HERITAGE IMPACT ASSESSMENT

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

Proposed development of the Kiara PV 7 Facility and Associated Infrastructure, North West Province

Prepared by Heritage CTS

CTS HERITAGE

For

Savannah Environmental

June 2022

CTS HERITAGE

EXECUTIVE SUMMARY

The Applicant, Voltalia South Africa (Pty) Ltd, is proposing the construction of a photovoltaic (PV) solar energy facility (known as the **Kiara PV 7 facility**) located on a site approximately 16km north east of the town of Lichtenburg in the North West Province. The solar PV facility will comprise several arrays of PV panels and associated infrastructure and will have a contracted capacity of up to **130MW**. The development area is situated within the Ditsobotla Local Municipality within the Ngaka Modiri Molema District Municipality. The site is accessible via an existing gravel road which provides access to the development area.

The findings of this field assessment largely correlate with the findings of other specialists conducted in the area. No significant stone age archaeological resources were identified. A number of stone structures were identified within the development area. Some of these are indicative of historic occupation of the area in the form of ruins, old structures and stone kraals. These have been graded as having low local significance due to their contribution to the history of the broader context. Other such features represent burials and burial grounds. These features have high levels of local significance and may not be impacted by the development activities.

Where there is a clear spatial relationship between the kraals, ruins and graves, these have been mapped as clusters of high sensitivity in the maps above. In order to conserve the integrity of the relationship between the kraals, ruins and graves, it is recommended that the clusters as mapped are considered to be no-go areas for the proposed development.

While the area proposed for development is underlain by geological sediments of very high palaeontological sensitivity, no fossil outcrops requiring conservation were identified within the area proposed for development. However, it is recommended that the attached Chance Fossil Finds Procedure be implemented for the duration of construction activities on site.

There is no objection to the proposed development of the Kiara PV 6 facility on heritage grounds on condition that:

- The recommended no-go areas as per Table 2.1 and Figure 7.1 and 7.2 are implemented
- The attached Chance Fossil Finds Procedure must be implemented for the duration of the construction phase of the project
- Should any buried archaeological resources or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.

CTS HERITAGE

CONTENTS

APPENDICES

1. INTRODUCTION

1.1 Background Information on Project

The Applicant, Voltalia South Africa (Pty) Ltd, is proposing the construction of a photovoltaic (PV) solar energy facility (known as the **Kiara PV 7 facility**) located on a site approximately 16km north east of the town of Lichtenburg in the North West Province. The solar PV facility will comprise several arrays of PV panels and associated infrastructure and will have a contracted capacity of up to **130MW**. The development area is situated within the Ditsobotla Local Municipality within the Ngaka Modiri Molema District Municipality. The site is accessible via an existing gravel road which provides access to the development area.

The development area for the PV facility and associated infrastructure will be located on Remaining Extent of the Farm Hollaagte No. 8

Six additional PV facilities (Kiara PV 1, Kiara PV 2, Kiara PV 3, Kiara PV 4, Kiara PV 5 and Kiara PV 6) are concurrently being considered on the project site (within Portion 2 of the Farm Hollaagte 8 and the Remaining Extent of the Farm Hollaagte No. 8) and are assessed through separate Environmental Impact Assessment (EIA) processes.

A facility development area (approximately **210ha**) as well as grid connection solution have been considered in the Scoping phase. The infrastructure associated with this PV facility includes:

- PV modules and mounting structures
- Inverters and transformers
- Battery Energy Storage System (BESS)
- Site and internal access roads (up to 8m wide)
- Site offices and maintenance buildings, including workshop areas for maintenance and storage.
- Temporary and permanent laydown area
- Grid connection solution will include:
    - Facility Substation
    - Eskom Switching Station
    - A 275kV powerline (16.6km in length) (either single or double circuit), to connect the PV facility to the Watershed MTS. The 132kV powerline from the on-site substation to the collector substation is approximately 1.2 km long.

1.2 Description of Property and Affected Environment

The landscape falls within the semi-arid southern African Grassland Biome, and the vegetation across the project area is characterised largely by grassland (dense in several portions) and shrubland that is evident on undulating plains with chert bedrock outcropping in multiple locations (see Mucina et al., 2006), which served as a source of raw-material for Pleistocene and Holocene occupants of the area. Nodules were also used as demarcation/protection within potential grave structures documented within the project area (see below).

Much of the area has been affected by historical farming related activities. The evidence of crop rotation and different types of cultivation is visible in areas of the development footprint. Currently predominantly grassland for grazing. In addition, several stone quarries exist within the footprint, mainly north of the Phase 3 area.

The surface sediments are generally bioturbated sandy soils, which appear to be aeolian in terms of original deposition, with inclusions of primary nodules of chert (5-30cm in maximum diameter) deriving from the local bedrock. There are prominent rocky chert and dolomite ridges with some Basaltic lava outcrops in the southeast. There are no prominent flowing water sources on the property. However, a drying spring is situated within the middle of the development footprints of Phase 1 and Phase, to the property's southeast. Dirt roads and farmlands bound the site to the north, south, east and west.

