PALAEONTOLOGICAL ASSESSMENT: COMBINED DESKTOP & FIELD-BASED ASSESSMENT

Proposed Brakpoort Solar Farm on Portion 3 of Farm Kliphokkies No. 173 near Victoria West, Northern Cape Province

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1. SUMMARY

Af-Rom Energy is proposing to develop a 75 MW photovoltaic solar farm on Portion 3 of Farm Kliphokkies No. 173, situated about 25 km east-northeast of Victoria West, Northern Cape Province. The Brakpoort Solar Farm study area is underlain by fluvial sedimentary rocks of the Abrahamskraal Formation (Lower Beaufort Group, Karoo Supergroup) that are known for their rich fossil heritage of terrestrial vertebrate remains of Middle to Late Permian age.

Field assessment shows that the Abrahamskraal Formation sediments in the study area are almost entirely mantled in unfossiliferous superficial deposits such as soils and downwasted-surface gravels. Baking of surrounding bedrocks by dolerite intrusions may have further compromised fossil preservation. No body or trace fossils were observed within the very limited bedrock exposures seen within, as well as on the periphery of, the study area. Furthermore, there are very few previous records of vertebrate fossils from the broader study region northeast of Victoria West.

In view of the overall VERY LOW significance of the proposed developments on palaeontological heritage resources, it is concluded that no further palaeontological heritage studies or specialist mitigation are required for this project, pending the exposure of any substantial fossil remains (*e.g.* vertebrate bones and teeth, large blocks of petrified wood) during the construction phase. The ECO responsible for these developments should be alerted to the possibility of fossil remains being found on the surface or exposed by fresh excavations during construction. Should substantial fossil remains be discovered during construction, these should be safeguarded (preferably *in situ*) and the ECO should alert SAHRA so that appropriate mitigation (*e.g.* recording, sampling or collection) can be taken by a professional palaeontologist.

The specialist involved would require a collection permit from SAHRA. Fossil material must be curated in an approved repository (*e.g.* museum or university collection) and all fieldwork and reports should meet the minimum standards for palaeontological impact studies developed by SAHRA.

These recommendations should be incorporated into the EMP for the Brakpoort solar farm project.

Summary of palaeontological impact significance ratings for the Brakpoort Solar Farm project:

Impact	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Disturbance, damage or destruction of significant fossil remains exposed at the surface or buried beneath the surface within the development footprint during the construction phase	Low	Possible	Very Low	Negative	Medium
With mitigation	Low	Possible	Very Low	Negative	Medium

It should be emphasized that, *providing appropriate mitigation is carried out*, the majority of developments involving bedrock excavation can make a *positive* contribution to our understanding of local palaeontological heritage.

2. INTRODUCTION & BRIEF

The company Af-Rom Energy is proposing to develop a 75 MW photovoltaic solar farm on a 400 ha parcel of land on Portion 3 of Farm Kliphokkies No. 173 which is situated about 25 km east-northeast of Victoria West, Northern Cape Province (Fig. 1). The study area lies just to the north of the electrified railway line between Beaufort West and De Aar and along dust roads connecting the N12 and the R398 (Fig. 2). The development footprint will lie between 150 and 250 hectares and the solar farm has an expected life span of 25 years.

The main elements of the proposed soar farm development include:

- Up to 75 MW of photovoltaic (PV) panels constructed in rows along an east/west axis. Anchoring of the PV panels to the ground will be by means of 1500 mm long galvanised steel posts;
- Inverter substations. Clusters of PV modules will be connected with underground cables to inverter substations;
- Step-up Substation;
- Internal cabling - medium voltage (MV) underground power lines will be installed from the inverter substations to a central collector/ step-up substation;
- An approximately 1 km long 132 kV overhead power line from the step-up substation to the Eskom Substation (attached to the Beaufort West to De Aar electrified rail line);
- Internal roads that are likely to be either natural tracks, or potentially gravel. A short access road to the site will be required;
- A security fence and a fire break around the perimeter of the site. The area to be fenced is expected to be between 150 and 250 ha;
- Control room;
- A water reservoir (c. 50 000 l) for cleaning panels.

The study area overlies Permian bedrocks of the Beaufort Group (Karoo Supergroup) that are portentially fossiliferous. A Phase 1 palaeontological field assessment for the project has therefore been commissioned by SRK Consulting, Port Elizabeth, in accordance with the requirements of the National Heritage Resources Act, 1999 and the National Environmental Management Act 107 of 1998 (NEMA) (Contact details: SRK Consulting, Ground Floor, Bay

Suites, 1a Humewood Rd, Humerail, Port Elizabeth, 6001; Tel: +27 (0) 41 509 4800; E-mail: portelizabeth@srk.co.za).

2.1. National Heritage Resources Act

The extent of the proposed development (over 5000 m^2) falls within the requirements for a Heritage Impact Assessment (HIA) as required by Section 38 (Heritage Resources Management) of the South African National Heritage Resources Act (Act No. 25 of 1999). 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
- palaeontological objects and material, meteorites and rare geological specimens

Minimum standards for the palaeontological component of heritage impact assessment reports are currently being developed by SAHRA. The latest version of the SAHRA guidelines is dated August 2011.

