ARCHAEOLOGICAL IMPACT ASSESSMENT

PROPOSED DEVELOPMENT OF A 50 MW SOLAR PHOTOVOLTAIC (PV) FACILITY ON PORTION 9 OF THE FARM COMMANDANTS PAN NO. 382 AND PORTION 3 OF THE FARM KOPJE ALLEEN NO. 81, KHAUTA E NYANE SOLAR PV FACILITY NEAR RIEBEECKSTAD, MATJHABENG LOCAL MUNICIPALITY, FREE STATE PROVINCE

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Executive summary

1. Introduction

ACRM was appointed by King's Landing Trading 507 (Pty) Ltd t/a Enviroworks (hereafter referred to as Enviroworks) to conduct an Archaeological Heritage Impact Assessment for the proposed 50MW Khauta e Nyane Solar PV Facility on Portion 3 of the Farm Kopje Alleen No. 81, and Portion 9 of the Farm Commandants Pan No. 382, near Riebeeckstad (Matjhabeng Local Municipality) near Welkom, in the Free State Province

Riebeeckstad is located about 15kms north of Welkom, and about 155kms north east of Bloemfontein. The two farms combined are about 1016ha in extent, while only 87ha has been set aside for the proposed Solar PV facility. The topography of the receiving environment is mostly flat and covered in thick grassland vegetation. There are no significant landscape features such as rocky kopjes, outcrops, streams or pans, in the application area. The current land use is grazing, although some free roaming antelope occur on Farm 382. There is virtually no surface stone covering the land surface. Existing infrastructure comprises farm roads, fencing, isolated windmills and some water storage tanks.

2. The development proposal

The infrastructure associated with the proposed 50MW Khauta e Nyane Solar PV Facility includes the following:

- PV modules and mounting structures with fixed, single or double axis tracking mounting structures;
- Battery Energy Storage System (BESS);
- Site and internal access roads (up to 6 m wide);
- Auxiliary buildings (offices, parking etc.);
- Temporary laydown area (and a latter permanent laydown area for BESS);
- Facility Substation;
- Grid connection infrastructure, includes (underground cabling where practical) medium voltage cabling between the project components and the facility substation;
- Perimeter fencing, and
- Rainwater and/or groundwater storage tanks and associated water transfer infrastructure

Enviroworks is the appointed Environmental Assessment Practitioner (EAP) responsible for facilitating the Environmental Impact Assessment (EIA) process for Environmental Authorisation.

The 50 MW Khauta e Nyane SPV Facility substation will be connected via a 33/44 kV overhead powerline to the Riebeeckstad Main Transmission Substation. The proposed 33/44 kV overhead powerline between the Khauta e Nyane SPV Facility substation and the main transmission substation in Riebeeckstad will be assessed as part of a separate Application for Environmental Authorisation.

3. Aim

The overall purpose of the study is to assess the sensitivity of archaeological resources on the proposed development site, to determine the potential impacts of the development on such resources, and to avoid and/or minimise such impacts by means of management and/or mitigation measures.

A field based Palaeontological Impact Assessment for the proposed development was conducted by Dr John Almond of Natura Viva cc.

4. Constraints and limitations

The study site is covered in extremely thick grassland vegetation, resulting in poor archaeological visibility. However, the results of the study indicate that the proposed development site is not a sensitive archaeological landscape.

5. Findings

5.1 Archaeology

A field assessment of the proposed Khauta e Nyane Solar PV Facility took place on 11th April 2022, in which the following observations were made.

- A single Middle Stone Age (MSA) quartzite core was recorded on the north western boundary of the footprint area of Farm 81/3.

The isolated context in which it was found means that the remains have been graded as having low (IVC) archaeological significance.

5.2 Late Iron Age

- No evidence of any Late Iron Age archaeological heritage was noted during the field assessment, which appears to be absent from the study area.

5.3 Anglo Boer War

- No evidence of any Anglo-Boer War battlefield sites (1899-1904), war graves or memorials were encountered during the study.

According to Mr Louis Venter of the War Museum in Bloemfontein (pers. comm. May 2022), there are no references to any Anglo Boer War skirmishes in the area.

5.3 Palaeontological heritage

According to Almond (2022), `no fossil remains of any kind were recorded from the Permian bedrocks and Late Caenozoic superficial sediments that underly the study area, and that no palaeontological High Sensitivity or No-Go areas were identified'. Almond (2022) concludes that the `site is in practice of Low to Very Low palaeosensitivity'.

6. Potential impacts

MSA resources may be buried below the coversands, but overall, the impact of the proposed Khauta e Nyane Solar PV Facility on pre-colonial Stone Age archaeological resources is rated as being very low.

