Fig. 14. Highly cleaved, kaolinitised Lower Bokkeveld mudrocks showing sparse rusty-brown bodies of ferromanganese minerals. Some of these may originally have been fossil moulds (Loc. 043) (Hammer = 27 cm).

Fig. 15. Highly weathered lower Gydo Formation sediments showing well-spaced vertical joints (striking at 050º) picked out by secondary ferruginous minerals and quartz veins (Loc. 047).

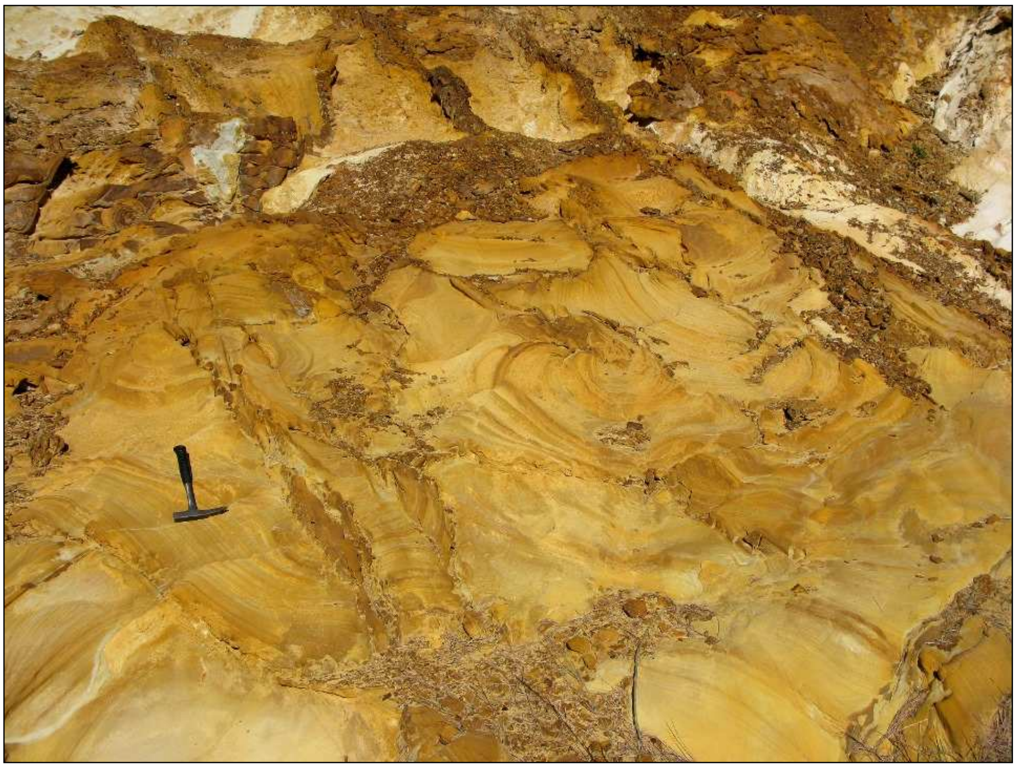

Fig. 16. Detail of prominent Liesegang rings within mineralised zone at locality shown above (Hammer = 27 cm).

Fig. 17. Highly-weathered heterolithic zone within the Lower Bokkeveld Group with steeply dipping sandstone and mudrock interbeds, R62 road cutting (Loc. 048). Note mantle of gravelly brown soil here.

2.3. Superficial sediments

Steeper hill slopes within the study area are extensively mantled by coarse, rubbly **colluvial deposits** that may reach thicknesses of several meters, as seen for example north of the N2 near Kruisfontein (*e.g.* Loc. 051, Fig. 6). The colluvial gravels are usually highly angular, poorly sorted and massive, but occasionally crude bedding defined by contracting grain-size spectra and sorting can be defined. Older gravels are semi-consolidated and partially cemented by ferruginous minerals, occasionally by silica to form **silcretes**, giving reddish-brown to tan hues respectively.

Downwasted rubbly colluvial gravels, poorly-sorted, angular, semi-consolidated and partially ferruginised, overlie Nardouw Subgroup bedrocks in a small quarry on the northern outskirts of Humansdorp where they are a meter or more thick (Loc. 050) (Fig. 18). They are overlain here by pebbly soils. The quarry floor is partially covered by wind-blown sand of Recent origin.

