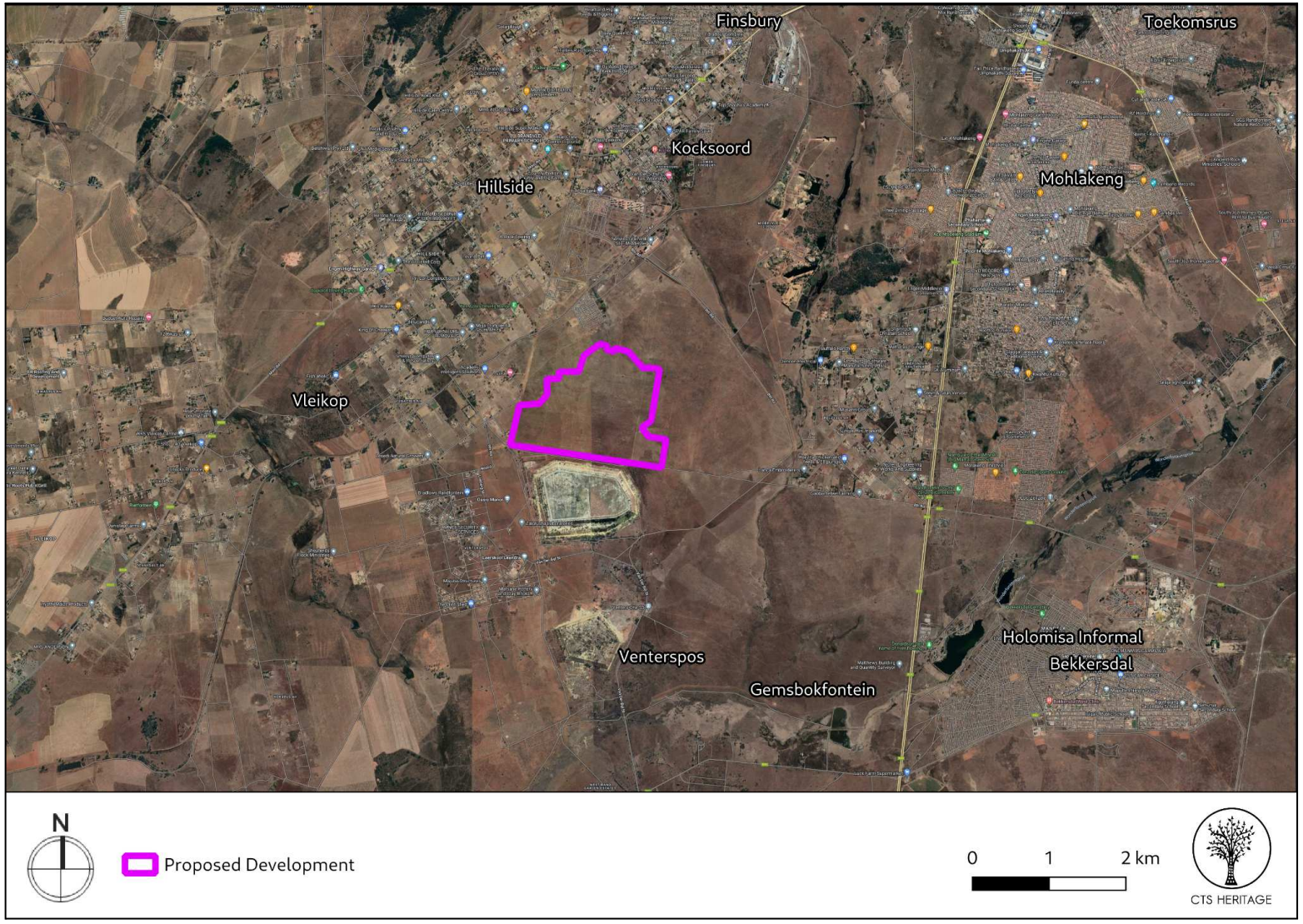

Figure 1b Overview Map. Satellite image (2022) indicating the proposed development area at closer range.

