PALAEONTOLOGICAL IMPACT ASSESSMENT (PIA) for the proposed Kiara Solar PV1 Facility, Local Municipality, District Municipality , Northwest Province

FOR

CTS Heritage

DATE: 30 June 2022

By

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EXECUTIVE SUMMARY

Dr Gideon Groenewald was appointed to undertake a Phase 1 Palaeontological Assessment Survey and a site visit for the proposed Kiara Solar PV1 Facility in the rural area northeast of Lichtenburg in the Ditsobotla Local Municipality of the Ngaka Modiri Molema District Municipality in the North West Province.

This Phase 1 PIA Survey is done to prepare a “Chance Find Protocol” (CFP) document to assist with possible future field visits and to complete a Phase 2 PIA (if required) since the entire development is underlain by geological formations with an inferred Very High sensitivity for Palaeontological Heritage (SAHRIS Database).

This Palaeontological Assessment forms part of the Heritage Impact Assessment (HIA) and complies with the requirements of the South African National Heritage Resource Act No 25 of 1999 (revised 2017). In accordance with Section 38 of the National Resources Act No 25 of 1999 (Heritage Resources Management), a HIA is required to assess any potential impacts to palaeontological heritage within the development footprint.

Significant fossils are expected in areas where deep excavations (>1,5m) are planned for excavation in areas indicated in red on the palaeontological sensitivity map.

Dr Gideon Groenewald, a suitably qualified palaeontologist, was appointed to visit the site of the development on 20th June to 22nd June 2022. Most of the obvious stromatolite structures were recorded, but if more significant fossils are exposed during the lifetime of the project, the finds must be reported as soon as possible to the HIA team for collection and safe keeping of palaeontological heritage.

In areas underlain by the Malmani Subgroup, the field investigation confirmed the potential for the presence of fossils (Table 2), and most of the important fossil structures were recorded. If however, more unique examples of these fossils are recorded by the ECO, it will be imperative that a suitably qualified palaeontological specialist be appointed to do a Phase 2 PIA and to upgrade the “Chance Find Protocol” document. The CFP development must then be included as part of the EMPr of this project, to record all unexpected fossils associated with the geological formations on site.

It is recommended that:

- The EAP and ECO must be informed of the fact that a very high palaeontological sensitivity is allocated to the entire study area underlain by Monte Christo Formation.
- A uniquely well defined sinkhole depression is present on site and it is recommended that this specific site (Figure 6, GPS coordinates Kiara 12 sinkhole 26.028777° S 26.279019° E) be excluded from the development.
- **No further mitigation for palaeontological heritage is recommended for this project, unless excavation of deeper than 1,5m exposes uniquely well-defined fossils of stromatolites**
- Recommendations contained in this Phase 1 PIA must be approved by SAHRA for inclusion in the EMPr of the project

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INTRODUCTION

Dr Gideon Groenewald was appointed to undertake a Phase 1 Palaeontological Assessment Survey and a site visit for the proposed Kiara Solar PV1 Facility in the rural area northeast of Lichtenburg in the Ditsobotla Local Municipality of the Ngaka Modiri Molema District Municipality in the North West Province.

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Legal Requirements

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Categories of heritage resources recognised as part of the National Estate in Section 3 of the Heritage Resources Act, and which therefore fall under its protection, include:

- geological sites of scientific or cultural importance;
- objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens; and
- objects with the potential to yield information that will contribute to an understanding of South Africa’s natural or cultural heritage.

Aims and Methodology

A Phase 1 site investigation is often the only opportunity to record the fossil heritage within the development footprint. These records are very important to understand the past and form an important part of South Africa’s National Estate.

Following the “*SAHRA APM Guidelines: Minimum Standards for the Archaeological & Palaeontological Components of Impact Assessment Reports*” the aims of the palaeontological impact assessment are:

- to identify exposed and subsurface rock formations that are considered to be palaeontologically significant;
- to asses the level of palaeontological significance of these formations;
- to comment on the impact of the development on these exposed and/or potential fossil resources and
- to make recommendations as to how the developer should conserve or mitigate damage to these resources.

Prior to a field investigation, a preliminary assessment (desktop study) of the topography and geology of the study area was made using appropriate 1:250 000 geological information (2626 Westrand) in conjunction with Google Earth. Potential fossiliferous rock units (groups, formations etc.) are identified within the study area and the known fossil heritage within each rock unit is inventoried from the published scientific literature, previous palaeontological impact studies in the same region and the author's field experience.

Priority palaeontological areas are identified within the development footprint to focus the field investigator's time and resources. The aim of the desktop survey is to document any exposed fossil material and to assess the palaeontological potential of the region in terms of the type and extent of rock outcrop in the area.

The likely impact of the proposed development on local fossil heritage is determined on the basis of the palaeontological sensitivity of the rock units concerned and the nature and scale of the development itself, most notably the extent of fresh bedrock excavation envisaged. The different sensitivity classes used are explained in Table 1 below.