Relict patches of **High Level Gravels** ("Grahamstown Formation") are preserved overlying the gently sloping pediment surfaces incised into Table Mountain Group rocks northwest of Melkbos Substation as well as overlying Bokkeveld Group rocks north of Dieprivier Substation (Fig. 2) but no examples were encountered during the present field assessment.

Well-developed **ferricretes** are seen in the vicinity of the Dieprivier Substation where they overlie weathered Bokkeveld Group mudrocks. Excavated float blocks of ferricrete show pebbly gravels and nodules in a deeply ferricretised, purplish-brown gritty matrix. Thick banks of *in situ* ferricrete are exposed along the margins of trenches and small dam here (Fig. 20). Banks of reworked pebbly ferricrete conglomerate are exposed in road cuttings along the R62 to the southeast of Dieprivier (Loc. 049) (Fig. 21).

A wide range of soils overlie the Palaeozoic bedrocks in the study area. Many of these are pebbly and / or rich in reworked ferricrete nodules with clast rounding suggesting fluvial action (Loc. 048), while brick-red *terra rossa* soils are often developed above deeply weathered Bokkeveld mudrocks (Fig. 19).

Fig. 18. Downwasted surface gravels overlying Nardouw Subgroup sandstones, quarry on northern edge of Humansdorp (Loc. 050) (Hammer = 27 cm).

Fig. 19. Pebbly soils overlying weathered Bokkeveld Group saprolite, R62 road cutting (Loc. 048). The high degree of pebble rounding suggests fluvial transport.

Fig. 20. Subsurface *hardebank* of well-consolidated pebbly ferricrete beneath silty surface soils in the vicinity of the Dieprivier Substation (Hammer = 27 cm).

Fig. 21. Well-sorted conglomerate of rounded, ferruginised sandstone pebbles and ferricrete nodules overlain by grey silty soil with sparse, angular vein quartz clasts, R62 road cutting (Loc. 049).

3. PALAEONTOLOGICAL HERITAGE WITHIN THE STUDY REGION

A brief review of the fossil assemblages recorded from the various major rock units represented within the broader Humansdorp study area is given here. Most of these rock units are only sparsely fossiliferous to unfossiliferous. However, rich and scientifically important fossil assemblages have been recorded from the Cedarberg and Baviaanskloof Formations of the Table Mountain Group as well as the Lower Bokkeveld Group elsewhere in the Cape Fold Belt. The palaeontological sensitivity of these three rock units has generally been seriously compromised in the study region near Humansdorp as a result of high levels of tectonic deformation (*e.g.* cleavage formation) as well as deep chemical weathering since the fragmentation of Gondwana some 120 million years ago. Furthermore, the outcrop areas of the mudrock-rich sedimentary successions that are most likely to yield fossil remains are narrow and ill-defined, and are largely mantled in a veneer of superficial deposits such as soil, alluvium and gravels that may shield any fresher (less weathered), potentially fossiliferous bedrocks from significant disturbance during development.

3.1. Fossils in the Table Mountain Group

Body fossils (shells, teeth, bones *etc*) are so far unknown from the **Peninsula Formation** but a modest range of shallow marine to nearshore fluvial and / or estuarine trace fossils have been recognised, mainly from the Western Cape outcrop area (*e.g.* Rust 1967, Potgieter & Oelofsen 1983, Broquet 1990, 1992, Almond 1998a,b, Braddy & Almond 1999, Thamm & Johnson 2006). These traces include trilobite resting and feeding burrows (*Cruziana*, *Rusophycus*), arthropod trackways (*e.g. Diplichnites, Palmichnium*) that are variously attributed to eurypterids, crustaceans or trilobites, palmate, annulated feeding burrows (*Arthrophycus*), dense assemblages ("pipe rock") of vertical dwelling burrows of unknown suspension feeders (*Skolithos, Trichichnus*), vertical columns or cones of densely reworked sediment (*Metaichna* / possible *Heimdallia*), and several types of horizontal burrows (*Palaeophycus,* possible *Aulichnites*).

An important, albeit low diversity, assemblage of Peninsula Formation trace fossils was recently recorded from heterlithic beds exposed in the Rosenhof Quarry site within the broader Tsitsikamma Community Wind Energy Facility study region to the southwest of Humansdorp by Almond (2012). Traces here include vertical *Skolithos* burrows, *Rusophycus* and *Cruziana* arthropod scratch burrows that were probably generated by trilobites, possible bivalve burrows (*Lockeia*) and teichichnoid spreiten burrows, as well as abundant flower-shaped "gyrophyllitid" burrows that had previously been reported from beach boulders at Cape Saint Francis.