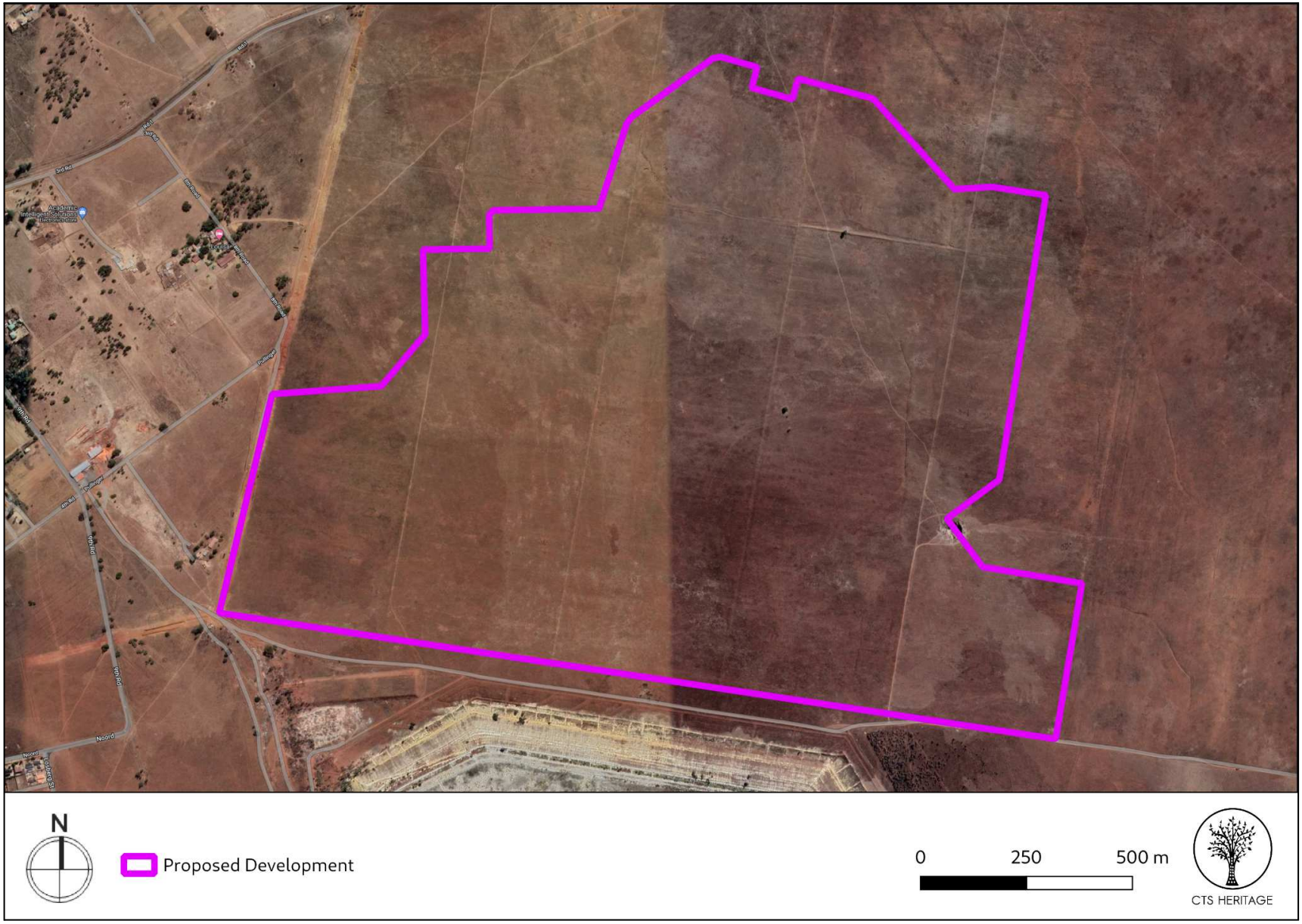

Figure 1c Overview Map. Satellite image (2022) indicating the proposed development area at closer range.