2.2. Approach used for this palaeontological desktop study

This report provides an assessment of the observed or inferred palaeontological heritage within the Brakpoort study area, with recommendations for any specialist palaeontological mitigation where this is considered necessary. The report is based on (1) a review of the relevant scientific literature, (2) geological maps, (3) several previous palaeontological heritage assessments for alternative energy developments in the Brakpoort region (*e.g.* Almond 2011, 2012a, 2012b); and (4) a site visit carried out on 24 March 2012.

In preparing a palaeontological desktop study the potentially fossiliferous rock units (groups, formations *etc*) represented within the study area are determined from geological maps. 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 scoping 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 been compiled by Almond & Pether 2008). The likely impact of the proposed development on local fossil heritage is 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 notably the extent of fresh bedrock excavation envisaged. When rock units of moderate to high palaeontological sensitivity are present within the development footprint, a field-based assessment by a professional palaeontologist is usually warranted.

On the basis of the desktop study, the likely impact of the proposed development on local fossil heritage and any need for specialist mitigation are then determined. Adverse palaeontological impacts normally occur during the construction rather than the operational or decommissioning phase. Mitigation by a professional palaeontologist – normally involving the recording and sampling of fossil material and associated geological information (*e.g.* sedimentological data) – is usually most effective during the construction phase when fresh fossiliferous bedrock has been exposed by excavations, although pre-construction recording of surface-exposed material may sometimes be more appropriate. To carry out mitigation, the palaeontologist involved will need to apply for a palaeontological collection permit from

the relevant heritage management authority (*i.e.* SAHRA, Cape Town). It should be emphasized that, *providing appropriate mitigation is carried out*, the majority of developments involving bedrock excavation can make a *positive* contribution to our understanding of local palaeontological heritage.

2.3. Assumptions & limitations

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.

The major limitation on this study is the very low level of bedrock exposure in the Brakpoort study region.

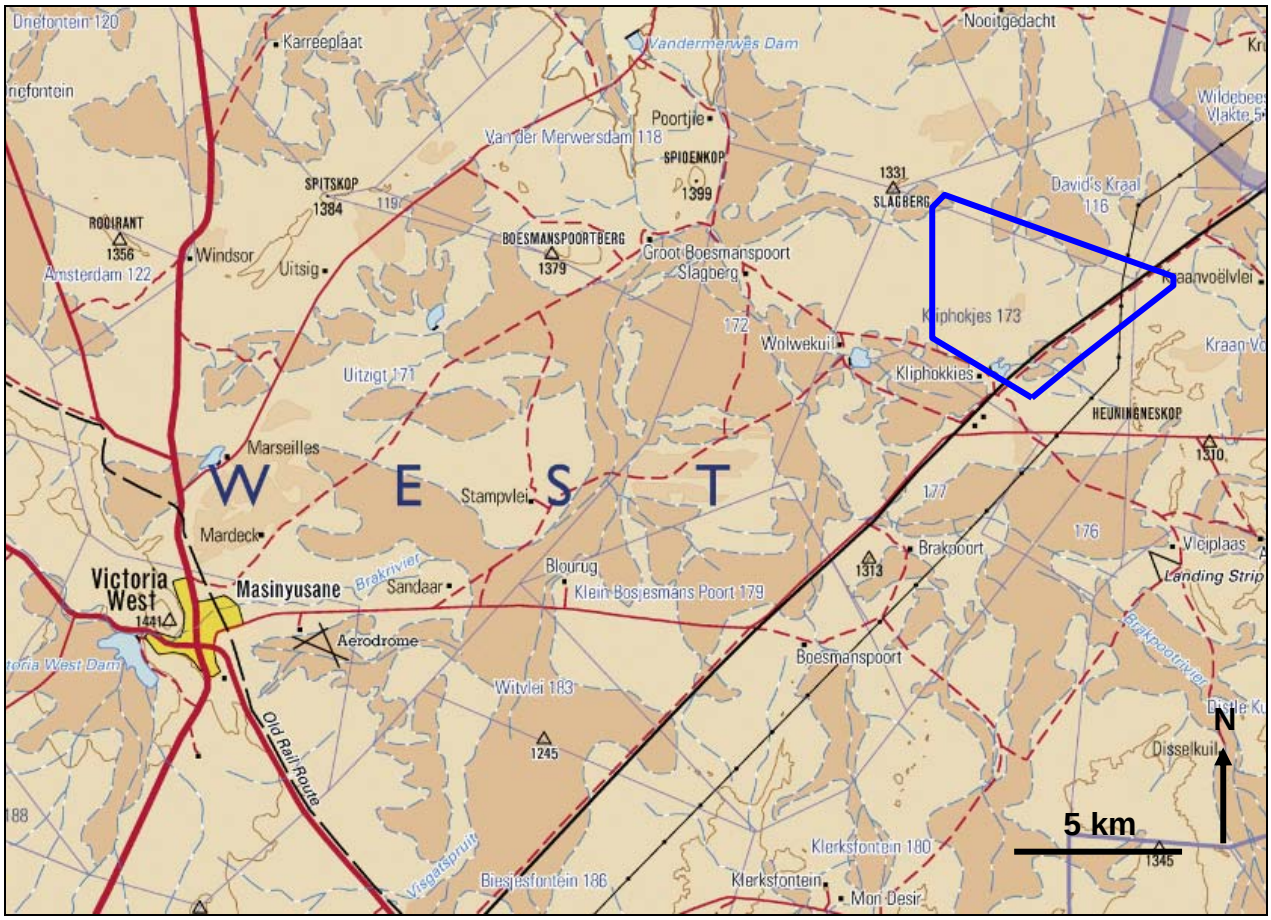

Fig. 1. Extract from 1: 250 000 topographical map 3122 Victoria West (Courtesy of the Chief Directorate of Surveys & Mapping, Mowbray) showing the location of the Brakpoort solar farm study area on Farm Kliphokkies No. 173, *c*. 25 km ENE of Victoria West, Northern Cape Province (black polygon). See also satellite-based image of development area in Fig. 2.