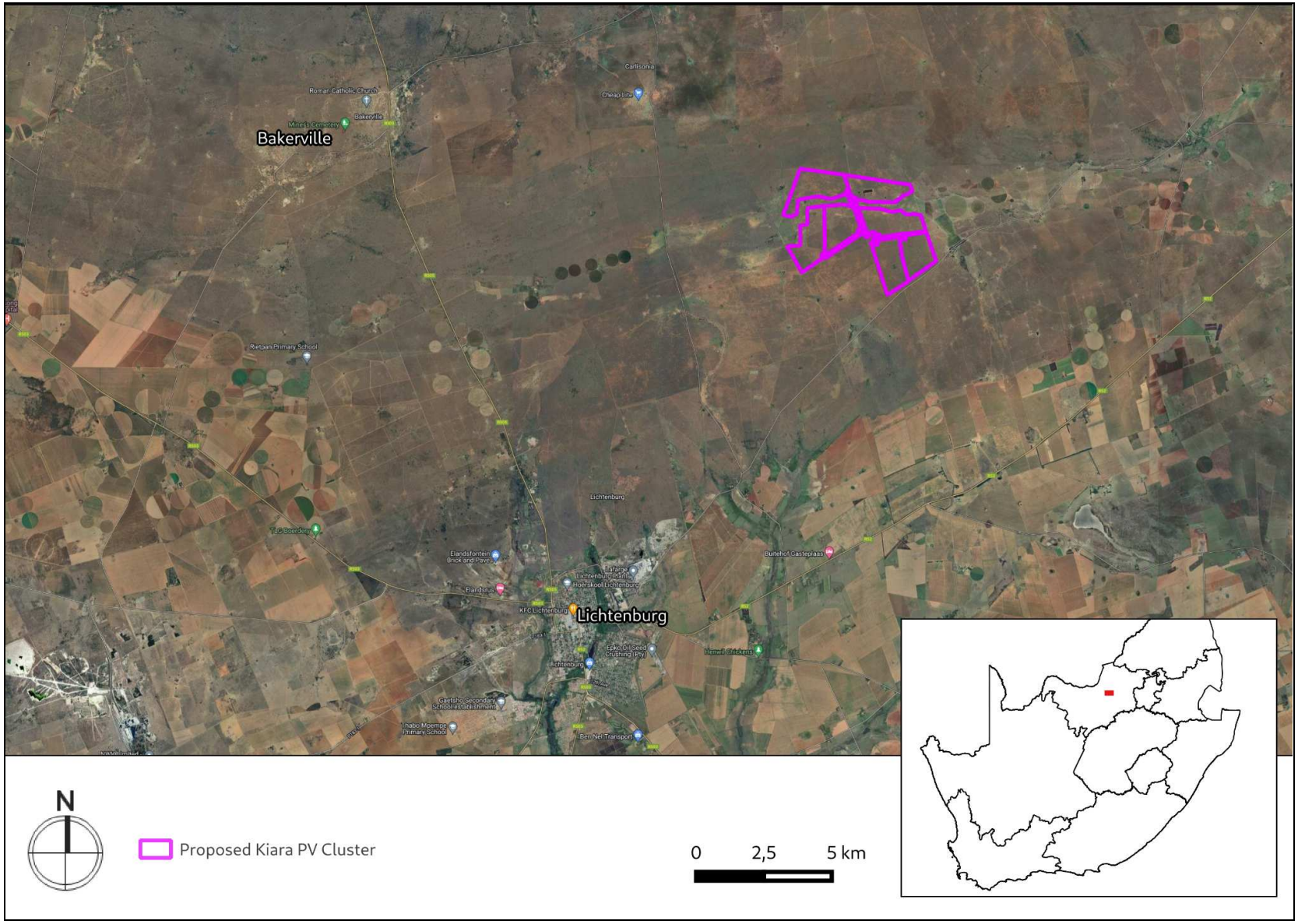

Figure 1.1: The proposed project area

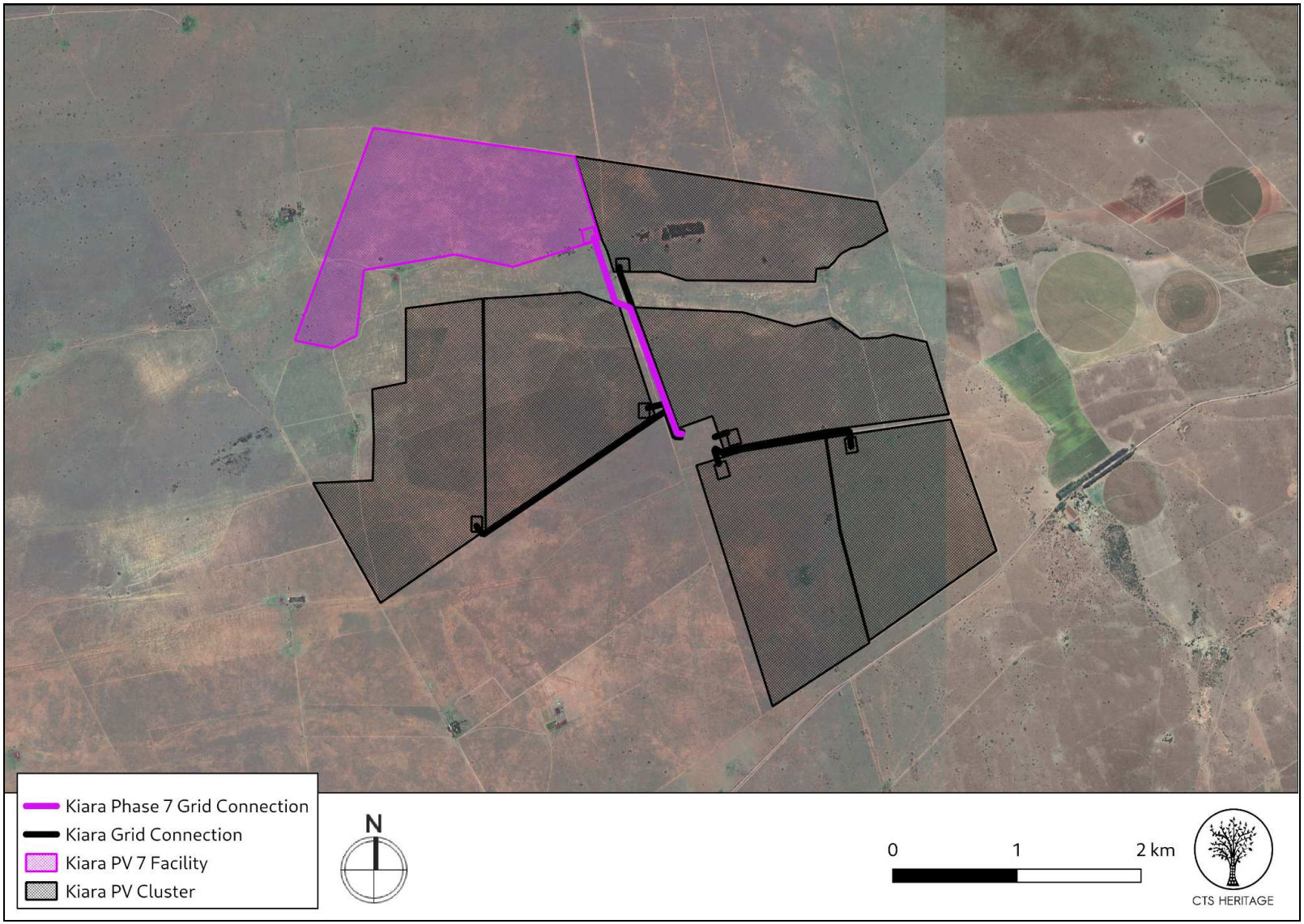

Figure 1.2: The proposed development area

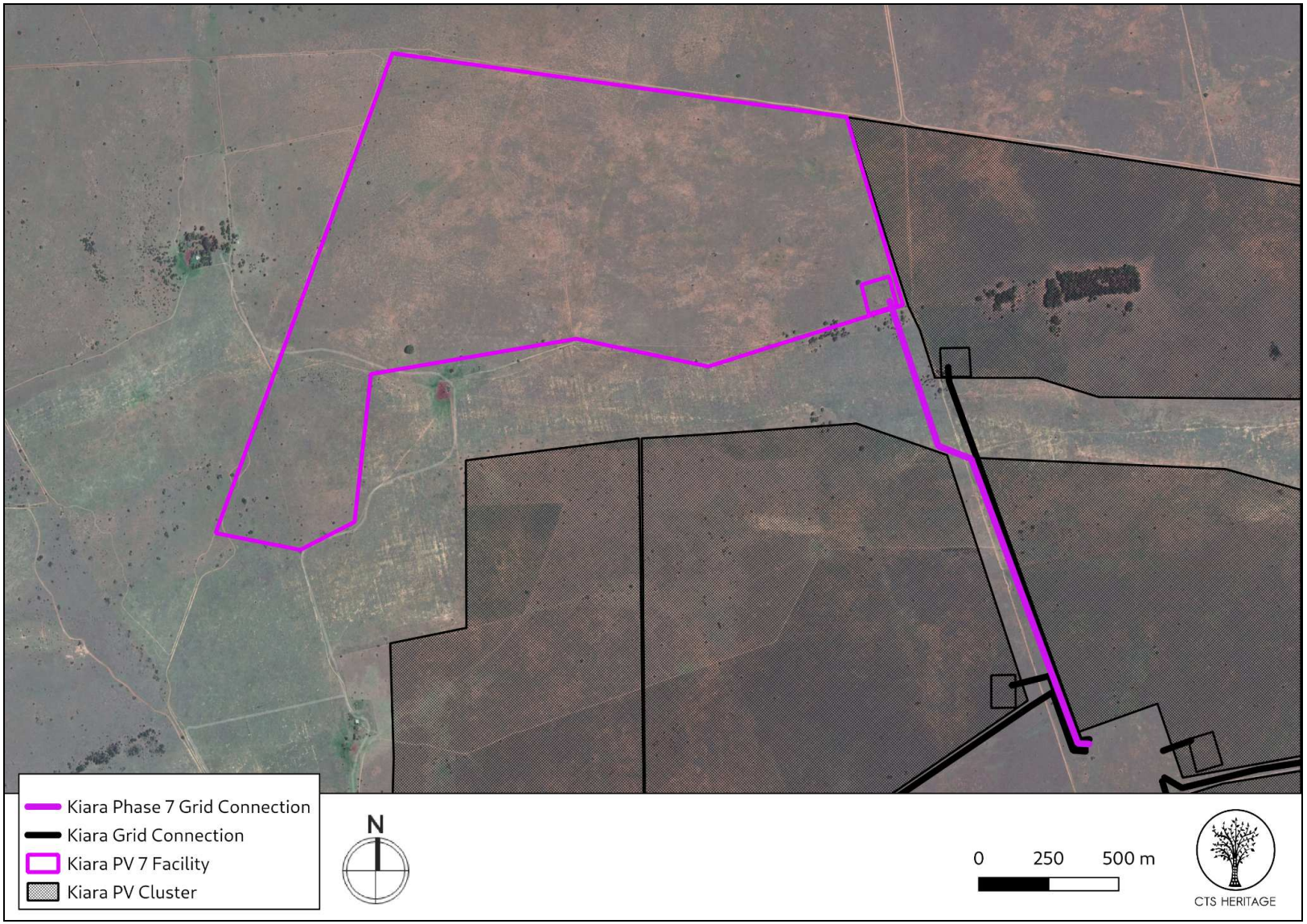

Figure 1.3: The proposed development area

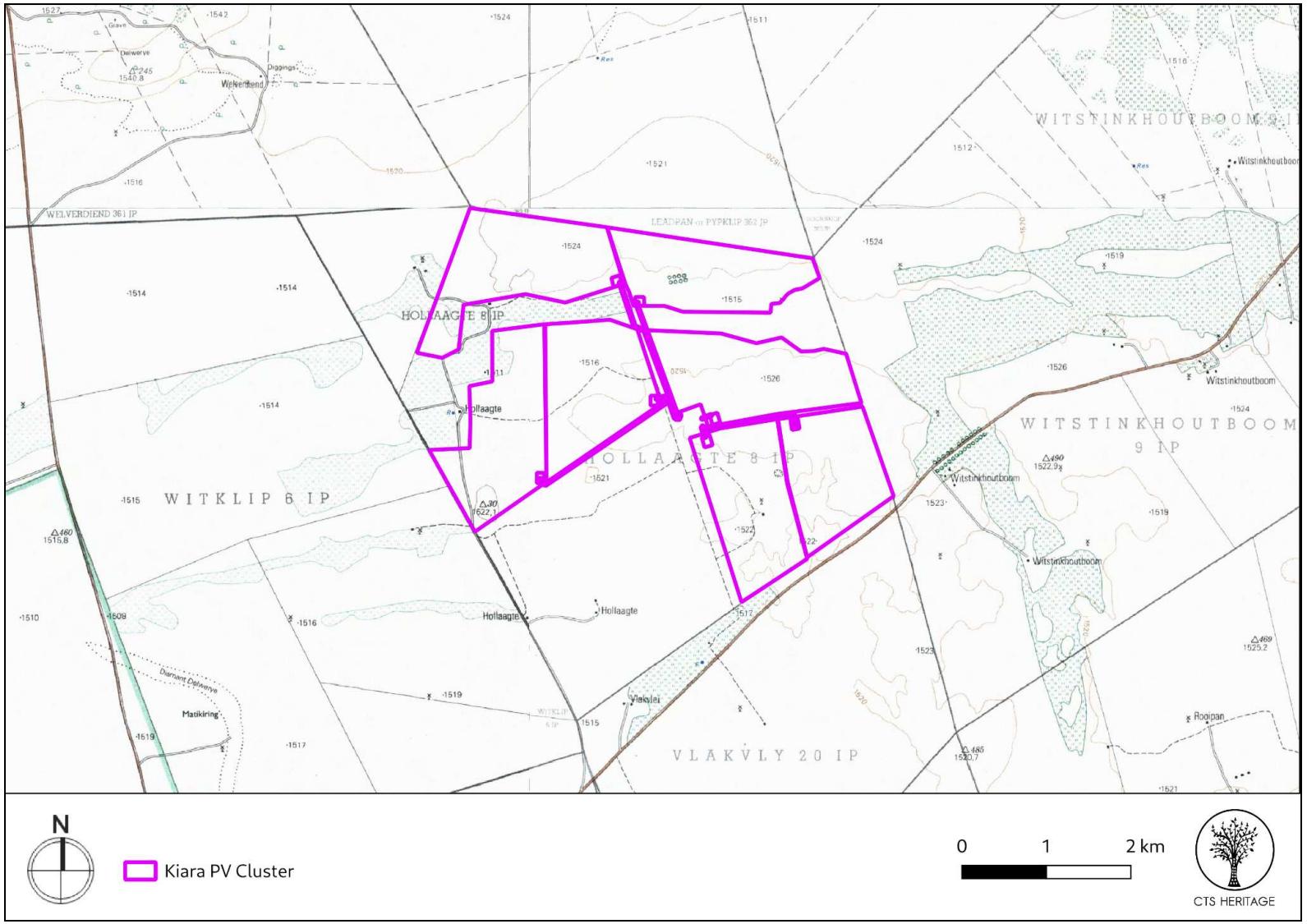

Figure 1.4: The proposed development area on the 1:50 000 Topo Map

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
- An archaeologist conducted a survey of archaeological resources likely to be disturbed by the proposed development. The site visit took place on 14 and 15 June 2022.
- A palaeontologist conducted a survey of palaeontological resources likely to be disturbed by the proposed development. The site visits took place on 20 to 22 June 2022.
- The identified resources were assessed to evaluate their heritage significance
- Alternatives and mitigation options were discussed with the Environmental Assessment Practitioner
- The results of the VIA were integrated into the HIA

