ARCHAEOLOGICAL SPECIALIST STUDY

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

The development of various PV Facilities and their associated grid connections associated with Harmony Gold Mining activities throughout the Free State Province and in the North West Province

Prepared by

CTS HERITAGE

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EXECUTIVE SUMMARY

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1. INTRODUCTION

1.1 Background Information on Project

TBA

1.2 Description of Property and Affected Environment

1.2.1 *Harmony*

The potentially affected footprint related to the proposed PV facility is located across the Harmony 1 mining area, approximately 2.5km south of the town of Welkom. The potentially affected area is largely flat. Yet an isolated elevated mound of disturbed quaternary sediments of fluvial origin is present on the landscape (CHM5). This elevated mound appears to have been exposed through past agricultural activities, and includes associated archaeological materials of Pleistocene age, as well as abundant unworked riverine raw-materials in certain localities.

Indeed, much of the northern and central portions of the affected area are significantly modified by recent and historical agricultural activities. In this regard, there are structural remnants of a farm (HM5) that would have encompassed substantial portions of the affected area when active, which is evident by the lateral spatial morphology of the now dense grasses and delineated fields associated with the agriculturally affected portions. Where retained and unaffected by agriculture, the natural vegetation comprises grassland and shrubland typical of the Free State Grassland Biome, interspersed with denser indigenous foliage along several drainage and paleo-drainage channels traversing the area. Predictably, local wildlife is more abundant in the areas that retain more extensive coverage of indigenous vegetation, with evidence of smaller antelope (such as Duiker and Steenbok), indigenous fowl including francolin, spurfowl and guineafowl , as well as some traces of burrowing rodents (molerats, hares and meerkats) evident in the project footprint.

The south-western portion of the potentially affected area has a higher frequency of active non-perennial drainages than the north-eastern portion. These drainages are associated with substantial fluvial deposits of riverine quartzite rocks (evident from the rock cortex), and other secondary deposits of sedimentary rocks that derive from the parent formations of the broader goldfields region. These cobbles would have been sources of raw-material for Stone Age occupants of the area. Other rock types incorporated in the cobble deposits include quartz and indurated shales (Hornfels), many of which are artefact manufacturing quality in terms of homogeneity and lithic fracture properties.

The historical use of the landscape for agricultural purposes, and relatively abundant remnants of recently abandoned structures in one area (HM5-HM8) raise the potential for graves and isolated burials. Importantly though, no graves were identified within this particular survey, and there would not be evidence of graves within the extensive ploughed areas of the footprint. However, the dense grass cover related to late summer heavy rainfall was a pertinent constraint to documenting potential graves in the areas that were not ploughed. Grass cover made potential grave locations impossible to exhaustively assess across the project area (particularly in cases where above surface material indicators may have been removed through crop related activities or through trampling related to stock farming).

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1.2.2 *Central*

The potentially affected footprint related to the proposed PV facility and associated infrastructure is located across several previously ploughed agricultural camps, approximately 9.5km to the south-east of the town of Welkom. Overall the area is flat, and is heavily modified by modern land-use activities such as historical agriculture and prospecting. As a result of such disturbance, little of the original natural landscape - in terms of vegetation, geology and probably also archaeology - is visible today.

The northern portion (Central Plant PV Facility (Alternative 1)) of the affected area is characterised by ploughed agricultural camps. Agricultural activities have disturbed the upper ~0.5-1m of original quaternary sediments associated with this area. At several localities, exposures of agriculturally reworked quaternary surface deposits are visible (CCT63), which include sparsely distributed Pleistocene stone artefacts in some places. These artefacts have been rolled, as evidenced by rounding and frequencies of edge-damage on all specimens, and are in heavily disturbed depositional contexts. Structural remains of past agricultural activities are also evident in close proximity to the ploughed areas. Ephemeral remnants of one modern Kraal were visible, however, this Kraal is likely not older than 60 years, thus offering little in terms of scientific or heritage value (CCT14).

An active high energy non-perennial braiding river with associated minor drainages is located in the south-eastern portion, and there are extensively ploughed fields in the south-western portion of Alternative 1. Several associated drainage channels expose fluvial deposits that are likely Pleistocene in origin. However, the spatial extent and life-history of the drainages are affected by the extensive modern disturbance related to mining activity and prospection in the area (CCT1). Substantial fluvial deposits of riverine quartzite rocks, and other secondary deposits of sedimentary rocks that are characteristic of the parent formations of the broader goldfields region, are associated with these channels. A diversity of rocks is incorporated in the cobble deposits including quartz and indurated shales (Hornfels), many of which are artefact quality in terms of homogeneity and fracture characteristics. Sparse Pleistocene artefacts are associated with these cobble deposits, and mostly comprise products from early on in core reduction, with one weathered bifacial tool indicative of an earlier Late Pleistocene or Middle-Pleistocene occupation of the region. This bifacial tool may be indicative of a broad minimum age for the original fluvial deposition of the cobbles and artefacts in this area. That said, the artefacts themselves could have been fluvially transported over substantial distances. The artefacts identified were all *ex-situ*, meaning that they cannot be dated or geochronologically associated with an encompassing deposit, so are limited in scientific value. All artefacts occur as isolated finds rather than scatters of associated archaeological materials.

The potentially affected area also has sporadic invasive vegetation including eucalyptus, occasional black Wattle and several Pine trees. Where the indigenous vegetation is evident, it comprises grassland and semi-arid shrubland typical of the southern African Grassland Biome in the summer-rainfall region, although indigenous vegetation has been removed across >70% of the affected area. In terms of fauna, only evidence for burrowing rodents (predominantly hares) was observed. Bioturbation relating to burrowing rodents may well affect any potential sub-surface archaeology (though no sub-surface remains were documented apart from the reworked isolated Pleistocene artefacts).

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Apart from the isolated Stone Age remains mentioned, there was no evidence of Iron Age archaeology within the footprint. No graves were identified within the survey and visibility was reasonably good for stone structures, although much of the surface sediments were only visible in disturbed contexts. Relevantly, the dense grass cover was a pertinent constraint to documenting potential graves in the areas that were not disturbed. Agricultural and prospection activities may have removed surficial indicators of sub-surface archaeology such as burials, which needs to be considered in future development implicating excavation.

1.2.3 *Target*

The potentially affected area associated with the proposed PV facility is located in the Target mining area, approximately 12 km north-east of the town of Odendaalsrus in the goldfields region of the Lejweleputswa district of the Free State province of South Africa. The footprint for potential development is largely flat, and characterised - over substantial portions - by ploughed agricultural camps in the western most two-thirds. The upper sediments in the agriculturally affected regions (western portion) have thus been extensively disturbed through agricultural processes, and the original quaternary deposits have been reworked or removed to depths in excess of ~0.5m in several places, as a consequence of agriculture and/or mining related clearing (CTG1 - CTG6).

Local bedrock outcrops ephemerally at several points east of the affected area. This bedrock is comprised largely of shales and indurated siltstones (Ecca Group), whereas the upper sediments covering these host rocks, and the footprint itself, likely derive from the in-situ weathering of local parent formations. The upper sediments were fluvially deposited across much of the area (as evidenced by sub-angular edges and rounding of lithic inclusions), and potentially relate in depositional origin to summer flooding of the drainages to the south and west.

In the eastern portion of the affected property, where natural landscape is primarily retained (i.e. unaffected by modern activity), grassland and semi-arid shrubland is evident with shale and some evidence for sub-volcanic rock in the form of small secondary colluvial nodules (<5cm in maximum diameter) in several locations. No primary or secondary sources of artefact quality stone were documented on the affected property, and only two stone artefacts (on exotic fine-grained quartzite) were documented in the vicinity of the affected property. The isolated archaeological finds were documented in the eastern portion, in broad association with the original quaternary upper sediments. However these archaeological finds occurred in secondary contexts on a deflated land surface, so therefore have limited potential for modern scientific analyses (due to the *ex situ* spatial contexts of the finds and limited possibility of radiometric dating or directly associating them with dateable sediments).

The western portion of the affected property is interspersed with vehicle tracks where grass has been trampled and/or removed, probably to facilitate vehicle manoeuvrability between agricultural infrastructure and to facilitate movement associated with prospecting. Indigenous fowl including francolin and guineafowl were observed on the affected property, in addition to abundant traces of burrowing rodents (predominantly hares), which may well affect any potential sub-surface archaeology (though no sub-surface remains were documented).

Apart from the ephemeral Stone Age remains documented, evidence for archaeology was minimal. No graves were identified within the survey and visibility was reasonably good for stone structures, so the latter finding could be

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considered comprehensive. However, the substantial grass cover and soil formation across the eastern part of the footprint was a relevant constraint to documenting stone artefacts and other smaller potential surface remains such as pottery etc.

1.2.4 *Joel*

The potentially affected footprint related to the proposed PV facility is located across the Joel mining area, approximately 12 km north-east of the town of Odendaalsrus in the goldfields region of the Lejweleputswa district of the Free State province of South Africa. Relative to the 4 other affected areas discussed in the report, the Joel area is substantially less affected by modern activities and significant portions of the original landscape are retained that have thick shrubs and grasses, although portions of the property owned by the mine look currently to be leased out for cattle grazing, and one small central area has been affected by historical mining (evidenced by an abandoned shaft CJL13).

The footprint is located in the vicinity of the Free State Doring meandering river system. Portions of the affected property are located on the terraces of this drainage system, with evidence of banded chert nodules (4-11cm in maximum diameter – a high quality raw-material for artefact manufacture) (CJL2), and thick fluvially deposited sands (CJL11). Importantly, only marginal topsoil formation was evident in the area, which may be a further indicator of the erosional effects of a past active high-energy river system. Several remnants of dam structures were recorded, implicating the historical anthropogenic capture of naturally available water in the summer rainfall season (CJL3 and CHL6). Although the affected area is relatively flat, there are more resistant raised areas that are richer in archaeological materials relative to the deflated areas between(CJL11). There is also more evidence for soil formation in the raised portions, indicating that parts of the landscape have been differentially eroded by natural (flooding) and/or anthropogenic processes (agriculture) over time.

The natural vegetation comprises Savanna Grassland typical of the southern African summer-rainfall region interspersed with abundant acacia, and dense grasses among the shrubs, with small open patches of sand dispersed between the thicker vegetation (which were extensively examined, although archaeological visibility was poor) (CJL1, CJL2, CJL4, CJL10, CJL12, and JL1 and 2) . Chert artefacts were exposed in several patches indicating that the vegetation cover may be inhibiting visibility of more extensively distributed archaeological materials. There is abundant evidence of indigenous and invasive fauna including smaller to medium sized buck (Bushbuck, Duiker and Steenbok), Suids including various bushpig species (and modern traps set for their capture), abundant Vervet monkeys, indigenous and feral fowl including herds of Ostrich, francolin, spurfowl and guineafowl, as well as traces of burrowing rodents (molerats, hares and meerkats).

Importantly, no graves were identified within the survey, and there would not be evidence of graves within the areas of the footprint extensively affected by flooding. In addition, there was no evidence for historical dwelling structures that would make potential burials more likely. The dense grass and acacia cover, however, was a pertinent constraint to documenting potential graves in the areas that were not disturbed. Extensive grass cover made potential grave locations impossible to exhaustively assess across the project area although their presence seems unlikely given the

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paucity of archaeological evidence for historical domestic activities such as dwellings.

1.2.5 Moab

The potentially affected area related to the proposed PV facility is located across the Moab mining area and some privately owned agricultural camps in the east, approximately 12 km south-east of the town of Orkney. Although Orkney is located in the North-West province, the PV footprint is located across the southern bank of the Vaal River, on the northern border of the Free State province of South Africa.

Much of the footprint has been affected by sporadic surface disturbance and modern excavation likely associated with historical agricultural activities (and modern ploughed fields to the east of the Moab boundary included in the affected footprint) (CMB3), with mining prospection and the development of mining related infrastructure (CMB26). Where the natural vegetation is retained, it comprises grassland typical of the southern African Grassland Biome in the summer-rainfall region interspersed with acacia, and in some areas, such as the south-west, dense invasive forest comprising eucalyptus plantation and occasional black Wattle (CMB10). Chert bedrock outcrops in multiple locations (CMB4) in the north-west and in the south-east (some with clear prehistoric exploitation traces) (CM2). Where indigenous grassland is retained, evidence of smaller antelope (such as Duiker and Steenbok), abundant Vervet monkeys, indigenous fowl including francolin, spurfowl and guineafowl, as well as traces of burrowing rodents (molerats, hares and meerkats) were observed within the affected area.

The topography of the project area is generally flat. It declines, however, gradually in the south-east where a drainage channel is located associated with Middle and Later Stone Age materials. There is extensive disturbance in the form of recent and historical clearing associated with probable mining-related activities. Bioturbation in the form of rodent activity is evident in the upper ~0.4-1m of sandy topsoil, as well as evidence for past stock rotation farming in the southern portion (probably prior to the land being owned by the mining company), and modern stock farming and bean plantation in the most easterly portion (on what looks to be privately owned/leased land).

The sandy upper sediments look to be fluvially deposited across much of the area, with very few lithic inclusions (some marginally rounded), indicating low-energy deposition in the north-western portions probably related to the Vaal river system, and with primary nodules of chert (5-10cm in maximum diameter) deriving from the local bedrock. Artefact quality raw-material in the form of primary local cherts is available within the footprint, with several outcrops associated with sparse archaeological evidence. Some ephemeral Stone Age exploitation evidence in the form of simple cortical flakes, flake removal traces on outcrops and cores were identified as well as some systematic Levallois and bladelet production in the eastern portion. No identified sites represent archaeological remains in dateable contexts that need to be avoided (see sensitivity ranking), and all are of low scientific significance.

Importantly, no graves were identified within the survey, and there would not be evidence of graves within the extensively disturbed areas of the footprint. In addition, there was no evidence for historical dwelling structures apart from the non-domestic dilapidated Vaal Reef Shooting Club. Relevantly though, the dense grass cover was a pertinent constraint to documenting potential graves in the areas that were not disturbed. Extensive grass cover made potential grave locations impossible to exhaustively assess across the project area (particularly in cases where above surface

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material indicators may have been removed through modern disturbance or through trampling related to historical stock farming activities.