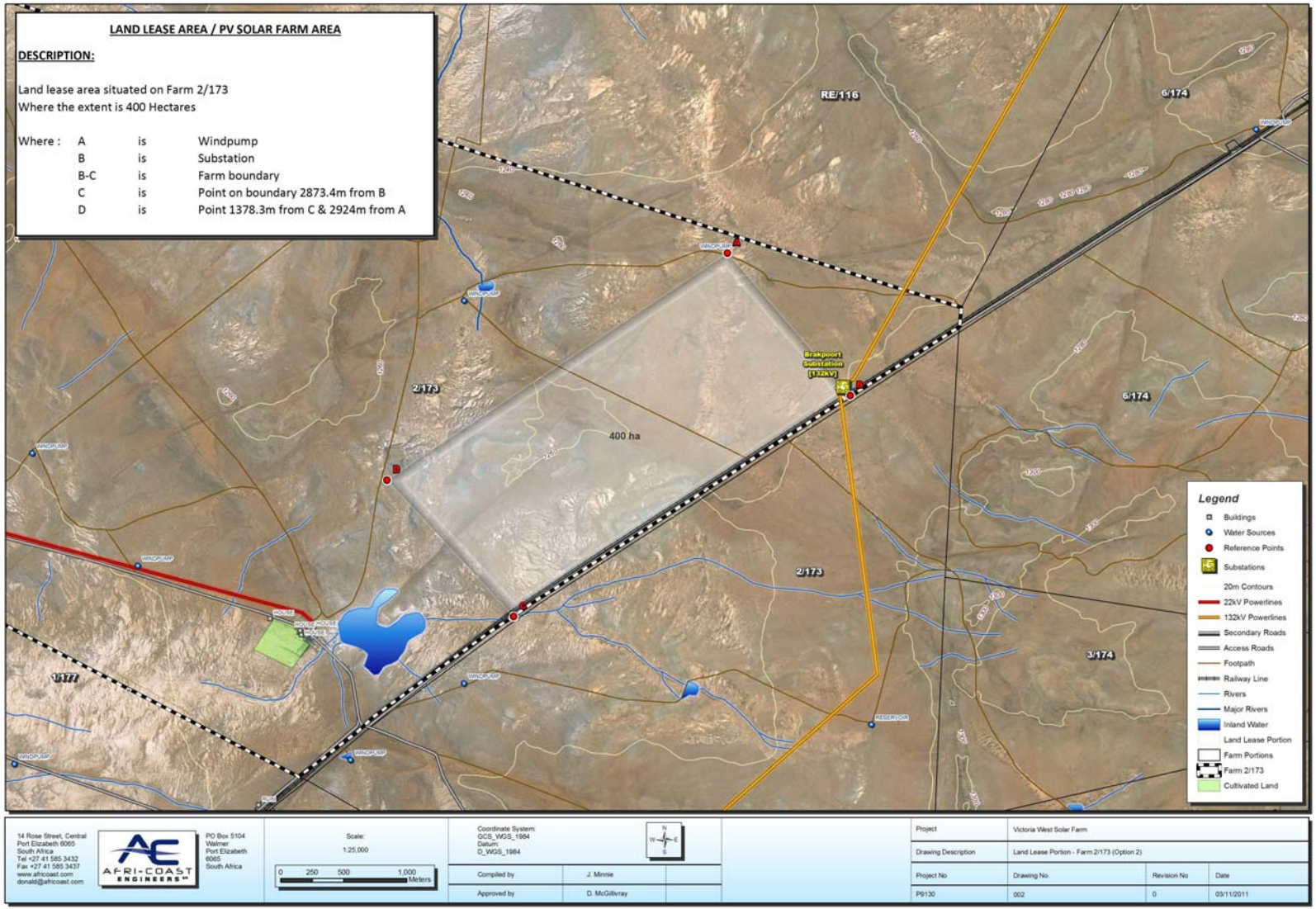

Fig. 2. Development area of the proposed Brakpoort solar farm on Kliphokkies No. 173 near Victoria West (Image kindly supplied by SRK Consulting, Port Elizabeth).

3. GEOLOGICAL BACKGROUND

The geology of the study area ENE of Victoria West is shown on 1: 250 000 sheet 3122 Victoria West (Fig. 3; Le Roux & Keyser 1988). The area is largely underlain at depth by fluvial sediments of the Mid to Late Permian **Abrahamskraal Formation** (Lower Beaufort Group, Karoo Supergroup) that are extensively intruded here by dykes and sills of the Early Jurassic **Karoo Dolerite Suite** (Johnson *et al.* 2006, Duncan & Marsh 2006). Since the sandstone-dominated **Poortjie Member** (**Ptp**) at the base of the overlying **Teekloof Formation** has been mapped just five kilometres or so south of Brakpoort Station, it can be inferred that the Lower Beaufort beds beneath the solar farm study area belong to the uppermost portion of the Abrahamskraal Formation succession; this has implications for the biostratigraphy (*i.e.* fossil zonation) of the sediments concerned (Section 4).