Table 1 Palaeontological sensitivity analysis outcome classification

PALAEONTOLOGICAL SIGNIFICANCE/VULNERABILITY OF ROCK UNITS	
The following colour scheme is proposed for the indication of palaeontological sensitivity classes. This classification of sensitivity is adapted from that of Almond et al (2008, 2009) (Groenewald et al., 2014).	
RED	Very high palaeontological sensitivity/ vulnerability. Development will most likely have a very significant impact on the palaeontological heritage of the region. Very high possibility that significant fossil assemblages will be present in all outcrops of the unit. Appointment of professional palaeontologist, desktop survey, Phase I Palaeontological Impact Assessment (PIA) (field survey and recording of fossils) and Phase II PIA (rescue of fossils during construction) as well as application for collection and destruction permit compulsory.
ORANGE	High palaeontological sensitivity/ vulnerability. High possibility that significant fossil assemblages will be present in most of the outcrop areas of the unit. Fossils most likely to occur in associated sediments or underlying units, for example in the areas underlain by Transvaal Supergroup dolomite where Cenozoic cave deposits are likely to occur. Appointment of professional palaeontologist, desktop survey and Phase I palaeontological impact assessment (field survey and collection of fossils) compulsory. Early application for collection permit recommended. Highly likely that a Phase II PIA will be applicable during the construction phase of projects.
GREEN	Moderate palaeontological sensitivity/ vulnerability. High possibility that fossils will be present in the outcrop areas of the unit or in associated sediments that underlie the unit. For example, areas underlain by the Gordonia Formation or undifferentiated soils and alluvium. Fossils described in the literature are visible with the naked eye and development can have a significant impact on the palaeontological heritage of the area. Recording of fossils will contribute significantly to the present knowledge of the development of life in the geological record of the region. Appointment of a professional palaeontologist, desktop survey and Phase I PIA (ground proofing of desktop survey) recommended.
BLUE	Low palaeontological sensitivity/ vulnerability. Low possibility that fossils that are described in the literature will be visible to the naked eye or be recognized as fossils by untrained persons. Fossils of for example small domal Stromatolites as well as micro-bacteria are associated with these rock units.

	Fossils of micro-bacteria are extremely important for our understanding of the development of life, but are only visible under large magnification. Recording of the fossils will contribute significantly to the present knowledge and understanding of the development of life in the region. Where geological units are allocated a blue colour of significance, and the geological unit is surrounded by highly significant geological units (red or orange coloured units), a palaeontologist must be appointed to do a desktop survey and to make professional recommendations on the impact of development on significant palaeontological finds that might occur in the unit that is allocated a blue colour. An example of this scenario will be where the scale of mapping on the 1:250 000 scale maps excludes small outcrops of highly significant sedimentary rock units occurring in larger alluvium deposits. At least one site visit by a competent palaeontologist is compulsory. Collection of a representative sample of potential fossiliferous material is recommended.
GREY	Very low palaeontological sensitivity/ vulnerability. Very low possibility that significant fossils will be present in the bedrock of these geological units. The rock units are associated with intrusive igneous activities and no life would have been possible during intrusion of the rocks. It is however essential to note that the geological units mapped out on the geological maps are invariably overlain by Cenozoic aged sediments that might contain significant fossil assemblages and archaeological material. Examples of significant finds occur in areas underlain by granite, just to the west of Hoedspruit in the Limpopo Province, where significant assemblages of fossils and clay-pot fragments are associated with large termite mounds. Where geological units are allocated a grey colour of significance, and the geological unit is surrounded by very high and highly significant geological units (red or orange coloured units), a palaeontologist must be appointed to do a desktop survey and to make professional recommendations on the impact of development on significant palaeontological finds that might occur in the unit that is allocated a grey colour. An example of this scenario will be where the scale of mapping on the 1:250 000 scale maps excludes small outcrops of highly significant sedimentary rock units occurring in dolerite sill outcrops. It is important that the report should also refer to archaeological reports and possible descriptions of palaeontological finds in Cenozoic aged surface deposits. At least one site visit by a suitably qualified palaeontologist is recommended.

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

Scope and Limitations of the Phase 1 Investigation

The scope of a Phase 1 Investigation includes:

- an analysis of the area's stratigraphy, age and depositional setting of fossil-bearing units;
- a review of all relevant palaeontological and geological literature, including geological maps, and previous palaeontological impact reports;
- data on the proposed development provided by the developer (e.g. location of footprint, depth and volume of bedrock excavation envisaged); where feasible, location and examination of any fossil collections from the study area (e.g. museums); and
- an on-site investigation to assess the identified palaeontological sensitive areas within the development footprint/ study area, including a formal palaeontological collection if fossils are of collectable quality. The investigation focuses on the bedrock exposure where excavations would most probably require palaeontological monitoring.

The results of the field investigation are used to predict the potential of buried fossil heritage within the development footprint. In some investigations, (as in this study), this involves the examination of similar accessible bedrock exposures, such as road cuttings and quarries, along roads that run parallel to or across the development footprint.

Locality and Proposed Development

The Kiara Solar PV1 Facility falls in the rural area northeast of Lichtenburg in the Ditsobotla Local Municipality of the Ngaka Modiri Molema District Municipality in the North West Province (Figure 1).

