Appendix D3b: Updated Palaeontological Assessment/Addendum (2017 revision)

RECOMMENDED EXEMPTION FROM FURTHER PALAEONTOLOGICAL STUDIES & MITIGATION:

PROPOSED VANRHYNSDORP ROMA SOLAR PLANT, NEAR VANRHYNSDORP, WESTERN CAPE

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EXECUTIVE SUMMARY

Roma Energy Vanrhynsdorp (Pty) Ltd is proposing to construct a 5 MW Photovoltaic (PV) Energy Generation Facility, the Vanrhynsdorp Roma Solar Plant, on De Duinen Remainder of Farm 258, situated on the north-eastern outskirts of Vanrhynsdorp, Western Cape. The study area is underlain by weathered and highly deformed metasediments of the Gariep Supergroup (possibly Aties Formation) that are mantled by calcareous and gypsiferous soils. Both the bedrocks and overlying superficial sediments are of low palaeontological sensitivity. The overall palaeontological impact significance of the proposed Vanrhynsdorp Roma Solar Plant development on fossil heritage is considered to be LOW because:

- The study area is mantled by superficial sands of low palaeontological sensitivity;
- Extensive, deep excavations are unlikely to be involved in this sort of solar park project.

It is therefore recommended that, pending the exposure of significant new fossils during development, exemption from further specialist palaeontological studies and mitigation be granted for this solar plant development.

There are no objections on palaeontological heritage grounds to authorisation of the proposed power plant. Should any substantial fossil remains (*e.g.* vertebrate bones and teeth, shells, calcretised burrows) be encountered during excavation, however, these should be reported to Heritage Western Cape for possible mitigation by a professional palaeontologist (Contact details: Protea Assurance Building, Green Market Square, Cape Town 8000. Private Bag X9067, Cape Town 8001. Tel: 086-142 142. Fax: 021-483 9842. Email: hwc@pgwc.gov.za).

The only studies located that deal specifically with potential palaeontological impacts in the Vanrhysdorp region are those for gypsum and limestone mining developments by Almond (2011a, 2011b, in prep. 2017). In general, the anticipated impact significance on local fossil heritage of developments proposed in the Vanrhynsdorp region is rated as low. It is concluded that cumulative impacts on the very sparse local fossil assemblages posed by the Vanrhynsdorp Keren Solar Plant and other developments in the Vanrhynsdorp region is low.

1. OUTLINE OF DEVELOPMENT

Roma Energy Vanrhynsdorp (Pty) Ltd is proposing to construct a 5 MW Photovoltaic (PV) Energy Generation Facility, the Vanrhynsdorp Roma Solar Plant, on De Duinen Remainder of Farm 258, situated on the north-eastern outskirts of Vanrhynsdorp, Western Cape.

The proposed activity entails the construction of about 18540 Solar modules with a footprint of less than 20 ha. The PV panels will be mounted on pedestals drilled and set into the ground. Extensive bedrock excavations are not envisaged, but some vegetation will need to be cleared from the site. Associated infrastructure includes a perimeter access road, single track internal access roads, trenches for underground cables, 2 to 4 transformer pads, a switching station, a maintenance shed, and a temporary construction camp.

The present palaeontological heritage comment has been commissioned by EnviroAfrica cc, Somerset West as part of a comprehensive Heritage Impact Assessment of the proposed development (Contact details: Mr Bernard de Witt, EnviroAfrica cc, P. O. Box 5367, Helderberg, 7135; 29 St James St, Somerset West; mobile: +27 82 4489991; tel: +27 21 851 1616; fax: 086203308).

1.1. Legislative Framework

The present palaeontological heritage assessment report contributes to the consolidated Heritage Impact Assessment for the proposed solar plant and falls under the South African Heritage Resources Act (Act No. 25 of 1999). It will also inform the Environmental Management Programme (EMPr) for this alternative energy project.

The various categories of heritage resources recognised as part of the National Estate in Section 3 of the National Heritage Resources Act include, among others:

- geological sites of scientific or cultural importance;
- palaeontological sites; and
- palaeontological objects and material, meteorites and rare geological specimens.