Satellite images and the field study show that the Beaufort Group bedrocks in the study area are almost entirely mantled by dolerite scree, sparse down-wasted gravels (clasts mainly of dolerite and Beaufort Group sandstone, some showing well-developed patina of desert varnish, with minor calcrete, hornfels and vein quartz), pedogenic calcrete hardpan, orange-brown sandy soils and silty alluvium (Fig. 4). These superficial sediments are probably Late Quaternary to Recent in age. In flat-lying areas the alluvium may reach a meter or more in thickness, as shown for example by open aardvark excavations, but elsewhere the Beaufort Group bedrock lies close below the surface.

In general, there is very little surface exposure of the potentially fossiliferous Beaufort Group mudrocks here, apart from in scattered wetland areas where soil and vegetation development is minimal (Fig. 7). Low ridges of well-jointed, buff-coloured Beaufort Group sandstones, including sheet-like to flaggy, ripple cross-laminated crevasse splay sandstones, occur in some peripheral areas (Fig. 6). Occasional intra-formational mudflake conglomerates and ferruginous carbonate lenses (*koffieklip*) associated with the sandstones were examined for reworked bones, teeth and plant material, but without success. Likewise locally extensive, pale grey calcrete hardpans of probable Permian age and pedogenic origin proved unfossiliferous (Fig. 5). They contain occasional large ferruginous carbonate concretions. The larger dolerite intrusions crop out at surface as low ridges showing typical onionskin weathering and variable development of a dark “desert varnish” (Fig. 8), but smaller dykes are often only expressed as concentrations of doleritic surface gravels and calcrete. Beaufort Group sediments in contact with the dolerite intrusions are likely to have been baked to hornfels and quartzite, but good exposures of the contact zones were not observed.

