PALAEONTOLOGICAL HERITAGE ASSESSMENT: DESKTOP STUDY

Ancillary infrastructure for the Coleskop Wind Energy Facility near Middelburg, Pixley ka Seme & Chris Hani District Municipalities, Northern and Eastern Cape Provinces.

John E. Almond PhD (Cantab.)
***Natura Viva* cc,**
PO Box 12410 Mill Street,
Cape Town 8010, RSA
naturaviva@universe.co.za

February 2021

EXECUTIVE SUMMARY

Coleskop Wind Power is proposing the development of ancillary infrastructure associated with the Coleskop Wind Energy Facility (WEF) to be established near Noupoort and Middelburg in the Pixley Ka Seme District Municipality (Northern Cape Province) and the Chris Hani District Municipality (Eastern Cape Province). The proposed infrastructure comprises a new access point, the upgrading of existing jeep tracks and farm roads, a short section of new road, three concrete batching plants, temporary laydown areas and construction areas, and Operation and Maintenance Services (OMS) building, short 132 kV internal overhead lines (2 route options) and a 33 kV switching station.

The footprint of the proposed WEF ancillary infrastructure is underlain by (1) potentially fossiliferous Permo-Triassic sedimentary rocks of the Beaufort Group (Karoo Supergroup) as well as, to a considerable extent, by (2) unfossiliferous intrusions of the Karoo Dolerite Suite, both of which are extensively mantled by Late Caenozoic superficial deposits of low palaeosensitivity. A limited number of fossil sites – principally vertebrate skeletal remains, vertebrate burrows and other trace fossils as well as plant material – have been recorded within the Coleskop WEF project area (Almond 2015, 2018a) but none of these lies within the ancillary infrastructure footprint.

Based on desktop analysis of satellite imagery, geological maps, published scientific literature as well as previous field-based palaeontological heritage assessments of the broader Coleskop WEF project area (Almond 2015, 2018a, 2018b, 2018c, 2019), it is concluded that the impact significance of the proposed ancillary infrastructure regarding local palaeontological heritage resources is LOW (before and after mitigation). There is no preference on palaeontological grounds to one or other of the internal overhead line route options under consideration. No fatal flaws or No-Go areas in terms of palaeontological heritage resources have been identified within the WEF infrastructure footprint. Anticipated cumulative impacts on fossil heritage resources posed by alternative energy developments in the region, including the adjoining Umsobomvu 1 and Coleskop WEFs, are LOW.

The possibility of rare, unpredictable pockets of high palaeosensitivity within the infrastructure footprint (*e.g.* well-preserved vertebrate skeletons) cannot be completely excluded but potential impacts here during the construction phase of the WEF can be at least partially mitigated through implementation of a Chance Fossil Finds Procedure, as outlined in Appendix 1. Residual impacts should then be low but not negligible. No significant further impacts are anticipated during the operational and decommissioning phases of the development.

There are no objections on palaeontological heritage grounds to authorization of the proposed WEF ancillary infrastructure. No further specialist palaeontological studies or

mitigation for the development are recommended here, pending the potential discovery of scientifically important fossil material before or during the construction phase, in which case the Chance Fossil Finds Procedure outlined in Appendix 1 applies. These recommendations should be included within the EMPr for the proposed WEF ancillary infrastructure development.

Should substantial fossil remains - such as vertebrate bones and teeth, shells, trace fossils or fossil wood - be encountered at surface or exposed during construction, the ECO should safeguard these, preferably *in situ*. They should then alert the responsible Heritage Resources Agency (*i.e.* the South African Heritage Resources Agency (SAHRA) for the Northern Cape, the Eastern Cape Provincial Heritage Resources Agency (ECPHRA) for the Eastern Cape) as soon as possible. This is to ensure that appropriate action - *i.e.* recording, sampling or collection of fossils *plus* recording of relevant geological data - can be taken by a professional palaeontologist at the developer's expense. A tabulated Chance Fossil Finds Procedure is appended to this report (Appendix 1). Palaeontological recording and collection should meet best international practice standards and all palaeontological reports should adhere to the Minimum Standards prescribed by SAHRA (2013).