According to Section 35 of the National Heritage Resources Act, dealing with archaeology, palaeontology and meteorites:

(1) The protection of archaeological and palaeontological sites and material and meteorites is the responsibility of a provincial heritage resources authority.
(2) All archaeological objects, palaeontological material and meteorites are the property of the State.
(3) Any person who discovers archaeological or palaeontological objects or material or a meteorite in the course of development or agricultural activity must immediately report the find to the responsible heritage resources authority, or to the nearest local authority offices or museum, which must immediately notify such heritage resources authority.
(4) No person may, without a permit issued by the responsible heritage resources authority—
  (a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;
  (b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;
  (c) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or
  (d) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites.

(5) When the responsible heritage resources authority has reasonable cause to believe that any activity or development which will destroy, damage or alter any archaeological or palaeontological site is under way, and where no application for a permit has been submitted and no heritage resources management procedure in terms of section 38 has been followed, it may—

(a) serve on the owner or occupier of the site or on the person undertaking such development an order for the development to cease immediately for such period as is specified in the order;

(b) carry out an investigation for the purpose of obtaining information on whether or not an archaeological or palaeontological site exists and whether mitigation is necessary;

(c) if mitigation is deemed by the heritage resources authority to be necessary, assist the person on whom the order has been served under paragraph *(a)* to apply for a permit as required in subsection (4); and

(d) recover the costs of such investigation from the owner or occupier of the land on which it is believed an archaeological or palaeontological site is located or from the person proposing to undertake the development if no application for a permit is received within two weeks of the order being served.

Minimum standards for the palaeontological component of heritage impact assessment reports (PIAs) have been published by Heritage Western Cape, HWC (2016) and the South African Heritage Resources Agency, SAHRA (2013).

1.1. Study approach and methodology

Due to (1) the small footprint of the proposed solar plant development as well as (2) the inferred very low palaeontological sensitivity of the study area - based on previous desktop and field-based assessments by the author and others in the region (*e.g.* Almond 2011a, 2011b, in prep. 2017), only a desktop palaeontological impact assessment is submitted here.

In preparing a palaeontological desktop study the potentially fossiliferous rock units (groups, formations *etc.*) represented within the study area are determined from geological maps and satellite images. 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 (Consultation with professional colleagues as well as examination of institutional fossil collections may play a role here, or later following field assessment during the compilation of the final report). This data is then used to assess the palaeontological sensitivity of each rock unit to development (provisional tabulations of palaeontological sensitivity of all formations in the Northern Cape have already been compiled by Almond & Pether (2008); see also the palaeosensitivity maps provided on the SAHRIS website). The likely impacts of the proposed development on local fossil heritage are then determined on the basis of (1) the palaeontological sensitivity of the rock units concerned and (2) the nature and scale of the development itself, most significantly the extent of fresh bedrock excavation envisaged. When rock units of moderate to high palaeontological sensitivity are present within the development footprint, a Phase 1 field-based assessment study by a professional palaeontologist is usually warranted to identify any palaeontological hotspots and make specific recommendations for any mitigation or monitoring required before or during the construction phase of the development.

1.3. Limitations of this study

The accuracy and reliability of palaeontological specialist studies as components of heritage impact assessments are generally limited by the following constraints:

1. Inadequate database for fossil heritage for much of the RSA, given the large size of the country and the small number of professional palaeontologists carrying out fieldwork here. Most development study areas have never been surveyed by a palaeontologist.

2. Variable accuracy of geological maps which underpin these desktop studies. For large areas of terrain these maps are largely based on aerial photographs alone, without ground-truthing. The maps generally depict only significant ("mappable") bedrock units as well as major areas of superficial "drift" deposits (alluvium, colluvium) but for most regions give little or no idea of the level of bedrock outcrop, depth of superficial cover (soil *etc*), degree of bedrock weathering or levels of small-scale tectonic deformation, such as cleavage. All of these factors may have a major influence on the impact significance of a given development on fossil heritage and can only be reliably assessed in the field.

3. Inadequate sheet explanations for geological maps, with little or no attention paid to palaeontological issues in many cases, including poor locality information.

4. The extensive relevant palaeontological "grey literature" - in the form of unpublished university theses, impact studies and other reports (*e.g.* of commercial mining companies) - that is not readily available for desktop studies.

5. Absence of a comprehensive computerized database of fossil collections in major RSA institutions which can be consulted for impact studies. A Karoo fossil vertebrate database is now accessible for impact study work.

In the case of palaeontological desktop studies without supporting Phase 1 field assessments these limitations may variously lead to either:

a) *underestimation* of the palaeontological significance of a given study area due to ignorance of significant recorded or unrecorded fossils preserved there, or

b) *overestimation* of the palaeontological sensitivity of a study area, for example when originally rich fossil assemblages inferred from geological maps have in fact been destroyed by tectonism or weathering, or are buried beneath a thick mantle of unfossiliferous "drift" (soil, alluvium *etc*).

