Palaeontological Impact Assessment for the Proposed Mining permit on Farm Goedgedacht 27 IQ, North West Province

Phase 2 Study

For

Gono Mining Corporation (Pty) Ltd

08 May 2023

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Specialist Declaration

I, Nonhlanhla Vilakazi declare that –

• I act as the independent specialist (reviewer) in this application;

• I'll complete the application-related work objectively, even if it results in conclusions that are unfavorable to the applicant;• I certify that nothing may possibly compromise my objectivity in carrying out such task;• I have experience in conducting the specialist report on the palaeontological impact assessment pertinent to this application, including knowledge of the pertinent laws and any regulations that are pertinent to the proposed activity;I will comply with the applicable legislation;

• I don't have any competing interests, and I will not while carrying out the action;

• All the information provided by me in this form is true and correct;

• I hereby undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential to influence - any decision to be made with respect to the application by the competent authority; and - the objectivity of any report, plan, or document to be prepared by myself for submission to the competent authority.

Signature of Specialist

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1. EXECUTIVE SUMMARY

Dr. Nonhlanhla Vilakazi was appointed by Gono Africa Mining (Pty) Ltd to conduct a PIA for the proposed prospecting rights as part of specialists (inputs) Impact Assessment studies required to fulfil the BAR process and its requirements. No fossils where discovered during the impact assessment phase of the project.

2. INTRODUCTION

In order to analyze the probable palaeontological impact of the proposed prospecting rights within the JB Marks Local Municipality, Dr. Kenneth Kaunda District Municipality, North West Province, Nonhlanhla Vilakazi was chosen to conduct a Phase 2 Palaeontological Impact Assessment.

3. PROJECT BACKGROUND

The aim of this project is to mine for iron ore and manganese in the Dr. Kenneth Kaunda District. The project is situated in the JB Marks Local Municipality (see Figure 1).

4. LEGISLATIVE FRAMEWORK

4.1 Constitution of the Republic of South Africa, Act 108 of 1996

All individuals have the right to an environment that is not injurious to their health or wellbeing, as well as the right to have the environment protected for the benefit of both current and future generations, according to Section 24.

4.2 National Environmental Management Act No. 107 of 1998

For the sake of both current and future generations, everyone has the right to the protection of the environment through legislation and other regulations that—

- promote conservation;

- assure ecologically sustainable use of natural resources, prevent pollution and ecological deterioration; and
- advance legitimate economic and social development

4.3 National Heritage Resources Act, No. 25 Of 1999

- According to the Act, heritage resources are places or things with cultural significance, such as places or things with aesthetic, architectural, geographic, scientific, social, spiritual, linguistic, or technological worth. This Act makes provisions for the protection of these historic resources. Any heritage site, archeological site, palaeontological site, burial ground, grave, or public monument or memorial that may be discovered during construction requires permits before it can be disturbed, demolished, or destroyed.The Act outlines what constitutes a heritage resource, the standards for determining its significance, and the specific activities that may call for a heritage specialist review. In this context, the development categories stated in Section 38 (1) of the NHR Act are:• constructing a road, wall, power line, pipeline, canal, or another comparable linear development or barrier that is longer than 300 meters;• Building a bridge or other comparable structure greater than 50 meters;• Any construction or other activity that modifies the site's character;Exceeding 5000 m² in extent;
- • involving three or more erven that already exist or their subdivisions;Involving three or more subdivisions thereof which have been consolidated within the past five years;
- • The costs of which will exceed beyond the budget established by the South African Heritage Resources Agency (SAHRA) regulations.The rezoning of a site exceeding 10 000 m²
- Any other category of development provided for in regulations by the South African Heritage Resources Agency (SAHRA).

If any objects are discovered during this operation, all excavation-related activities must halt, and a qualified palaeontologist must be called to the site for inspection and possible rescue. Nothing may ever be altered or removed without the South African Heritage Resources Agency's consent.