According to the Scoping report su[pplied “The Applicant, Voltalia South Africa (Pty) Ltd, is proposing the construction of a photovoltaic (PV) solar energy facility (known as the Kiara PV 1 facility) located on a site approximately 16km north east of the town of Lichtenburg in the North West Province. The solar PV facility will comprise several arrays of PV panels and associated infrastructure, and will have a contracted capacity of up to 100MW.”

“Six additional PV facilities (Kiara PV 2, Kiara PV 3, Kiara PV 4, Kiara PV 5, Kiara PV 6, Kiara PV 7) are concurrently being considered on the project site (within Portion 2 of the FarmHollaagte 8 and the Remaining Extent of the Farm Hollaagte No. 8) and are assessed through separate Environmental Impact Assessment (EIA) processes. A facility development area (approximately 165ha) as well as grid connection solution have been considered in the Scoping phase. The infrastructure associated with this PV facility includes:- PV modules and mounting structures- Inverters and transformers- Battery Energy Storage System (BESS)- Site and internal access roads (up to 8m wide)- Site offices and maintenance buildings, including workshop areas for maintenance and storage- Temporary and permanent laydown area- Grid connection solution will include:- Facility Substation- Eskom Switching StationA 275kV powerline (16.6km in length) (either single or double circuit), to connect the PV facility to the Watershed MTS”.

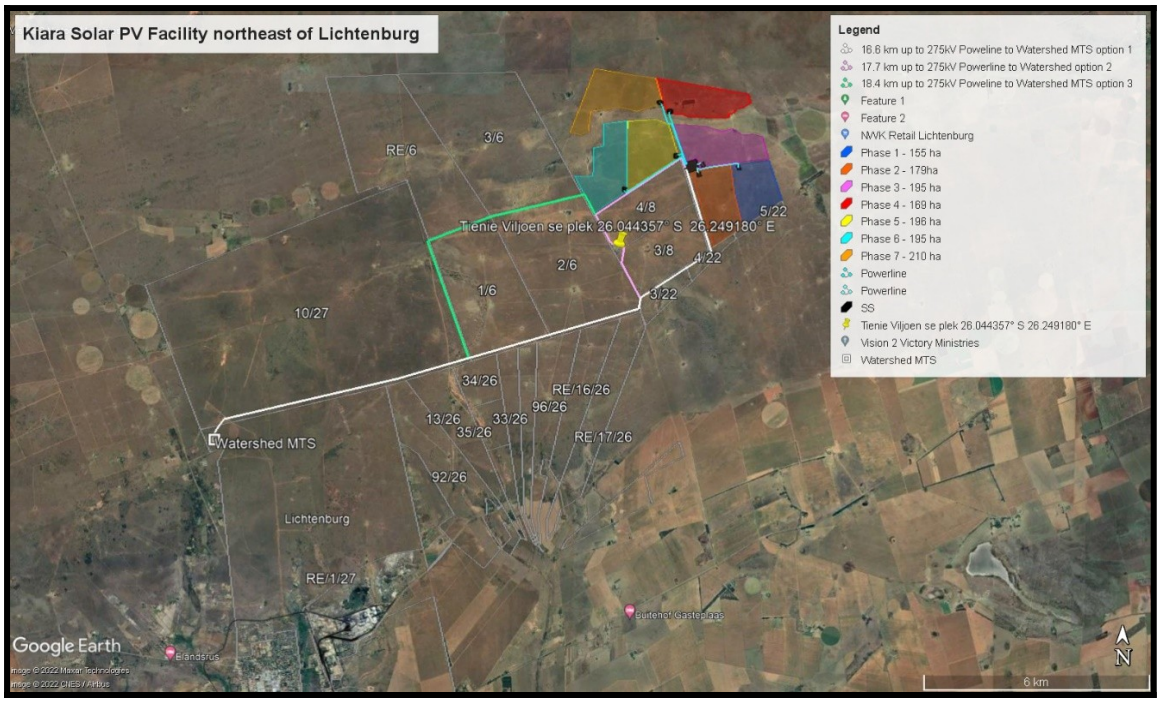


Figure 1 Locality and layout of the Kiara Solar PV1 Facility

GEOLOGY

The study area is underlain predominantly by Vaalian aged rocks of the, Chuniespoort Group of the Transvaal Supergroup (Figure 2).