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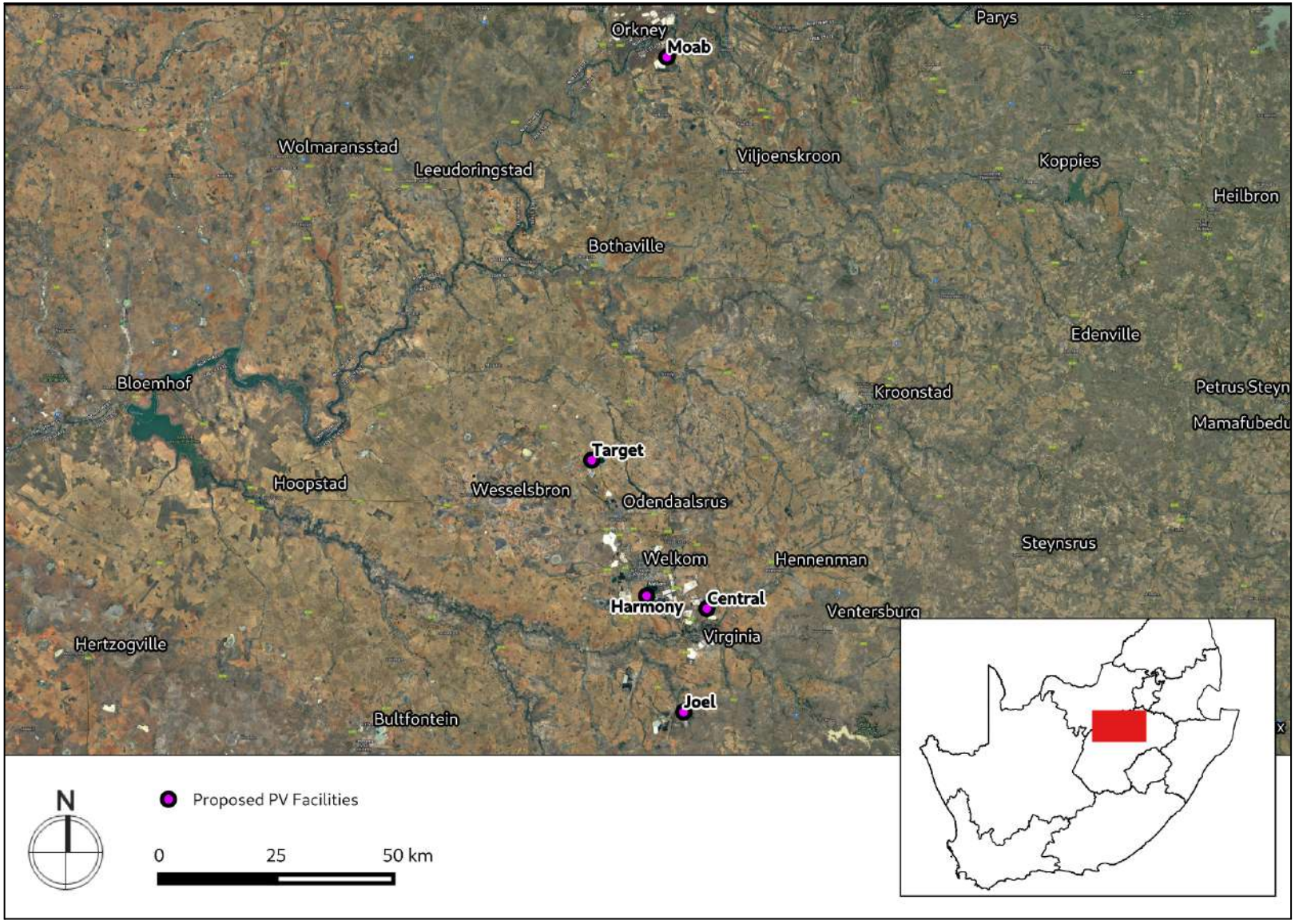

Figure 1.1: Close up satellite image indicating proposed location of study area

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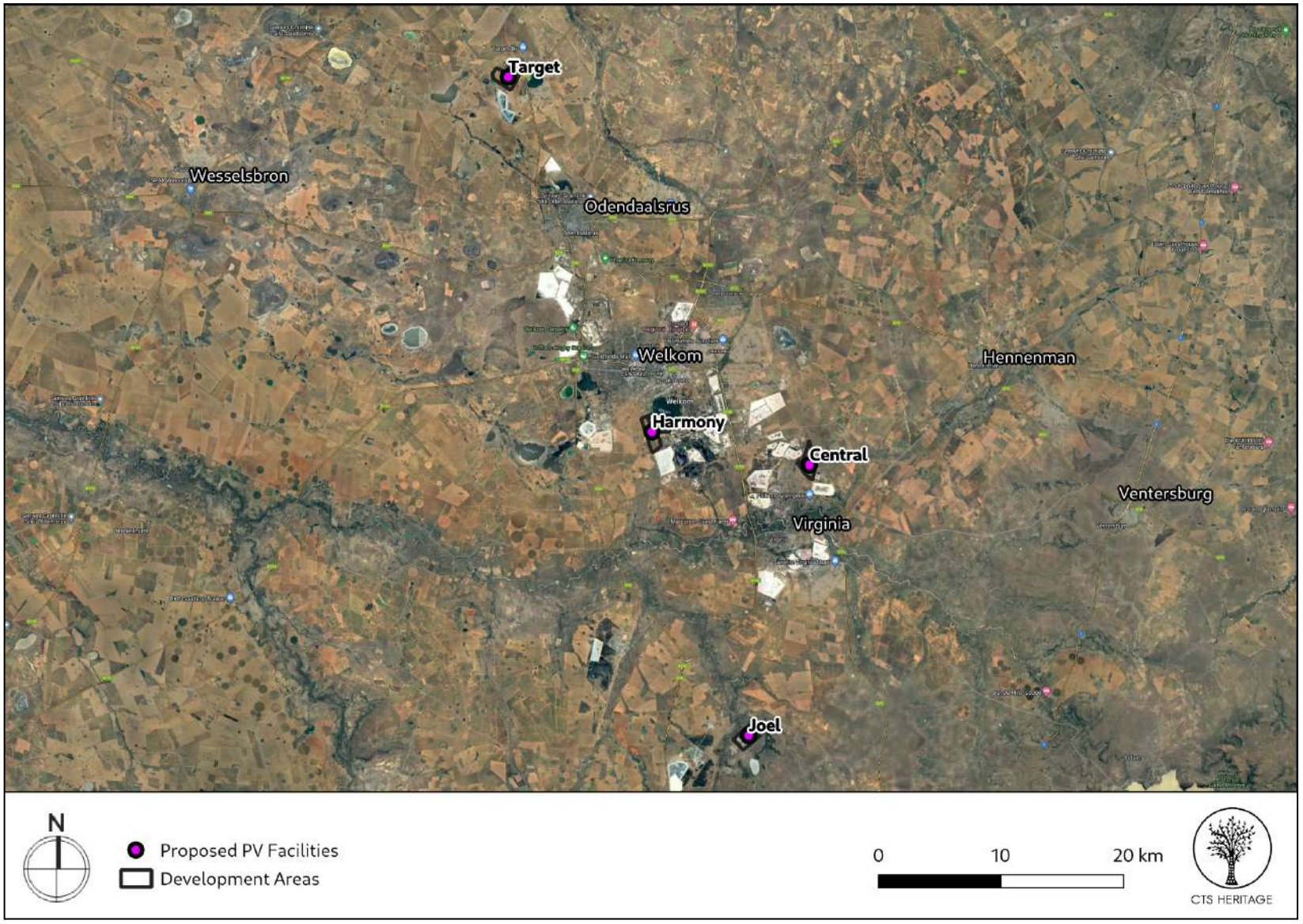

Figure 1.2: Study Area

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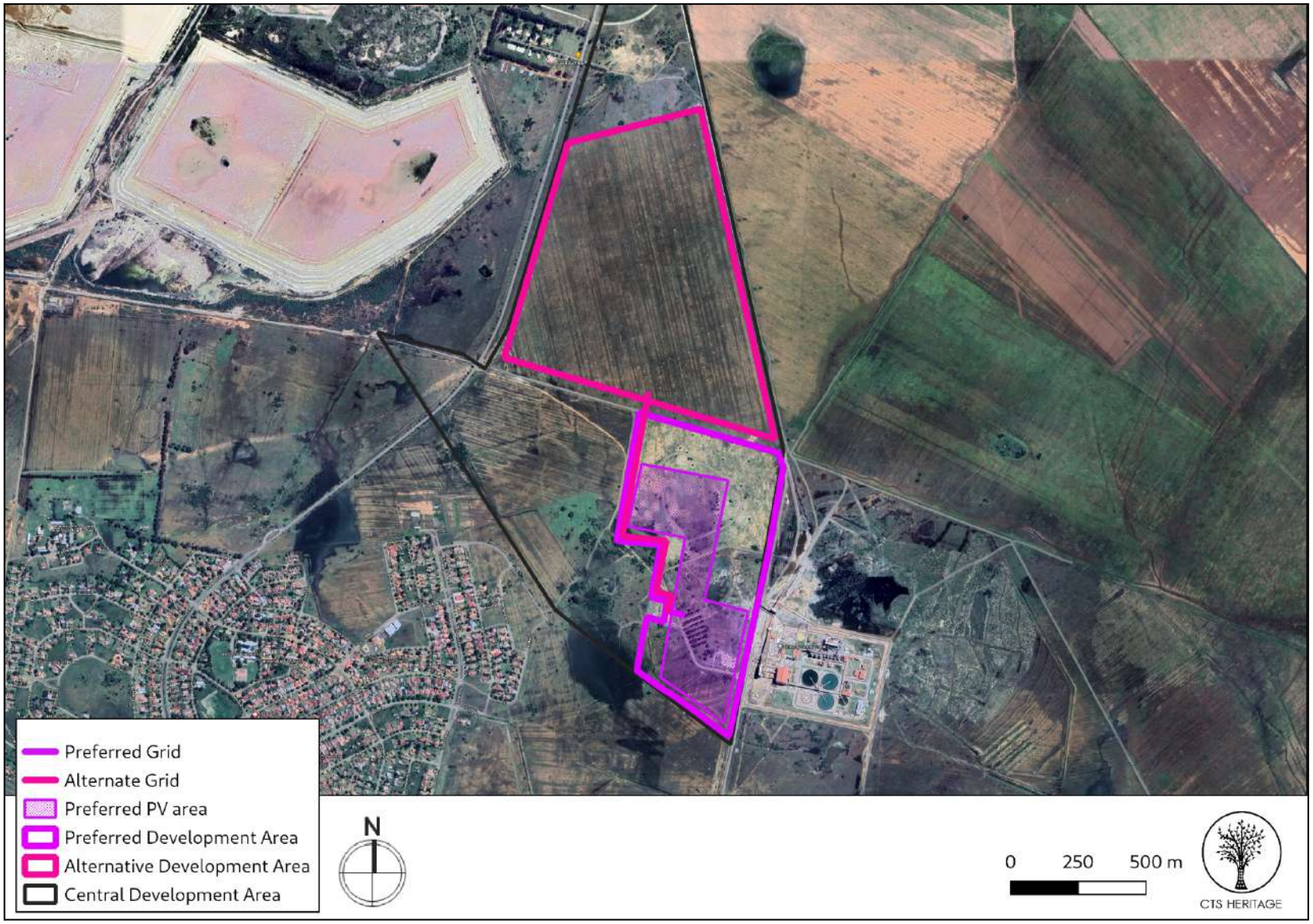

Figure 1.3: Study Area for Central PV

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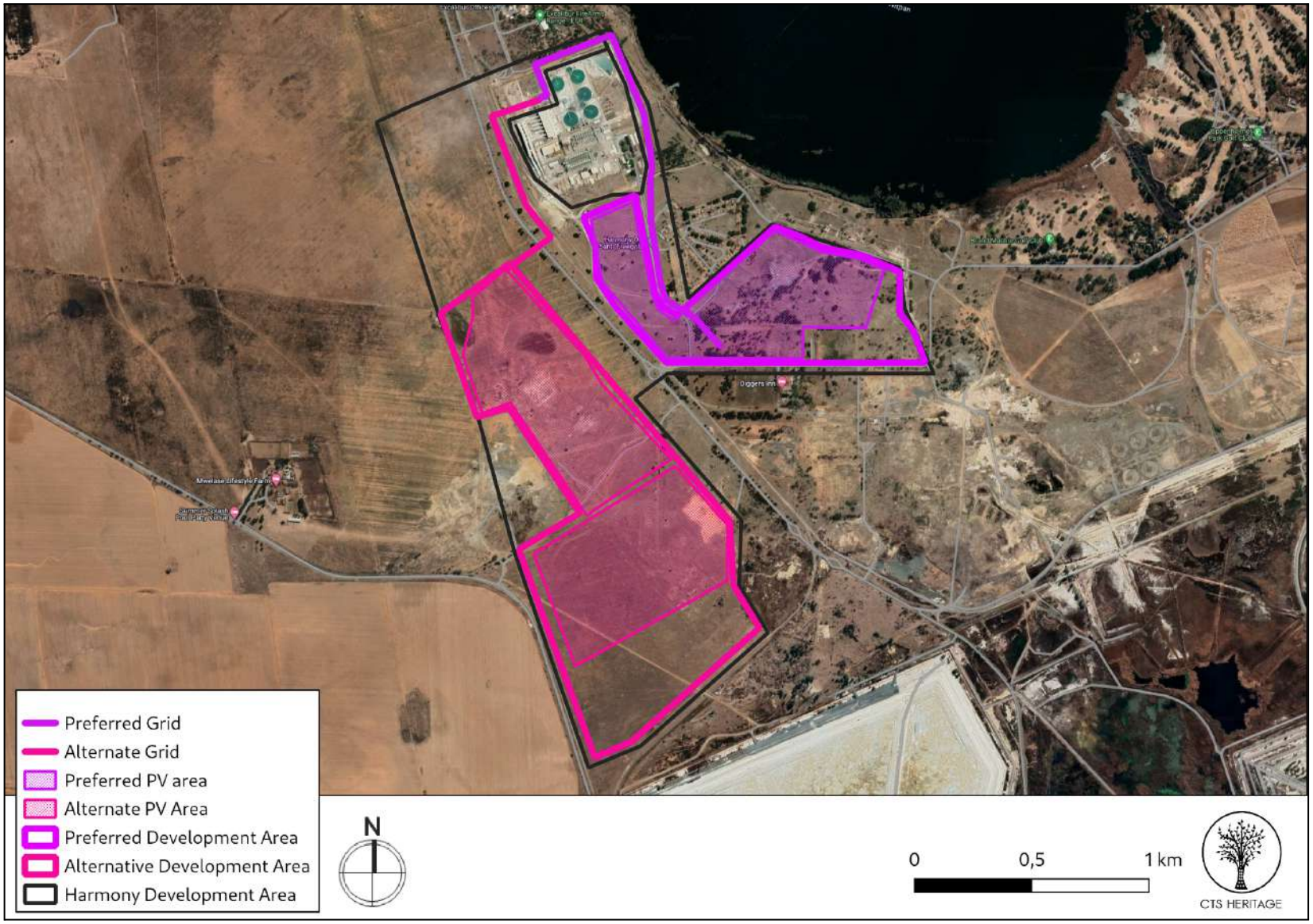