5. ASSESSMENT METHODOLOGY (IN COMPLIANCE WITH THE NHRA (ACT NO. 25 OF 1999) AND SAHRA GUIDELINES):

- Identify, map & provide background to heritage finds/localities within the vicinity of the affected area via desktop assessment.
- Provide an assessment, with Field Rating criteria, of the significance of heritage resources in the region via desktop assessment.
- Identify and map all possible heritage finds/localities within the affected area / footprint via pedestrian survey.
- Provide an assessment with Field Rating criteria, of the potential impact by the development on heritage resources within the affected area.
- Provide appropriate mitigation measures and recommendations for heritage resources identified within the area of impact, including providing of identification training workshop to ECO's, chance find protocols and monitoring procedures

6. PROJECT AREA DESCRIPTION

The Dr. Kenneth Kaunda District Municipality is a Category C municipality in the North West Province. It is situated 65 kilometers southwest of Johannesburg and shares that side of the border with the Gauteng Province. It is the province's smallest district in terms of area, making just 14% of it. The municipality is made up of the three local municipalities JB Marks, City of Matlosana, and Maquassi Hills. It is a location with a chance for long-term economic growth as well as a rich and diverse natural heritage. This region is home to some of the most famous gold mines in the world as well as one of the world's earliest meteor impact sites (https://www.gov.za/about-government/contact-directory/nw-municipalities/nwmunicipalities/kenneth-kaunda-dr-district).

Figure 1: Map of areas in the Dr. Kenneth Kaunda District Municipality (the project is in the JB Marks local municipality).

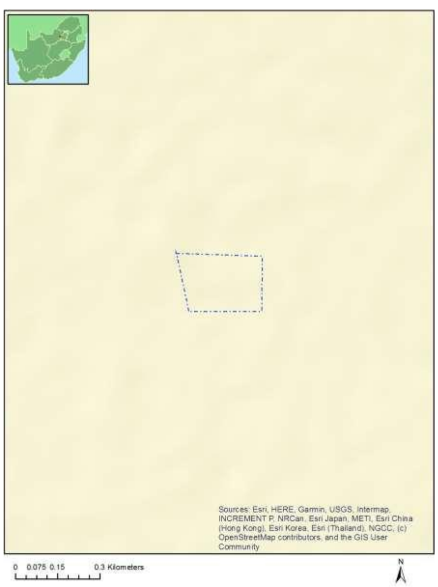

Figure 2: Map of proposed site and relevant areas (marked with yellow pins).

Cadastral details of the proposed site:

No	Farm Name	Farm/Erf No	Portion	Latitude	Longitude	Property Type
1	Goedgedacht	27	0	26°7'13.49S	27°15'17.04E	Farm
3	Goedgedacht	27	1	26°7'57.52S	27°15'28.36E	Farm Portion

7. GEOLOGICAL CONTEXTS

7.1 Kaapvaal Craton

The core of the roughly 3.1 Ga Kaapvaal craton was formed by the initial thin-skinned overthrusts within ocean- and arc adjustments, followed by the merging of displaced oceanic and arcuate terranes with significant granitoid magmatism (ca. 3.3-3.2 Ga) under the assumption that plate tectonics was at work (de Wit et al. 1992). Between 3.23 and 2.9 Ga, the majority of the terraneous accretion that formed the Kaapvaal craton is thought to have taken place in the Barberton Lineament (BL) and the Thabazimbi-Murchison Lineament (TML), two prominent ENE-WSW suture zones (Poujol et al 2003; Anhaeusser 2006; Robb et al. 2006). The Kaapvaal craton is made up of at least four distinct terranes, including Barberton-North (BN) and Barberton-South (BS) on either side of the BL, Murchison-Northern Kaapvaal (MNK) north of the TML, and Limpopo Central Zone (LCZ) (Figure 3), each of which underwent a distinctive crustal evolution and successive (Zeh et al. 2009).

