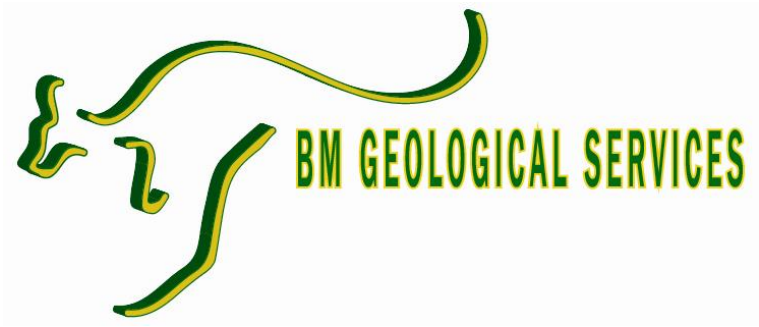

ANNUAL PALAEONTOLOGICAL MONITORING REPORT (AUGUST 2021) ON VAALBULT COLLIERY LOCATED ON PORTIONS 1, 9 AND 10 OF THE FARM VAALBULT 3 IT, MPUMALANGA PROVINCE

Prepared for:
Vaalbult Mining Company (Pty) Ltd

Prepared by:
Prof B D Millsteed

9 October 2021

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EXECUTIVE SUMMARY

Vaalbult Mining Company (Pty) Ltd owns and operates a colliery on Portions 1, 9 and 10 of the farm Vaalbult 3 IT, Gert Sibande District Municipality, located west of Carolina, Mpumalanga Province. The South African Heritage Resources Agency (SAHRA) has instructed Vaalbult Mining Company (Pty) Ltd [SAHRA document Ref: 16/5/1 Vaalbult Mining Project; dated 14 February 2014] that on-site checks for the occurrence of any fossils of the excavated pit and stockpiled material are required every six months by an experienced Karoo palaeobotanist. The Karoo palaeobotanist must submit a monitoring report to SAHRA on this work. SAHRA also indicated that the frequency of these checks should be assessed after six months, this assessment being based on the findings and the planned mining programme. In July 2016 BM Geological Services recommended that these monitoring reports should be conducted on an annual basis. Following on from those recommendations SAHRA has instructed Vaalbult Mining Company (Pty) Ltd [SAHRA document Ref: 16/5/1 Vaalbult Mining Project; dated 18 April 2017] that on-site checks for the occurrence of any fossils of the excavated pit and stockpiled material are required every twelve months.

In compliance with the SAHRA instruction discussed above, and subsequent recommendations, this report documents the results of a palaeontological monitoring program site visit conducted by Prof B Millsteed on the 31st of August 2021. Prof Millsteed was accompanied by Ms E Nethavhani [representing Vaalbult Mining Company (Pty) Ltd] who facilitated the access to all those areas that were required. Vaalbult Mining Company made no restrictions concerning the location of areas to be investigated and access was freely available to Prof Millsteed to inspect wherever he desired. Given that freedom, it proved impossible to visit the floor of the mine void and its highwalls dur to the presence of abundant water. The present investigation was conducted within the mine's Cut 63. This cut being the only working open caste pit void at the time of inspection. The mine is in the process of transitioning to underground mining, and it is expected that this will be the last open pit mining conducted within the mine lease.

The present palaeontological monitoring study revealed that the Vaalbult Colliery mining operations impact directly upon strata of the Early Permian Vryheid Formation, Karoo Supergroup. This unit is known to be richly fossiliferous elsewhere in its extent; common fossils known to occur within the unit include plant macrofossils and trace fossils. The stratigraphic succession within in the Vaalbult Colliery consists of eight distinct lithofacies, named units A-H herein. This stratigraphic sequence is dominated by two coal seams that are being economically exploited by the colliery. These seams are the upper-most D seam (unit E) and the underlying E seam (unit A). The E seam constitutes the base of the colliery pit in all areas observed and appears to be uniformly distributed throughout the pit.

A revised understanding of the stratigraphic relationship between units C and D was developed and presented in the 2019 site visit report. In that it was recognised that unit

D is not uniformly thick, and may occur contained in the upper half of unit C. Unit D may pinch out in some regions of the study area. The present study confirms those observations. The present study also expands the number of smaller lithofacies that occur within the broader stratigraphic classification, and which may also be fossiliferous (although no fossils were located within them during this site visit).

The strata examined within the box cut were poorly. During the present site visit an unidentifiable plant compressions of a woody stem segments and several blocks containing abundant specimens of *Skolithus* sp. ichnofossils were located within rock fall at the base of highwalls comprised of unit F. The fossils identified were of minimal scientific importance and, thus, even if their provenance was known no damage mitigation protocols would have been required. None of the fossils (plant macrofossil or trace fossils) identified are palaeontologically significant and require special preservation or excavation. No fossil materials were identified that would necessitate damage mitigation procedures to be enacted.

Overall, the lithological succession of the Vaalbult Colliery is fossiliferous (albeit poorly so) and low in taxonomic diversity. Thus, due care needs to be exercised to ensure that the mining activities do not diminish the palaeontological heritage of the area. That said the Vryheid Formation strata occur beneath a uniformly thick regolith horizon and do not crop out. The absence of bedrock outcrop means that no fossils are observable at surface. Thus, it is only due to the ongoing mining activities that the fossiliferous strata are exposed and made available for scientific study. None of the fossils located during either the current or the preceding study are of sufficient palaeontological significance that their excavation by a palaeontologist or their preservation is required. This situation is subject to future change but this may not always be the case. However, comparison of the stratigraphic successions studied in this and the preceding palaeontological monitoring reports indicates that several of the geological units present within the mine show significant sedimentological variation across the small area mined to date. Significant facies variations may be possible across the extent of the Mining Right area. Changes within the abundance and type of fossil assemblages may be possible and that palaeontologically significant fossil assemblages may be present. The possibility of the presence of palaeontologically significant fossils within the rocks of the colliery therefore remains a strong possibility.

The above being said, Prof Millsteed was informed during the site visit that the mine is in the final stages of transition to an underground mining operation. It is common practice in the industry that all rock surfaces not being actively mined are coated with lime powder to prevent methane combustion. This activity hides the rock surface and makes observation of the rock and its content impossible. Similarly, the preponderance of Mine Health and Safety protocols that are part of the fabric of underground mining usually make access to the freshly mined surface impossible for individuals who are not appropriately trained and qualified.

It is accordingly recommended that:

- The annual palaeontological audit of the mine workings should be placed into a state of suspension indefinitely (subject to later review should open caste mining recommence at Vaalbult Mine at any time in the future).
- Should opencast mining be planned at any time in the future of the life of mine, the mine must contact SAHRA and inform them of this possible intention, and potentially trigger a resumption of annual palaeontological impact assessment audit (at the request of SAHRA).

1 INTRODUCTION

Vaalbult Mining Company (Pty) Ltd owns and operates a colliery on Portions 1, 9 and 10 of the farm Vaalbult 3 IT, Gert Sibande District Municipality, located west of Carolina, Mpumalanga Province. The South African Heritage Resources Agency (SAHRA) has instructed Vaalbult Mining Company (Pty) Ltd [SAHRA document Ref: 16/5/1 Vaalbult Mining Project; dated 13 February 2014] that on-site checks for the occurrence of any fossils of the excavated pit and stockpiled material are required every six months by an experienced Karoo palaeobotanist. The Karoo palaeobotanist must submit a monitoring report to SAHRA on this work. SAHRA indicated that the frequency of these checks should be assessed after six months, based on the findings and the planned mining programme. In July 2016 BM Geological Services recommended that these monitoring reports should be conducted on an annual basis. Following on from those recommendations SAHRA has instructed Vaalbult Mining Company (Pty) Ltd [SAHRA document Ref: 16/5/1 Vaalbult Mining Project; dated 18 April 2017] that on-site checks for the occurrence of any fossils within the excavated pits and stockpiled materials are required every twelve months. In compliance with the SAHRA instruction and subsequent recommendations, this report documents the results of a palaeontological monitoring program site visit conducted by Prof B. Millsteed on the 31st of August 2021. Prof Millsteed was accompanied by Ms E Nethavhani representing Vaalbult Mining Company (Pty) Ltd who facilitated the access to all those areas that were required. Vaalbult Mining Company (Pty) Ltd made no restrictions concerning the location of areas to be investigated and access was freely available to Dr Millsteed to inspect wherever he desired. The only remaining open pit void being actively mined was visited (Cut 63), and all observations and data were obtained from that void.