Figure 1.4: Study Area for Harmony PV

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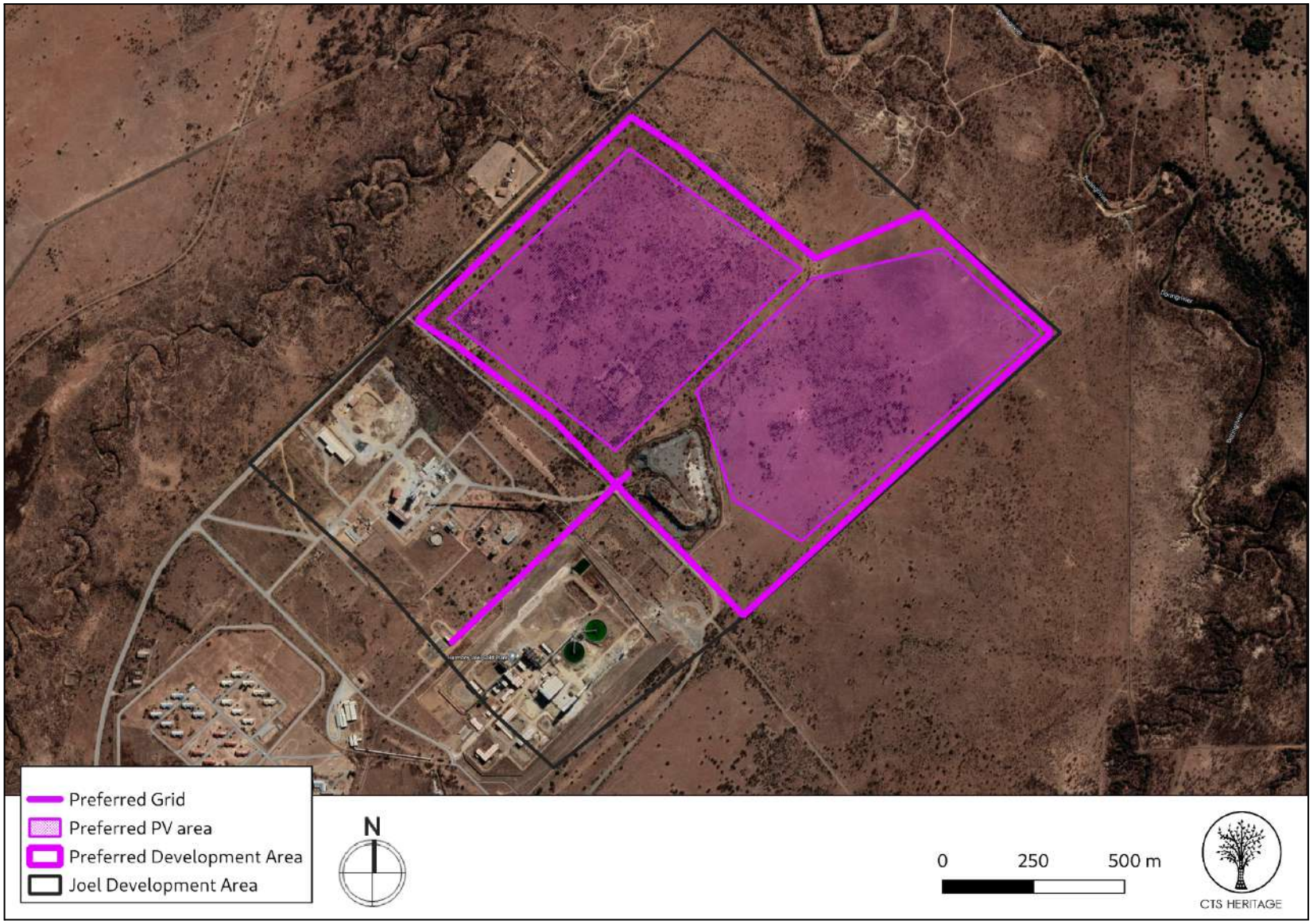

Figure 1.5: Study Area for Joel PV

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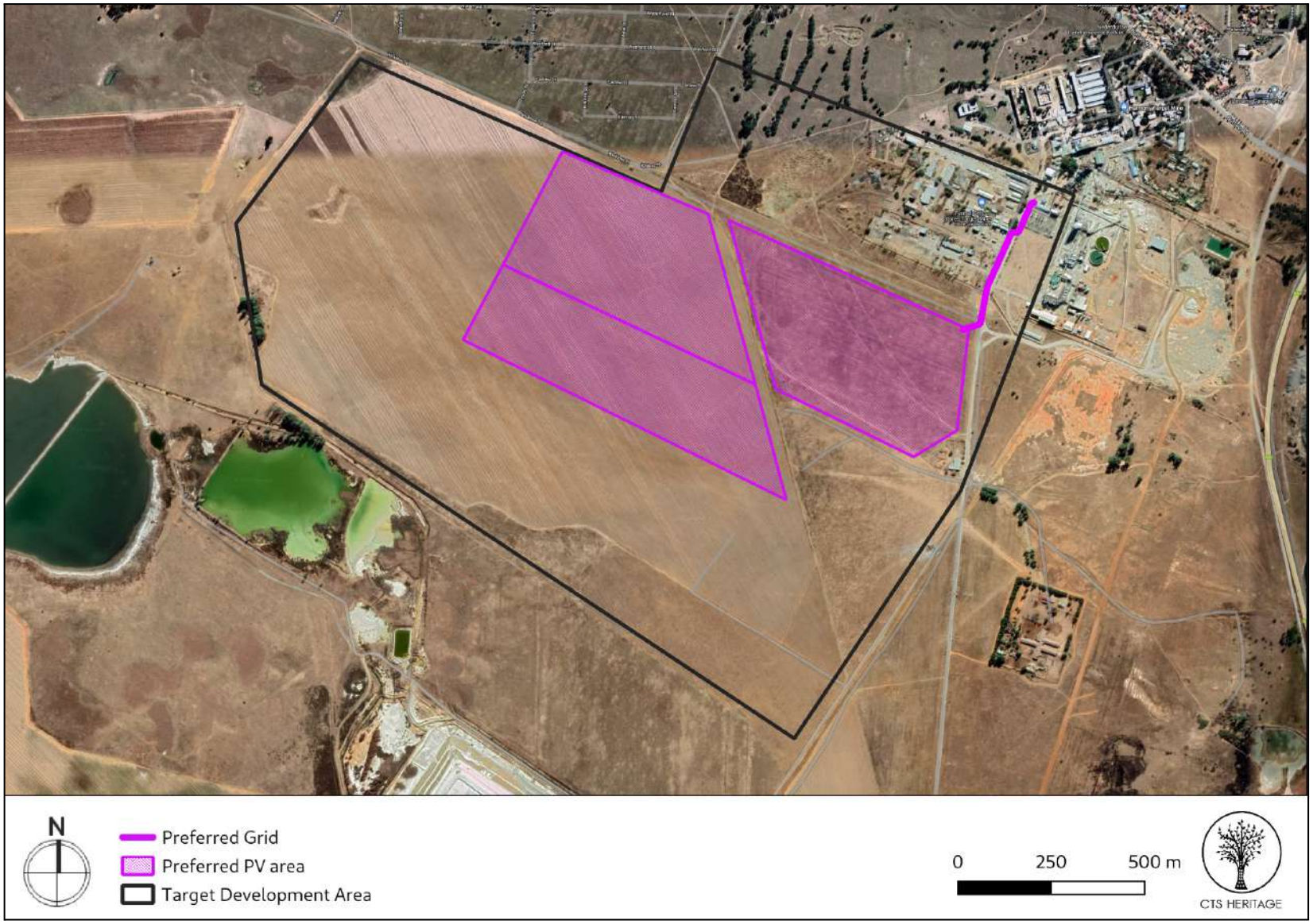

Figure 1.6: Study Area for Target PV

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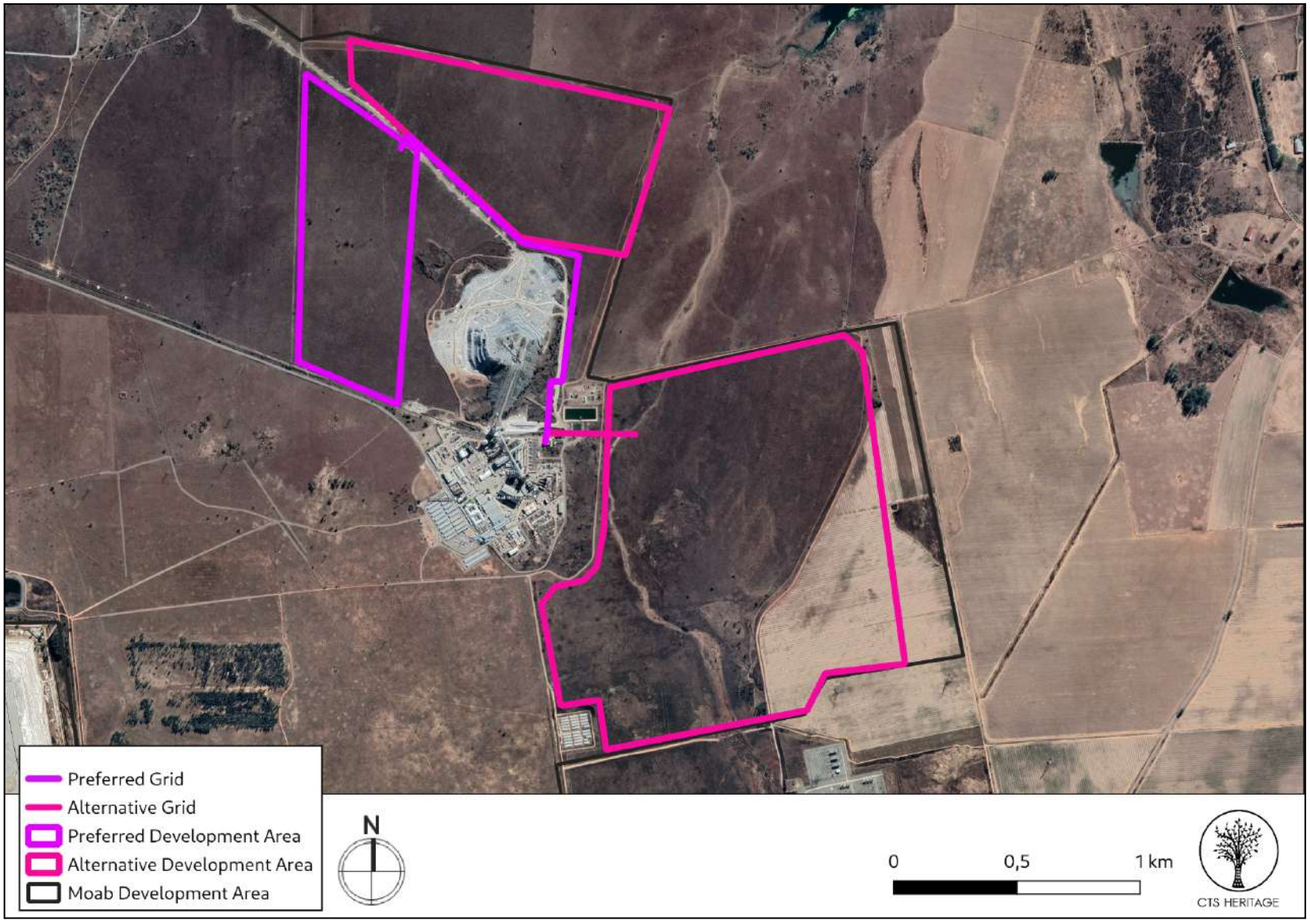

Figure 1.7: Study Area for Moab PV

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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 sites and its environs from May to July 2022 to determine what archaeological resources are likely to be impacted by the proposed development.
- The study area was assessed on foot in transects, 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

2.1 Harmony

(1) Dense grasses and occasional shrubs cover portions of the project area. This coverage significantly inhibited the visibility of surface archaeology. However, this is not regarded as a substantial problem in relation to the Stone Age archaeological remains, which in most cases look to have generally limited scientific importance due to the disturbed and deflated contexts they occur in. An exception is the context of the archaeology at JL2, which occurs in a potentially dateable context. Additionally, even in the places that had optimal visibility, evidence of archaeology was sparse. It is clear that the Stone Age sensitivity and scientific potential of the project area has been comprehensively assessed.

(2) The inability to assess some of the footprint area at ground surface level in some portions (due to modern vegetation cover), should be regarded as a constraint to the documentation of potential graves.

(3) Previous vegetation clearing activities through prospecting, and by farmers, may have affected evidence of surface archaeology including the possible above-surface presence of material evidence of graves (i.e. the removal of surface stone structures).

(4) Upper sediments are disturbed in the portions of the potentially affected area that have been historically farmed, inhibiting visibility.

(5) Access was not possible in areas that are being actively mined; however, any archaeology occurring in these areas would probably be *ex situ* in any case, and of limited scientific importance.

2.2 Central

(1) The area is heavily modified by modern land-use activities such as historical agriculture and prospecting. As a result of such disturbance, little of the original natural landscape - in terms of vegetation, geology and

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probably also archaeology - is visible today. Previous vegetation clearing activities through prospecting, and by farmers historically, may have affected evidence of surface archaeology including the possible above-surface presence of material evidence of graves (i.e. the removal of surface stone structures).

(2) Dense grasses and occasional shrubland cover portions of the project area. This coverage significantly inhibited the visibility of surface archaeology. However, this is not regarded as a substantial problem in relation to the Stone Age archaeological remains, which in most cases look to have generally limited scientific importance due to the disturbed and deflated contexts they occur in. Additionally, even in the places that had optimal visibility, evidence of archaeology was sparse. It is clear that the Stone Age sensitivity and scientific potential of the project area has been comprehensively assessed.

(3) The inability to assess some of the footprint area at ground surface level in some portions (due to modern vegetation cover), should be regarded as a constraint to the documentation of potential graves.

(4) Access was inhibited in areas actively prospected or mined; however, any archaeology occurring in these areas would be *ex situ* in any case, and of limited scientific importance.

2.3 *Target*

(1) Ploughed agricultural camps encompass the western most two-thirds of the affected area. Consequently, the upper sediments are substantially disturbed where crops are actively growing and cattle grazing and resulting trampling is evident.

(2) Dense grasses and occasional shrubland cover portions of the project area. This coverage significantly inhibited the visibility of surface archaeology. However, this is not regarded as a substantial problem in relation to the Stone Age archaeological remains, which in most cases look to have generally limited scientific importance due to the disturbed and deflated contexts they occur in. Additionally, even in the places that had optimal visibility, evidence of archaeology was extremely sparse. It is clear that the Stone Age sensitivity and scientific potential of the project area has been comprehensively assessed.

(3) The inability to assess some of the footprint area at ground surface level in some portions (due to modern vegetation cover), should be regarded as a constraint to the documentation of potential graves.

(4) Previous vegetation clearing activities through prospection, and by farmers, may have affected evidence of surface archaeology including the possible above-surface presence of material evidence of graves (i.e. the removal of surface stone structures).

(5) Access was not possible in areas actively mined; however, any archaeology occurring in these areas would be *ex situ* in any case, and of limited scientific importance.

2.4 Joel

(1) Substantial acacia and other shrubs cover portions of the project area, which are interspersed with dense

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grasses. This coverage significantly inhibited the visibility of surface archaeology. Given the presence of an archaeological site occurring in a dateable context, this vegetation coverage has to be considered a significant hindrance to assessing the Stone Age sensitivity of the project area.

(2) The inability to assess some of the footprint area at ground surface level in some portions (due to modern vegetation cover), should also be regarded as a constraint to the documentation of potential graves.

(3) High energy flooding may have affected evidence of surface archaeology including the possible above-surface presence of material evidence of graves (i.e. the removal of surface stone structures).

(4) Access was inhibited in areas that are actively mined; however, any archaeology occurring in these areas would be *ex situ* in any case, and of limited scientific importance.

2.5 Moab

(1) Dense grasses and occasional shrubland cover portions of the project area. This coverage significantly inhibited the visibility of surface archaeology. However, this is not regarded as a substantial problem in relation to the Stone Age archaeological remains, which in most cases look to have generally limited scientific importance due to the disturbed and deflated contexts they occur in. Additionally, even in the places that had optimal visibility, evidence of archaeology was extremely sparse. It is clear that the Stone Age sensitivity and scientific potential of the project area has been comprehensively assessed.

(2) The inability to assess some of the footprint area at ground surface level in some portions (due to modern vegetation cover), should be regarded as a constraint to the documentation of potential graves.

(3) Previous vegetation clearing activities through prospection may have affected evidence of surface archaeology including the possible above-surface presence of material evidence of graves (i.e. the removal of surface stone structures).

(4) Upper sediments are substantially disturbed in the eastern portion where crops are actively growing and cattle grazing is evident (in the area that appears to be private property).

(5) Access was inhibited in areas actively mined; however, any archaeology occurring in these areas would likely be *ex situ* in any case, and of limited scientific importance.

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3. HISTORY AND EVOLUTION OF THE SITE AND CONTEXT

This application is for the proposed development of a number of PV Facilities located throughout the Free State associated with various Harmony Mines. Four of these facilities are located in proximity to one another around the Welkom area, and the fifth is located further north near Orkney.