7.2 Transvaal Supergroup

The Transvaal Supergroup, which is still present, is made up of three Kaapvaal Craton basins: the Transvaal, Griqua West in South Africa, and Kanye in Botswana (see figure 3). The Transvaal basin, which also acts as the base for the well-known Bushveld Complex intrusion, which dates to roughly 205 Ga., may contain one of the thickest and most widespread sequences of these Neoarchaean-Palaeoproterozoic rocks (Eriksson & Reczko, 1995). The Transvaal rocks principally formed hornfelses and quartzites from clastic protoliths and asbestos deposits in the Banded Iron Formation (BIF) as a result of contact metamorphism. According to Eriksson et al. (2001), the only deformation of the Transvaal sedimentary is found in interference folds, faulting, synBushveld dykes and sills, and bedding that generally dips in the direction of the central Bushveld Complex. A notable chert breccia and chert-dominated conglomerates on a palaeokarst surface that separates the underlying dolomite/iron formation sequence (Chuniespoort Group) from the underlying Pretoria Group sediments define the significant unconformity in the eastern Transvaal basin (Eriksson et al., 1993). In some places, the Pretoria Group rests directly on dolomitic rocks beneath with an uneven karstic contact. It is obvious that the deviation from the underlying sequence is angular and erosive. Only the northern portions of the basin have retained iron deposits (Penge Formation) (Eriksson and Reczko, 1995). The unconformity gradually crosses the Chuniespoort Group from north (Potgietersrust) to south (Carolina), where, in some places, the entire lower sequence has been eroded to a thickness of up to 3 km (Button, 1986; Eriksson and Reczko, 1995).

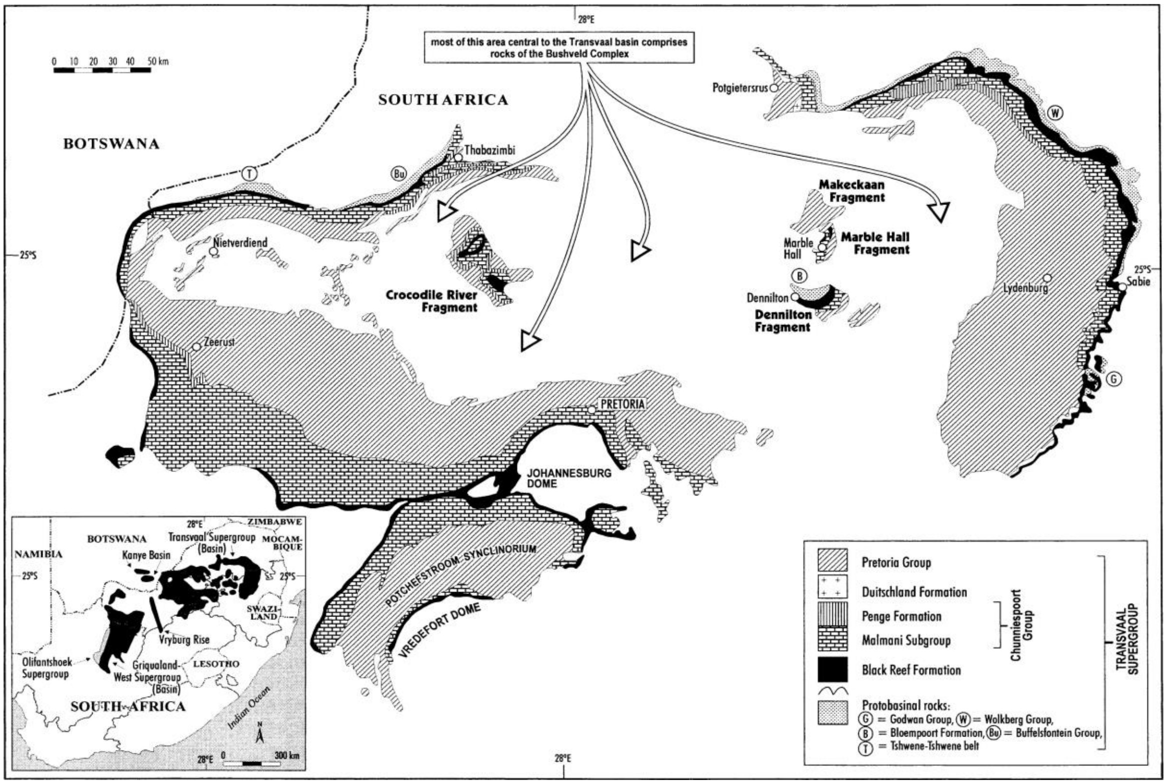

Figure 3: Geological map of the Transvaal basin, Transvaal Supergroup showing protobasinal rocks, succeeding the Black Reef Formation, Chuniespoort Group and upper Pretoria Group (after Eriksson, et. al., 2001).