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 area has previously been cultivated and disturbed by human and animal activity. Therefore, sites were predominantly recognised by focussing on vegetation changes and studying Google Earth imagery and old topographic maps.

The area was surveyed as best as possible at the time and as the vegetation growth allowed. The survey tracks followed the farm roads, fences and camp boundaries from which we conducted pedestrian surveys at various points. Additionally, the ground surface of areas with noticeable vegetation changes was inspected. Unfortunately, the powerline extended onto properties to which we could not gain access due to locked gates. We surveyed the areas from the roads and fences as best as possible. As such, the authors are confident that an accurate assessment of the archaeological sensitivity of the development area has been determined.

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).

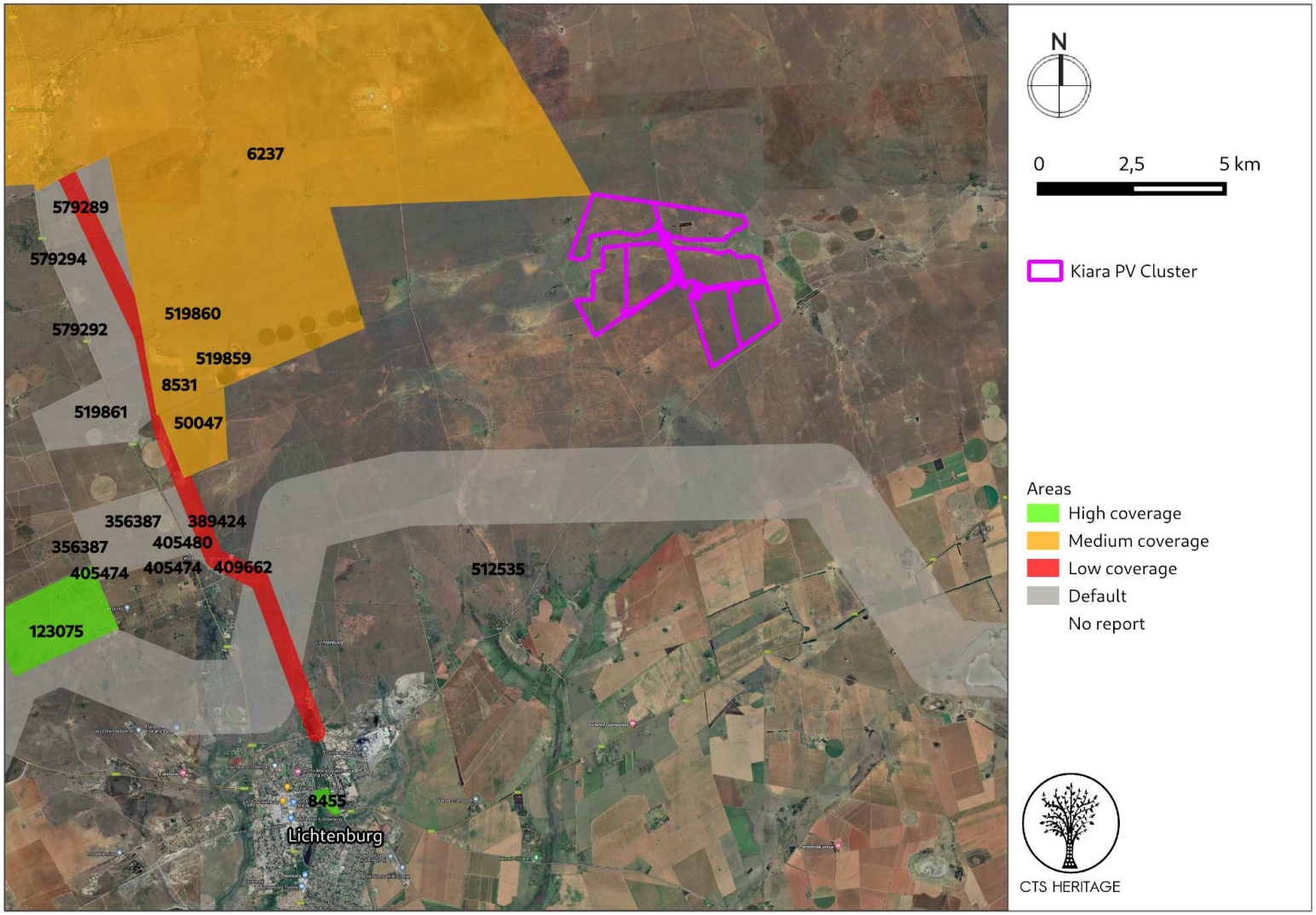

Figure 2: Spatialisation of heritage assessments conducted in proximity to the proposed development

