COMBINED DESKTOOP & FIELD-BASED PALAEONTOLOGICAL HERITAGE REPORT

PROPOSED UMSOBOMVU 400KV TURN-IN OVERHEAD LINE, SITUATED ON PORTIONS OF FARMS UITZICHT 3 AND ELANDS KLOOF 135 IN THE UMSOBOMVU LOCAL MUNICIPALITY (NORTHERN CAPE PROVINCE) AND THE INXUBA YETHEMBA LOCAL MUNICIPALITY (EASTERN CAPE PROVINCE).

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EXECUTIVE SUMMARY

Umsobomvu Wind Power (Pty) Ltd, a subsidiary of EDF Renewables (Pty) Ltd, is proposing to construct a 400kV Overhead Line (OHL) turn-in system at the Koruson Substation in support of the proposed Umsobomvu Wind Energy Facility (WEF) and Coleskop WEF projects located near Middelburg in the Eastern and Northern Cape Provinces.

The 400 kV turn-in OHL project area is underlain by potentially fossiliferous continental sediments of the Adelaide and Tarkastad Subgroups (Beaufort Group. Karoo Supergroup) which are of latest Permian and earliest Triassic age, spanning a catastrophic mass extinction event. Provisional mapping using the DFFE Screening Tool suggests that much of the project area is of Very High palaeosensitivity.

A sparse scatter of fossil remains have been recorded here within the Beaufort Group bedrocks during a recent one-day site visit, as well as previous field-based palaeontological assessments of the Umsobomvu 1 WEF project area (Almond 2018b) and the Korason Substation project area (Almond 2021b). They mainly comprise fragmentary reworked bones and teeth of small tetrapods preserved within well-developed, calcrete concretion-dominated, basal channel breccio-conglomerates or inside pedogenic concretions. Low diversity trace fossil assemblages are observed locally within sandstone and siltstone facies. The vertebrate fossils are sparsely distributed and for the most part taxonomically unidentifiable. The majority are poorly preserved due to intensive regional dolerite intrusion as well as near-surface weathering; hence these fossils are of modest palaeontological or conservation significance. Possible calcretized rhizoliths (plant root casts) of limited scientific interest are the only fossils observed within the Late Caenozoic superficial sediments. It is concluded that the 400 kV turn-in OHL project area is, in practice, of LOW palaeosensitivity overall and the palaeosensitivity mapping shown by the DFFE Screening Tool is accordingly *contested* here.

It is inferred that potential impacts on palaeontological heritage resources due to the proposed OHL infrastructure developments are likely to be of LOW to VERY LOW significance. Pending the discovery of significant new fossil finds within the project footprint before or during construction, no further specialist palaeontological studies, monitoring or mitigation are recommended for these developments. Provided that the Chance Fossil Finds Protocol tabulated in Appendix 1 is incorporated into the EMPr and fully implemented during the construction phase of the OHL developments, there are no objections on palaeontological heritage grounds to their authorisation.

1. INTRODUCTION

Umsobomvu Wind Power (Pty) Ltd, a subsidiary of EDF Renewables (Pty) Ltd, is proposing to develop additional electrical infrastructure on Portions 2, 4, 6 and 8 of the farm Uitzicht 3 and the Remaining Extent of the farm Elands Kloof 135, located in the Agter-Renosterberg region *c*. 24 km northwest of Middelburg, Eastern Cape, in order to supplement the development of the authorised Wind Energy Facilities (WEFs) in proximity to the infrastructure site. The properties involved are situated inside the authorised Umsobomvu 1 WEF project area that falls within the Umsobomvu Local Municipality in the Northern Cape Province and the Inxuba Yethemba Local Municipality in the Eastern Cape Province (Fig. 1).

The proposed OHL development involves the construction of a 400kV turn-in system at the Koruson Substation (SS) (DFFE Reference: 14/12/16/3/3/2/730/2) in support of the proposed Umsobomvu WEF (DFFE Ref: 14/12/16/3/3/2/730) and Coleskop WEF (DFFE Ref: 14/12/16/3/3/2/730/1). The 400kV turn-in system will include two 400kV OHLs of up to 6km each in length. This is to ensure that electrical energy generated by the WEFs can be evacuated from the Eskom Koruson SS to the national electrical grid network *via* the existing Eskom 400kV distribution lines. The proposed Umsobomvu 400kV Turn-in System will consist of the following:

- Two (2) 400kV OHLs (assessed within 600m wide corridors) which will extend from the Koruson SS to the Eskom 400kV distribution lines in a northwest and southwest direction from the SS.

N.B. All other related infrastructure, including roads, substation (Koruson), laydown areas, amongst others, has already received Environmental Authorisation (DFFE: 14/12/16/3/3/2/730/2)

Previous palaeontological heritage assessments have been undertaken by the author for WEF infrastructure -related developments in the region, including the Coleskop and Umsobomvu WEFs *plus* ancillary electrical and other infrastructure, including an IPP 132 kV Substation (Koruson) and 132 kV Distribution Collector Substation on Farm Uitzicht 3 (See References under Almond 2015, 2018a-c, 2019, 2021a-b).

The 400 kV OHL project area overlies potentially fossiliferous continental sediments of the Beaufort Group (Karoo Supergroup) and according to the SAHRIS palaeosensitivity map as well as the DFFE Screening Tool it is in large part of Very High palaeosensitivity, with the exception of areas mantled by Late Caenozoic alluvium or intruded by dolerite (Fig. 24). In accordance with Appendix 6 of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) Environmental Impact Assessment (EIA) Regulations of 2014, a combined field-based and desktop site sensitivity verification has therefore been undertaken in order to confirm the current land use and environmental sensitivity of the proposed project area as identified by the DFFE National Web-Based Environmental Screening Tool.

The present short PIA Site Sensitivity Verification report has been commissioned by the independent EAP responsible for the relevant environmental assessment processes, CES - Environmental and Social Advisory Services, Gqeberha / Port Elizabeth (Contact details: Ms Caroline Beer (née Evans). CES - Environmental and Social Advisory Services. Head Office Tel.: +27 (0)46 622 2364. E-mail: c.evans@cesnet.co.za).