According to Fourie (2021), "The Free State has a rich archaeological and historical history going back millions of years and includes significant aspects such as Later Stone Age rock art, Battlefields and Iron Age stonewalled enclosures. The general surroundings of the study area became a melting pot of contact and conflict as it represents one of many frontiers where San hunter-gatherers, Nguni and Sotho-Tswana agro-pastoralists, Dutch Voortrekkers and British Colonists all came together. The ravages of war also swept across these plains, and in particular the South African War (1899-1902) as well as the Boer Rebellion (1914-1915)." No heritage resources of significance were identified by Van der Walt (2013) in his assessment of a nearby farm. Van der Walt (2013) notes that "some MSA finds might be possible around pans on the farm. It is important to note that the lack of sites can be attributed to a lack of sustainable water sources (no pans exist in the development footprint) in the development area as well as the lack of raw material for the manufacturing of stone tools. No Sites dating to the Early or Middle Iron Age have been recorded or are expected for the study area. The same goes for the Later Iron Age period where the study area is situated outside the western periphery of the distribution of Late Iron Age settlements in the Free State. However to the north of the study area, ceramics from the Thabeng facies belonging to the Moloko branch of the Urewe tradition were recorded at Oxf 1 and Platberg 32/71 (Maggs 1976, Mason 1986)".

Archaeology of the broader Welkom area

In his field assessment conducted within this broader area, Rossouw (2012) noted that "The Stone Age archaeological footprint in the region is largely represented by the occurrence of open-site, Middle Stone Age (MSA) and Later Stone Age (LSA) assemblages that are mainly located near river drainages. Interestingly, a large number of MSA artifacts were found 2m below the surface at the Allanridge railway siding in 1953. The material is stored at the National Museum in Bloemfontein. Unfortunately, the context of the assemblage is unknown. MSA as well as LSA artefacts, in association with mammal fossil remains, are also found in a series of erosional gullies along the Sand and Doring Rivers between Virginia and Theunisen. There are no records of rock engravings known from the area. The ruins of a large complex of Late Iron Age settlements (OXF 1, Maggs 1976) are found at Strydfontein between Hennenman and Ventersburg. However, it is noted that the affected area is situated outside the western periphery of the distribution of Late Iron Age settlements below the Vals River in the Free State (Maggs 1976)." In Rossouw's assessment, he found no evidence of *in situ* Stone Age or Iron Age archaeological material. He noted no indications of prehistoric structures or rock engravings, historical buildings or structures older than 60 years. Two small graveyards were also recorded during the survey.

In an assessment completed in this area, Van Ryneveld (2013) identified five historical structures on the property, but no archaeological heritage resources. Despite the high number of heritage impact assessments completed in the broader area, no archaeological sites of significance have been identified in close proximity to the proposed development area. This is likely due to the extreme transformation of the area as a result of historic and ongoing gold mining activities.

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Archaeology of the broader Orkney area

Archaeological sites spanning the Earlier, Middle and Later Stone Age have been found in the region despite the extensive agricultural transformation of the area. In Dreyer (2005) and Van der Walt's (2007) heritage impact assessments of the nearby Pretorius Kraal 53, various modern buildings were recorded that are located near the banks of the Vaal River that were deemed as not conservation worthy. Van der Walt identified some Middle to Later Stone Age artefacts scattered across the farm but did not map them. In Van Schalkwyk's (2021) impact assessment of the Siyanda Solar farm on Grootdraai 468 (which lies on the western border of Pretorius Kraal 53), visibility issues were a major problem,

"Due to the very dense vegetation cover that occur in the project area, natural as well as agricultural fields, it was impossible to obtain any ground visibility. The strategy was therefore to examine natural and man-made features that are usually associated with human habitation and activities such as clumps of trees and rock outcrops. The proposed power line corridor connecting the Solar Power Plant to the the existing Vaal Reef Substation was not surveyed as access to the relevant properties (Pretoriuskraal 53) was not possible. It is proposed that once the power line route has been confirmed within the 100m corridor a heritage walk-though needs to be undertaken." Two burial sites were recorded during this survey despite the lack of Stone Age sites with the help of a local informant who had been working on the property for a number of years.

In his assessment of an area immediately adjacent to the Moab PV project area, Huffman (2005, SAHRIS ID 7367) identified no sites of archaeological interest. In their assessment of an area located immediately adjacent to the areas proposed for development, Henderson and Koortzen (2007, SAHRIS ID 7340) noted that while no sites were found in the area surveyed, a number of previously excavated inspection pits yielded archaeological material in the form of stone artefacts. Henderson and Koortzen (2007, SAHRIS ID 7340) note that "These artefacts had been brought up from an unknown depth (probably no more than a metre or two), and were mostly undiagnostic flakes with one blade-like flake which could be Middle Stone Age. Raw material included cryptocrystalline, chert and quartz."

In an assessment completed by CTS Heritage for a proposed PV facility located nearby, a single site and very few isolated individual artefacts were documented. Cumulatively these findings indicate cultural evidence for MSA and LSA occupations of the area. It was noted that the majority of finds were identified in disturbed surface contexts, and could not be tied chrono-culturally to a particular prehistoric period, however one site (VK4) was relatively less affected by post-depositional processes, and may have been exposed relatively recently. Apart from this one site, the potential for finding a dateable *in-situ* archaeological horizon based on current surface observations appears to be low. The documented archaeology is therefore classified as scientifically LOW-SIGNIFICANCE. It is therefore highly likely that further burials may be located on the proposed solar PV areas as well as Stone Age material similar to the artefacts recorded but not mapped by Van der Walt.

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4. IDENTIFICATION OF HERITAGE RESOURCES

4.1 Field Assessment

The survey was conducted primarily on foot but also involved driving between key targeted areas, and sought to assess the presence and significance of archaeological occurrences within the project area. Across all 5 potentially affected areas, overall field assessment documented a sparse number of isolated stone artefacts in secondary and surface contexts and one denser occupational context in a potentially dateable context, suggesting the area may have been traversed intermittently by Stone Age groups through periods in both the Middle Stone Age (MSA – ~300ka:~40ka), the Later Stone Age (LSA: ~40ka: ~2ka) in addition to individual bifacial tools potentially associated with the later ESA (~400-~200ka), although artefacts that could be clearly linked with chrono-cultural periods were scarce. The presence of small nodules of artefact-quality chert rocks, homogenous quartzites as well as high-quality riverine Hornfels and Quartz in the project areas in addition to relatively abundant standing water, were likely the resources that attracted groups to the broader region, and resulted in them leaving behavioural traces in the form of stone artefacts and traces of lithic exploitation on primary sources of raw-material (the latter exclusively at Moab). Indeed the majority of the stone artefacts identified look to be the result of expedient 'testing' of rocks for quality, although several cores and tools associated with more extensive investment in production were identified. In this sense – apart from the single site at Joel (see below) - no evidence of substantial densities of finds or occupational debris were identified, and the stone artefacts present look to have been produced by mobile forager groups moving through the area.

4.1.1 Harmony

Field assessment at Harmony documented several stone artefact scatters in secondary contexts and one site (CHM4) in a close to primary context that optimally needs to be avoided. Cumulatively these finds suggest the area was occupied or traversed intermittently by Stone Age groups through periods in the Middle Stone Age (HM1-HM3), and perhaps the terminal ESA/early MSA (CHM4), as well as historical periods associated with more recent occupations of the region (HM5-8).

The sites of HM1, HM2 and HM3 have predominantly MSA artefacts that occur in ex-situ contexts, and the weathering of the edges suggests the artefacts have been exposed for substantial periods and have limited scientific value. HM4 is an MSA site associated with Pleistocene occupation of a paleo-drainage terrace. The artefacts at HM4 are eroding out of laminated – highly detailed – fluvial deposits that document both the depositional history of the meandering river system and the associated prehistoric occupation of the river terraces by MSA hominins. One bifacial tool was identified, which is certainly MSA, but may also document an older Middle-Pleistocene occupation of the terraces. Given the detailed depositional history of the river documented at HM4 and its association with anthropogenic activity, if this site could be avoided with the guidance of a 30m buffer zone for development that would be optimal.

The historical structures located at HM5-HM8 were documented, but are largely demolished and have limited scientific value. HM7 represents a historical walling structure associated with a drainage channel but has been affected by modern prospection to a degree that it no longer retains substantial heritage value.

4.1.2 Central

Field assessment at Central documented 4 Stone Age occurrences in secondary contexts (CT1-CT4). Cumulatively these

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finds suggest the area was occupied or traversed intermittently by Stone Age groups through periods in the Middle Stone Age, and perhaps the terminal ESA/early MSA.

CT1 was an isolated dolerite core that had been exposed in an intensively ploughed area. The bidirectional nature of removals suggest that the core is probably Middle Stone Age. CT2 was a quartz flake with a prepared platform, also occurring in an area affected substantially by modern agricultural activity. Such platform preparation (CT2) is typical of the products of MSA techniques of flake production. CT3 was a bifacial tool associated with a drainage channel within the footprint, although it was also isolated so has limited scientific value as a single find in an ex-situ, redeposited context. In addition, CT3 had substantial edge damage and weathering indicating that it may have been deposited by a river. As CT3 is a larger bifacial tool, it may be representative of terminal Acheulean technological activity within the area.

4.1.3 Target

No significant archaeology was documented within the footprint at Target. The only isolated finds were two small probably Later Stone age cores (TG1), however, these cores were documented in the area of the footprint that is not currently earmarked for development.

4.1.4 Joel

Field assessment at Joel documented several stone artefact scatters in secondary contexts and one site in a potentially dateable context that needs to be avoided. Cumulatively these finds suggest the area was occupied or traversed intermittently by Stone Age groups through periods in the Middle Stone Age (JL1, JL2, JL5), and the Later Stone Age (JL4, JL6), as well as potentially by groups in periods associated with herder and early historical occupations of the region. JL1 has a dolerite bi-directionally reduced core from initial nodule testing that is characteristic of the MSA. JL2 represents a site that accumulated because of the chert raw-material source nearby, so flakes are largely primary. JL2 also has a hammerstone with visible pitting associated with percussion activities – probably knapping. JL3 has heavily weathered quartzite artefacts including a single platform core (probably MSA given the degree of patination and probable Pleistocene age). JL4 has high-quality chert artefacts, which are also patinated, likely associated with bladelet production, thus indicative of a terminal Pleistocene or Holocene age. At JL6 there is a single platform bladelet core with evidence of crest production and unipolar bladelet production, certainly LSA, and probably indicative of Holocene technological activity.

The relatively more scientifically significant sites/finds are associated with J5, which has later MSA lithics (prepared core technologies), a diversity of raw-materials, as well as a unifacially retouched point potentially indicative of the post-Howiesons Poort period (~55ka-35ka). At JL5, artefacts are eroding out of quaternary sediments, and have been brought to the current land surface through rodent borrowing and other forms of bioturbation. As this site appears to be in a potentially close to primary context (at least an *in situ* context that is potentially dateable), it should be avoided with at least a ~50m buffer zone for development.

4.5 Moab

The survey at Moab documented several isolated finds, and a sparse stone artefact scatter in a secondary context.

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The site at CM1 has a concentration of artefacts that look to be eroding from an encompassing sedimentary context, although the sediments in the close vicinity have been affected by recent land use activities. If this site could be avoided with the guidance of a 30m buffer zone for development that would be optimal. At CM3 several isolated chert artefacts were present on a deflated land surface. The small size of the flakes in addition to the platform morphology and dorsal removal patterns on one specimen may be indicative of bladelet production, thus indicating a likely terminal Pleistocene or Holocene age for these artefacts. Primary sources of chert were documented at several locations within the footprint (e.g. CM2), and several negative flake removals indicating Stone Age exploitation were identified on these outcrops.

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Figure 4.1: Dense grasses and occasional shrubs covering portions of the project area. Such vegetation inhibits the visibility of surface archaeology at Harmony: CHM1, CHM4, CHM8, CHM9, CHM15.

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Figure 4.2: Dense grasses cover portions of the project area inhibiting the visibility of surface archaeology at Central: CCT2; CCT8; CCT11; CT2.

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Figure 4.3: Dense grasses and occasional shrubs cover portions of the project area, inhibiting the visibility of surface archaeology at Moab: CMB1; CMB3; CMB5; CMB8; CMB9; CMB10; CMB16; CMB22; CMB25; CMB27.

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Figure 4.4: . Dense grasses cover portions of the project area inhibiting the visibility of surface archaeology at Target: CTG9.

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Figure 4.5:Acacia and other shrubs cover portions of the project area at Joel, which are interspersed with dense grasses: CJL1, CJL2, CJL10, CJL12.

Figure 4.6: Areas of Harmony affected by mining activities: CHM12

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Figure 4.7: Photos show an isolated elevated mound of quaternary sediments of fluvial origin at Harmony (CHM5). Coarse sands followed by laminated well-sorted coarse-medium sand succeeded by silts displayed in the photo is typical for a perennial meandering river.

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Figure 4.8: Active non-perennial drainages at Harmony (CHM4 and CHM13):

Figure 4.9: A depiction of raw material sources at Harmony: quartzite and shale (CHM3)..

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Figure 4.10: Areas of Central affected by mining activities: CCT1.

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Figure 4.11: Agricultural activities at Central have disturbed the upper ~0.5-1m of original quaternary sediments: CCT6

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Figure 4.12: An active high energy non-perennial braiding river (CCT11) with associated minor drainages is located in the south-eastern portion (CT3). Riverine quartzite rocks (CT3), and other secondary deposits of sedimentary rocks are associated with these fluvial channels. Many of these rocks are artefact quality in terms of homogeneity and fracture characteristics(CCT9).

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Figure 4.13: Areas of Moab affected by mining activities: CMB26.

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Figure 4.14: Areas of Moab affected by agricultural activities, fields: CMB3 and CMB20, as well as topsoil removed: CMB22.

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Figure 4.15: Artefact quality raw-material in the form of primary local cherts, available within the footprint (CMB4), with several outcrops associated with sparse archaeological evidence(CM1).

Figure 4.16: Areas of Target affected by mining activities

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Figure 4.17: Areas of Target affected by agricultural activities: CTG2, CTG4, CTG6

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Figure 4.18:Areas of Joel affected by mining activities CJL13

Figure 4.19: The natural Savanna Grassland vegetation at Joel: CJL4.

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Figure 4.20: small open patches of sand dispersed between the thicker vegetation: JL1 and JL2

Figure 4.21: Raised area of Joel that is richer in archaeological materials (site JL5) relative to the deflated areas surrounding (CJL11).

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Figure 4.22: Raw material availability at Joel: banded chert (CJL2) and hornfels outcrop with associated artefact (JL2).