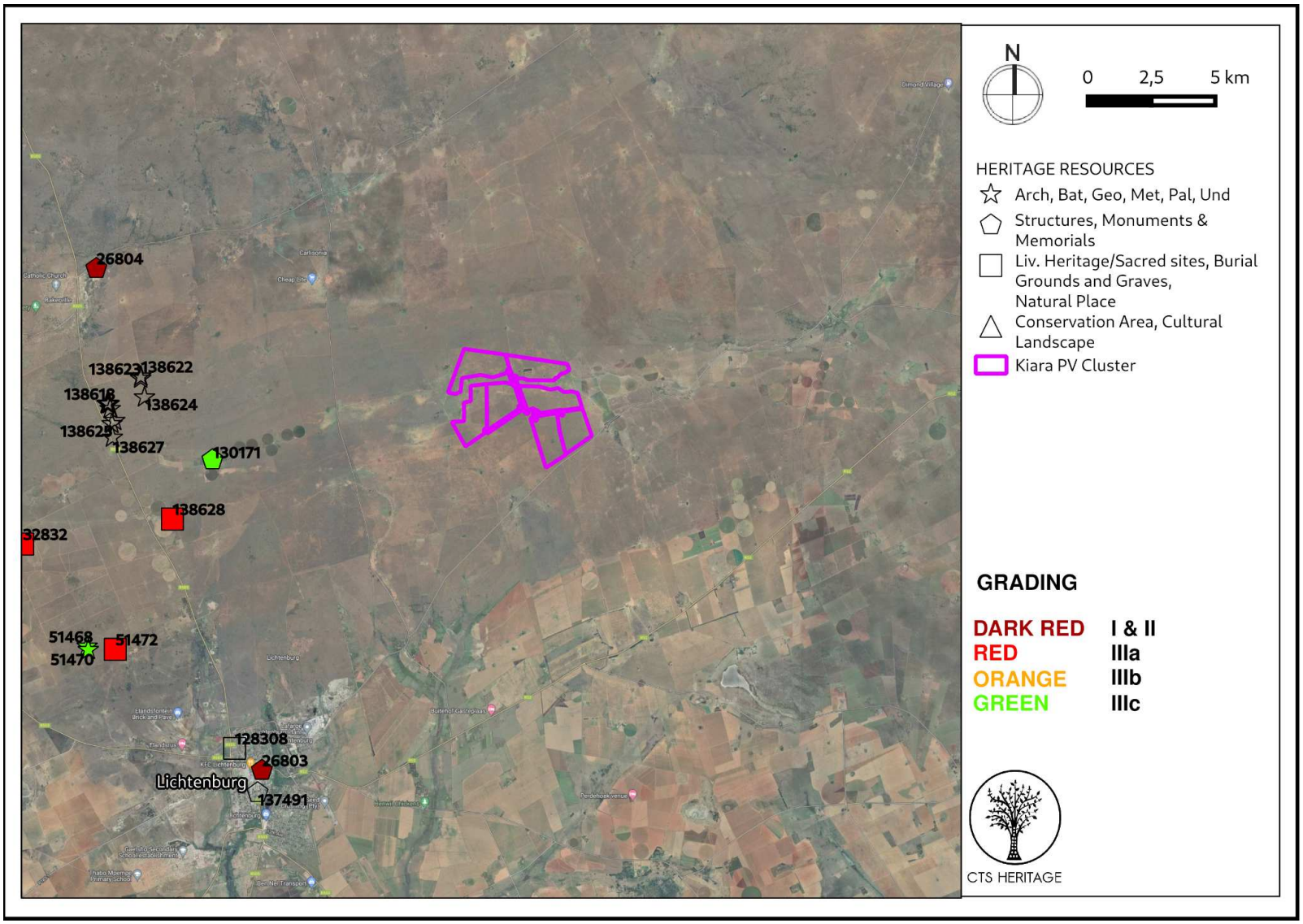

Figure 3: Spatialisation of known heritage resources in proximity to the proposed development

3. HISTORY AND EVOLUTION OF THE SITE AND CONTEXT

3.1 Previous Heritage Impact Assessments

Archaeology and Built Environment Heritage

Lichtenburg town was established in 1873 and named "Town of Light". General Del la Rey was buried in Lichtenburg after a fatal shooting incident at Langlaagte. During the 1800's, more and more farmers settled in the area. During the Second Boer War, the strategically important town of Lichtenburg was occupied by both Boer and Briton for short spells. In November 1900, a large British force under Col. Robert Baden-Powell was transferred to Lichtenburg and secured the town, and much of the territory with it. In addition, the town is known from Rudyard Kipling's poem, Lichtenberg, which relays the story of a foreign combatant in the second South African War. In 1926, Lichtenburg experienced a gold rush that lasted approximately 10 years. Lichtenburg district is now mostly a farming area, combining cattle and crop-farming and large areas of former diamond mine diggings are now used as grazing.

According to van Schalkwyk et al (1995, SAHRIS NID 6237) in their report completed for the Bakerville Diamond Fields, "land use in the area goes back to the Early Stone Age, as can be determined by the number of stone artifacts found near the old mining commissioners office. This material seems to be disturbed from its primary context because of the mining activities. It is postulated that similar occurrences will be found in other parts of the diggings, but that this material would have been disturbed out of context." As a result of the dominant land use in the area, many of the heritage resources identified by van Schalkwyk et al (1995) are associated with past and present agriculture, and consist of farming implements, a few windmills, and dipping-troughs. One such trough, located at Elandsputte on the farm Uitgevonden 355JP, was the site where the first diamond was discovered. This structure is a proclaimed national monument (now Provincial Heritage Site). Van Schalkwyk et al (1995) identified a number of burial grounds within their surveyed area (Map 5 and 5a). Heritage resources known from this area include burial grounds and graves, archaeological artefacts and old structures, often associated with farming activities or diamond mining. In his assessment completed for an adjacent PV facility, Van Schalkwyk (2021) identified no significant archaeological heritage resources, but did identify a number of informal burials. No resources are known to be located within any of the areas proposed for the development.

An archaeological field assessment was conducted for the Lichtenburg PV facilities, located approximately 15km west of the proposed development area in 2019. The field assessment conducted noted that, similar to this proposed development area, the area had been disturbed and transformed by agricultural activities. Furthermore, throughout the farming areas several heaps of rocks that were removed from the agricultural fields were identified. During the field assessment conducted in 2019, *no archaeological resources, graves or burial grounds were identified* in the project area. Another field assessment for the Houthaalbomen PV Facility located 20km

from the proposed development area was completed in 2014 by Van der Walt and 2021 by CTS Heritage. Van der Walt (2014) notes that "The site lies on a featureless flat plain. The entire development footprint was extensively utilised for crop farming and ploughing through the years resulted in a lateral and downward migration of artefacts making it virtually impossible to identify knapping or manufacture sites and site extent of artefact concentrations. In some areas borrowing animals brought MSA artefacts to the surface where the sand cover is more than a metre and a half thick and the possibility of finding subsurface material cannot be excluded. Most of the Stone Age archaeology in the study area consists of low densities of scattered (and possibly mixed) MSA and LSA artefacts." The findings of the 2021 field assessment report suggests that "the area was occupied or traversed intermittently by Stone Age groups potentially through periods in both the Middle Stone Age (MSA – 300ka:~40ka) and the Later Stone Age (LSA: 40ka: ~2ka), although artefacts that could be clearly linked with chrono-cultural periods were scarce, which is likely a function of the proximity to primary sources of raw-material. The abundance of high-quality chert rocks in the project area was likely the resource that attracted groups there and resulted in them leaving behavioural traces in the form of stone artefacts.

Indeed the majority of the stone artefacts identified look to be the result of expedient 'testing' of rocks for quality, and the so-called products in many of the scatters were likely transported away. In this sense no evidence of substantial densities of finds or occupational debris were identified, and the stone artefacts present are evidenced to have been produced by mobile groups moving through the area. The raw-materials exploited for stone artefact manufacture were exclusively local cherts. The presence of primary and secondary sources of chert in association with stone artefacts, are suggestive of the landscape resources that probably drew Stone Age groups to the region over an extended expanse of human evolutionary history."

3.2 Geology, geomorphology and Palaeontology

The proposed development is located on geological deposits belonging to the Monte Christo Formation of the Chuniespoort Group. The Monte Christo Formation is within the Malmani Subgroup. These deposits have a very high sensitivity for impacts to palaeontological resources. This group is known to contain a range of shallow marine to intertidal stromatolites (domes, columns *etc*) and organic-walled microfossils. In addition, it is within this group that fossiliferous Late Cenozoic cave breccias have been identified, such as within the Cradle of Humankind region. A development located approximately 15km away within the same geology was surveyed on foot by Bamford et al. (2019) as part of the Heritage Impact Assessment completed for the Lichtenburg PV facilities in 2019.

According to Bamford (2019), the project area lies on rocks of the Malmani Subgroup, Chuniespoort Group. The Malmani Subgroup is up to 2000m thick and comprises five formations distinguished by the amount of chert, stromatolite morphology, intercalated shales and erosion surfaces (Eriksson et al., 2006). The basal Oaktree

Formation overlies the Black Reef Formation, and is made up of carbonaceous shales, stromatolitic dolomites and locally developed quartzites. Above this is the Monte Christo Formation comprising erosive breccia, overlain by stromatolitic and oolitic platformal dolomites. Next is the Lyttleton Formation of shales quartzites and stromatolitic dolomites. The Eccles Formation comprises a series of erosional breccias and the overlying Frisco Formation is made up mostly of stromatolitic dolomites.

The palaeontological sensitivity of the area under consideration is presented in Figure 4a. The site proposed for development is in the Malmani Subgroup which contains a number of stromatolitic dolomites. These were formed in warm shallow sea and are the accumulation of layer upon layer of minerals deposited by blue-green algae (also known as cyanobacteria) and rarely some filamentous algae. Minerals deposited by the algae include calcium carbonate, calcium sulphate and magnesium carbonate. Very rarely are the algal cells preserved in the stromatolites and these are microscopic. Stromatolites are essentially trace fossils and these ones are 2750 to 2650 million years old and very abundant. 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 much too old to contain fossils other than blue-green algae. Taking account of the defined criteria, the potential impact to fossil heritage resources is negligible to extremely low.

Table 1: Explanation of symbols for the geological map and approximate ages (Erikssen et al., 2006. Johnson et al., 2006; McCarthy et al., 2006; Robb et al., 2006; van der Westhuizen et al., 2006). SG = Supergroup; Fm = Formation.