2 LOCATION

The Vaalbult Colliery mining lease lies approximately 10 km west of the town of Carolina and 28 km northeast of Hendrina, Gert Sibande District Municipality, located west of Carolina, Mpumalanga Province (Figure 1). The approximate corner points (Figure 1) of the Mining Right area are provided in Table 1. Vaalbult Colliery is located on Portions 1, 9 and 10 of the farm Vaalbult 3 IT (Figure 2). All work conducted during the present study took place on Portion 9 of the farm.

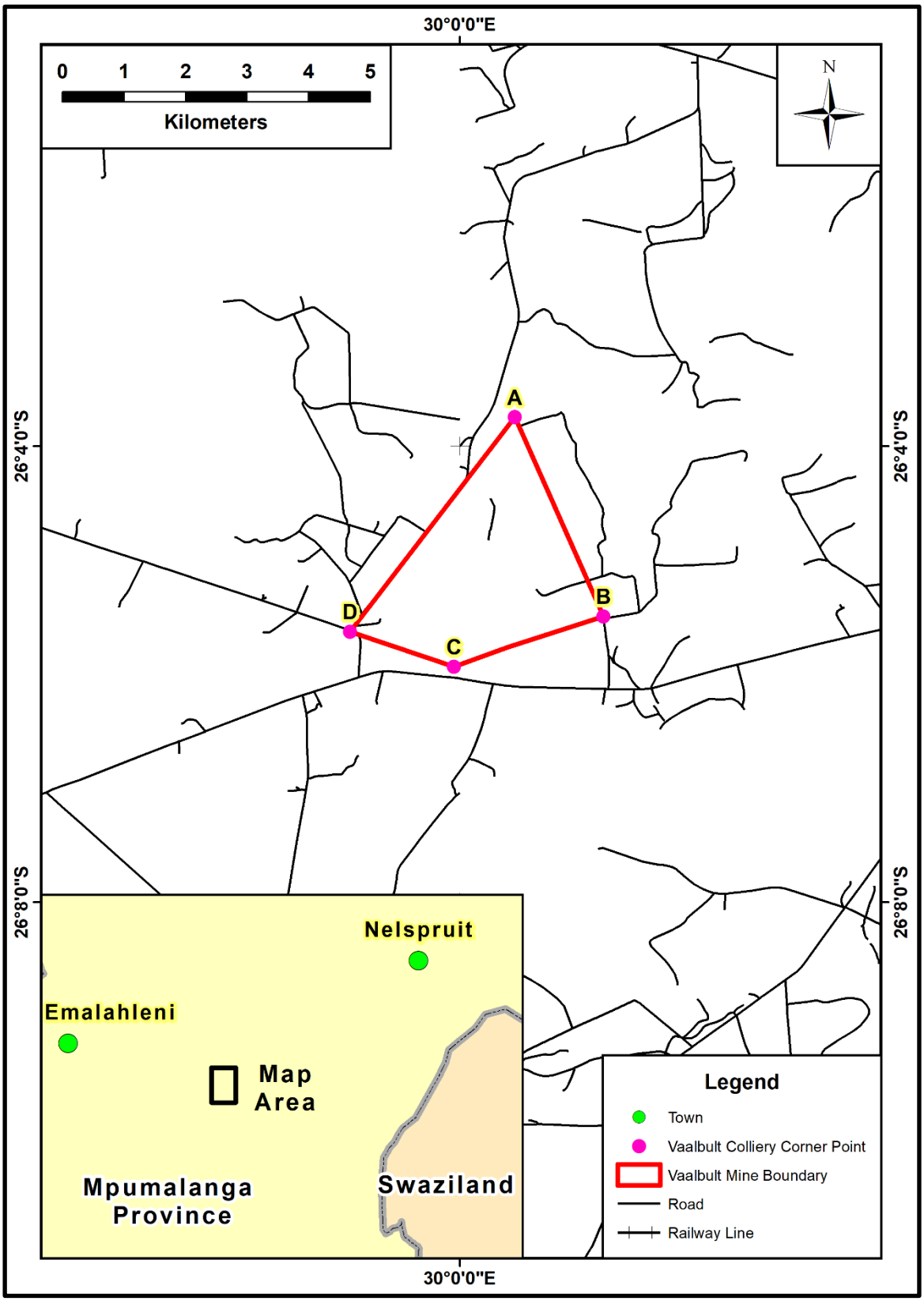

Figure 1: Location map of the Vaalbult Colliery. Shown, as the purple circles are the approximate corner points of the Mining Right area, the co-ordinates for the corner points are provided in Table1.