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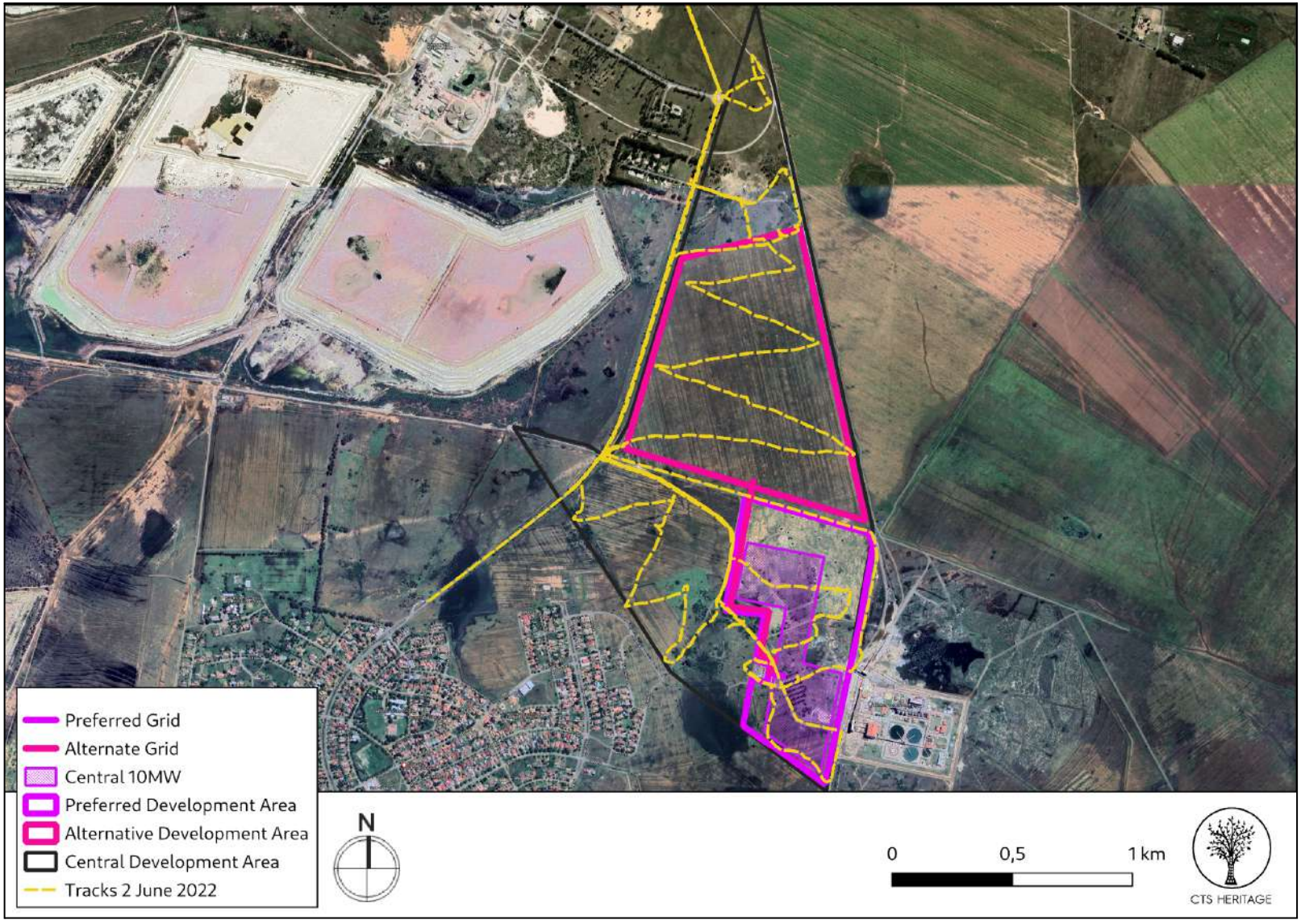

Figure 5.1: Overall track paths of foot survey - Central PV Facility

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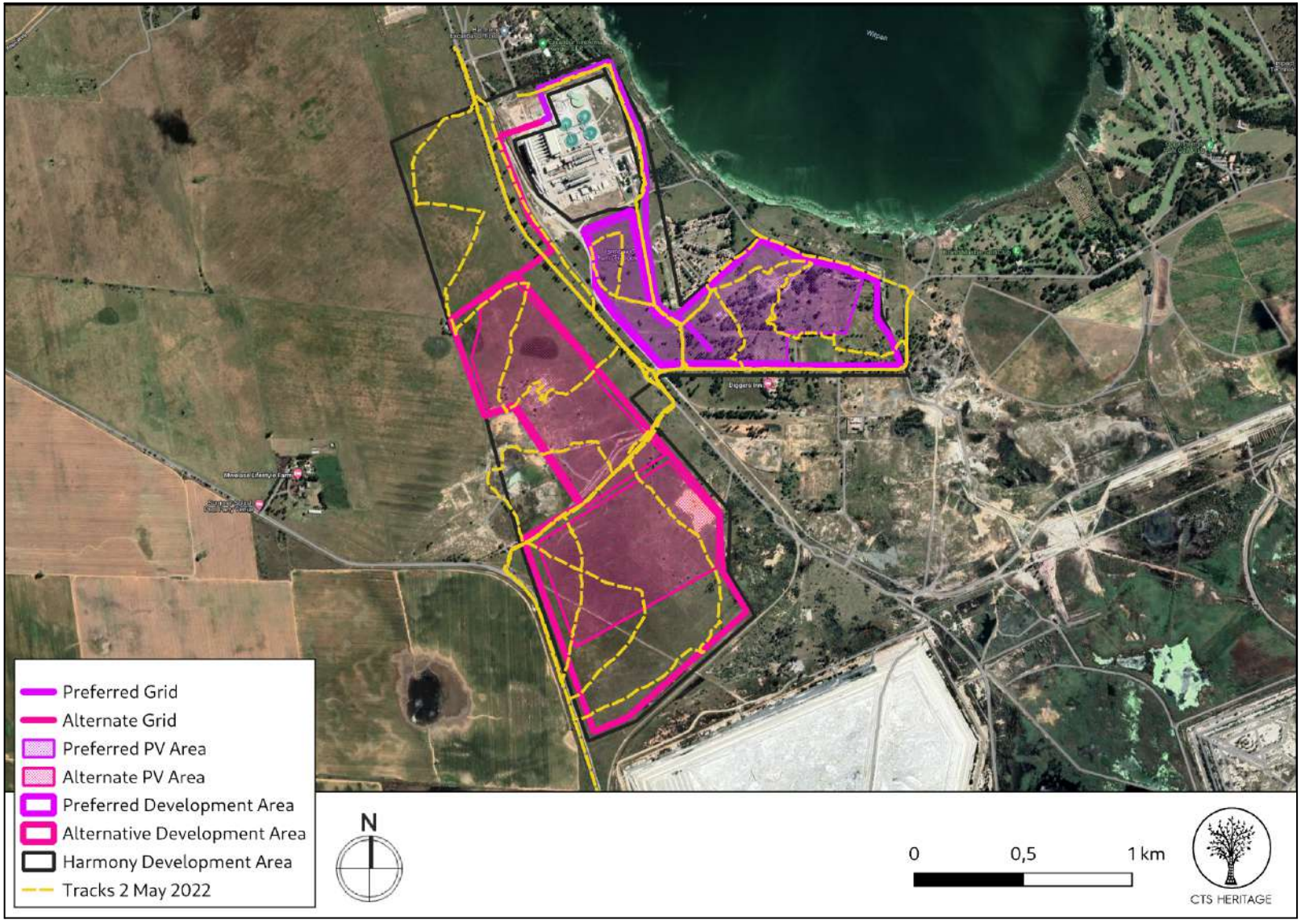

Figure 5.2: Overall track paths of foot survey - Harmony PV Facility

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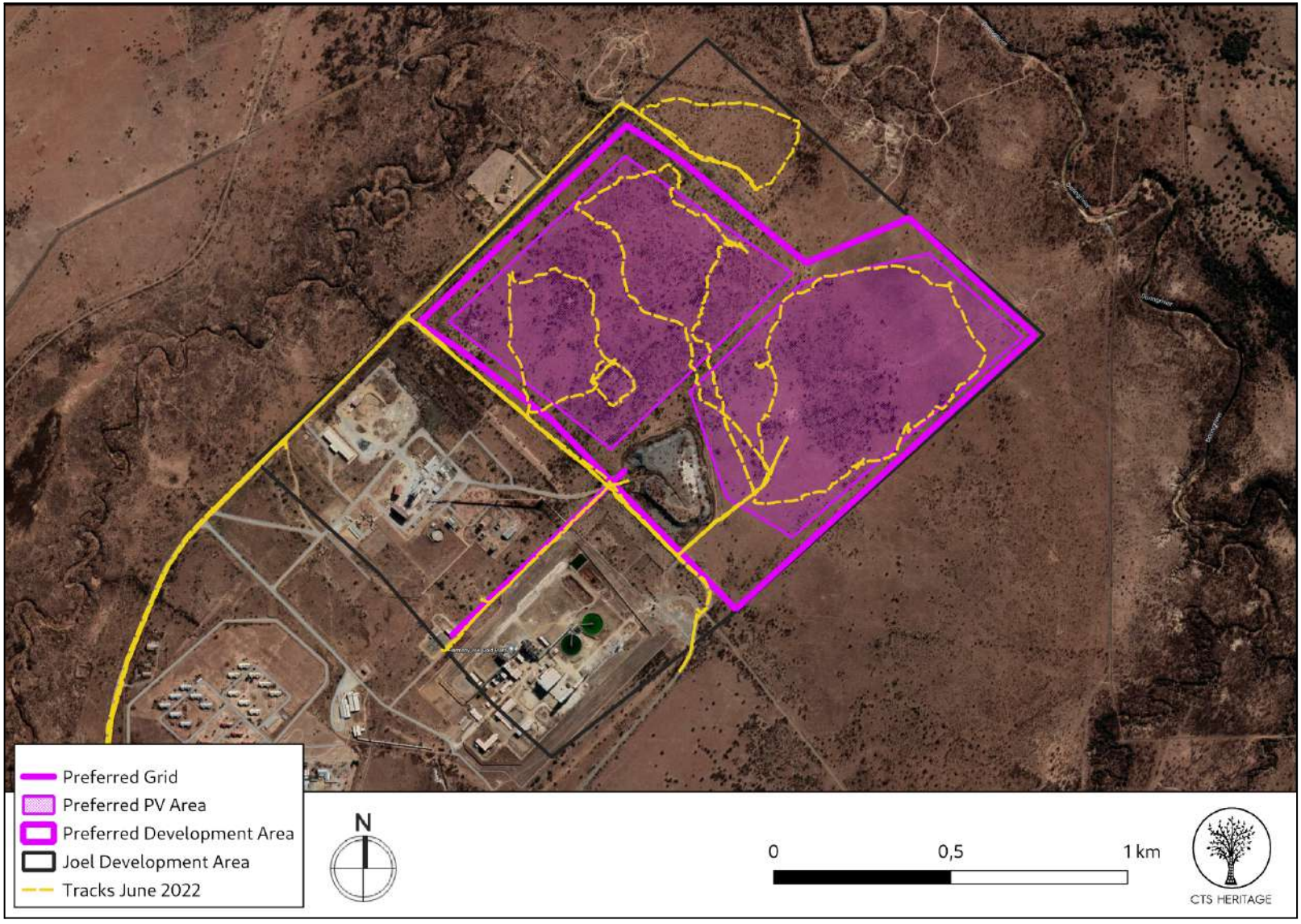

Figure 5.3: Overall track paths of foot survey - Joel PV Facility

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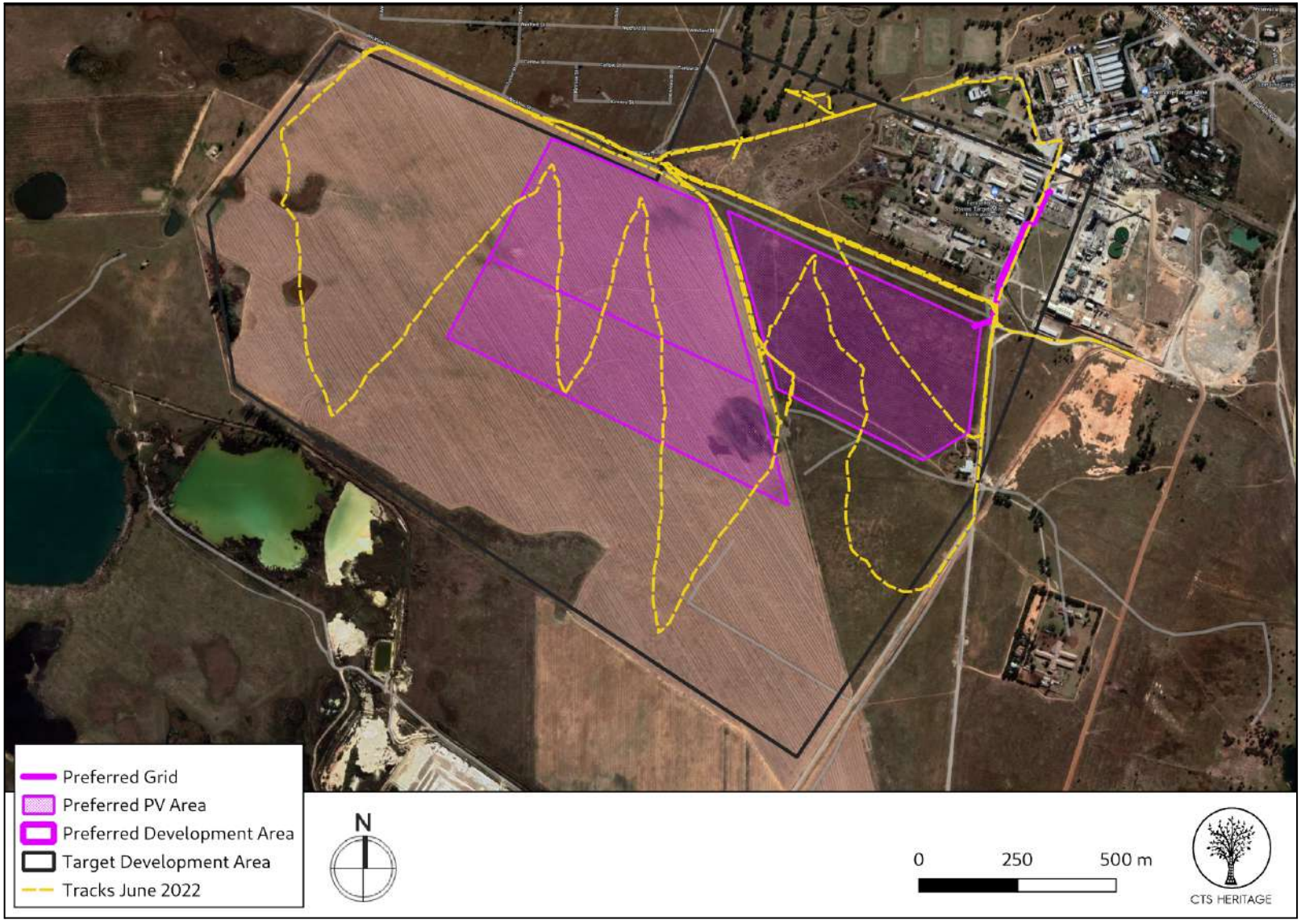