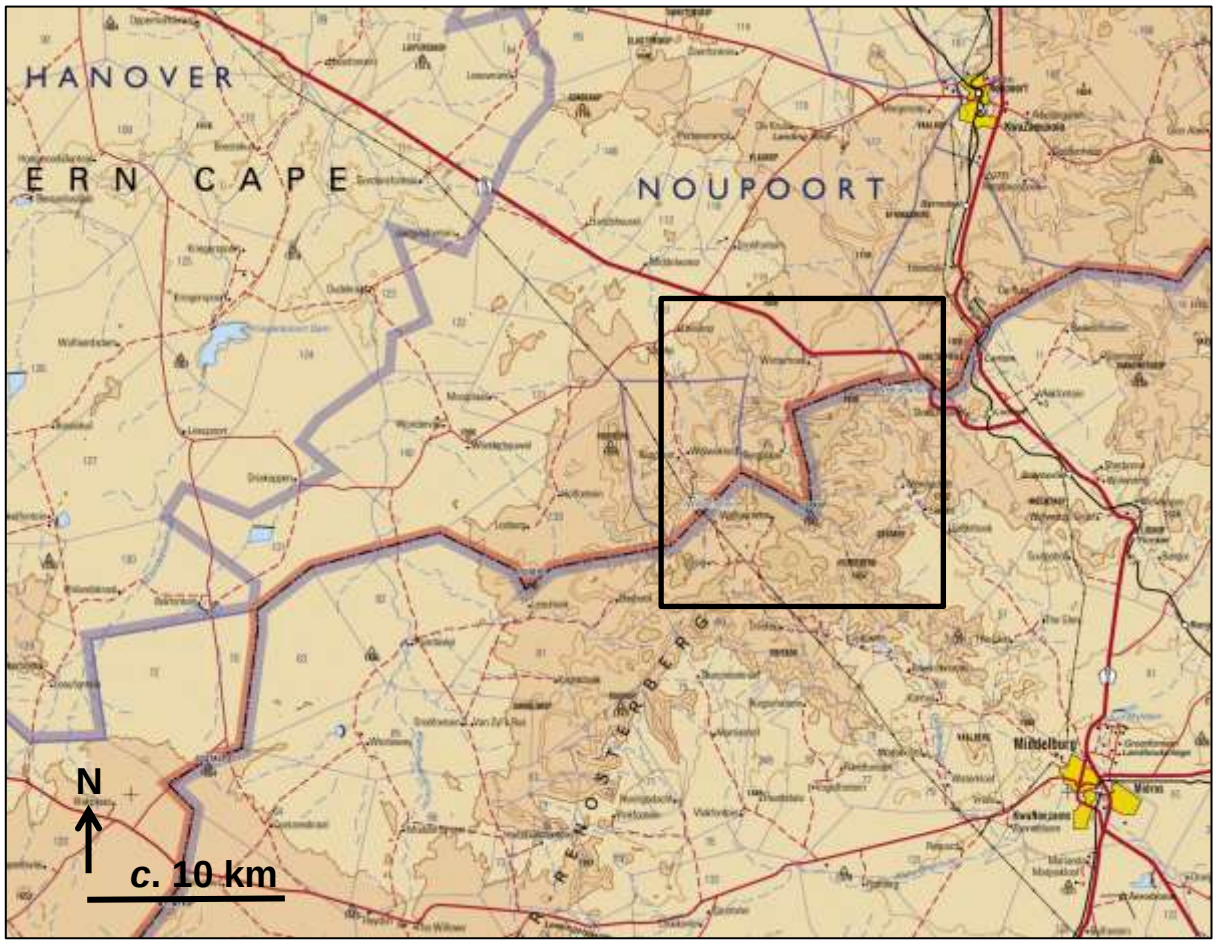

Figure 1: Extract from 1: 250 000 topographical sheet 3124 Middelburg (Courtesy of the Chief Directorate: National Geo-spatial Information, Mowbray) showing the *approximate* location of the proposed Coleskop WEF in the Agter-Renosterberg region of the Eastern Karoo, *c*. 25 km NW of Middelburg, Northern and Eastern Cape Province (black rectangle).

1. Project outline and brief

Coleskop Wind Power (the Applicant), a subsidiary of EDF Renewables (Pty) Ltd, is proposing the development of ancillary infrastructure associated with the Coleskop Wind Energy Facility (WEF) to be established near Noupoort and Middelburg in the Pixley Ka Seme District Municipality (Northern Cape Province) and the Chris Hani District Municipality (Eastern Cape Province) (Fig. 1).The affected properties include the Remaining Extent (RE), Portion 2, Portion 7 and Portion 8 of Uitzicht (Farm 3), the RE of Elands Kloof (Farm 135) and the RE of Winterhoek (Farm 118) (Fig. 2).

The proposed Coleskop Infrastructure Development includes the following (See Figs. 2 & 4):

- Creating a **new access point** and upgrading existing **jeep tracks and farm** roads of approximately 7.1 km in length to create new access road routes. These roads will be expanded to 12 m in width during the construction phase and rehabilitated to 5 m in width during the operational phase;
- The construction of three (3) **concrete batching plants, temporary laydown areas and construction areas**. Each will consist of a concrete and/or steel batching plant of approximately 11 250 m^2, a temporary laydown area of approximately 22 500 m^2 and a construction compound area of approximately 11 250 m^2. The combined total area to be cleared for these three (3) concrete batching plants, temporary laydown areas and construction areas is approximately 45 000 m^2 (4.5 ha) within the 135 000 m^2 (13.5 ha) assessed area;
- The construction of electrical infrastructure which includes an **Operation and Maintenance Services (OMS) building** of up to 60 m x 60 m, requiring the clearance of up to 3 600 m^2 (0.36 ha); and
- Two (2) 500 m corridors for the construction of a **132 kV overhead line** of approximately 7.6 km in length, which will be routed from the **Coleskop Substation** to the MTS Substation. This will include a double circuit, twin Tern 132 kV conductor. The overhead line will connect the proposed infrastructure to the existing electrical grid.