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

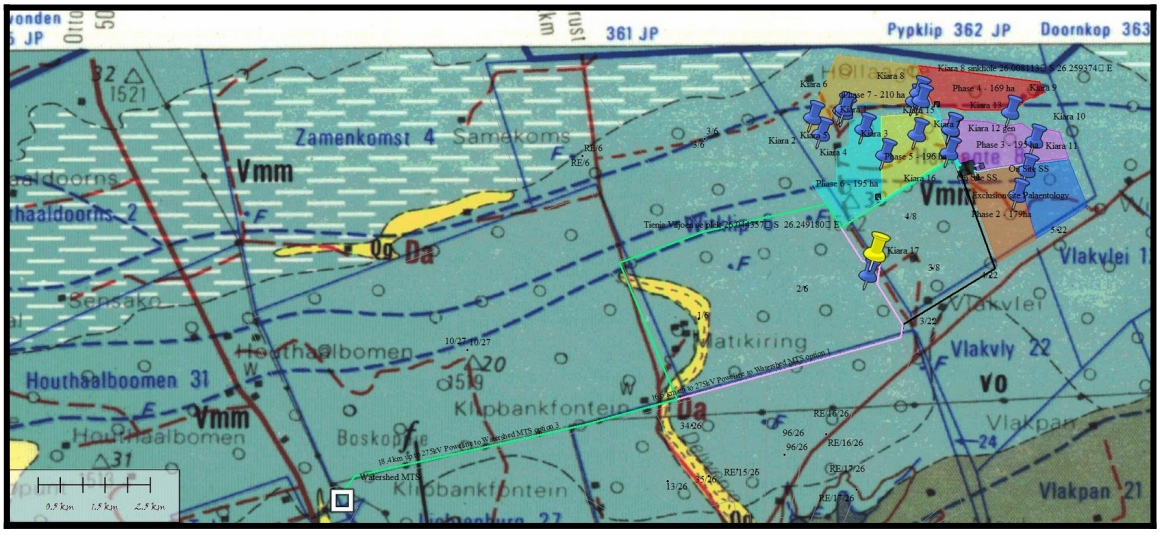


Figure 2 The entire study area is underlain by chert-rich dolomite of the Monte Christo Formation, Malmani Subgroup, Chuniespoort Group of the Transvaal Supergoup

Rub

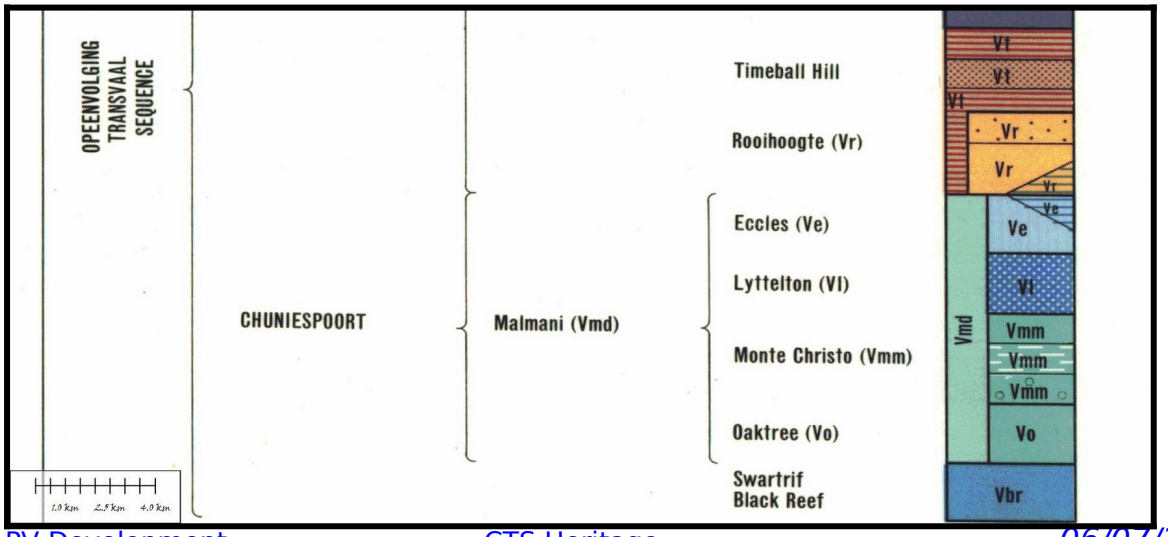


Figure 3 Geological legend for the study area. The entire site is underlain by dolomate of the Monte Christo Formation.

Transvaal Supergroup

Chuniespoort Group

Malmani Subgroup

Monte Christo Formation

Stromatolitic carbonates (limestones / dolomites), minor secondary cherts, mudrocks including carbonaceous shales (Groenewald et al, 2014, Johnson et al 2006; MacRae 1999; Obbes, 1995; Khasi, 2020).

The Monte Christo Formation is known for the presence of well-defined karst topopgraphy with evidence of sinkhole formation as well as cave breccia present in the surface deposits associated with local depressions in the landscape (see Table 2).

PALAEONTOLOGY

Following the summaries of Groenewald et al (2014) the study area has an overall high to very high sensitivity for Palaeontological heritage (Figure 4). The following discussion refers to available literature surveys and summaries in terms of the fossil heritage of the Monte Christo Formation other units underlying the Kiara Solar PV1 development.