7. Conclusions

The study has identified no significant impacts to pre-colonial Stone Age archaeological heritage that will need to be mitigated prior to construction activities commencing.

The assessment has shown that the site for the proposed 50MW Khauta e Nyane Solar PV Facility near Riebeeckstad, is not a sensitive archaeological landscape.

The assessment is supported by the literature study, as well as several recent studies, which have shown that no Stone Age archaeological resources have been recorded in Riebeeckstad, and in the surrounding area.

The overall impact significance of the proposed 50MW Khauta e Nyane Solar PV Facility on archaeological heritage is assessed as LOW and therefore there are no objections, on archaeological grounds, to the development proceeding.

Almond (2022) has also shown that that the site is `of Low to Very Low palaeosensitivity'.

The cultural landscape, primarily agriculture (i. e. grazing), with farm fences, tracks, water storage, and isolated windmills, being the main tangible evidence of the landscape, has low heritage significance.

The study has shown that there are no fatal flaws in the development proposal.

8. Recommendations

8.1 Archaeology

1. It is recommended that the proposed development should be authorised.

2. No mitigation of archaeological resources is required is required prior to construction activities commencing.

3. If any human burials are uncovered during construction activities then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and will require inspection by a professional archaeologist.

8.2 Palaeontology

1. Provided that the Chance Fossil Finds Protocol tabulated in Appendix 1 of the PIA is incorporated into the EMPr and fully implemented during the construction phase, there are no objections on palaeontological heritage grounds to their authorisation (Almond 2022).

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1. INTRODUCTION

ACRM was appointed by Enviroworks, on behalf of Khauta e Nyane PV Facility RF (Pty) Ltd, to conduct an Archaeological Heritage Impact Assessment for the proposed 50MW Khauta e Nyane Solar PV Facility on Portion 3 of the Farm Kopje Alleen No. 81, and Portion 9 of the Farm Commandants Pan No. 382, near Riebeeckstad (Matjhabeng Local Municipality), near Welkom, in the Free State Province (Figures 1 & 2).

Riebeeckstad is located about 15kms north of Welkom, and about 155kms north east of Bloemfontein.

The two farms combined are about 1016ha in extent, while only 87ha has been set aside for the proposed 50MW facility.

Figure 1. Google Earth satellite map indicating the location of the proposed Khauta e Nyane Solar PV Facility (yellow pin) in Riebeeckstad in the Free State Province (regional context).