Recessive weathering of trace-rich heterolithic intervals is undoubtedly responsible for under-recording of fossils within the Peninsula Formation. It is also likely that relatively unweathered samples of fine-grained muddy sediments within these heterolithic intervals may eventually yield microfossil assemblages (*e.g.* organic-walled acritarchs) of biostratigraphic and palaeonvironmental significance.

Apart from vague meniscate backfilled burrows from late glacial or postglacial dropstone argillites in the Hex River Valley, no fossil remains have been described from the **Pakhuis Formation** (Almond 2008).

An exceptionally important and interesting biota of soft-bodied (*i.e.* unmineralised) and shelly invertebrates, primitive jawless vertebrates and microfossils has been recorded since the middle 1970s from finely laminated, black mudrocks of the **Soom Member**, forming the lower, mudrock-dominated portion of the **Cedarberg Formation**. This is one of only two so-called soft-body *Lagerstaette* of Late Ordovician age recorded worldwide (the other example was recently discovered in Canada; Young *et al.,* 2007). The "Soom Shale" is between 10-15m thick, and fossils occur sporadically throughout the succession, from 1m above the base upwards. This biota has been extensively reviewed by Aldridge *et al*. (1994, 2001) and Selden and Nudds (2004) while much new information remains to be published (See review in Almond 2008 and refs. therein). The macrofossils include a range of macroalgae, shelly invertebrates (*e.g.* inarticulate brachiopods, conical-shelled nautiloids and other molluscs, crustaceans, unmineralised trilobites and eurypterids or "water scorpions") and several groups of primitive jawless fish (*e.g.* anaspids, conodonts). Important microfossil groups include chitinozoans, spore tetrads of land plants and marine acritarchs. A further interesting category of fossils recorded from the Soom Member of Kromrivier are bromalites. These are the various fossilised products of ancient animal guts such as droppings (coprolites), regurgitates and stomach contents that sometimes contain the comminuted remains of recognisable prey animals such as conodonts or brachiopods (Aldridge *et al*., 2006). The majority of Soom fossils have been collected from a handful of localities, most of which lie on the Clanwilliam sheet within the central to northern Cedarberg (Gray *et al*. 1986, Cocks & Fortey 1986, Theron *et al*. 1990, Aldridge *et al*. 1995). New fossiliferous localities have recently been identified in the Clanwilliam area, while well preserved trilobite trace fossils (*Rusophycus*) have been collected from thin tempestite sandstones towards the base of the Soom Member in the Hex River Mountains by Almond (unpublished obs., 2011).

A low diversity shelly faunule, dominated by articulate and inarticulate brachiopods together with a small range of trace fossils is recorded from the heterolithic **Disa Member** that forms the upper portion of the Cedarberg Formation. Marine invertebrate fossils have been recorded from the Disa Member in the Groot Winterkoek mountains near Porterville, some 30km southeast of Piketberg, while important post-glacial trace fossil assemblages are known from the Clanwilliam region (Rust 1967b, Cocks *et al.* 1970, Cocks & Fortey 1986, Almond 2008).

The fossil record of the **Goudini** and **Skurweberg Formations**, dominated by braided fluvial sandstones, is very sparse indeed. This reflects major global regression (low sea levels) during the Silurian Period, peaking during the latter part of the period (Cooper 1986). Sporadic, low diversity ichnoassemblages from thin, marine-influenced stratigraphic intervals have been recorded from all three Nardouw formations in the Western Cape by Rust (1967a, 1981) and Marchant (1974). There are also scattered, often vague reports of trace fossils in geological sheet explanations and SACS reports (*e.g.* Malan *et al.* 1989, De Beer *et al.* 2002). Most involve "pipe rock" (*Skolithos* ichnofacies) or various forms of horizontal epichnial burrows, including possible members of the *Scolicia* group which may be attributable to gastropods. Also recorded are typical Early Silurian palmate forms of the annulated burrow *Arthrophycus*, poorly preserved "bilobites" (bilobed arthropod scratch burrows), gently curved epichnial furrows and possible arthropod tracks (Almond 2008). It is possible that more diverse ichnoassemblages (and even microfossils from subordinate mudrock facies where these have not been deeply weathered or tectonised) may eventually be recorded from the more marine-influenced outcrops of the Eastern Cape Fold Belt.