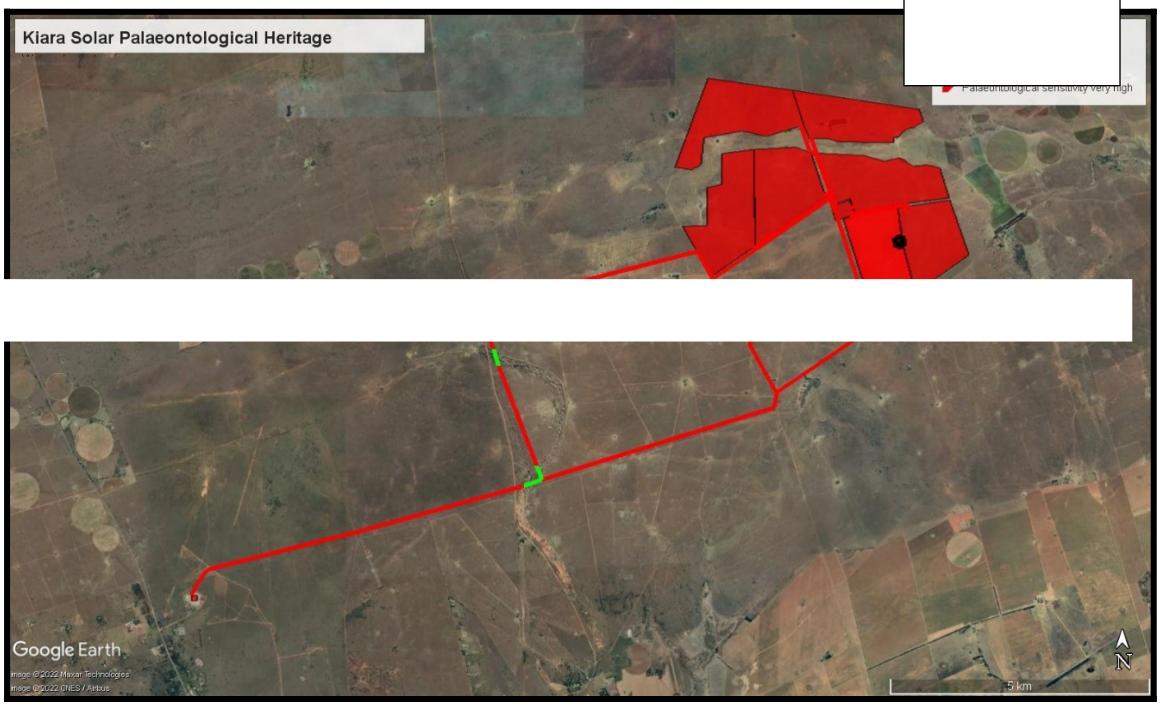
The valuable palaeo-environmental information that can be gained from studies of stromatoltic structures contributres significantly towards our understanding of the geological history of the study area (MacRae, 1999; McCarthy and Rubidge, 2005).

Transvaal Supergroup,

Chuniespoort Group, Malmani Subgroup

Monte Christo Formation

The Monte Christo Formation contains a range of shallow marine to intertidal stromatolites (domes, columns etc), organic-walled microfossils and oolitic chert beds, with some of the best examples of stromatolite structures of Vaalian age (MacRae, 1999; McCarthy and Rubidge, 2005).



Less well-known and seldom recorded in this region, are bone-bearing breccias, calc tufa (flowstones, speleothems), colluvial and alluvial gravels, collapse debris, “cave earth” and other cave deposits. These deposits are comparable with Late Pliocene to Late Pleistocene and Holocene (< 3 Ma) cave sites. e.g. Sterkfontein Formation to the East. These deposits are known to be of Pliocene (3.6 / 3.2 Ma) to Late Pleistocene age.

PRELIMINARY ASSESSMENT RESULTS

The palaeontological sensitivity was predicted after identifying potentially fossiliferous rock units; ascertaining the fossil heritage from the literature and evaluating the nature and scale of the development itself. The palaeontological sensitivity was predicted as very highly significant, due to the potential abundance of Permian aged fossils in the Malmani Subgroup.

FIELD INVESTIGATIONS

Dr Gideon Groenewald, experienced fieldworker, and the landowner Mr Tienie Viljoen, visited the site of the proposed Kiara Solar PV1 Facility on Monday 20th June to Wednesday 22nd June 2022.

The topography of the area is typically slightly undulating with very broad valleys and extended middle slopes that give an impression of a “flat” landscape.

Isolated sinkhole depressions are the only sites with obviously more rugged topography where the vegetation changes from pure grassland

Field investigation confirmed that excavations for the new developments will expose chert-rich dolomite of the Monte Christo Formation, Malmani Subgroup.

Photographic recordings of geological information and fossils occurring in the outcrops at specific localities (Figure 5) are presented in Table 2 below. These photographic recordings might be the only records of Palaeontological heritage for this project. In cases where deep excavation (>1,5m) are planned for solar panel stands (geotechnical reports), the author expects that the chance find of well-preserved, significant fossils in this environment is high.