Figure 5.4: Overall track paths of foot survey - Target PV Facility

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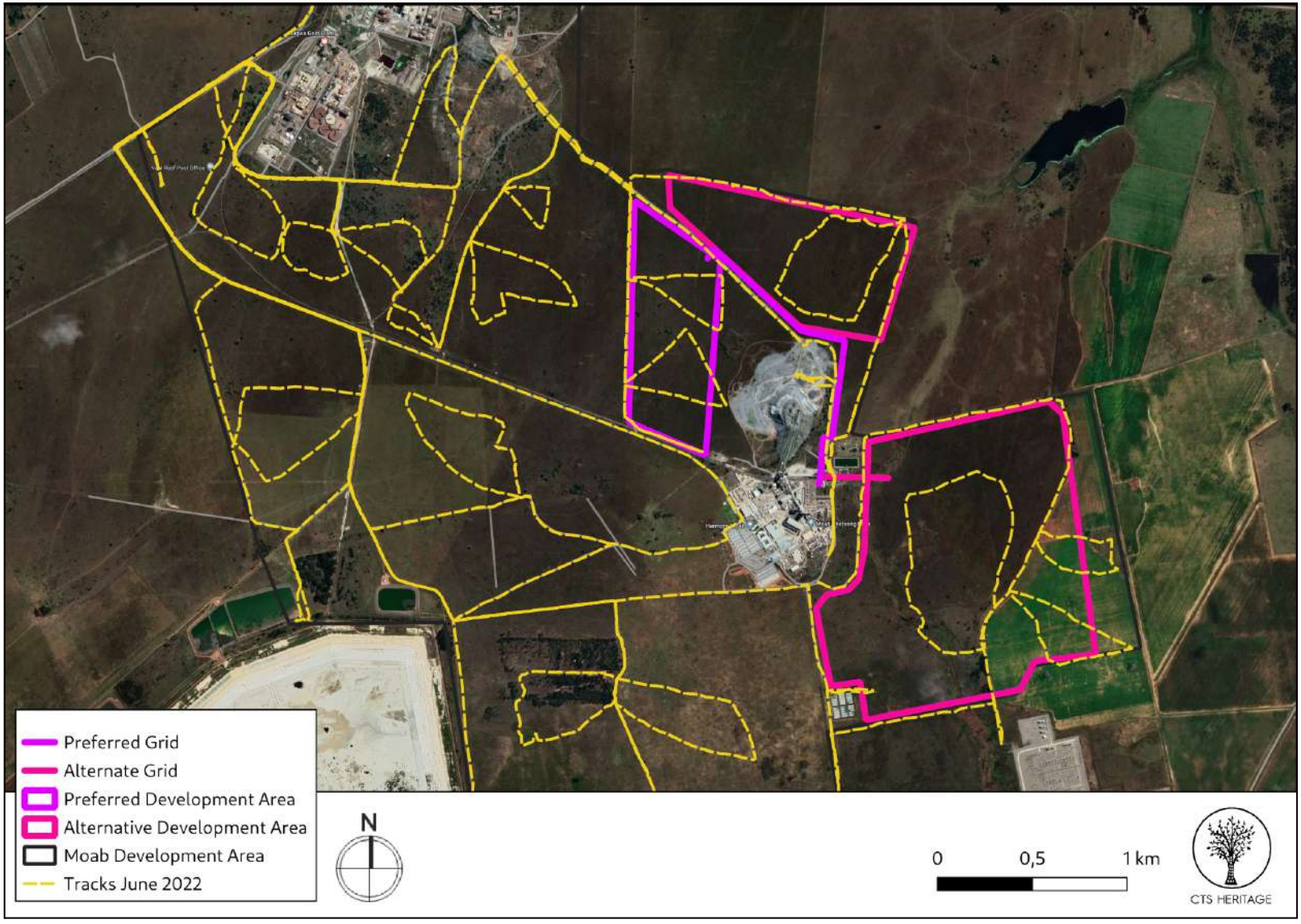

Figure 5.5: Overall track paths of foot survey - Moab PV Facility

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4.2 Archaeological Resources identified

Table 2: Observations noted during the field assessments conducted

Site No.	Site Name	Description	Period	Co-ordinates		Grading	Mitigation
CT1	Central PV	Isolated dolerite artefact: core with primary removals	ESA-MSA	-28,0423649 959266	26,8796689 622104	NCW	NA
CT2	Central PV	Isolated quartz artefact: prepared platform flake, heavily rolled and weathered	ESA-MSA	-28,0541419 889777	26,8806460 406631	NCW	NA
CT3	Central PV	Isolated quartzite artefact: bifacial tool with alternating retouch on both faces	MSA	-28,0561190 284788	26,8845039 792358	NCW	NA
CT4	Central PV	Isolated quartzite artefact: core with primary removals	ESA-MSA	-28,0617710 296064	26,88364198 43137	NCW	NA
HM1	Harmony PV	Isolated quartzite artefact: large side scraper	MSA	-28,0374500 155448	26,75613303 66879	NCW	NA
HM2	Harmony PV	Isolated quartzite artefact: single platform core with platform preparation removals	MSA	-28,0343310 255557	26,75568401 8135	NCW	NA
HM3	Harmony PV	Isolated quartzite artefact: marginally reduced core with primary removals	MSA	-28,0334970 261901	26,74948199 65213	NCW	NA
HM4	**Harmony PV**	**Concentration of artefacts: bifacial tool; complete flake and flake fragments**	**ESA-MSA**	**-28,027887 0183974**	**26,7480419 855564**	**IIIC**	**AVOID completely**
HM5	Harmony PV	Building structure likely older than 60 years: remnants of the farm house	Historical	-28,0253369 919955	26,7440390 400588	NCW	NA
HM6	Harmony PV	Foundation structure of a building older than 60 years	Historical	-28,0260460 171848	26,76196298 56199	NCW	NA
HM7	Harmony PV	Stone structure older than 60 years: walling structure.	Historical	-28,0248629 953712	26,75855197 01242	NCW	NA
HM8	Harmony PV	Remains of building structure.	Unclear	-28,0253489 781171	26,7605979 926884	NCW	NA
JL1	Joel PV	Isolated dolerite artefact: bi-directional core, heavily reduced	MSA-LSA	-28,24715198 94897	26,8277529 627084	NCW	NA
JL2	**Joel PV**	**Concentration of artefacts: Anvil, flake fragment, chert outcrop with exploitation evidence**	**MSA-LSA**	**-28,247044 0305769**	**26,8308319 710195**	**IIIC**	**AVOID completely**
JL3		Isolated quartzite artefacts: poorly preserved core - heavily weathered and rolled, rolled flake	unknown	-28,2532779 872417	26,8349339 906126	NCW	NA
JL4	Joel PV	Isolated chert artefact: flake potentially associated with bladelet production	LSA	-28,2490820 06514	26,8273689 877241	NCW	NA
JL5	**Joel PV**	**Concentration of artefacts in a**	**MSA-LSA**	**-28,250538**	**26,8279530**	**IIIB**	**AVOID completely**

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		datable context: 1)single platform chert core; 2) chert flake; 3) chert core; 4) point; 5) silcrete retouched point on a blade; 6) miniature quartz flake; 6) dolerite big flake; 7) silcrete flake; 8) silcrete fragment		**026914**	**387371**		
JL6	Joel PV	Isolated chert artefacts: two chert cores	LSA	-28,2455849 926918	26,8313020 281493	NCW	NA
TG1	Target PV	Isolated artefacts: two miniature cores associated with microlithic flake production	LSA	-27,7608890 365809	26,6334529 872983	NCW	NA
CM1	**Moab PV**	**Isolated artefacts on sub-volcanic rock: Levallois core; Bladelet core and several flakes**	**MSA/LSA**	**-26,987904 9807786**	**26,8075089 901685**	**IIIC**	**AVOID completely**
CM2	Moab PV	Chert outcrop with evidence of hominin exploitation	Stone Age	-26,9811560 39983	26,7780160 06574	NCW	NA
CM3	Moab PV	Isolated chert artefacts: several flakes	LSA	-26,9765090 290457	26,78688196 46537	NCW	NA

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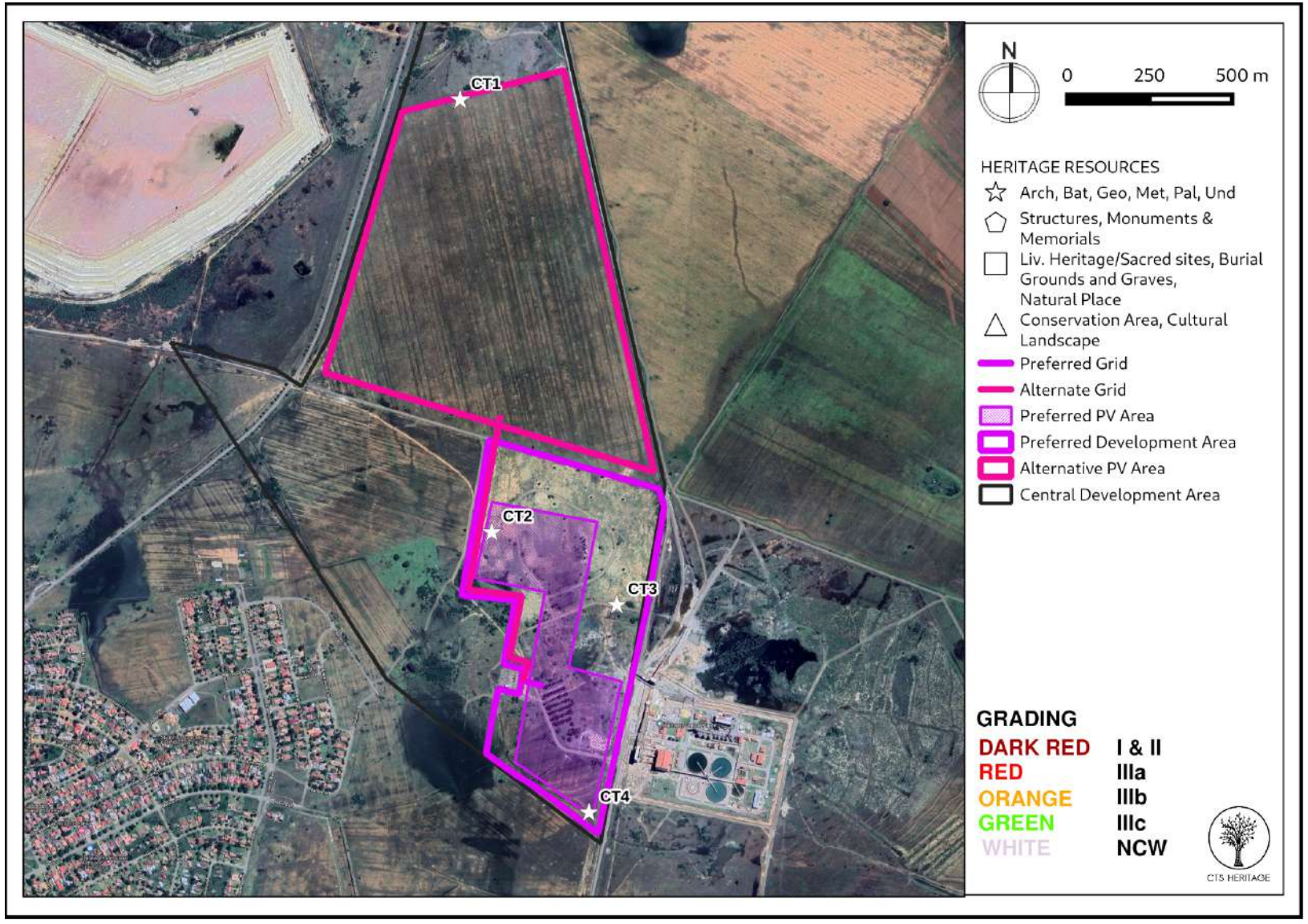

Figure 6.1: Map of field observations relative to the proposed development at the proposed Central PV Facility

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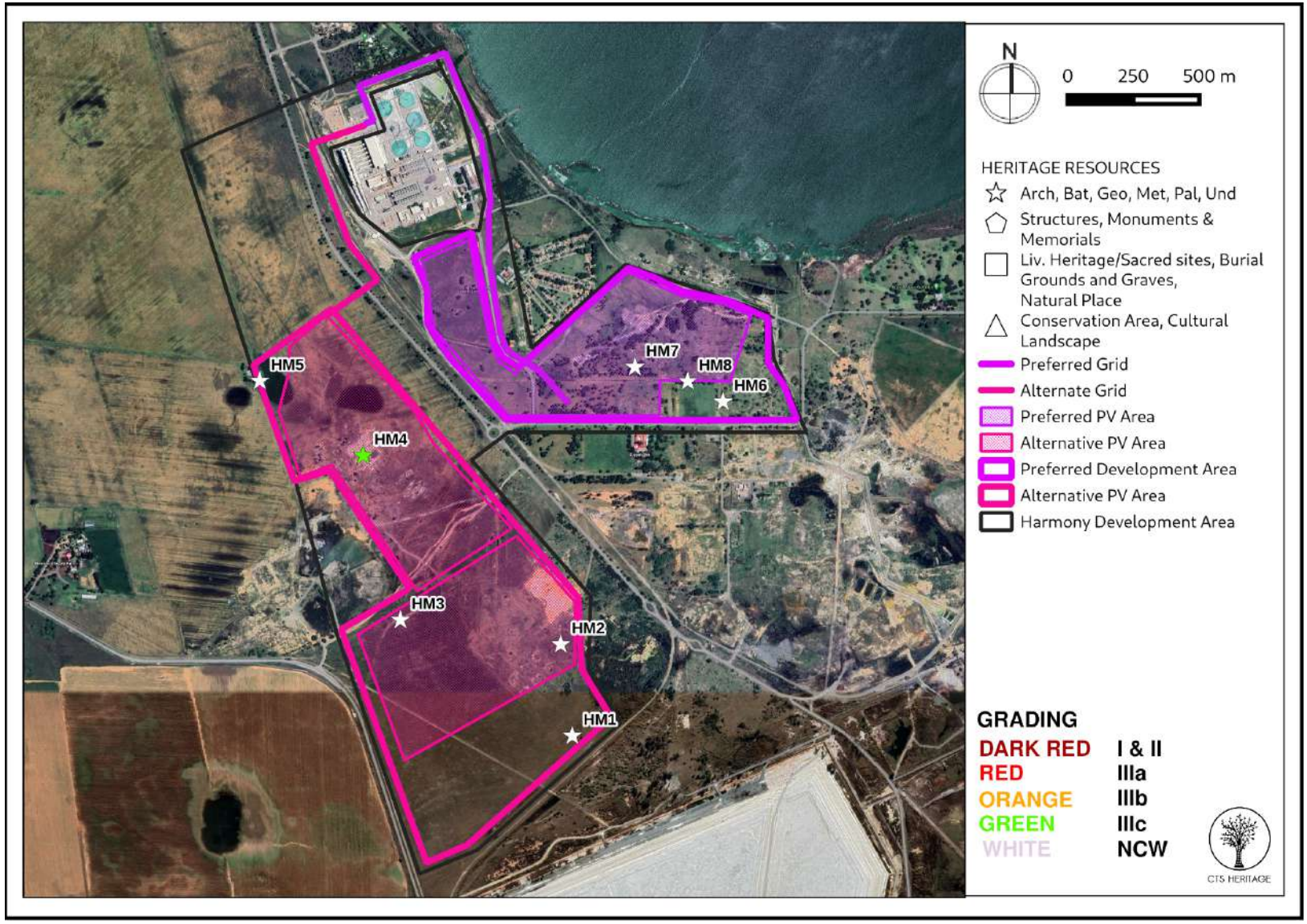

Figure 6.2: Map of field observations relative to the proposed development at the proposed Harmony PV Facility