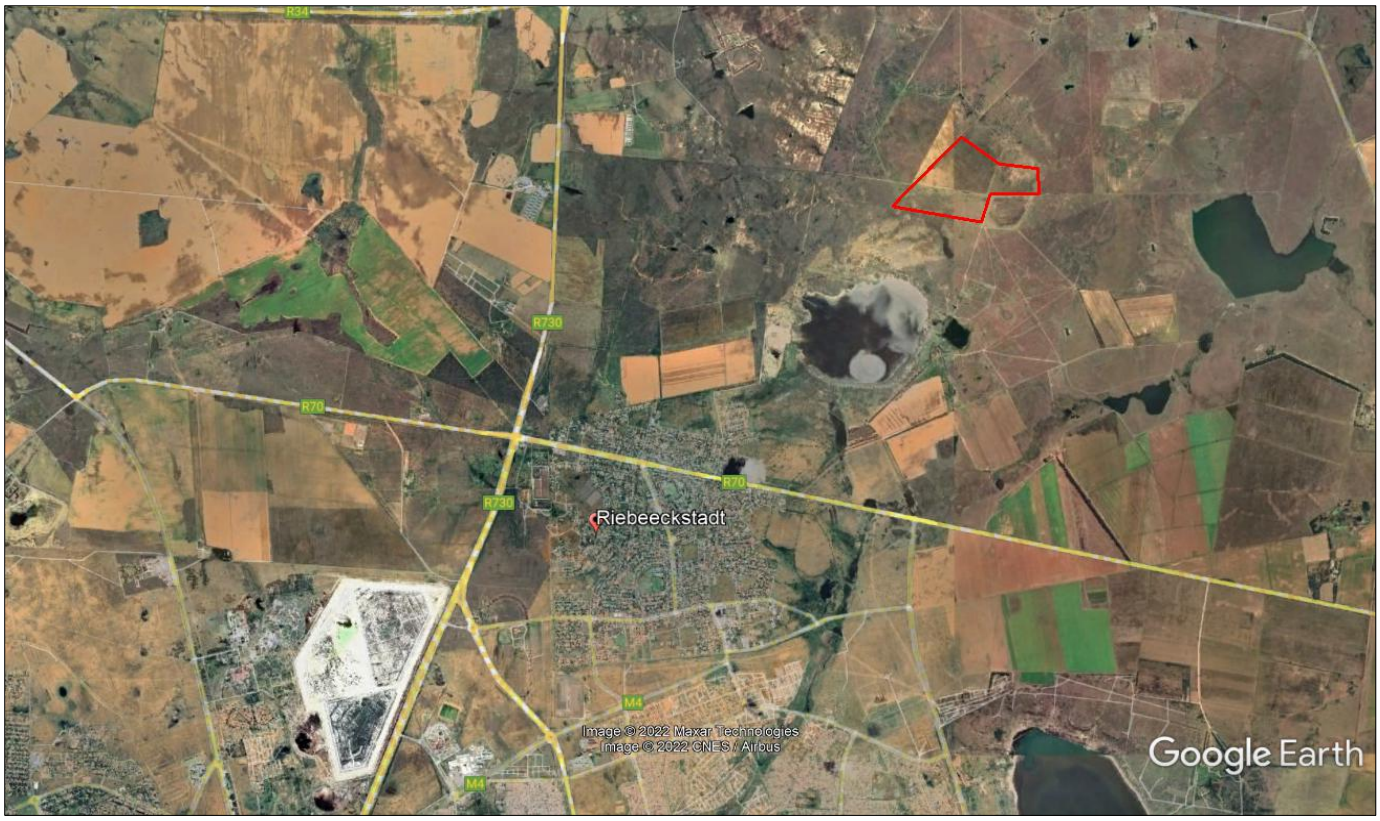

Figure 2. Google Earth satellite map indicating the application area (red polygon) for the proposed Khauta e Nyane Solar PV Facility near Riebeeckstad.

2. THE DEVELOPMENT PROPOSAL

The infrastructure associated with the proposed 50 MW Khauta e Nyane Solar PV Facility near Riebeeckstad includes the following:

- PV modules and mounting structures with fixed, single or double axis tracking mounting structures;
- Battery Energy Storage System (BESS);
- Site and internal access roads (up to 6 m wide);
- Auxiliary buildings (offices, parking etc.);
- Temporary laydown area (and a latter permanent laydown area for BESS);
- Facility Substation;
- Grid connection infrastructure, includes (underground cabling where practical) medium voltage cabling between the project components and the facility substation;
- Perimeter fencing, and
- Rainwater and/or groundwater storage tanks and associated water transfer infrastructure.

Enviroworks is the appointed independent Environmental Assessment Practitioner (EAP) responsible for facilitating the Environmental Impact Assessment (EIA) process for Environmental Authorisation.

The 50 MW Khauta e Nyane SPV Facility substation will be connected via a 33/44 kV overhead powerline to the Riebeeckstad Main Transmission Substation. The proposed 33/44 kV overhead powerline between the Khauta e Nyane SPV Facility substation and the main transmission substation in Riebeeckstad will be assessed as part of a separate Application for Environmental Authorisation.

A proposed Site Layout Plan is presented in Figure 3.