A combined desktop and field-based palaeontological heritage assessment (PIA) of the originally envisaged Umsobomvu Wind Energy Facility (WEF) near Middelburg, Eastern Cape, which included the subsequently defined Coleskop WEF project area, was submitted by Almond (2015). Palaeontological assessments for the revised Coleskop WEF (DEA Reference Number: 14/12/16/3/3/1/2039) and the associated grid connection were subsequently submitted by Almond (2018b, 2018c). The 2018b PIA report, which addressed proposed infrastructure for the Coleskop WEF specifically, concluded that:

- Due to (1) the general scarcity of fossil remains, especially in the upland areas where the majority of the infrastructure will be situated, (2) the moderately high levels of near-surface bedrock weathering and baking of sediments by dolerite intrusions, as well as (3) the extensive superficial sediment cover observed within most of the study area, the overall impact significance of the construction phase of the proposed alternative energy project is assessed as LOW.

- Given the low impact significance of the proposed Coleskop WEF near Middelburg as far as palaeontological heritage is concerned, no further specialist palaeontological heritage studies or mitigation are considered necessary for this project, pending the potential discovery or exposure of substantial new fossil remains during development. There are no objections on palaeontological heritage grounds to authorization of the amended WEF development.

Subsequently the layout of ancillary infrastructure associated with the Coleskop WEF was revised, as outlined above. The author submitted a short Palaeontological Heritage Resources Comment (October 2019) to confirm that the conclusions reached in the previous 2018a PIA assessment applied to the revised infrastructure as well. The Department of Environment, Forestry and Fisheries (DEFF) and SAHRA have now requested a stand-alone Heritage Impact Report that specifically addresses sensitivity, potential impacts and mitigation measures for the revised ancillary infrastructure layout for the WEF. The present desktop study has according been commissioned on behalf of the proponent by CES - Environmental and social advisory services, Grahamstown (Contact details: Ms Caroline Evans. CES - Environmental and social advisory services. Grahamstown, Eastern Cape. Tel: +27 (46) 622 2364. Fax: +27 (46) 622 6564. E-mail: c.evans@cesnet.co.za).

1.1. Information sources

The present desktop palaeontological heritage report is primarily based on the following information sources:

1. A detailed project description, kmz files and maps provided by CES;
2. Previous combined desktop and field-based palaeontological heritage reports and comments relating to the Coleskop WEF by the author (Almond, 2015, 2018a, 2018b, 2019);
3. The author's field experience with the formations concerned and their palaeontological heritage.