7.3 Chuniespoort Group

The chemical sedimentary lithologies of the Chuniespoort Group are a sign of inelastic sedimentation and consequent tectonic instability. The Ventersdorp fault systems may therefore thermally subside to permit Chuniespoort sedimentation (Eriksson et al., 1993a, 1995), which is a plausible theory. The Chuniespoort is the last of a sequence of late Archaean successor basins on the Kaapvaal craton, according to Clendenin (1989a). It follows that during the Chuniespoort period, the fault networks that are thought to have experienced mechanical sinking during protobasinal sedimentation and volcanism also experienced thermally-induced flexural subsidence. A transgression black shale covers an unconformity at the top of the Black Reef Formation at the base of the Chuniespoort dolomite BIF series (Clendenin, 1989; Catuneanu and Eriksson, 1999). The Penge BIF are followed unconformably in the northeast of the basin by the predominately marly Duitschland Formation lithologies, which can be up to 1100 m thick. The Chuniespoort Group is made up of the basal Malmani Subgroup (almost 1200 m of pre-dominantly dolomitic rocks), which grades up into c.640 m of BIF (Clendenin, 1989).

7.4 Malmani Subgroup

This Subgroup comprises of formations with stromatolitic dolomites as the main component, with mudrock, limestone, chert, and chert-in-shale breccias present in trace proportions. The primary factors of stratigraphic subdivision are stromatolite types, interbedded chert and mudrock, as well as low-angle unconformities (Button, 1973; Clendenin, 1989). The geometry of the subgroup and its constituent forms is similar to that of a sheet (Eriksson and Altermann, 1998). A significantly larger carbonate platform that is also preserved in the Kanye and Griqualand West depositories is part of the subgroup situated on the Kaapvaal craton. There are many different varieties of stromatolites, including columnar stromatolites, huge domes, laminated mats, fenestral microbial laminites, and regional oolitic beds (Altermann and Siegfried, 1997). Hälbich et al. (1993) claim that the Malmani carbonates grade up into the Penge Formation BIF, which is made up of micro- to macro-banded lithologies with surviving shard structures along with interbeds of mudrock and intraclastic breccias. A sheet-like shape for this BIF is once again suggested by preserved outcrops, which are exclusively found in the northern Transvaal basin (Eriksson and Reczko, 1995). The Duitschland Formation is the uppermost part of the Chuniespoort Group, although because of its angular unconformities, it would probably be best positioned as a separate unit. The formation's geometry is unknown due to its confinement to the northeastern preserved Transvaal basin and the extremely uneven preserved thicknesses that lie under the higher erosional unconformity.