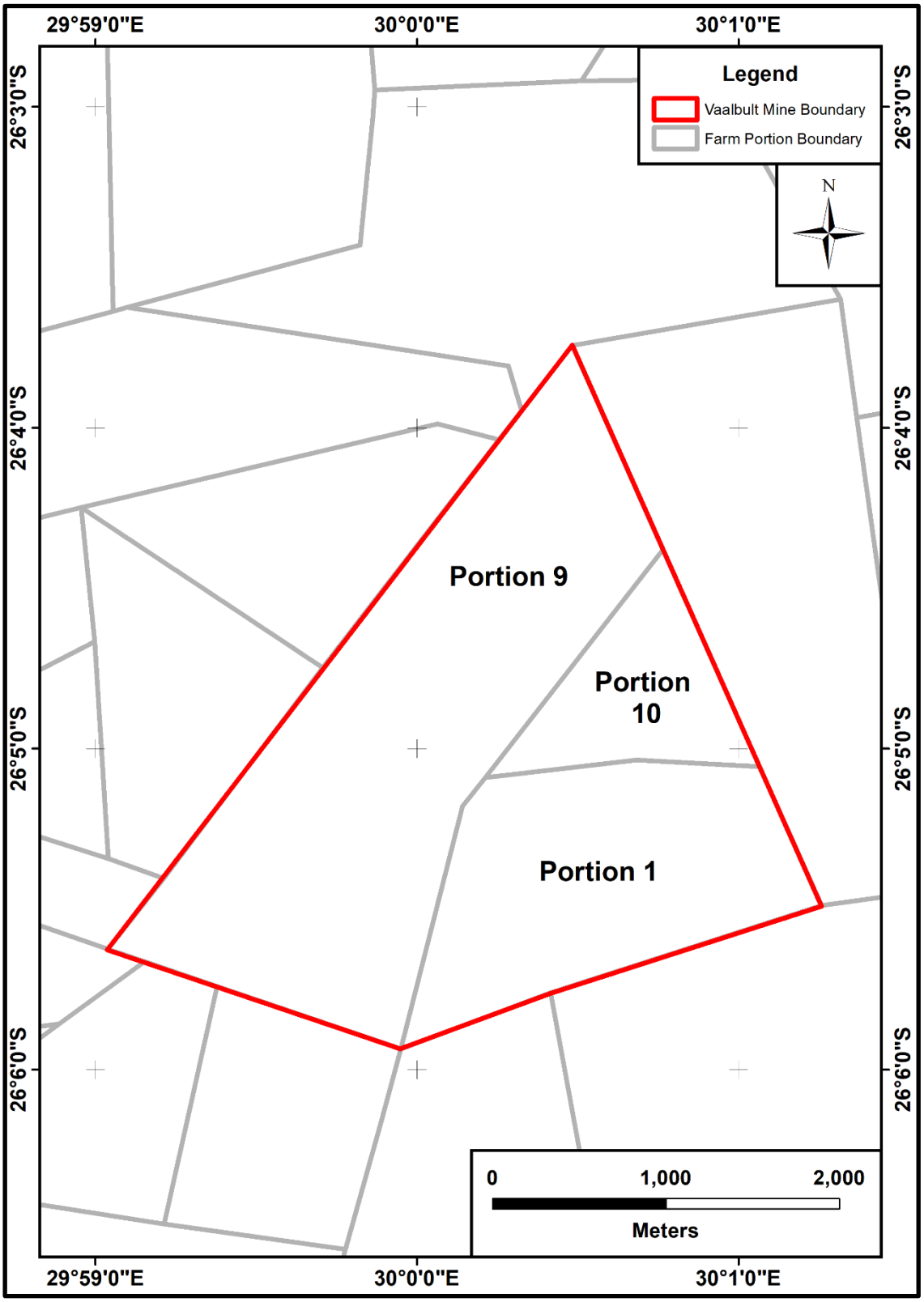

Figure 2: Map showing the location of the various portions Vaalbult 3 IT that constitute the Mining Right area. Superimposed on the farm portions is the GPS trackway indicating where the work program was conducted.

CORNER POINT	LATITUDE	LONGITUDE
A	-26.062385	30.008051
B	-26.091515	30.020978
C	-26.098911	30.999122
D	-26.093777	30.983943

Table 1: Approximate latitude and longitude of corner points of the Vaalbult Colliery Mining Right boundary. The coordinates are provided in geographic format (WGS84 datum).

3 RELEVENT EXPERIENCE

Prof B Millsteed holds a PhD in palaeontology and has previously been employed as a professional palaeontologist with the Council for Geoscience in South Africa. He is the principle of BM Geological Services and has sufficient knowledge of palaeontology and the relevant legislation required to produce this Palaeontological Monitoring Report. Prof Millsteed is registered with the South African Council for Natural Scientific Professions (SACNASP; Reg. No. 400332/07), is a member of the Palaeontological Society of South African, a member of the Association of Australasian Palaeontologists and is a fellow of the Geological Society of South Africa.

4 ACCESS AND INDEPENDENCE

Dr Millsteed was retained, as an independent consultant to conduct this palaeontological monitoring study and compile the present report, and shall receive fair remuneration for these professional services. Neither Prof Millsteed nor BM Geological Services has any financial interest in the Vaalbult Colliery, the Vaalbult Mining Company (Pty) Ltd nor any companies or individuals associated with the project.

No restrictions concerning the location of areas to be investigated were made by Vaalbult Mining Company and access was freely available to Prof Millsteed to inspect wherever he desired. Vaalbult Mining Company (Pty) Ltd made all safety and access arrangements required to inspect the areas selected by Prof Millsteed. That said, it proved impossible to visit the pit floor and its associated highwalls due to the presence of water.

5 METHODOLOGY

The Vaalbult Colliery was visited and inspected by Prof Millsteed on the 31st of August 2021. Prof Millsteed was accompanied during the investigation by Ms E Nethavhani representing Vaalbult Mining Company (Pty) Ltd. All sites were inspected on foot and extensive observation was made of accessible portions of the box cut high-walls. As part

of this process all sedimentary facies present in the high-walls were identified and investigated for their palaeontological content. The identified facies were described and are documented herein. The locations where detailed observations were recorded and/or photographs taken were made as waypoints using a hand-held GPS (Figure 3). The present investigation was conducted within the mine's Cut 63 (Figures 4 and 5). This cut being the only working open caste pit void at the time of inspection. The mine is in the process of transitioning to underground mining.

6 GEOLOGY

Figure 6 shows that the project area is completely underlain by rocks of the Early Permian Vryheid Formation. A summary of the characteristics of the Vryheid Formation in general, the strata present within the Vaalbult Colliery open pit, and their fossiliferous content and potential follows.

6.1 Vryheid Formation

The Main Karoo Basin consists of a retro-arc foreland basin filled with a lithological succession ranging in age from the Late Carboniferous to the Middle Jurassic (Johnson *et al*., 2006). The basin-fill sequence wedges out northwards over the adjacent Kaapvaal Craton.

In the Main Karoo Basin, of South Africa the Vryheid Formation is a sandstone and coal-rich stratigraphic unit that interfingers with (i.e., is transitional with and partially time equivalent to) the overlying Volksrust and underlying Pietermaritzburg Formations; both of which are both are predominantly argillaceous (Figure 9). In terms of environment of deposition, the formation can be divided into a lower fluvial-dominated deltaic interval, a middle fluvial interval (the coal-bearing zone) and an upper fluvial-dominated deltaic interval (Johnson *et al*., 2006). The thickness and frequency of the sandstone units increases from the base of the formation, reaching their maximum in the middle fluvial interval and then decrease again towards the overlying Volksrust Formation. To the south and southeast, the Vryheid Formation grades laterally into undifferentiated, deep-water argillites of the Ecca Group (Figure 7).

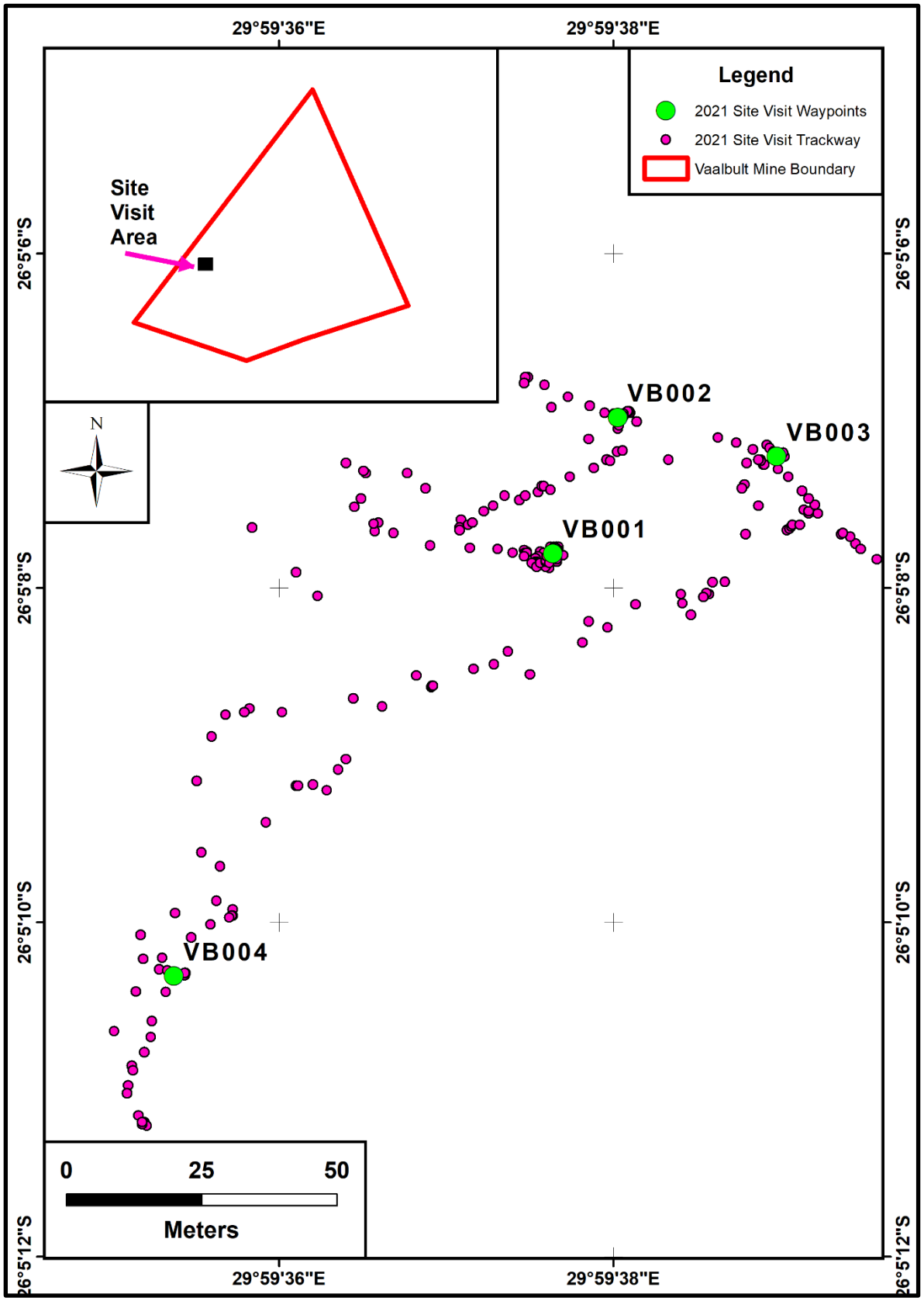

Figure 3: Map showing the location of the GPS waypoints and site visit trackway that define the areas examined during the site visit on the 31st of August 2021.

