

HERITAGE IMPACT ASSESSMENT

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

Proposed development of a solar photovoltaic (PV) energy facility and associated infrastructure with a generation capacity of up to 10MW, located near Sasolburg in the Free State Province

SAHRIS Ref:

Prepared by CTS Heritage



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For

Savannah Environmental (Pty) Ltd

March 2022



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EXECUTIVE SUMMARY

1. Site Name:

Becrux Two Solar PV Facility

2. Location:

Portion 1 of the Farm Saltbery Plain 137 and the Remaining Extent of Portion 1 of the Farm Roseberry Plain 250

3. Locality Plan:

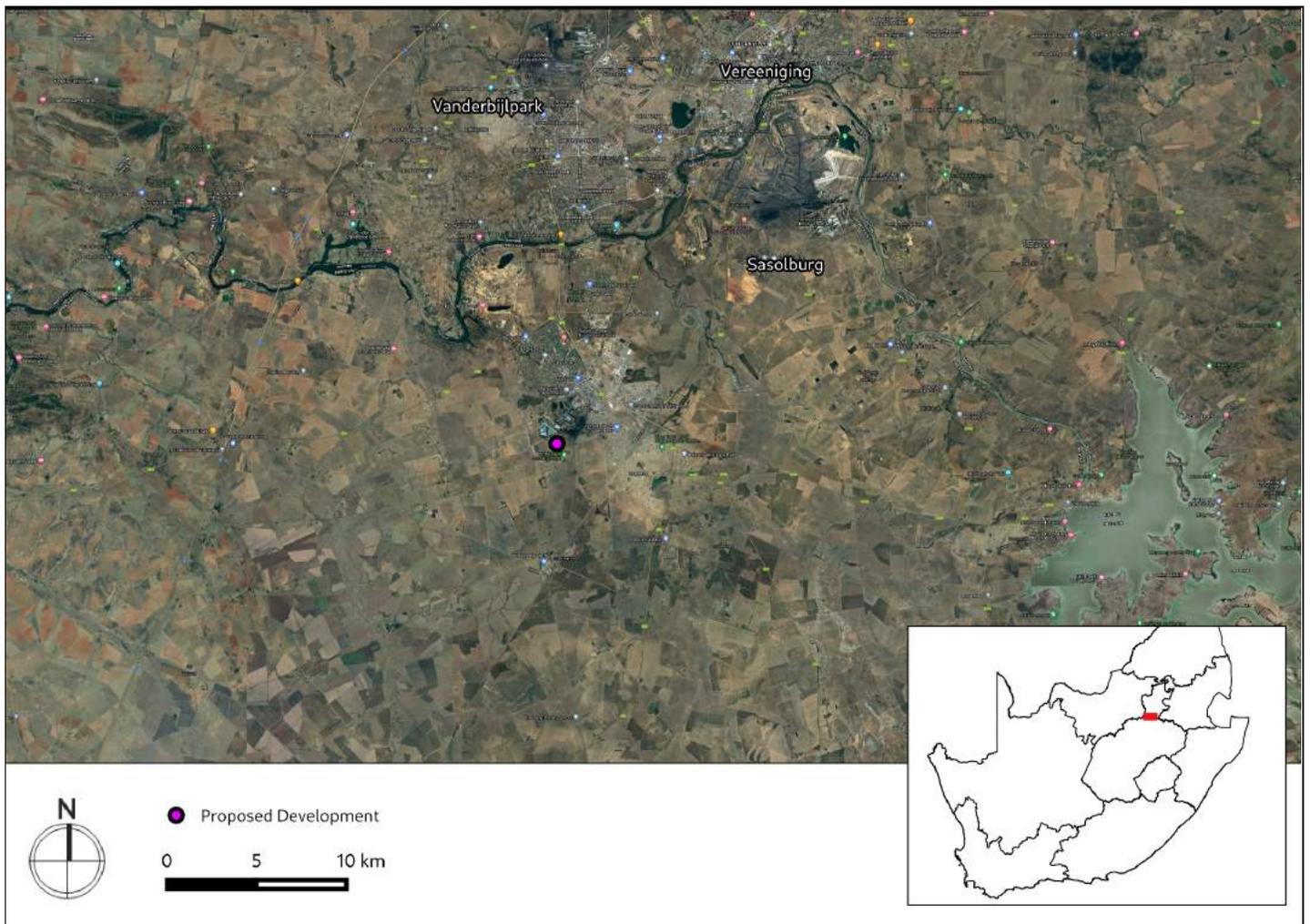


Figure 1: Location of the proposed study area



4. Description of Proposed Development:

Becrux Solar PV Project Two (Pty) Ltd is proposing to develop a 10MW ac Solar Photovoltaic (PV) Energy Facility and associated infrastructure on the Remainder of Portion 1 of the Farm Saltberry Plain 137 and the Remaining Extent of Portion 1 of the Farm Roseberry Plain 250, located 4km southeast of the town Sasolburg, within jurisdiction of the Metsimaholo Local Municipality and the Fezile Dabi District Municipality in the Free State Province. The purpose of the facility will be to generate electricity for exclusive use by Sasol Limited.

5. Heritage Resources Identified in the broader study area:

No heritage resources were identified within the study area.

6. Anticipated Impacts on Heritage Resources:

No impacts to heritage resources are anticipated.

7. Recommendations:

There is no objection to the proposed development of the proposed Becrux Two Solar PV Facility and its associated infrastructure on condition that:

- The attached Chance Fossil Finds Procedure must be implemented for the duration of construction activities
- Should any previously unrecorded archaeological resources or possible burials be identified during the course of construction activities, work must cease in the immediate vicinity of the find, and SAHRA must be contacted regarding an appropriate way forward.

8. Author/s and Date:

Jenna Lavin

February 2022



Details of Specialist who prepared the HIA

Jenna Lavin, an archaeologist with an MSc in Archaeology and Palaeoenvironments, and currently completing an MPhil in Conservation Management, heads up the heritage division of the organisation, and has a wealth of experience in the heritage management sector. Jenna's previous position as the Assistant Director for Policy, Research and Planning at Heritage Western Cape has provided her with an in-depth understanding of national and international heritage legislation. Her 8 years of experience at various heritage authorities in South Africa means that she has dealt extensively with permitting, policy formulation, compliance and heritage management at national and provincial level and has also been heavily involved in rolling out training on SAHRIS to the Provincial Heritage Resources Authorities and local authorities.

Jenna is on the Executive Committee of the Association of Professional Heritage Practitioners (APHP), and is also an active member of the International Committee on Monuments and Sites (ICOMOS) as well as the International Committee on Archaeological Heritage Management (ICAHM). In addition, Jenna has been a member of the Association of Southern African Professional Archaeologists (ASAPA) since 2009. Recently, Jenna has been responsible for conducting training in how to write Wikipedia articles for the Africa Centre's WikiAfrica project.

Since 2016, Jenna has drafted over 50 Heritage Impact Assessments throughout South Africa.

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1. INTRODUCTION

1.1 Background Information on Project

Becrux Solar PV Project Two (Pty) Ltd is proposing to develop a 10MW ac Solar Photovoltaic (PV) Energy Facility and associated infrastructure on the Remainder of Portion 1 of the Farm Saltberry Plain 137 and the Remaining Extent of Portion 1 of the Farm Roseberry Plain 250, located 4km southeast of the town Sasolburg, within jurisdiction of the Metsimaholo Local Municipality and the Fezile Dabi District Municipality in the Free State Province. The purpose of the facility will be to generate electricity for exclusive use by Sasol Limited.

Power generated at the facility will be delivered to Sasol Limited by feeding into the grid through a Wheeling Agreement signed with Eskom and/or direct embedded generation. To evacuate the generated power to Sasol Limited, an 11kV overhead power line will be established to connect the proposed 11kV onsite containerised/non-containerised substation to the existing Sigma Substation. A grid connection corridor up to 200m wide, extending up to ~400m around the footprint of the Sigma Substation, and up to 500m in length, has been identified for the assessment and suitable placement of the grid connection infrastructure within the corridor. This corridor will provide for the avoidance of sensitive environment areas and features and allow for the micro-siting of the overhead power line within the corridor.

A development area of up to ~30ha and a development footprint of up to ~19.99ha have been identified within the project site (~339.87ha) by Becrux Solar PV Project Two (Pty) Ltd for the development of the Becrux Two Solar PV Facility. Infrastructure associated with the Solar PV Energy Facility will include the following:

- Solar PV array comprising PV modules and mounting structures.
- Inverters and transformers.
- Cabling between the panels.
- 11kV onsite containerised/non-containerised substation.
- 11kV overhead power line for the distribution of the generated power, which will be connected to the existing Sigma Substation.
- Main access gravel road and internal gravel roads.
- Operations and Maintenance (O&M) building, including a sewage/conservancy tank and water storage tanks.
- Site office, workshop area, storage area, and laydown area.
- Fire break and fencing around the site, including an access gate.



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1.2 Description of Property and Affected Environment

The landscape of the study area is Central Free State Grassland, which is a broad vegetation zone from Sasolburg in the north to Dewetsdorp in the south. Other significant settlements within this unit include Kroonstad, Ventersburg, Steynsrus, Winburg, Lindley and Edenville. The Central Free State Grassland features undulating plains supporting short grassland, which in its natural condition is dominated by red grass (red oat grass) while weeping lovegrass and blue lovegrass become dominant in degraded habitats (Mucina & Rutherford 2006, SANBI 2022).

The site footprint is predominantly grassland with rushes and reeds towards the middle and west, along the waterline. Due to the recent rainfall, the area was very muddy, with dark, clayey soil and, in some areas, deep pools of stagnant water. There are mounds of rubble, with tar and concrete blocks and bricks and tiles in the northern parts of the terrain. To the southeast is a dilapidated sports stadium, still in use, even though the infrastructure has been broken down and used as an informal shelter. In the south, a small-scale subsistence farm is situated. Towards the southwest of the footprint is a series of modern cement foundations with building rubble. Historical imagery on Google Earth shows that the structures in this area were demolished in 2017. The whole area is further utilised for grazing, as cows, goats, and pigs were encountered. The connection corridor runs through highly disturbed industrial Sasol grounds.



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- Proposed Powerline
- Becrux PV II Development Area
- Becrux PV II Project Area

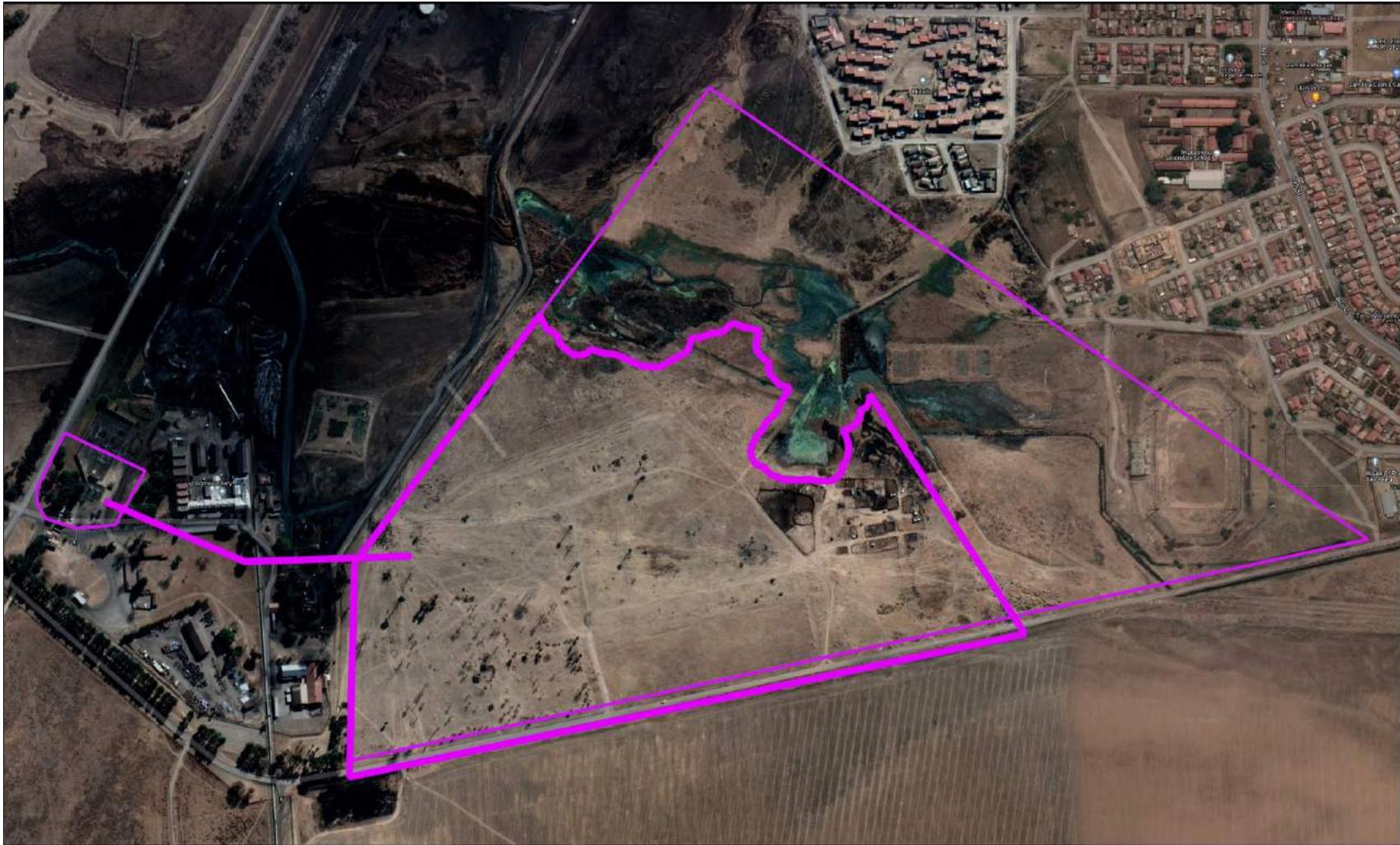


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Map 1.1: The proposed development area of the Becrux Two Solar PV Facility Project



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- Proposed Powerline
- Becrux PV II Development Area
- Becrux PV II Project Area

0 100 200 m



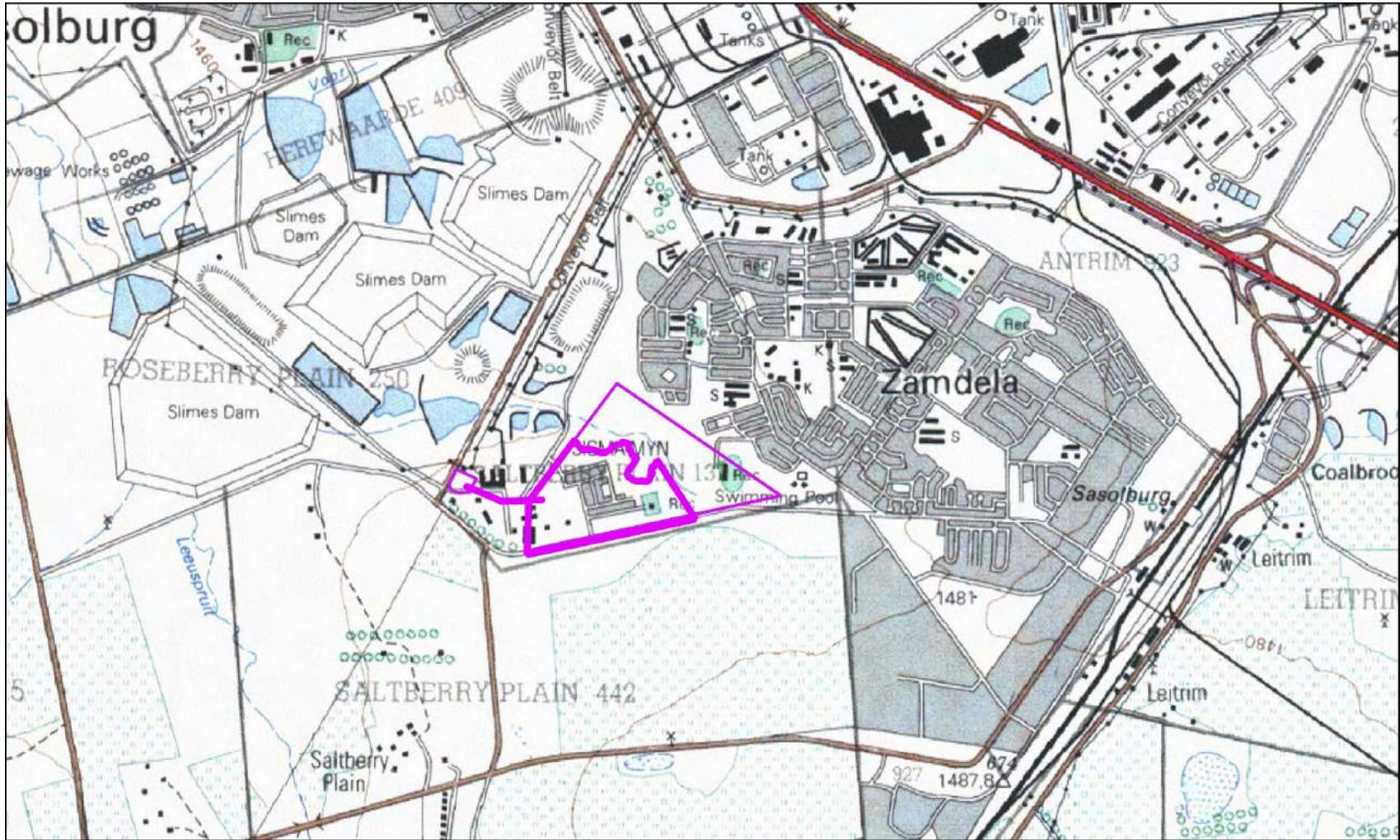
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Map 1.2: The proposed development area of the Becrux Two Solar PV Facility Project

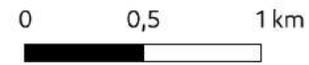
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- Proposed Powerline
- Becrux PV II Development Area
- Becrux PV II Project Area



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Map 1.3: 1:50 000 Topo Map indicating the proposed study area at closer range.

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). The broader study area was assessed for heritage resources in order to inform the preferred location for the proposed 10MW PV facility.

2.2 Summary of steps followed

- A Desktop Study was conducted of relevant reports previously written (please see the reference list for the age and nature of the reports used)
- An archaeologist conducted an assessment of the broader study area in order to determine the archaeological resources likely to be disturbed by the proposed development. The archaeologist conducted her site visit on 11 February 2022
- A palaeontologist conducted an assessment of the broader study area in order to determine the palaeontological resources likely to be disturbed by the proposed development. The palaeontologist conducted his site visit on 24 January 2022
- The identified resources were assessed to evaluate their heritage significance
- Alternatives and mitigation options were discussed with the Environmental Assessment Practitioner

2.3 Assumptions and uncertainties

- The *significance* of the sites and artefacts is determined by means of their historical, social, aesthetic, technological and scientific value in relation to their uniqueness, condition of preservation and research potential. It must be kept in mind that the various aspects are not mutually exclusive, and that the evaluation of any site is done with reference to any number of these.
- It should be noted that archaeological and palaeontological deposits often occur below ground level. Should artefacts or skeletal material be revealed at the site during construction, such activities should be halted, and it would be required that the heritage consultants are notified for an investigation and evaluation of the find(s) to take place.

However, despite this, sufficient time and expertise was allocated to provide an accurate assessment of the heritage sensitivity of the area.



2.4 Constraints & Limitations

All possible care has been taken during the comprehensive field survey to identify sites of cultural importance within the development areas. However, it is essential to note that some heritage sites may have been missed due to their subterranean nature or dense vegetation cover. No subsurface investigation (i.e. excavations or sampling) was undertaken since a SAHRA permit is required for such activities.

Given the extent of previous assessments and the work covered in this study, we feel confident in marking off a larger area of sensitivity in the broader study area than was previously recommended.

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.



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- 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:

$$S = (E + D + M) \times P$$

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).