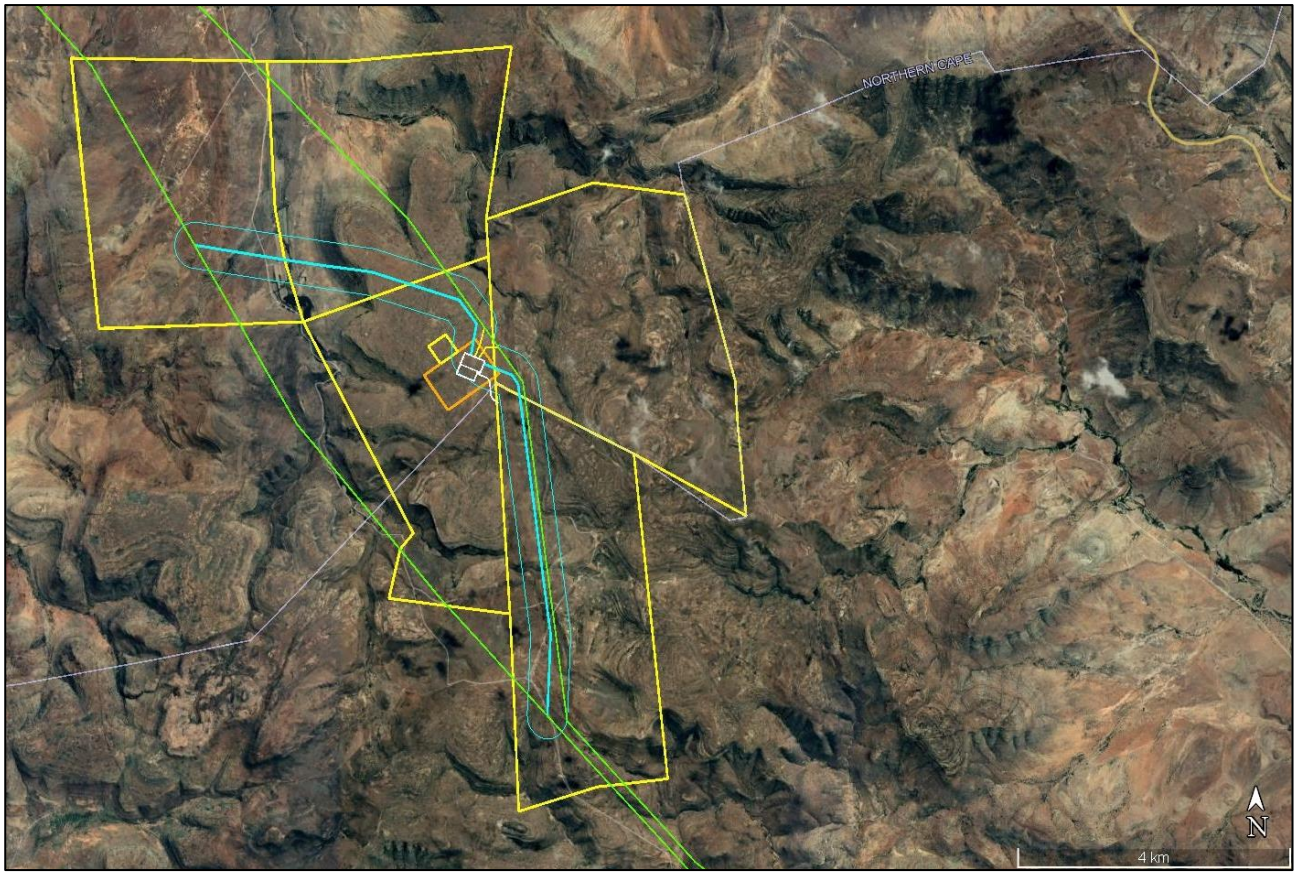

Figure 1: Google Earth© satellite image for the proposed 400 kV turn-in OHL project area (two pale blue corridors) linking into existing Eskom 400 kV lines (green) situated on various portions of the farms Uitzicht 3 and Elands Kloof 135, located *c*. 24 km northwest of Middelburg in the Klein-Renosterberg region of the Eastern and Northern Cape. The project area spans the boundary between the Northern and Eastern Cape Provinces (thin purple line). Project areas for new substations (Korason SS) and a concrete tower manufacturing facility (orange and white rectangles) have already been assessed by Almond (2021b).

2. DATA SOURCES FOR SITE SENSITIVITY VERIFICATION

The palaeontological heritage report of the proposed OHL project area is based on:

- A short project outline (Draft Scoping Report, dated March 2022), maps, kmz files, DFFE Screening Tool palaeosensitivity map and other pertinent data provided by CES - Environmental and Social Advisory Services;

- A desktop review of (a) the relevant 1:50 000 and 1: 250 000 scale topographic maps (3124BD Carlton, 3124 Middelburg respectively), (b) Google Earth© satellite imagery, (c) published geological and palaeontological literature, including the 1:250 000 geological map (3124 Middelburg) for which a short sheet explanation has been published by Cole *et al.* (2004), as well as (d) several previous desktop and field-based fossil heritage (PIA) assessments for the Umsobomvu and Coleskop WEF projects near Middelburg by the author (Almond 2015, 2018a-c, 2019, 2021a-b) and for the nearby Umsobomvu solar PV energy facilities by Butler (2019).

- A one-day field assessment of the relevant project areas by the author on 29 April 2022.

Although portions of the OHL project area were covered by dense grassy to bossieveld vegetation during the site visit, following recent heavy rains, the season of the visit has no significant impact on this assessment study and confidence levels for the conclusions reached here are Medium to High.

3. GEOLOGICAL CONTEXT

The geology of the OHL project area in the Agter-Renosterberg region is shown on 1: 250 000 geology sheet 3124 (Council for Geoscience, Pretoria) with a useful sheet explanation by Cole *et al.* (2004) (Fig. 7). Further details of the regional geology and extensive references are provided in previous illustrated PIA reports by Almond (2015, 2018a and 2021b).

The northern and southern corridors for the 400 kV turn-in OHL within the Umsobomvu 1 WEF project area are underlain by continental (fluvial, lacustrine) sediments of the **Beaufort Group** (Karoo Supergroup). The lower-lying sectors of the project area, at the foot of the Agter-Renosterberg range, are underlain by thin sandstone packages and mudrocks of the upper **Adelaide Subgroup** of latest Permian – earliest Triassic age (Pa in map Fig. 7). The sandstone-dominated succession building the upper slopes of the incised escarpment and capping the Agter-Renosterberg plateau represents Early Triassic fluvial channel sandstones and subordinate overbank mudrocks of the **Katberg Formation** (Tarkastad Subgroup, Karoo Supergroup). In terms of dominant sedimentary facies, the contact between the Adelaide and Tarkastad Subgroups in the study region appears to be gradational, at least at a macroscopic (mapping) scale (*cf* Fig. 3). The Karoo Supergroup sediments in the region 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. The Beaufort Group and Karoo dolerite bedrocks are extensively mantled by a variety of **Late Caenozoic superficial deposits** such as colluvial / eluvial rock rubble (scree, surface gravels), stream alluvium and unconsolidated sandy soils. Exposure levels of the Beaufort Group bedrocks within the project area are generally limited due to extensive cover by superficial sediments as well as grassy vegetation and bossieveld (Figs. 2 to 6). Occasional good exposures of the Permo-Triassic bedrocks and Late Caenozoic cover sediments within or close to the OHL corridors under consideration in this report are provided in Figures 8 to 19, together with explanatory figure legends.

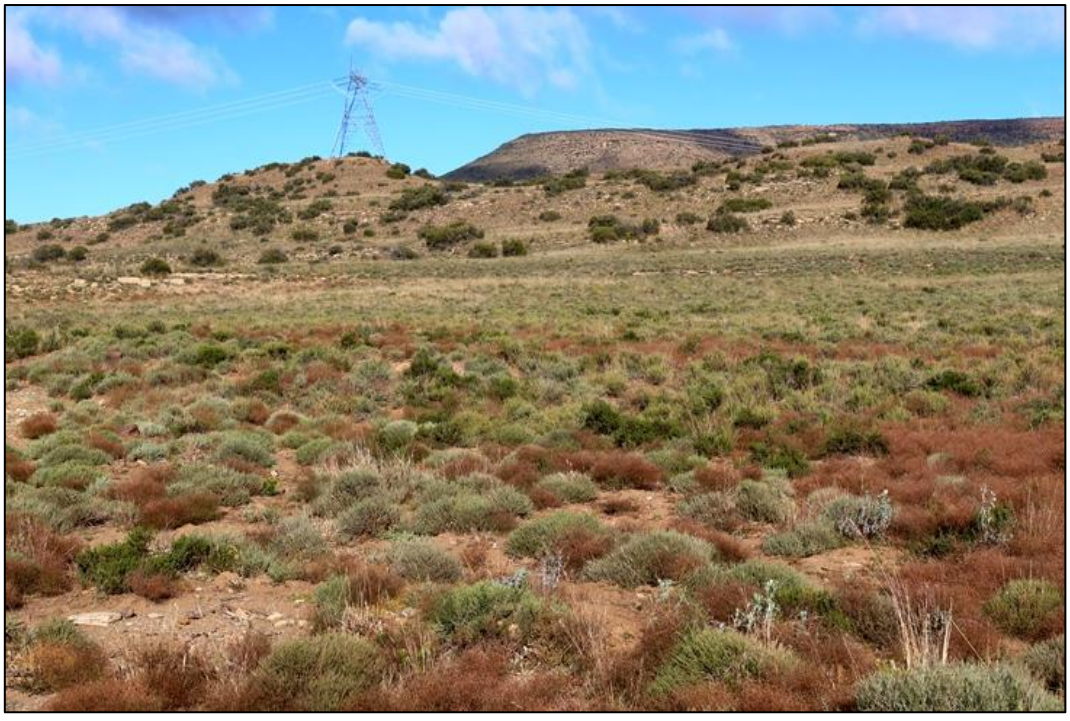

Figure 2: Low hills to the NE of Rietpoort homestead (Uitzicht 3) whose stepped lower slopes are built of a sandstone package of the Adelaide Subgroup capped by dolerite. The northern 400 kV turn-in OHL will join the existing Eskom line near here.