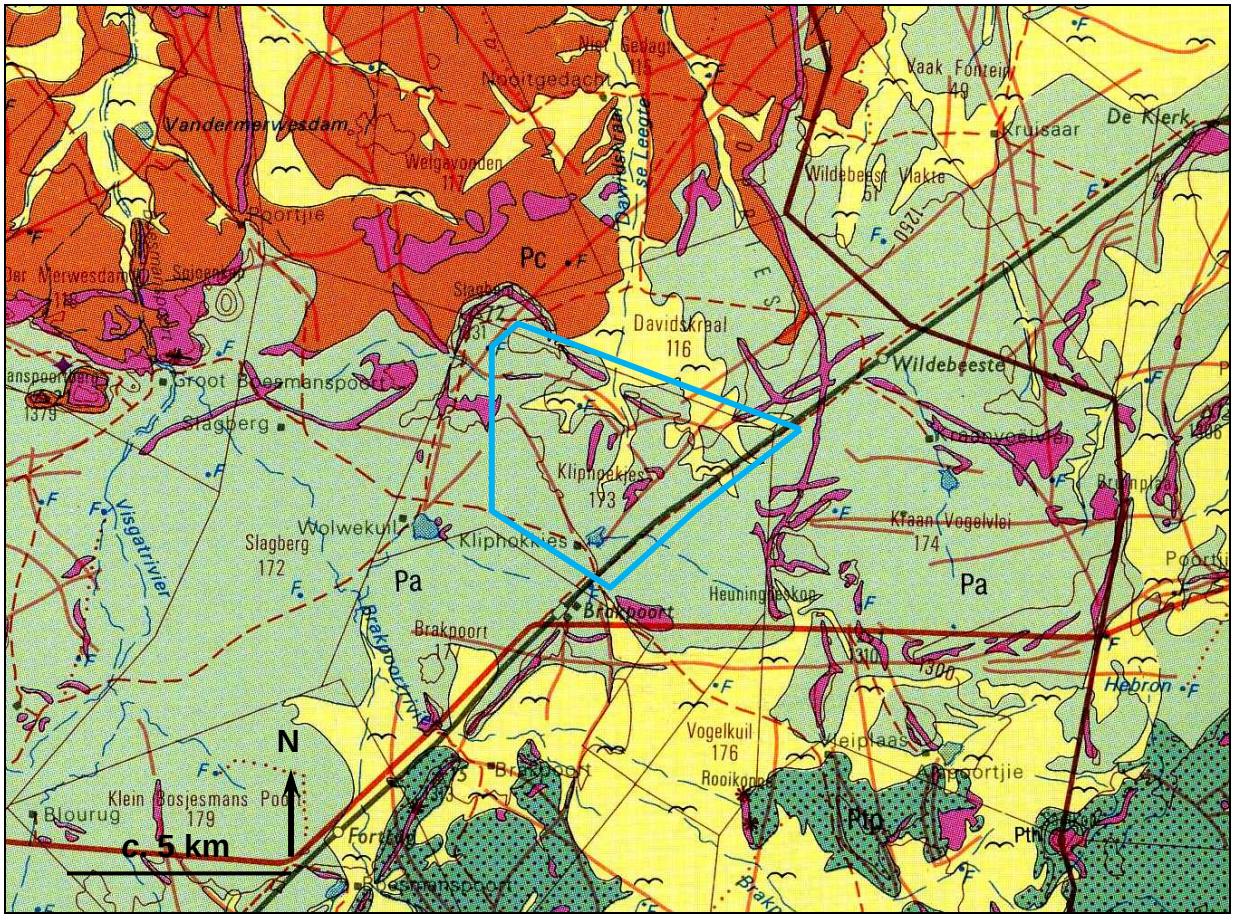

Fig. 3. Extract from 1: 250 000 geological map 3122 Victoria West (Council for Geoscience, Pretoria) showing approximate location of the study area on Kliphokkies No. 173 (blue polygon), close to the Victoria West – De Aar railway line. Geological units represented in this region are the Mid Permian Abrahamskraal Formation (Pa pale green), the Late Permian Teekloof Formation (Poortjie Member, Ptp dark green with stipple), Early Jurassic intrusive dykes of the Karoo Dolerite Suite (Jd, pink), and Late Caenozoic alluvium (yellow with "flying bird" symbol).

Fig. 4. Flat terrain in the Brakpoort solar farm study area, viewed towards the north, showing karroid shrubs and grasses and extensive soil cover with platy surface gravels of Beaufort Group sandstone.

Fig. 5. Local development of pale grey calcrete hardpan (Hammer = 32 cm). Pedogenic calcretes are often associated with fossil remains in the Beaufort Group.

Fig. 6. Shallow surface exposure of well-jointed, ripple cross-laminated sandstones of the Abrahamskraal Formation.

Fig. 7. Rare surface exposure of dark blue-grey Abrahamskraal mudrocks in an unvegetated wetland area.

Fig. 8. Surface exposure of intrusive dolerite showing onion-skin weathering and dark "desert varnish" surface patina (Hammer = 32 cm).

4. PALAEONTOLOGICAL HERITAGE

The overall palaeontological sensitivity of the Beaufort Group sediments in general is high to very high (Almond & Pether 2008). These continental sediments have yielded one of the richest fossil records of land-dwelling plants and animals of Permo-Triassic age anywhere in the world (*e.g.* MacRae 1999, Rubidge 2005, McCarthy & Rubidge 2005). A chronological series of mappable fossil biozones or assemblage zones (AZ), defined mainly on their characteristic tetrapod faunas, has been established for the Main Karoo Basin of South Africa (Rubidge 1995). Maps showing the distribution of the Beaufort assemblage zones within the Main Karoo Basin have been provided by Kitching (1977), Keyser and Smith (1979), Rubidge (1995) and, most recently, by Van der Walt *et al.* (2010). According to the latest map (Fig. 9) the contact between the *Tapinocephalus* AZ and *Pristerognathus* AZ runs through the region to the ENE of Victoria West (Fig. 9). As argued above, the proximity of the Brakpoort solar study area to the outcrop area of the Poortjie Member (base of the Teekloof Formation) indicates that the rocks here belong to the uppermost part of the Abrahamskraal Formation and can therefore be assigned to the ***Pristerognathus* Assemblage Zone** (Smith & Keyser 1995).

Kitching (1977) does not list many Karoo vertebrate fossil sites in the Victoria West area. Recent maps of Beaufort Group fossil localities in Nicolas (2007) show a thin scatter of sites northeast of Victoria West, with much denser occurrences either side of the N1 between Three Sisters and Richmond (Fig. 10). Levels of bedrock exposure, often limited by doleritic scree in this sector of the Karoo, is probably a more important control than fossil abundance. A short list of vertebrate fossils from the *Pristerognathus* AZ in the Victoria West sheet area is given by Le Roux and Keyser (1988).

Fossils of the *Pristerognathus* Assemblage Zone characterize the arenaceous Poortjie Member as well as the uppermost beds of the underlying Abrahamskraal Formation in the western Main Karoo Basin as well as the laterally equivalent beds spanning the Koonap / Middleton Formation boundary in the eastern Karoo (Smith & Keyser 1995). This important terrestrial biota is dominated by various therapsids ("mammal-like reptiles") such as the moderate-sized therocephalian carnivore *Pristerognathus* as well as several gorgonopsian predators / scavengers and herbivorous dicynodonts (Figs. 11 and 12). The commonest genus by far is the small burrowing dicynodont *Diictodon* (Keyser and Smith 1977-78, Smith & Keyser 1995, MacRae 1999, Cole *et al*., 2004, Rubidge 2005, Almond 2010, Nicolas 2007, Nicolas & Rubidge 2010). There are also large, rhino-sized herbivorous pareiasaur reptiles (*Bradysaurus* spp.), small, superficially tortoise-like parareptiles like *Eunotosaurus*, crocodile-like temnospondyl amphibians (*Rhinesuchus*), palaeoniscoid bony fish, vascular plant fossils of the *Glossopteris* Flora (fossil wood, leaves *etc*) and various trace fossils, including invertebrate and therapsid burrows as well as tetrapod trackways. The comparatively low number of specimens and major taxa represented in fossil collections from this biozone has been highlighted by Nicolas (2007). The fossil biota of the *Pristerognathus* AZ is of special interest because it possibly represents an impoverished post-extinction recovery fauna following a late Mid Permian extinction event that preceded the well-known end-Guadalupian biotic crisis (*cf* Benton 2003, Retallack *et al.,* 2006, Lucas 2009).