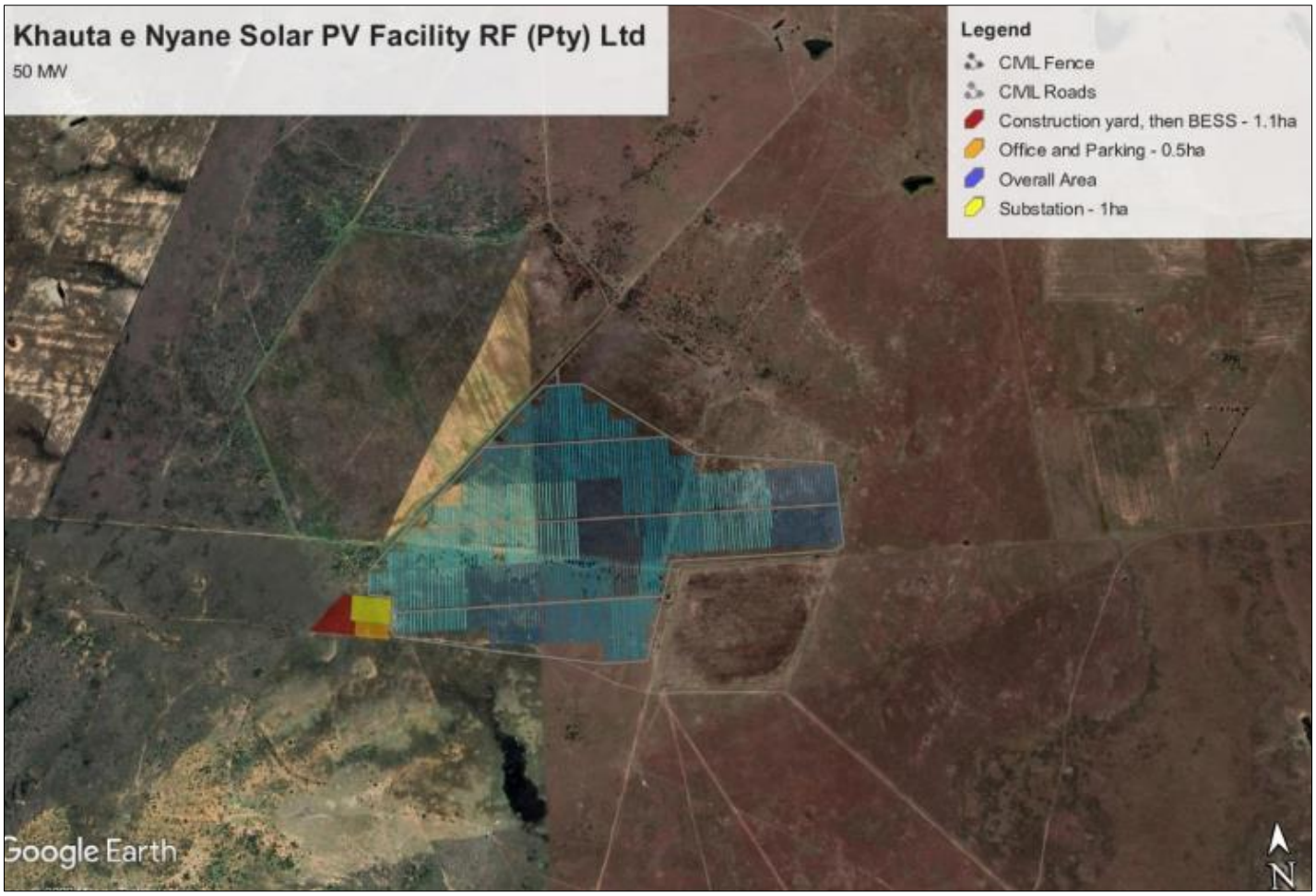

Figure 3. Proposed 50MW Khauta e Nyane Solar PV Facility. Preliminary layout of the proposed development.

3. HERITGE LEGISLATION

The National Heritage Resources Act (NHRA No. 25 of 1999) protects archaeological and palaeontological sites and materials, as well as graves/cemeteries, battlefield sites, public monuments and buildings, structures and features over 60 years old. The South African Heritage Resources Agency (SAHRA) administers this legislation nationally, with Heritage Resources Agencies acting at provincial level.

According to the Act (Sect. 35), it is an offence to destroy, damage, excavate, alter of remove from its original place, or collect, any archaeological, palaeontological and historical material or object, without a permit issued by the South African Heritage Resource Agency (SAHRA) or applicable Provincial Heritage Resources Agency.

Notification of SAHRA is required for proposed developments exceeding certain dimensions (Sect. 38), upon which they will decide whether or not the development must be assessed for heritage impacts (an HIA) that may include an assessment of archaeological (a, AIA) or palaeontological heritage (a PIA).

4. TERMS OF REFERENCE

The terms of reference for the study were to:

- Identify and map archaeological resources that might be impacted by proposed development activities;

- Assess the sensitivity of archaeological in the proposed development site;

- Assess the significance of any impacts resulting from the proposed development, and

- Identify measures to protect any valuable archaeological resources that may exist in the proposed development site.

5. DESCRIPTION OF THE RECEVING ENVIRONMENT

The topography of the receiving environment is mostly flat and featureless, and covered in thick grassland vegetation (Figures 5-7). The current land use is cattle grazing, although some free ranging game (mostly antelope) also occur on Farm 382. There is virtually no surface stone covering the farm. There are no significant landscape features, such as rocky outcrops or kopjes in the application area, or any shallow depressions such as dry pans, springs, streams, wetlands or rivers. Several small farms dams occur, but these are located some distance from the application area. The soils are mostly fine, loamy and orange coloured. Existing infrastructure comprises farm roads, farm tracks, fencing, isolated windmills and some concrete and plastic Jo-Jo water storage tanks. No erosion gullies, or any excavations were noted during the field study.