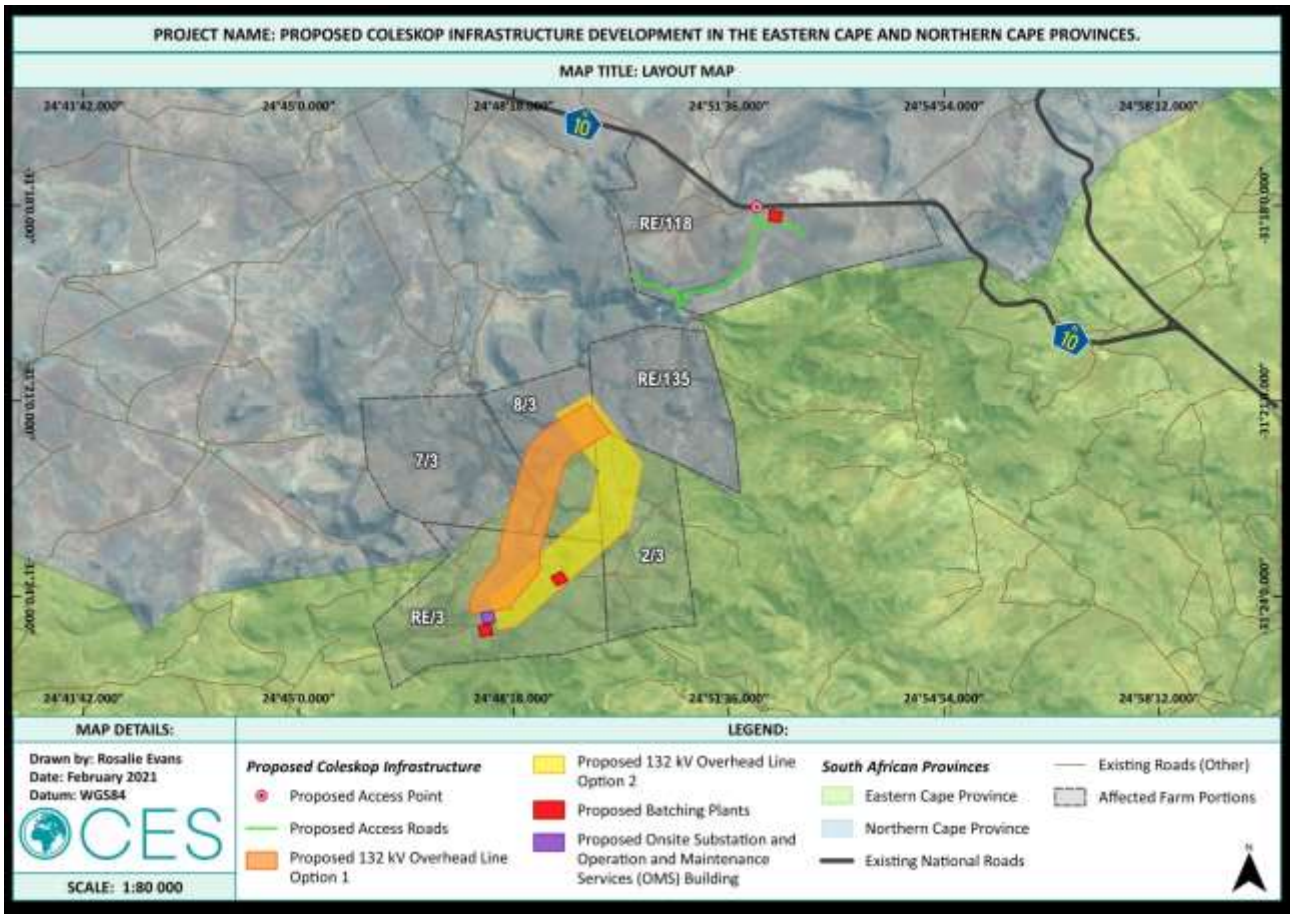

Figure 2: Map showing the proposed site (grey polygons) and revised ancillary infrastructure for the Coleskop WEF near Middelburg, Eastern and Northern Cape Provinces. The affected properties include the Remaining Extent (RE), Portion 2, Portion 7 and Portion 8 of Uitzicht (Farm 3), the RE of Elands Kloof (Farm 135) and the RE of Winterhoek (Farm 118) (Image provided by CES).

2. Geological context

The proposed Coleskop WEF project area is largely underlain by continental (fluvial, lacustrine) sediments of the Beaufort Group (Karoo Supergroup) (See Almond 2015, 2018b for details) (Fig. 3). These include (1) latest Permian to earliest Triassic rocks forming the uppermost portion of the **Adelaide Subgroup** (equivalents of the Balfour Formation of the eastern Main Karoo Basin) that crop out in low-lying, hilly terrain around the periphery of the Klein-Renosterberg massif, as well as (2) Early Triassic sediments of the **Katberg Formation** (Tarkastad Group) that build the Klein-Renosterberg escarpment and large parts of the upland plateau. The Karoo Supergroup sediments have been extensively intruded by Early Jurassic dykes and sills of the **Karoo Dolerite Suite** that have baked the adjacent country rocks and also underlie large areas of the plateau, including a large fraction of the ancillary infrastructure footprint. The Beaufort Group and Karoo dolerite bedrocks are extensively mantled by a variety of **Late Caenozoic superficial deposits** such as colluvial rock rubble (scree), alluvium, surface gravels, soils and pedocretes.