Symbol	Group/Formation	Lithology	Approximate Age
Qc	Quaternary	Alluvium, sand, calcrete	Neogene, ca 2.5 Ma to present
C-Pd	Dwyka Group	Diamictites, tillites, mudstones, shales,	Early Permian, Middle Ecca, ca 280-270 Ma
Vmm	Monte Christo Fm, Malmani Subgroup, Chuniespoort Group, Transvaal SG	Chert-rich dolomite; circles = oolitic	Ca 2585 – 2480 Ma

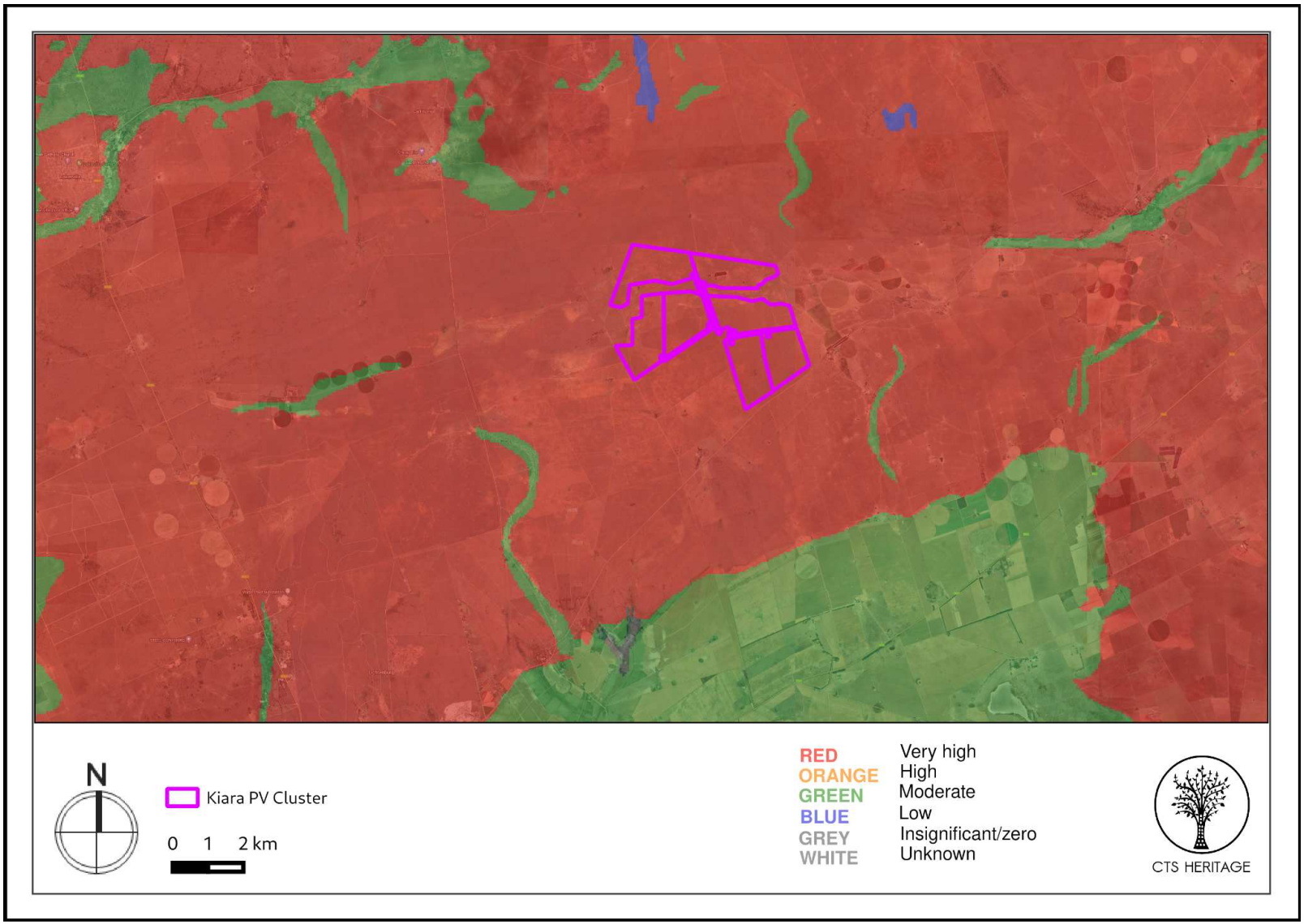

Figure 5: Palaeontological sensitivity of the proposed development area

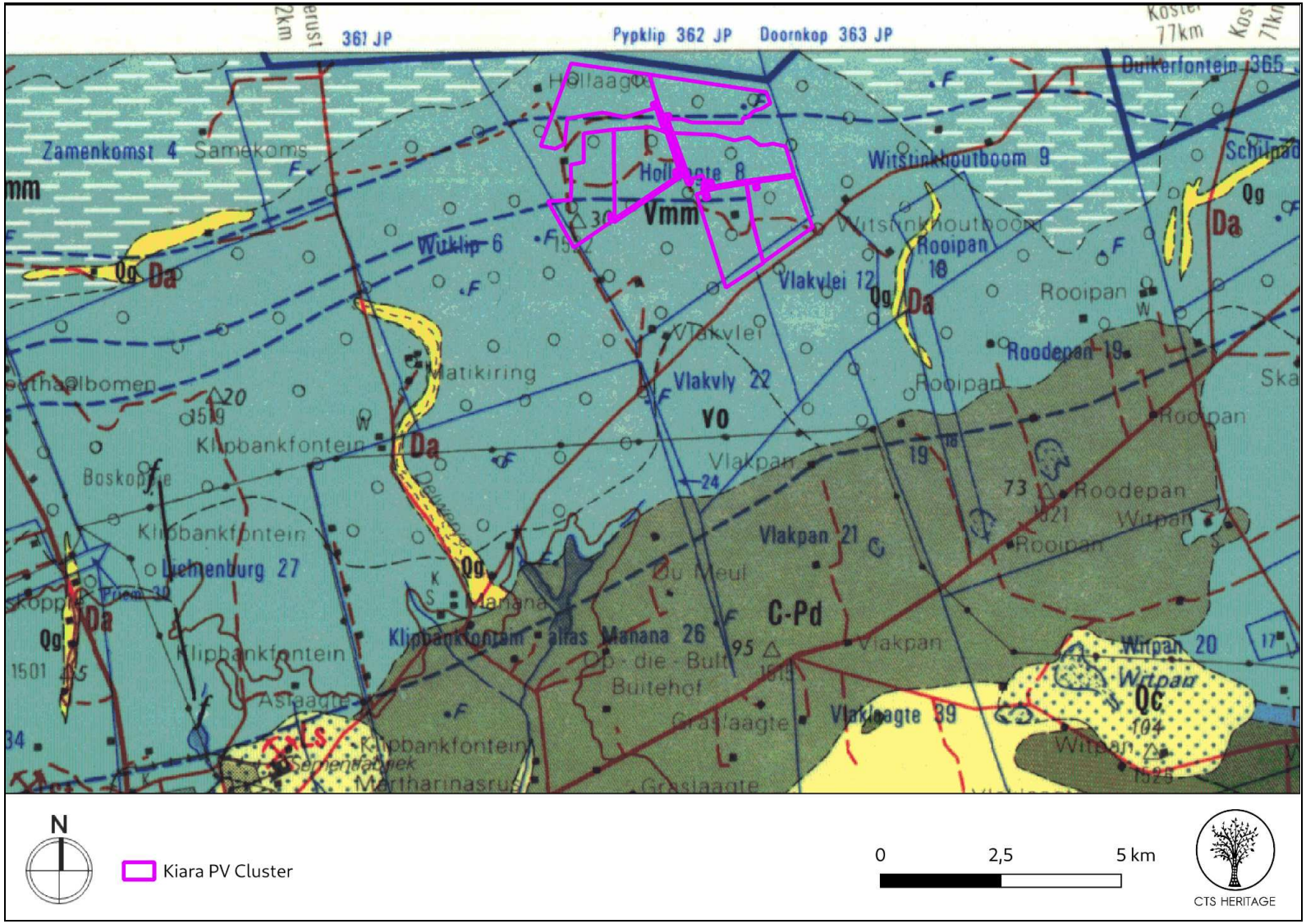

Figure 6: Geology underlying the proposed project area extracted from the Council of Geoscience Map (1:250 000) 2626 West Rand

4. IDENTIFICATION OF HERITAGE RESOURCES

4.1 Summary of findings of Specialist Reports

Archaeology (Appendix 1)

Stone Age Archaeology

No lithic material was recorded within the development footprint. However, the natural occurring chert and dolomite would have provided suitable raw material for knapping tools. Therefore, it is possible that isolated formal tools can occur in the landscape, but no knapping sites were identified.

Ruins and Kraals

Ruins of old farm structures and kraals are ubiquitous across this broader landscape. The old farmhouse and associated remaining farmscape (023-028), dating to the mid-to-late 19th century, represent the settlement and history of the farm. No midden could be identified, and no surface scatters of 19th-century cultural material were recorded.