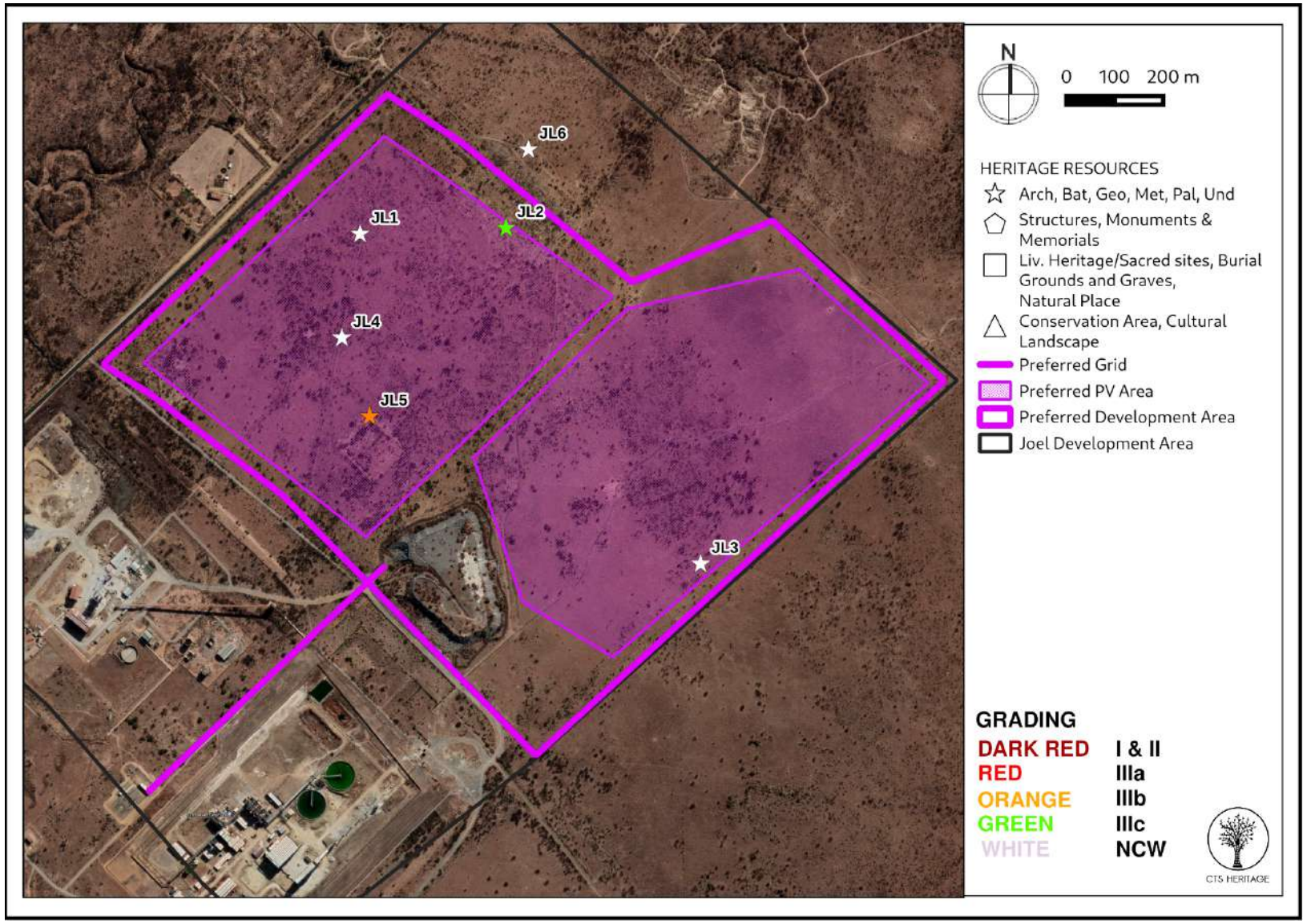

Figure 6.3: Map of field observations relative to the proposed development at the proposed Joel PV Facility

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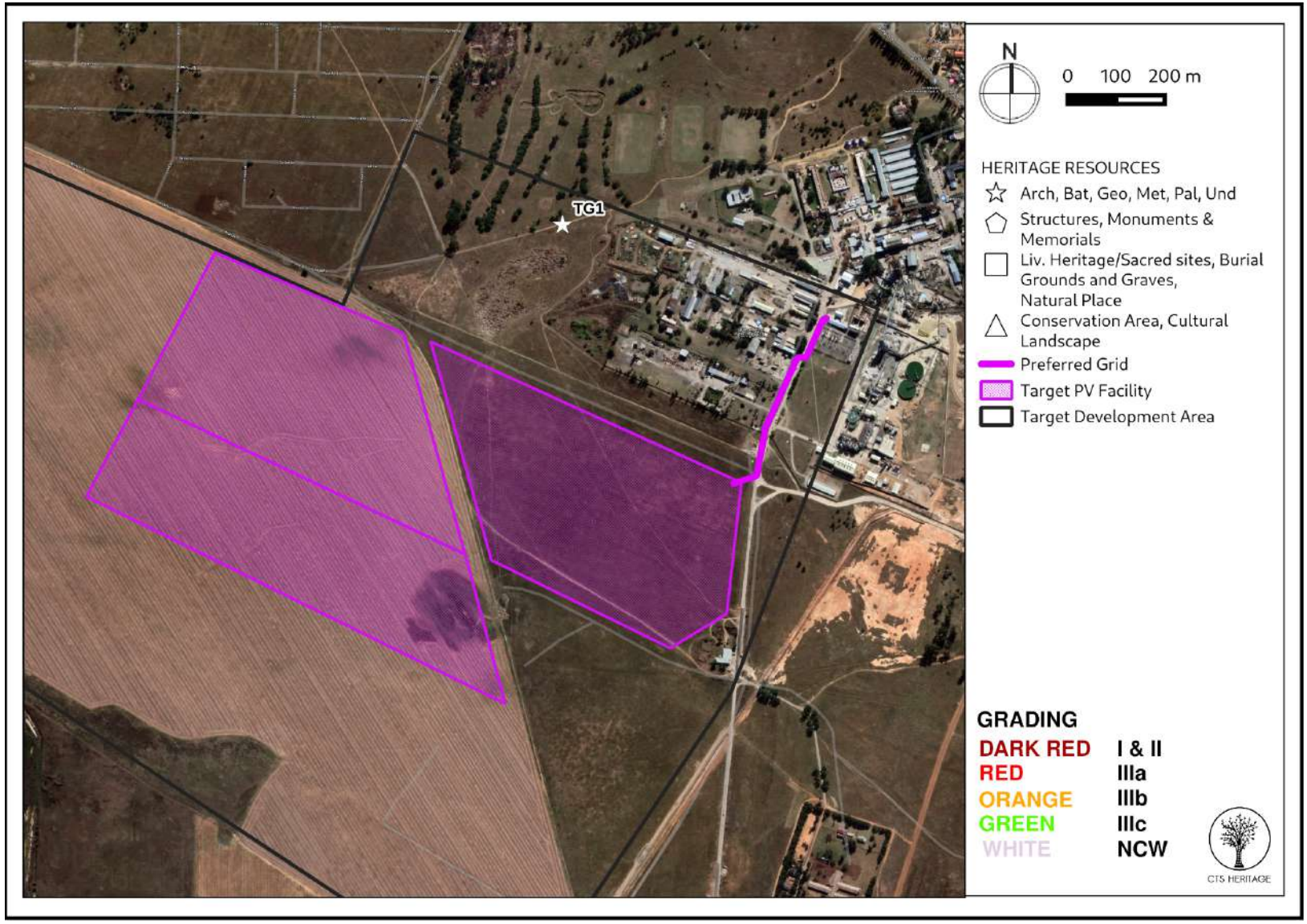

Figure 6.4: Map of field observations relative to the proposed development at the proposed Target PV Facility

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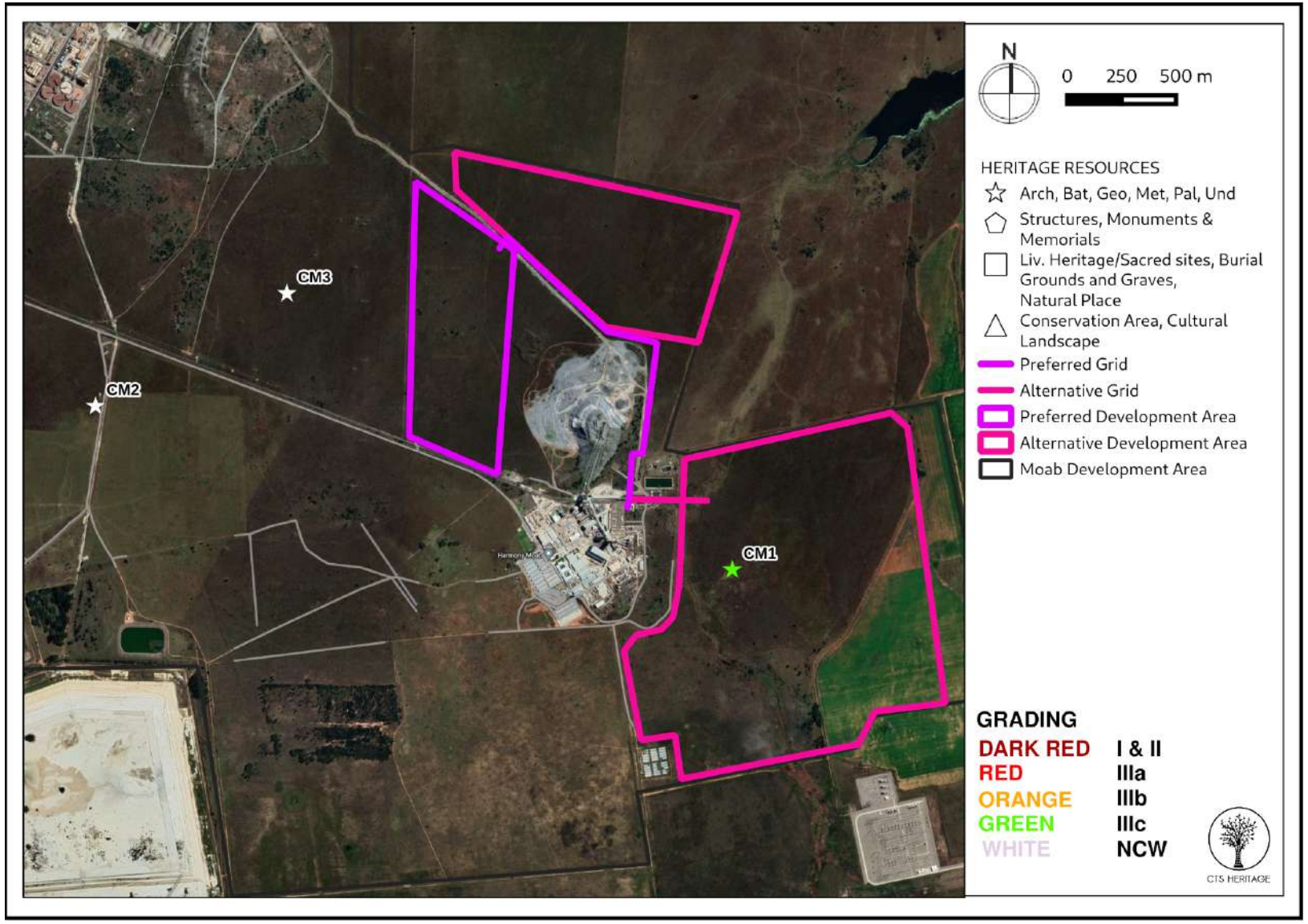

Figure 6.5: Map of field observations relative to the proposed development at the proposed Moab PV Facility

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4.3 Selected photographic record

(a full photographic record is available upon request)

Figure 7.1: Isolated stone artefacts from Harmony: HM1- large side scraper, HM2- single platform core with platform preparation removals, HM3-marginally reduced core with primary removals

Figure 7.2: Concentration of artefacts HM4 next to CHM4: bifacial tool; complete flake and flake fragments.

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Figure 7.3: Demolished and dilapidated historical structures from Harmony: HM5, HM6, HM7, and HM8

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Figure 7.4: Isolated stone artefacts from Central: CT 1-core with primary removals, CT2-prepared weather platform flake, CT3- bifacial tool with alternating retouch on both faces, CT4-core with primary removals.

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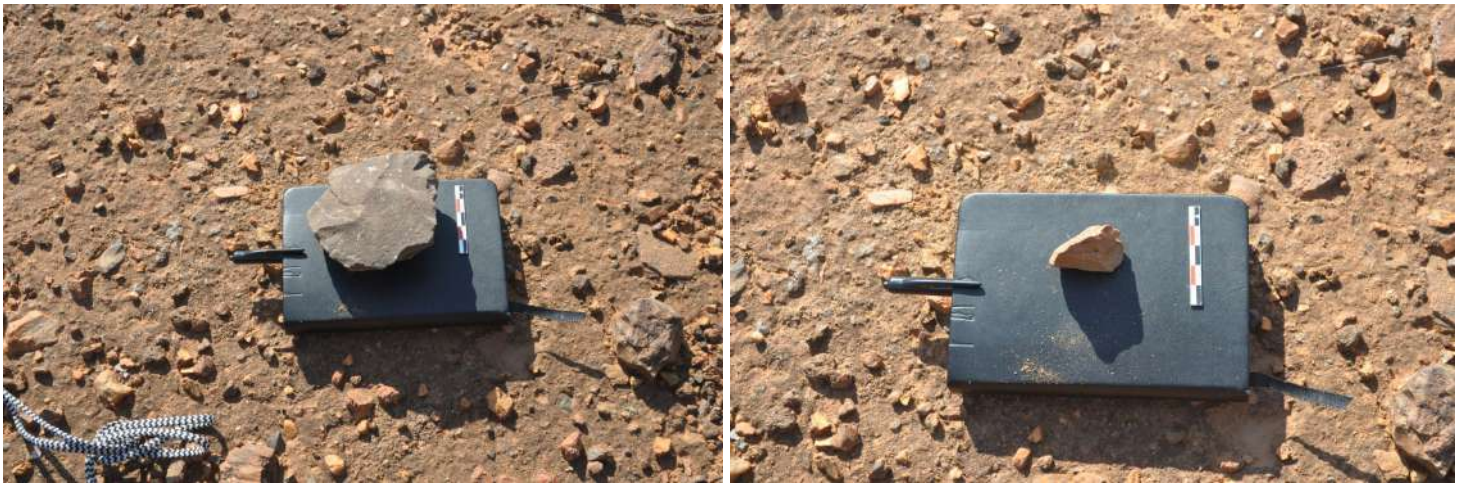

Figure 7.5: Deflated concentration of archaeological remains at Moab CM1: Levallois core and Bladelet core

Figure 7.7: Ex situ archaeological remains at Moab: CM2-Chert outcrop with evidence of hominin exploitation, CM3-flakes

Figure 7.8: Ex situ archaeological remains from Target: TG1: two miniature cores associated with microlithic flake production

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Figure 7.9: Ex-situ archaeological remains from Joel: JL1-bi-directional core, JL2-hammerstone-anvil, JL3-core and flake, JL4- flake potentially associated with bladelet production, JL6-two cores.

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Figure 7.10: Concentration of artefacts in a datable context: 1)single platform chert core; 2) chert flake; 3) chert core; 4) point; 5) silcrete retouched point on a blade; 6) miniature quartz flake; 6) dolorite big flake; 7) silcrete flake; 8) silcrete fragment

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Figure 7.11: Burrows associated with artefacts at JL5.

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5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

5.1 Assessment of impact to Archaeological Resources

5.1.1 Harmony

All archaeological finds at Harmony were documented in what appear to be *ex-situ* surface contexts, yet the absence of evidence for trampling of artefacts at HM4 suggests that post-depositional effects may be minimal and that the artefacts may have eroded out of associated fluvial deposits. The river terrace deposits may be dateable with luminescence techniques, although the direct association of the archaeology with the fluvial stratigraphy would require further investigation to establish.

Based on the surface observations at Harmony, excavation associated with the development should be aware of the potential for sub-surface Stone Age materials if this excavation encroaches on the laminated river deposits. The documented archaeology at Harmony is classified as scientifically LOW SIGNIFICANCE, however the site at HM4 should be avoided if possible through the implementation of a 30m no-go buffer (Figure 7.1).

Concerning the Stone Age archaeology at Harmony, there are no objections to the authorization of the proposed development, provided that if any evidence of human remains are exposed during excavation, that development activities cease in the area of the identified remains.

5.1.2 Central

The potential for finding a dateable *in-situ* archaeological horizon at Central based on current surface observations outlined above appears to be low. The documented archaeology at Central is therefore classified as scientifically LOW SIGNIFICANCE.