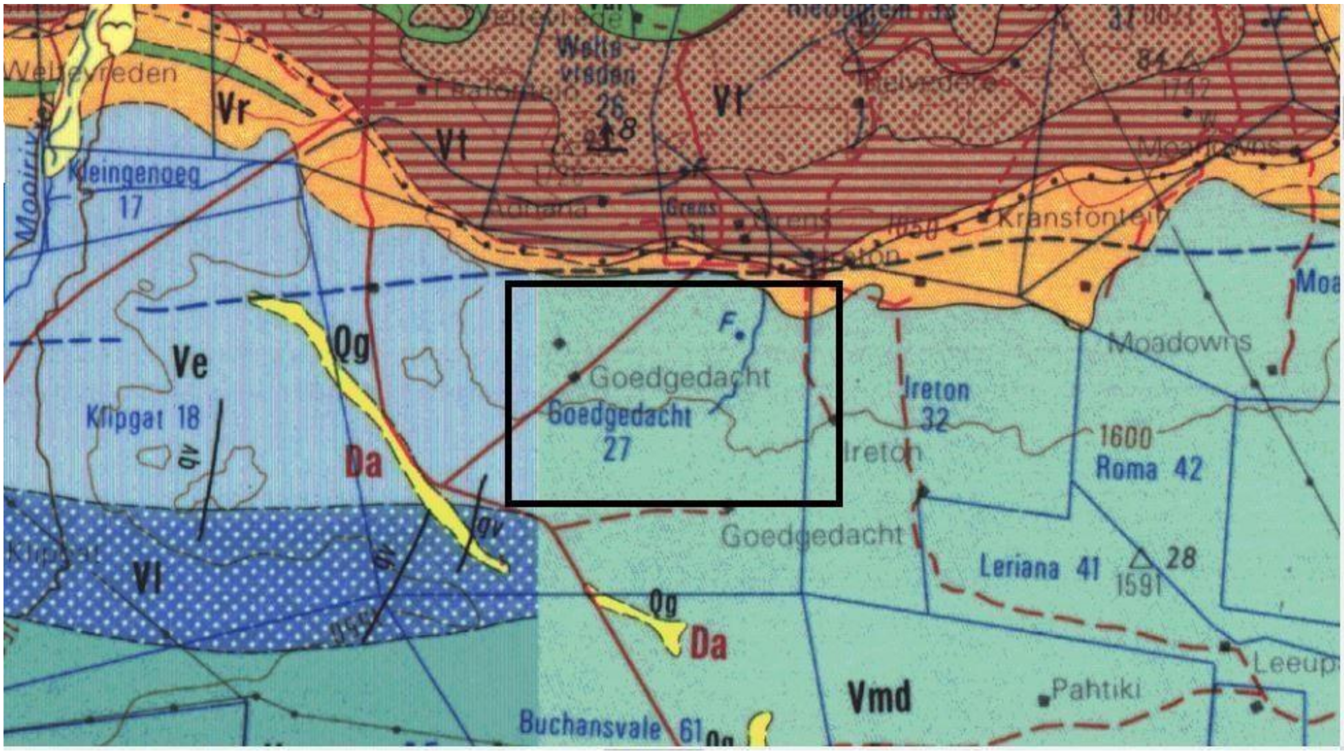

Figure 3: Geological Map of the area around the Goedgedacht Farm. The location of the proposed project is indicated with the black rectangle. Map enlarged from the Geological Survey 1: 250 000 Map 2626 West Rand (1986). The proposed area has Vmd sediments, and this simply suggests the area is surrounded by dolomite, chert and remnants of the chert breccia of the Rooihoogte Formation.

7.5 Oaktree Formation

This formation takes its name from the hamlet at the junction of the Johannesburg-Ventersdorp and Krugersdorp-Hekpoort routes. A structureless dolomite that weathers to a chocolate brown colour is followed by a dark dolomite bearing elongate domical stromatolites. The area is covered by a thin layer of shale that has large domes, and then a layer of light-colored dolomite sits on top of that with irregularly shaped domes. This region has the complex chert marker (CCM). This marker stands out because it contains the only considerable amount of chert in the formation and has domes that are bent and occasionally overturned. Above the dolomite with a light hue, there is a substantial thickness of finely laminated dolomite (Eriksson & Truswell, 1974).

7.6 Monte Christo Formation

The Monte Christo and Eccles Formations' laminated fenestral dolomite cycles transform into cherty dolomite with domal and columnar stromatolites as they rise. Clastic-laminated carbonate rock is a prominent marker unit in the lower parts of the Frisco Formation and the Oaktree Formation. The secondary growth of calcite between the bedding planes highlights the notable graded bedding and crossbedding seen in this lithofacies, which is connected to net-like fenestrate dolomite (Hartzer, 1989). The Monte Christo Formation was pierced by Precambrian dolerite dykes from the east, west, and north-south. Sinkhole occurrence is associated with the karst topography that developed as a result of erosion and dissolution along structurally controlled lineaments (SACS, 1980).