Since most areas of the RSA have not been studied palaeontologically, a palaeontological desktop study usually entails *inferring* the presence of buried fossil heritage within the study area from relevant fossil data collected from similar or the same rock units elsewhere, sometimes at localities far away. Where substantial exposures of bedrocks or potentially fossiliferous superficial sediments are present in the study area, the reliability of a palaeontological impact assessment may be significantly enhanced through field assessment by a professional palaeontologist.

In the case of the present study area near Vanrhynsdorp in the Northern Cape, preservation of potentially fossiliferous bedrocks is favoured by the semi-arid climate and sparse vegetation. However, high rates of subsurface weathering are retained from more pluvial periods in the past, as witnessed by the mantle of deeply-weathered saprolite commonly encountered in the Knersvlakte region. Fresh bedrock exposure is also constrained by extensive superficial deposits, such as surface gravels and soils, and there has been little formal palaeontological fieldwork in this area. Confidence levels for this impact assessment are nevertheless rated as *medium to high.*

2. GEOLOGICAL BACKGROUND

The proposed Vanrhynsdorp solar plant study area, De Duinen Remainder of Farm 258 (31° 35' S, 18° 45' E), is on flat, semi-arid sandy terrain of the southern Knersvlake region, between the courses of the Langkloofrivier that flows through Vanrhynsdorp and the Droërivier that flows to the north (Fig. 2). The area lies at c. 150 m amsl and lies just north of the airstrips on the north-eastern outskirts of town. The N1 trunk road to Namibia runs 1.7 km to the west, and the R27 tar road to Nieuwoudtville 0.8 km to the southeast.

The geology of the study area near Vanrhynsdorp is shown on the 1: 250 000 geology map 3118 Calvinia (Council for Geoscience, Pretoria; Fig. 1 herein). A comprehensive sheet explanation for this map has been published by De Beer *et al.* (2002). The older sheet explanation to the 1: 125 000 geology sheet Doring Bay & Lambert's Bay by Visser and Toerien (1971) is also relevant (but not seen by author).

The solar plant study area is entirely mantled by **calcareous and gypsiferous soils** (**Q-r2**) that are the target for the gypsum mining operations elsewhere in the Vanrhynsdorp area (Almond 2011). These soils cover large areas of the Knersvlake region around Vanrhynsdorp and are often capped by a reddish, well-consolidated calcareous or siliceous hardpan or *dorbank*. The soils comprise a spectrum of gravally conglomerates, grit, sand and finer sediment showing a variable degree of calcretisation (*i.e.* pedogenic limestone formation typical of semi-arid climates). At depth, these surface sands probably overlie highly deformed metasediments of the Late Precambrian **Gariep Supergroup** such as the Aties Formation that is mapped on the western side of the Droërivier (Gresse *et al.* 2006).

3. PALAEONTOLOGICAL HERITAGE

Satellite images of the study area near Vanrhynsdorp show that the landscape here is covered with dense populations of termitaria, giving a speckled appearance from above. The main Late Caenozoic fossils mentioned in the 1: 250 000 Calvinia sheet explanation by De Beer *et al.* (2002) are calcretised subfossil termitaria (termite mounds or *heuweltjies*) that may be several thousand years old and reflect past, more pluvial (*i.e.* rainy) climatic episodes. Recent carbon dating gives dates in the range of 30-40 000 years BP for fossil termitaria in the West Coast region, *i.e.* preceding the last glacial maximum (Midgley *et al.* 2002, Potts *et al.* 2009 and refs. therein). Examples of these complex calcareous structures embedded within the Quagga's Kop Formation to the north of Vanrhynsdorp have probably been mistaken in the past as fossil corals, while freshwater unionid bivalves have been erroneously taken to be marine mussel shells (De Beer *et al.* 2002 p. 79, and Lamont 1947).

Calcareous and gypsiferous soils (Q-r2) mapped in the study area are probably unfossiliferous. While older alluvial gravels of the Quagga's Kop succession are not mapped here, the possibility of comparable, fossil-bearing alluvial deposits associated with the Droërivier system should be borne in mind. Residual gravels within the calcareous and gypsiferous soils that are probably derived from the Quagga's Kop Formation might contain derived (reworked) fossil remains such as resistant mammalian teeth or bones as well as Early Stone Age (Pleistocene) artefacts (De Beer *et al.* 2002, p. 81).