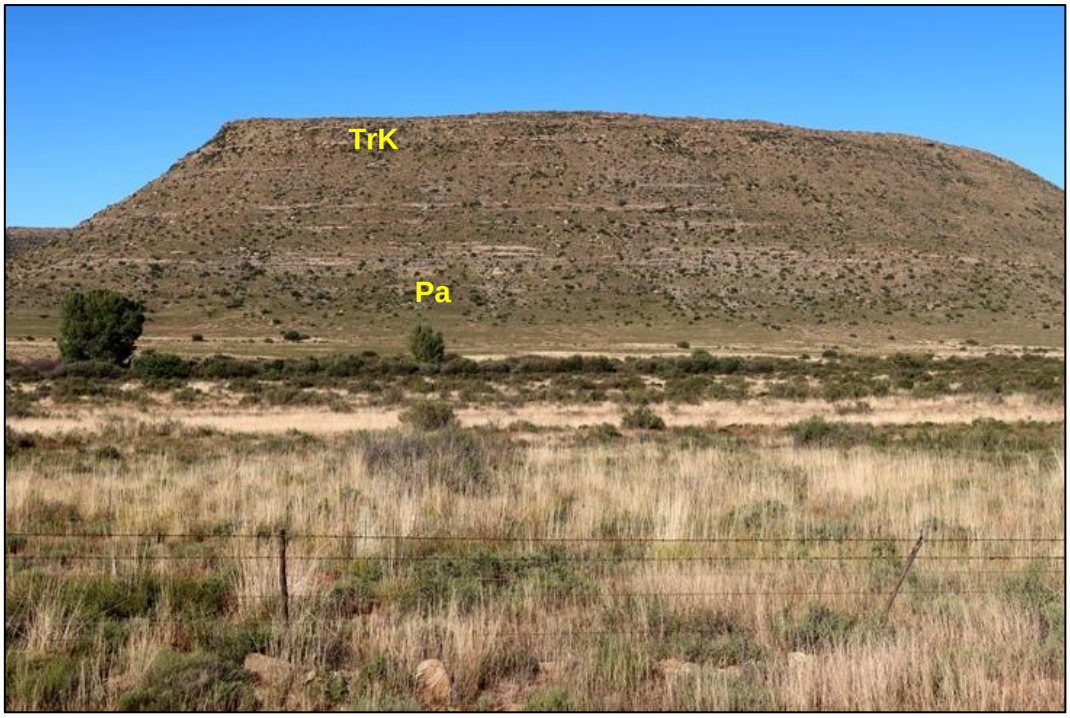

Figure 3: West-facing escarpment of the Agter-Renosterberg just NE of Wolwekloof homestead (Uitzicht 3). The contact between the Adelaide Subgroup (Pa) building the lower slopes and the sandstone-dominated Katberg Formation (TrK) underlying the upland plateau may be transitional in this region.

Figure 4: Typical Katberg sandstone scenery on the Agter-Renosterberg plateau north of the Koreson Substation site. Potentially fossiliferous mudrocks are only rarely exposed here (*cf* Almond 2021b).

Figure 5: View southward along the southern 400 kV turn-in OHL corridor to the east of Weltevreden homestead (Uitzicht 3) showing limited bedrock exposure and thick orange-brown alluvial deposits along an incised water course (See Figure 19).

Figure 6: View northwards along the southern 400 kV turn-in OHL corridor south of Weltevreden homestead (Uitzicht 3) where the topography is dominated by prominent-weathering Katberg sandstone packages.