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3. HISTORY AND EVOLUTION OF THE SITE AND CONTEXT

3.1 Desktop Assessment

Background

Sasol Limited is an integrated energy and chemical company based in Sandton, South Africa. The company was formed in 1950 in Sasolburg, South Africa and has a large operation in Sasolburg and Secunda, Mpumalanga. The town of Sasolburg was established in 1954 to provide housing and other facilities for Sasol employees. The company issued a request for information (RFI) in May 2020 for the supply, by IPPs, of up to 600 MW of renewable energy to its South African operations. Sasol indicated on August 3, 2020 that the decision to issue an RFP for two 10 MW solar PV facilities represented the “first step” towards the group realising its commitment to eventually procure 600 MW of renewable- energy capacity. Chief sustainability officer Hermann Wenhold said the RFP also formed part of the group’s broader aspiration to reduce greenhouse gas emissions by 10% by 2030. Sasol is one of several large South African corporations to indicate that they intended to introduce renewable self-generation at their operations, with several mining companies also moving ahead with projects. The self-generation projects were being pursued to both bolster security of supply and improve tariff visibility in a context of steeply rising Eskom and municipal tariffs and an ongoing risk of load-shedding (Creamer 03 August 2020). Due to its strategic infrastructure, Sasolburg was subject to a number of attacks as part of the struggle against Apartheid. The strategic infrastructure at Sasolburg remains a National Key Point.

Cultural landscape and the Built Environment

The area proposed for development has been extensively previously disturbed through agriculture and mining infrastructure (Becrux Two Solar PV Facility is proposed to be located at the Sigma Mine - Figure 1d). The ground intended for the proposed 10MWac solar PV plant is immediately adjacent to existing coal mine infrastructure. The installation of a solar PV plant is therefore in keeping with the broader development character of the immediate surroundings which lie on the peri-urban edge of Sasolburg and the massive Sigma coal mine nearby to the east and northwest.

A number of monuments, burial grounds and significant historical structures are located within 10km of the development area (Figure 3) however none of these heritage resources are anticipated to be impacted directly or indirectly by the proposed development.

Archaeology

A number of archaeological and heritage impact assessments have been completed in the area as a result of the ongoing mining activity here. According to Higgitt et al. (2015, SAHRIS ID 349672), “Archaeologically, sites associated with the Stone Age have been identified in the local study area. Pistorius (2007) notes the numerous Stone Age sites discovered along the ancient banks of the Vaal and Klip Rivers at localities such as Klipplaatdrift,



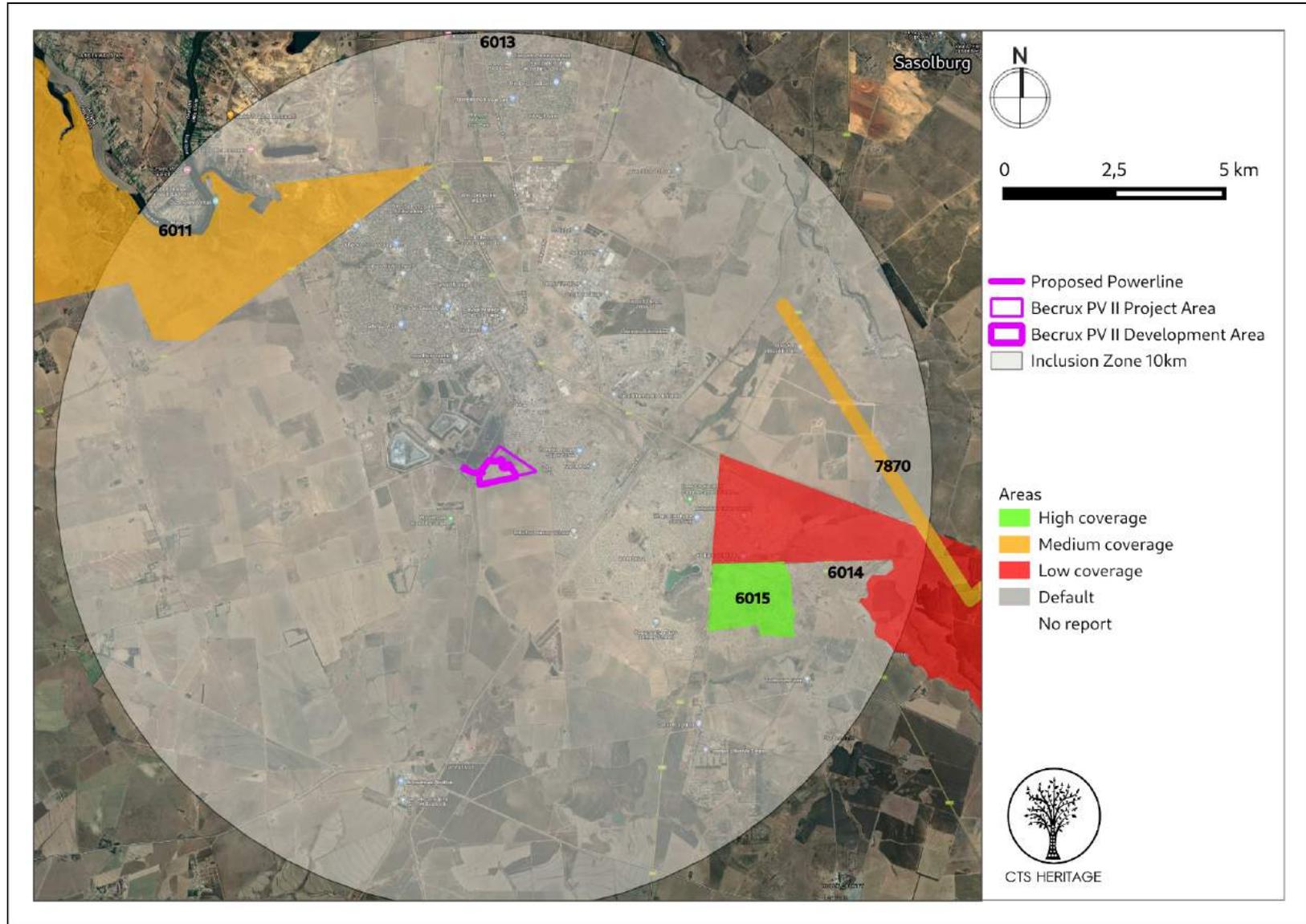
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the Klip River Quarry site and the Duncanville Archaeological Reserve. Van Schalkwyk (1998) makes reference to the Vaal River basin and its association with the ESA. Here it is noted that the Vaal River gravels remain an important source of information on the ESA which is associated with the Oldowan and Acheulian industries.” In the broader area, Higgitt et al. (2015) note the presence of both Middle (Van Vollenhoven, 2008) and Later Stone Age archaeology (Fourie, 2007). Higgitt et al. (2015) also note that the rock engraving site of Leeuwkuil is located in the broader area. This site is described as being located on a small island in the Vaal River where engravings are concentrated on the south-eastern part of the peninsula. Eland and other antelope dominated the images depicted, which appeared to be in the San hunter-gatherer engraving tradition. Although the area proposed for development is located some distance (approximately 7km) from the Vaal River, there is a small tributary of the Vaal that runs adjacent to the proposed Becrux Two Solar PV Facility.

According to SAHRIS, one archaeological site is located within 10km of the development area - SAHRIS Site ID 31991 on Farm Woodlands 407RD. This site is graded IIIB however no additional information about this site, no site description and no source for the information about this site is recorded along with the site recording on SAHRIS and as such, it is impossible to determine the accuracy of this information. Although the areas proposed for the development of the Becrux Two Solar PV Facility have been extensively previously disturbed, significant archaeological heritage is known from the broader area and as such, it is possible that the proposed development may negatively impact on similar archaeological heritage.



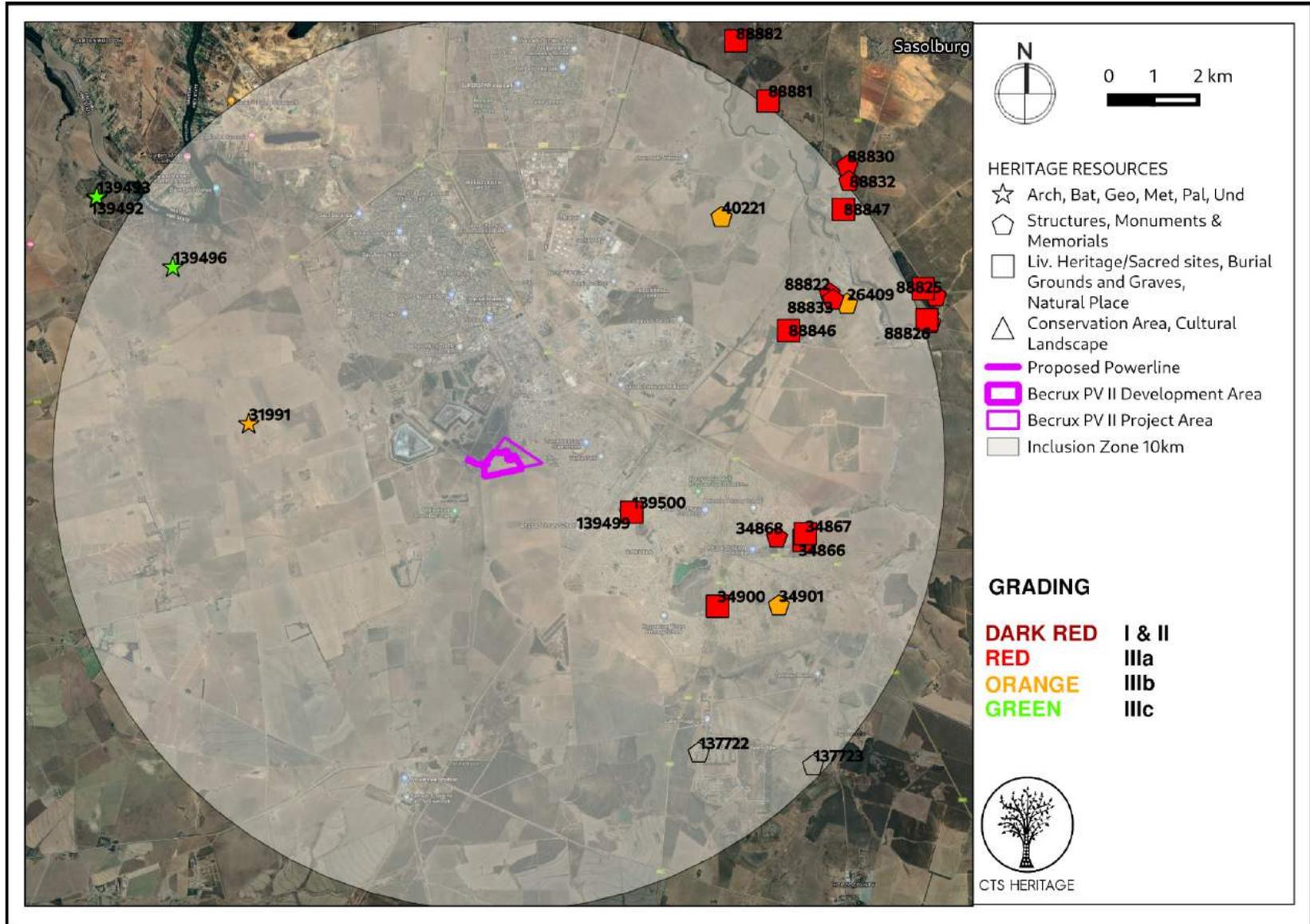
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Map 2.1 Spatialisation of heritage assessments conducted in proximity to the broader study area



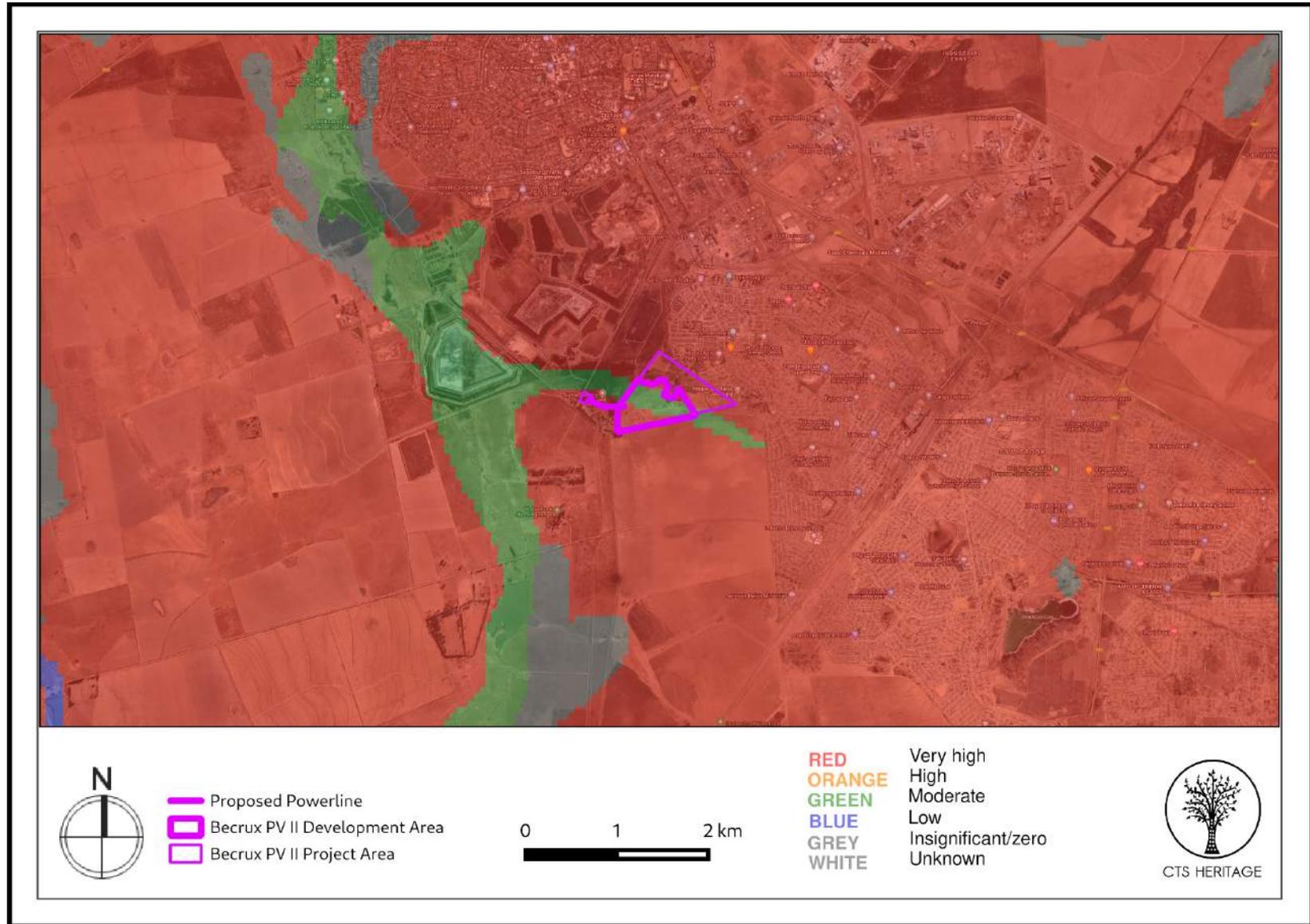
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Map 2.2: Spatialisation of heritage resources known in proximity to the broader study area



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Map 3.1: Palaeontological sensitivity of the area surrounding the broader study area

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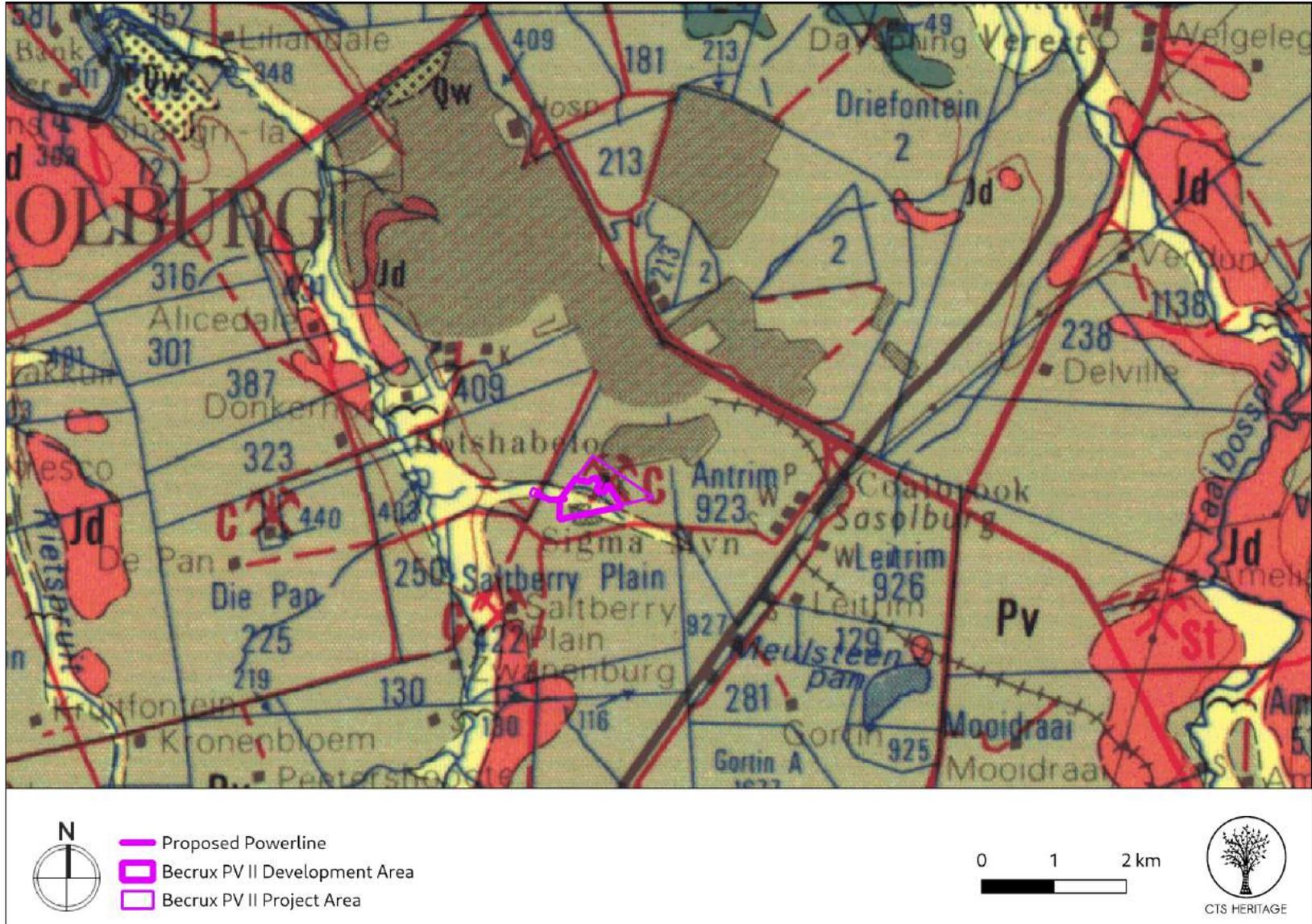


Figure 3.2. Geology Map. Extract from the CGS 2626 West Rand Map indicating that the development area is underlain by the following sediments: Jd: Jurassic Dolerite and Pv: Vryheid Formation of the Ecca Group and Quaternary Sands



3.2 Palaeontology

According to the SAHRIS Palaeosensitivity Map (Figure 4a), the area proposed for development is underlain by sediments of very high and moderate palaeontological sensitivity. According to the extract from the CGS 2626 West Rand Map, the moderately sensitive sediments underlying the development area are ascribed to Quaternary Sands. The very highly sensitive sediments are ascribed to the Vryheid Formation of the Ecca Group. According to a letter from Bamford (2019, SAHRIS ID 522976), the Vryheid Formation contains coal seams and fossil plant impressions of the *Glossopteris* flora. Bamford (2019) goes on to note that the coal seams in the Sigma Colliery are more than 150m below the surface and they are covered by mostly dolerite with some sandstone and sandstone intercalated with shale. There is no chance, therefore, of surface activities in this vicinity having any impact on palaeontology. Based on the information available, it is very unlikely that the proposed development of the 10MWac PV facility will negatively impact on significant palaeontological heritage; however it was recommended by Bamford (2019) in her letter that a Chance Fossil Finds Procedure be adopted. This recommendation is reiterated for this project.