Gariep Supergroup metasediments beneath the cover sands are highly deformed and unlike to be fossiliferous. However, various forms of stromatolite (fossil microbial mounds) have been reported from carbonate units near Vredendal and the Bokkeveldberge Escarpment, respectively west and east of Vanrhynsdorp (Reimer 1978, De Beer *et al.* 2002, Almond in prep. 2017).

The overall palaeontological sensitivity of the Vanrhynsdorp solar plant study area is assessed as LOW.

3.1. Cumulative impacts on palaeontological heritage

In order to assess cumulative impacts on palaeontological heritage, previous palaeontological impact assessment reports (PIAs) for alternative energy and other developments in the Vanrhysndorp region were accessed using the SAHRIS website as well as the author's own database. It is noted that for the great majority of development proposals in the region a PIA report has not been submitted, reflecting its low palaeontological sensitivity. Proposals documented are largely for mineral prospecting (*e.g.* gypsum, mining; Almond 2011). In practice, the only strictly relevant studies are those that deal with comparable fossil heritage assemblages from the same sedimentary rock units that are represented in the Vanrhynsdorp Keren solar plant study area itself, in particular Late Caenozoic superficial sediments overlying Gariep Supergroup bedrocks.

The only studies located that deal specifically with potential palaeontological impacts in the Vanrhysdorp region are those for gypsum and limestone mining developments by Almond (2011a, 2011b). In general, the anticipated impact significance on local fossil heritage of developments proposed in the Vanrhynsdorp region is rated as low.

It is concluded that cumulative impacts on the very sparse local fossil assemblages posed by the Vanrhynsdorp Keren solar plant and other developments in the Vanrhynsdorp region is low.