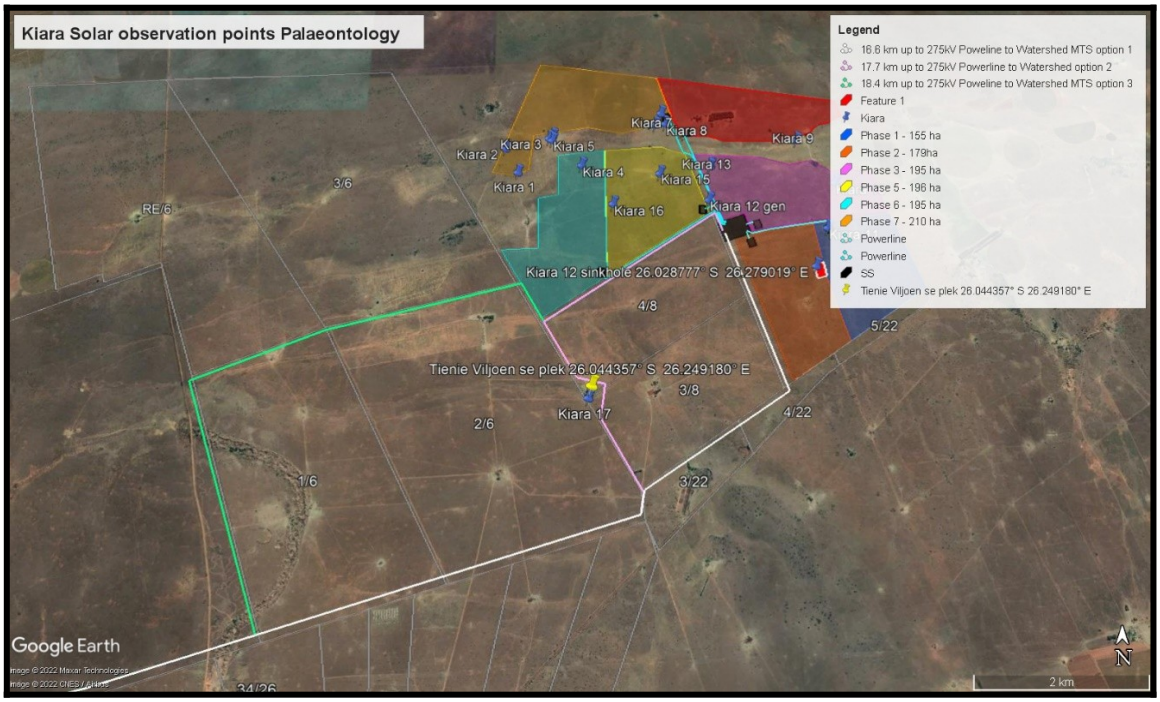


Figure 5 Observation points where photographic recordings is listed in Table 2

Table 2 Photographic recordings in the study area

Photo	(GPS station) Coordinates	Comments	Photographic Record

Y open plains	26.016386° S 26.239859° E	The study site is characterised by open plain grassland, underlain by dolomite with resulting karts topography and local breccia of the Monte Christo Formation	
Kiara 1	26.016386° S 26.239859° E	Breccia associated with cave deposits in the study area. The breccia can be associated with bone fossils of Pliocene to Late Pleistocene age	
Kiara 1	26.016386° S 26.239859° E	Very well-defined small-scale (100mm) dome-like stromatolite structures associated with chert layers in the Monte Christo Formation	
Kiara 1	26.016386° S 26.239859° E	Stromatolite structures (50mm) forming well-defined small domes in profile.	
Kiara 1	26.016386° S 26.239859° E	Oolitic chert beds indicating rich marine life during deposition of the Monte Christo Formation.	
Kiara 2	26.013083°S 26.238136°E	Breccia associated with possible sinkhole cave formations. No fossils were observed, but it is important that the ECO is vigilant and know what to look for in these deposits.	

Kiara 3	26.011662°S 26.244038°E	Very deeply weathered dolomite of the Monte Christo Formation. Significant stromatolites observed in dolomite blocks used as building material on site.	
Kiara 6	26.011294° S 26.244510°E	Well-defined stromatolite in dolomite of the Monte Christo Formation on site.	
Kiara 5	26.011942°S 26.244462°E	Deeply weathered dolomite of the Monte Christo Formation. Typically open grassland region.	
Kiara 6	26.011294° S 26.244510°E	Small scale stromatolites in dolomite.	
Kiara 6	26.011294° S 26.244510°E	Secondary cement in fractures associated with possible desiccation features in dolomite.	