4. IDENTIFICATION OF HERITAGE RESOURCES

4.1 Summary of findings of Specialist Reports

Archaeology (Appendix 1)

No heritage resources were identified during the survey. The proposed development footprint has been disturbed by various mining and agricultural activities. The Becrux Two Solar PV Facility development area is predominantly waterlogged towards the middle of the area, with scattered heaps of building rubble. The proposed development area has sections that are inaccessible due to the recent heavy rains, and the vegetation is very dense, obscuring the visibility of surface areas. However, the team is confident that no heritage resources of significance are located within the development area.

It was, however, noted that a small-scale subsistence farm and sports stadium located within the Becrux Two Solar PV Facility development area are currently in use by community members. This should be taken into consideration as the area may be of social significance to the surrounding community however it is noted that the project footprint is located outside of the footprint of the stadium.

Palaeontology (Appendix 2)

The proposed site lies on the palaeontologically very highly sensitive rocks of the Vryheid Formation (Ecca Group, Karoo Supergroup) that could potentially preserve impression fossils of the Glossopteris flora. The site visit confirmed that there were NO FOSSILS visible on either site or along the route for the grid connection.

4.2 Heritage Resources identified

No heritage resources of archaeological or palaeontological significance were identified within the development area proposed for the Becrux Two Solar PV Facility Project.



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Figure 4.1 Views of Becrux Two Solar PV Facility from the south



Figure 4.2 Views of Becrux Two Solar PV Facility from the north



Figure 4.3 Views of Becrux Two Solar PV Facility from the east



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Figure 4.3 Views of Becrux Two Solar PV Facility from the south



Figure 4.4 Views of Becrux Two Solar PV Facility from the south



Figure 4.4 Views of Becrux Two Solar PV Facility grid connection corridor towards the west.



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5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

5.1 Assessment of impact to Heritage Resources

Based on the desktop assessment completed, it was noted that although the areas proposed for the development of the Becrux Two Solar PV Facility have been extensively previously disturbed, significant archaeological heritage is known from the broader area and as such, it is possible that the proposed development may negatively impact on similar archaeological heritage.

The archaeological field assessment completed did not identify any archaeological or other heritage resources of significance within the areas proposed for development. As such, it is very unlikely that the proposed development will impact significant archaeological heritage.

It was, however, noted that a small-scale subsistence farm and sports stadium located within the Becrux Two Solar PV Facility development area are currently in use by community members. This should be taken into consideration as the area may be of social significance to the surrounding community. This must be addressed in the SIA completed for the project.

Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks are the correct age and type to contain fossils, however, no fossils were seen on the surface and there were no rocky outcrops that could preserve fossils. Since there is a small chance that fossils from the Vryheid Formation could occur below the surface and may be disturbed, a Fossil Chance Find Protocol has been added to this report. Taking account of the defined criteria, the potential impact to fossil heritage resources is extremely low.



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Table 4.1: Impacts of the proposed development on archaeological resources

NATURE: It is possible that buried archaeological resources may be impacted by the proposed development in the preferred location			
		Without Mitigation	With Mitigation
MAGNITUDE	L(1)	No archaeological resources were identified within the development area	L(1) No archaeological resources were identified within the development area
DURATION	H (5)	Where manifest, the impact will be permanent.	H (5) Where manifest, the impact will be permanent.
EXTENT	L (1)	Limited to the development footprint	L (1) Limited to the development footprint
PROBABILITY	L (1)	It is unlikely that significant archaeological resources will be impacted	L (1) It is unlikely that significant archaeological resources will be impacted
SIGNIFICANCE	L	(1+5+1)x1 = 7	L (1+5+1)x1 = 7
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?	L	Not Likely	L Not Likely
CAN IMPACTS BE MITIGATED		Yes	
MITIGATION:			
<ul style="list-style-type: none"> Should any previously unrecorded archaeological resources or possible burials be identified during the course of construction activities, work must cease in the immediate vicinity of the find, and SAHRA must be contacted regarding an appropriate way forward. 			
RESIDUAL RISK:			
None			



Table 4.2: Impacts of the proposed development to palaeontological resources

NATURE: It is possible that buried palaeontological resources may be impacted by the proposed development in the preferred location				
		Without Mitigation		With Mitigation
MAGNITUDE	L (1)	According to the SAHRIS Palaeosensitivity Map (Figure 4), the area proposed for development of the PV facilities is underlain by sediments that have very high palaeontological sensitivity. However, no palaeontological heritage resources were identified in the field assessment.	L (1)	According to the SAHRIS Palaeosensitivity Map (Figure 4), the area proposed for development of the PV facilities is underlain by sediments that have very high palaeontological sensitivity. However, no palaeontological heritage resources were identified in the field assessment.
DURATION	H (5)	Where manifest, the impact will be permanent.	H (5)	Where manifest, the impact will be permanent.
EXTENT	L (1)	Limited to the development footprint	L (1)	Limited to the development footprint
PROBABILITY	L (1)	It is unlikely that significant fossils will be impacted	L (1)	It is unlikely that significant fossils will be impacted
SIGNIFICANCE	H	(1+5+1)x1=7	H	(1+5+1)x1=7
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	Unlikely	L	Not Likely
CAN IMPACTS BE MITIGATED		Yes		
MITIGATION:				
<ul style="list-style-type: none"> The attached Chance Fossil Finds Procedure must be implemented for the duration of construction activities Should any previously unrecorded palaeontological resources be identified during the course of construction activities, work must cease in the immediate vicinity of the find, and SAHRA must be contacted regarding an appropriate way forward. 				
RESIDUAL RISK:				
None				

5.2 Sustainable Social and Economic Benefit

In terms of socio-economic benefits associated with the project, the development of the facility will enhance the competitiveness and therefore the sustainability of Sasol Limited’s operations by reducing energy costs and reliance on the Eskom grid power. In terms of environmental impact, it will result in a reduction of GHG emissions, thereby supporting government commitments made in the Paris Accord and contribute to a healthier environment in South Africa. Additionally, it will generate up to 150 employment opportunities (short-term) during the construction period and up to 10 permanent employment opportunities during the operation period, with priority placed on local recruitment.

Based on the available information, the anticipated socio-economic benefits of the proposed development of the 10MW PV Facility outweigh the anticipated impacts to heritage resources on condition that all of the recommendations included below in section 8 are implemented.

5.3 Proposed development alternatives

The client is no longer considering the assessment of two sites and as such, besides technology alternatives, no other alternatives (be it location, layout or activity alternatives) are considered and assessed as part of this project.

5.4 Cumulative Impacts

In terms of cumulative impacts, there is only one renewable energy facility within 30km of the proposed site. It may also be important to note that the site is located within an area that has been disturbed by numerous mining and industrial activities, as well as residential areas.

The preferred area proposed for development is located within an area that has been previously impacted by the development of the Sigma Mine. As such, it is not anticipated that the proposed PV development will have a negative cumulative impact on the broader landscape which is already dominated by mining infrastructure and agriculture. In terms of renewable development activities which can have an industrial feel, it is recommended that such infrastructure be grouped or clustered to avoid sprawl across natural landscapes.

Table 5: Cumulative Impact Table

NATURE: Cumulative Impact to the sense of place and known archaeological resources				
		Overall impact of the proposed project considered in isolation		Cumulative impact of the project and other projects in the area
MAGNITUDE	L (4)	Low	M (5)	Moderate
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	$(4+3+1) \times 2 = 16$	L	$(5+4+1) \times 3 = 30$
STATUS		Neutral		Neutral
REVERSIBILITY	H	High	L	Low
IRREPLACEABLE LOSS OF RESOURCES?	L	Unlikely	L	Possible
CAN IMPACTS BE MITIGATED		NA		NA
CONFIDENCE IN FINDINGS: High				
MITIGATION: None				



6. RESULTS OF PUBLIC CONSULTATION

The public consultation process will be undertaken by the EAP during the EIA. No heritage-related comments have been received to-date. SAHRA is required to comment on this HIA and make recommendations prior to the granting of the Environmental Authorisation.

7. CONCLUSION

The desktop assessment completed for this project indicated that it was likely that significant archaeological and palaeontological heritage could be impacted by the proposed development. However, the ground-truthing process for both archaeology and palaeontology identified no archaeological or palaeontological resources of heritage significance within the area proposed for development.

Based on the outcomes of this assessment, it is very unlikely that the proposed development will negatively impact on significant archaeological and palaeontological heritage and as such there is no objection to the proposed development on heritage grounds.

While the risk of impact to significant palaeontology is low, the possibility remains due the high levels of palaeontological sensitivity of the underlying stratigraphy. As such, it is recommended that the attached Chance Fossil Finds Procedure be implemented for the duration of construction activities.

8. RECOMMENDATIONS

There is no objection to the proposed development of the proposed Becrux Two Solar PV Facility and its associated infrastructure on condition that:

- The attached Chance Fossil Finds Procedure must be implemented for the duration of construction activities
- Should any previously unrecorded archaeological resources or possible burials be identified during the course of construction activities, work must cease in the immediate vicinity of the find, and SAHRA must be contacted regarding an appropriate way forward.



CTS HERITAGE

9. REFERENCES

Heritage Impact Assessments				
Nid	Report Type	Author/s	Date	Title
6011	AIA Phase 1	Johnny Van Schalkwyk, M Naude	01/11/1996	A Survey of Cultural Resources in the Proposed Sigma Colliery North West Strip Mine, Sasolburg District, Free State Province
6014	AIA Phase 1	Cobus Dreyer	10/06/2005	First Phase Archaeological and Cultural Heritage Assessment of the Proposed Residential Developments at Amelia 518, Sasolburg
6015	AIA Phase 1	Karen Van Ryneveld	23/10/2007	Mooibraai Township Establishment (Zamdela Ext. 17), Portions of Portion 1 and the Remainder of the Farm Mooibraai 44, Sasolburg, Free State, South Africa
6016	AIA Phase 1	Polke Birkholtz	15/02/2008	Phase 1 Heritage Impact Assessment Proposed Lefapha Housing Development Situated on the Remaining Extent of the Farm Leitrim 926, Metsimaholo Local Municipality, Free State Province
7870	AIA Phase 1	Julius CC Pistorius	01/07/2008	A Phase I Heritage Impact Assessment Study for Sasol's Proposed New Gas and Liquid Pipelines (Along a Corridor) from Sasol Synfuels in Secunda (Mpumalanga) to Sasol Infrachem and Natref in Sasolburg (Free State) on the Highveld in the Republic of South Af
158942	Heritage Statement	Shahzaadee Karodia Khan, Johan Nel		HERITAGE STATEMENT FOR THE SASOL MINING SIGMA COLLIERY ASH BACKFILLING PROJECT, SASOLBURG, FREE STATE PROVINCE
177559	Heritage Statement	Justin du Piesanie	03/10/2014	
324834	Heritage Impact Assessment Specialist Reports	Natasha Higgitt, Justin du Piesanie	27/07/2015	Heritage Watching Brief Report for the Sasol Sigma Mooikraal 7Mâ,“ Pipeline

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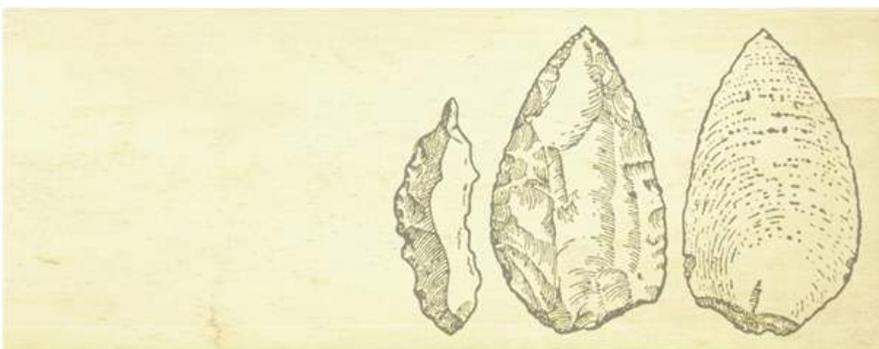
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APPENDICES



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APPENDIX 1: Archaeological Assessment 2022



PHASE 1 AIA FIELD REPORT

PROPOSED DEVELOPMENT OF A SOLAR PHOTOVOLTAIC (PV) ENERGY FACILITY AND ASSOCIATED INFRASTRUCTURE WITH A GENERATION CAPACITY OF UP TO 10MW, LOCATED NEAR SASOLBURG, IN THE METSIMAHOLO LOCAL MUNICIPALITY, FEZILE DABI DISTRICT MUNICIPALITY FREE STATE PROVINCE.

PREPARED FOR:
CTS HERITAGE

PREPARED BY:
HEIDI FIVAZ
UBIQUE HERITAGE CONSULTANTS

16 FEBRUARY 2022

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Declaration of independence:

UBIQUE Heritage Consultants hereby confirm our independence as heritage specialists and declare that:

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



Signed:

J.A.C. Engelbrecht, H. Fivaz
UBIQUE Heritage Consultants

Date: 2022-02-16

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SUMMARY OF SPECIALIST EXPERTISE

HEIDI FIVAZ

CRM ARCHAEOLOGIST &
OBJECT CONSERVATOR

Heidi Fivaz has been a part of UBIQUE Heritage Consultants since 2016 and took over ownership in 2018. She is responsible for project management, surveys, research and report compilation. She holds a B.Tech. Fine Arts degree (2000) from Tshwane University of Technology, a BA Culture and Arts Historical Studies degree (2012) from UNISA and received her BA (Hons) Archaeology in 2015 (UNISA). She has received extensive training in object conservation from the South African Institute of Object Conservation and specialises in glass and ceramics conservation. She is also a skilled artefact and archaeological illustrator. Ms Fivaz was awarded her MA in Archaeology (with distinction) in 2021 by the University of South Africa (UNISA), focusing on historical and industrial archaeology. She is a professional member of the Association of South African Archaeologists with CRM accreditation and has worked on numerous archaeological excavation and surveying projects over the past ten years.

SKY-LEE FAIRHURST

ARCHAEOLOGIST

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

EXECUTIVE SUMMARY

Project description

CTS Heritage appointed UBIQUE Heritage Consultants as independent heritage specialists per Section 38 of the NHRA and the National Environmental Management Act 107 of 1998 (NEMA) to conduct a field survey on their behalf. UBIQUE surveyed the development footprint to determine the impact of the proposed development of a Solar Photovoltaic (Pv) energy facility and associated infrastructure on any sites, features, or objects of cultural heritage significance. The project is located near Sasolburg, in the Metsimaholo Local Municipality, Fezile Dabi District Municipality Free State Province,

Findings and Impact on Heritage Resources

No heritage resources were identified during the survey. The proposed development footprint has been disturbed by various mining and agricultural activities. Sigma Pv Site 1 is predominantly waterlogged towards the middle of the area, with scattered heaps of building rubble. Sigma Pv Site 2 has been cultivated in the past. Both Sigma Pv Sites 1 and 2 have impassable areas due to the recent heavy rains, and the vegetation is very dense, obscuring the visibility of surface areas. These conditions may have concealed heritage resources, though we are confident that the anthropogenic disturbances in the area would have disturbed any in-situ heritage resources if present. Therefore, we do not foresee any impact on heritage resources, and from an archaeological viewpoint, the development can continue.

Recommendations

Based on the assessment of the potential impact of the development on the identified heritage, the following recommendations are made, taking into consideration any existing or potential sustainable social and economic benefits:

1. No significant heritage sites or features were identified within the surveyed sections of the areas earmarked for agricultural developments. Therefore the proposed development can continue.
2. Although all possible care has been taken to identify sites of cultural importance during the investigation of study areas, it is always possible that hidden or sub-surface sites could be overlooked during the assessment, especially considering the environmental conditions encountered during the survey. Therefore, we recommend that a Protocol of Finds accompany the Heritage Impact Assessment to assist the ECO in managing any archaeological resources uncovered during development.

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1. INTRODUCTION

1.1 Scope of study

The project involves the proposed development of a 10MW ac Solar Photovoltaic (PV) Energy Facility and associated infrastructure on Portion 1 of the Farm Saltberry Plain 137 and the Remaining Extent of the Farm Zamdela 449, and Portion 7 of Roseberry Plain No. 250 located near Sasolburg in the Metsimaholo Local Municipality, which forms part of the Fezile Dabi District Municipality in the Free State Province. UBIQUE Heritage Consultants were appointed by CTS Heritage as independent heritage specialists per the National Environmental Management Act 107 of 1998 (NEMA), and in compliance with Section 38 of the National Heritage Resources Act 25 of 1999 (NHRA), to conduct a cultural heritage assessment field survey (AIA/HIA) of the development area.

Becrux Solar PV Project One (Pty) Ltd's project purpose will be to generate electricity for exclusive use by Sasol Limited. A 33kV overhead power line will be established to connect the proposed 33kV onsite MV substation to the existing Sigma Substation to facilitate the evacuation of the generated power to Sasol Limited. Two alternative sites (i.e., Site Alternative 1 and Site Alternative 2) have been identified to place the solar facility infrastructure. For each site, grid connection corridors have been identified for the assessment and suitable placement of the grid connection infrastructure within the corridor. For Site Alternative 1, the grid connection corridor will be up to 200m wide, extending to ~400m around the footprint of the Sigma substation, and up to 500m long. For Site Alternative 2, the grid connection corridor will be up to 70m wide, extending up to ~400m around the footprint of the existing Sigma Substation, and up to 2.1km long.

The field assessment aimed to identify and report heritage resources within the development footprint. Furthermore, it aims to determine the impact of the proposed development on any sites, features, or objects of cultural heritage significance; to assess the significance of any identified resources; and to assist the developer in managing the documented heritage resources in an accountable manner, within the framework provided by the National Heritage Resources Act (Act 25 of 1999) (NHRA).

South Africa's heritage resources are rich and widely diverse, encompassing sites from all periods of human history. Resources may be tangible, such as buildings and archaeological artefacts, or intangible, such as landscapes and living heritage. Their significance is based on their aesthetic, architectural, historical, scientific, social, spiritual, linguistic, economic or technological values; their representation of a time or group; their rarity; and sphere of influence.

Natural (e.g. erosion) and human (e.g. development) activities can jeopardise the integrity and significance of heritage resources. In the case of human activities, a range of legislation exists to ensure the timely and accurate identification and effective management of heritage resources for present and future generations.

1.2 Assumptions and limitations

It is assumed that the client's description of the proposed project is accurate as provided by the client. Furthermore, it is assumed that the public consultation process undertaken as part of the Environmental Impact Assessment (EIA) is comprehensive and does not have to be repeated as part of the heritage impact assessment.

All possible care has been taken during the comprehensive field survey to identify sites of cultural importance within the development areas. However, it is essential to note that some heritage sites may have been missed due to their subterranean nature or dense vegetation cover. No subsurface investigation (i.e. excavations or sampling) was undertaken since a SAHRA permit is required for such activities. Therefore, should any heritage features and/or objects such as architectural features, stone tool scatters, artefacts, human remains, or fossils be uncovered or observed during construction, operations must be stopped, and a qualified archaeologist contacted for an assessment of the find. Observed or located heritage features and/or objects may not be disturbed or removed in any way until such time that the heritage specialist has been able to assess the significance of the site (or material) in question.



2. FIELD ASSESSMENT

2.1 Methodology

2.1.1 Systematic survey

A systematic survey of the proposed project area to locate, identify, record, photograph, and describe archaeological, historical or cultural interest sites were completed.

UBIQUE Heritage Consultants inspected the proposed development corridors and surrounding areas on the 11th of February, 2022. The areas surveyed for the impact assessment were dictated by the Google Earth maps of the development footprints provided by the client and the Heritage Screener compiled by CTS Heritage. Sigma Pv Alternative Site 1 was surveyed by a two-person team from the east to the north and southeast to the southwest. In addition, the connection corridor of Alternative 1 was surveyed to where it continued into the Sigma substation. The connection corridor to Sigma Pv Alternative Site 2 was followed from the Sigma substation in the east until the way became blocked by deep pools of stagnant water from recent rains. The rest of the connection corridor was approached from the west, from the Sigma Pv Alternative Site 2 boundary. Alternative 2 was surveyed from the northern, eastern and western site boundaries. The site was extremely overgrown with tall and dense grasses and cosmos plants.