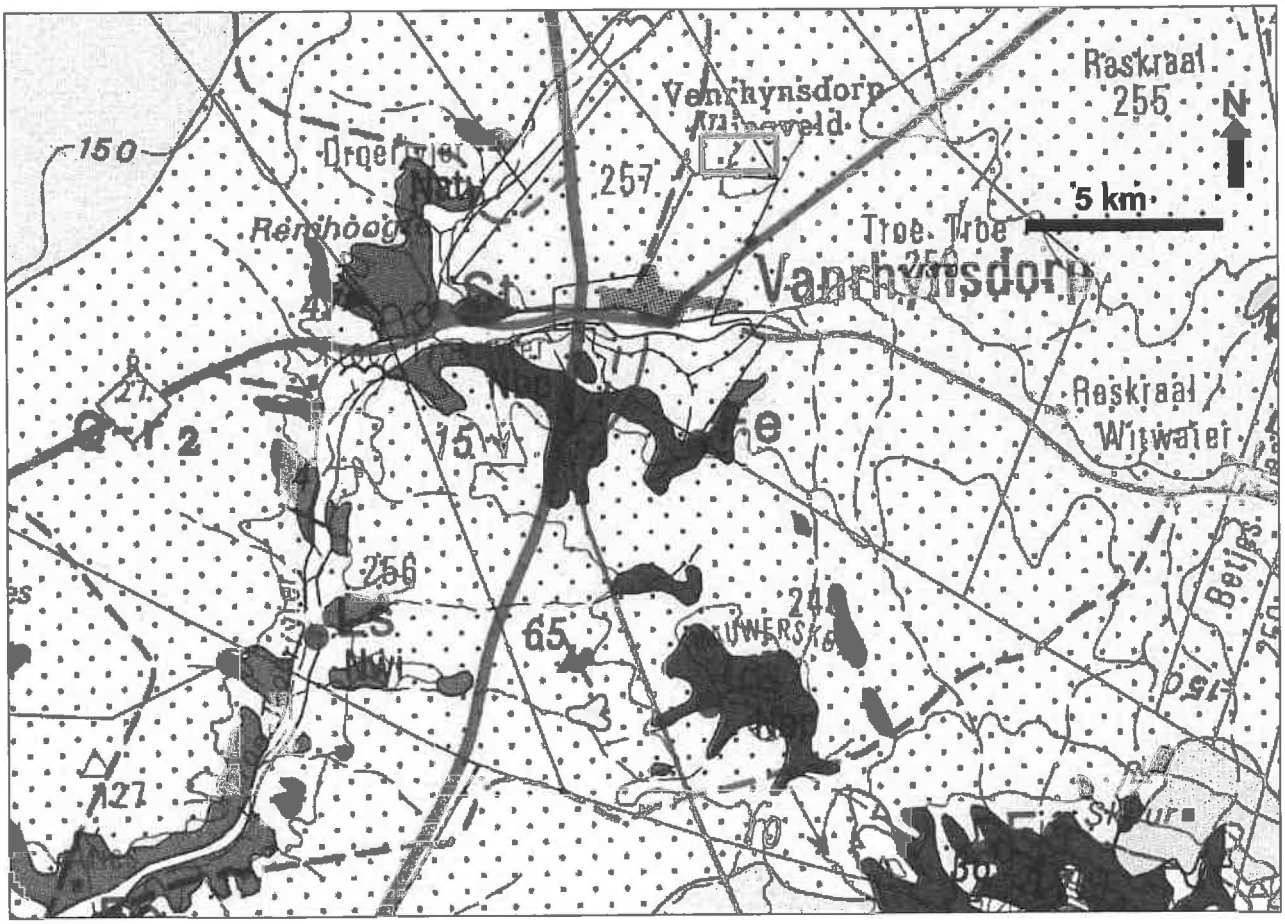

Fig. 1. Extract from 1: 250 000 geological map 3118 Calvinia (Council for Geoscience, Pretoria) showing approximate location of proposed Vanrhynsdorp Roma Solar Plant study area on the north-eastern outskirts of Vanrhynsdrop, Western Cape Province (small blue rectangle). The study area is underlain by calcareous and gypsiferous soils of Quaternary to Recent age (Q-r2, yellow areas with stipple).

Fig. 2. Google earth© satellite image showing the study area for the Vanrhynsdorp Roma Solar Plant to the north of the airstrips on the north-eastern outskirts of Vanrhynsdorp, Western Cape (red polygon). The Droërivier runs north of the study site and the Langkloofrivier to the south.

4. CONCLUSIONS & RECOMMENDATIONS

The overall impact significance of the proposed Vanrhynsdorp Roma Solar Plant development on fossil heritage is considered to be LOW because:

- The study area is mantled by superficial sands of low palaeontological sensitivity;
- Extensive, deep excavations are unlikely to be involved in this sort of solar park project.

It is therefore recommended that, pending the exposure of significant new fossils during development, exemption from further specialist palaeontological studies and mitigation be granted for this solar plant development.

There are no objections on palaeontological heritage grounds to authorisation of the proposed power plant. Should any substantial fossil remains (*e.g.* vertebrate bones and teeth, shells, calcretised burrows) be encountered during excavation, however, these should be reported to Heritage Western Cape for possible mitigation by a professional palaeontologist (Contact details: Protea Assurance Building, Green Market Square, Cape Town 8000. Private Bag X9067, Cape Town 8001. Tel: 086-142 142. Fax: 021-483 9842. Email: hwc@pgwc.gov.za).

The Environmental Control Officer (ECO) responsible for the solar plant development should be made aware of the potential occurrence of scientifically-important fossil remains such as stromatolites within the development footprint. During the construction phase all major clearance operations (*e.g.* for new access roads) and deeper (> 1 m) excavations (*e.g.* for solar panel footings) should be monitored for fossil remains on an on-going basis by the ECO. Should substantial fossil remains - such as stromatolites, vertebrate bones and teeth - be encountered at surface or exposed during construction, the ECO should safeguard these, preferably *in situ*. They should then alert the relevant provincial heritage management authority as soon as possible - *i.e.* Heritage Western Cape. This is to ensure that appropriate action - *i.e.* recording, sampling or collection of fossils, recording of relevant geological data - can be taken by a professional palaeontologist at the developer's expense.

These mitigation recommendations should be incorporated into the Environmental Management Programme (EMPr) for the solar plant project.

Please note that:

- All South African fossil heritage is protected by law (South African Heritage Resources Act, 1999) and fossils cannot be collected, damaged or disturbed without a permit from SAHRA or the relevant Provincial Heritage Resources Agency (in this case Heritage Western Cape);

- The palaeontologist concerned with potential mitigation work will need a valid fossil collection permit from Heritage Western Cape and any material collected would have to be curated in an approved depository (*e.g.* museum or university collection);

- All palaeontological specialist work should conform to international best practice for palaeontological fieldwork and the study (*e.g.* data recording fossil collection and curation, final report) should adhere as far as possible to the minimum standards for Phase 2 palaeontological studies developed by HWC (2016) and SAHRA (2013).