A distinctive marine shelly invertebrate faunule of Early Devonian, Malvinokaffric aspect characterises the upper portion of the **Baviaanskloof Formation** from the Little Karoo eastwards along the Cape Fold Belt. It is dominated by the globose, finely-ribbed articulate brachiopod *Pleurothyrella africana*. Rare homalonotid trilobites, a small range of articulate and inarticulate brachiopods, nuculid and other bivalves, plectonotid "gasteropods" and bryozoans also occur within impure brownish-weathering wackes (Boucot *et al*. 1963, Rossouw *et al*. 1964, Johnson 1976, Toerien & Hill 1989, Hill 1991, Theron *et al.* 1991, Almond *in* Rubidge *et al*. 2008). In many cases fossil shells are scattered and disarticulated, but *in situ* clumps of pleurothyrellid brachiopods also occur. This shelly assemblage establishes an Early Devonian (Pragian / Emsian) age for the uppermost Nardouw Subgroup, based on the mutationellid brachiopod *Pleurothyrella* (Boucot *et al*. 1963, Theron 1972, Hiller & Theron 1988). Trace fossils include locally abundant, mud-lined burrows (*Palaeophycus*, *Rosselia*) and rare giant rusophycid burrows of Devonian aspect (*R. rhenanus*) that are attributed to homalonotid trilobites. Recently, dense assemblages of primitive vascular plants with forked axes and conical terminal "sporangia" that are provisionally ascribed to the genus *Dutoitia* have been collected from

Baviaanskloof Formation mudrocks near Cape St Francis, Eastern Cape (Dr Mark Goedhart, Council for Geoscience, Port Elizabeth, pers. comm., 2008; Robert Gess pers. comm., 2011; *cf* Hoeg 1930, Anderson & Anderson 1985).

During the present one-day field study almost all the Table Mountain Group exposures showed high levels of tectonic deformation (*e.g.* steep bedding, quartz veins, pervasive cleavage within mudrock intervals) as well as deep chemical weathering. These two factors, which are both more extremely developed within the potentially more fossiliferous mudrock-rich intervals of the Table Mountain Group (*e.g.* Cederberg, Goudini and Baviaanskloof Formation), have seriously compromised fossil preservation here. No fossil remains were observed within the Table Mountain Group sediments in the study area and the various formations concerned are considered to have a low palaeontological sensitivity in this region.

3.2. Fossils in the Lower Bokkeveld Group (Ceres Subgroup)

The most important fossil groups recorded from the lower Bokkeveld Group (Ceres Subgroup) include shelly marine invertebrates and traces (burrows *etc*), together with rare fish remains, primitive vascular plants, trace fossils (burrows, borings *etc*) and microfossils (*e.g.* foraminiferans, ostracods, palynomorphs). The overall palaeontological sensitivity of this stratigraphic unit is generally considered to be high to very high (Almond *et al*. 2008), but may be compromised locally by cleavage and weathering (*cf* Haughton *et al.* 1937, p. 23).

The Lower Bokkeveld Group is especially well known for its rich fossil assemblages of **marine invertebrates** of Early to Mid-Devonian age. The main invertebrate taxa concerned are trilobites, brachiopods, molluscs and echinoderms. Numerous more minor groups are also recorded - corals, conulariids, hyolithids, tentaculitids *etc* - making the Bokkeveld Group one of the palaeontologically most important Devonian units in the southern hemisphere. Fossil invertebrates are especially diverse and abundant within the mudrock-dominated formations, although low-diversity sandstone-hosted fossils assemblages also occur. Shells are generally preserved as external and internal moulds and casts (*e.g.* Schwarz 1906, Reed 1925, Du Toit 1954, Cooper 1982, Oosthuizen 1984, Hiller 1995, Hiller & Theron 1988, Theron & Johnson 1991, Jell & Theron 1999, Thamm & Johnson 2006, Almond 2008). Remarkably rich marine trace fossil assemblages are also known from the lower Bokkeveld Group, especially in nearshore facies (Almond 1998a, 1998b).