We inspected the ground's surface, wherever the surface was visible. The archaeological survey was done with no substantial attempt to clear brush, sand, deadfall, leaves or other material that may cover the surface and with no attempt to look beneath the surface beyond the inspection of rodent burrows, cut banks and other exposures fortuitously observed.

2.1.2 Recording significant areas

GPS points of significant areas were recorded with handheld Garmin global positioning units (Garmin eTrex 10) and the Android Locus Maps application on a Samsung smartphone. Photographs were taken with a Panasonic Lumix digital camera. Detailed field notes were taken to describe observations (Appendix B).

2.1.3 Determining significance

Levels of the significance of the various types of heritage resources observed and recorded in the project area have been determined according to criteria set out in Appendix A.

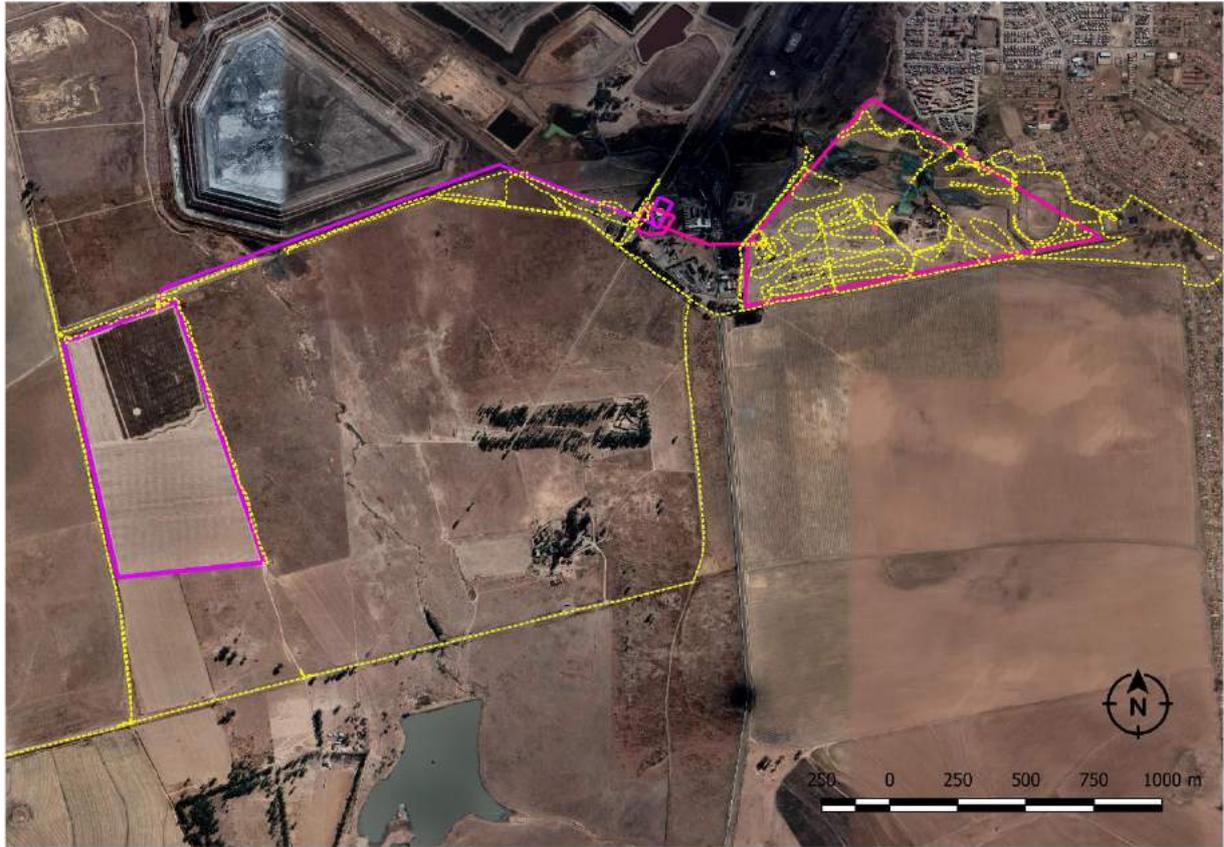


Figure 1 Recorded tracks of the survey along the proposed development footprint

2.2 Description of the affected environment

2.2.1 Sigma Pv Site Alternative 1 with connection corridor

The landscape of the study area is Central Free State Grassland, which is a broad vegetation zone from Sasolburg in the north to Dewetsdorp in the south. Other significant settlements within this unit include Kroonstad, Ventersburg, Steynsrus, Winburg, Lindley and Edenville. The Central Free State Grassland features undulating plains supporting short grassland, which in its natural condition is dominated by red grass (red oat grass) while weeping lovegrass and blue lovegrass become dominant in degraded habitats (Mucina & Rutherford 2006, SANBI 2022).

The site footprint is predominantly grassland with rushes and reeds towards the middle and west, along the waterline. Due to the recent rainfall, the area was very muddy, with dark, clayey soil and, in some areas, deep pools of stagnant water. There are mounds of rubble, with tar and concrete blocks and bricks and tiles in the northern parts of the terrain. To the southeast is a dilapidated sports stadium, still in use, even though the infrastructure has been broken down and used as an informal shelter. In the south, a small-scale subsistence farm is situated. Towards the southwest of the footprint is a series of modern cement foundations with building rubble. Historical imagery

on Google Earth shows that the structures in this area were demolished in 2017. The whole area is further utilised for grazing, as cows, goats, and pigs were encountered. The connection corridor runs through highly disturbed industrial Sasol grounds.



Figure 2. Views of Alternative Site 1 from the north.



Figure 3. Views of Alternative Site 1 from the east.



Figure 4. Views of Alternative Site 1 from the south.



Figure 5. Views of Alternative Site 1 connection corridor towards the west.

2.2.2 Sigma Pv Site Alternative 2 with connection corridor

The Site Alternative 2 landscape is predominantly Central Free State Grassland bordering Soweto Highveld Grassland in the west. Soweto Highveld Grassland is characterised by short to medium-high, dense, tufted grassland. It is dominated almost entirely by red grass and accompanied by various other grasses such as wiregrass, narrow heart lovegrass, spear grass, and hairy trident grass (Mucina & Rutherford 2006, SANBI 2022).

The site footprint is currently densely overgrown with grass types and cosmos plants. Google Earth historical imagery shows the area has been consistently cultivated for crops over the last decade at least. The connection corridor straddles the fence between the mining area and open veldt. Excavation mounds from mining activity and heavy vehicle use are visible to the corridor's north. Crushed building rubble like concrete, bricks and the remains of bathroom tiles and plumbing fixtures are present along the dirt road that follows the corridor's trajectory. Similar to Pv Site Alternative 1, the route of the connection corridor to Site 2 was waterlogged along waterlines and lower-lying areas at the time of the field visit due to recent rains.



Figure 6. Views of Alternative Site 2 from the southern and northwestern corners of the footprint.



Figure 7. Views of the connection corridor from Alternative Site 2 towards the northeast.



Figure 8. Views of the connection corridor from Alternative Site 2 towards the Sigma substation.

2.3 Archaeological resources identified

2.3.1 Heritage resources within the development corridor

No archaeological resources were recorded on the two alternative site footprints or connection corridors.

2.3.2 Other

On the development footprint of Alternative Site 1, the small-scale subsistence farm and the sports stadium are areas currently in use by community members. Therefore, they should be taken into consideration as areas of some significance to the surrounding community.

3. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

Description	Development Impact		Mitigation	Field rating/ Significance
1. No archaeological, cultural, or intangible heritage resources were recorded.	Nature	N/A	No mitigation required	N/A
	Extent	N/A		
	Duration	N/A		
	Intensity	N/A		
	Potential of impact on irreplaceable resource	N/A		
	Consequence	N/A		
	Probability of impact	N/A		
	Significance	N/A		

4. RECOMMENDATIONS AND CONCLUSIONS

No heritage resources were identified during the survey. The proposed development footprint has been disturbed by various mining and agricultural activities. Sigma Pv Site 1 is predominantly waterlogged towards the middle of the area, with scattered heaps of building rubble. Sigma Pv Site 2 has been cultivated in the past. Both Sigma Pv Sites 1 and 2 have impassable areas due to the recent heavy rains, and the vegetation is very dense, obscuring the visibility of surface areas. These conditions may have concealed heritage resources, though we are confident that the anthropogenic disturbances in the area would have disturbed any in-situ heritage resources if

present. Therefore, we do not foresee any impact on heritage resources, and from an archaeological viewpoint, the development can continue.

Recommendations

Based on the assessment of the potential impact of the development on the identified heritage, the following recommendations are made, taking into consideration any existing or potential sustainable social and economic benefits:

1. No significant heritage sites or features were identified within the surveyed sections of the areas earmarked for agricultural developments. Therefore the proposed development can continue.
2. Although all possible care has been taken to identify sites of cultural importance during the investigation of study areas, it is always possible that hidden or sub-surface sites could be overlooked during the assessment, especially considering the environmental conditions encountered during the survey. Therefore, we recommend that a Protocol of Finds accompany the Heritage Impact Assessment to assist the ECO in managing any archaeological resources uncovered during development.
3. If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (Natasha Higgitt/Phillip Hine 021 462 5402) must be alerted as per section 35(3) of the NHRA.
4. If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Mimi Seetelo 012 320 8490) must be alerted immediately as per section 36(6) of the NHRA. Depending on the nature of the finds, a professional archaeologist or palaeontologist must be contacted as soon as possible to inspect the findings. If the newly discovered heritage resources prove archaeological or palaeontological significance, a Phase 2 rescue operation may be required, subject to permits issued by SAHRA.

5. REFERENCES

- Mucina, L. & Rutherford, M.C. (eds) 2006. *The vegetation of South Africa, Lesotho and Swaziland*. Strelitzia 19. SANBI: Pretoria.
- SANBI 2022. *South African National Biodiversity Institute, Biodiversity GIS*. <http://bgisviewer.sanbi.org/> (Accessed 2022-02-15).

APPENDIX A

Determining significance and development impact

Heritage resources are considered of value if the following criteria apply:

a.	It is important in the community or pattern of South Africa's history;
b.	It has uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
c.	It has the potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
d.	It is vital in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
e.	It exhibits particular aesthetic characteristics valued by a community or cultural group;
f.	It is essential in demonstrating a high degree of creative or technical achievement at a particular period;
g.	It has a strong or unique association with a particular community or cultural group for social, cultural or spiritual reasons;
h.	It has a strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa;
i.	It is of significance relating to the history of slavery in South Africa.

Levels of significance of the various types of heritage resources observed and recorded are determined by the following criteria:

CULTURAL & HERITAGE SIGNIFICANCE	
LOW	A cultural object found out of context, not part of a site or without any related feature/structure in its surroundings.
MEDIUM	Any site, structure or feature is regarded as less important due to several factors, such as date, frequency and uniqueness. Likewise, any important object found out of context.
HIGH	Any site, structure or feature is regarded as important because of its age or uniqueness. Graves are always categorised as of a high importance. Likewise, any important object found within a specific context.

Field Ratings or Gradings are assigned to indicate the level of protection required and who is responsible for national, provincial, or local protection.

FIELD RATINGS & GRADINGS	
National Grade I	Heritage resources with exceptional qualities to the extent that they are of national significance and should therefore be managed as part of the national estate.
Provincial Grade II	Heritage resources with qualities provincial or regional importance, although it may form part of the national estate, it should be managed as part of the provincial estate.
Local Grade IIIA	Heritage resources are of local importance and worthy of conservation. Therefore, it should be included in the heritage register and not be mitigated (high significance).
Local Grade IIIB	Heritage resources are of local importance and worthy of conservation. Therefore, it should be included in the heritage register and mitigated (high/ medium significance).
General Protection Grade IVA	The site/resource should be mitigated before destruction (high/ medium significance).
General protection Grade IVB	The site/resource should be recorded before destruction (medium significance).
General protection Grade IVC	Phase 1 is considered as sufficient recording, and it may be demolished (low significance).

A heritage resource impact may be defined broadly as the net change, either beneficial or adverse, between the integrity of a heritage site with and without the proposed development. Beneficial impacts occur wherever a proposed development actively protects, preserves, or enhances a heritage resource by minimising natural site erosion or facilitating non-destructive public use. More commonly, development impacts are of an adverse nature and can include:

- destruction or alteration of all or part of a heritage site;
- isolation of a site from its natural setting; and / or
- introduction of physical, chemical or visual elements out of character with the heritage resource and its setting.

Beneficial and adverse impacts can be direct or indirect and cumulative, as implied by the examples. Although indirect impacts may be more difficult to foresee, assess and quantify, they must form part of the assessment process. Therefore, the following assessment criteria have been used to assess the impacts of the proposed development on possible identified heritage resources:

CRITERIA	RATING SCALES	NOTES
Nature	POSITIVE	An evaluation of the type of effect the construction, operation and management of the proposed development would have on the heritage resource.
	NEGATIVE	
	NEUTRAL	
Extent	LOW	Site-specific affects only the development footprint.
	MEDIUM	Local (limited to the site and its immediate surroundings, including the surrounding towns and settlements within a 10 km radius);
	HIGH	Regional (beyond a 10 km radius) to national.
Duration	LOW	0-4 years (i.e. duration of construction phase).
	MEDIUM	5-10 years.
	HIGH	More than 10 years to permanent.
Intensity	LOW	Where the impact affects the heritage resource in such a way that its significance and value are minimally affected.
	MEDIUM	Where the heritage resource is altered, and its significance and value are measurably reduced.
	HIGH	Where the heritage resource is altered or destroyed to the extent that its significance and value cease to exist.
Potential for impact on irreplaceable resources	LOW	No irreplaceable resources will be impacted.
	MEDIUM	Resources that will be impacted can be replaced, with effort.
	HIGH	There is no potential for replacing a particular vulnerable resource that will be impacted.
Consequence	LOW	A combination of any of the following: <ul style="list-style-type: none"> Intensity, duration, extent and impact on irreplaceable resources are all rated low. Intensity is low and up to two of the other criteria are rated medium. - Intensity is medium, and all three other criteria are rated low.
	MEDIUM	Intensity is medium, and at least two of the other criteria are rated medium.
	HIGH	Intensity and impact on irreplaceable resources are rated high, with any combination of extent and duration. Intensity is rated high, with all the other criteria being rated medium or higher.
Probability (the likelihood of the impact occurring)	LOW	It is highly unlikely or less than 50 % likely that an impact will occur.
	MEDIUM	It is between 50 and 70 % certain that the impact will occur.
	HIGH	It is more than 75 % certain that the impact will occur, or it is definite that the impact will occur.

CRITERIA	RATING SCALES	NOTES
Significance (all impacts including potential cumulative impacts)	LOW	Low consequence and low probability. Low consequence and medium probability. Low consequence and high probability.
	MEDIUM	Medium consequence and low probability. Medium consequence and medium probability. Medium consequence and high probability. High consequence and low probability.
	HIGH	High consequence and medium probability. High consequence and high probability.

APPENDIX B



FIELD NOTES

Phase 1 Archaeological/Heritage Impact Assessment

Site ID: SIGMA PV1 & SIGMA PV2, Sasolburg, Free State Province

Phase 1 survey conducted				
CRM Archaeologist	Heidi Fivaz	Date/s	2022-02-11	
Additional surveyors	Sky-Lee Fairhurst			
Type of survey	Pedestrian/Vehicular	Transects	Dictated by landscape	
Technical equipment	GPS	Locus App, Garmin E-Trex10	Camera	Panasonic Lumix

PROJECT PARTICULARS

Technical information

Project description	
Project name	CTS21_283 Savannah Sigma PV Sasolburg
Description	Proposed development of a solar photovoltaic (PV) energy facility and associated infrastructure with a generation capacity of up to 10MW, located near Sasolburg in the Free State Province.
Developer	
Becrux Solar	
Development type	Solar Power Infrastructure
Consultants	
Environmental	Savannah
Heritage and archaeological	CTS (Fieldwork by UBIQUE Heritage Consultants)
Paleontological	
Property details	
Province	Free State
District municipality	Fezile Dabi District Municipality
Local municipality	Metsimaholo Local Municipality

Topo-cadastral map	1: 50 000 2627DD
Farm name	Portion 1 of the Farm Saltbery Plain 137 and the Remaining Extent of the Farm Zamdela 449
Closest town	Sasolburg
GPS Co-ordinates	Alt 1: 26° 50'52.74"S 27° 50'22.45"E Alt 2: 26° 51'29.22"S 27° 48'46.81"E
Property size	
Development footprint size	
Land use	
Previous	Agriculture
Current	Agriculture and mining
Rezoning required	No
Sub-division of land	No
Development criteria in terms of Section 38(1) NHRA	
	Yes/No
Construction of a road, wall, power line, pipeline, canal or other linear forms of development or barrier exceeding 300m in length.	Yes
Construction of bridge or similar structure exceeding 50m in length.	No
Construction exceeding 5000m ² .	Yes
Development involving three or more existing erven or subdivisions.	No
Development involving three or more erven or divisions that have been consolidated within the past five years.	No
Rezoning of site exceeding 10 000m ² .	No
Any other development category, public open space, squares, parks, recreation grounds.	No

GENERAL ENVIRONMENT, INFRASTRUCTURE AND LANDSCAPE

Site description

Description of the general area affected by development
Type of environment
Sigma Pv site 1: Grassland. Sigma Pv site 2: Grassland.
Terrain description
Alternative Site 1: Empty field in an urban environment with building rubble, rubbish, grazing animals. Connection corridor 1: Industrial terrain, coal mounds. Alternative Site 2: Overgrown previously cultivated/ploughed land. Connection corridor 2: Disturbed grassland, mining activity disturbances, old tar road.
Geology
Visible dolerite towards the centre of Alternative Site 1.
Vegetation
Very dense vegetation, knee-height and taller in both alternatives.
Waterways/sources
Alternative Site 1: small tributary flowing from northwest to northeast, waterlogged marshy area towards the middle. Most of the footprint is muddy with stagnant water pools due to recent rains.

Alternative Site 2: one tributary and marshy area across the connection corridor, approx. 0.49 km east from site 2.	
Site boundaries	
Alternative Site 1: Houses to the north-southeast, donga and open field to the south, mining to the northwest, Sigma to the west.	
Alternative Site 2: Mining to the north, open field to the east and south, dirt road to the west.	
Site access	GPS Co-ordinates
Alternative Site 1: access from the northeast	26° 50' 44.71" S 27° 50' 35.13" E
Alternative Site 2 access from the west	26° 51' 07.27" S 27° 48' 32.00" E
Disturbances	
Natural erosion	Flooding
Human-made	Demolition of structures, rubbish dumping, mining, possible over-grazing
Notes	
The whole area within the development footprints show signs of disturbance.	

Environmental recording

See photographs

HERITAGE RESOURCES RECORDING

Stone Age Resources Identified

Point ID & Site #	Photo #	Description	Period	Location	Field rating/ Significance/ Recommended Mitigation
NONE RECORDED		Type lithic/s			
		Raw material			
		N in m ² .			
		Context			
		Additional			

Historical Period Resources Identified

Point ID & Site #	Photo #	Description	Period	Location	Field rating/ Significance/ Recommended Mitigation
NONE RECORDED		Type of feature			No Mitigation Required
		Material			

		N in m ² .				
		Context				
		Additional				

Iron Age/ Agri-pastoral Early Farming Communities Resources Identified

Point ID & Site #	Photo #	Description	Period	Location	Field rating/ Significance/ Recommended Mitigation
NONE RECORDED		Type of feature			
		Material			
		N in m ² .			
		Context			
		Additional			

Graves Identified

Point ID & Site #	Photo #	Description	Period	Location	Field rating/ Significance/ Recommended Mitigation
NONE RECORDED		Grave markers			
		Inscription			
		Graves' Orientation			
		Dimensions/ Extent			
		Additional			

Intangible Heritage Resources/ Cultural Landscape Identified

Point ID & Site #	Photo #	Description	Period	Location	Field rating/ Significance/ Recommended Mitigation
NONE RECORDED		Nature			
		Cultural evidence			
		Access			
		Affected community			
		Additional			

IDENTIFIED HERITAGE RESOURCES DISCUSSION

Specialist comments

Stone Age finds
N/A
Iron Age/ Agri-pastoralist Early Farming communities finds
N/A
Historical finds
N/A
Identified graves
N/A
Intangible Heritage/ Cultural Landscape
N/A
Other
Sports stadium currently still being used by the community. 26° 50'51.35"S; 27° 50'42.98"E
Small-scale subsistence farm. 26° 50'53.36"S; 27° 50'27.00"E

IDENTIFIED HERITAGE RESOURCES MITIGATION

Specialist recommendations

Stone Age finds
Due to the dense vegetation and recent rains obscuring the surface of the study areas, we recommend a Protocol of Finds for the development.
Iron Age/ Agri-pastoralist Early Farming communities finds
Due to the dense vegetation and recent rains obscuring the surface of the study areas, we recommend a Protocol of Finds for the development.
Historical finds
Due to the dense vegetation and recent rains obscuring the surface of the study areas, we recommend a Protocol of Finds for the development.
Identified graves
Due to the dense vegetation and recent rains obscuring the surface of the study areas, we recommend a Protocol of Finds for the development.
Intangible Heritage/ Cultural Landscape
Due to the dense vegetation and recent rains obscuring the surface of the study areas, we recommend a Protocol of Finds for the development.