Figure 4: View to east of highwall exposure Cut 63 (waypoint VB001; see Figure 3).

Figure 5: View to the west of the only working open pit void area extant on the mine i.e., Cut 63 (waypoint VB004; see Figure 3).

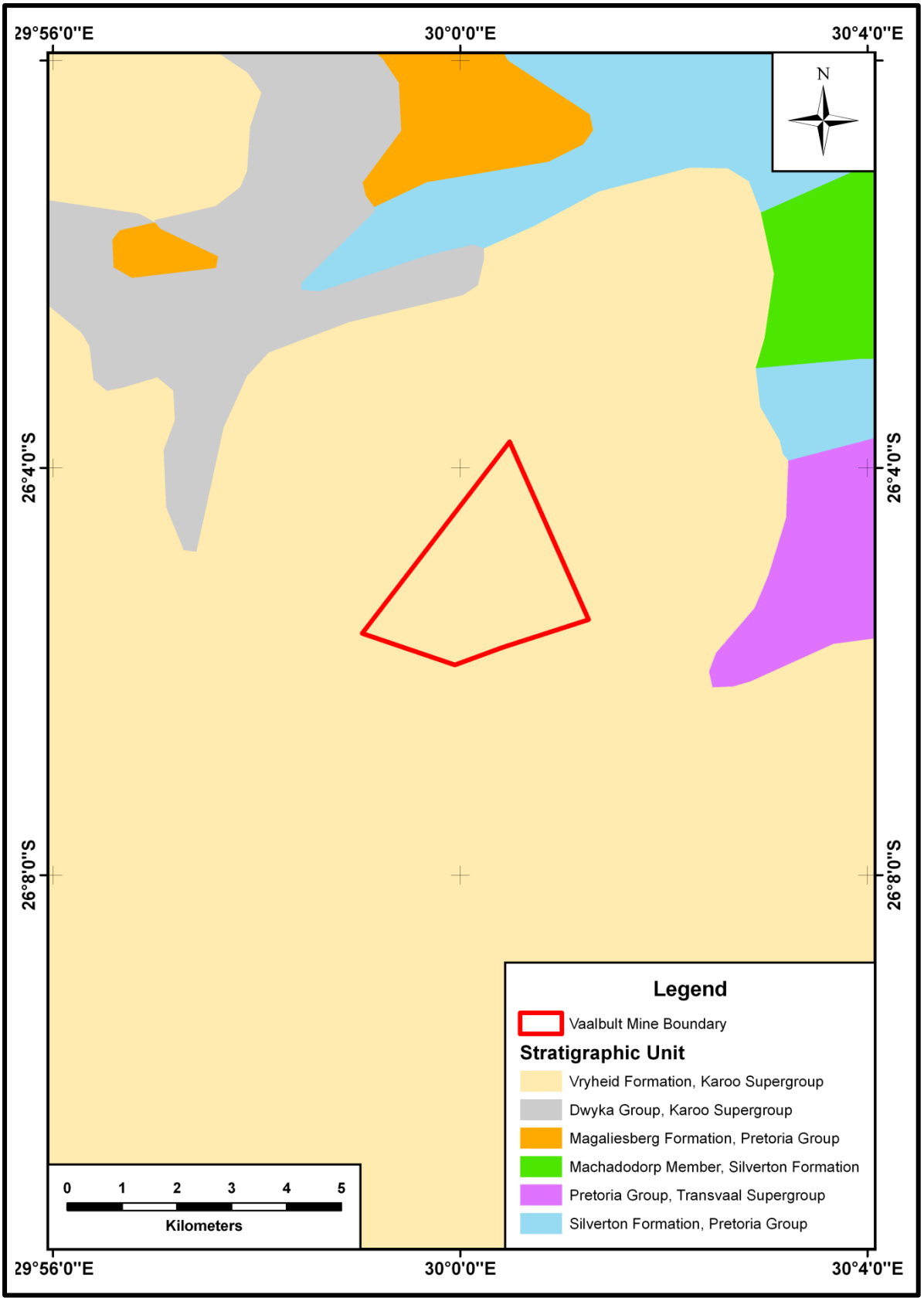

Figure 6: Geological map of the area underlying the Vaalbult Colliery Mining Right area and its immediate environs.

