

## PALAEONTOLOGICAL IMPACT ASSESSMENT: DESKTOP STUDY

**PROPOSED MERAPI (EXCELSIOR) PHOTOVOLTAIC (PV) SOLAR ENERGY FACILITIES, Portion 0 of Farm 311 Ceylon, Portion 0 of Farm 566 Moedersgift, Portion 0 of Farm 1623 Welgegund, Portion 0 of Farm 374 Concordia, and Portion 1 of Farm 1547 De Hoop of Matsopa Local Municipality, Eastern Free State Province.**

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### **SUMMARY**

The proposed Merapi (Excelsior) Photovoltaic (PV) Solar Energy Facilities are situated in Matsopa Local Municipality, Eastern Free State. The region is underlain by sediments of the Adelaide and Tarkastad subgroups, Beaufort Group (Karoo Supergroup), which is rich in Triassic and Permian fossils. Remains of terrestrial vertebrates and well-preserved leaf impressions are common, while fish remains, non-marine molluscs, invertebrate burrows and trails, silicified wood and stem impressions occur sporadically throughout the subgroups

Excavations for installation sites, transmission pylons, fences, office and storage foundation, access roads, trenches for underground electrical cables, and water treatment unit, may compromise, disturb, destroy or damage fossil heritage, especially during the construction phase of the development.

It is recommended that a qualified palaeontologist be commissioned to carry out a field scoping study of the designated area before commencement of any construction. This is essential in identifying localities where specialist paleontological mitigation may be necessary during construction. The specialist should also be present during the construction phase of the project.

## INTRODUCTION

The Solairedirect Southern Africa (Pty) Ltd is proposing to establish a commercial photovoltaic solar energy facility as well as associated infrastructure on a site located approximately 5 km south-east of Excelsior in the Free State Province. The proposed development will be split in four phases and will be located on the following farms, portions: Portion 0 of Farm 311 Ceylon, Portion 0 of Farm 566 Moedersgift, Portion 0 of Farm 1623 Welgegund, Portion 0 of Farm 374 Concordia, and Portion 1 of Farm 1547 De Hoop of Matsopa Local Municipality, Eastern Free State Province, area of approximately 1505 hectares (Fig. 1).