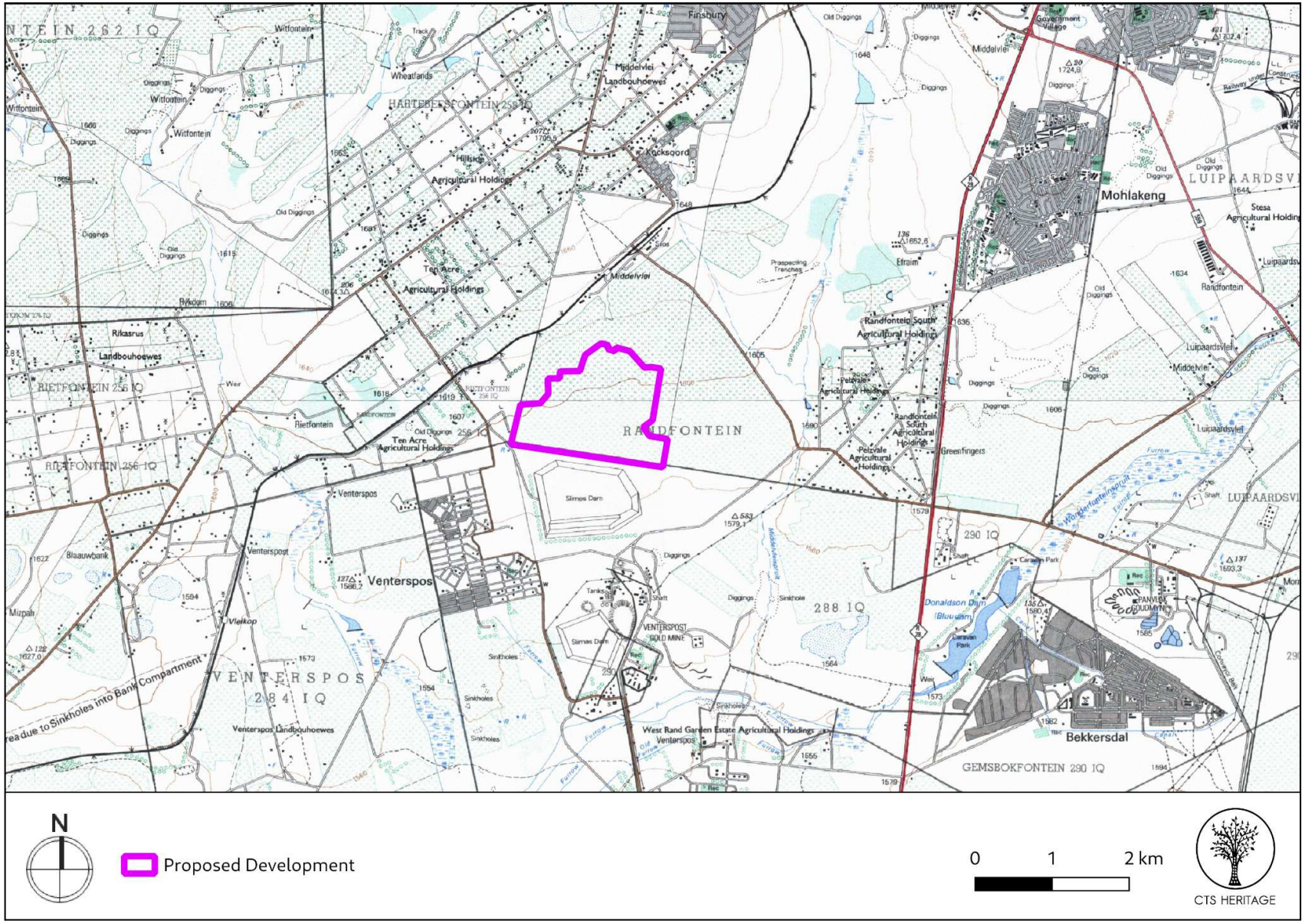

Figure 1d. Overview Map. 1:50 000 Topo Map for the development area

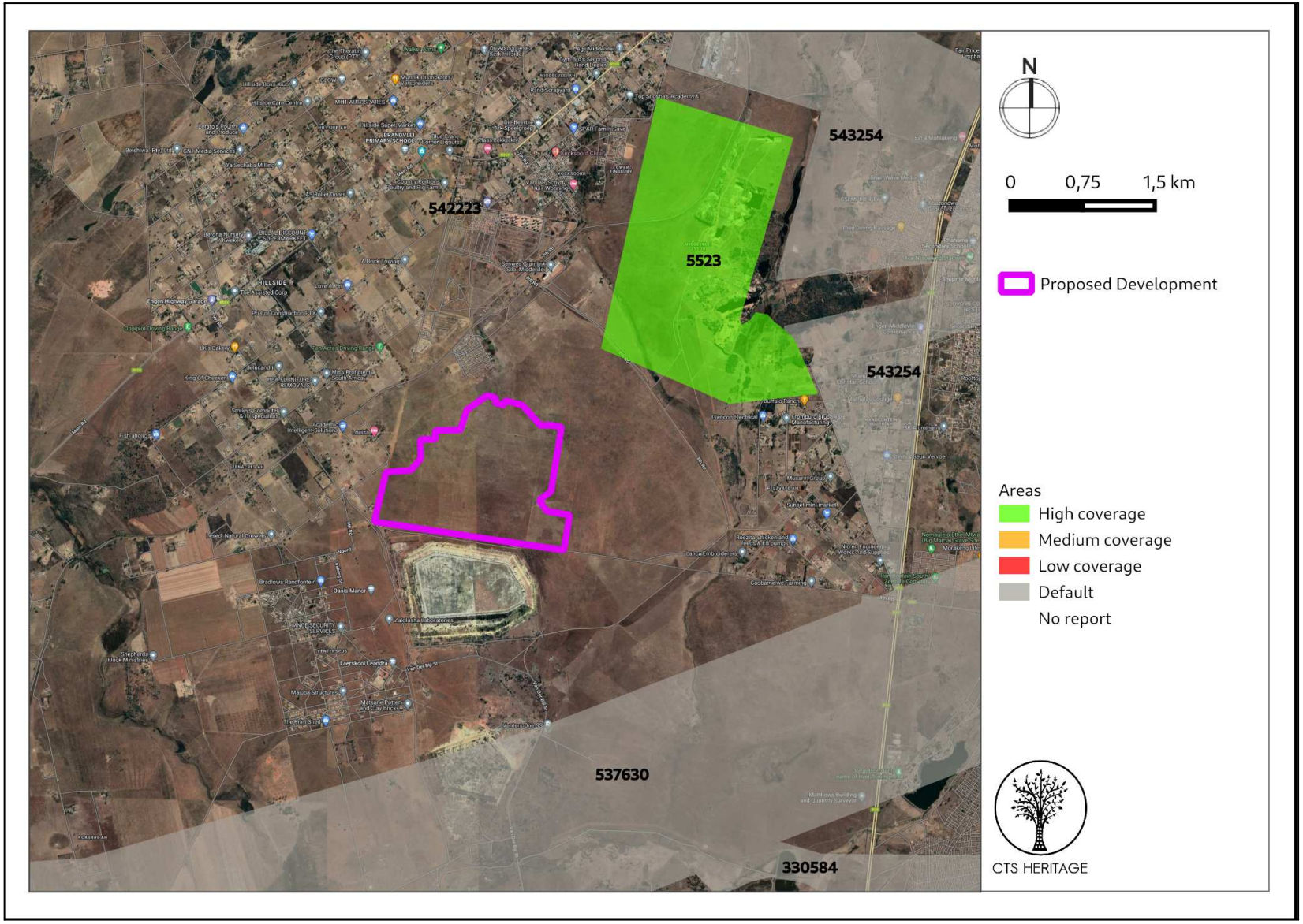

Figure 2a. Previous HIAs Map. Previous Heritage Impact Assessments surrounding the proposed development area, with SAHRIS NIDS indicated. Please