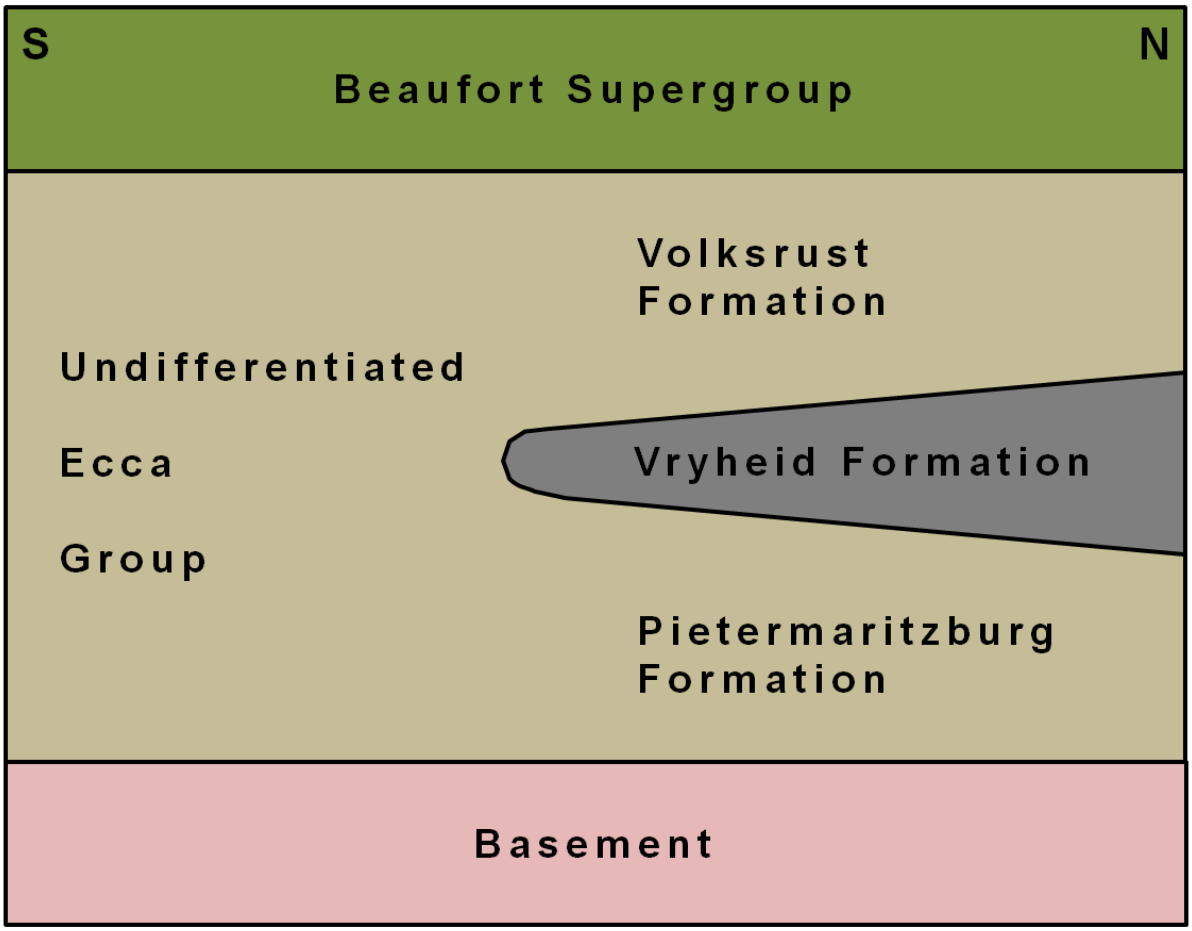

Figure 7: Schematic north-south oriented stratigraphic section of the Ecca Group in the northeast corner of the Karoo Basin. The Volksrust and Pietermaritzburg Formations can only be recognised when the Vryheid Formation forms part of the vertical sequence. In the north and north-western portions of the basin the Pietermaritzburg Formation was not deposited. In these areas the coal-bearing strata of the Vryheid Formation rest directly upon the basement.

The Vryheid Formation is one of sixteen (16) recognised stratigraphic units that constitute the Permian Ecca Group. During the deposition of the Ecca Group the basin was dominated by a large sea; the salinity levels of this water body remain unresolved. The exception to this model was the deposition of the coal-bearing strata of the Vryheid Formation along the northern margin during an episode of deltaic progradation into the basin.

Deposition of the Vryheid Formation was terminated by a basin-wide transgression. This event drowned the Vryheid Formation deltas and their coal swamps resulting in the deposition of the deep-water sediments of the Volksrust Formation. The investigation of

the project area did not identify any outcrops of bedrock, the entire area being covered by Cainozoic Regolith.

6.2 Geology of the Vaalbult Colliery

6.2.1 Historical overview

The major lithological succession described by BM Geological Services in previous reports from the colliery is outlined in Table 2. This stratigraphic sequence is dominated by the two coal seams that are being economically exploited by Vaalbult Colliery (Figures 8 and 9). These coal seams are the stratigraphically younger D seam (unit E) and the underlying E seam (unit A). The E seam constitutes the base of the colliery pit in all area observed and appears to be uniformly distributed throughout the colliery. The E seam has been observed to be up to ca. 1.5 m thick. Unit E has been observed to be present as a predominantly mudstone-rich horizon containing numerous thin, discontinuous coaly stringers; it has also observed as a well-developed coal seam > 40 cm and < 1.5 m in thickness. In this thicker part of the unit E a ±15-20 cm thick, grey coloured granulestone has previously been identified approximately half-way up the coal seam.

Lithological Unit	**Unit Code**
Regolith	H
Brown sandstone	G
Carbonaceous mudstone	F
D seam	**E**
Buff sandstone	D
Carbonaceous mudstone	C
Buff sandstone	B
E seam	**A**

Table 2: Lithological succession previously described from within the Vaalbult Colliery pit. The code indicated is the letter code used to identify the individual major lithological units in this report. Coal horizons are highlighted in bold text.

The sedimentary sequence separating the two seams varies between 11.5 m and 12.5 m in thickness (the thickness deceases towards the west; Figure 8). The inter-seam lithostratigraphic succession within the colliery is as follows. Immediately overlying the E seam is a highly variable sandstone unit (unit B) which is termed "the parting" in the mine's terminology. Unit B has been observed to be a 30 cm thick, buff coloured

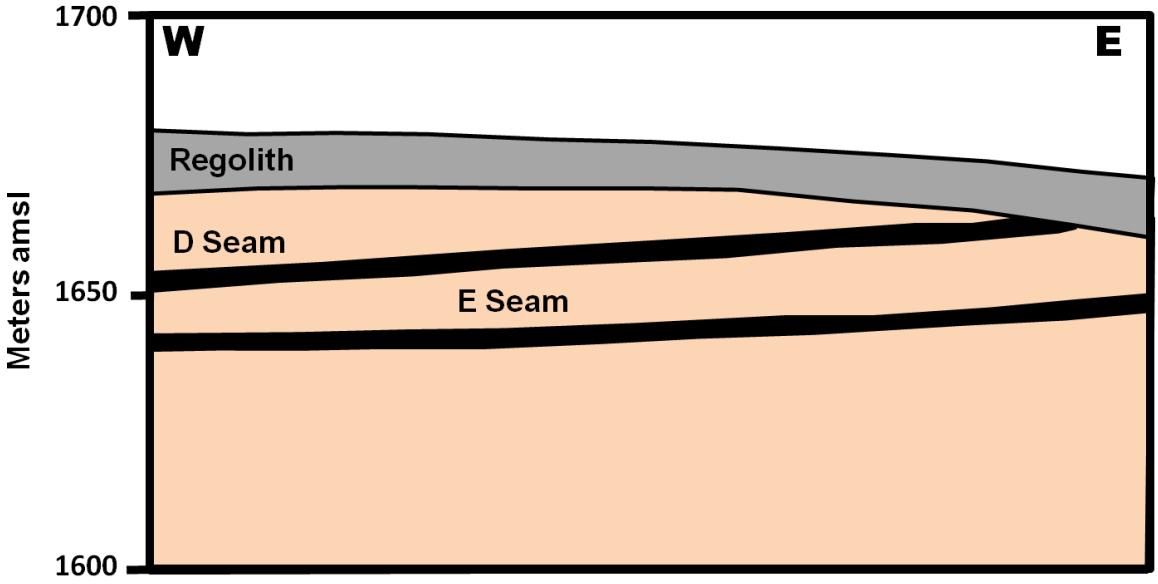

Figure 8: Schematic E-W oriented geological cross section across the central western section of the Mining Right area, and approximately in the same location as the mine pit (data obtained from the client). The location of this cross-section is provided in Figure 9.

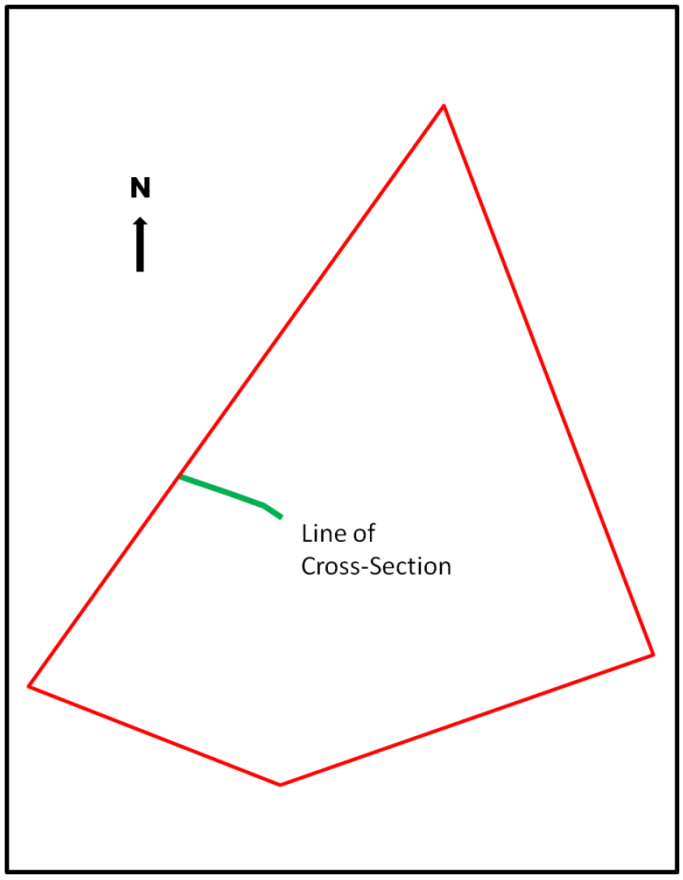

Figure 9: Map showing the location of the geological cross-section shown in Figure 8.