Graves

Four sites with marked graves were documented. In addition, unmarked graves may exist within the development footprints. Large heaps of collected stones could be seen throughout the footprint as stones were removed from agricultural lands to facilitate ploughing. Some of these stones may have been unknowingly removed from graves.

Palaeontology (Appendix 2)

Rocks with very high palaeontological sensitivity are present within the development footprint and palaeontological mitigation measures must be incorporated into the Environmental Management Plan (EMP) for this project. Due to the fact that the 1:250 000 scale vector maps obtained from the Council for Geoscience indicate the rock unit underlying the area applicable to this report as being the Chuniespoort Group of the Transvaal Supergroup, lead to an initial assessment that very distinctive fossils will be present. Field work during this survey as well as literature surveys indicated that the rock units that will be exposed most of the time is the potentially fossiliferous Malmani Subgroup, a well-known rock sequence of the Transvaal Supergroup that contains highly significant palaeontological heritage (MacRae 1999; McCarthy and Rubidge, 2005; Johnson et at, 2006).

The dolomite of this specific study area is the basal chert-rich part of the Monte Christo Formation. The Malmani Subgroup is known for the well-defined stromatolite structures associated with the dolomite (Obbes, 1995; Johnson et al, 2006).

The Monte Christo Formation is known for the presence of well-defined karst topography with evidence of sinkhole formation as well as cave breccia present in the surface deposits associated with local depressions in the landscape.

Visual Impacts (Appendix 5)

4.2 Heritage Resources identified

Table 2.1: Significant heritage resources identified within the development area

Site No.	Description	Type	Co-ordinates		Grading	Mitigation
023	Original Farm House. No archaeological material. Just south of Phase 7 boundary	Ruin	-26.010725	26.24467222	IIIC	20m no-go Buffer. Falls within sensitive area
024	Stone Foundation. Part of larger werf.	Ruin	-26.010725	26.24594166	IIIC	20m no-go Buffer. Falls within sensitive area
025	Stone Kraal. Part of larger werf.	Ruin	-26.010677	26.245619	IIIC	20m no-go Buffer. Falls within sensitive area
026	Stone Foundation. Part of larger werf.	Ruin	-26.010483	26.245277	IIIC	20m no-go Buffer. Falls within sensitive area
027	Stone Foundation. Part of larger werf.	Ruin	-26.010527777	26.24265555	IIIC	20m no-go Buffer. Falls within sensitive area
028	Graves with one visible headstone, broken, large Eucalyptus tree.Jacoba van Heerden, Born 18(33/88/83/38)? Died Aged 30 A large Eucalyptus tree grows over the grave/s. The tree's trunk has enveloped a fence pole. It is unclear how many graves have been overgrown by tree roots.	Graves	-26.010088888	26.24325	IIIA	50m no-go Buffer. Falls within sensitive area

Table 2.2: Significant fossil heritage resources identified within the development area

Site No.	Description	Type	Co-ordinates		Grading	Mitigation
001	Breccia associated with cave deposits in the study area. The	Fossil	-26.016386° S	26.239859° E	IIIC	Chance Fossil Finds Procedure

	breccia can be associated with bone fossils of Pliocene to Late Pleistocene age Very well-defined small-scale (100mm) dome-like stromatolite structures associated with chert layers in the Monte Christo Formation Oolitic chert beds indicating rich marine life during deposition of the Monte Christo Formation.					
002	Breccia associated with possible sinkhole cave formations. No fossils were observed, but it is important that the ECO is vigilant and know what to look for in these deposits.	Fossil	-26.013083°S	26.238136°E	IIIC	Chance Fossil Finds Procedure
003	Very deeply weathered dolomite of the Monte Christo Formation. Significant stromatolites observed in dolomite blocks used as building material on site.	Fossil	-26.011662°S	26.244038°E	IIIC	Chance Fossil Finds Procedure
005	Deeply weathered dolomite of the Monte Christo Formation. Typically open grassland region.	Fossil	-26.011942°S	26.244462°E	NCW	Chance Fossil Finds Procedure
006	Well-defined stromatolite in dolomite of the Monte Christo Formation on site.	Fossil	-26.011294° S	26.244510°E	IIIC	Chance Fossil Finds Procedure
007	Deeply weathered dolomite of the Monte Christo Formation with deep red Hutton soils. Typical topographic setting on site of the solar farm.	Fossil	-26.009737°S	26.258551°E	NCW	Chance Fossil Finds Procedure
008	Well-developed cave breccia with associated depression caused by karst topographic features (see Kiara 8 sinkhole) .	Fossil	-26.009614°S	26.259915°E	IIIB	Chance Fossil Finds Procedure