Kiara 7	26.009737°S 26.258551°E	Deeply weathered dolomite of the Monte Christo Formation with deep red Hutton soils. Typical topographic setting on site of the solar farm.	
Kiara 4	26.015404°S 26.248452°°E	Sub-outcrop of dolomite with deep soil formation over the larger part of the study area. No outcrop, no fossils observed.	
Kiara 8	26.009614°S 26.259915°E	Well-developed cave breccia with associated depression caused by karst topographic features (see Kiara 8 sinkhole) .	
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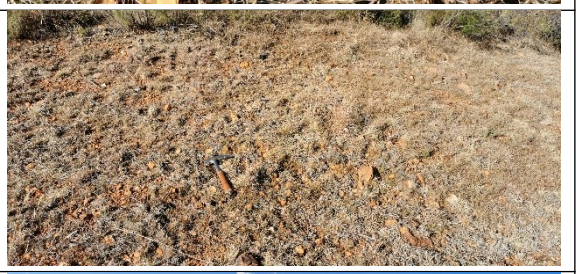
Kiara 8 Sinkhole	26.008113° S 26.259374° E	Large white stinkwood tree (*Celtis africana*) growing in a depression caused by kast topography as a result of sinkhole formation in the Monte Christo Formation	
Kiara 8 Sinkhole	26.008113° S 26.259374° E	Large woody vegetation associated with a depression caused by karst topography as a result of sinkhole formation in the Monte Christo Formation. Wild Olive (Olea capensis) and White Stinkwood (Celtis africana).	
Kiara 9	26.011931°S 26.277686°E	Stromatolitic dolomite of the Monte Christo Formation.	
Kiara 9	26.011931°S 26.277686°E	Weathered stromatolite structures in dolomite. These structures are common in the Malmani Subgroup and although construction of the solar development will destroy some of the structures, it will not have a significantly negative impact.	
Kiara 9	26.011931°S 26.277686°E	Micro stromatolitic structures and breccia in dolomite and chert beds of the Monte Christo Formation.	
Kiara 10	26.017790° S 26.282440° E	Typical extended grassland on shallow soils. Excavation for panel stand foundations will most probably expose some well-defined stromalites.	

Kiara 11	26.282440° S 26.280948° E	Breccia and fractured dolomite over extensive plains. No fossils observed but it is highly likely that deep excavation (>1,5m) will expose stromatolitic dolomite.	
Kiara 12	26.028777° S 26.279019° E	Stromatolitic dolomite of the Monte Christo Formation in a well-defined sinkhole depression in the study area. The unique setting of this micro-ecosystem warrants exclusion of the site from development	
Kiara 12	26.028777° S 26.279019° E	Well-defined stromatolite structure in dolomite at the sinkhole depression.	
Kiara 12	26.028777° S 26.279019° E	Artefact at the sinkhole shelter on site.	
Kiara 12	26.028777° S 26.279019° E	Karst topography due to sinkhole formation in the Monte Christo Formation. This unique setting warrants recommendation for exclusion from development.	

Kiara 12	26.028777° S 26.279019° E	Unique algal growth on ripple laminated surface in the Monte Christo Formation dolomite. This structure needs further studies and is only recorded as “problematica” at this stage.	
Kiara 12	26.028777° S 26.279019° E	Well-defined stromatolites, albeit weathered, in the Monto Christo Formation at Kiara 12. Exclusion of the site will have a minimum impact on the development and a major positive impact on Palaeontological Heritage.	
Kiara 12 Gen	26.020145° S 26.265417° E	Fractured dolomite – outcrop of potential cave breccia on site	
Kiara 13,14	26.015552° S 26.265763° E	Extended grassveld with very few outcrops. Assumption that most of this part of the development site is underlain by brecciated dolomite with very few stromatolites in situ.	

Kiara 15	26.016534° S 26.258985° E	Fractured dolomite. Very small chance of stromatolite exposures but cave breccia might contain significant remains of Hominin fossils.	
Kiara 16	26.020657° S 26.252639° E	Plains of open grassland, deeply weathered dolomite and chance find of stromatolites during excavation of deeper than 1,5m very high	
Kiara 17	26.044926° S 26.249256° E	Examples of well-defined stromatolites in dolomite used for building material on the farm	
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PALAEONTOLOGICAL IMPACT AND MITIGATION

The predicted palaeontological impact (Figure 6) of the development is based on the initial mapping assessment and literature reviews, as well as information gathered during the field investigation (Table 2).