uniform, massively bedded unit. However, in some areas the sandstone forms a 50 cm thick fining-upward sequence with granulestone at the base, grading upward into a flaser-bedded portion and an upper-most massive to planar-bedded sandstone portion. A carbonaceous, very-coarse grained, highly irregularly thick, undulatory and lenticular, sandstone horizon up to ca. 30 cm thick occurs in some areas occurring between the top of the E seam and the base of Unit B. Elsewhere, unit B is present as a <2 m thick laminated, micaceous sandstone (the individual mica flakes exceed several millimetres in size. Overlying unit B is approximately 6 m of black, thinly laminated, carbonaceous mudstone and fine-sandstones. Unit C overlies unit B and consists of ca. 9-10 m of buff coloured sandstone. Overlying unit C is approximately 5-6 m of brown coloured, sandstones of unit D. The sandstone is variable in appearance, being parallel bedded in and exhibiting well developed point bar cross-beds. Unit C has been observed as being extremely variable in appearance. It sporadically occurs as a discontinuous 30-40 cm thick, buff coloured sandstone (maximum thickness) that occurs approx. 40–50 cm above the top of unit B. In some areas the sandstone is a distinct tabular member. Elsewhere along strike the sandstone lenses out to become a discontinuous non-connected series of lenses distributed over a 30-40 cm vertical stratigraphic thickness. Occurring above this sandstone, but still within unit C in the present site investigation is a ca. 30-40 cm thick buff coloured, tabular sandstone is present throughout all the sections identified and occurs ca. 2 m above the top of unit B.

Unit D has been observed to consist of approximately 5 m of tabular sandstones which are lighter in colour (buff) than in the underlying unit C. The unit is mostly composed of thin, well delineated tabular sandstones, but that distributed throughout the succession are a number (four were observed) of much thicker, laterally continuous buff sandstones.

The coals of Unit E (D seam) overly unit D and the maximum exposed thickness in the colliery is ca. 40 cm. In the previous biannual site visit the unit overlying unit E was ca. 8 m of thinly laminated, black carbonaceous mudstones (termed unit F). The rocks comprising unit F was subdivided in a previous palaeontological audit report into three distinct lithological subunits (termed F1-F3). Rock sequence F1 consists of ca. 2 m of massive and laminated dark grey mudstones, F2 consists of ca. 1 m of light grey, laminated mudstones and the upper part of unit F consists of ca. 3 m of black, carbonaceous mudstone (subunit F3). Overlying unit F is a light brown sandstone unit several meters in thickness termed unit G. The light brown sandstones of unit G have not been observed closely anywhere in the colliery and, as such, little detail can be provided of it. Approximately 2 m of regolith (unit H) tops the sequence.

6.2.2 Observations from the current study

The sites observed in the site visit reported herein all lie stratigraphically above the D seam. Spatially the waypoints VB001-VB003, see Figure 3) Lie along the north-western

margin of Cut 63, while waypoint VB004 is located on the western margin of the mine void.

The strata cropping out at waypoints VB001-VB003 are the finely laminated, grey sandstones and mudstones of unit F (Figures 10-11). Evident along the bedding surfaces of the coarser-grained of the sandstones are abundant course-grained mica flakes.

The stratigraphic unit copping out at waypoint VB004 correlates to Unit G. Lithologically the rocks here consist of cream to blonde coloured sandstones that are medium-grained (i.e., coarser than in unit F). They grade from massive, through laminated, to cross-bedded and may contain mudstone rip up clasts (Figures 12-13). Collectively, this suite of sedimentary structures and textures suggest a higher energy environment of deposition than in unit F.

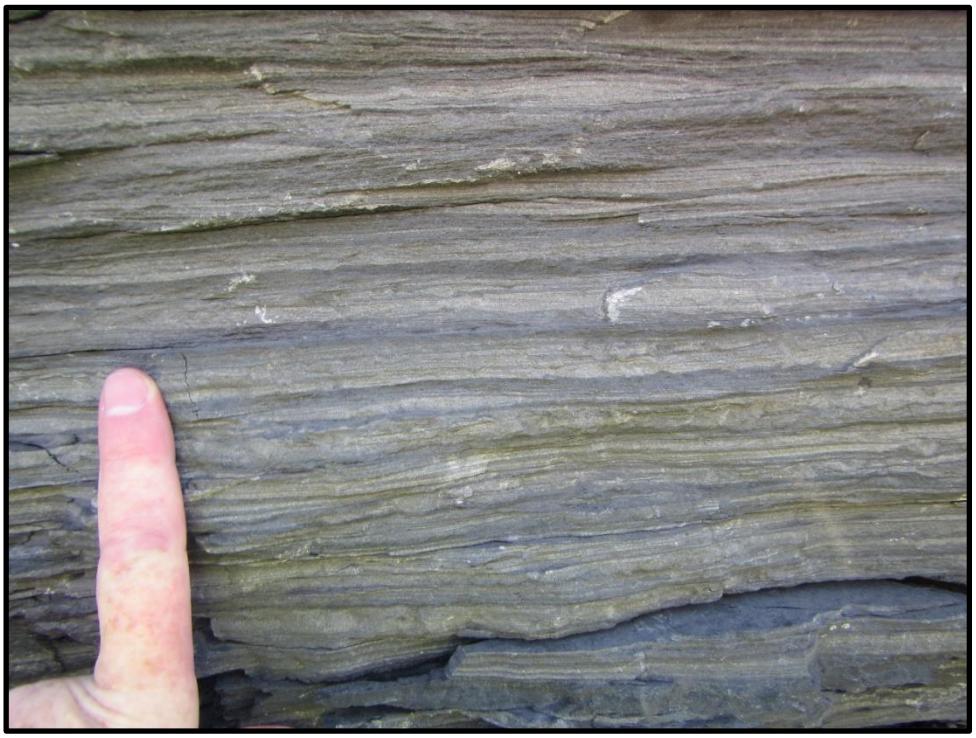

Figure 10: Finely laminated grey to buff coloured fine-grained sandstones and siltstones of unit F. View of the western end of phase 23b cut (waypoint VB001; see Figure 3).

Figure 11: Rocks of unit F also located at waypoint VB001. Shown here is a bedding surface with abundant course-grained mica flakes evident. The presence of the mica and the size of the grains suggests a fluvial origin for the rocks and limited transport from the source area.