see Appendix 2 for a full reference list.

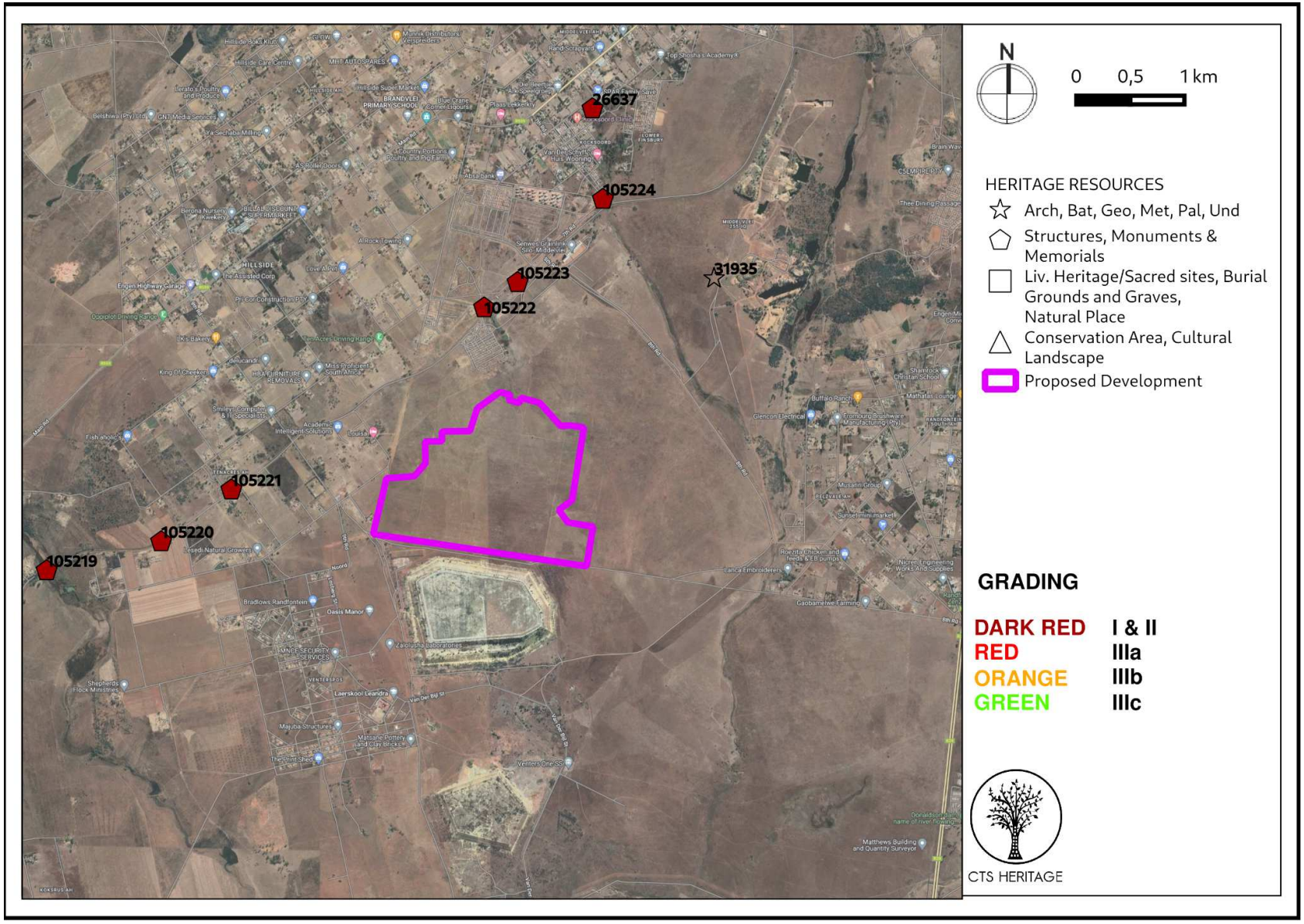

Figure 3. Heritage Resources Map. Heritage Resources previously identified in and near the study area, with SAHRIS Site IDs indicated. Please See Appendix 4 for a full description of heritage resource types.