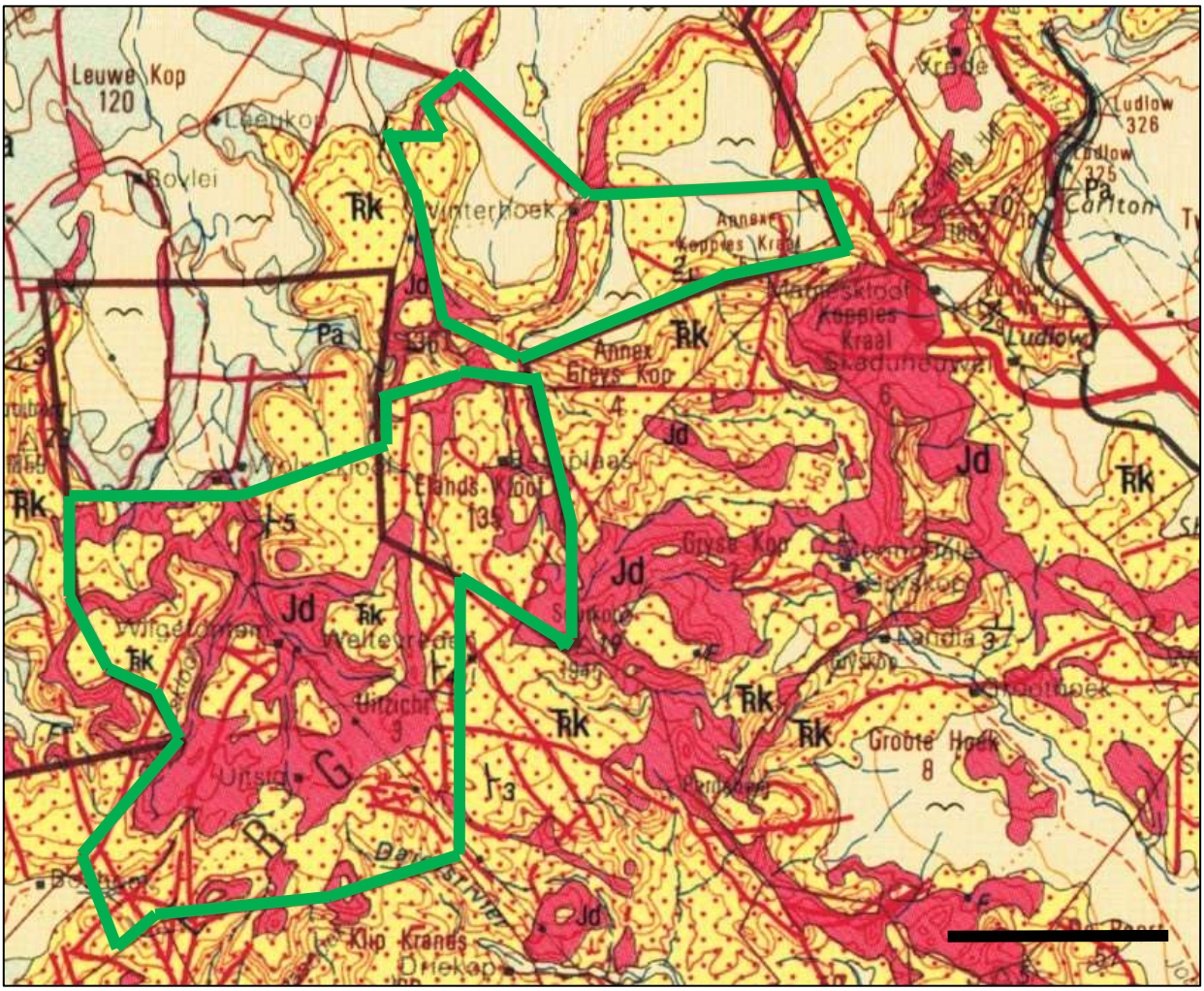

Figure 3: Extract from 1: 250 000 geology sheet 3124 Middelburg (Council for Geoscience, Pretoria) showing the *approximate* outline of the Coleskop WEF and ancillary infrastructure project area in the Klein-Renosterberg region to the northwest of Middelburg, Northern and Eastern Cape (green polygon). Scale bar = 4 km. N towards the top of the map. The main geological units represented here are: Pa (pale blue-green) = Late Permian to Earliest Triassic Adelaide Subgroup (Lower Beaufort Group, Karoo Supergroup); TRk (pale orange with red dots) = Early Triassic Katberg Formation of the Tarkastad Subgroup (Upper Beaufort Group, Karoo Supergroup); Jd (red) = intrusive sills and dykes of the Early Jurassic Karoo Dolerite Suite. Pale yellow areas with "flying bird" symbol = Quaternary to Recent alluvium. *N.B.* Other Caenozoic superficial deposits such as colluvium (scree *etc*), soils and surface gravels are not depicted here.

3. Potential palaeontological issues

The upper Adelaide Subgroup and Katberg Formation of the Beaufort Group (Karoo Supergroup) are well-known for their important continental biotas spanning the Permo-Triassic boundary, including diverse fossil vertebrates (therapsids, reptiles, amphibians, fish), trace fossils (*e.g.* invertebrate and vertebrate burrows, trackways) and rarer vascular plants. These fossil faunas provide key data for understanding the impact of the catastrophic end-Permian Mass Extinction at 251 Ma (million years ago) on the terrestrial life of Gondwana. A number of new fossil sites featuring vertebrate skeletal material, tetrapod burrows, invertebrate trace fossils and vascular plants were recorded within the original, much more extensive Umsobomvu WEF study area (including the later-defined Coleskop WEF project area) by Almond (2015, 2018b) who provides tabulated gps localities and details of the fossils concerned. These sites are shown (numbered white squares) in the satellite map in Figure 4. It is noted that **the footprint of the proposed WEF ancillary infrastructure does not overlap with any of the known fossil sites shown here**. It should be emphasized that the recording of sites is far from exhaustive and there must be numerous other, hitherto unrecorded sites within the project area, some of which might lie within the project footprint. However, these are likely to be sparsely distributed and unpredictable while many or most sites can be effectively mitigated in the pre-construction phase.

6. Impact assessment

A tabulated assessment of anticipated impacts on Palaeontological Heritage Resources relating to proposed Ancillary Infrastructure for the Coleskop WEF (Construction Phase) is provided below in Table 1. The reasoning behind this assessment follows that provided by Almond (2018b). It is noted here that (a) much of the proposed ancillary infrastructure will be located in upland areas underlain by unfossiliferous dolerite, and (b) the total footprint of the infrastructure, including volume of anticipated bedrock excavation, is small.

- Due to (1) the general scarcity of fossil remains, especially in the upland areas where the majority of the infrastructure will be situated, (2) the moderately high levels of near-surface bedrock weathering and baking of sediments by dolerite intrusions, as well as (3) the extensive superficial sediment cover observed within most of the study area, the overall impact significance of the construction phase of the proposed WEF ancillary infrastructure development is assessed as LOW. There is no preference on palaeontological grounds to one or other of the internal overhead line route options under consideration. Further significant impacts during the operational and decommissioning phases are not anticipated.

- Given the low impact significance of the proposed Coleskop WEF ancillary infrastructure near Middelburg as far as palaeontological heritage is concerned, no further specialist palaeontological heritage studies or mitigation are considered necessary for this development, pending the potential discovery or exposure of substantial new fossil remains before or during construction. There are no objections on palaeontological heritage grounds to authorization of the proposed WEF ancillary infrastructure development.