Other
We recommend that the sports stadium and farm space be avoided during the development as the community uses these spaces.

ADDITIONAL NOTES AND RESOURCES

Attached Field Data

Filename	File type	Description
Sigma Pv Alt 1	Folder	Photos
Sigma Pv Alt 2	Folder	Photos
Sigma Pv Alt 2 corridor	Folder	Photos
SIGMA Waypoints	kmz	Waypoints with added placemarks
SASOL SIGMA tracks	kml	Combined tracks of two devices

Additional Notes





CTS HERITAGE

APPENDIX 2: Palaeontology Assessment 2022

**Palaeontological Impact Assessment for the proposed
development of a solar photovoltaic (PV) energy
facility near Sigma, Sasolburg, in the
Free State Province**

**CTS21_283
Savannah**

Site visit report (Phase 2)

For

CTS Heritage

03 February 2021

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

Expertise of Specialist

The Palaeontologist Consultant: Prof Marion Bamford
Qualifications: PhD (Wits Univ, 1990); FRSSAf, ASSAf
Experience: 32 years research; 24 years PIA studies

Declaration of Independence

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

Specialist: Prof Marion Bamford

A handwritten signature in blue ink, appearing to read 'M Bamford', with a horizontal line underneath.

Signature:

Executive Summary

A Palaeontological Impact Assessment was requested for the proposed Becrux Solar PV Project One (Pty) Ltd development of a 10MW ac Solar Photovoltaic (PV) Energy Facility and associated infrastructure on Portion 1 of the Farm Saltbery Plain 137 and the Remaining Extent of the Farm Zamdela 449, located near Sasolburg and the Sigma Substation

To comply with the regulations of the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA), a site visit Palaeontological Impact Assessment (PIA) was completed on 24th January 2022 by Rick Tolchard for the proposed development.

The two proposed sites lie on the palaeontologically very highly sensitive rocks of the Vryheid Formation (Ecca Group, Karoo Supergroup) that could potentially preserve impression fossils of the Glossopteris flora. The site visit confirmed that there were NO FOSSILS visible on either site or along the route for the grid connection. Nonetheless, a Fossil Chance Find Protocol should be added to the EMPr. Based on this information it is recommended that no further palaeontological impact assessment is required unless fossils are found by the developer/ environmental officer/ other designated responsible person once excavations/drilling activities have commenced.

As far as the palaeontology is concerned, the project should be authorised. There is no preferred alternative and there are no no-go areas.

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1. Background

Becrux Solar PV Project One (Pty) Ltd is proposing the development of a 10MW ac Solar Photovoltaic (PV) Energy Facility and associated infrastructure on Portion 1 of the Farm Saltbery Plain 137 and the Remaining Extent of the Farm Zamdela 449, located near Sasolburg in the Metsimaholo Local Municipality, which forms part of the Fezile Dabi District Municipality in the Free State Province. The purpose of the facility will be to generate electricity for exclusive use by Sasol Limited (Figures 1, 2).

To evacuate the generated power to Sasol Limited, a 33kV overhead power line will be established to connect the proposed 33kV onsite MV substation to the existing Sigma Substation. Two alternative sites (i.e., Site Alternative 1 and Site Alternative 2) have been identified for the assessment and placement of the solar facility infrastructure. Grid connection corridors have been identified for each site for the assessment and suitable placement of the grid connection infrastructure within the corridor.

For Site Alternative 1, the grid connection corridor will be up to 200m wide, extending to ~400m around the footprint of the Sigma substation, and up to 500m long. For Site Alternative 2, the grid connection corridor will be up to 70m wide, extending up to ~400m around the footprint of the existing Sigma Substation, and up to 2.1km long.

A Palaeontological Impact Assessment was requested for the Becrux Sigma PV facility south of Sasolburg. To comply with the regulations of the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA), a site visit (phase 2) Palaeontological Impact Assessment (PIA) was completed for the proposed development and is reported herein.

Table 1: Specialist report requirements in terms of Appendix 6 of the EIA Regulations (amended 2017)

	A specialist report prepared in terms of the Environmental Impact Regulations of 2017 must contain:	Relevant section in report
ai	Details of the specialist who prepared the report	Appendix B
aii	The expertise of that person to compile a specialist report including a curriculum vitae	Appendix B
b	A declaration that the person is independent in a form as may be specified by the competent authority	Page
c	An indication of the scope of, and the purpose for which, the report was prepared	Section 1
ci	An indication of the quality and age of the base data used for the specialist report: SAHRIS palaeosensitivity map accessed – date of this report	Yes
cii	A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change	Section 5

	A specialist report prepared in terms of the Environmental Impact Regulations of 2017 must contain:	Relevant section in report
d	The date and season of the site investigation and the relevance of the season to the outcome of the assessment	N/A
e	A description of the methodology adopted in preparing the report or carrying out the specialised process	Section 2
f	The specific identified sensitivity of the site related to the activity and its associated structures and infrastructure	Section 4
g	An identification of any areas to be avoided, including buffers	N/A
h	A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	N/A
i	A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 5
j	A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment	Section 4
k	Any mitigation measures for inclusion in the EMPr	Section 8, Appendix A
l	Any conditions for inclusion in the environmental authorisation	N/A
m	Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 8, Appendix A
ni	A reasoned opinion as to whether the proposed activity or portions thereof should be authorised	Section 6
nii	If the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Sections 6, 8
o	A description of any consultation process that was undertaken during the course of carrying out the study	N/A
p	A summary and copies if any comments that were received during any consultation process	N/A
q	Any other information requested by the competent authority.	N/A

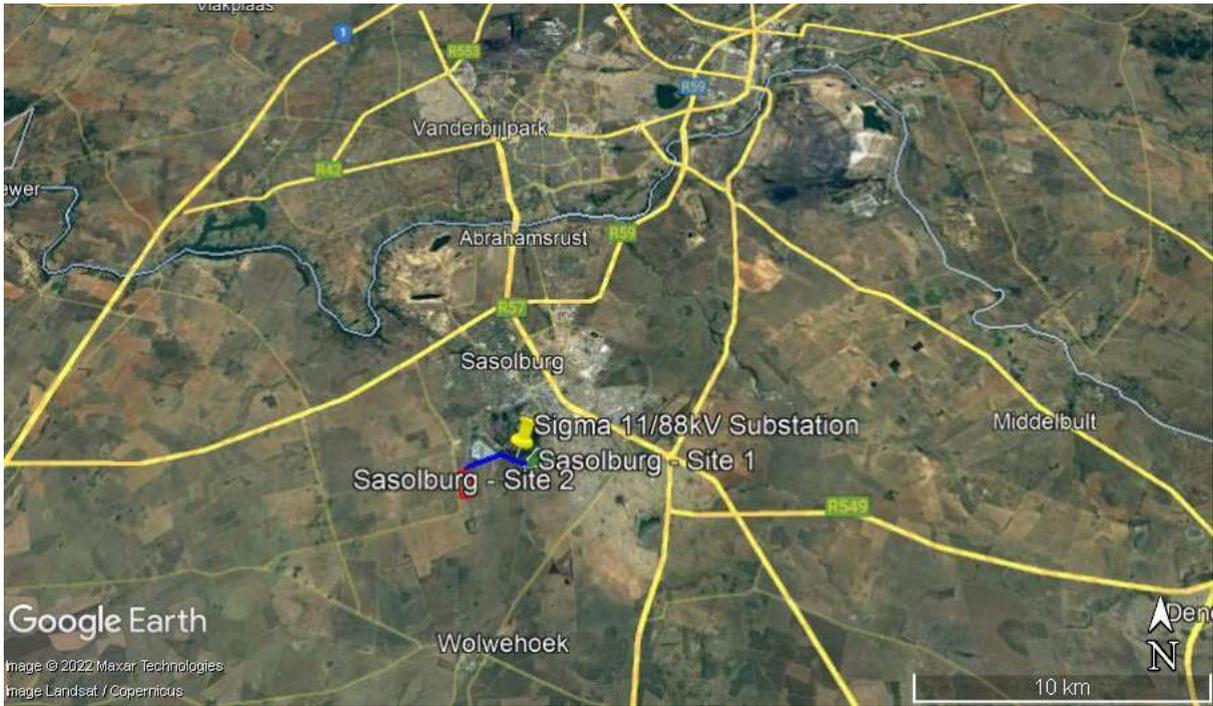


Figure 1: Google Earth map of the proposed development with the relevant landmarks.



Figure 2: Google Earth map to show the proposed Becrux Sigma PV Facility just south of Sasolburg with the two alternatives as indicated.

2. Methods and Terms of Reference

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

The methods employed to address the ToR included:

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

3. Geology and Palaeontology

i. Project location and geological context

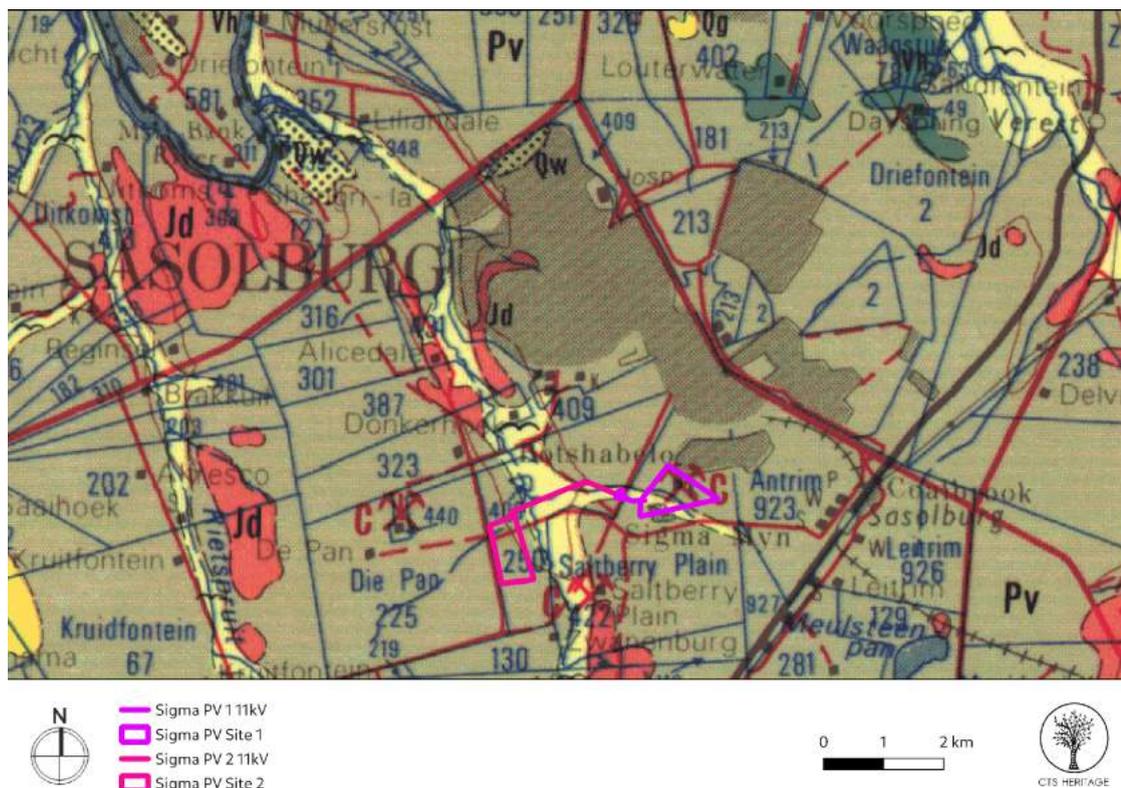


Figure 3: Geological map of the area around Sasolburg with the proposed project indicated within the pink and purple rectangles Abbreviations of the rock types are explained in Table 2. Map enlarged from the Geological Survey 1: 250 000 map 2626 west Rand.

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

Symbol	Group/Formation	Lithology	Approximate Age
Qs	Quaternary	Alluvium, sand, calcrete	Neogene, ca 2.5 Ma to present
Jd	Jurassic dykes	Dolerite dykes, intrusive	Jurassic, approx. 180 Ma
Pv	Vryheid Fm, Ecca Group, Karoo SG	Shales, sandstone, coal	Early Permian, Middle Ecca

The project lies in the central part of the Main Karoo Basin and in the Vereeniging-Sasolburg Coalfield (Figure 3) that has deep deposits of the Vryheid Formation with five coal seams.

The Karoo Supergroup rocks cover a very large proportion of South Africa and extend from the northeast (east of Pretoria) to the southwest and across to almost the KwaZulu Natal south coast. It is bounded along the southern margin by the Cape Fold Belt and along the northern margin by the much older Transvaal Supergroup rocks. Representing some 120 million years (300 – 183Ma), the Karoo Supergroup rocks have preserved a diversity of fossil plants, insects, vertebrates and invertebrates.

During the Carboniferous Period South Africa was part of the huge continental landmass known as Gondwanaland and it was positioned over the South Pole. Melting of the icesheets deposited sediments in the Karoo Basin. These are the oldest rocks in the system and are exposed around the outer part of the ancient Karoo Basin, and are known as the Dwyka Group. They comprise tillites, diamictites, mudstones, siltstones and sandstones that were deposited as the basin filled (Johnson et al., 2006).

Overlying the Dwyka Group rocks are rocks of the Ecca Group that are Early Permian in age. There are eleven formations recognised in this group but they do not all extend throughout the Karoo Basin. In the Free State, Mpumalanga and KwaZulu Natal, from the base upwards are the Pietermaritzburg Formation, **Vryheid Formation** and the Volksrust Formation. All of these sediments have varying proportions of sandstones, mudstones, shales and siltstones and represent shallow to deep water settings, deltas, rivers, streams and overbank depositional environments.

Overlying the Ecca Group are the rocks of the Beaufort Group that has been divided into the lower Adelaide Subgroup for the Upper Permian strata, and the Tarkastad Subgroup for the Early to Middle Triassic strata. As with the older Karoo sediments, the formations vary across the Karoo Basin.

Large exposures of Jurassic dolerite dykes occur throughout the area. These intruded through the Karoo sediments around 183 million years ago at about the same time as

the Drakensberg basaltic eruption. Much younger Quaternary Alluvium has filled many of the river and stream valleys.

ii. Palaeontological context

The palaeontological sensitivity of the area under consideration is presented in Figure 4. The site for development is in the Early Permian Vryheid Formation that could potentially preserve plant impressions of the *Glossopteris* flora, but no vertebrates. This flora includes the diverse glossopterids (extinct seed ferns), lycopods, sphenophytes, ferns and early gymnosperms (Anderson and Anderson, 1985; Plumstead, 1969; Appendix A). Borehole cores for the Sigma Coal mine show that the uppermost coal seam is 180 m below the surface and is covered by shale to 140m (Snyman, 1998, fig 18). Thick dolerite is common and only the shales would preserve fossils. The dolerite and sandstone do not preserve fossils.

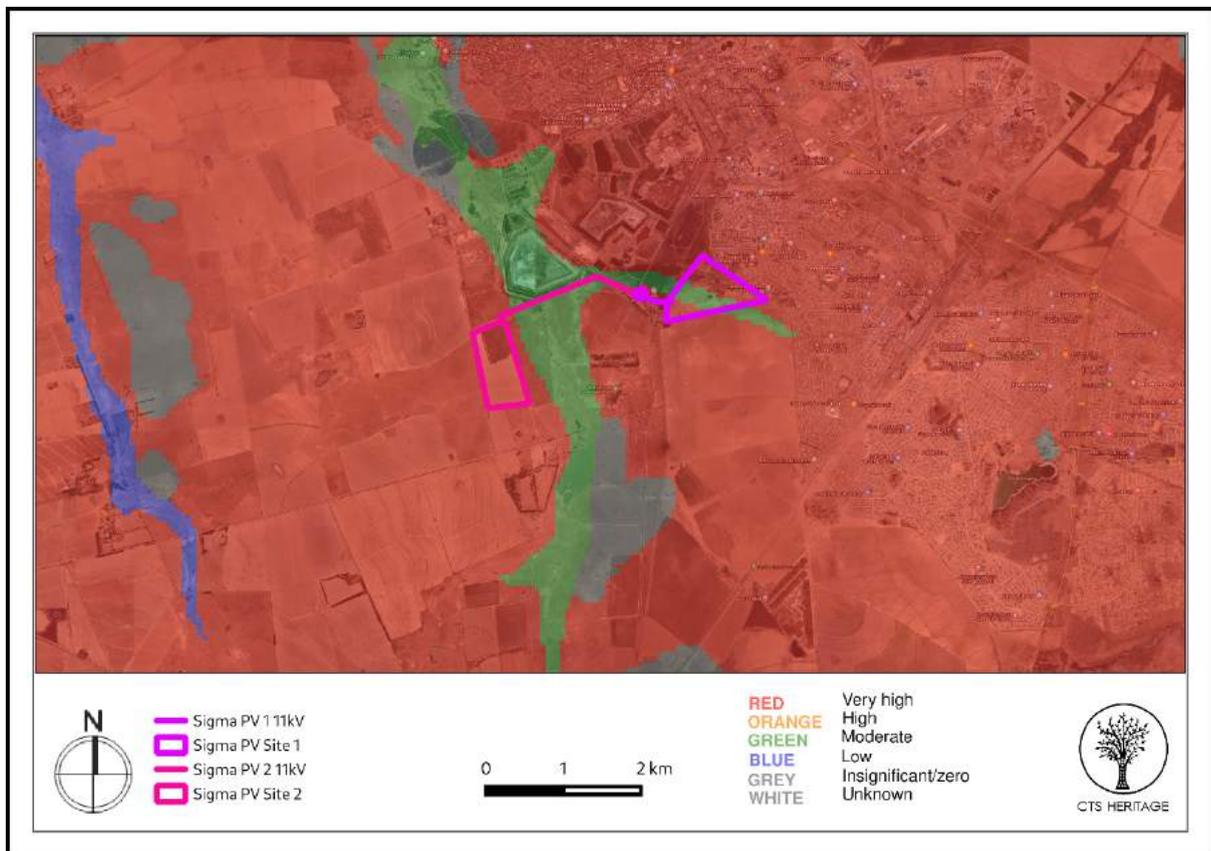


Figure 4: SAHRIS palaeosensitivity map for the site for the proposed Sigma PV facility. Background colours indicate the following degrees of sensitivity: red = very highly sensitive; orange/yellow = high; green = moderate; blue = low; grey = insignificant/zero.

iii. Site visit observations

Rick Tolchard visited the two proposed areas on 24th January and walked through the area. Photographic stops and observations are listed in Table 3 below and relate to the pins in Figure 5. All the photographs in Figure 6 were taken by Tolchard.

NO FOSSILS were seen in the project areas or along the proposed grid connection. In Site 1 the vegetation is dense grass but visibility of the soils was good. In Site 2, the land has been ploughed recently and there were no fossils or even any rocky outcrops that could potentially preserve fossil plants. The grid connection route is along a road and servitude and no fossils were seen.