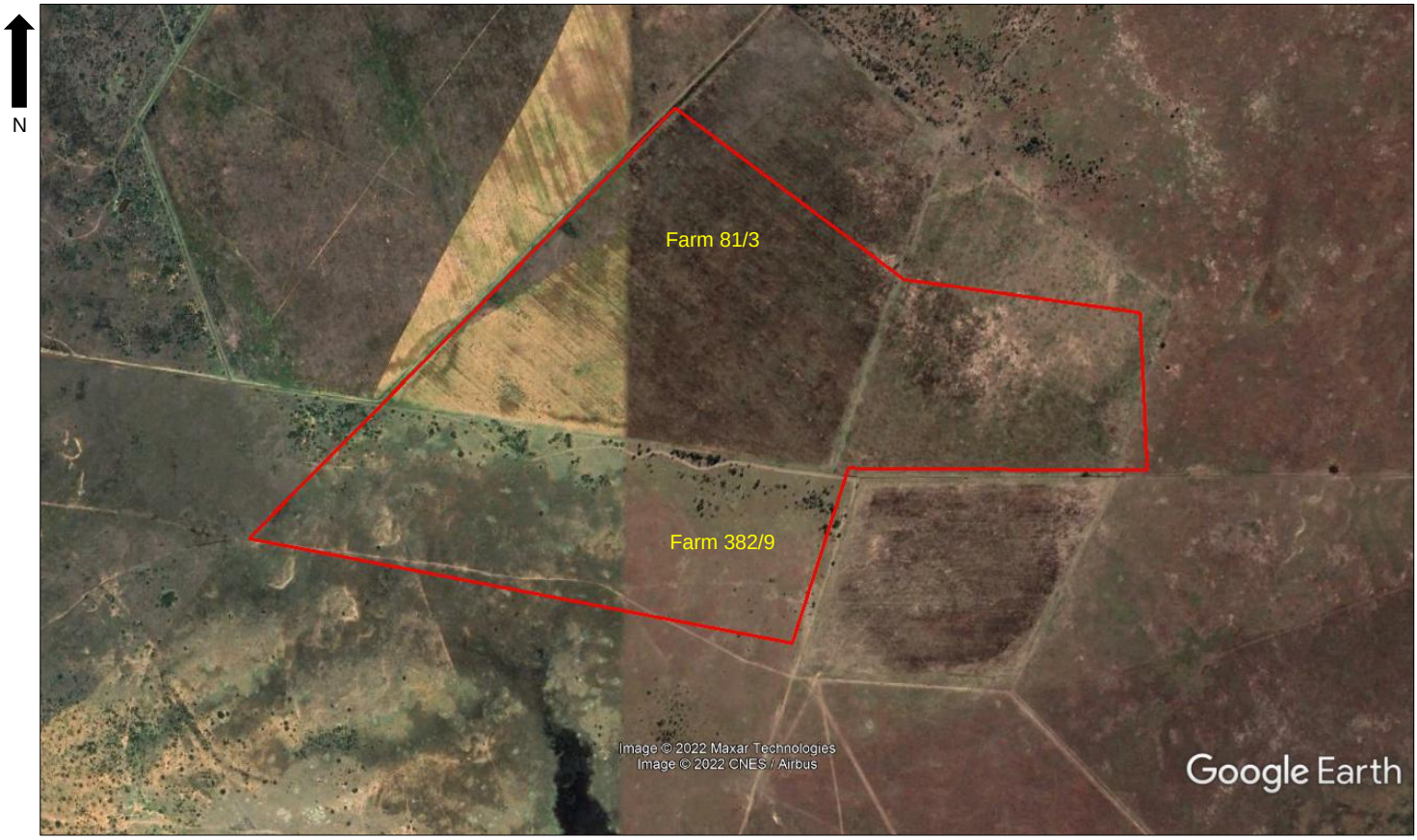

Figure 5. Google Earth satellite map of the application area (red polygon).

Figure 6. View of the study site facing south.

Figure 7. View of the study site facing south.

6. STUDY APPROACH

6.1 Method of survey

The purpose of the study is to assess the sensitivity of archaeological resources in the study area, to determine the potential impacts of the development on such resources, and to avoid and/or minimize such impacts by means of management and/or mitigation measures.

A field assessment was undertaken on 11th April 2022. The survey was carried out on foot. The position of identified archaeological resources, were plotted using a Garmin Oregon 700 hand-held GPS device set on the map datum wgs 84. A track path of the survey was also captured.

A desktop study was carried out to assess the heritage context surrounding the proposed development site. The literature survey included unpublished commercial reports sourced primarily from the South African Heritage Resources Information System (SAHRIS).

The heritage specialist also consulted with Ms Loudine Phillip, Head of the Department of Archaeology, National Museum of Bloemfontein, as well as with Dr Johan van Zyl Head Human Science War Museum in Bloemfontein.

A field based Paleontological Impact Assessment (PIA) was undertaken by consulting palaeontologist, Dr John Almond of Natura viva cc (Almond 2022).