The only **vascular plants** recorded from the Ceres Subgroup are a small range of dichotomously branching, leafless forms known as psilophytes (*e.g. Dutoitia*) and primitive lycopods or “club mosses” such as *Palaeostigma*. The material is generally transported (washed offshore from the land), poorly preserved, and has mainly been recorded from the eastern outcrop area of the Bokkeveld Group (Plumstead 1967, 1969, Theron 1972, Anderson and Anderson 1985).

Very sparse **fossil fish** remains have been recorded from the Ceres Subgroup (Gydo and Tra Tra Formations), several retaining their original phosphatic bony material. They comprise acanthodians (“spiny sharks”), primitive sharks, placoderms, and bony fish or osteichthyans, but so far no agnathans (Almond 1997, Anderson *et al*. 1999a, 1999b). The material is fragmentary but of considerable palaeontological significance since so little is known about Early Devonian ichthyofaunas of the ancient supercontinent Gondwana.

So far, the great majority of published records of fossils from the Ceres Group refer to the much better known western outcrop areas in the Western Cape. In the Eastern Cape Province, where the potentially fossiliferous mudrocks are frequently highly deformed, cleaved, and often deeply weathered or covered by dense vegetation, the fossil known record is still rather sparse and understudied. Most of the early geological mapping surveys revealed very few useful fossil records –

essentially a scattering of poorly preserved, often deformed marine shells and locally abundant trace fossils (*e.g.* Haughton 1928, 1935, Haughton *et al*., 1937, Engelbrecht *et al*., 1962). Apart from probable records of the primitive vascular plant *Dutoitea*, most early records of plant material and arthropods from the Bokkeveld Group in the Eastern Cape (such as those from near Port Alfred) are probably more correctly assigned to the younger lower Witteberg Group (*e.g.* Anderson & Anderson 1985).

Within the western part of the Eastern Cape Province, only a handful of productive fossil localities within the Ceres Subgroup have been recorded so far. Most notably, these include the Cockscomb area between Willowmore and Steytlerville, Klein Kaba near Alexandria, and the Uitenhage North area (*e.g.* Theron 1972, Johnson 1976, Hiller 1980, Oosthuizen 1984, Toerien & Hill 1989, Le Roux 2000). As is the case to the west, shelly fossils are most abundant in the mudrock-dominated formations, including the Gydo, Voorstehoek and Tra Tra Formations. Indeed, the Voorstehoek Formation in the Eastern Cape may prove quite productive, although the assignation of some faunal records to this unit requires confirmation (*e.g.* Hiller 1980, Oosthuizen 1984, Hiller 1990). Useful faunal lists for the rich Gydo Formation biota at the Cockscomb Mountains and the unconfirmed Voorstehoek Formation biota at Klein Kaba are given by Oosthuizen (1984, Table III and p.138 respectively). The Cockcomb biota is preserved as moulds within early diagenetic nodules of phosphatic or other composition (*cf* Browning 2008). It includes a wide range of trilobites, brachiopods, bivalves, gastropods, crinoids, a possible echinoid, corals, abundant well-preserved conulariids, ostracods and various problematic groups (*e.g.* hyolithids, tentaculitids and other tubular fossils). The Klein Kaba faunule listed by Oosthuizen (1984) is dominated by a number of articulate brachiopods, but also comprises gastropods, bivalves, nautiloids, trilobites , crinoids, conulariids, various tubular fossils and traces.

The Ceres Subgroup succession in the Humansdorp study area is dominated by offshore mudrocks and has clearly suffered high levels of tectonic deformation (steep bedding, pervasive cleavage *etc*) as well as deep chemical weathering. Since no fossil remains (apart from possible ferruginised low diversity invertebrate burrow assemblages) were observed during the present field study, these two factors have apparently obliterated most of all the fossil remains originally preserved in the near-surface bedrocks whose palaeontological sensitivity here is therefore assessed as low.

3.4. Fossils within Caenozoic superficial deposits

Sparse fossil remains have been recorded from Tertiary or younger silcretes (*i.e.* silica-cemented pedocretes) of the Grahamstown and equivalent formations by Roberts (2003) and earlier authors. These include a small range of trace fossils (*e.g.* rhizoliths or plant root casts and invertebrate burrows such as *Skolithos*), charophyte algae (calcareous stoneworts), reed-like wetland plants resembling the extant *Phragmites* (*fluitjiesriet*), and reworked Late Permian silicified wood from the Beaufort Group (See also Adamson 1934, Du Toit 1954, and Roberts *et al.,* 1997). Silicified termitaria might also be expected here, although termite activity is inhibited by waterlogged soils that probably prevailed in areas where silcrete formation occured.