7.7 Lyttelton Formation

The 150 m-thick, chert-poor Lyttelton Formation, which is characterised by chocolate-colored dolomite, overlies the Monte Christo Formation. The lowest portion of this sequence has more chert than the middle (Clay, 1981). Other features of this Formation include the occurrence of cross-bedded dolarenite layers frequently and megadomal stromatolites. There are lots of areas with a dark tone, a mild topography, and fuzzy bedding lines.

7.8 Eccles Formation

Near the gradational contact where this Formation overlies the Lyttelton Formation, the dolomite's color shifts from dark brown to grey with increased chert content (Clay, 1981). Obbes (1995) cites this Formation as having outstanding bedding traces and numerous bands of interbedded light grey dolomite and chert. The top of this formation is covered in chert breccia. The dolomite layer, which is dark brown in color, sits on top of the chert shale breccias. The Eccles Formation is topped by silicified chert breccia with a marker unit (Obbes, 1995).

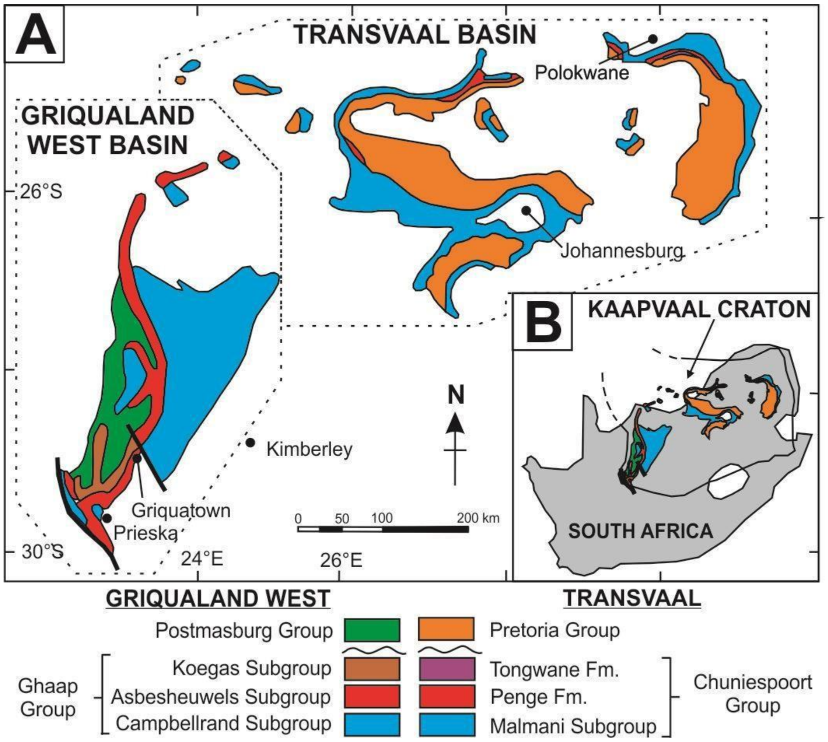

Figure 4: Regional map of the Transvaal Supergroup; (A) the major stratigraphic subdivisions of the Transvaal Supergroup in South Africa; (B) position of the Transvaal and Griqualand West basins on the Kaapvaal Craton (modern day South Africa shaded). Adapted from Sumner and Grotzinger, 2004.