4.3 Mapping and spatialisation of heritage resources

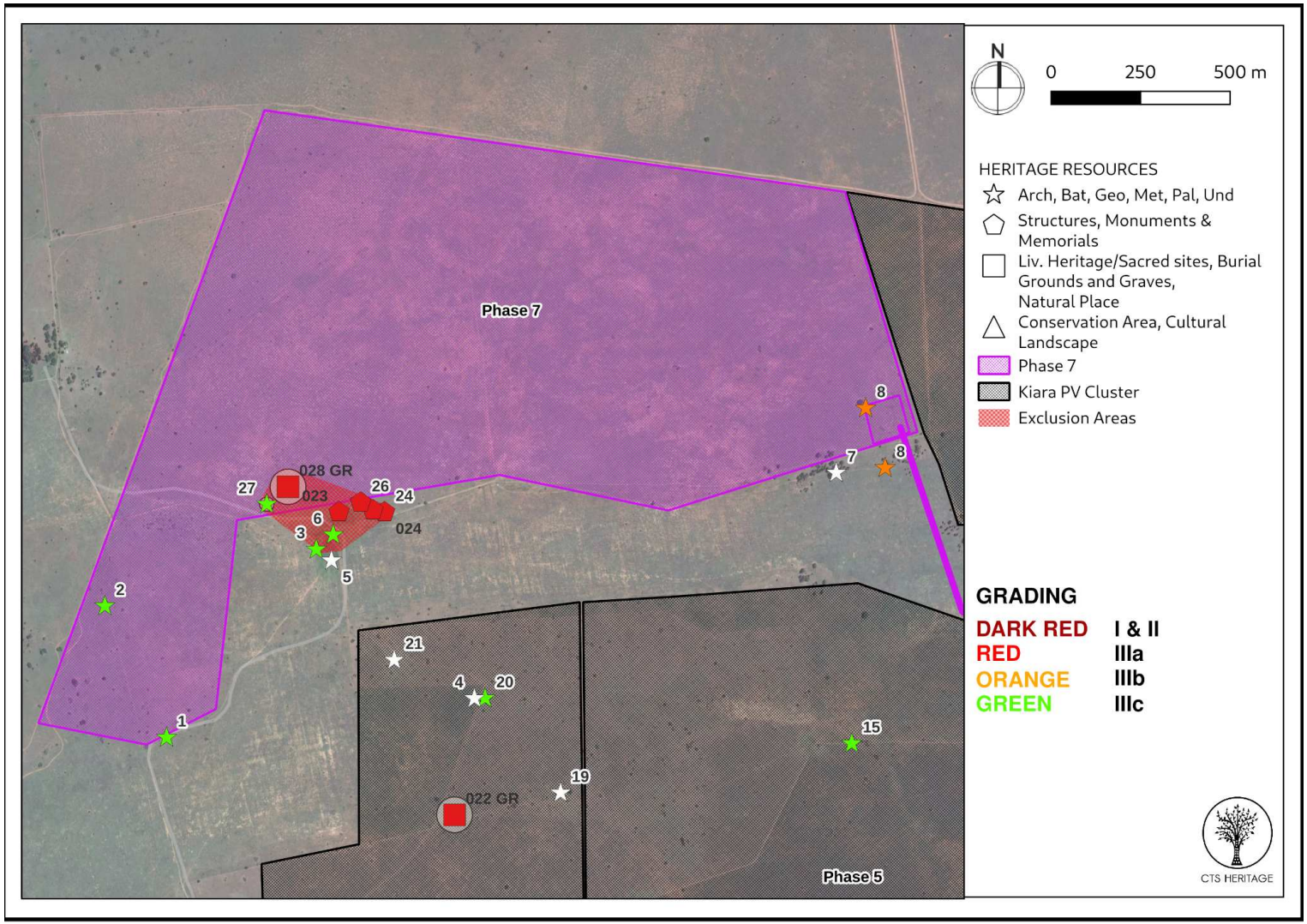

Figure 7.1: Heritage Resources in the vicinity of the proposed development area

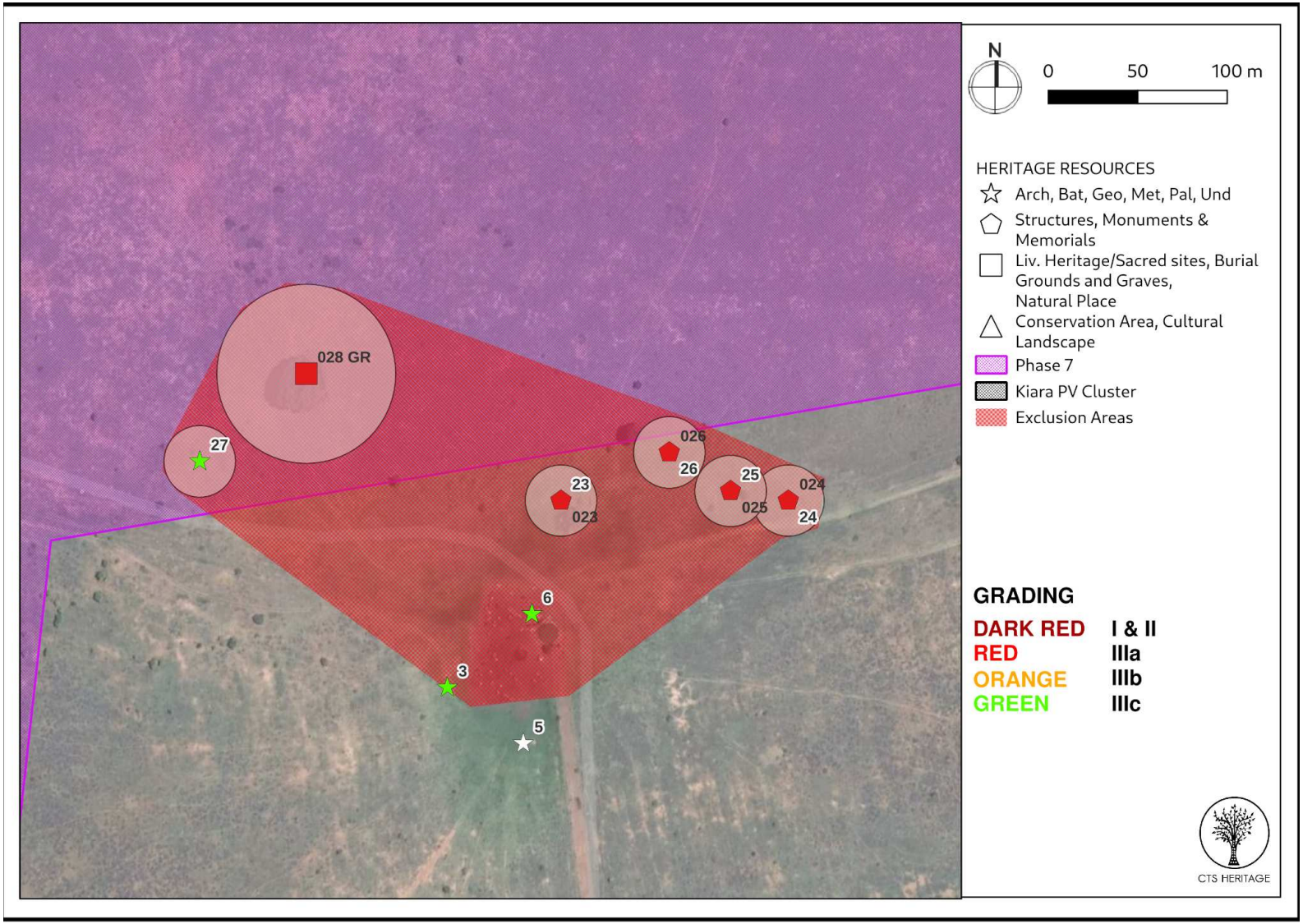

Figure 7.2: Heritage Resources in the vicinity of the proposed development area with recommended buffers and exclusion areas

5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

5.1 Assessment of impact to Heritage Resources

Archaeology

No stone age archaeological resources were identified during the field assessment despite the presence of abundant raw material sources. In other nearby projects, Stone Age archaeological resources that were identified were graded as having low levels of scientific significance. As such, it is very unlikely that the proposed development will impact on significant Stone Age archaeological heritage..

A number of stone structures were identified within the study area. These have been categorised as either kraals or ruins of varying heritage value. Where the kraals and ruins form part of a cluster of resources, these have been graded as IIIC for their historical contextual significance and their contribution to the cultural landscape. It is recommended that a no-development buffer of 20m is implemented around these Grade IIIC structures. Where ruins or kraals are isolated on the landscape, their heritage value is limited and as such, these have been graded as Not Conservation-Worthy (NCW).

A number of graves were identified within the areas proposed for development. All the graves are ascribed high local levels of cultural value and as such, are graded IIIA. It is important that human remains are not disturbed through the process of construction of this development.

The clusters of resources have been mapped with their recommended no-go buffer areas in the maps above. In order to conserve the integrity of the relationship between the kraals, ruins and graves, it is recommended that the clusters as mapped are considered to be no-go areas for the proposed development (Figure 7.1 and 7.2).

Palaeontology

Geological units within the development area range from very highly sensitive dolomites of the Monte Christo Formation of the Malmani Subgroup to moderately sensitive, recent, alluvium.

Following observations during the field investigation as well as data obtained from previous palaeontological impact assessments in this region, it is our professional opinion that significant stromatolites from the Malmani Subgroup are abundantly present in this area.

The excavations for the construction of the proposed Kiara PV 6 Facility will most probably expose some sediments that are very highly sensitive geological formations and some sites revealed evidence of very highly significant remains of fossils. A significant part of the excavation project will cut into rocks of the Malmani Subgroup, Chuniespoort Group of the Transvaal Supergroup. This unit has a very high sensitivity for

palaeontological heritage. Impacts to the sensitive geology can be mitigated through the implementation of the attached Chance Fossil Finds Procedure for the duration of construction activities.

Table 3: Impacts to heritage resources

NATURE: The construction phase of the project will require excavation, which may impact on heritage resources if present.				
		Archaeology		**Palaeontology**
MAGNITUDE	**H (8)**	Kraals, graves and ruins of heritage significance were identified within the development area. These features are related and should be considered as one site.	**H (8)**	The area proposed for development is underlain by sediments of very high palaeontological sensitivity and one specific areas for exclusion has been 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)**	Since only the 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	**H (5)**	It is likely heritage resources are would be found in the development area	**H (5)**	It is likely fossils would be found in the development area
SIGNIFICANCE	**H**	(8+5+1)x5=70	**H**	(8+5+1)x5=70
STATUS		Negative		Negative
REVERSIBILITY	**L**	Any impacts to heritage resources that do occur are irreversible	**L**	Any impacts to heritage resources that do occur are irreversible
IRREPLACEABLE LOSS OF RESOURCES?	**H**	Likely	**H**	Likely
CAN IMPACTS BE MITIGATED		Yes		Yes
MITIGATED SIGNIFICANCE		(8+5+1)x1=14		(8+5+1)x1=14
MITIGATION: - The areas recommended for exclusion must be excluded from the development as no-go areas - The attached Chance Fossil Finds Procedure must be implemented - Should any buried archaeological resources or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.				
RESIDUAL RISK: 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

According to the SIA (2022) completed for this project, "The majority of social impacts associated with the project are anticipated to occur during the construction phase of the development and are typical of the type of social impacts generally associated with construction activities. These impacts will be temporary and short-term (~12 months) but could have long-term effects on the surrounding social environment if not planned or managed appropriately. It is therefore necessary that the detailed design phase be conducted in such a manner so as not to result in permanent social impacts associated with the ill-placement of project components or associated infrastructure or result in the mis-management of the construction phase activities.

The positive and negative social impacts identified at this stage and will be assessed for the construction phase includes:

- Direct and indirect employment opportunities
- Economic multiplier effects
- Influx of jobseekers and change in population
- Safety and security impacts
- Impacts on daily living and movement patterns
- Nuisance impacts, including noise and dust
- Visual impacts and sense of place impacts"

It is anticipated that the primary long-term socio-economic benefit to be derived from this project is its contribution of generation capacity to the National Grid and its contribution to mitigating the negative impacts of load shedding. An additional benefit is the contribution of this project to the shift away from reliance on coal and fossil fuel for South Africa's energy needs and towards renewable energy sources.

As such, the anticipated benefits of the proposed development outweigh any negative impacts to heritage resources on condition that the recommendations outlined below are implemented.

5.3 Proposed development alternatives

There are no alternatives being considered for this project.

No alternatives are proposed from a heritage perspective as the impacts anticipated can be appropriately mitigated through the recommendations outlined below.

5.4 Cumulative Impacts

The proposed development is located within a belt of approved renewable energy facilities. In terms of impacts to heritage resources, it is preferred that this kind of infrastructure development is concentrated in one location and is not sprawled across an otherwise culturally significant landscape. The proposed development is therefore unlikely to result in unacceptable risk or loss, nor will the proposed development result in a complete change to the sense of place of the area or result in an unacceptable increase in impact.