6.1. Cumulative impacts

In the absence of comprehensive data on palaeontological heritage studies for alternative energy or other developments in the Middelburg area, it is impossible to realistically assess cumulative impacts on fossil heritage resources. Similar fossil assemblages to those reported from the Coleskop WEF study area were previously recorded from comparable Beaufort Group sedimentary successions during palaeontological field assessments in the nearby Noupoort area by Gess (2013), Almond (2012) and Butler (2014). A palaeontological heritage assessment for the adjoining Umsobomvu 1 WEF (part of the original Umsobomvu WEF project) has been provided by Almond (2018a).The fossiliferous sedimentary rock units represented within these WEF project areas (*e.g.* Adelaide Subgroup / Balfour Formation, Katberg Formation, alluvium, calcretes, surface gravels) are of widespread occurrence within the Main Karoo Basin and this is also likely to apply to most, but not all, of the fossils they contain; anticipated loss of unique, irreplaceable fossil heritage is considered possible but unlikely. **It concluded that the cumulative impact on fossil heritage resources posed by potential alternative energy developments in the region, including the adjoining Umsobomvu 1 and Coleskop WEFs, is *LOW*.**

7. Conclusions and recommendations

Based on desktop analysis of satellite imagery, geological maps, published scientific literature as well as previous field-based palaeontological heritage assessments of the broader Coleskop WEF project area, it is concluded that the impact significance of the proposed ancillary infrastructure regarding local palaeontological heritage resources is LOW (before and after mitigation). There is no preference on palaeontological grounds to one or other of the internal overhead line route options under consideration. No fatal flaws or No-Go areas in terms of palaeontological heritage resources have been identified within the WEF infrastructure footprint. Anticipated cumulative impacts on fossil heritage resources posed by alternative energy developments in the region, including the adjoining Umsobomvu 1 and Coleskop WEFs, are LOW.

The possibility of rare, unpredictable pockets of high palaeosensitivity within the infrastructure footprint (*e.g.* well-preserved vertebrate skeletons) cannot be completely excluded but potential impacts here during the construction phase of the WEF can be at least partially mitigated through implementation of a Chance Fossil Finds Procedure, as outlined in Appendix 1. Residual impacts should then be low but not negligible. No significant further impacts are anticipated during the operational and decommissioning phases of the development.

There are no objections on palaeontological heritage grounds to authorization of the proposed WEF ancillary infrastructure. No further specialist palaeontological studies or mitigation for the development are recommended here, pending the potential discovery of scientifically important fossil material before or during the construction phase, in which case the Chance Fossil Finds Procedure outlined in Appendix 1 applies. These recommendations

should be included within the EMPr for the proposed Coleskop WEF ancillary infrastructure development.

Should substantial fossil remains - such as vertebrate bones and teeth, shells, trace fossils or fossil wood - be encountered at surface or exposed during construction, the ECO should safeguard these, preferably *in situ*. They should then alert the responsible Heritage Resources Agency (*i.e.* the South African Heritage Resources Agency (SAHRA) for the Northern Cape, the Eastern Cape Provincial Heritage Resources Agency (ECPHRA) for the Eastern Cape) as soon as possible. This is to ensure that appropriate action - *i.e.* recording, sampling or collection of fossils *plus* recording of relevant geological data - can be taken by a professional palaeontologist at the developer's expense. A tabulated Chance Fossil Finds Procedure is appended to this report (Appendix 1). Palaeontological recording and collection should meet best international practice standards and all palaeontological reports should adhere to the Minimum Standards prescribed by SAHRA (2013).

8. Key references

ALMOND, J.E. 2012. Proposed Mainstream wind farm near Noupoort, Pixley ka Seme District Municipality, Northern Cape. Palaeontological specialist study: combined desktop & field assessment report, 47 pp. Natura Viva cc, Cape Town.

ALMOND, J.E. 2015. Umsobomvu Wind Energy Facility near Middelburg, Pixley ka Seme & Chris Hani District Municipalities, Northern and Eastern Cape. Palaeontological specialist assessment: combined desktop and field-based study, 77 pp. Natura Viva cc, Cape Town.

ALMOND 2018a. Umsobomvu 1 Wind Energy Facility near Middelburg, Pixley ka Seme & Chris Hani District Municipalities, Northern and Eastern Cape. Palaeontological specialist assessment: combined desktop and field-based study, 79 pp. Natura Viva cc, Cape Town.

ALMOND 2018b. Coleskop Wind Energy Facility near Middelburg, Pixley ka Seme & Chris Hani District Municipalities, Northern and Eastern Cape. Palaeontological specialist assessment: combined desktop and field-based study, 83 pp. Natura Viva cc, Cape Town.

ALMOND, J.E. 2018c. Eskom Electrical Infrastructure for the Coleskop & Umsobomvu 1 Wind Energy Facilities near Middelburg, Pixley ka Seme & Chris Hani District Municipalities, Northern and Eastern Cape. Palaeontological specialist assessment: desktop study, 24 pp. Natura Viva cc, Cape Town.

ALMOND, J.E. 2019. Coleskop Wind Energy Facility near Middelburg, Pixley ka Seme & Chris Hani District Municipalities, Northern and Eastern Cape (DEA Reference Number: 14/12/16/3/3/1/2039). Palaeontological heritage resources comment, 2 PP. Natura Viva cc, Cape Town.