Figure 5: Annotated Google Earth map of site visit GPS points (see table 4)

Table 3: Site visit observations

GPS points	Observations	Figure
Stop 1 – Site 1 S26°50'56.21894" E27°50'19.62237"	Generally flat topography with thick cover of grasses and some paths through the field. No rocky outcrops and no fossils found	6A,B
Stop 2 26°50'57.34929" E27°50'14.26392"	Generally flat topography with thick cover of grasses and some paths through the field. No rocky outcrops and no fossils found	6C, D

Stop 3 S26°51'03.08945" E27°50'05.71357"	Generally flat topography with thick cover of grasses and some paths through the field. No rocky outcrops and no fossils found	7A-D
Stop 4 - Site 2 S26°51'03.09" E27°48'38.33"	Generally flat topography, ploughed with a well developed mealie crop. No rocky outcrops and no fossils found	8A
Stop 5 S26°51'38.93" E27°48'40.58"	Mealie fields	
Grid connection route	Generally flat topography, disturbed ground and roads. No fossils and no rocky outcrops.	8B-D



Figure 6: Site visit photographs for the Becrux PV facility near Sasolburg. A – Site 1 - view across the field towards the township. B – close-up of the dense grasses covering the land. C – close-up of the sandy soils alongside the track. D - another section of the open area.



Figure 7: Photographs of site visit for the Becrux PV facility near Sasolburg, site 1. A – view across the field with thick grass cover. B – close-up of the soils where the grasses are thinner. C – another view across the field from the southern corner. D – thick grass cover, general flat topography.



Figure 8: Photographs from the site visit for the Becrux PV facility near Sasolburg. A – Site 2 is a mealie field. No fossils, B –C - route for the grid connection. D. View of the substation and Sigma mine from a distance. Foreground shows sandy soils and no rocky outcrops.

4. Impact assessment

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

Table 4a: Criteria for assessing impacts

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

Table 4b: Impact Assessment

PART B: Assessment		
SEVERITY/NATURE	H	-
	M	-
	L	Dolerite and soils do not preserve plant fossils; There records from the Vryheid formation of plant in this region but none was seen on the site visit. The impact would be negligible.
	L+	-
	M+	-
	H+	-

DURATION	L	-
	M	-
	H	Where manifest, the impact will be permanent.
SPATIAL SCALE	L	Since the only possible fossils within the area would be fossil plants from the <i>Glossopteris</i> flora in the shales, the spatial scale will be localised within the site boundary.
	M	-
	H	-
PROBABILITY	H	-
	M	-
	L	It is extremely unlikely that any fossils would be found in the loose soils and sand that cover the area and will be excavated. No fossils were seen on the site walkthrough. Nonetheless, a Fossil Chance Find Protocol should be added to the eventual EMPr.

Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks are the correct and age and type to contain fossils, however, no fossils were seen on the surface and there were no rocky outcrop that could preserve fossils.. Since there is a small chance that fossils from the Vryheid Formation could occur below the surface and may be disturbed, a Fossil Chance Find Protocol has been added to this report. Taking account of the defined criteria, the potential impact to fossil heritage resources is extremely low.

5. Assumptions and uncertainties

Based on the geology of the area and the palaeontological record as we know it, it can be assumed that the formation and layout of the dolomites, sandstones, shales and sands are typical for the country and do contain fossil plant, insect, invertebrate and vertebrate material. The sands of the Quaternary period would not preserve fossils. The site visit and walkthrough confirmed that there are NO FOSSILS on either Site 1 or site 2 and not along the proposed route for the grid connection.

6. Recommendation

Based on the site visit and walkthrough there are no fossils on the land surface. It is unlikely that there would be any just below the surface because the borehole core from the Sigma mine indicates that there are thick layers of dolerite above the coal seams. Since there is a very small chance that fossils may occur in the below ground in the shales of the early Permian Vryheid Formation, a Fossil Chance Find Protocol should be added to the EMPr. If fossils are found by the environmental officer, or other responsible person once excavations for foundations and infrastructure have commenced then they

should be rescued and a palaeontologist called to assess and collect a representative sample. Based on the palaeontology, the project should be authorised because there are no fossils on site. There is no preferred site and there are no no-go areas.

7. References

Anderson, J.M., Anderson, H.M., 1985. Palaeoflora of Southern Africa: Prodrumus of South African megafloras, Devonian to Lower Cretaceous. A.A. Balkema, Rotterdam. 423 pp.

Johnson, M.R., van Vuuren, C.J., Visser, J.N.J., Cole, D.I., Wickens, H.deV., Christie, A.D.M., Roberts, D.L., Brandl, G., 2006. Sedimentary rocks of the Karoo Supergroup. In: Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J., (Eds). The Geology of South Africa. Geological Society of South Africa, Johannesburg / Council for Geoscience, Pretoria. Pp 461 – 499.

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

Snyman, C.P., 1998. Coal. In: Wilson, M.G.C., and Anhaeusser, C.P., (Eds). The Mineral Resources of South Africa: Handbook, Council for Geosciences 16, 136-205.

8. Chance Find Protocol

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

1. The following procedure is only required if fossils are seen on the surface and when drilling/excavations commence.
2. When excavations begin the rocks and must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (plants, insects, bone, coal) should be put aside in a suitably protected place. This way the project activities will not be interrupted.
3. Photographs of similar fossils must be provided to the developer to assist in recognizing the fossil plants, vertebrates, invertebrates or trace fossils in the shales and mudstones (for example see Figure 9). This information will be built into the EMP's training and awareness plan and procedures.
4. Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.
5. If there is any possible fossil material found by the developer/environmental officer then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the selected material and check the dumps where feasible.
6. Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.
7. If no good fossil material is recovered then no site inspections by the palaeontologist will be necessary. A final report by the palaeontologist must be sent to SAHRA once the project has been completed and only if there are fossils.
8. If no fossils are found and the excavations have finished then no further monitoring is required.

9. Appendix A – Examples of fossils from the Vryheid Formation



Figure 9: Photographs of fossil plant impressions from the Vryheid formation, Ecca Group.

10. Appendix B – Details of specialists

Curriculum vitae (short) - Marion Bamford PhD January 2022

i) Personal details

Surname : **Bamford**
First names : **Marion Kathleen**
Present employment : Professor; Director of the Evolutionary Studies Institute.
Member Management Committee of the NRF/DST Centre of Excellence Palaeosciences, University of the Witwatersrand, Johannesburg, South Africa-
Telephone : +27 11 717 6690
Fax : +27 11 717 6694
Cell : 082 555 6937
E-mail : marion.bamford@wits.ac.za ; marionbamford12@gmail.com

ii) Academic qualifications

Tertiary Education: All at the University of the Witwatersrand:

1980-1982: BSc, majors in Botany and Microbiology. Graduated April 1983.

1983: BSc Honours, Botany and Palaeobotany. Graduated April 1984.

1984-1986: MSc in Palaeobotany. Graduated with Distinction, November 1986.

1986-1989: PhD in Palaeobotany. Graduated in June 1990.

iii) Professional qualifications

Wood Anatomy Training (overseas as nothing was available in South Africa):

1994 - Service d'Anatomie des Bois, Musée Royal de l'Afrique Centrale, Tervuren, Belgium, by Roger Dechamps

1997 - Université Pierre et Marie Curie, Paris, France, by Dr Jean-Claude Koeniguer

1997 - Université Claude Bernard, Lyon, France by Prof Georges Barale, Dr Jean-Pierre Gros, and Dr Marc Philippe

iv) Membership of professional bodies/associations

Palaeontological Society of Southern Africa

Royal Society of Southern Africa - Fellow: 2006 onwards

Academy of Sciences of South Africa - Member: Oct 2014 onwards

International Association of Wood Anatomists - First enrolled: January 1991

International Organization of Palaeobotany – 1993+

Botanical Society of South Africa

South African Committee on Stratigraphy – Biostratigraphy - 1997 - 2016

SASQUA (South African Society for Quaternary Research) – 1997+

PAGES - 2008 –onwards: South African representative

ROCEEH / WAVE – 2008+

INQUA – PALCOMM – 2011+onwards

vii) Supervision of Higher Degrees

All at Wits University

Degree	Graduated/completed	Current
Honours	11	0
Masters	10	4
PhD	11	4
Postdoctoral fellows	10	5

viii) Undergraduate teaching

Geology II – Palaeobotany GEOL2008 – average 65 students per year

Biology III – Palaeobotany APES3029 – average 25 students per year

Honours – Evolution of Terrestrial Ecosystems; African Plio-Pleistocene Palaeoecology;

Micropalaeontology – average 2-8 students per year.

ix) Editing and reviewing

Editor: *Palaeontologia africana*: 2003 to 2013; 2014 – Assistant editor

Guest Editor: *Quaternary International*: 2005 volume

Member of Board of Review: *Review of Palaeobotany and Palynology*: 2010 –

Review of manuscripts for ISI-listed journals: 25 local and international journals

x) Palaeontological Impact Assessments

Selected – list not complete:

- Thukela Biosphere Conservancy 1996; 2002 for DWAF
- Vioolsdrift 2007 for Xibula Exploration
- Rietfontein 2009 for Zitholele Consulting
- Bloeddrift-Baken 2010 for TransHex
- New Kleinfontein Gold Mine 2012 for Prime Resources (Pty) Ltd.
- Thabazimbi Iron Cave 2012 for Professional Grave Solutions (Pty) Ltd
- Delmas 2013 for Jones and Wagener
- Klipfontein 2013 for Jones and Wagener
- Platinum mine 2013 for Lonmin
- Syferfontein 2014 for Digby Wells
- Canyon Springs 2014 for Prime Resources
- Kimberley Eskom 2014 for Landscape Dynamics
- Yzermyne 2014 for Digby Wells
- Matimba 2015 for Royal HaskoningDV
- Commissiekraal 2015 for SLR
- Harmony PV 2015 for Savannah Environmental
- Glencore-Tweefontein 2015 for Digby Wells
- Umkomazi 2015 for JLB Consulting
- Ixia coal 2016 for Digby Wells
- Lambda Eskom for Digby Wells
- Alexander Scoping for SLR
- Perseus-Kronos-Aries Eskom 2016 for NGT
- Mala Mala 2017 for Henwood

- Modimolle 2017 for Green Vision
- Klipoortjie and Finaalspan 2017 for Delta BEC
- Ledjadja borrow pits 2018 for Digby Wells
- Lungile poultry farm 2018 for CTS
- Olienhout Dam 2018 for JP Celliers
- Isondlo and Kwasobabili 2018 for GCS
- Kanakies Gypsum 2018 for Cabanga
- Nababeep Copper mine 2018
- Glencore-Mbali pipeline 2018 for Digby Wells
- Remhoogte PR 2019 for A&HAS
- Bospoort Agriculture 2019 for Kudzala
- Overlooked Quarry 2019 for Cabanga
- Richards Bay Powerline 2019 for NGT
- Eilandia dam 2019 for ACO
- Eastlands Residential 2019 for HCAC
- Fairview MR 2019 for Cabanga
- Graspan project 2019 for HCAC
- Lieliefontein N&D 2019 for EnviroPro
- Skeerpoort Farm Mast 2020 for HCAC
- Vulindlela Eco village 2020 for 1World
- KwaZamakhule Township 2020 for Kudzala
- Sunset Copper 2020 for Digby Wells
- McCarthy-Salene 2020 for Prescali
- VLNR Lodge 2020 for HCAC
- Madadeni mixed use 2020 for EnviroPro
- Frankfort-Windfield Eskom Powerline 2020 for 1World
- Beaufort West PV Facility 2021 for ACO Associates
- Copper Sunset MR 2021 for Digby Wells
- Sannaspos PV facility 2021 for CTS Heritage
- Smithfield-Rouxville-Zastron PL 2021 for TheroServe

xi) Research Output

Publications by M K Bamford up to January 2022 peer-reviewed journals or scholarly books: over 150 articles published; 5 submitted/in press; 10 book chapters.

Scopus h-index = 30; Google scholar h-index = 35; i10-index = 92

Conferences: numerous presentations at local and international conferences.

Mr Frederick Tolchard

Brief Curriculum Vitae – January 2022

Academic training

BA Archaeology – University of the Witwatersrand, graduated 2015
BSc (Honours) Palaeontology – University of the Witwatersrand, 2017 with distinction
MSc Palaeontology – University of the Witwatersrand, 2018 – 2019. Graduated 2020 with Distinction
PhD Palaeontology – Wits – 2020 - current

Field Experience

Honours Fieldtrip – Karoo biostratigraphy – April 2017
Research fieldwork – Elliot Formation with Prof Choiniere – April 2018, Nov 2018; April 2019; Sept 2021

Publications

Tolchard, F., Nesbitt, S.J., Desojo, J.B., Viglietti, P.A., Butler, R.J. and Choiniere, J.N., 2019.
'Rauisuchian' material from the lower Elliot Formation of South Africa: Implications for late Triassic biogeography and biostratigraphy. *Journal of African Earth Sciences*, 160, 103610.

Viglietti, P.A., McPhee, B.W., Bordy, E.M., Sciscio, L., Barrett, P.M., Benson, R.B.J., Wills, F., Tolchard, F., Choiniere, J.N., 2020. Biostratigraphy of the Scalenodontoides Assemblage Zone (Stormberg Group, Karoo Supergroup), South Africa. *South African Journal of Geology* 123, 239-248.

Tolchard F., Kammerer C., Butler R.J., Abdala F., Hendrickx C., Benoit J., Choinière J.N. (2021.) A very large new trirachodontid from the Triassic of South Africa and its implications for Gondwanan biostratigraphy. *Journal of Vertebrate Paleontology*. DOI: 10.1080/02724634.2021.1929265.

PIA fieldwork projects

2018 May – Williston area – SARAO project, Digby Wells
2018 September – Lichtenburg PVs – CTS Heritage
2018 November – Nomalanga farming – Digby Wells
2019 January – Thubelisha coal – Digby Wells
2019 March – Matla coal – Digby Wells
2019 March – Musina-Machado SEZ – Digby Wells
2019 June – Temo coal – Digby Wells
2019 September – Makapanstad Agripark – Plantago
2020 January – Hendrina, Kwazamakuhle – Kudzala
2020 February – Hartebeestpoort Dam - Prescali
2020 March – Twyfelaar Coal mine – Digby Wells
2020 March – Ceres Borrow Pits – ACO Associates
2020 March – Copper Sunset Sand – Digby Wells
2020 October – Belfast loop and Expansion – Nsovo
2020 October – VLNR lodge Mapungubwe – HCAC
2020 November – Delmore Park BWSS - HCAC
2020 December – Kromdraai commercial – HCAC
2021 January – Welgedacht Siding – Elemental Sustainability
2021 March – Shango Kroonstad – Digby Wells

2021 May – Copper Sunset sand mining – Digby Wells
2021 August – New Largo Pit – Golder
2021 August – Khutsong Ext 8 housing, Carletonville, for Afzelia
2021 September – Lichtenburg PV facility – CTS Heritage
2021 October – Ogies South MR – beyondgreen
2021 October – Nooitgedacht Colliery MR - Shangoni



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APPENDIX 3: Heritage Screening Assessment



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HERITAGE SCREENER

CTS Reference Number:	CTS21_283
SAHRA Case No.	TBA
Client:	Savannah
Date:	February 2022
Title:	Proposed development of a solar photovoltaic (PV) energy facility and associated infrastructure with a generation capacity of up to 10MWac, located near Sasolburg in the Free State Province
Recommendation:	RECOMMENDATION It is unlikely that the proposed development will impact on significant archaeological and palaeontological heritage. However an HIA is required to assess impacts to these identified heritage resources and to provide appropriate mitigation measures to prevent negative impact..

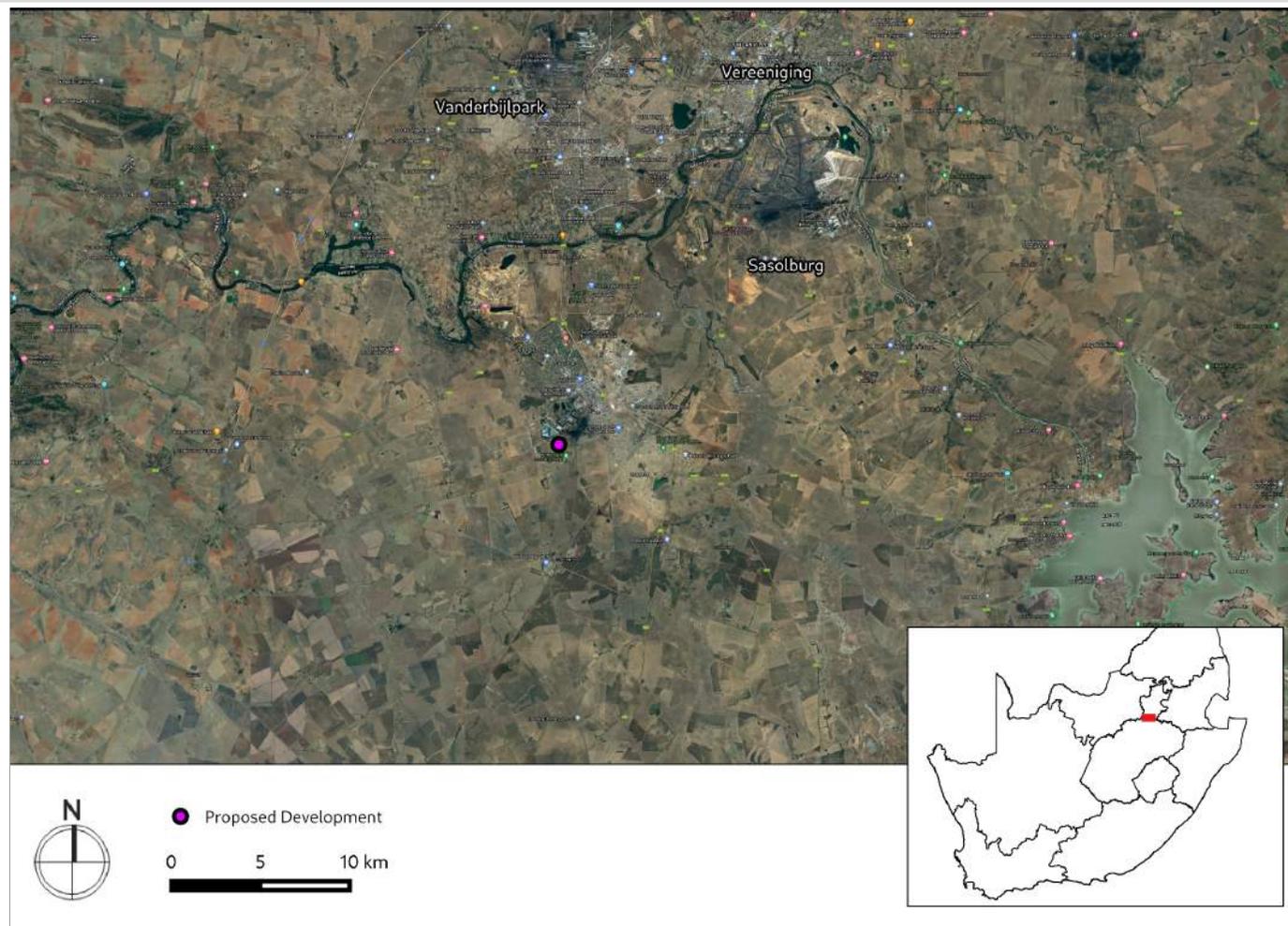


Figure 1a. Satellite map indicating the location of the proposed development in the North West Province



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1. Proposed Development Summary

Becrux Solar PV Project Two (Pty) Ltd is proposing to develop a 10MW ac Solar Photovoltaic (PV) Energy Facility and associated infrastructure on Portion 1 of the Farm Saltberry Plain 137 and the Remaining Extent of Portion 1 of the Farm Roseberry Plain 250, located 4km southeast of the town Sasolburg, within jurisdiction of the Metsimaholo Local Municipality and the Fezile Dabi District Municipality in the Free State Province. The purpose of the facility will be to generate electricity for exclusive use by Sasol Limited.