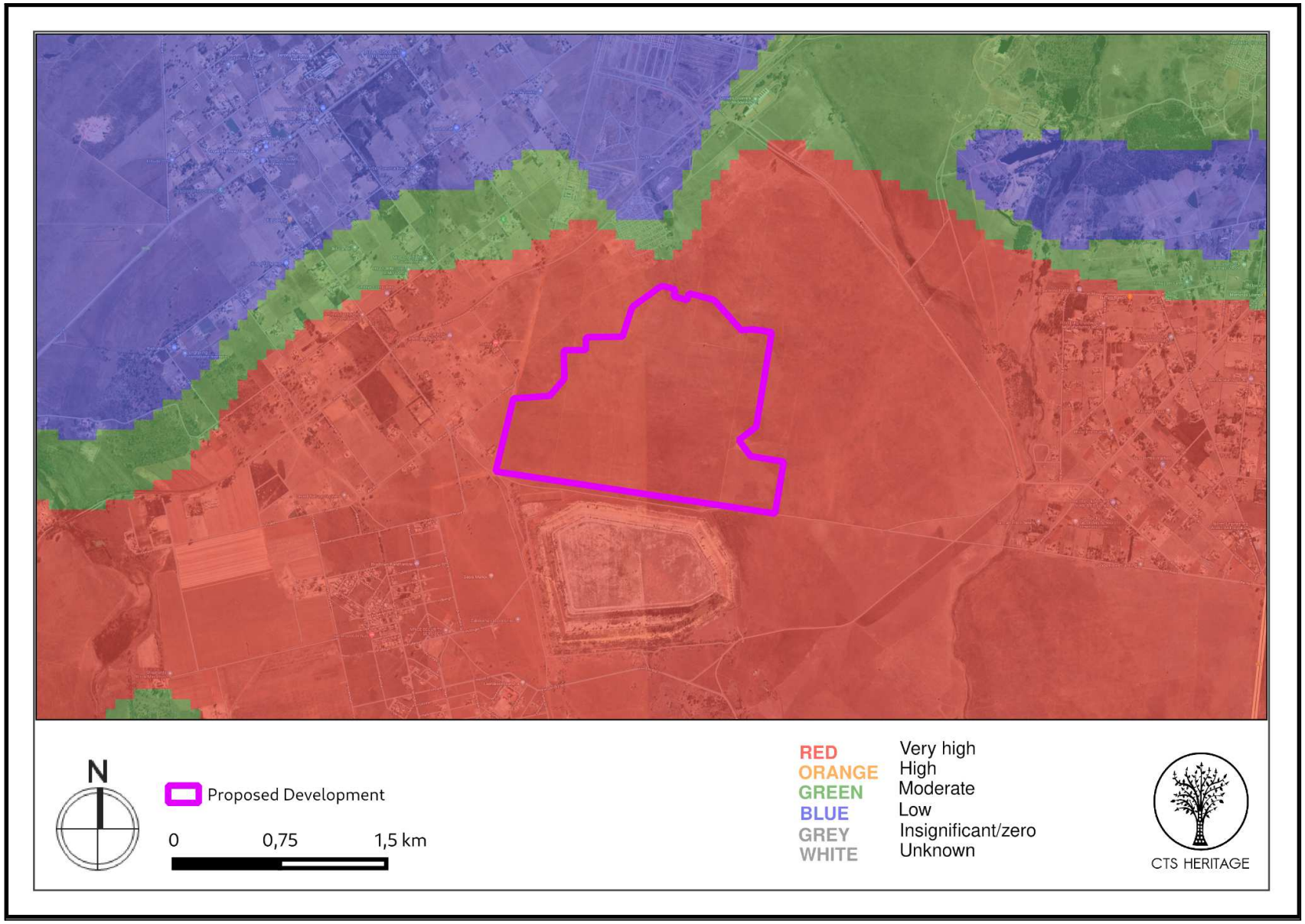

Figure 4. Palaeosensitivity Map. Indicating Low to Very High fossil sensitivity underlying the study area. Please See Appendix 3 for a full guide to the legend.