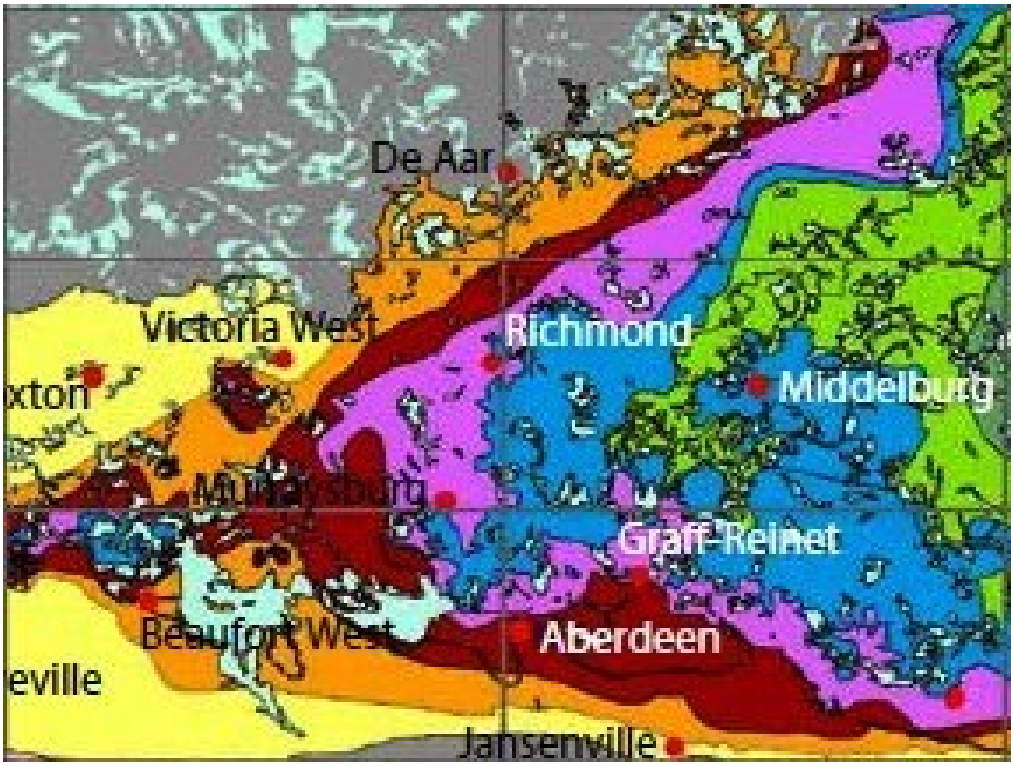

Fig. 9. Extract from recent fossil assemblage zone map for the Main Karoo Basin published by Van der Walt *et al.* (2010). The area to the northeast of Victoria West lies in the contact zone between the *Tapinocephalus* Assemblage Zone (pale yellow) and the overlying *Pristerognathus* Assemblage Zone (orange). It is likely that the map will be refined in future in the light of new vertebrate fossil discoveries.