A development area of up to ~30ha and a development footprint of up to ~19.99ha have been identified within the project site (~339.87ha) by Becrux Solar PV Project Two (Pty) Ltd for the development of the Becrux II Solar PV Energy Facility. Infrastructure associated with the Solar PV Energy Facility will include the following:

- Solar PV array comprising PV modules and mounting structures.
- Inverters and transformers.
- Cabling between the panels.
- 11kV onsite containerised/non-containerised substation.
- 11kV overhead power line for the distribution of the generated power, which will be connected to the existing Sigma Substation.
- Main access gravel road and internal gravel roads.
- Operations and Maintenance (O&M) building, including a sewage/conservancy tank and water storage tanks.
- Site office, workshop area, storage area, and laydown area.
- Fire break and fencing around the site, including an access gate.

2. Application References

Name of relevant heritage authority(s)	SAHRA
Name of decision making authority(s)	Free State Department of Economic, Small Business Development, Tourism & Environmental Affairs

3. Property Information

Latitude / Longitude	26°50'52.74"S 27°50'22.45"E
Erf number / Farm number	- Portions 1 and 7 of Roseberry Plan 250 - Portion 0 of Saltberry Plan 422
Local Municipality	Metsimaholo Local Municipality
District Municipality	Fezile Dabi District Municipality
Province	Free State

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Current Use	Agriculture and Mining
Current Zoning	Agriculture and Mining

4. Nature of the Proposed Development

Total Surface Area	Up to 19.99ha
Depth of excavation (m)	Approximately less than 5m in depth
Height of development (m)	Up to 3 meters for the PV panel modules (when installed) and up to 20m for the overhead 11kV power line.

5. Category of Development

x	Triggers: Section 38(8) of the National Heritage Resources Act
	Triggers: Section 38(1) of the National Heritage Resources Act
	1. Construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier over 300m in length.
	2. Construction of a bridge or similar structure exceeding 50m in length.
	3. Any development or activity that will change the character of a site-
x	a) exceeding 5 000m ² in extent
	b) involving three or more existing erven or subdivisions thereof
	c) involving three or more erven or divisions thereof which have been consolidated within the past five years
	4. Rezoning of a site exceeding 10 000m ²
	5. Other (state):



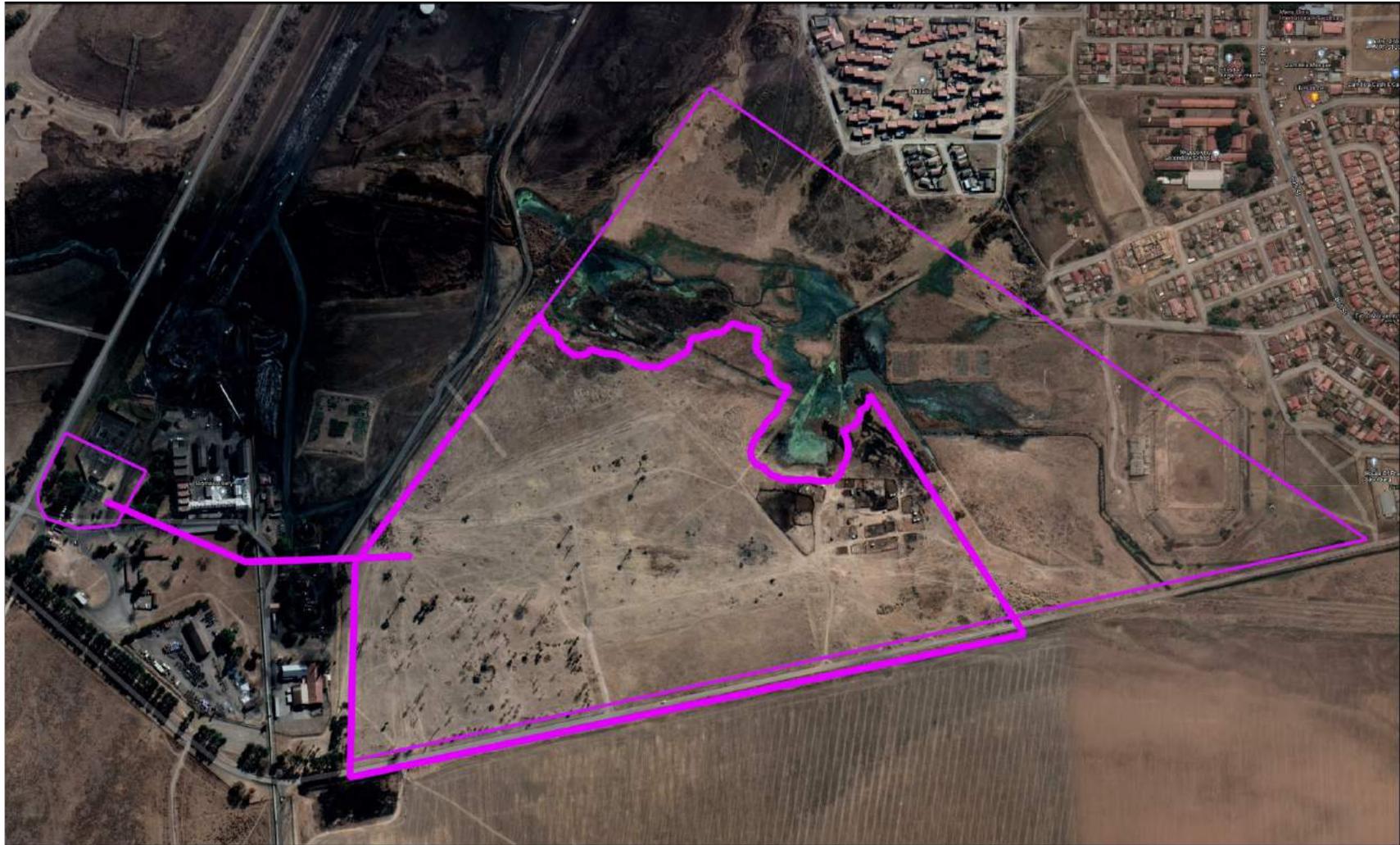
6. Additional Infrastructure Required for this Development

Solar PV array comprising PV modules and mounting structures, Inverters and transformers, Cabling between the panels, onsite MV substation, overhead power line for the distribution of the generated power, which will be the existing Sigma Substation, Laydown area, Access gravel road (existing) and internal gravel roads, Security booth, O&M building, workshop, storage area and site office.

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



Figure 1b Overview Map. Satellite image (2019) indicating the proposed study area



- Proposed Powerline
- Becrux PV II Development Area
- Becrux PV II Project Area

0 100 200 m



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Figure 1c. Overview Map. Satellite image (2019) indicating the proposed study area at closer range.



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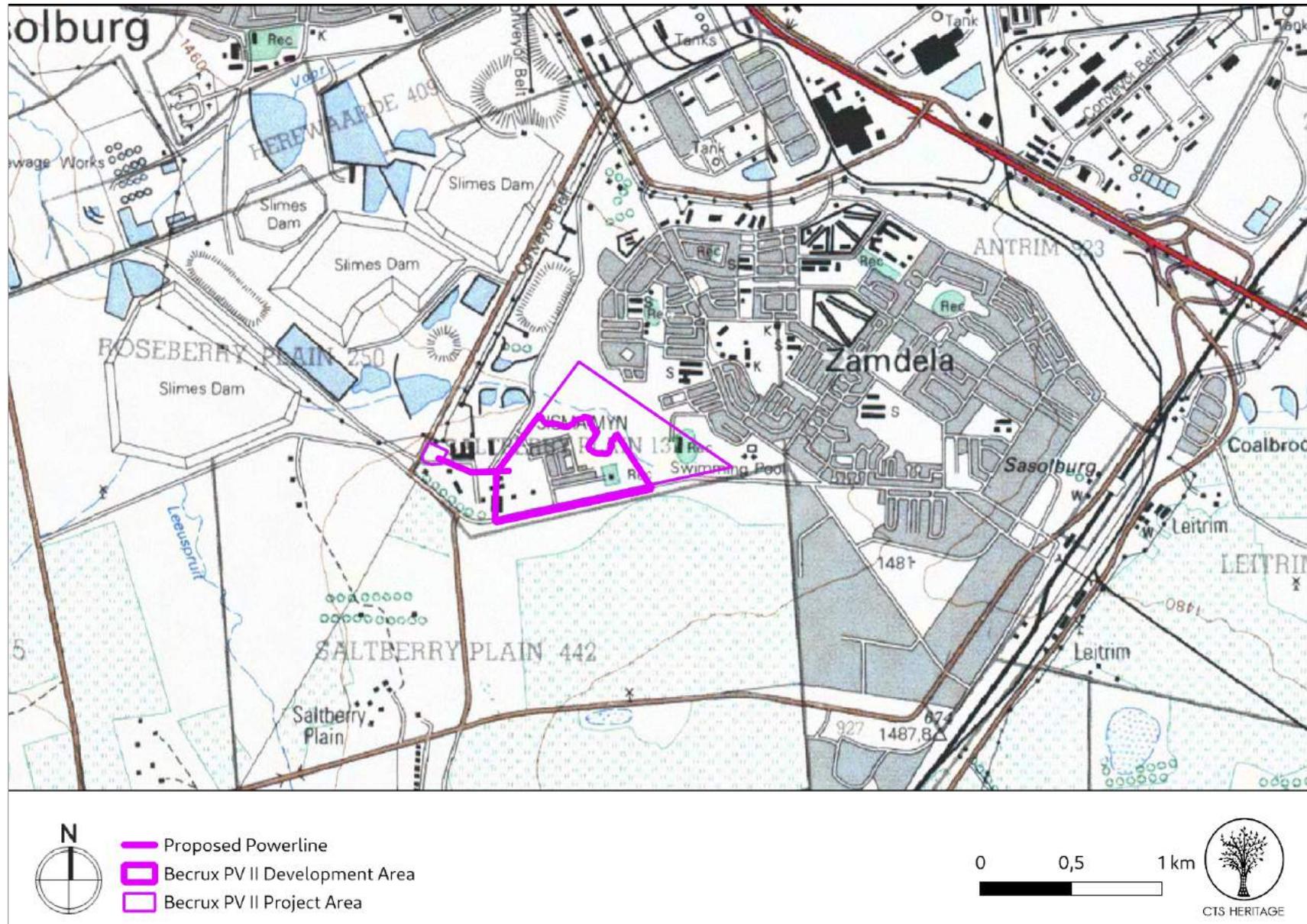


Figure 1d. Overview Map. 1:50 000 Topo Map indicating the proposed study area at closer range.

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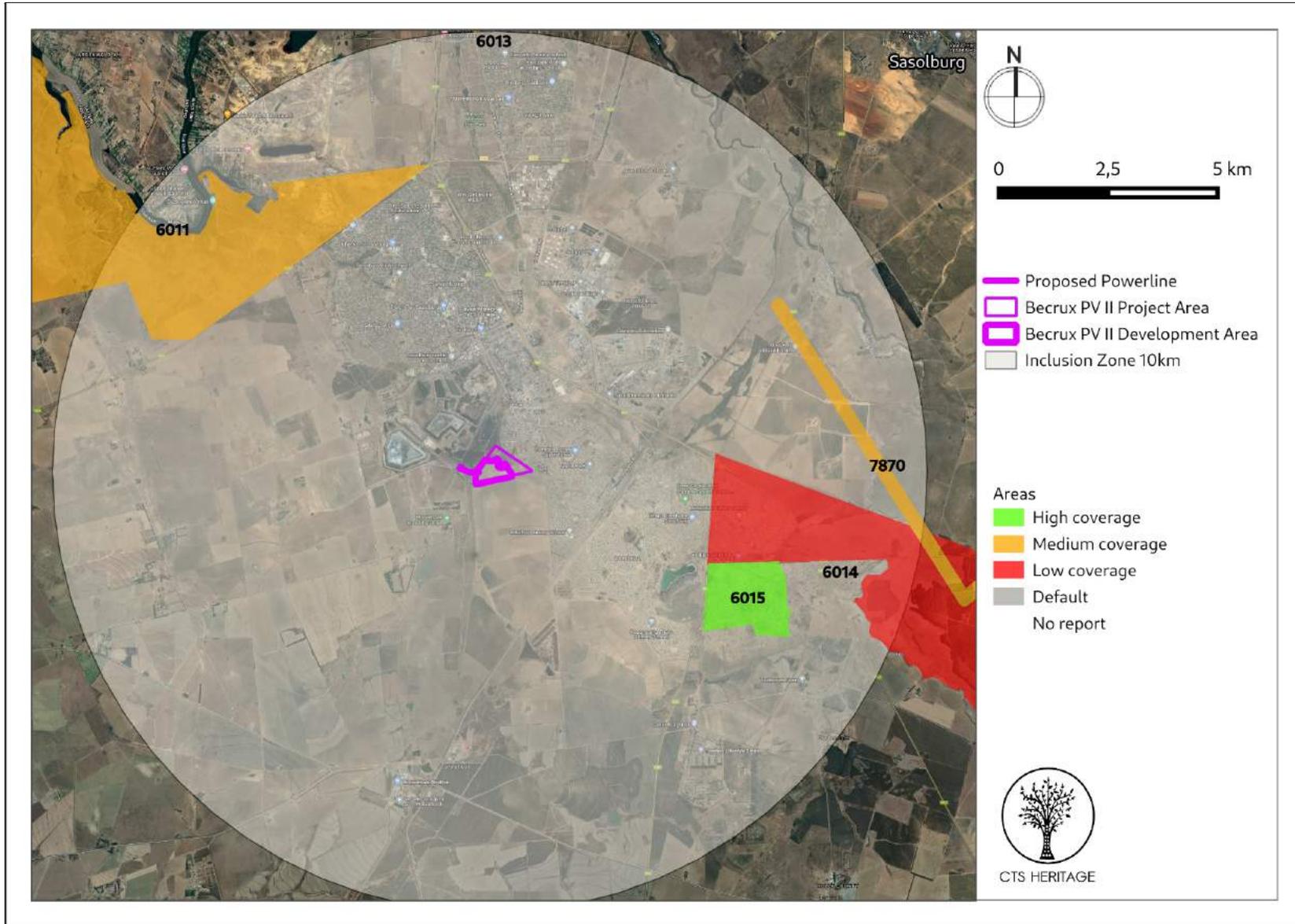


Figure 2. Previous HIAs Map. Previous Heritage Impact Assessments surrounding the proposed study area within 10km, with SAHRIS NIDS indicated. Please see Appendix 2 for a full reference list.

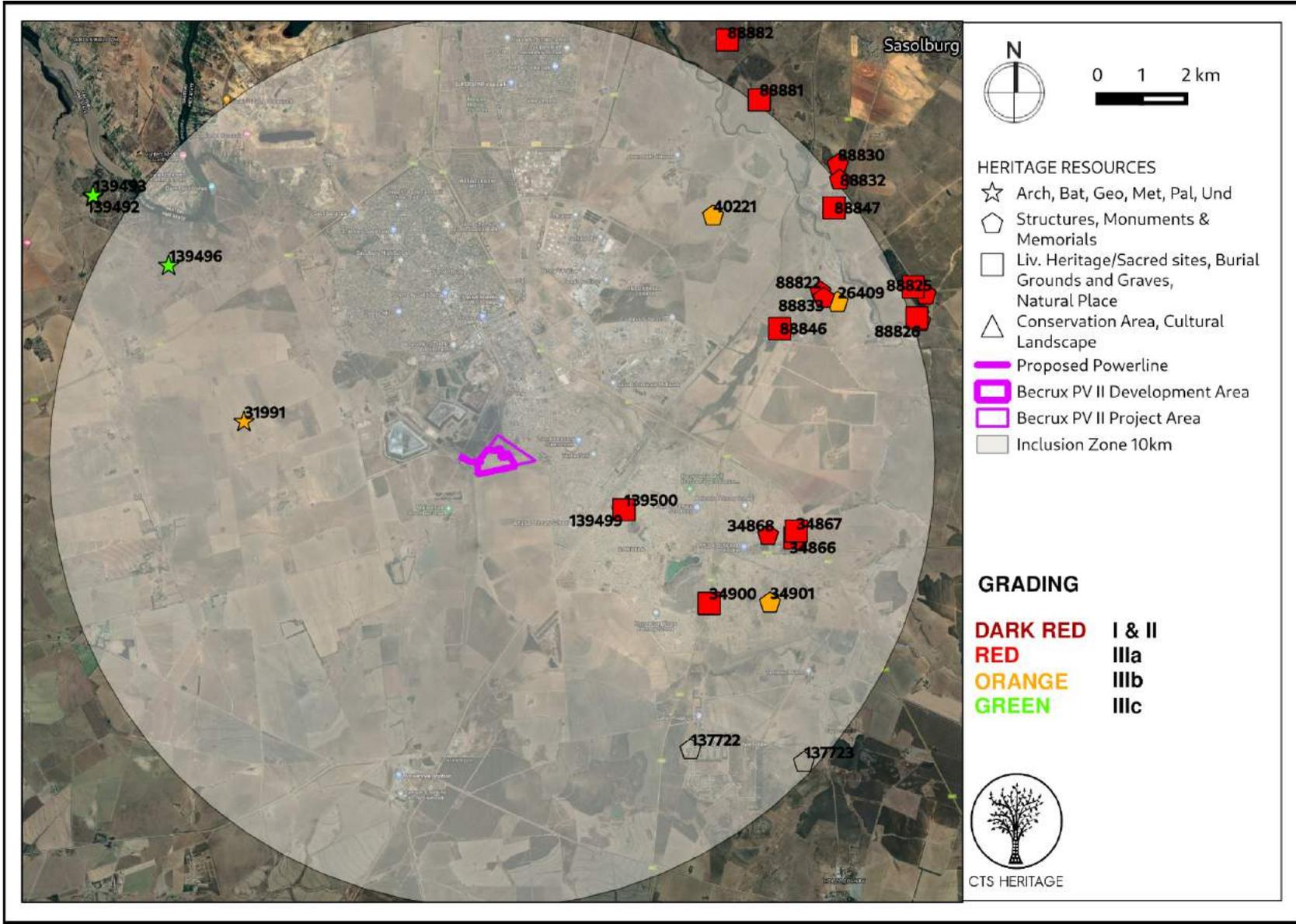


Figure 3. Heritage Resources Map. Heritage Resources previously identified in and near the study area, with SAHRIS Site IDs indicated. Please See Appendix 4 for a full description of heritage resource types.