Table 4: Cumulative Impact Table

NATURE: Cumulative Impact to the sense of place due to the development of the PV facility which will intensify industrial development within the area.				
		Overall impact of the proposed project considered in isolation		**Cumulative impact of the project and other projects in the area**
MAGNITUDE	**L (4)**	Low	**L (4)**	Low
DURATION	**M (3)**	Medium-term	**H (4)**	Long-term
EXTENT	**L (1)**	Low	**L (1)**	Low
PROBABILITY	**L (2)**	Improbable	**H (3)**	Probable
SIGNIFICANCE	**L**	(4+3+1)x2=16	**L**	(4+4+1)x3=27
STATUS		Neutral		Neutral
REVERSIBILITY	**H**	High	**L**	Low
IRREPLACEABLE LOSS OF RESOURCES?	**L**	Unlikely	**L**	Unlikely
CAN IMPACTS BE MITIGATED		NA		NA
CONFIDENCE IN FINDINGS: High				
MITIGATION: No impacts are anticipated and as such, no mitigation is required				

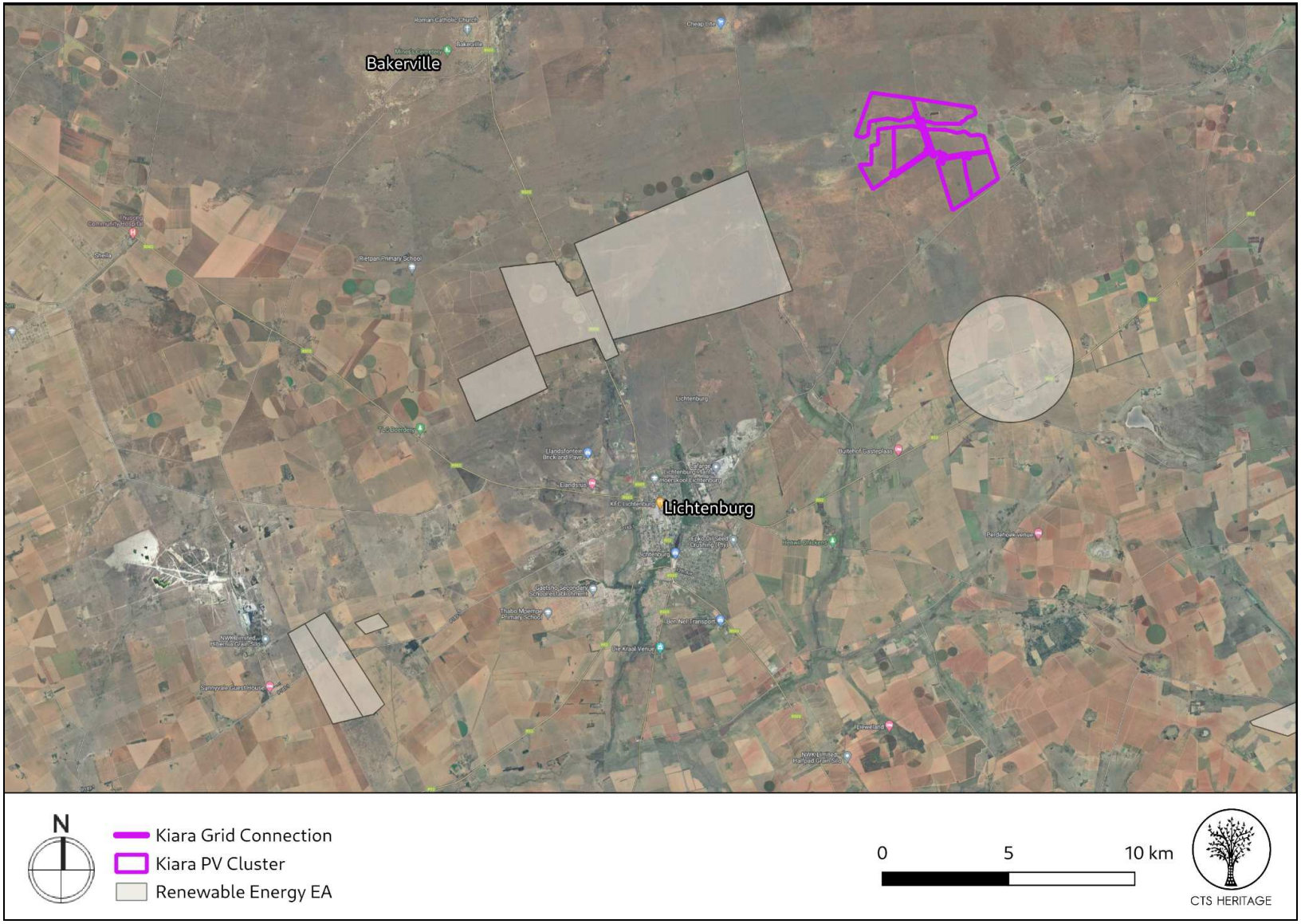

Figure 8: Approved Renewable Energy Facilities in the area

6. RESULTS OF PUBLIC CONSULTATION

The public consultation process will be undertaken by the EAP during the EIA.

7. CONCLUSION

The findings of this field assessment largely correlate with the findings of other specialists conducted in the area. No significant stone age archaeological resources were identified. A number of stone structures were identified within the development area. Some of these are indicative of historic occupation of the area in the form of ruins, old structures and stone kraals. These have been graded as having low local significance due to their contribution to the history of the broader context. Other such features represent burials and burial grounds. These features have high levels of local significance and may not be impacted by the development activities.

Where there is a clear spatial relationship between the kraals, ruins and graves, these have been mapped as clusters of high sensitivity in the maps above. In order to conserve the integrity of the relationship between the kraals, ruins and graves, it is recommended that the clusters as mapped are considered to be no-go areas for the proposed development.

While the area proposed for development is underlain by geological sediments of very high palaeontological sensitivity, no fossil outcrops requiring conservation were identified within the area proposed for development. However, it is recommended that the attached Chance Fossil Finds Procedure be implemented for the duration of construction activities on site.

8. RECOMMENDATIONS

There is no objection to the proposed development of the Kiara PV 6 facility on heritage grounds on condition that:

- The recommended no-go areas as per Table 2.1 and Figure 7.1 and 7.2 are implemented
- The attached Chance Fossil Finds Procedure must be implemented for the duration of the construction phase of the project
- Should any buried archaeological resources or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.

9. REFERENCES

Heritage Impact Assessments				
Nid	**Report Type**	**Author/s**	**Date**	**Title**
6237	AIA Phase 1	Johnny Van Schalkwyk, Robert de Jong, S Smith	01/08/1995	Reconnaissance of Remaining Cultural Resources in the Bakerville Diamond Fields
8330	AIA Phase 1	Francois P Coetzee	01/03/2008	Cultural Heritage Survey of the PPC Slurry Operation, near Zeerust, North West Province
8455	HIA Phase 1	Udo Kusel	25/07/2008	Cultural Heritage Resources Impact Assessment of Portion 151 of Lichtenburg Town and Townlands 27 IP (Lichtenburg Extension 10) North West Province
8531	HIA Phase 1	Johnny Van Schalkwyk	01/11/2008	Heritage Impact Report for the Proposed 88 kV Power Line from Watershed Substation, Lichtenburg, to the Mmabatho Substation, North West Gauteng Province
50047	HIA Phase 1	M Hutten	01/05/2012	Heritage Impact Assessment for the Proposed Lichtenburg Solar Park North of Lichtenburg, North West Province
50048	PIA Phase 1	Bruce Rubidge	14/07/2012	Palaeontological Assessment - Lichtenburg Solar Park
110338	HIA Phase 1	Julius CC Pistorius	01/06/2011	A PHASE I HERITAGE IMPACT ASSESSMENT (HIA) STUDY FOR THE PROPOSED MAFIKENG CEMENT PROJECT NEAR ITSOSENG IN THE NORTH-WEST PROVINCE OF SOUTH AFRICA
123075	Heritage Scoping	Jaco van der Walt	12/11/2013	Archaeological Impact Assessment Report
138895		Jaco van der Walt, John E Almond	14/10/2013	Archaeological Impact Assessment for the Proposed Hibernia Solar Project near the town of Lichtenburg in the North West Province of South Africa & Paleontological Report: Recommended Exemption From Further Palaeontological Studies: Proposed Hibernia Pv S

Other References:

Lavin, Tomose, de Bruin et al. (September 2018). ARCHAEOLOGICAL SPECIALIST STUDY: In terms of Section 38(8) of the NHRA for a Development of the Lichtenburg 1, 2 and 3 PV Solar Energy Facility and associated infrastructure on a site near Lichtenburg, North West Province (Unpublished)

Bamford (September 2018). Palaeontological Impact Assessment for three proposed PV projects near Lichtenburg, Northwest Province. (Unpublished)

Lavin and Wiltshire. (June 2018). Heritage Screening Assessment for the proposed development of the Lichtenburg 2 PV Solar Energy Facility and associated infrastructure on a site near Lichtenburg, North West Province. (Unpublished).

Du Plessis (October 2018). Proposed Lichtenburg 2 Pv Solar Energy Facility, North West Province: Visual Impact Assessment. (Unpublished)

APPENDICES

APPENDIX 1: Archaeological Assessment (2021)

APPENDIX 2: Palaeontological Assessment (2021)

APPENDIX 3: Chance Fossil Finds Procedure

APPENDIX 4: Heritage Screening Assessment

APPENDIX 5: Visual Impact Assessment