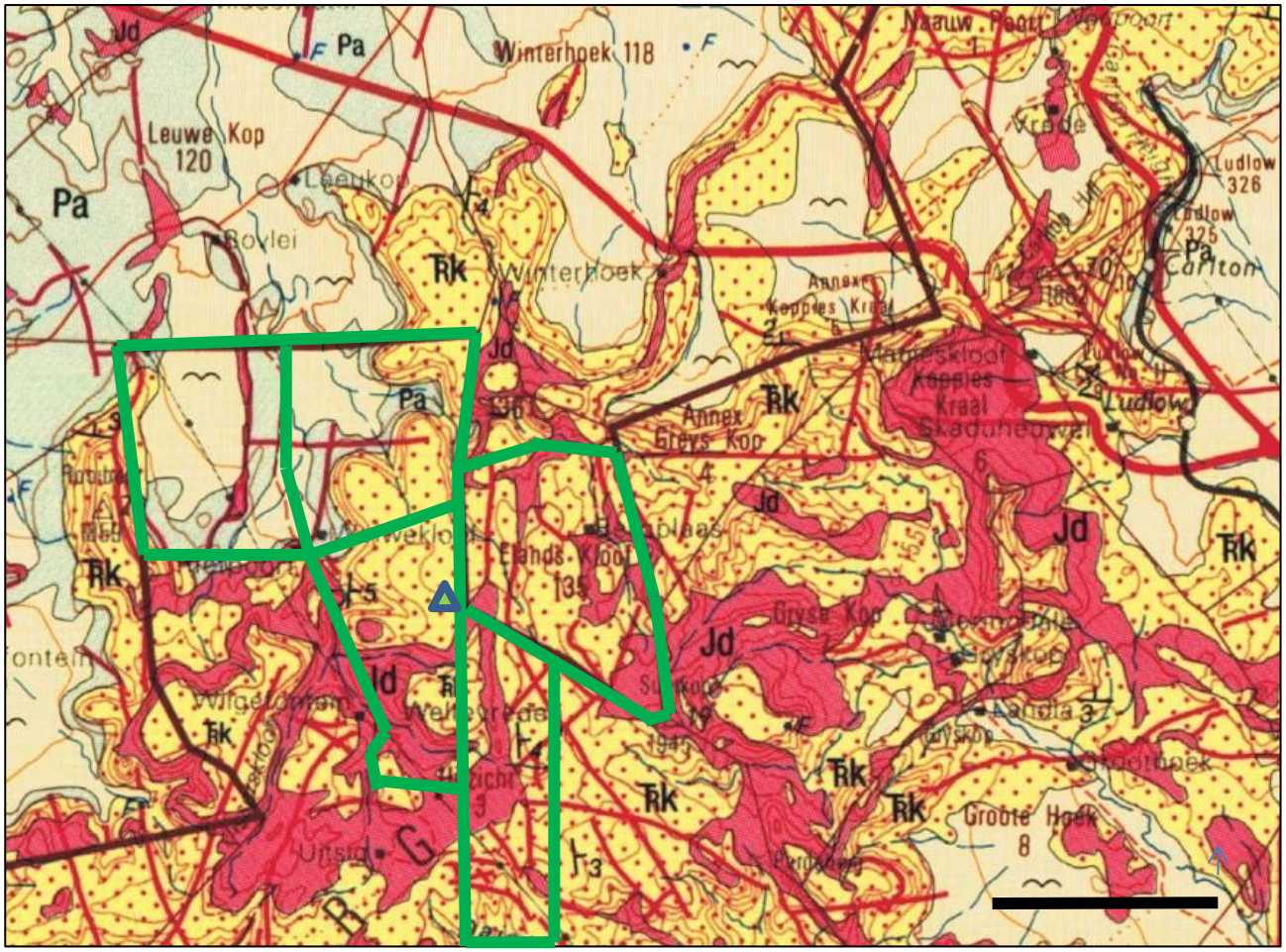

Figure 7: Extract from 1: 250 000 geology sheet 3124 Middelburg (Council for Geoscience, Pretoria) showing the *approximate* outline of the land parcels concerned with the 400 kV turn-in OHL project area situated in the Agter-Renosterberg region to the northwest of Middelburg, Northern and Eastern Cape (green polygons). The blue triangle indicates the location of the proposed Korason Substation. 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 mapped at this scale.

Figure 8: Adelaide Subgroup tabular sandstone package capped by a dolerite sill, 1.2 km WNW of Rietpoort homestead (Uitzicht 3). Note small stone structure at base of hill.

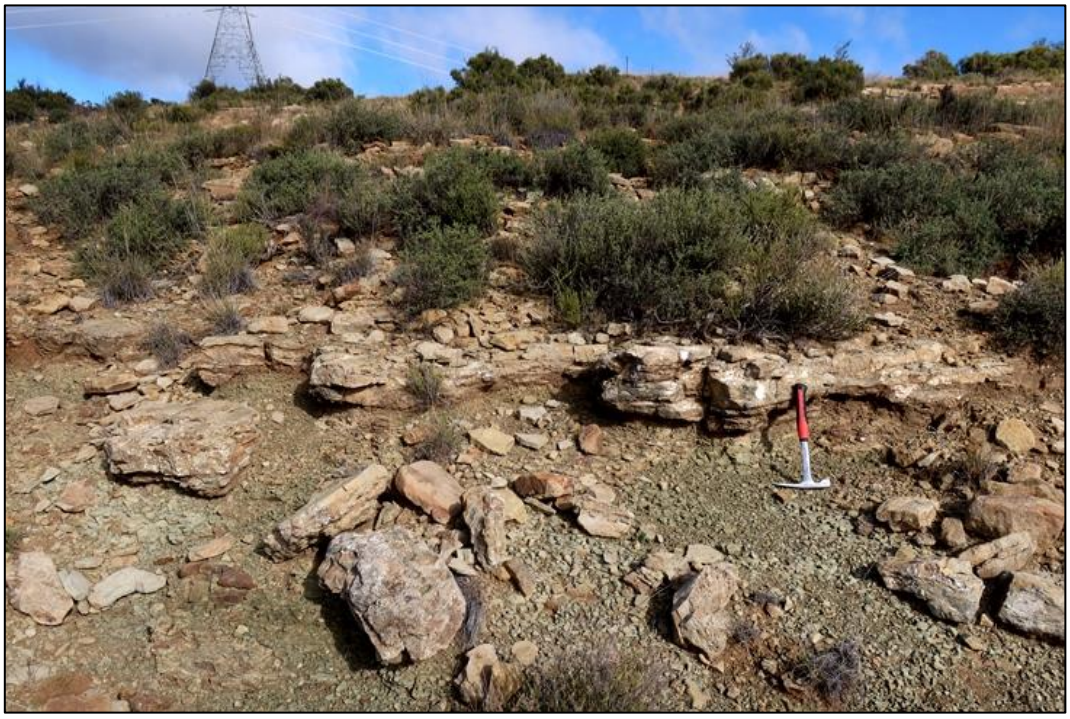

Figure 9: Adelaide Subgroup exposure on the eastern slopes of the hill illustrated above showing contact between a sandstone package and underlying weathered, grey-green siltstones. Calcrete-rich breccio-conglomerates here (adjacent to hammer = 30 cm) contain sparse reworked bone fragments while skeletal remains are recorded within ferruginous concretions in the underlying mudrocks.

Figure 10: Detail of the pedogenic nodule conglomerate in the previous illustration showing well-rounded calcrete clasts, including sphaeroidal pisoliths up to 1.5 cm in diameter, within a brown, ferruginised sandy matrix.

Figure 11: Incised drainage line to the WNW of Rietpoort homestead (Uitzicht 3) showing the great thickness of gravelly to sandy alluvium overlying Beaufort Group bedrocks in low-lying sectors of the OHL corridor.

Figure 12: Shallow streambed exposure of Katberg Formation mudrocks *c*. 1 km SW of Weltevreden homestead (Uitzicht 3).

Figure 13: Borrow pit exposure of a thin-bedded, current-rippled and crevasse splay sandstone within the Katberg Formation *c*. 2.4 km SW of Weltevreden homestead (Uitzicht 3). Sandstone infilled mudcracks as well as casts of reedy plant stems are recorded here.

Figure 14: Package of Katberg Formation grey-green overbank mudrocks with pedocrete concretions capped by a tabular-bedded sandstone package, roadside exposure *c*. 330 m SW of Weltevreden homestead (Uitzicht 3).

Figure 15: Coarse basal channel breccia composed of angular mudrock intraclasts within a gritty sandy matrix originally rich in calcrete grains (subsequently dissolved away), Katberg Formation, same locality as previous figure (hammer = 30 cm).

Figure 16: Thick, lencticular incised channel infill of grey reworked pedogenic calcrete and thin-bedded sandstone, Katberg Formation *c*. 0.5 km west of Weltevreden homestead (Uitzicht 3) (hammer = 30 cm). This extensive channel infill body contains sparse reworked fossil bones and teeth.

Figure 17: Thin-bedded, highly tabular, grey-green and minor purple-brown overbank mudrocks of the Katberg Formation exposed in the bed of a deeply-incised stream *c*. 760 m west of Weltevreden homestead (Uitzicht 3).

Figure 18: Thin Katberg sandstone packages with wave-rippled bed tops interbedded with khaki-hued weathered overbank siltstones, stream bed exposure *c*. 600 m west of Weltevreden homestead (Uitzicht 3).

Figure 19: Thick package of gravely to sandy, orange-brown Late Caenozoic alluvium exposed in the banks of a stream *c*. 800 m west of Weltevreden homestead (Uitzicht 3) (hammer = 30 cm).

4. PALAEONTOLOGICAL HERITAGE

Fossil biotas within the upper portion of the Adelaide Subgroup are for the most part referred to the *Daptocephalus* Assemblage Zone (previously known as the *Dicynodon* Assemblage Zone) and have been reviewed by Kitching (1995), Smith *et al.* (2012) and more recently by Viglietti (2020). They are of considerable interest in documenting the catastrophic end-Permian Mass Extinction Event of 252 million years ago (*e.g.* Smith & Botha-Brink 2014).

The uppermost beds of the Adelaide Subgroup as well as the entire overlying Katberg Formation of the Main Karoo Basin contains important post-extinction fossil biotas of earliest Triassic age that are referred to the *Lystrosaurus declivis* Assemblage Zone (previously known as the *Lystrosaurus* Assemblage Zone). These fossil assemblages – including a wide range of amphibians, therapsids and true reptiles as well as trace fossils and rare plant material – have been reviewed by Groenwald & Kitching (1995), Smith *et al.* (2012) as well as Botha and Smith (2020). Igneous bedrocks of the Karoo Dolerite Suite are entirely unfossiliferous and have almost certainly compromised fossil material originally preserved in the adjacent sedimentary country rocks through thermal metamorphism (baking) and secondary leaching or mineralisation by hot circulating subterranean fluids. Soils (including possible pedocretes such as calcrete and ferricrete) as well as unconsolidated stream and eluvial surface gravels in the study region are generally of very low palaeosensitivity.