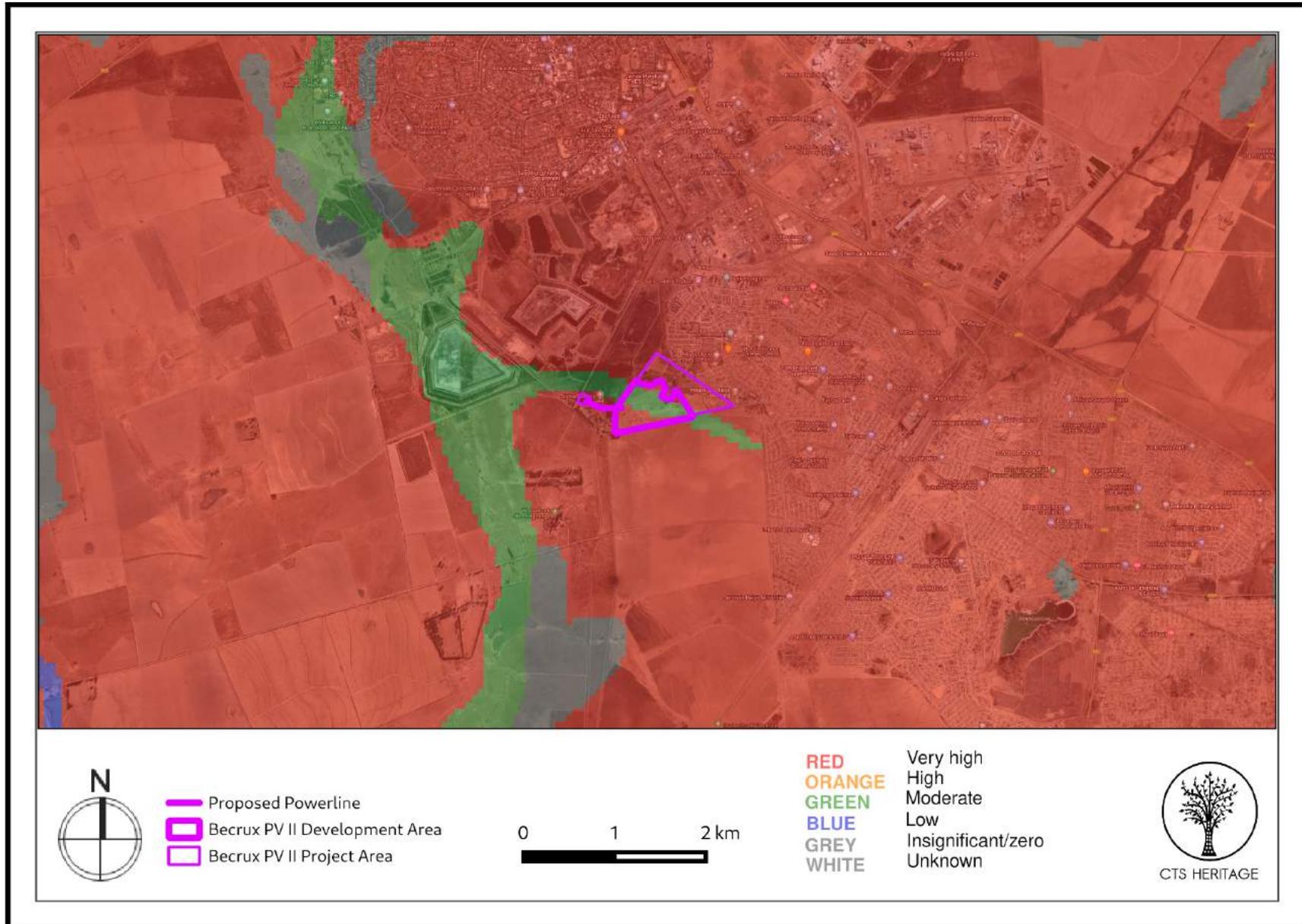


Figure 4a. Palaeosensitivity Map. Indicating varied fossil sensitivity underlying the study area. Please See Appendix 3 for full guide to the legend.

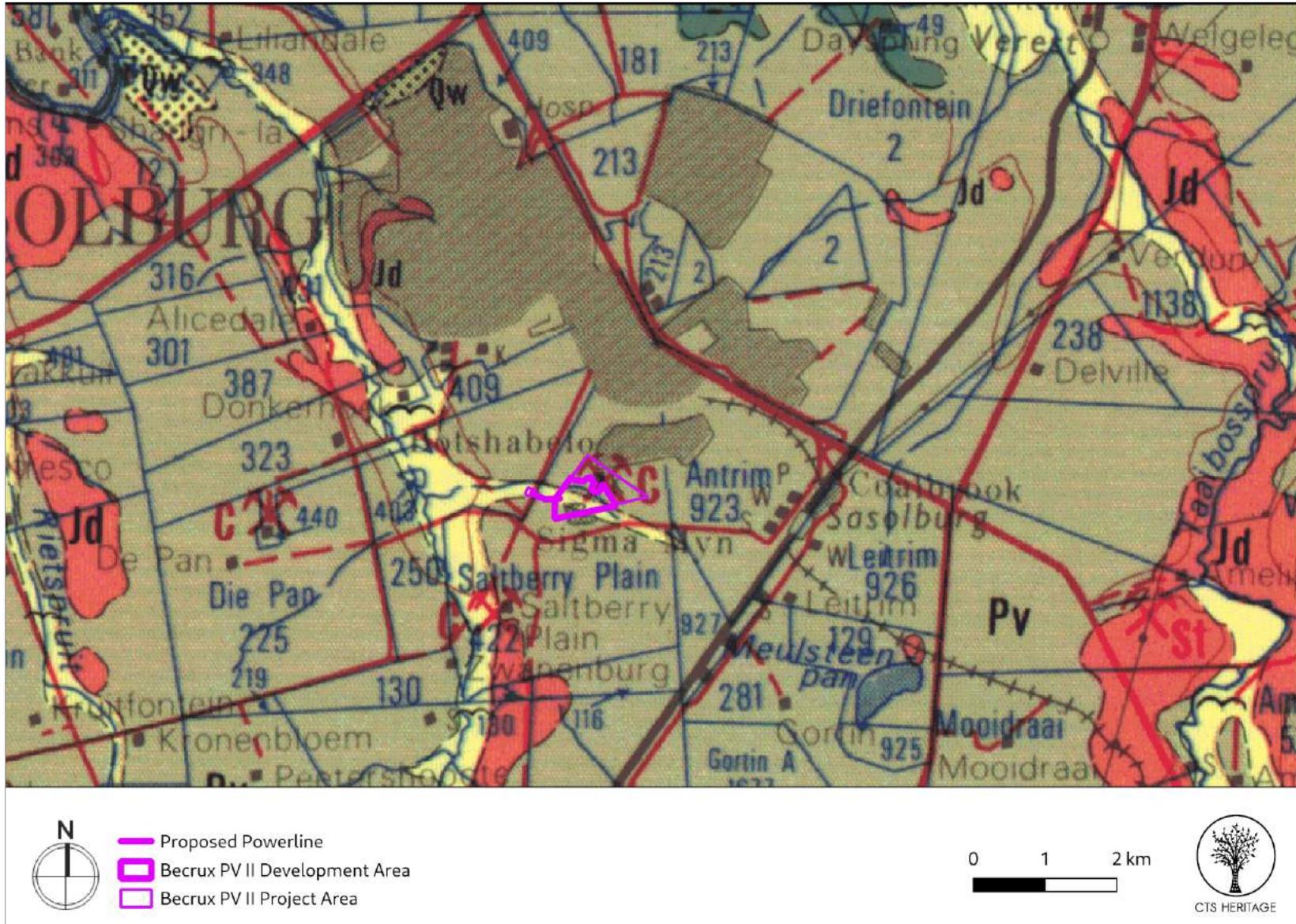


Figure 4b. Geology Map. Extract from the CGS 2626 West Rand Map indicating that the development area is underlain by the following sediments: Jd: Jurassic Dolerite and Pv: Vryheid Formation of the Ecca Group and Quaternary Sands



8. Heritage statement and character of the area

Background

Sasol Limited is an integrated energy and chemical company based in Sandton, South Africa. The company was formed in 1950 in Sasolburg, South Africa and has a large operation in Sasolburg and Secunda, Mpumalanga. The town of Sasolburg was established in 1954 to provide housing and other facilities for Sasol employees. The company issued a request for information (RFI) in May 2020 for the supply, by IPPs, of up to 600 MW of renewable energy to its South African operations. Sasol indicated on August 3, 2020 that the decision to issue an RFP for two 10 MW solar PV facilities represented the “first step” towards the group realising its commitment to eventually procure 600 MW of renewable- energy capacity. Chief sustainability officer Hermann Wenhold said the RFP also formed part of the group’s broader aspiration to reduce greenhouse gas emissions by 10% by 2030. Sasol is one of several large South African corporates to indicate that they intended to introduce renewable self-generation at their operations, with several mining companies also moving ahead with projects. The self-generation projects were being pursued to both bolster security of supply and improve tariff visibility in a context of steeply rising Eskom and municipal tariffs and an ongoing risk of load-shedding (Creamer 03 August 2020). Due to its strategic infrastructure, Sasolburg was subject to a number of attacks as part of the struggle against Apartheid. The strategic infrastructure at Sasolburg remains a National Key Point.

Cultural landscape and the Built Environment

The area proposed for development has been extensively previously disturbed through mining infrastructure (Becrux PV II is proposed to be located at the Sigma Mine - Figure 1d). The ground intended for the proposed 10MWac solar PV plant is immediately adjacent to the existing Sigma Coal Mine. The installation of a solar PV plant is therefore in keeping with the broader development character of the immediate surroundings which lie on the peri-urban edge of Sasolburg and the massive Sigma coal mine nearby to the east and northwest.

A number of monuments, burial grounds and significant historical structures are located within 10km of the development area (Figure 3) however none of these heritage resources are anticipated to be impacted directly or indirectly by the proposed development.

Archaeology

A number of archaeological and heritage impact assessments have been completed in the area as a result of the ongoing mining activity here. According to Higgitt et al. (2015, SAHRIS ID 349672), “Archaeologically, sites associated with the Stone Age have been identified in the local study area. Pistorius (2007) notes the numerous Stone Age sites discovered along the ancient banks of the Vaal and Klip Rivers at localities such as Klipplaatdrift, the Klip River Quarry site and the Duncanville Archaeological Reserve. Van Schalkwyk (1998) makes reference to the Vaal River basin and its association with the ESA. Here it is noted that the Vaal River gravels remain an important source of information on the ESA which is associated with the Oldowan and Acheulian industries.” In the broader area, Higgitt et al. (2015) note the presence of both Middle (Van Vollenhoven, 2008) and Later Stone Age archaeology (Fourie, 2007). Higgitt et al. (2015) also note that the rock engraving site of Leeuwkuil is located in the broader area. This site is described as being located on a small island in the Vaal River where engravings are concentrated on the south-eastern part of the peninsula. Eland and other antelope dominated the images depicted, which appeared to be in the San hunter-gatherer engraving tradition. Although the area proposed for development is located some distance (approximately 7km) from the Vaal River, there is a small tributary of the Vaal that runs adjacent to Becrux PV II.

According to SAHRIS, one archaeological site is located within 10km of the development area - SAHRIS Site ID 31991 on Farm Woodlands 407RD. This site is graded IIIB however no additional information about this site, no site description and no source for the information about this site is recorded along with the site recording on SAHRIS and as such, it is impossible to determine the accuracy of this information. Although the areas proposed for the development of Becrux PV II have been extensively previously disturbed, significant archaeological heritage is known from the broader area and as such, it is possible that the proposed development may negatively impact on similar archaeological heritage.



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Palaeontology

According to the SAHRIS Palaeosensitivity Map (Figure 4a), the area proposed for development is underlain by sediments of very high and moderate palaeontological sensitivity. According to the extract from the CGS 2626 West Rand Map, the moderately sensitive sediments underlying the development area are ascribed to Quaternary Sands. The very highly sensitive sediments are ascribed to the Vryheid Formation of the Ecca Group. According to a letter from Bamford (2019, SAHRIS ID 522976), the Vryheid Formation contains coal seams and fossil plant impressions of the Glossopteris flora. Bamford (2019) goes on to note that the coal seams in the Sigma Colliery are more than 150m below the surface and they are covered by mostly dolerite with some sandstone and sandstone intercalated with shale. There is no chance, therefore, of surface activities in this vicinity having any impact on palaeontology on the basis that this area has been disturbed by mining activities. Based on the information available, it is very unlikely that the proposed development of the 10MWac PV facility will negatively impact on significant palaeontological heritage; however it was recommended by Bamford (2019) in her letter that a Chance Fossil Finds Procedure be adopted. This recommendation is reiterated for this project.

RECOMMENDATION

It is unlikely that the proposed development will impact on significant archaeological and palaeontological heritage. However an HIA is required to assess impacts to these identified heritage resources and to provide appropriate mitigation measures to prevent negative impact.

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APPENDIX 1: List of heritage resources in proximity to the development area

Site ID	Site no	Full Site Name	Site Type	Grading
40221	Clydesdale North substation	Clydesdale North substation	Building	Grade IIIb
31991	2627DA1	Farm Woodlands 407RD	Archaeological	Grade IIIb
88846	VAALC014	Vaal Colliery 014	Burial Grounds & Graves	Grade IIIa
26409	9/2/335/0003	Muller House, Wonderfontein, Sasolburg District	Building	Grade IIIb
88822	VAALC002	Vaal Colliery 002	Building	Grade IIIa
34868	AME003	Frits Pistorius Memorial Cairn, Zamdela	Monuments & Memorials	Grade IIIa
34900	MOOI001	Moidraai 001	Burial Grounds & Graves	Grade IIIa
88833	VAALC012	Vaal Colliery 012	Building	Grade IIIa
34866	AME001	Amelia 001	Burial Grounds & Graves	Grade IIIa
34867	AME002	Amelia 002	Burial Grounds & Graves	Grade IIIa
137722	Old Farm school	Old Farm school	Monuments & Memorials	
34901	MOOI002	Moidraai 002	Building	Grade IIIb

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APPENDIX 2: Reference List

Heritage Impact Assessments				
Nid	Report Type	Author/s	Date	Title
6011	AIA Phase 1	Johnny Van Schalkwyk, M Naude	01/11/1996	A Survey of Cultural Resources in the Proposed Sigma Colliery North West Strip Mine, Sasolburg District, Free State Province
6014	AIA Phase 1	Cobus Dreyer	10/06/2005	First Phase Archaeological and Cultural Heritage Assessment of the Proposed Residential Developments at Amelia 518, Sasolburg
6015	AIA Phase 1	Karen Van Ryneveld	23/10/2007	Mooibraai Township Establishment (Zamdela Ext. 17), Portions of Portion 1 and the Remainder of the Farm Mooibraai 44, Sasolburg, Free State, South Africa
6016	AIA Phase 1	Polke Birkholtz	15/02/2008	Phase 1 Heritage Impact Assessment Proposed Lefapha Housing Development Situated on the Remaining Extent of the Farm Leitrim 926, Metsimaholo Local Municipality, Free State Province
7870	AIA Phase 1	Julius CC Pistorius	01/07/2008	A Phase I Heritage Impact Assessment Study for Sasol's Proposed New Gas and Liquid Pipelines (Along a Corridor) from Sasol Synfuels in Secunda (Mpumalanga) to Sasol Infrachem and Natref in Sasolburg (Free State) on the Highveld in the Republic of South Af
158942	Heritage Statement	Shahzaadee Karodia Khan, Johan Nel		HERITAGE STATEMENT FOR THE SASOL MINING SIGMA COLLIERY ASH BACKFILLING PROJECT, SASOLBURG, FREE STATE PROVINCE
177559	Heritage Statement	Justin du Piesanie	03/10/2014	
324834	Heritage Impact Assessment Specialist Reports	Natasha Higgitt, Justin du Piesanie	27/07/2015	Heritage Watching Brief Report for the Sasol Sigma Mooikraal 7Mâ,“ Pipeline

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APPENDIX 3 - Keys/Guides

Key/Guide to Acronyms

AIA	Archaeological Impact Assessment
DARD	Department of Agriculture and Rural Development (KwaZulu-Natal)
DEFF	Department of Environment, Forest and Fisheries (National)
DEADP	Department of Environmental Affairs and Development Planning (Western Cape)
DEDEAT	Department of Economic Development, Environmental Affairs and Tourism (Eastern Cape)
DEDECT	Department of Economic Development, Environment, Conservation and Tourism (North West)
DEDT	Department of Economic Development and Tourism (Mpumalanga)
DEDTEA	Department of economic Development, Tourism and Environmental Affairs (Free State)
DENC	Department of Environment and Nature Conservation (Northern Cape)
DMR	Department of Mineral Resources (National)
GDARD	Gauteng Department of Agriculture and Rural Development (Gauteng)
HIA	Heritage Impact Assessment
LEDET	Department of Economic Development, Environment and Tourism (Limpopo)
MPRDA	Mineral and Petroleum Resources Development Act, no 28 of 2002
NEMA	National Environmental Management Act, no 107 of 1998
NHRA	National Heritage Resources Act, no 25 of 1999
PIA	Palaeontological Impact Assessment
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
VIA	Visual Impact Assessment

Full guide to Palaeosensitivity Map legend

	RED:	VERY HIGH - field assessment and protocol for finds is required
	ORANGE/YELLOW:	HIGH - desktop study is required and based on the outcome of the desktop study, a field assessment is likely
	GREEN:	MODERATE - desktop study is required
	BLUE/PURPLE:	LOW - no palaeontological studies are required however a protocol for chance finds is required
	GREY:	INSIGNIFICANT/ZERO - no palaeontological studies are required
	WHITE/CLEAR:	UNKNOWN - these areas will require a minimum of a desktop study.

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APPENDIX 4 - Methodology

The Heritage Screener summarises the heritage impact assessments and studies previously undertaken within the area of the proposed development and its surroundings. Heritage resources identified in these reports are assessed by our team during the screening process.

The heritage resources will be described both in terms of **type**:

- Group 1: Archaeological, Underwater, Palaeontological and Geological sites, Meteorites, and Battlefields
- Group 2: Structures, Monuments and Memorials
- Group 3: Burial Grounds and Graves, Living Heritage, Sacred and Natural sites
- Group 4: Cultural Landscapes, Conservation Areas and Scenic routes

and **significance** (Grade I, II, IIIa, b or c, ungraded), as determined by the author of the original heritage impact assessment report or by formal grading and/or protection by the heritage authorities.

Sites identified and mapped during research projects will also be considered.

DETERMINATION OF THE EXTENT OF THE INCLUSION ZONE TO BE TAKEN INTO CONSIDERATION

The extent of the inclusion zone to be considered for the Heritage Screener will be determined by CTS based on:

- the size of the development,
- the number and outcome of previous surveys existing in the area
- the potential cumulative impact of the application.

The inclusion zone will be considered as the region within a maximum distance of 50 km from the boundary of the proposed development.

DETERMINATION OF THE PALAEOLOGICAL SENSITIVITY

The possible impact of the proposed development on palaeontological resources is gauged by:

- reviewing the fossil sensitivity maps available on the South African Heritage Resources Information System (SAHRIS)
- considering the nature of the proposed development
- when available, taking information provided by the applicant related to the geological background of the area into account

DETERMINATION OF THE COVERAGE RATING ASCRIBED TO A REPORT POLYGON

Each report assessed for the compilation of the Heritage Screener is colour-coded according to the level of coverage accomplished. The extent of the surveyed coverage is labeled in three categories, namely low, medium and high. In most instances the extent of the map corresponds to the extent of the development for which the specific report was undertaken.

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Low coverage will be used for:

- desktop studies where no field assessment of the area was undertaken;
- reports where the sites are listed and described but no GPS coordinates were provided.
- older reports with GPS coordinates with low accuracy ratings;
- reports where the entire property was mapped, but only a small/limited area was surveyed.
- uploads on the National Inventory which are not properly mapped.

Medium coverage will be used for

- reports for which a field survey was undertaken but the area was not extensively covered. This may apply to instances where some impediments did not allow for full coverage such as thick vegetation, etc.
- reports for which the entire property was mapped, but only a specific area was surveyed thoroughly. This is differentiated from low ratings listed above when these surveys cover up to around 50% of the property.

High coverage will be used for

- reports where the area highlighted in the map was extensively surveyed as shown by the GPS track coordinates. This category will also apply to permit reports.

RECOMMENDATION GUIDE

The Heritage Screener includes a set of recommendations to the applicant based on whether an impact on heritage resources is anticipated. One of three possible recommendations is formulated:

(1) The heritage resources in the area proposed for development are sufficiently recorded - The surveys undertaken in the area adequately captured the heritage resources. There are no known sites which require mitigation or management plans. No further heritage work is recommended for the proposed development.

This recommendation is made when:

- enough work has been undertaken in the area
- it is the professional opinion of CTS that the area has already been assessed adequately from a heritage perspective for the type of development proposed

(2) The heritage resources and the area proposed for development are only partially recorded - The surveys undertaken in the area have not adequately captured the heritage resources and/or there are sites which require mitigation or management plans. Further specific heritage work is recommended for the proposed development.

This recommendation is made in instances in which there are already some studies undertaken in the area and/or in the adjacent area for the proposed development. Further studies in a limited HIA may include:

- improvement on some components of the heritage assessments already undertaken, for instance with a renewed field survey and/or with a specific specialist for the type of heritage resources expected in the area
- compilation of a report for a component of a heritage impact assessment not already undertaken in the area

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- undertaking mitigation measures requested in previous assessments/records of decision.

(3) The heritage resources within the area proposed for the development have not been adequately surveyed yet - Few or no surveys have been undertaken in the area proposed for development. A full Heritage Impact Assessment with a detailed field component is recommended for the proposed development.

Note:

The responsibility for generating a response detailing the requirements for the development lies with the heritage authority. However, since the methodology utilised for the compilation of the Heritage Screeners is thorough and consistent, contradictory outcomes to the recommendations made by CTS should rarely occur. Should a discrepancy arise, CTS will immediately take up the matter with the heritage authority to clarify the dispute.

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