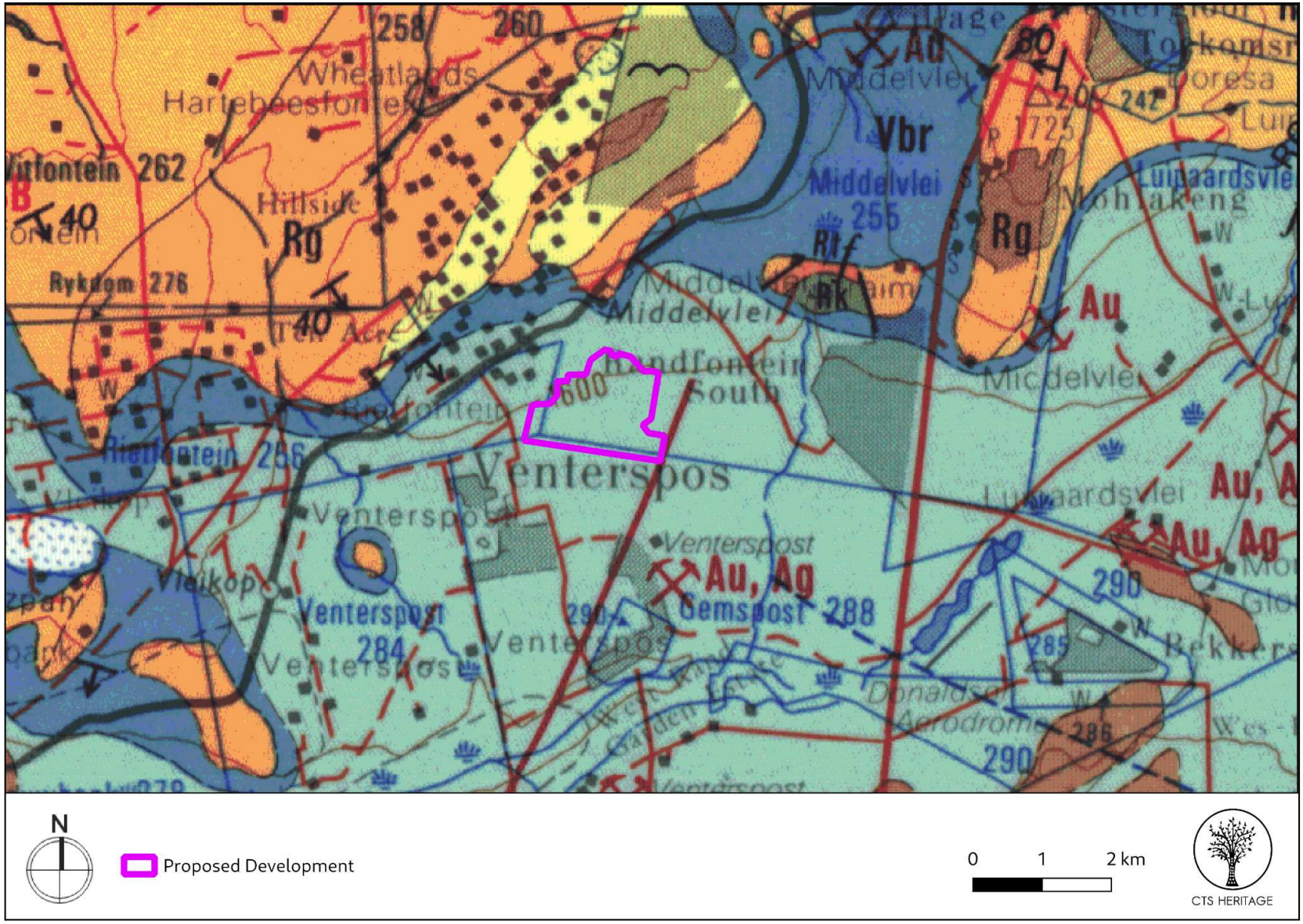

Figure 5. Geology Map. Extract from the CGS 2626 West Rand Geology Map indicating that the development area is underlain by Vmd - Malmani Subgroup of the Chuniespoort Group

8. Heritage statement and character of the area

Background

This application is for the proposed development of a PV Facility located west of Johannesburg, and directly north of Westonaria, north of the N12 and south of Randfontein. Westonaria was formed in 1948 by the amalgamation of the townships Venterspost, proclaimed in 1937, and Westonaria, proclaimed in 1938. According to Van der Walt (2017), "Westonaria was proclaimed in 1938 as a result of all the mining activities that took place in this area since 1910 when the first shaft – Pullinger Shaft was sunken. Venterspost town was proclaimed in 1937; Hillshaven, Glenharvie, Waterpan and Libanon were established as mining residential areas. Bekkersdal was established in 1945 and administered under Westonaria Town Council." In 1958, Lenasia was established as the "group area" for people of Indian descent living in Johannesburg at the onset of the Group Areas Act (1950). Many of its early residents were forcibly removed under the Group Areas Act from Pageview and the portion of Vrededorp populated by non-whites (jointly known as Fietas) and Fordsburg, areas close to the Johannesburg city centre, to Lenasia. As segregation grew it became the largest place where people of Indian extraction could legally live in the Transvaal Province.