6.2 Constraints and limitations

The extensive grass cover posed a severe limitation during the survey, and it is likely that isolated artefacts could have gone unnoticed. However, indications are that that such material is unlikely to be of high significance.

6.3 Identification of potential risks

The results of the study, supported by the literature survey, indicate that the proposed development of the Khauta e Nyane Solar PV Facility will not impact on significant archaeological resources.

MSA resources may be buried below the coversands, but overall, the impact of the proposed development on pre-colonial archaeological heritage remains is rated as being Low.

6.4 Archaeological and heritage context

The primary source of information was the South African Heritage Resources Information System (SAHRIS) national database.

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, Anglo Boer War Battlefields and Iron Age stonewalled enclosures. The general surroundings of the area became a melting pot of contact and conflict as it represents one of many frontiers where San/Bushman 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) (Birkholtz 2017).

The town of Welkom was laid out on a farm of the same name after gold was discovered in the region, and officially proclaimed a town in 1948. Riebeeckstad is named after Jan van Riebeeck and was established as an upper-class suburb void of mine shafts for people working in Welkom and on the Free State goldfields.

The archaeological history of the area can broadly be divided into a Stone Age, Iron Age and Historic Period. Both the Stone Age and Iron Age form part of what is referred to as the Pre-Colonial Period, whereas the Historic Period is referred to as the Colonial Period.

It is interesting to note that no, or very little archaeological or cultural heritage resources were recorded during the majority of the CRM[1] project reports consulted (Coetzee 2008; Dreyer 2011, 2008, 2004; Prins 2013; Van der Walt 2020, 2015), aside from Colonial Period farming infrastructure and cemeteries (Dreyer 2007; Van Ryneveld 2009) – giving the impression of a generally low archaeological and cultural heritage significance to the area. Google satellite imagery indicates that the surrounding area has been quite heavily impacted on by social housing development, construction of powerlines, roads, agriculture and mining, which have likely impacted on surface indicators of heritage sites.

Heritage resources were recorded during a field study of the Thabong Solar Farm, on the Farm Uitkyk 509, directly to the east of the proposed Khauta Solar PV Cluster (Van Ryneveld 2013). These included several Colonial Period sites including a ruined homestead, a barn and adjoining livestock enclosure. The remains were graded as having Low significance. Three historic cemeteries were also recorded on the 867ha property. Cemeteries are graded as having High local significance. Two cemeteries were recorded on the adjacent Farm Helderwater 494 (Van Ryneveld 2013).

No pre-colonial archaeological Stone Age heritage resources were encountered during the Thabong study.

Van Ryneveld (2009) also conducted an Archaeological Impact Assessment for the Thandanani Residential Development south west of Riebeeckstad. Heritage sites recorded included one Historical Period farming site, graded as Low significance (Van Ryneveld 2009). No pre-colonial archaeological Stone Age resources were identified across the 180ha study site. No graves, cemeteries, buildings, or historic period middens were encountered either.

Very little is therefore known about the Stone Age archaeology of Riebeeckstad and its immediate surroundings. Middle Stone Age (MSA) and Later Stone Age (LSA) implements associated with mammal fossil remains have been recorded in erosion gullies along the Sand, Doring and Vet Rivers between Virginia and Theunissen 20kms south of Riebeeckstad (Birkholtz 2017; Loudine Philip National Museum Bloemfontein, pers. comm.), but no Stone Age resources have yet been recorded in Welkom or Riebeeckstad.

The arrival of early Black farming communities during the first millennium, heralded in the start of the Iron Age for South Africa. The Iron Age is that period in South Africa's archaeological history associated with pre-colonial farming communities associated with agricultural and pastoralist farming activities, and metal production.

[1] Cultural Resource Management

7. RESULTS

7.1 Archaeology

An isolated Middle Stone Age (MSA) quartzite core (S27° 53.136' E26° 50.904') was recorded on the north western boundary of the footprint area of the proposed Solar PV facility on the Farm Kopje Alleen 81/3 (Figures 8 & 9).

The isolated context in which it was found, means that remains have been graded as having *low* (IVC) archaeological significance.