BUTLER, E. 2014. Palaeontological impact assessment for the proposed upgrade of existing water supply infrastructure at Noupoort, Northern Cape Province, 22 pp. Karoo Palaeontology Department National Museum, Bloemfontein.

GESS, R.W. 2013. Palaeontological impact assessment for proposed establishment of a Solar Energy facility on farm Naauwpoort near Noupoort, Eastern Cape, 13 pp. Rob Gess Consulting, Bathurst.

SAHRA 2013. Minimum standards: palaeontological component of heritage impact assessment reports, 15 pp. South African Heritage Resources Agency, Cape Town.

9. Acknowledgements

Ms Caroline Evans and Ms Rosalie Evans of CES - Environmental and social advisory services, Grahamstown are both thanked for commissioning this study and for providing the necessary background project information.

10. 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, Northwest Province, Mupumalanga, Gauteng, KwaZulu-Natal and the Free State under the aegis of his Cape Town-based company *Natura Viva* cc. He has served as 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)

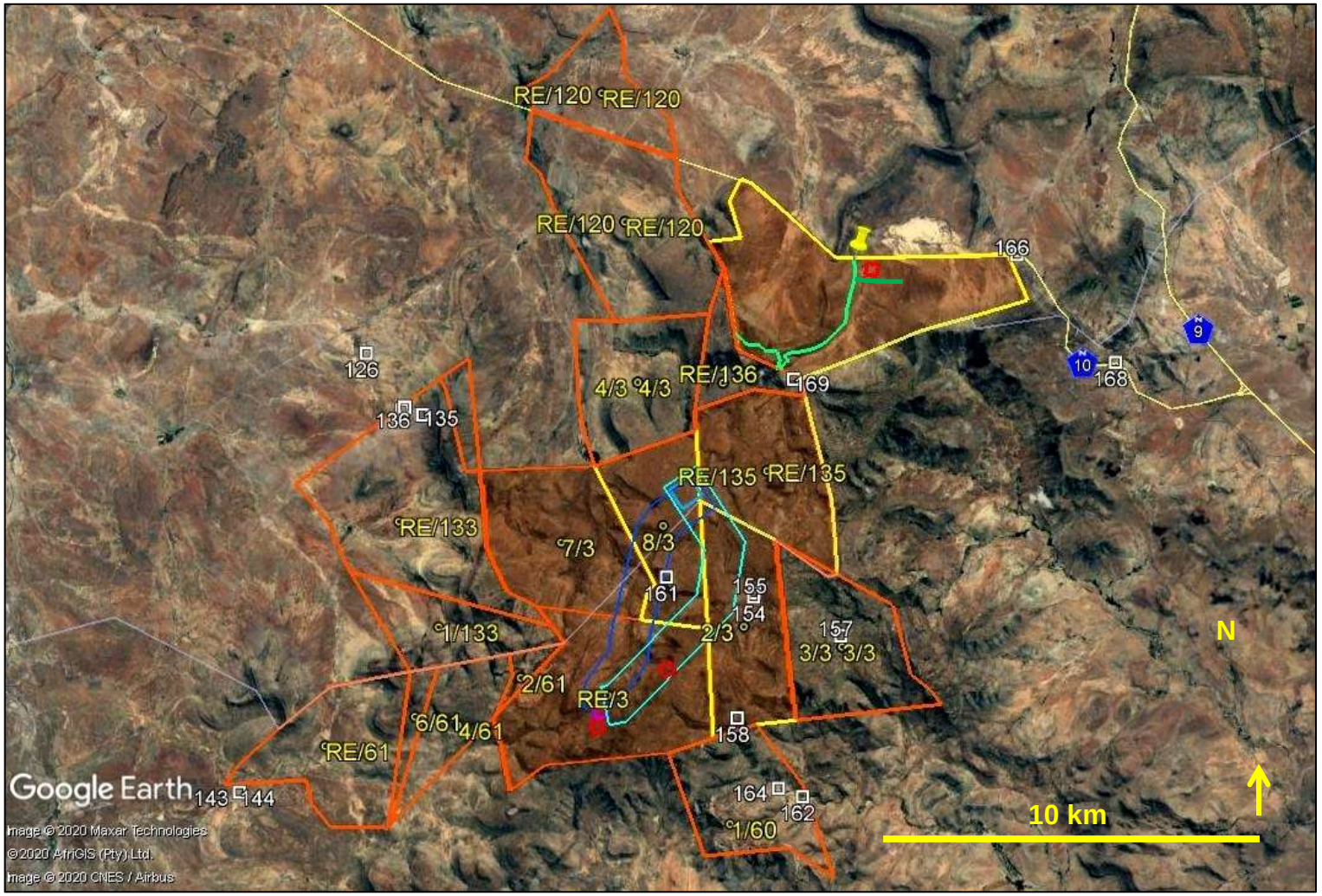

Figure 4: Google Earth© satellite image of the Coleskop WEF and ancillary infrastructure project area (orange-shaded polygons) *plus* several adjoining farms involved with the more extensive original Umsobomvu WEF project area assessed by Almond (2015). The location of known fossil sites (numbered white squares, from Almond 2015, 2018a, 2018b) is shown in relation to the proposed ancillary infrastructure for the Coleskop WEF, *viz*: new access point (yellow tack symbol), new or existing roads to be upgraded (green lines), collector substation (pale blue

square), alternative corridors for internal overhead lines from the switching station (small purple square) to the collector substation (dark and pale blue polygons) and three concrete batching plants / temporary laydown areas / construction areas (red squares). Note that the infrastructure layout does not overlap with any of the known fossil sites (Fossil Site 161 lies just outside the internal line corridor).