New palaeontological sites recorded during the recent site visit (April 2022) as well as nearby fossil sites previously recorded within the Umsobomvu 1 WEF project area that are listed by Almond (2018a) are tabulated in Appendix 1, together with a brief description, Provisional Field Rating and any recommended mitigation. The sites are mapped on a satellite image with reference to the 400 kV turn-in OHL corridors in Figure A1.

Sparse fragments of reworked bone as well as cylindrical calcrete structures with a central muddy core (*possibly* rhizoliths) are recorded locally within basal channel breccias of the Adelaide Subgroup within the northern OHL corridor on Ultzicht 3 (Figs. 22a & 22b). Underlying weathered mudrocks contain partially articulated postcrania of small tetrapods preserved within ferruginous palaeocalcrete concretions (Figs. 20 & 21). The fossil material here is mostly poorly preserved and taxonomically unidentifiable and has accordingly been assigned a low Field Rating (IIIB, IIIC Local Resource). Although the sites lie within the OHL corridor, no special palaeontological mitigation is proposed in their regard.

Sparse vertebrate fossil remains recorded within the lower part of the Katberg Formation within or close to the project area comprise several, mostly unidentifiable, rolled bone fragments preserved within pedogenic concretion breccio-conglomerates infilling incised channels (Figs. 22c-22f & 23). These thick channel infills were associated with episodes of intense degradation of arid floodplains associated with challenging climates at the time of the Permo-Triassic extinction event (Pace *et al.* 2009, Smith & Botha-Brink 2014). One of the bone fragments (Fig. 23) is probably a fragmentary palate of a small (possibly juvenile) temnospondyl amphibian, such as a rhinesuchid, showing a complex plicidentine tooth structure (pers. comm. 2022 Prof. Sean Modesto, Cape Breton University, Canada). Overbank silty mudrocks and thin sandstones associated with wave-rippled, sun-cracked palaeosurfaces display assemblages of subcylindrical reedy plant stem casts (probably equisetalean ferns) (Fig. 24) as well as poorly preserved *Scoeynia* Ichnofacies invertebrate trace fossil assemblages that are typically associated with damp substrates. All of the Katberg Formation fossil remains recorded here are assigned a low Field Rating (IIIB, IIIC Local Resource) and no special palaeontological mitigation is proposed in their regard (*N.B*. In addition, several of the sites lie *outside* the OHL corridors, as shown in map Figure A1).

The only potential fossils recorded from the locally thick, Late Caenozoic superficial deposits within the project area comprise ill-defined, irregular, subvertical calcrete structures within sandy alluvial deposits which might be calcretised plant roots and / or invertebrate burrows (Fig. 25).

Figure 20: Semi-articulated postcrania of a small tetrapod, including backbone, possible pelvis and proximal limb bones, preserved within a ferruginous concretion within grey-green mudrock facies of the Adelaide Subgroup (Loc. 660) Scale bar = 5 cm.

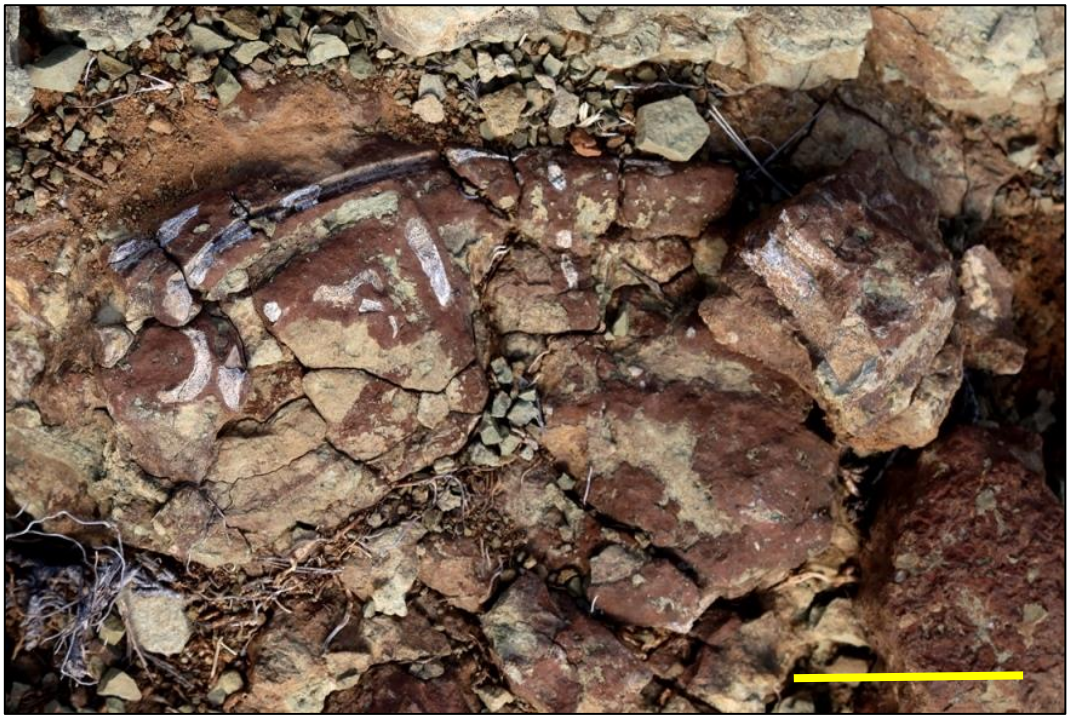

Figure 21: Disarticulated postcranial remains, including ribs and limb bones, of a small tetrapod - possibly the same individual as shown in the previous illustration (Loc. 660). Scale bar = 5 cm.