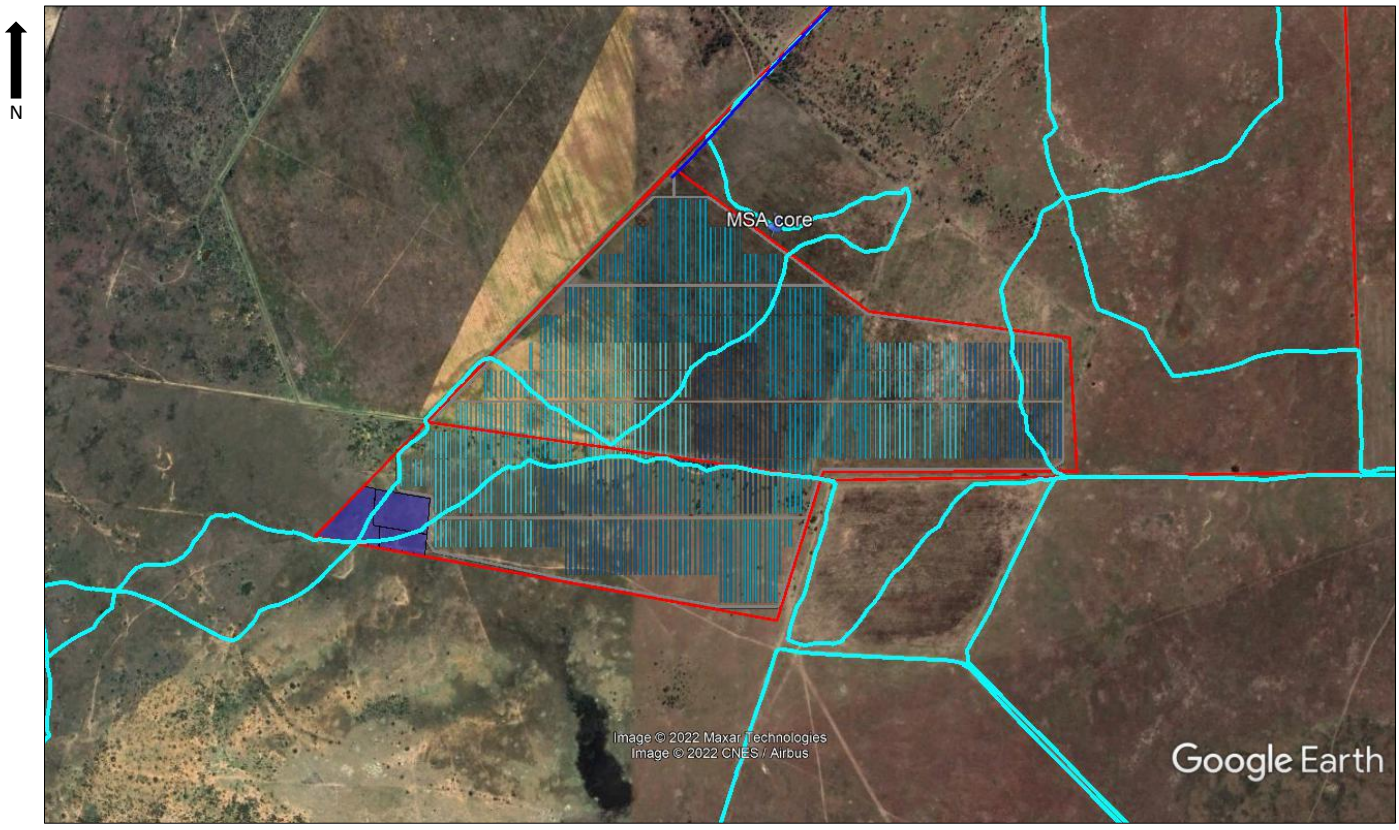

Figure 8. Trackpaths (in blue) and waypoints of archaeological finds. Red polygon is the application area.

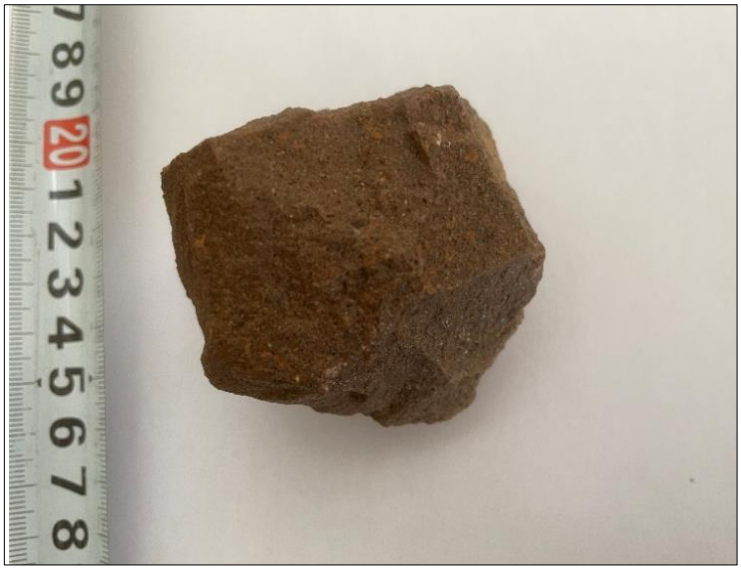

Figure 9. MSA core. Ruler scale is in cm.