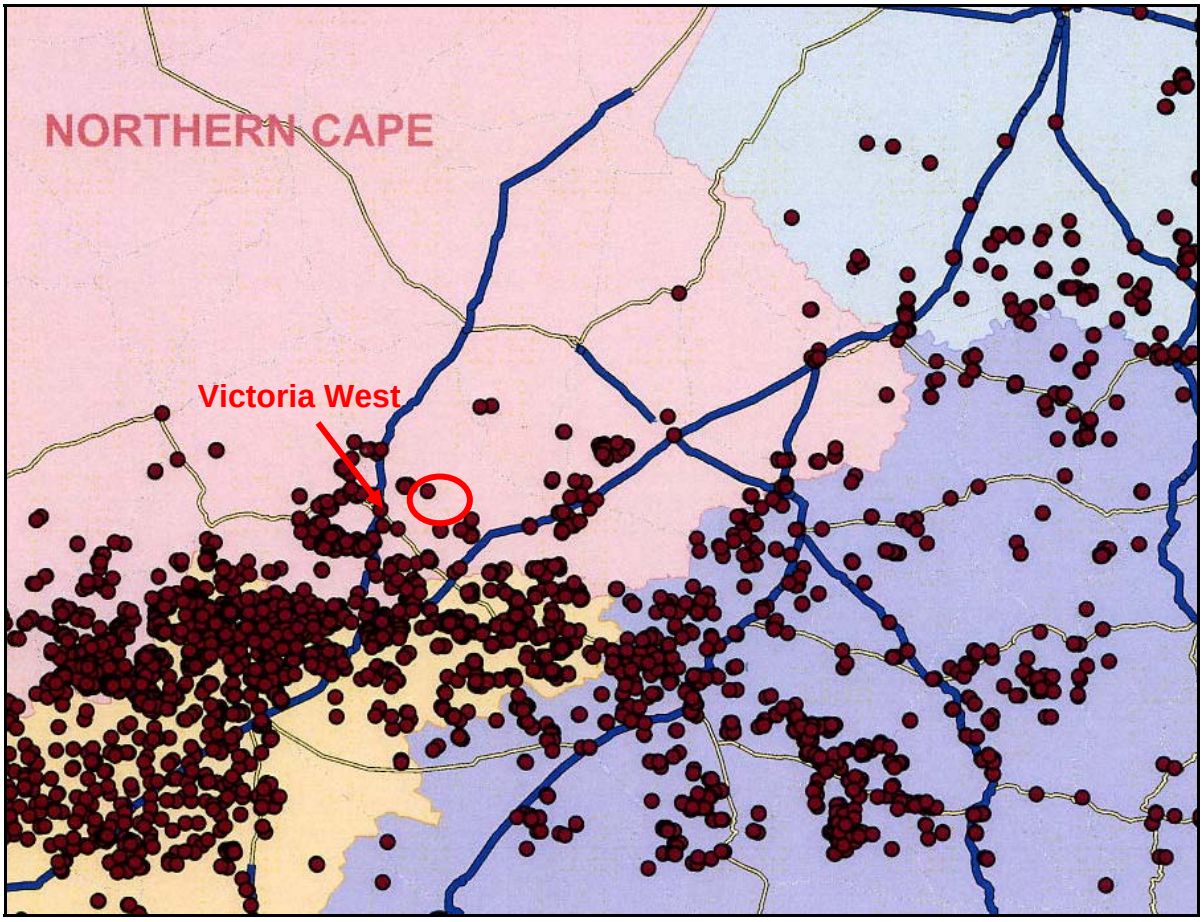

Fig. 10. Distribution map of recorded vertebrate fossil sites within the Beaufort Group of the Great Karoo around the junction of the Western, Northern and Eastern Cape and the Free State (From Nicolas 2007). Note the paucity of known fossil sites from the region ENE of Victoria West (red ellipse). This is in large part probably due to the low levels of bedrock exposure, as well as general low abundance of fossils in the *Pristerognathus* Assemblage Zone.

Due no doubt in large part to the extensive cover of younger superficial sediments, which are themselves of very low palaeontological sensitivity, no body or trace fossils were observed during fieldwork at the study site. During a recent palaeontological heritage assessment of a property only some 10-20 km to the northeast, a single vertebrate fossil, possibly a bone-containing coprolite or regurgitate, was found on the NW-facing slopes of a sandstone ridge (Almond 2012b). In the same area thin, ripple cross-laminated sheet sandstones of probable crevasse splay origin display a small range of horizontal to oblique cylindrical burrows on their upper surfaces. Some of the cm-wide scratch burrows are attributable to the ichnogenus *Scoyenia* and were probably generated by arthropods or oligochaete worms in moist, firm sediments on the flood plain or around a playa lake.

The Karoo Dolerite Suite intrusions in the study area are unfossiliferous, and the superficial sediments mantling the bedrocks are at most very sparsely fossiliferous. Subrounded pieces of silicified wood that have been reworked out of the underlying Beaufort Group are occasionally found among the surface gravels in the region (Almond 2012). No fossils were seen within these younger surface sediments during the field visit.

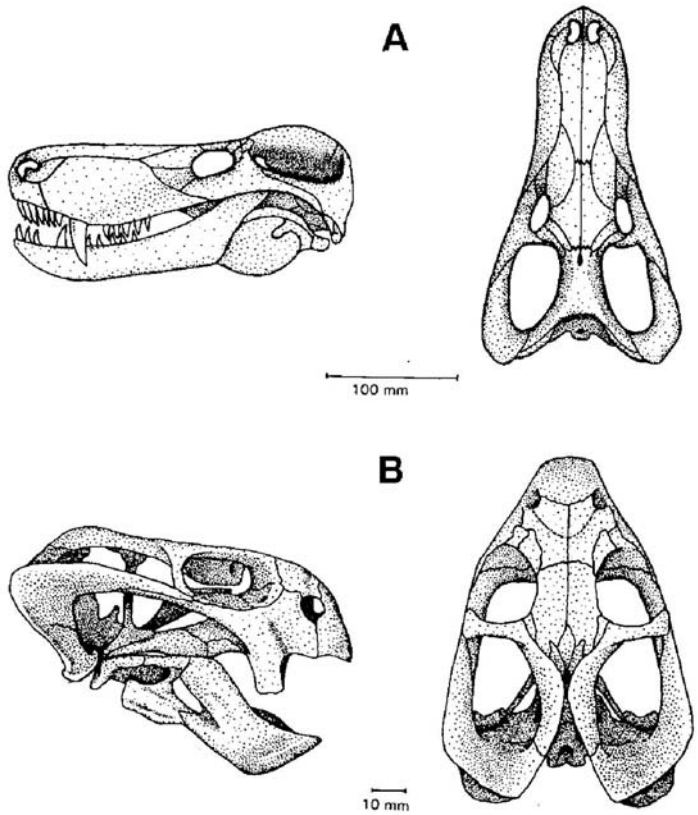

Fig. 11. Skulls of typical therapsids from the *Pristerognathus* Assemblage Zone: A. the dog-sized carnivorous therocephalian *Pristerognathus* and B. the small herbivorous dicynodont *Diictodon* (From Smith & Keyser 1995).