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6. QUALIFICATIONS & EXPERIENCE OF THE AUTHOR

Dr John Almond has an Honours Degree in Natural Sciences (Zoology) as well as a PhD in Palaeontology from the University of Cambridge, UK. He has been awarded post-doctoral research fellowships at Cambridge University and in Germany, and has carried out palaeontological research in Europe, North America, the Middle East as well as North and South Africa. For eight years he was a scientific officer (palaeontologist) for the Geological Survey / Council for Geoscience in the RSA. His current palaeontological research focuses on fossil record of the Precambrian - Cambrian boundary and the Cape Supergroup of South Africa. He has recently written palaeontological reviews for several 1: 250 000 geological maps published by the Council for Geoscience and has contributed educational material on fossils and evolution for new school textbooks in the RSA.

Since 2002 Dr Almond has also carried out palaeontological impact assessments for developments and conservation areas in the Western, Eastern and Northern Cape, Limpopo, Gauteng, KwaZulu-Natal, Mpumalanga, Northwest and Free State under the aegis of his Cape Town-based company *Natura Viva* cc. He has been a long-standing member of the Archaeology, Palaeontology and Meteorites Committee for Heritage Western Cape (HWC) and an advisor on palaeontological conservation and management issues for the Palaeontological Society of South Africa (PSSA), HWC and SAHRA. He is currently compiling technical reports on the provincial palaeontological heritage of Western, Northern and Eastern Cape for SAHRA and HWC. Dr Almond is an accredited member of PSSA and APHP (Association of Professional Heritage Practitioners – Western Cape).

Declaration of Independence

I, John E. Almond, declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed project, application or appeal in respect of which I was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of my performing such work.

Dr John E. Almond
Palaeontologist
***Natura Viva* cc**

Appendix D3b: Original Palaeontological Assessment (2012)

RECOMMENDED EXEMPTION FROM FURTHER PALAEONTOLOGICAL STUDIES & MITIGATION:

PROPOSED VANRHYNSDORP ROMA SOLAR PLANT, NEAR VANRHYNSDORP, WESTERN CAPE

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March 2012

1. OUTLINE OF DEVELOPMENT

Roma Energy Van Rhynsdorp (Pty) Ltd is proposing to construct a 10 MW Concentrating Photovoltaic (CPV) Energy Generation Facility, the Vanrhynsdorp Roma Solar Plant, on Duinen Remainder of Farm 258, situated on the north-eastern outskirts of Van Rhynsdorp, Western Cape.

The proposed activity entails the construction of about 140 CPV solar panels with a footprint of about 20 ha. The CPV panels will be mounted on pedestals drilled and set into the ground. Extensive bedrock excavations are not envisaged, but some vegetation will need to be cleared from the site. Associated infrastructure includes a perimeter access road, single track internal access roads, trenches for underground cables, 2 to 4 transformer pads, a switching station, a maintenance shed, and a temporary construction camp.

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2. GEOLOGICAL BACKGROUND

The proposed Vanrhynsdorp solar plant study area, Duinen Remainder of Farm 258 (31° 35' S, 18° 45' E), is on flat, semi-arid sandy terrain of the southern Knersvlake region, between the courses of the Langkloofrivier that flows through Vanrhynsdorp and the Droërivier that flows to the north (Fig. 2). The area lies at c. 150 m amsl and lies just north of the airstrips on the north-eastren outskirts of town. The N1 trunk road to Namibia runs 1.7 km to the west, and the R27 tar road to Nieuwoudtville 0.8 km to the southeast.

The geology of the study area near Vanrhynsdorp is shown on the 1: 250 000 geology map 3118 Calvinia (Council for Geoscience, Pretoria; Fig. 1 herein). A comprehensive sheet explanation for this map has been published by De Beer *et al.* (2002). The older sheet explanation to the 1: 125 000 geology sheet Doring Bay & Lambert's Bay by Visser and Toerien (1971) is also relevant (but not seen by author).

The solar plant study area is entirely mantled by **calcareous and gypsiferous soils** (**Q-r2**) that are the target for the gypsum mining operations elsewhere in the Vanrhynsdorp area (Almond 2011). These soils cover large areas of the Knersvlake region around Vanrhynsdorp and are often capped by a reddish, well-consolidated calcareous or siliceous hardpan or *dorbank*. The soils comprise a

spectrum of gravally conglomerates, grit, sand and finer sediment showing a variable degree of calcretisation (*i.e.* pedogenic limestone formation typical of semi-arid climates). At depth, these surface sands probably overlie highly deformed metasediments of the Late Precambrian **Gariep Supergroup** such as the Aties Formation that is mapped on the western side of the Droërivier (Gresse *et al.* 2006).