Neogene to Recent alluvial deposits may also contain fossil remains of various types. In coarser sediments (*e.g.* conglomerates) these tend to be robust, highly disarticulated and abraded (*e.g*. rolled bones, teeth of vertebrates) but well-preserved skeletal remains of plants (*e.g.* wood, roots) and invertebrate animals (*e.g.* freshwater molluscs and crustaceans) as well various trace fossils may be found within fine-grained alluvium. Human artefacts such as stone tools that can be assigned to a specific interval of the archaeological time scale (*e.g.* Middle Stone Age) can be of value for constraining the age of Pleistocene to Recent drift deposits like alluvial terraces. Ancient alluvial “High Level Gravels” tend to be coarse and to have suffered extensive reworking (*e.g.* winnowing and erosional downwasting), so they are generally unlikely to contain useful fossils.

No fossil remains were observed within the various superficial deposits recorded within the Humansdorp study area during the present field study.

4. ASSESSMENT OF TRANSMISSION LINE DEVELOPMENT IMPACTS ON PALAEONTOLOGICAL HERITAGE RESOURCES

The proposed 132 kV transmission line and associated substation developments are situated in areas that are underlain by potentially fossiliferous sedimentary rocks of Palaeozoic and Late Tertiary or Quaternary age (Sections 2 and 3). The construction phase of the transmission line and associated infrastructure may entail substantial excavations into the superficial sediment cover as well as locally into the underlying bedrock. In addition, considerable areas of bedrock may be sealed-in or sterilized by lay-down areas as well as new gravel roads. All these developments may adversely affect fossil heritage resources at or beneath the surface of the ground within the development footprint by destroying, 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 transmission line are unlikely to involve further adverse impacts on palaeontological heritage, however.

The inferred impact of the proposed transmission line development on local fossil heritage is analysed in Table 1 below. This assessment applies to the transmission line itself as well as associated substation and road infrastructure developments.

In general, the destruction, damage or disturbance out of context of fossils preserved at the ground surface or below ground that may occur during construction represents a *negative* impact that is limited to the development footprint. Such impacts can usually be mitigated but cannot be fully rectified (*i.e. permanent*). Because of the generally sparse occurrence of fossils within most of the formations concerned as well as within the overlying superficial sediments (soil *etc*), as inferred from better exposed localities elsewhere, the intensity and probability of impacts are conservatively rated as *low*.

Due to the high to very high levels of bedrock weathering and tectonic deformation observed within and close to the Humansdorp study area, the impact significance of the construction phase of the proposed transmission line project is assessed as LOW with respect to fossil heritage resources. There are no fatal flaws in the development proposal as far as fossil heritage is concerned.

It should be noted that should fossils be discovered before or during construction and reported by the responsible ECO to the responsible heritage management authority, the Eastern Cape Provincial Heritage Resources Agency (ECPHRA) for professional recording and collection, as recommended here, the overall impact significance of the project would remain LOW. Residual negative impacts from any loss of fossil heritage would be partially offset by an improved palaeontological database as a direct result of appropriate mitigation. This is a *positive* outcome because any new, well-recorded and suitably curated fossil material from this palaeontologically under-recorded region would constitute a useful addition to our scientific understanding of the fossil heritage here.

Despite the low levels of bedrock exposure within the study area, confidence levels for this assessment are HIGH following the one-day field assessment of representative geological sites, supplemented by other palaeontological heritage assessment studies in the Humansdorp region.

Table 1: Assessment of impacts on palaeontological heritage resources resulting from the proposed 132 kV Dieprivier to Melkhout transmission line project

CRITERIA	RATING	COMMENTS
Nature	Negative	Disturbance, damage, destruction or sealing-in of fossil remains preserved on or beneath the ground surface within the development area, notably by bedrock excavations during the construction phase of the transmission line, substations.
Extent	Low	Site specific
Duration	High	Permanent
Intensity	Low	
Potential for impact on irreplaceable resources	Low	Sedimentary formations affected have large outcrop area outside development footprint
Consequence	Low	
Probability	Low	Almost all original fossil heritage has been destroyed near-surface by tectonic deformation and deep chemical weathering
Significance	LOW	No recommendation for further specialist palaeontological studies or mitigation for this project