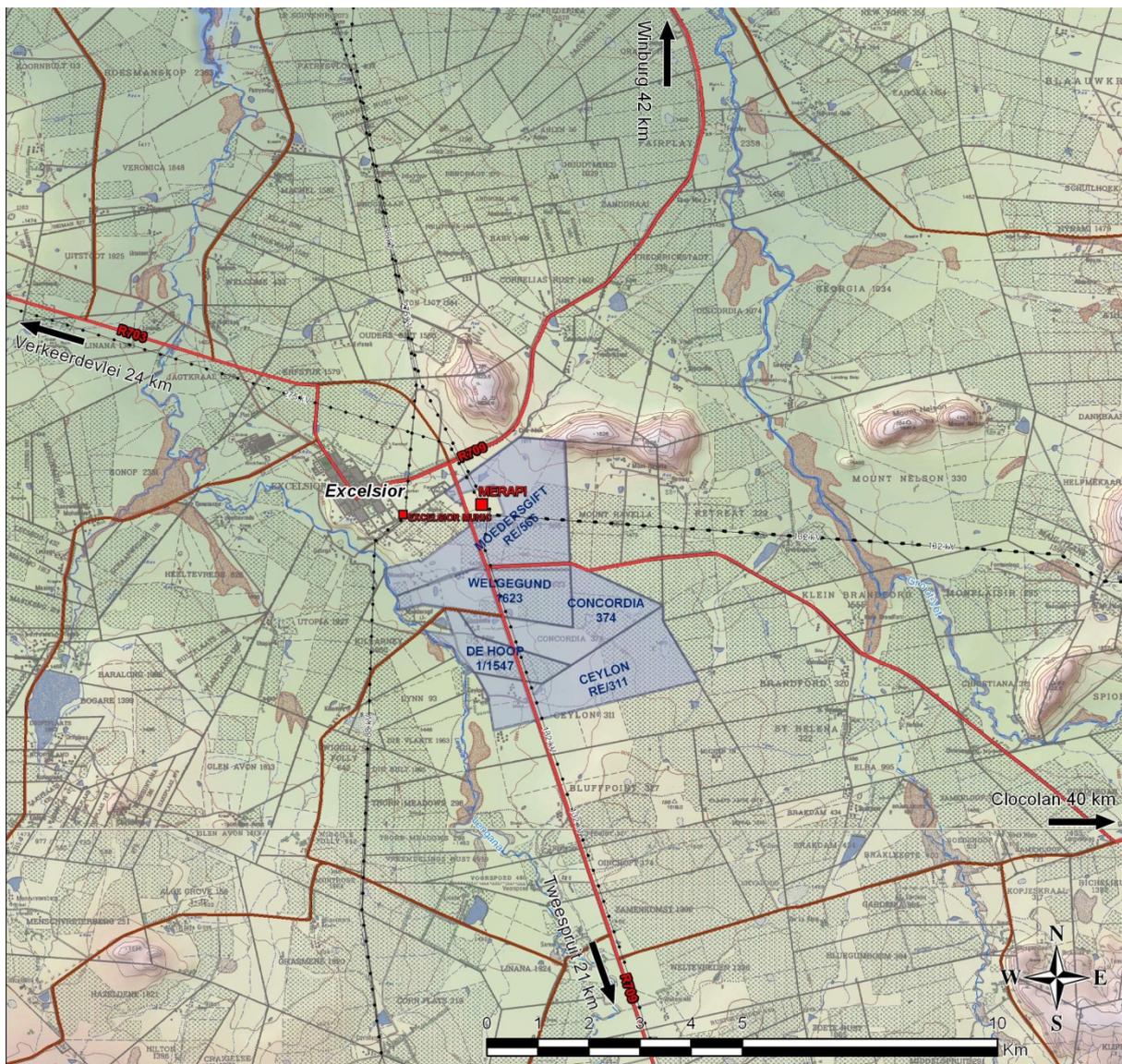


Figure 1. Extract showing the location of proposed Merapi (Excelsior) Photovoltaic (PV) Solar Energy Facilities in Matsopa Local Municipality, Eastern Free State.

## COMPONENTS OF THE PROPOSED DEVELOPMENT

The key components of the Merapi (Excelsior) Photovoltaic (PV) Solar Energy Facilities will accommodate the following:

- Solar modules of 300Wp each;
- Arrays of photovoltaic (PV) panels;
- Inverter/Transformer enclosures;
- Grid connection substation and 132kV overhead power lines;
- Auxiliary Electrical equipment
- Cabling between the project components, to be laid underground where practical;
- Internal access roads; fencing and
- Workshop area for maintenance storage, office, toilets and small water treatment unit.

## GEOLOGICAL BACKGROUND

The bedrock geology of the study area is outlined on the 1: 250 000 Topo-Cadastral series of South Africa, 2826 Worcester (Council for Geoscience, Pretoria; Bester A.F. 1998). The site of the proposed Merapi Solar Power Development Plant is underlain by sediments of the Adelaide and Tarkastad subgroups, Beaufort Group (Karoo Supergroup). The Beaufort Group is composed of sandstone and mudrock and ranges in thickness from 5000m to 150m or less (Groenewald 1989).

## PALAEONTOLOGICAL SIGNIFICANCE OF THE STUDY AREA

The Beaufort Group (Karoo Supergroup) of formations are rich in Triassic and Permian fossils (Johnson et al., 2006). Vertebrate fossils including reptiles, mammal-like reptiles (Fig. 2), amphibians and fish remains occur in the Beaufort Group (Rubidge et al., 1995). Invertebrate fossils, invertebrate burrows and trails, well-preserved leaf impressions (Fig. 3), silicified wood and stem impressions have also been recorded from a number of localities in the Beaufort Group (Anderson et al., 1998; McLachlan & Anderson 1973; 1977; Riek, 1973, 1976, Rubidge et al., 1995).



Figure 2. Example of *Cynognathus* skull typical of the Beaufort Group (Rubidge et al., 1995)



Figure 3. An example of Glossopteris leaves common in the Beaufort Group.

### **ASSESSMENT OF POTENTIAL IMPACT OF PROPOSED DEVELOPMENT**

The proposed development includes substantial excavations for laying of underground cables, substation, enclosures; fencing, workshop area, office, toilets and small water treatment unit, as well as internal access roads. All these activities may disturb, damage or destroy scientifically significant fossil heritage. Additionally, fossiliferous bedrock may be sealed-in or sterilized by infrastructure such as office, toilets, storage areas and internal access roads.

The impact of the development can be mitigated by commissioning a qualified palaeontologist to sample, record and salvage fossil remains before and during the construction phase.

#### *Extent and Intensity of impact*

The extent and intensity of the impact on fossil heritage is proportional to the intensity of planned activities and their extent. The proposed development has a number of activities that will involve substantial ground disturbance over a larger area. Previous studies (e.g. Rubidge et al., 1995) indicate that the bedrock in this region is highly fossiliferous. It is thus likely that the envisaged excavations may have a great impact in intensity and extent to potentially fossiliferous bedrock.

#### *Duration of impact*

Similar to other solar energy facilities, the duration of impact on the fossil heritage is limited to the construction phase of the proposed development where disturbance, damage, destruction and sealing-in is permanent. This can be remedied by scientifically directed and controlled excavation, recording and recovery of fossil remains before and during the construction phase. Additional impacts on fossil heritage are not foreseen during the operational and/or decommissioning phases of the solar energy facility.

## CONCLUSIONS & RECOMMENDATIONS

Rocky outcrops in the study area are associated with fossil vertebrate, invertebrate, plant and insect remains. Since the development of the proposed Merapi (Excelsior) Photovoltaic (PV) Solar Energy Facilities will involve substantial ground disturbances in form of excavations and seal-ins, it is likely that potentially fossiliferous bedrock may be disturbed, exposed, damaged and/or destroyed by the development. I recommended that a qualified palaeontologist be commissioned to carry out a field scoping study of the designated area before commencement of any construction and also during the construction phases of the development.

## References

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## **Declaration of Independence**

I, Job Kibii, author of the Palaeontological Impact Assessment: Desktop Study, hereby declare that I am an independent consultant appointed by Zone Land Solutions to provide specialist input on the proposed Merapi (Excelsior) Photovoltaic (PV) Solar Energy Facilities in Matsopa Local Municipality, Eastern Free State. I hereby confirm that I have no business, financial, personal or other interest in the activity, application or appeal in respect of which I have been appointed other than fair remuneration for work performed in connection with the activity and application. All opinions expressed in my specialist report are my own.



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