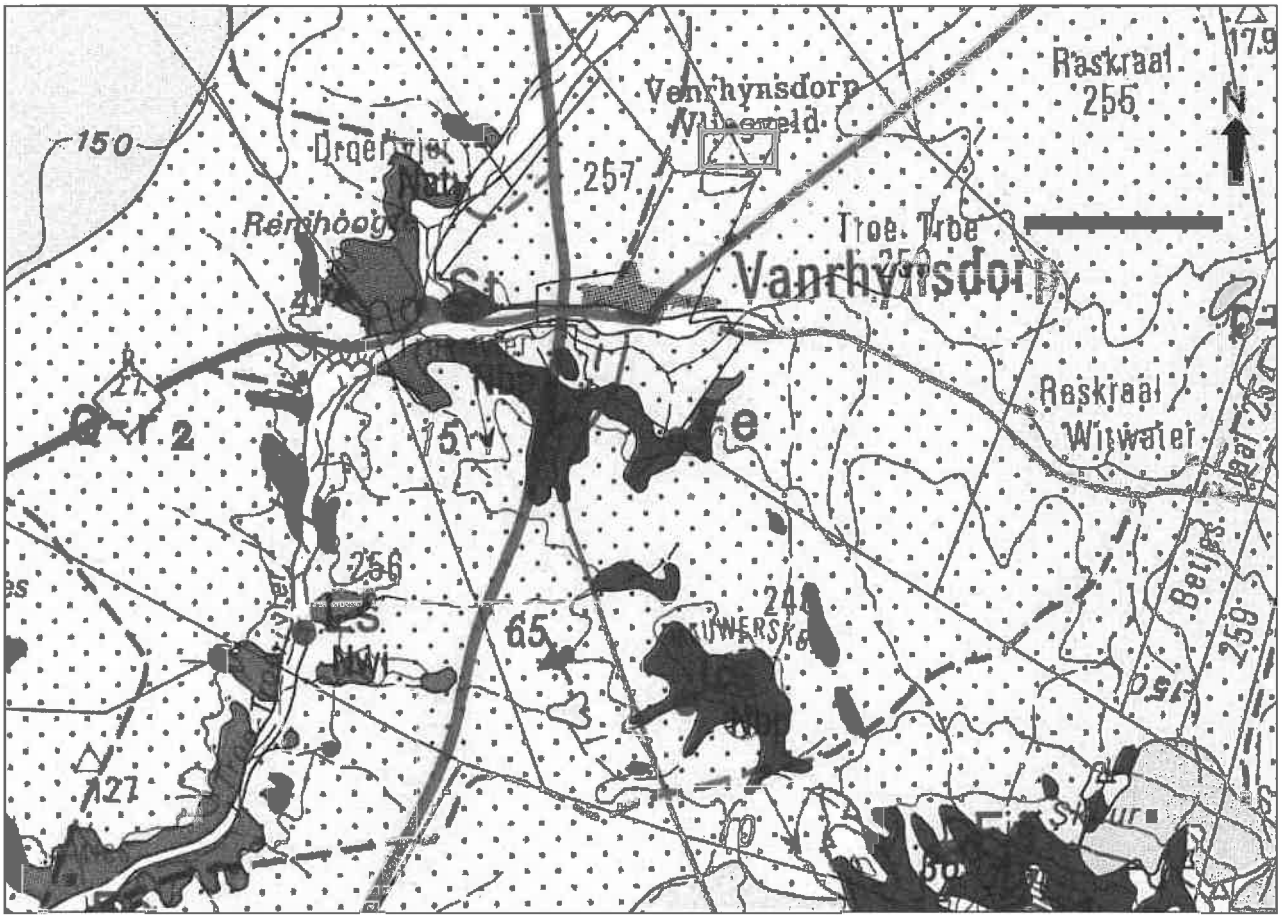

Fig. 1. Extract from 1: 250 000 geological map 3118 Calvinia (Council for Geoscience, Pretoria) showing approximate location of proposed Vanrhynsdorp Roma Solar Plant study area on the north-eastern outskirts of Vanrhynsdrop, Western Cape Province (small blue rectangle). The study area is underlain by calcareous and gypsiferous soils of Quaternary to Recent age (Q-r2, yellow areas with stipple).