Concerning the archaeology observed during the survey of the potentially affected area at Central, there are no objections to the authorization of the proposed development, provided that if any evidence of buried human remains are exposed during excavation, that development activities cease in the area of the identified remains.

No impacts to significant heritage resources are anticipated.

5.1.3 Target

The potential for finding a dateable *in-situ* archaeological horizon at Target based on current surface observations outlined above appears to be low. The documented archaeology at Target is therefore classified as scientifically LOW SIGNIFICANCE.

Concerning the archaeology observed during the survey of the potentially affected area at Target, there are no objections to the authorization of the proposed development, provided that if any evidence of buried human remains are exposed during excavation, that development activities cease in the area of the identified remains.

No impacts to significant heritage resources are anticipated.

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5.1.4 Joel

All archaeological finds at Joel were documented in what appear to be *ex-situ* surface contexts. However, the absence of evidence for trampling of artefacts, particularly at JL5, suggests that post-depositional effects on surface stone scatters may be marginal, and artefacts may have been exposed relatively recently. Further, the presence of artefacts that are currently eroding out of quaternary sediments at JL5 suggests that there may be sub-surface archaeological occurrences within the footprint. The potential for finding a preserved and dateable *in-situ* archaeological horizon based on surface observations and based on the availability of current dating techniques (luminescence would be the only set of applicable methods to this context), however, is low based on the absence of dateable organic materials and the bioturbated nature of sediments partially encompassing some of the artefacts (JL5). This site is graded IIIB for its potential to contribute to the body of scientific knowledge.

Based on the surface observations outlined above, the presence of sub-surface contextualised materials at Joel cannot be excluded as a possibility. Excavation associated with the development should therefore be aware of the potential for sub-surface Stone Age materials. As such, it is recommended that a no-development area of 50m is implemented around site JL5 (Figure 7.2).

JL2 represents a site that accumulated because of the chert raw-material source nearby, so flakes are largely primary. JL2 also has a hammerstone with visible pitting associated with percussion activities – probably knapping. This site has been graded IIIC and it is recommended that a no-development area of 30m is implemented around this site to ensure that it is conserved.

The documented archaeology at Joel is classified as scientifically LOW SIGNIFICANCE apart from the site at JL5 which is classified as MODERATE SIGNIFICANCE.

Concerning the Stone Age archaeology at Joel, there are no objections to the authorization of the proposed development, *provided that the monitoring recommendations outlined above are adhered to*, and provided that if any evidence of human remains are exposed during excavation, that development activities cease in the area of the identified remains.

5.1.5 Moab

The potential for finding a dateable *in-situ* archaeological horizon based on current surface observations outlined above appears to be low. The documented archaeology at Moab is therefore classified as scientifically LOW SIGNIFICANCE.

Concerning the archaeology observed during the extensive survey of the potentially affected area at Moab, there are no objections to the authorization of the proposed development, provided that if any evidence of buried human remains are exposed during excavation, that development activities cease in the area of the identified remains.

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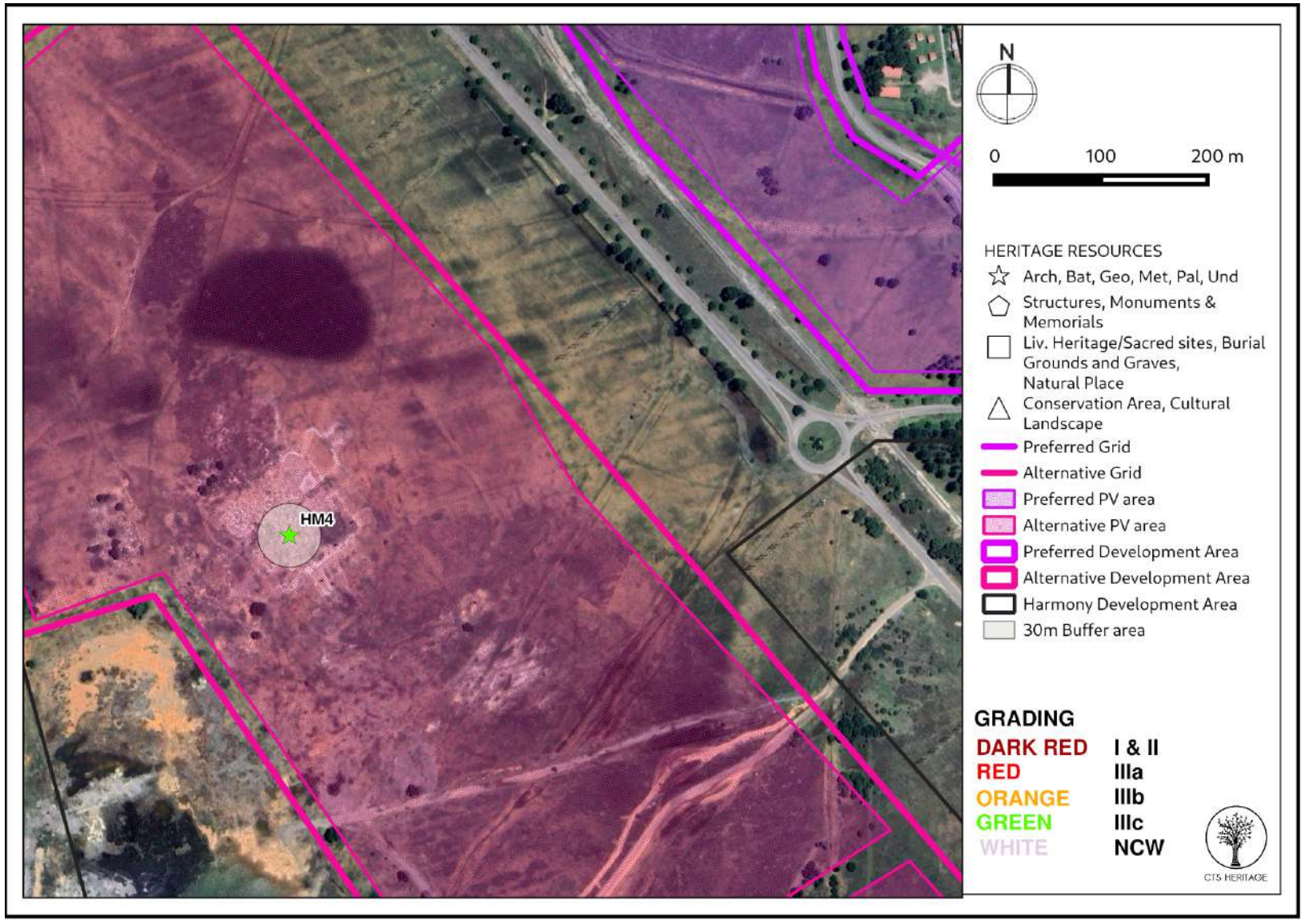

Figure 7.1: Map of significant sites relative to proposed development with recommended buffers around site HM4 (30m Buffer)

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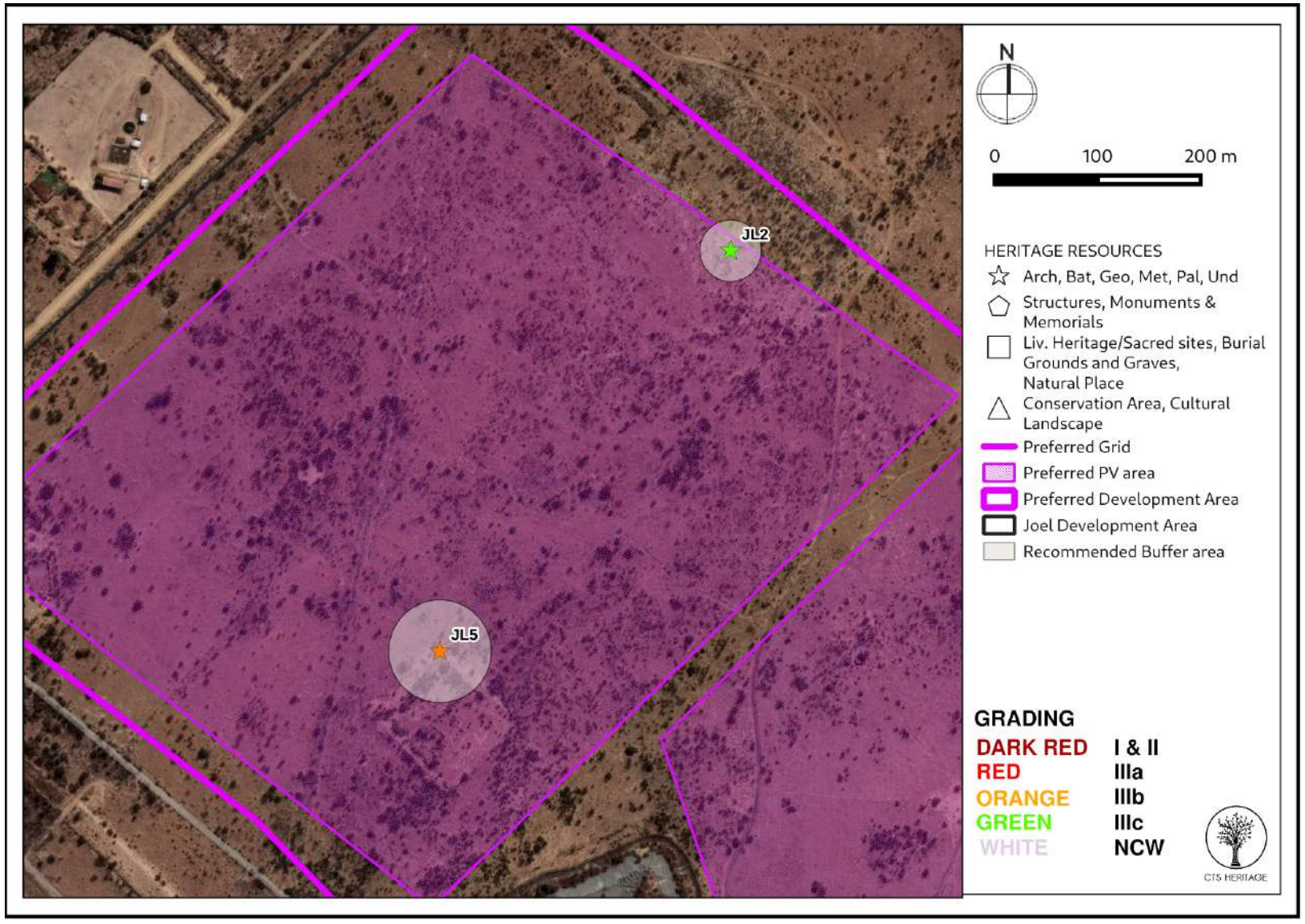

Figure 7.2: Map of significant sites relative to proposed development with recommended mitigation for JL2 (30m Buffer) and JL5 (50m Buffer)

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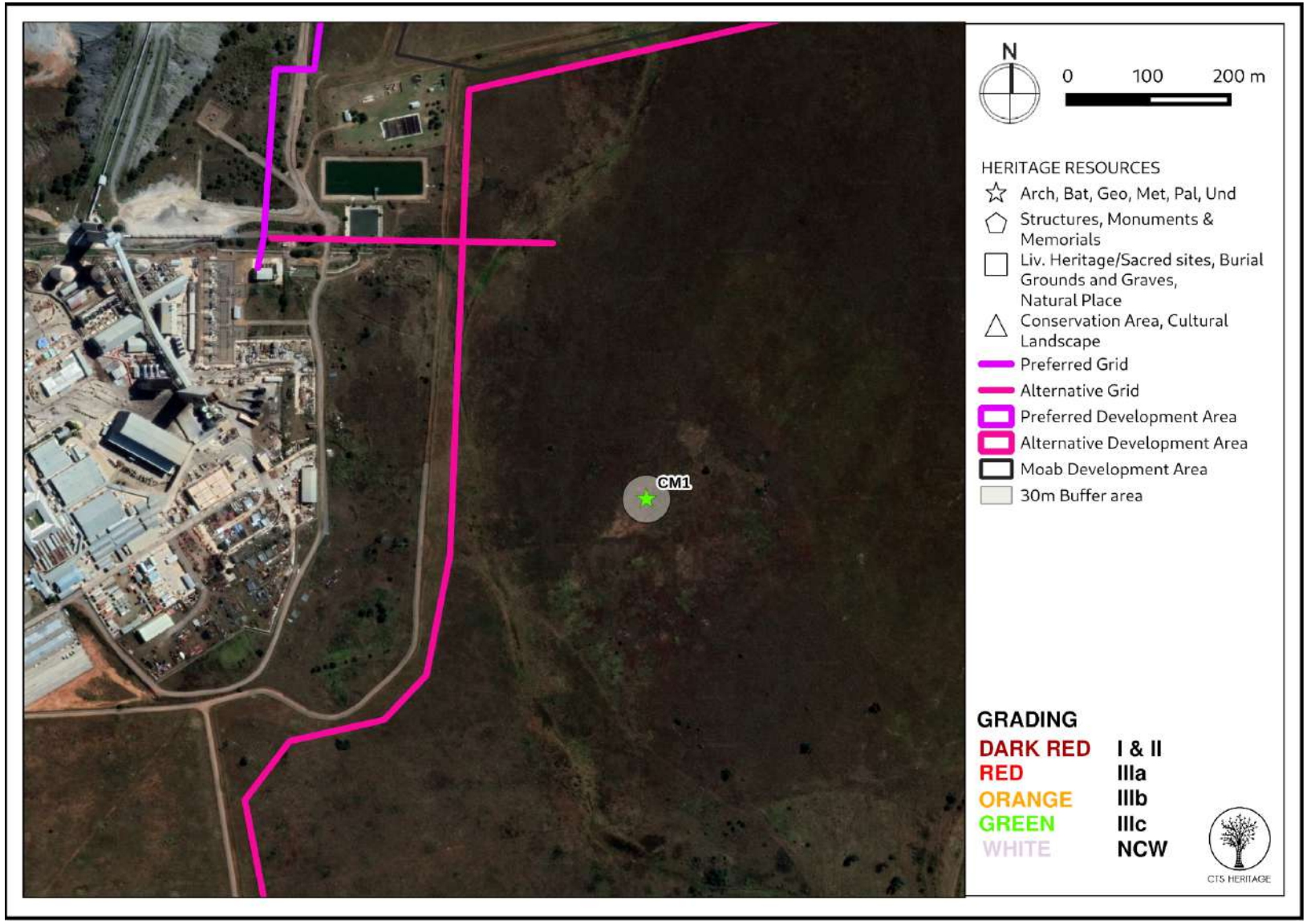

Figure 7.3: Map of significant sites relative to proposed development with recommended mitigation for CM1 (30m Buffer)

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6. CONCLUSION AND RECOMMENDATIONS

All of the areas surveyed as part of this assessment have been transformed through agricultural interventions and/or mining activity. As such, it is not surprising that the results of the survey only identified four sites of scientific cultural value - HM4 within the Alternative Area proposed for the Harmony PV development graded IIIC, JL2, graded IIIC and JL5 graded IIIB within the area proposed for the Joel PV development and CM1, graded IIIC, within the Alternative Area proposed for the Moab PV development.

The identified sites of archaeological significance have the potential to provide scientific insight into the past and as such, it is recommended that these areas are not impacted by the proposed development. It is therefore recommended that no-go development buffers as per the recommendations below are implemented. Further, it is recommended that these sites are mapped on all relevant SDPs and that on-going conservation measures are put in place in the EMPrs for the developments.

Recommendations

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

- The 30m buffer area recommended around sites CM1, JL2 and HM4 is implemented
- The 50m buffer area recommended around site JL5 is implemented
- 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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