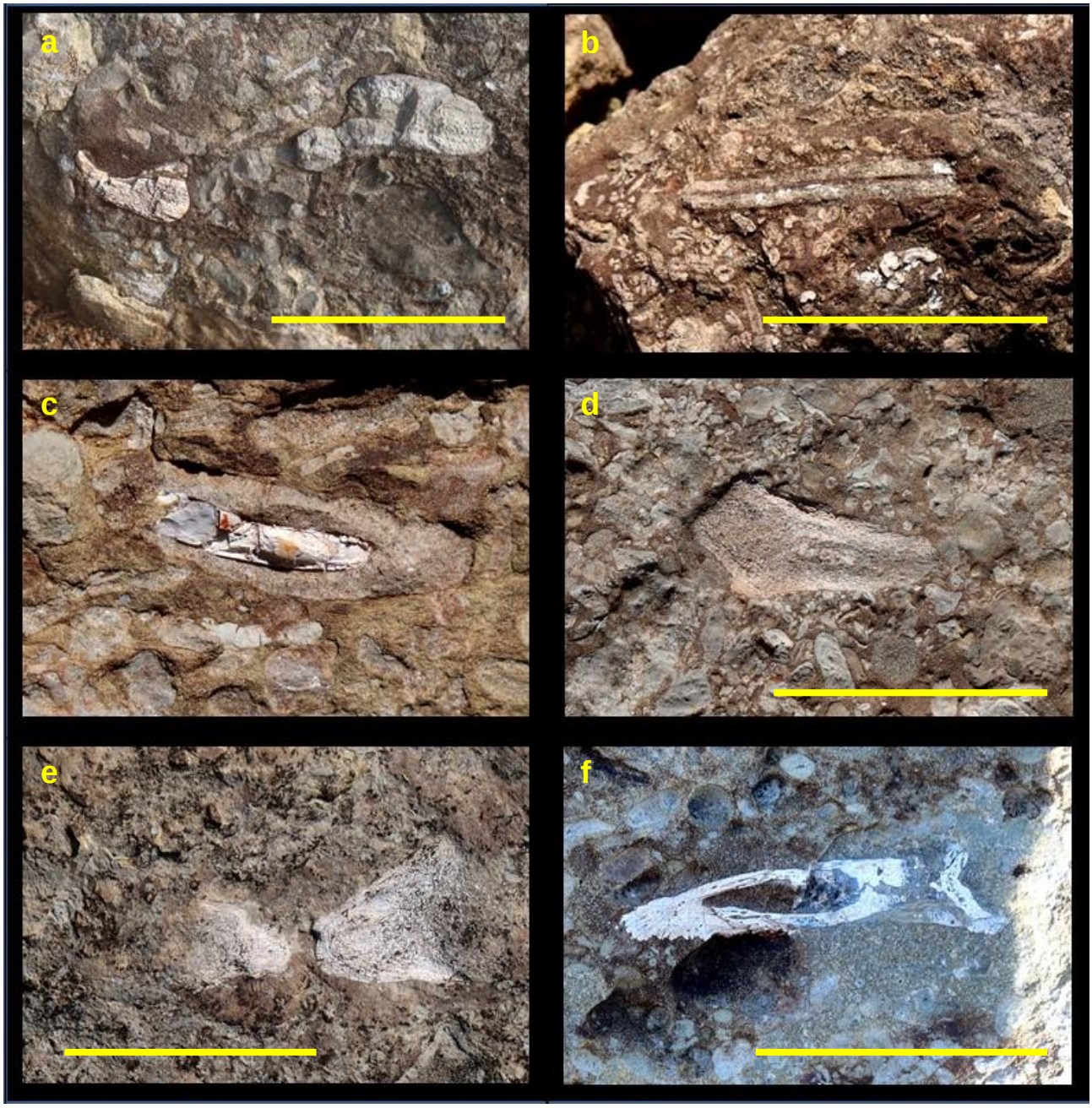

Figure 22 (a-f): Reworked, fragmentary and abraded bone and tooth fragments preserved within pedogenic concretion breccio-conglomerates infilling incised channels and basal breccias within the Beaufort Group. Scale bars = 5 cm.

Upper Adelaide Subgroup:

- **(a) unidentified rolled bone (Loc. 659);**
- **(b) cylindrical calcrete concretions with a central muddy core (possibly rhizoliths) (Loc. 659)**

Lower Katberg Formation:

- **(c) small tetrapod tooth *c*.14 mm long (possibly dicynodont) enclosed within a calcrete concretion (Loc. 025);**
- **(d) unidentified rolled bone (Loc. 026);**
- **(e) unidentified rolled bones (Loc. 027);**
- **(f) probable fragment of palate of a small amphibian (Loc. 022) (see Fig. 23 for more detail).**

Figure 23: Detailed image of the probable temnospondyl amphibian palate fragment from the Katberg Formation shown in Figure 22f above (Loc. 022). The specimen as seen is *c*. 7 cm long. The teeth show a complex plicidentine infolding that is typical of "labyrinthodonts" but also occasionally seen in several other tetrapod subgroups.

Figure 24: Assemblage of subcylindrical, vertical casts of reedy plant stems – probably sphenophyte ferns - preserved within grey-green mudrocks of the Katberg Formation (scale in 0.5cm intervals) (Loc. 003).

Figure 25: Irregular, subvertical calcrete structures - possibly calcretised plant roots and / or invertebrate burrows – within thick sandy alluvium, stream bank section *c*. 800 m west of Weltevreden homestead (Uitzicht 3) (hammer = 30 cm) (Loc. 014). See Figure 5 for context.

5. SITE SENSITIVITY VERIFICATION

The provisional paleontological sensitivity map for the 400 kV turn-in OHL project area (blue dotted polygons in Fig. 26) based on the DFFE Screening Tool suggests that most of the project area is of Very High palaeosensitivity due to the underlying sedimentary bedrocks of the Beaufort Group (Karoo Supergroup). Areas mantled by Late Caenozoic alluvial deposits are assigned a Medium palaeosensitivity while dolerite intrusions are of Zero palaeosensitivity.

Based on the recent one-day site visit as well as previous field-based palaeontological assessments of the Umsobomvu 1 WEF project area (Almond 2018b) and the Korason Substation project area (Almond 2021b), it is concluded that the 400 kV turn-in OHL project area is, in practice, of LOW palaeosensitivity overall. Fossil remains recorded here within the Beaufort Group bedrocks as well as the Late Caenozoic superficial sediments are sparsely distributed and for the most part poorly preserved due to intensive regional dolerite intrusion as well as near-surface weathering, and hence they are of modest palaeontological or conservation significance. The palaeosensitivity mapping shown by the DFFE Screening Tool is accordingly *contested* here.

6. CONCLUSIONS

The 400 kV turn-in OHL project area is underlain by potentially fossiliferous continental sediments of the Adelaide and Tarkastad Subgroups (Beaufort Group. Karoo Supergroup) which are of latest Permian and earliest Triassic age, spanning a catastrophic mass extinction event. Provisional mapping using the DFFE Screening Tool suggests that much of the project area is of Very High palaeosensitivity.

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calcrete concretion-dominated, basal channel breccio-conglomerates or inside pedogenic concretions. Low diversity trace fossil assemblages are observed locally within sandstone and siltstone facies. The vertebrate fossils are sparsely distributed and for the most part taxonomically unidentifiable. The majority are poorly preserved due to intensive regional dolerite intrusion as well as near-surface weathering; hence these fossils are of modest palaeontological or conservation significance. Possible calcretized rhizoliths (plant root casts) of limited scientific interest are the only fossils observed within the Late Caenozoic superficial sediments. It is concluded that the 400 kV turn-in OHL project area is, in practice, of LOW palaeosensitivity overall and the palaeosensitivity mapping shown by the DFFE Screening Tool is accordingly *contested* here.

It is inferred that potential impacts on palaeontological heritage resources due to the proposed OHL infrastructure developments are likely to be of LOW to VERY LOW significance. Pending the discovery of significant new fossil finds within the project footprint before or during construction, no further specialist palaeontological studies, monitoring or mitigation are recommended for these developments. Provided that the Chance Fossil Finds Protocol tabulated in Appendix 1 is incorporated into the EMPr and fully implemented during the construction phase of the OHL developments, there are no objections on palaeontological heritage grounds to their authorisation.