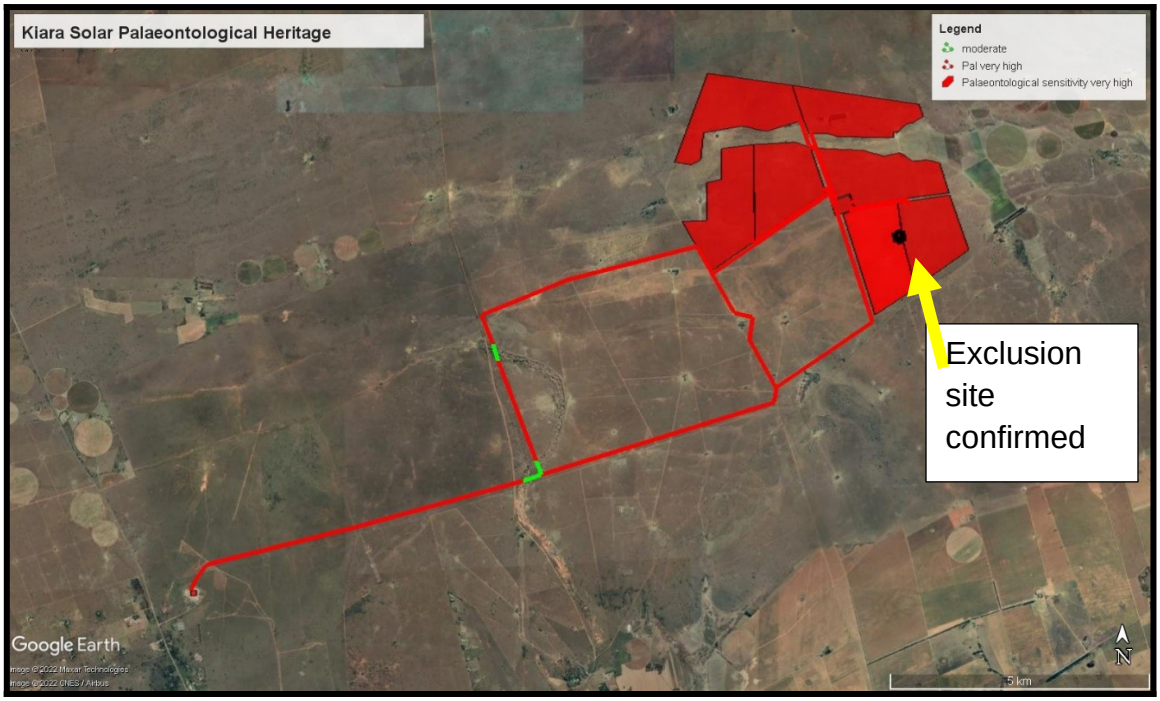

Figure 6 Confirmed very high sensitivity for Palaeontological Heritage. One site (indicated), is recommended for exclusion from the development

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

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

The excavations for the construction of the proposed Kiara Solar PV1 Facility will most probably expose some sediments that are very highly sensitive geological formations and some sites revealed evidence of very highly significant remains of fossils. A significant part of the excavation project will cut into rocks of the Malmani Subgroup, Chuniespoort Group of the Transvaal Supergroup. This unit has a very high sensitivity for palaeontological heritage and the ECO must be on the lookout for significant remains of stromatolites. Due to the large number of examples of stromatolites recorded during this field survey, it is the professional

opinion of the author that the ECO and dedicated environmental officers must be vigilant in recording some of the unique and extremely well preserved examples of these structures, where applicable. If the recommended area is excluded from the development, it is essential that only uniquely defined and preserved fossils is collected for further studies.

CONCLUSIONS

The development site applicable to the application for the proposed Kiara Solar PV1 Facility in the rural area northeast of Lichtenburg in the Ditsobotla Local Municipality of the Ngaka Modiri Molema District Municipality in the North West Province is underlain by Devonian aged sandstone and mudstones with a very high palaeontological sensitivity.

Significant fossils are expected in areas where deep excavations (>1,5m) are planned for excavation in areas indicated in red on the palaeontological sensitivity map.

Dr Gideon Groenewald, a suitably qualified palaeontologist, was appointed to visit the site of the development on 20th June to 22nd June 2022. Most of the obvious stromatolite structures were recorded, but if more significant fossils are exposed during the lifetime of the project, the finds must be reported as soon as possible to the HIA team for collection and safe keeping of palaeontological heritage.

In areas underlain by the Malmani Subgroup, the field investigation confirmed the potential for the presence of fossils (Table 2), and most of the important fossil structures were recorded. If however, more unique examples of these fossils are recorded by the ECO, it will be imperative that a suitably qualified palaeontological specialist be appointed to do a Phase 2 PIA and to upgrade the “Chance Find Protocol” document. The CFP development must then be included as part of the EMPr of this project, to record all unexpected fossils associated with the geological formations on site.

It is recommended that:

- The EAP and ECO must be informed of the fact that a very high palaeontological sensitivity is allocated to the entire study area underlain by Monte Christo Formation.
- A uniquely well defined sinkhole depression is present on site and it is recommended that this specific site (Figure 6, GPS coordinates Kiara 12

sinkhole 26.028777° S 26.279019° E) be excluded from the development.

- **No further mitigation for palaeontological heritage is recommended for this project, unless excavation of deeper than 1,5m exposes uniquely well-defined fossils of stromatolites.**.
- Recommendations contained in this Phase 1 PIA must be approved by SAHRA for inclusion in the EMPr of the project.

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QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR

Dr Gideon Groenewald has a PhD in Geology from the University of Port Elizabeth (Nelson Mandela Metropolitan University) (1996) and the National Diploma in Nature Conservation from Technicon RSA (the University of South Africa) (1989). He specialises in research on South African Permian and Triassic sedimentology and macrofossils with an interest in biostratigraphy, and palaeo-ecological aspects. He has extensive experience in the locating of fossil material in the Karoo Supergroup and has more than 20 years of experience in locating, collecting and curating fossils, including exploration field trips in search of new localities in the southern, western, eastern and north-eastern parts of the country. His publication record includes multiple articles in internationally recognized journals. Dr Groenewald is accredited by the Palaeontological Society of Southern Africa (society member for 25 years).

DECLARATION OF INDEPENDENCE

I, Gideon Groenewald, declare that I am an independent specialist consultant and have no financial, personal or other interest in the proposed development, nor the developers or any of their subsidiaries, apart from fair remuneration for work performed in the delivery of palaeontological heritage assessment services. There are no circumstances that compromise the objectivity of my performing such work.

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