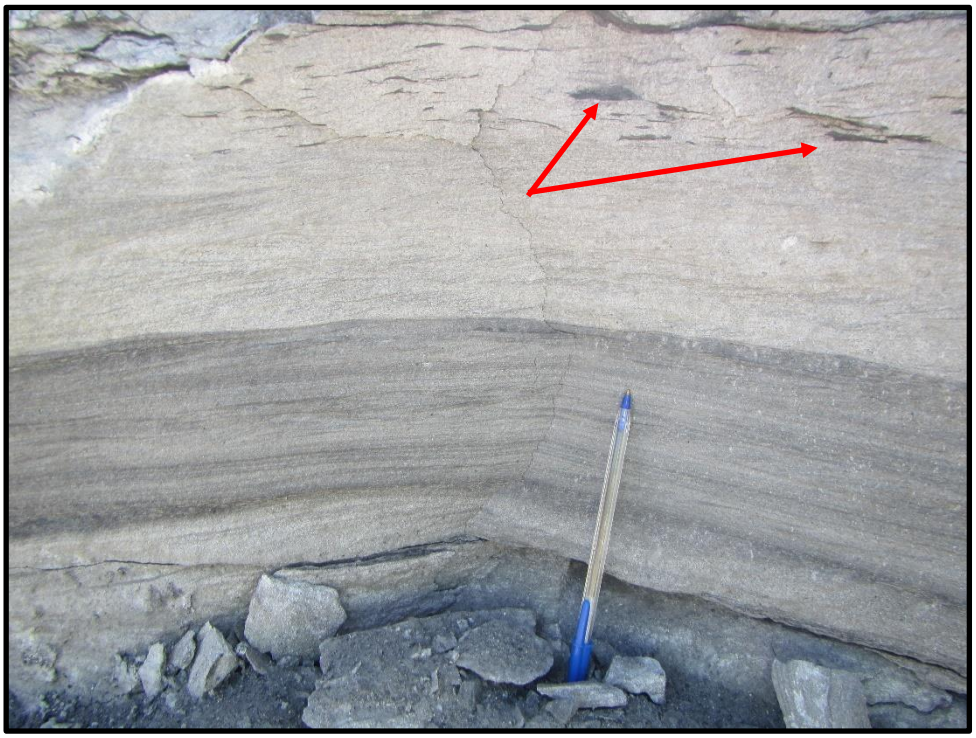

Figure 12: Parallel laminated sandstones delineated by carbonaceous laminae in the blonde sandstones of Unit G (waypoint VB004, see Figure 3). Several of the abundant carbonaceous mudstone rip up clasts are denoted by the red arrows.

Figure 13: A close-up view of the lower potion of the outcrop shown in Figure 12. It is evident that underlying the parallel laminated sandstones are tabular cross-bedded sandstones.

6.3 Palaeontological potential

6.3.1 Palaeontology of the Vryheid Formation

The most conspicuous and common components of the palaeontological record of the Ecca Group in general are the plant macrofossils of the *Glossopteris* flora. Two large and conspicuous leaf form taxa dominate the *Glossopteris* flora, these being *Glossopteris* and *Gangamopteris*. Within the upper Ecca (containing the Vryheid Formation) *Gangamopteris* has ceased to occur with only *Glossopteris* present (Anderson and McLauchlan, 1976). The palaeobotanical record of the Ecca Group is diverse and the literature describing it is voluminous (numerous papers having been published by E. Plumstead, H. Anderson, J. Anderson, E. Kovaks-Endrődy, R. Prevec, and M. Bamford amongst others). A comprehensive review of the flora in the Karoo Basin literature is, accordingly, beyond the scope of this study, but a thorough review of the palaeobotanical content of the Ecca Group in general and the Vryheid Formation is presented in Bamford (2004). In that summary, it is indicated that the Vryheid Formation can be expected to contain the plant macrofossils *Buthelezia*, *Sphenophyllum*, *Rangia*, *Phyllotheca*, *Schizoneura*, *Sphenopteris*, *Noeggerathiopsis*, *Taeniopteris*, *Pagiophyllum* and *Benlightfootia* and the wood taxa *Australoxylon* and *Prototaxoxylon*. In addition to the above records can be added the observations of Tavener-Smith *et al*., (1988) where it was noted that both *Glossopteris* and *Vertebraria* occur within the palaeontological record of the formation.

In portions of the formation typified by low thermal alteration, abundant assemblages of palynomorph plant microfossils (including acritarchs) can be expected (Anderson, 1977).

Jubb and Gardiner (1975) report the presence of fragmentary fish fossils within the Ecca sequence of southern Africa, these being *Coelacanthus dendrites* from the Somkele coal-field of northern Natal and *Namaicthys digitata* from correlative strata in the Senge Coal-fields of Zimbabwe. While fish faunas are obviously rare and none have been reported from the Vryheid Formation the possibility remains that they may be present.

Animal body fossils are rare within the Ecca Group in general (excepting the time equivalent faunas of the Whitehill Formation). However, no reptile fossils have been identified within the Vryheid Formation.

Hobday and Tavener-Smith (1975) reviewed trace fossil assemblages identified within the Vryheid Formation. Within that fossil assemblage, they identified two forms (*Helminthiopsis* and *Taphrelminthopsis* within horizontally laminated siltstones and mudstones that represent part of the deep-water *Nerites* community.

6.3.2 Palaeontology of the Vaalbult Colliery

Two district groups of fossils were identified within the sedimentary strata that comprise

the Vaalbult Colliery highwalls and the waste rock stockpiles. The fossil assemblages consist of plant macrofossils and a trace fossil assemblage. All fossils located during the conduct of the site visit reported herein were in finer-grained, lower energy sediments of unit F. The higher energy environment of deposition suggested for Unit G (based on the coarser grain size of the sediment as well as the tabular cross-bedding and rip up clasts) suggests a lower potential for fossil preservation.

6.3.2.1 Plant macrofossils

During the conduct of this site visit a single specimen of a plant macrofossils identified as an unidentifiable woody, carbonaceous, stem compression (waypoints VB001 11, Figure 14) was located in unit F. Unfortunately, the exact stratigraphic provenance of the specimen could not be accurately determined, as they were located within rock fall at the base of the remaining highwall. However, the similarity of the rock matrix surrounding the fossil to that of the nearby highwall suggests the two are from the same sequence.

The plant macrofossil material located was not palaeontologically significant, due to their unidentifiable nature and the lack of precise stratigraphic provenance and the unidentifiable nature of the fragment.

6.3.2.1 Trace fossils

During the conduct of earlier site visits conducted in the period 2016-2020 trace fossils representing burrows of two types were identified within the sedimentary rocks of the mine sequence. These fossils are a) closely spaced, unbranching, vertical, tubular burrows identified as the ichnogenus *Skolithus* and b) branching or bifurcating horizontal burrows tentatively identified as the ichnogenus cf. *Scolicia*. The fossils identified as the ichnogenus *Skolithus* were overwhelmingly the dominant ichnogenus recognised at the colliery. During the conduct of the present site visit only *Skolithus* sp. burrows were identified. *Skolithus* sp. specimens (Figure 15) were located in the present site visit within rocks of unit F in Cut 63 (ca around waypoint VB002, see Figure 3).

Hobday and Tavener-Smith (1975) report the presence of this fossil type elsewhere in the Ecca Subgroup where they occur in sandstones associated with upward-coarsening regressive facies cycles attributed to delta progradation.

As with the plant macrofossils discussed in Section 6.3.2.1 above the ichnofossil assemblages are not uniformly distributed within the rocks of the coalmine sequence, but are instead markedly patchy in their occurrence. These specimens were present in extensive accumulations of evenly spaced burrows. The lithology containing these fossils is micaceous, carbonaceous sandstones similar to those observed in "the parting" and otherwise known as unit B.