7.2 Late Iron Age

No evidence of any Late Iron Age archaeological heritage were noted during the field assessment, which appears to be absent from the study area. According to the distribution map for Iron Age settlements on the Southern Highveld as published in Maggs (1976), the Khauta SPV Cluster is located to the west of the known distribution of Late Iron Age sites. It is therefore unlikely for any such sites to be located within the study area, or its immediate surroundings.

7.3 Anglo Boer War

No evidence of any Anglo-Boer War battlefield sites (1899-1904), war graves or memorials were encountered during the study. According to Mr Louis Venter of the War Museum in Bloemfontein (pers. comm. May 2022), there are no references to any Anglo Boer War skirmishes in the area.

7.4 Palaeontological heritage

According to consulting palaeontologist, Dr John Almond (2022), `no fossil remains of any kind were recorded from the Permian bedrocks and Late Caenozoic superficial sediments that underly the study area', during a site visit conducted in May 2022, and that `no palaeontological High Sensitivity or No-Go areas were identified'.

Almond (2022) concludes that `the site is in practice of Low to Very Low palaeosensitivity'.

8 IMPACT ASSESMENT AND DESCRIPTION

Tables 1 and 2, assesses the overall impacts to archaeological heritage resources.

8.1 Summary of assessment of potential impact of the proposed activities

Potential impact on archaeological resources	
Nature of impact	Damage to, or destruction of archaeological resources
Extent and duration of impact	Localized short term
Intensity of impact	Low
Probability of occurrence	Improbable
Degree to which impact can be reversed	Reversible
Irreplaceability of resources	Low
Cumulative impact prior to mitigation	Low
Significance of impact pre-mitigation	Low
Degree of mitigation possible	High
Proposed mitigation	None required
Cumulative impact post mitigation	Low
Significance after mitigation	Insignificant

Table 1. Assessment of archaeological impacts: Construction Phase

Potential impact on archaeological resources	
Nature of impact	Damage to, or destruction of archaeological resources
Extent and duration of impact	Insignificant
Intensity of impact	Very Low
Probability of occurrence	Very Low
Degree to which impact can be reversed	Very Low
Irreplaceability of resources	Very Low
Cumulative impact prior to mitigation	Very Low
Significance of impact pre-mitigation	Very Low

Degree of mitigation possible	Very Low
Proposed mitigation	None required
Cumulative impact post mitigation	Low
Significance after mitigation	Insignificant

Table 2. Assessment of archaeological impacts: Operational Phase

9. CONCLUSION

The study has identified no significant impacts to pre-colonial Stone Age or historical archaeological heritage that will need to be mitigated prior to construction activities commencing.

The field survey has shown that the archaeological landscape is dominated by MSA lithics of LOW (Grade IVC) significance.

The assessment has shown that the site for the proposed 50MW Khauta e Nyane Solar PV Facility, near Riebeeckstad, is not a sensitive archaeological landscape.

The assessment is supported by the literature study which has shown no archaeological resources have previously been recorded in Riebeeckstad, and in the surrounding area.

The assessment is further supported by several recent studies conducted in Riebeeckstad (Kaplan 2022a, b, c).

The overall impact significance of the proposed 50MW Khauta e Nyane Solar PV Facility on archaeological heritage is assessed as LOW and therefore there are no objections, on archaeological grounds, to the development proceeding.

Almond (2022) has also shown that that `the site is in practice of Low to Very Low palaeosensitivity'.

The cultural landscape, primarily agriculture (i. e. grazing), with farm fences, tracks, water storage, and windmills, being the main tangible evidence of the landscape, has low heritage significance.

The study has shown that there are no fatal flaws in the development proposal.

10. RECOMMENDATIONS

Regarding the proposed 50MW Khauta e Nyane Solar PV Facility on Portion 3 of the Farm Kopje Alleen No. 81 and Portion 9 of the Farm Commandants Pan No. 382, the following recommendation are made

10.1 Archaeology

1. It is recommended that the proposed development should be authorised.

2. No mitigation of archaeological resources is required is required prior to construction activities commencing.

3. If any human burials are uncovered during construction activities then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and will require inspection by a professional archaeologist.

10. 2 Palaeontology

1. Provided that the Chance Fossil Finds Protocol tabulated in Appendix 1 of the PIA is incorporated into the EMPr and fully implemented during the construction phase, there are no objections on palaeontological heritage grounds to their authorisation (Almond 2022).

11. REFERENCES

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