3. PALAEONTOLOGICAL HERITAGE

Satellite images of the study area near Vanrhynsdorp show that the landscape here is covered with dense populations of termitaria, giving a speckled appearance from above. The main Late Caenozoic fossils mentioned in the 1: 250 000 Calvinia sheet explanation by De Beer *et al.* (2002) are calcretised subfossil termitaria (termite mounds or *heuweltjies*) that may be several thousand years old and reflect past, more pluvial (*i.e.* rainy) climatic episodes. Recent carbon dating gives dates in the range of 30-40 000 years BP for fossil termitaria in the West Coast region, *i.e.* preceding the last glacial maximum (Midgley *et al.* 2002, Potts *et al.* 2009 and refs. therein). Examples of these complex calcareous structures embedded within the Quagga's Kop Formation to the north of Vanrhynsdorp have probably been mistaken in the past as fossil corals, while freshwater unionid bivalves have been erroneously taken to be marine mussel shells (De Beer *et al.* 2002 p. 79, and Lamont 1947).

Calcareous and gypsiferous soils (Q-r2) mapped in the study area are probably unfossiliferous. While older alluvial gravels of the Quagga's Kop succession are not mapped here, the possibility of comparable, fossil-bearing alluvial deposits associated with the Droërivier system should be borne in mind. Residual gravels within the calcareous and gypsiferous soils that are probably derived from the Quagga's Kop Formation might contain derived (reworked) fossil remains such as resistant mammalian teeth or bones as well as Early Stone Age (Pleistocene) artefacts (De Beer *et al.* 2002, p. 81).

Gariep Supergroup metasediments beneath the cover sands are highly deformed and unlike to be fossiliferous.

The overall palaeontological sensitivity of the Vanrhynsdorp solar plant study area is assessed as LOW.

Fig. 2. Google earth© satellite image showing the study area for the Vanrhynsdorp Roma Solar Plant to the north of the airstrips on the north-eastern outskirts of Vanrhynsdorp, Western Cape. The Droërivier runs north of the study site and the Langkloofrivier to the south.

4. CONCLUSIONS & RECOMMENDATIONS

The overall impact significance of the proposed Vanrhynsdorp Roma Solar Plant development on fossil heritage is considered to be LOW because:

- The study area is mantled by superficial sands of low palaeontological sensitivity;
- Extensive, deep excavations are unlikely to be involved in this sort of solar park project.

It is therefore recommended that exemption from further specialist palaeontological studies and mitigation be granted for this solar plant development.

Should any substantial fossil remains (*e.g.* vertebrate bones and teeth, shells, petrified wood) be encountered during excavation, however, these should be reported to Heritage Western Cape for possible mitigation by a professional palaeontologist.

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6. QUALIFICATIONS & EXPERIENCE OF THE AUTHOR

Dr John Almond has an Honours Degree in Natural Sciences (Zoology) as well as a PhD in Palaeontology from the University of Cambridge, UK. He has been awarded post-doctoral research fellowships at Cambridge University and in Germany, and has carried out palaeontological research in Europe, North America, the Middle East as well as North and South Africa. For eight years he was a scientific officer (palaeontologist) for the Geological Survey / Council for Geoscience in the RSA. His current palaeontological research focuses on fossil record of the Precambrian - Cambrian boundary and the Cape Supergroup of South Africa. He has recently written palaeontological reviews for several 1: 250 000 geological maps published by the Council for Geoscience and has contributed educational material on fossils and evolution for new school textbooks in the RSA.

Since 2002 Dr Almond has also carried out palaeontological impact assessments for developments and conservation areas in the Western, Eastern and Northern Cape under the aegis of his Cape Town-based company *Natura Viva* cc. He is a long-standing member of the Archaeology, Palaeontology and Meteorites Committee for Heritage Western Cape (HWC) and an advisor on palaeontological conservation and management issues for the Palaeontological Society of South Africa (PSSA), HWC and SAHRA. He is currently compiling technical reports on the provincial palaeontological heritage of Western, Northern and Eastern Cape as well as Limpopo, Free State and Gauteng for SAHRA and HWC. Dr Almond is an accredited member of PSSA and APHP (Association of Professional Heritage Practitioners – Western Cape).

Declaration of Independence

I, John E. Almond, declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed project, application or appeal in respect of which I was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of my performing such work.

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