5. CONCLUSIONS AND RECOMMENDATIONS

On the basis of the current field assessment as well as the paucity of previous fossil records from the Humansdorp region it is concluded that the palaeontological sensitivity of the Palaeozoic bedrocks here is low due to high levels of tectonic deformation (*e.g.* folding, cleavage) and chemical weathering. This applies especially to the more mudrock-rich stratigraphic units (*e.g.* Cederberg and Ceres Subgroup) that may originally have been highly fossiliferous. The various Late Caenozoic superficial deposits mantling the bedrocks in the study region (*e.g.* alluvium, colluvium, soils, pedocretes) are also of low palaeontological sensitivity.

Given the resulting low impact significance of the proposed transmission line – including the associated substation and road developments - as far as palaeontological heritage is concerned, no further specialist studies or mitigation are considered necessary for this project.

It is recommended that:

- The Environmental Control Officer (ECO) responsible for the transmission line development should be at least aware of the possibility – albeit low - of important fossils (*e.g.* shells, plant remains, trace fossils, mammalian bones and teeth) being present or unearthed on site and should regularly monitor all substantial excavations into superficial sediments as well as fresh (*i.e.* unweathered) sedimentary bedrock for fossil remains;

- In the case of any significant fossil finds (*e.g.* vertebrate teeth, bones) made during construction, these should be safeguarded - preferably *in situ* - and reported by the ECO as soon as possible to the relevant heritage management authority (ECPHRA. Contact details: Mr Sello Mokhanya, 74 Alexander Road, King Williams Town 5600; smokhanya@ecphra.org.za) so that appropriate mitigation (*i.e.* recording, sampling or collection) by a palaeontological specialist can be considered and implemented, at the developer's expense; and

- These recommendations should be incorporated into the Environmental Management Plan (EMP) for the 132 kV transmission line project.

The palaeontologist concerned with mitigation work will need a valid palaeontological collection permit from SAHRA (Contact details: Mrs Colette Scheermeyer, P.O. Box 4637, Cape Town 8000. Tel: 021 462 4502. Email: cscheermeyer@sahra.org.za). All work would have to conform to international best practice for palaeontological fieldwork and the study (*e.g.* data recording fossil collection and curation, final report) should adhere to the minimum standards for Phase 2 palaeontological studies developed by SAHRA (2013).

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8. QUALIFICATIONS & EXPERIENCE OF THE AUTHOR

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

Since 2002 Dr Almond has also carried out palaeontological impact assessments for developments and conservation areas in the Western, Eastern and Northern Cape under the aegis of his Cape Town-based company *Natura Viva* cc. He is a long-standing member of the Archaeology, Palaeontology and Meteorites Committee for Heritage Western Cape (HWC) and an advisor on palaeontological conservation and management issues for the Palaeontological Society of South Africa (PSSA), HWC and SAHRA. He is currently compiling technical reports on the provincial palaeontological heritage of Western, Northern and Eastern Cape 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 transmission line 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: GPS LOCALITY DATA FOR NUMBERED SITES LISTED IN TEXT

All GPS readings were taken in the field using a hand-held Garmin GPSmap 60CSx instrument. The datum used is WGS 84.

Location number	South	East	Comments
043	S34 02 03.0	E24 43 36.3	Deeply weathered Ceres Subgroup mudrocks west of Humansdorp, R102 roadcutting exposure
044	S34 00 57.6	E24 40 08.1	Deeply weathered Ceres Subgroup mudrocks west of Humansdorp, R102 road cutting exposure
045	S34 01 28.4	E24 35 42.9	R62 roadcutting exposure of deeply weathered Baviaanskloof Formation arenites
046	S34 01 16.6	E24 35 18.6	R62 roadcutting exposure of fresher (comparatively unweathered) Baviaanskloof Formation arenites
047	S34 01 14.7	E24 35 15.2	Transition zone from Baviaanskloof Fm to lowermost Ceres Subgroup, R62 road cutting
048	S34 01 11.3	E24 35 06.4	Deeply weathered and mineralised Ceres Subgroup, R62 road cutting
049	S34 01 09.9	E24 34 38.9	Pebbly reworked ferricrete conglomerate and soils
050	S34 01 09.6	E24 46 26.3	Small quarry into weathered Table Mountain Group and gravelly colluvium, N edge of Humansdorp