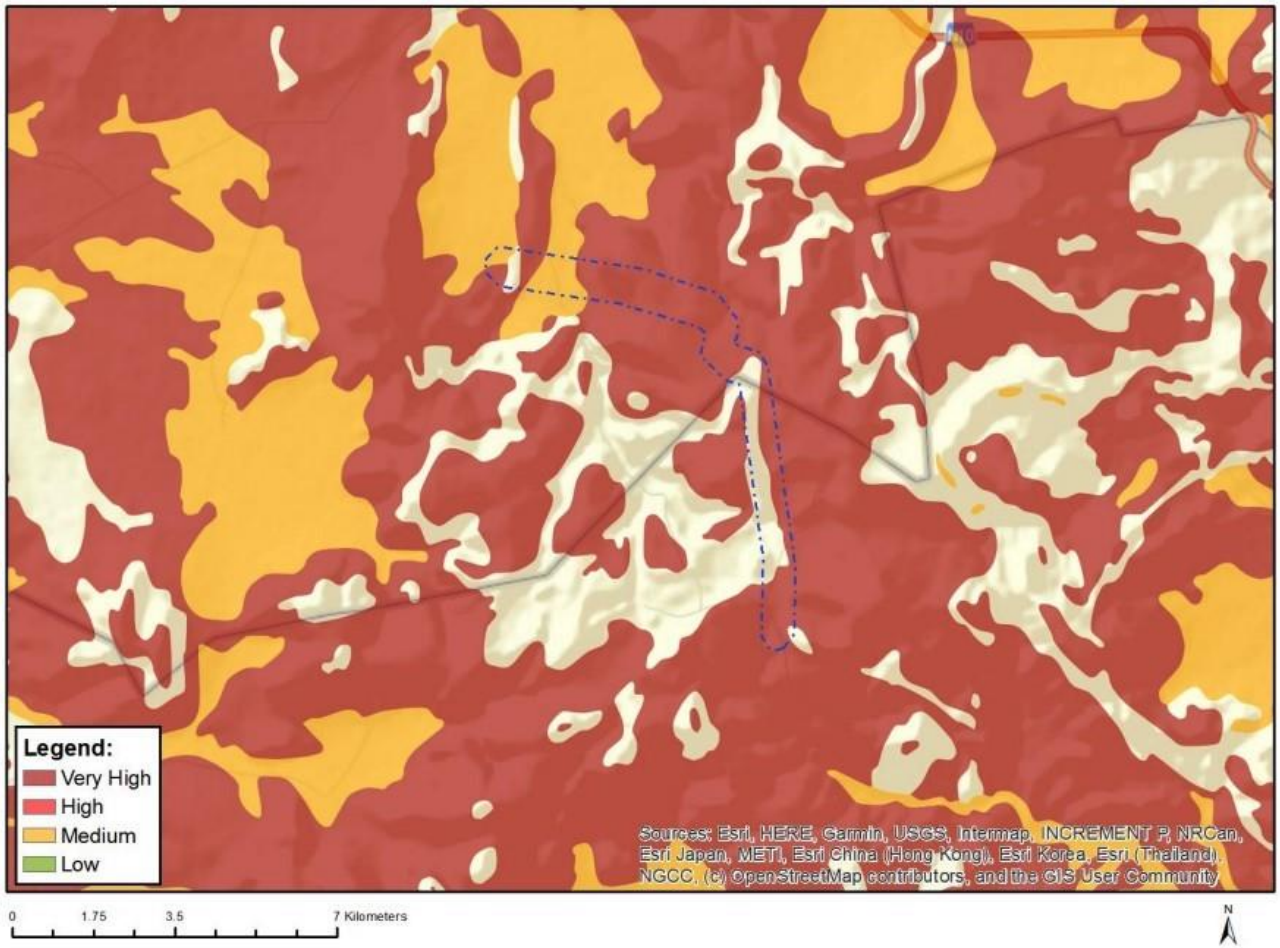

Figure 26: Paleontological sensitivity map for the 400 kV turn-in OHL project area (blue dotted polygons) based on the DFFE Screening Tool (generated March 2022). Most of the area is provisionally assigned a Very High palaeosensitivity here (dark red) due to the underlying sedimentary bedrocks of the Beaufort Group (Karoo Supergroup). Areas mantled by Late Caenozoic alluvial deposits are assigned a Medium palaeosensitivity (yellow) while dolerite intrusions are of Zero palaeosensitivity (white). The DFFE palaeosensitivity mapping is *contested* in this report.

7. ACKNOWLEDGEMENTS

Ms Caroline Beer of CES - Environmental and Social Advisory Services, Port Elizabeth, is thanked for commissioning this study and for providing the necessary background information. I am grateful to Dr Jennifer Botha-Brink (National Museum, Bloemfontein) and Professor Sean Modesto (Cape Breton University, Canada) for helpful discussions about the Katberg vertebrate fossil material.

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9. JOHN ALMOND - SHORT CV

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 the University of Tübingen in Germany, and has carried out palaeontological research in Europe, North America, the Middle East as well as North and South Africa and Madagascar. 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 numerous palaeontological impact assessments for developments and conservation areas in the Western, Eastern and Northern Cape, Limpopo, Northwest Province, Mpumalanga, Gauteng, KwaZulu-Natal and the Free State under the aegis of his Cape Town-based company *Natura Viva* cc. He has served as a 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 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.

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

APPENDIX 1: GPS LOCALITY DATA FOR RECORDED FOSSIL SITES

This table provides palaeontological field data for the Umsobomvu 400 kV turn-in OHL project area and the vicinity based on the recent site visit (April 2022, bold locality numbers) as well as the original palaeontological assessment for the Umsobomvu WEF (Almond 2018) (locality numbers not in bold font). All GPS readings were taken in the field using a hand-held Garmin GPSmap 60CSx or 64s instrument. The datum used is WGS 84. The fossil sites are mapped on a satellite image with respect to the proposed OHL project footprint in Figure A1 below.

N.B. Given the sensitivity and conservation importance of fossil sites in the RSA, this data is *not* for public release.

LOC	GPS DATA	COMMENTS
003	-31.381578° 24.833492°	Ultzicht 3, shallow streambed exposure of grey-green Katberg Fm mudrocks south of farm dam. Small (*c*. 5 mm diameter), subcylindrical stem casts of reedy plants and possible *Scoyenia* Ichnofacies invertebrate trace fossils. Proposed Field Rating IIIC. No mitigation required.
014	-31.375670° 24.832898°	Ultzicht 3. Irregular, subvertical calcrete structures - possibly calcretised plant roots and / or invertebrate burrows – within thick sandy alluvium, stream bank section *c*. 800 m west of Weltevreden homestead. Proposed Field Rating IIIC. No mitigation required.
022	-31.376403° 24.836417°	Uitzicht 3, upper portion of thick, pale grey calcrete pedogenic nodule conglomerate lens of Katberg Fm. Fragment of small tetrapod skull showing small teeth with plicidentine internal structure – probably a partial palate of a small temnospondyl amphibian (S. Modesto, pers. comm., 2022). Proposed Field Rating IIIB. Outside project area - no mitigation required.
025	-31.376514° 24.836416°	Uitzicht 3, small tusk – possibly dicynodont - enclosed in a calcrete concretion within thick, pale grey calcrete pedogenic nodule conglomerate lens of Katberg Fm. Proposed Field Rating IIIB. Outside project area - no mitigation required.
026	-31.376700° 24.836526°	Uitzicht 3, small fragment of rolled cancellous bone within thick, pale grey calcrete pedogenic nodule conglomerate lens of Katberg Fm. Proposed Field Rating IIIB. Outside project area - no mitigation required.
027	-31.375578° 24.836128°	Uitzicht 3, two small small fragments of rolled cancellous bone within thick, pale grey calcrete pedogenic nodule conglomerate lens of Katberg Fm. Proposed Field Rating IIIB. Outside project area - no mitigation required.
154	31 22 43.5 24 50 24.4	Uitzicht 3, roadside borrow pit exposure of grey-green Katberg mudrocks and thin sandstone interbeds, basal mudclast breccias with small bone fragments. Calcretised subcylindrical invertebrate burrow infills (1-2 cm diameter). Proposed Field Rating IIIC. No mitigation required.
155	31 22 40.3 24 50 25.4	Uitzicht 3, roadside borrow pit exposure of grey-green Katberg mudrocks and thin sandstone interbeds with dense assemblages of vertical burrows or – more probably – sandstone casts of reedy plant stems (*e.g.* equisetaleans). Baked channel breccio-conglomerates. Proposed Field Rating IIIC. No mitigation required.
157	31 23 15.9 24 51 49.4	Uitzicht 3, current megaripples and karst weathering in Katberg sandstones near Kamferkloof. Some ripple crests show possible evidence for trampling by tetrapods during period of subaerial exposure (equivocal).
158	31 24 24.4 24 50 08.2	Uitzicht 3, roadside borrow pit with reworked, fragmentary ferruginised plant compressions (*e.g.* longitudinally-ridged stems) within pale flaggy sandstones, upper Katberg Formation. Proposed Field Rating IIIB (given general rarity of Katberg Formation plant fossils). No mitigation required.
161	31 22 27.0 24 48 59.2	Uitzicht 3, thinly-laminated Katberg channel sandstone basal breccias with sparse small (cm-scale) fragments of reworked bone and teeth teeth. Close to "petrified riverbed" rippled sandstones. Proposed Field Rating IIIC. No mitigation required.
169	31 19 42.0 24 51 03.1	Annex Winterhoek 186, hillslope exposure of Katberg Fm grey-green mudrocks, pedocrete nodules, thin sandstones. Locally abundant *Katbergia* burrows. Proposed Field Rating IIIC. No mitigation required.
659	-31.341001° 24.783899°	Uitzicht 3. Small fragments of rolled bone as well as small, elongate, subcylidrical calcrete bodies with central mudrock core (possibly rhizoliths) within thin basal breccias of Adelaide Subgroup channel sandstone body. Proposed Field Rating IIIC. No mitigation required.
660	-31.340894° 24.783880°	Uitzicht 3. Partial, semi-articulated postcranial skeleton of a small tetrapod (ribs, backbone, probable pelvic bones, long bones) preserved within a rusty-brown ferruginous carbonate concretion, grey-green siltstones beneath a channel sandstone package with basal breccias. Proposed Field Rating IIIB. No mitigation required.
663	-31.394633° 24.826633°	Uitzicht 3. Small roadside borrow pit exposure of yellowish, current-rippled crevasse-splay sandstones. Thin sandstone float blocks display small (*c*. 5 mm diam.), subcylindrical stem casts of reedy plants. Proposed Field Rating IIIC. No mitigation required.