Randfontein was established in 1890 to serve the new mine and was administered by Krugersdorp until it became a municipality in 1929. Apart from having the largest stamp mill in the world, Randfontein, like many of the other outlying areas of Johannesburg, is essentially a rural collection of farms and small holdings in a particularly beautiful part of Gauteng. There are a number of privately owned gold-mining township villages and contractor labour quarters established by the mining companies on land owned by the mines within the broader area. The area surrounding the proposed development is dominated by a cultural landscape that is shaped and defined by the historic and on-going mining activities associated with the Witwatersrand. A detailed archaeological background of the area is provided by Du Pisanie and Nel (2012, SAHRIS NID 104305) and is therefore not repeated here. In general, for the development of PV infrastructure and its associated grid connection infrastructure, it is preferred for such development to be clustered with existing development, such as mining or residential development, in order to reduce the perception of urban and infrastructure sprawl across an otherwise agricultural landscape.

There is a long history of gold and uranium mining in the broader West Rand area with an estimated 1.3 billion tonnes of surface tailings, containing in excess of 170 million pounds of uranium and 11 million ounces of gold. The origins of the South Deep Gold Mine extend to the 1950's when gold-producing conglomerates of the Ventersdorp Contact Reef and the Upper Elsburg were identified near Westonaria. This area has been subject to active mining since that time. As such, the immediate context of the proposed PV development is dominated by mining activities and agriculture. The proposed PV facility can provide a new layer on this complex cultural landscape.

Built Environment & Cultural Landscapes

According to Du Pisanie and Nel (2016, SAHRIS NID 356134), "With the onset of the Transvaal and South African Wars, Gatsrand became a strategic location for British troops who occupied Potchefstroom. This region was located in close proximity to the Western Railway, which provided a tactical advantage. To exploit and protect this advantage, three blockhouses were constructed on the farms Driefontein 113 IQ and Driefontein 355 IQ. These structures were not identified during the pre-disturbance survey and it is assumed that they no longer exist. The next major event to take place on this region was the discovery of gold, which facilitated the establishment of several towns from the 1920s, an increase in population and an increase in services. Early mines established include Venterspost (1934), Libanon (1936), West Driefontein (1945), East Driefontein (1968) and later Kloof (1968). Shaped by these events and activities the study area has through time transformed into a historic mining landscape." In their Heritage Impact Assessment located in an area that somewhat overlaps with the proposed development areas, Du Pisanie and Nel (2016, SAHRIS NID 356134) identified a number of heritage resources, the majority of which were determined to be not conservation-worthy. The nature of the resources identified include burials and burial grounds (graded IIIA) as well as historic and modern farm structures. Similar resources are likely to be present within the proposed development areas.

The broader area has significance resulting from its position along the South-Western Railway line developed to link the Southern Railway Line (1886) to the Rand Tram (1888) and lucrative mines to the east. A built heritage inventory of the infrastructure associated with railway development was completed in 2016 and through this process, a number of significant features were identified. Much of the infrastructure associated with this railway development remains present to the west of the development area and is mapped in Figure 3 above. While this infrastructure clearly has significance for the mining and industrial heritage of South Africa, it is unlikely that each identified feature is a Grade II heritage resource.

Rather, all of the railway infrastructure identified through this inventory process may well have sufficient significance as a grouping to warrant Grade II significance. That being understood, it is unlikely that the proposed development of the PV facility will have a negative impact on any significant built environment resources associated with the railway line.

As such, it is not anticipated that any significant built environment or cultural landscape resources will be negatively impacted by the proposed development.

Archaeology

Archaeological sites spanning the Earlier, Middle and Later Stone Age, as well as sites pertaining to Iron Age farming communities have been found in the region despite the extensive agricultural transformation of the area. Archaeological resources from these technological periods have been identified in the vicinity of the project area by Huffman et al (1991), Schoeman and Barry (2004), Du Pisanie (2015), Van der Walt (2017) and De Bruyn (2020). Du PIsanie (2015) notes that, in the broader area, “Stone Age lithics recorded have been found as surface scatters outside of any discernible context thereby limiting the information potential and overall significance of these resources. Late Farming Community sites within the region have primarily been identified as stone walled settlements classified as Type N and Klipriviersberg.” This finding is reiterated by Van der Walt (2017) who notes that “widely dispersed isolated lithics was recorded. These are made entirely from quartzite and consist of cores and flakes with faceted platforms characteristic of the Middle Stone Age. These artefacts are not in-situ and are scattered too sparsely to be of any significance…”

All of the known heritage resources located within the assessment area have been mapped in Figure 3. Despite the extensive past disturbance of the development area from historic cultivation and grazing, a number of burial ground sare known from the broader area. No known heritage resources are located within the area proposed for development, however, as it is known that significant heritage resources are located in this area, it is likely that there are more heritage resources located here that have not yet been identified.It is therefore likely that these resources will be impacted by the proposed development and further assessment of these potential impacts is recommended.