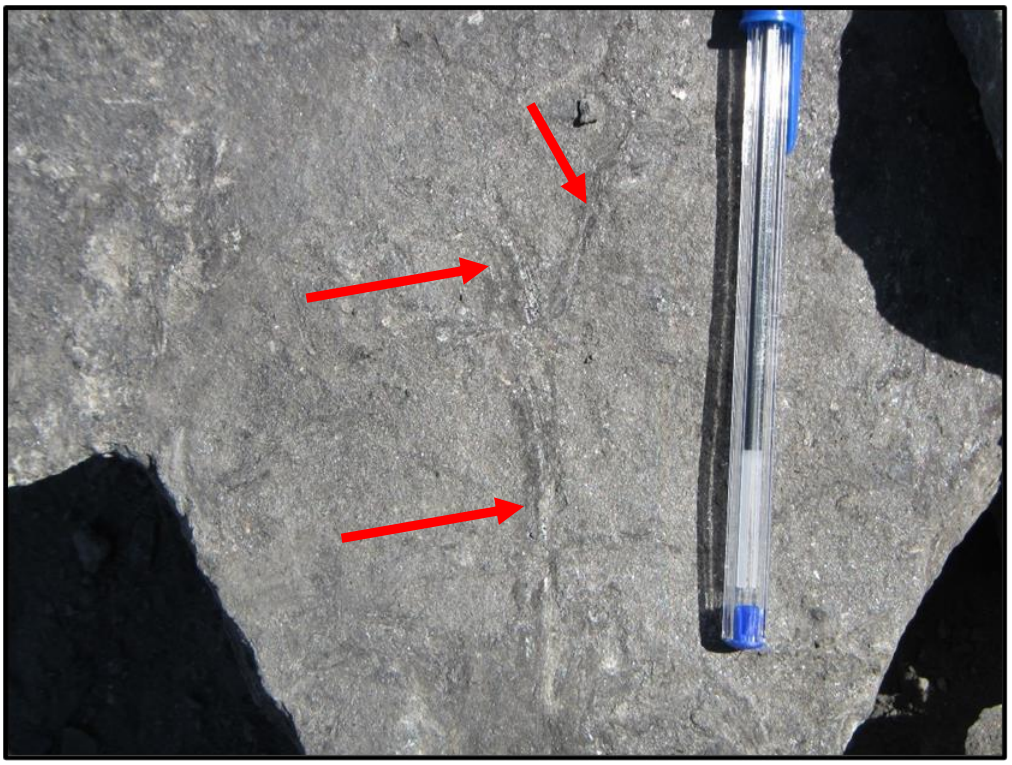

Figure 14: A branching, carbonaceous compression of a plant macrofossil, woody stem fragment. Various potions of the fossil are identified via red arrows (waypoint VB001, see Figure 3).

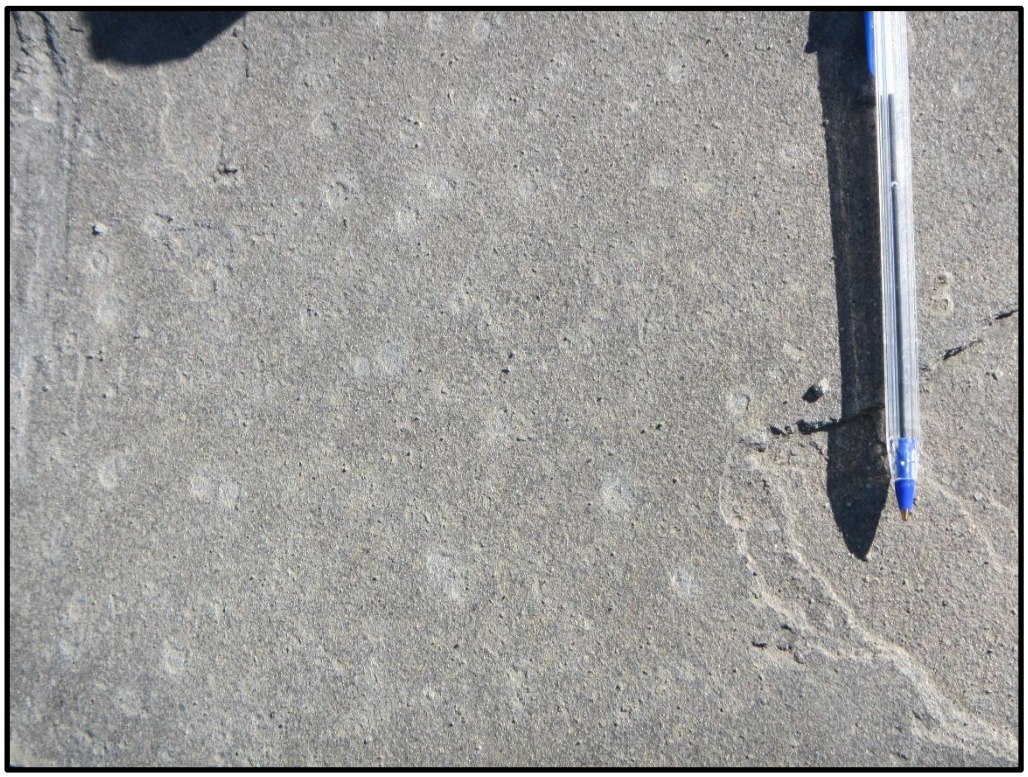

Figure 15: Indistinct specimens of *Skolithus* sp. from the light-coloured sandstones of unit F. Location is waypoint VB002 (see Figure 3 for location).

7 SUMMARY

Prof B. Millsteed, in the presence of Ms E Nethavhani [representing Vaalbult Mining Company (Pty) Ltd], conducted a site investigation of the only mine void being actively mined at the time of the visit on the 31st of August 2021. The present investigation was conducted within the immediate environs of the mine's Cut 63. Due to the amount of water in the base of the void access to the Cut itself was not possible.

The site investigation confirmed the presence informal stratigraphic units F and G in the remaining high-wall exposures. These strata sit stratigraphically upon coal seam D (Unit E), which was being exploited at the time of the visit. The mine is in the process of transitioning into an underground operation, and the limited availability of areas to be studied 9and thus stratigraphic units to be observed) reflect the fact that Cut 63 is believed to be the last open pit void to be exploited before the transition occurs.

The strata examined to date within the mine are generally poorly fossiliferous. During the present site visit an unidentifiable, carbonaceous stem compression of a woody stem segment and a small number of blocks containing numerous *Skolithus* sp. ichnofossils were located within rocks attributed in the rock fall underlying remnant high wall sections. The fossils themselves were of minimal scientific importance and, thus, even if the provenance was known with more precise detail damage mitigation protocols would not have been required.

As stated above, none of the fossils (plant macrofossil or trace fossils) identified are palaeontologically significant and require special preservation or excavation. Burrows attributable to *Skolithus* provided permanent shelter to animals that procured their food above the level of the sediment-water interface (Hobday and Tavener-Smith, 1975). The ichnogenus has been observed to be associated with the sandstones of unit B, with the sandier basal portion of unit C, and with the base of unit F elsewhere in the colliery in the preceding palaeontological monitoring reports (dated 2016 to 2020).

None of the fossils identified are palaeontologically significant and require special preservation or excavation. It is evident that the colliery is currently, and has been, exploiting rocks that are typified by being either palaeontologically depauperate or low in taxonomic diversity. This may however change as different portions of the Mining Right area and/or new lithological successions are exploited.

8 RECOMMENDATIONS AND CONSIDERED OPINION

The lithological succession of the Vaalbult Colliery is fossiliferous (although not abundantly so) and so due care needs to be exercised to ensure that the palaeontological heritage of the area is not diminished by the mining activities. That said, the strata being mined by the colliery occur beneath a uniformly thick regolith horizon and do not crop out. The absence of bedrock outcrop means that no fossils are observable at surface. As a result, it is only due to the ongoing mining activities that the

fossiliferous strata are exposed and made available for scientific study. None of the fossils located during this study or the preceding study are of sufficient palaeontological significance that their excavation by a palaeontologist or their preservation is required, but this may not always be the case. However, the area planned to be mined is large and only a small proportion of it has been exploited to date. In addition, several of the geological units present within the mine show significant sedimentological variation across the small area mined to date. It is interpreted, herein, that significant facies variations may be possible across the full extent of the Mining Right area. Changes within the abundance and type of fossil assemblages may be possible and that palaeontologically significant fossil assemblages may be present. The possibility of the presence of palaeontologically significant fossils within the rocks of the colliery therefore remains a strong possibility.

The above being said, Prof Millsteed was informed during the site visit that the mine is in the final stages of transition to an underground mining operation. It is common practice in the industry that all rock surfaces not being actively mined are coated with lime powder to prevent methane combustion. This activity hides the rock surface and makes observation of the rock and its content impossible. Similarly, the preponderance of Mine health and safety protocols that are part of the fabric of underground mining usually make access to the freshly mined surface impossible for individuals who are not appropriately trained and qualified.

It is accordingly recommended that:

- The annual palaeontological audit of the mine workings should be placed into a state of suspension indefinitely (subject to later review should open caste mining recommence at Vaalbult Mine at any time in the future).
- Should opencast mining be planned at any time in the future of the life of mine, the mine must contact SAHRA and inform them of this possible intention, and potentially trigger a resumption of annual palaeontological impact assessment audit (at the request of SAHRA).

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9 October 2020