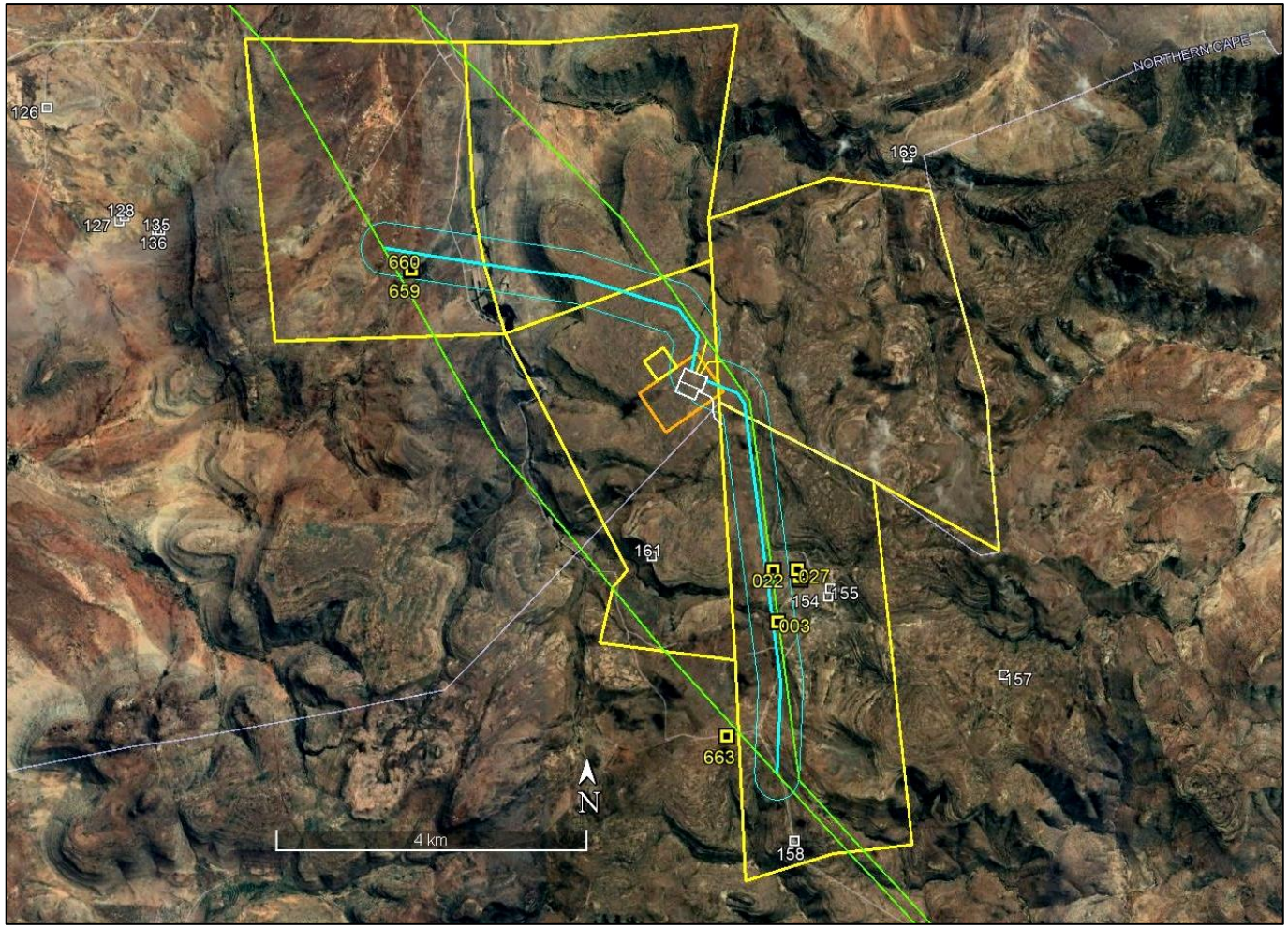

Figure A1: Google Earth© satellite image of the Umsobomvu 400 kV turn-in OHL project area near Middelburg showing the location of previously recorded fossils in the region (white numbered sites, from Almond 2018b) as well as recently recorded fossils (yellow numbered sites) (See table above for details). None of the recorded sites is of high scientific or conservation significance and no mitigation is recommended with regard to these sites.

<table>
<tr><th colspan="3">APPENDIX 2: Chance Fossil Finds Protocol - Umsobomvu 400 kV turn-in OHL project area, Agter-Renosterberg region near Middleburg</th></tr>
<tr><td>Province & region:</td><td colspan="2">Umsobomvu Local Municipality in the Northern Cape Province, Inxuba Yethemba Local Municipality in the Eastern Cape</td></tr>
<tr><td>Responsible Heritage Resources Agency</td><td colspan="2">ECPHRA for Eastern Cape (Contact details: Mr Sello Mokhanya, 74 Alexander Road, King Williams Town 5600; Email: smokhanya@ecphra.org.za).
SAHRA for N. Cape (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).</td></tr>
<tr><td>Rock unit(s)</td><td colspan="2">Lastest Permian – earliest Triassic Adelaide Subgroup (Beaufort Group, Karoo Supergroup).
Early Triassic Katberg Formation (Tarkastad Subgroup, Beaufort Group, Karoo Supergroup).
Late Caenozoic alluvium, sandy soils, surface gravels</td></tr>
<tr><td>Potential fossils</td><td colspan="2">Vertebrate skeletal remains and burrows, invertebrate trace fossils, plant fossils (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 fo 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>