Palaeontology

According to the SAHRIS Palaeosensitivity Map, the Proposed Development Areas are located within areas that have variable palaeontological sensitivity but all areas have sediments that have high and very high palaeontological sensitivity. According to the extract from the Council of GeoScience Map for West Rand 2626, the very highly sensitive formation that may be impacted include the Malmani Formation and the highly sensitive formations that may be impacted include the Ecca Group formations and the Timeball Hill formations. The Malmani Subgroup is known to preserve a range of shallow marine to intertidal stromatolites (domes, columns *etc*), organic-walled microfossils and includes FOSSILIFEROUS LATE CAENOZOIC CAVE BRECCIAS such as in the Cradle of Humankind. Similar concerns exist for the Timeball Hill formation sediments. The Ecca Group formations are known to preserve non-marine trace fossils, vascular plants (including petrified wood) and palynomorphs of *Glossopteris* flora, mesosaurid reptiles, fish (including microvertebrate remains, coprolites), crustaceans, sparse marine shelly invertebrates (molluscs, brachiopods), microfossils (radiolarians *etc*) and insects.

Based on the information available, there are no “fatal flaws” in terms of potential impacts to heritage resources associated with the Proposed Development Areas. It is, however, recommended that the final development area selected for the proposed development be subject to a Heritage Impact Assessment to assess impacts to archaeological and palaeontological resources, as well as potentially historically significant structures and burials or burial grounds.

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, Iron age sites and historical artefacts through destruction during the development phase is likely.
- Impacts to palaeontological resources are likely.
- Due to the nature of the development and its context, cumulative impact and negative impact to the cultural landscape is likely

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 cultural landscape, 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.

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APPENDIX 1

List of heritage resources within close proximity to the development area from SAHRIS

Site ID	Site no	Full Site Name	Site Type	Grading
31935	Farm Hatherley 331 JR	Farm Hatherley 331 JR	Archaeological	
105219	NZASM_SWL_055	Bridge east of Vleikop Station	Bridge	Grade II
105220	NZASM_SWL_056	Culvert at Harveston AH	Transport infrastructure	Grade II
105221	NZASM_SWL_057	Culvert at Harveston AH	Transport infrastructure	Grade II
105222	NZASM_SWL_058	Culvert at 3rd Road Kocksoord	Transport infrastructure	Grade II
105223	NZASM_SWL_059	Culvert at 7th Road Kocksoord	Transport infrastructure	Grade II

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APPENDIX 2

Reference List from SAHRIS

NID	Author(s)	Date	Type	Title
330584	Heritage Scoping	Justin du Piesanie	29/05/2015	Sibanye Gold Limited's West Rand Tailings Retreatment Project Heritage Scoping Report
356134	Heritage Impact Assessment Specialist Reports	Justin du Piesanie, Johan Nel	13/01/2016	Environmental Impact Assessment for Sibanye Gold Limited's West Rand Tailings Retreatment Project - Heritage Impact Assessment
374660	AIA Phase 1	Jaco van der Walt	13/10/2016	ARCHAEOLOGICAL IMPACT ASSESSMENT FOR THE PROPOSED MOHLAKENG X16 - TOWNSHIP DEVELOPMENT, GAUTENG PROVINCE
537630	HIA Phase 1	Wouter Fourie et al.	31/01/2019	Heritage Impact Assessment (HIA) for the new 400-kV Transmission line from the Pluto Substation to the Westgate Substation and for the loop ins/outs connecting the Hera-Westgate 400-kV line. West Rand District Municipality, Gauteng
590003	PIA Phase 2	Marion Bamford	11/09/2021	Palaeontological Impact Assessment for the proposed Eskom West Rand Strengthening Project Phase 2 Pluto Substation to Westgate Substation, Gauteng Province
543254	HIA Phase 1	Shannon Hardwick, Justin du Pisanie	26/10/2020	Heritage Impact Assessment: Basic Assessment Process for the Closure of the Cooke Underground Operations
5523	AIA Phase 1	Polke Birkholtz	08/04/2003	Cultural Heritage Assessment as Part of the EMP Report for the Proposed Impafa/Pamodzi OpenCape Archaeological Survey CCt Gold Mine on the Farm Middelvlei 255 IQ
407548	Jaco van der Walt	14/08/2017	HIA Phase 1	HERITAGE IMPACT ASSESSMENT (REQUIRED UNDER SECTION 38(8) OF THE NHRA (No. 25 OF 1999) FOR THE PROPOSED SOUTH DEEP SOLAR PV PROJECT, WESTONARIA, GAUTENG 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.