Table 1: Assessment and mitigation of impacts on Palaeontological Heritage Resources relating to proposed Ancillary Infrastructure for the Coleskop WEF (Construction Phase). Further significant impacts are not anticipated in the Operational and Decommissioning Phases.

DESCRIPTION OF IMPACTS	SPATIAL SCALE	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE/ LIKELIHOOD	SEVERITY/ BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
Issue: Fossil heritage resources							
Disturbance, damage, destruction or sealing-in of fossil remains preserved at or beneath the ground surface within the development area, especially during ground clearance or bedrock excavations during the construction phase.	Localised (infrastructure footprint)	Permanent	Possible	LOW NEGATIVE (but might be locally HIGH NEGATIVE)	LOW/ NEGATIVE	Monitoring of all substantial bedrock excavations for fossil remains by ECO, with reporting of new palaeontological finds (notably fossil vertebrate bones & teeth) to ECPHRA (E. Cape) or SAHRA (N. Cape) for possible specialist mitigation.	LOW/ NEGATIVE (but may be partially offset by professional recording and collection of new fossil finds = compensatory positive outcome)

<table>
<tr><th colspan="3">APPENDIX 1 - CHANCE FOSSIL FINDS PROCEDURE: Ancillary infrastructure for the Coleskop WEF near Middelburg</th></tr>
<tr><td>Province & region:</td><td colspan="2">NORTHERN CAPE: Pixley Ka Seme District Municipality
EASTERN CAPE: Chris Hani District Municipality</td></tr>
<tr><td>Responsible Heritage Resources Agency</td><td colspan="2">N. Cape: SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Phone: +27 (0)21 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za).
E. Cape: ECPHRA (Contact details: Mr Sello Mokhanya, 74 Alexander Road, King Williams Town 5600; Email: smokhanya@ecphra.org.za)</td></tr>
<tr><td>Rock unit(s)</td><td colspan="2">Adelaide Subgroup and Katberg Formation (Tarkastad Subgroup) of Beaufort Group. Late Caenozoic superficial deposits (e.g. colluvium, alluvium, soils, surface gravels, pedocretes).</td></tr>
<tr><td>Potential fossils</td><td colspan="2">Vertebrate skeletal remains and burrows, trace fossils, plant fossil (e.g. petrified wood, plant compressions) within the Beaufort Group. Mammalian and other vertebrate bones, teeth and horncores, freshwater molluscs, calcretised trace fossils (e.g. termitaria), subfossil plant material within superficial sediments.</td></tr>
<tr><td rowspan="5">ECO protocol</td><td colspan="2">1. Once alerted to fossil occurrence(s): alert site foreman, stop work in area immediately (N.B. safety first!), safeguard site with security tape / fence / sand bags if necessary.</td></tr>
<tr><td colspan="2">2. Record key data while fossil remains are still in situ:
Accurate geographic location – describe and mark on site map / 1: 50 000 map / satellite image / aerial photo
Context – describe position of fossils within stratigraphy (rock layering), depth below surface
Photograph fossil(s) in situ with scale, from different angles, including images showing context (e.g. rock layering)</td></tr>
<tr><td>3. If feasible to leave fossils in situ:
Alert Heritage Resources Agency and project palaeontologist (if any) who will advise on any necessary mitigation
Ensure fossil site remains safeguarded until clearance is given by the Heritage Resources Agency for work to resume</td><td>3. If not feasible to leave fossils in situ (emergency procedure only):
Carefully remove fossils, as far as possible still enclosed within the original sedimentary matrix (e.g. entire block of fossiliferous rock)
Photograph fossils against a plain, level background, with scale
Carefully wrap fossils in several layers of newspaper / tissue paper / plastic bags
Safeguard fossils together with locality and collection data (including collector and date) in a box in a safe place for examination by a palaeontologist
Alert Heritage Resources Agency and project palaeontologist (if any) who will advise on any necessary mitigation</td></tr>
<tr><td colspan="2">4. If required by Heritage Resources Agency, ensure that a suitably-qualified specialist palaeontologist is appointed as soon as possible by the developer.</td></tr>
<tr><td colspan="2">5. Implement any further mitigation measures proposed by the palaeontologist and Heritage Resources Agency</td></tr>
<tr><td>Specialist palaeontologist</td><td colspan="2">Record, describe and judiciously sample fossil remains together with relevant contextual data (stratigraphy / sedimentology / taphonomy). Ensure that fossils are curated in an approved repository (e.g. museum / university / Council for Geoscience collection) together with full collection data. Submit Palaeontological Mitigation report to Heritage Resources Agency. Adhere to best international practice for palaeontological fieldwork and Heritage Resources Agency minimum standards.</td></tr>
</table>