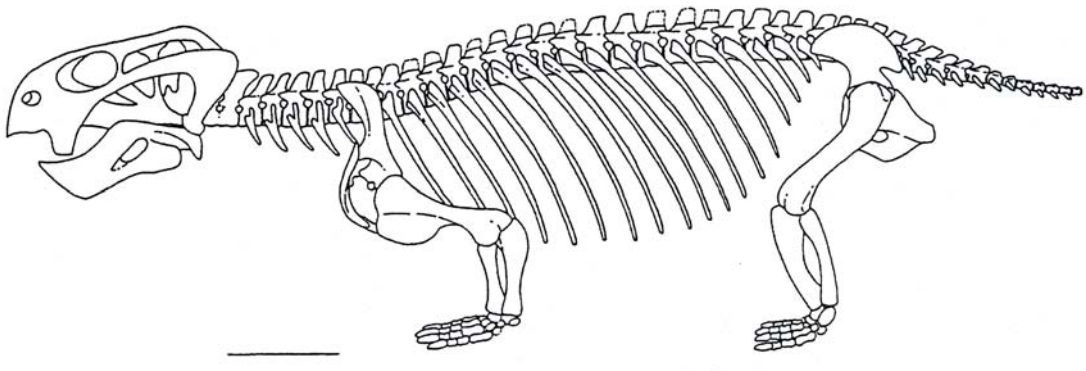

Fig. 12. Skeletal reconstruction of the dassie-sized burrowing dicynodont *Diictodon* (From Ray & Chinsamy 2003) (Scale bar = 5cm).

5. ASSESSMENT OF IMPACT SIGNIFICANCE

The construction phase of the proposed solar farm development will entail excavations into the superficial sediment cover (soils, surface gravels *etc*) and perhaps also into the underlying potentially fossiliferous Beaufort Group bedrock. These notably include excavations for the PV panel support structures, buried cables, internal access roads, any new power line pylons and associated infrastructure. All these developments may adversely affect potential fossil heritage within the study area by destroying, damaging, disturbing or permanently sealing-in fossils that are then no longer available for scientific research or other public good. Once constructed, the operational and decommissioning phases of the PV power station will not involve further adverse impacts on palaeontological heritage, however.

The significance of anticipated impacts on fossil heritage resources in the study area as a consequence of the proposed solar farm development are assessed for the construction phase in Table 1 according to the scheme developed by SRK Consulting.

Table 1. Assessment of impacts on fossil heritage of the proposed Brakpoort solar farm (construction phase)

	Spatial extent	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Without mitigation	Local	Low	Long-term	Low	Possible	Very Low	-ve	Medium
With mitigation	Local	Low	Long-term	Low	Possible	Very Low	-ve	Medium

Given the very low significance of anticipated impacts on palaeontological heritage mitigation would only be triggered if substantial fossil remains (*e.g.* assemblages of fossil vertebrate remains, petrified wood) were encountered or freshly exposed during the construction phase of development. In this case the ECO should safeguard the fossil material, preferably *in situ*, and alert SAHRA as soon as possible so that appropriate action (*e.g.* recording, sampling or collection) can be taken by a professional palaeontologist. If triggered, these mitigation actions are considered to be essential.

It should be emphasized that, *providing appropriate mitigation is carried out*, the majority of developments involving bedrock excavation can make a *positive* contribution to our understanding of local palaeontological heritage.

6. CONCLUSIONS & RECOMMENDATIONS

The proposed solar energy facility is located in an area of the Main Karoo Basin of South Africa that is underlain by potentially fossiliferous sedimentary rocks of the Lower Beaufort Group (Karoo Supergroup) that are of Middle to Late Permian age. Field assessment of the Brakpoort solar farm study area shows that the Abrahamskraal Formation sediments here are almost entirely mantled in unfossiliferous superficial deposits such as soils and downwasted-surface gravels. Baking of surrounding bedrocks by dolerite intrusions may have further compromised fossil preservation here. No body or trace fossils were observed within the very limited bedrock exposures seen within, as well as on the periphery of, the study area. Furthermore, there are very few previous records of vertebrate fossils from the broader study region northeast of Victoria West.

In view of the overall very low significance of the proposed developments on palaeontological heritage resources, it is concluded that no further palaeontological heritage studies or specialist mitigation are required for this project, pending the exposure of any substantial fossil remains (*e.g.* vertebrate bones and teeth, large blocks of petrified wood) during the construction phase. The ECO responsible for these developments should be alerted to the possibility of fossil remains being found on the surface or exposed by fresh excavations during construction. Should substantial fossil remains be discovered during construction, these should be safeguarded (preferably *in situ*) and the ECO should alert SAHRA so that appropriate mitigation (*e.g.* recording, sampling or collection) can be taken by a professional palaeontologist.

The specialist involved would require a collection permit from SAHRA. Fossil material must be curated in an approved repository (*e.g.* museum or university collection) and all fieldwork and reports should meet the minimum standards for palaeontological impact studies developed by SAHRA.

These recommendations should be incorporated into the EMP for the Brakpoort solar farm project.

6. ACKNOWLEDGEMENTS

Ms Tamarin Arthur of SRK Consulting, Port Elizabeth is thanked for commissioning this study and for proving all the necessary background information. Phillip is thanked for facilitating access to the study site.

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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.

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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 development 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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