8. PALAEONTOLOGICAL CONTEXT

The majority of these carbonate rock deposits in South Africa are composed of microbialites and stromatolites in a variety of morphologies (Truswell and Eriksson, 1972, 1975; Beukes, 1979, 1980, 1987; Altermann, 2008). Oolities, marginal conglomerates, carbonate arenites, and siliciclastic deposits are among the several non-stromatolitic dolomites and limestones that are present (Altermann and Wotherspoon, 1995; Altermann and Siegfried, 1997). Stromatolites and the surrounding carbonate sediments are good candidates for a facies investigation. The morphology of stromatolites frequently shows growth patterns that shift vertically as a sign of lateral facies shifts. The accumulation of these carbonate rocks shows that various depositional palaeoenvironments evolved on the Late Archean platform in South Africa (Altermann, 2008).The marine carbonates have retained many early signs of life (Altermann and Schopf, 1995; Altermann, 2008). The morphology of Archean **stromatolites** captures the energetic conditions of the environment, and the primary mineralogy of Archean and Proterozoic carbonate rocks reflects the paleo-bioecological and carbonate saturation of seawater (Veizer et al., 1992a; Sumner and Grotzinger, 2004; Polteau et al., 2006; Fischer et al., 2009). (Klein et al., 1987; Altermann and Siegfried, 1997; Kazmierczak and Altermann, 2002; Altermann, 2008). Columnar stromatolites were widespread and plentiful in the Precambrian, but they are rare in contemporary marine settings (Awramik and Riding, 1988). More than half of the morphological forms seen in Precambrian stromatolite assemblages are columnar forms, which frequently develop in shallow subtidal to intertidal marine environments (Raaben, 2006).

Figure 5: Examples of fossilized stromatolites to be expected from the area (https://media.sciencephoto.com/image/e4420638/800wm/E4420638-Precambrian_stromatolites.jpg).

9. PALAEONTOLOGICAL IMPACT/MITIGATION

The suggested colour system for identifying palaeontological sensitivity classes is shown below. This sensitivity rating is based on the work of Almond et al. (2008, 2009) (Loock, 2014).

HIGH IMPACT	Areas where fossil bearing rock units are present with a very high possibility of finding fossils of a specific assemblage zone. Fossils will most probably be present in all outcrops and the chances of finding fossils during a field-based assessment by a professional palaeontologist are very high. Palaeontological mitigation measures need to be incorporated into the Environmental Management Plan

MODERATE SENSITIVITY	Areas where fossil bearing rock units are present but fossil finds are localised, within thin or scattered sub-units. Pending the nature and scale of the proposed development, the chances of finding fossils are moderate. A field-based assessment by a professional palaeontologist is usually warranted.
LOW SENSITIVITY	Areas where there is likely to be a negligible impact on the fossil heritage. This category is reserved largely for areas underlain by igneous rocks. However, development in fossil bearing strata with shallow excavations or with deep soils or weathered bedrock can also form part of this category.

Looking at the proposed area on the SAHRIS map suggests that is it highly sensitive (see figure 5), and therefore suggests that there be a chance find protocol for the ECO during mining. This protocol has been incorporated in the document below.

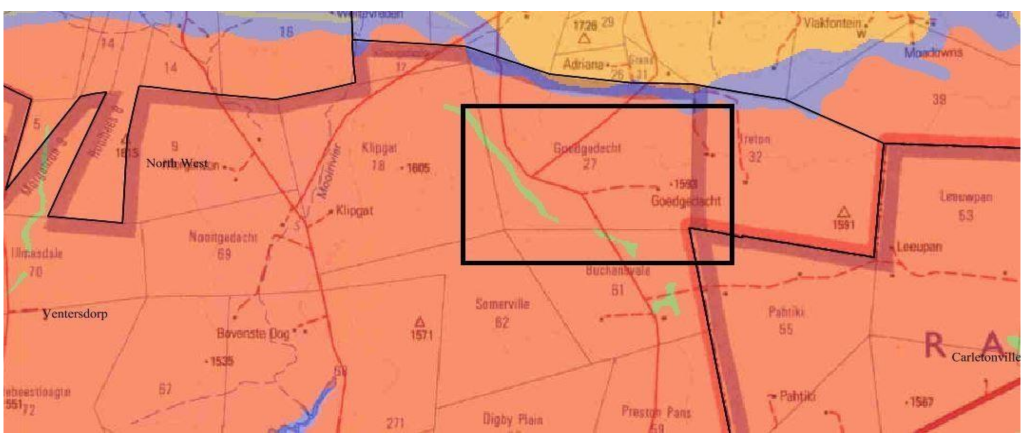

Figure 5: Photo showing the sensitivity of the proposed area (marked with a black rectangle). Using this map in conjunction with the table above suggests the area is highly sensitive (SAHRIS, 2023).

10. RECOMMENDATION

The survey and the information above suggest that there is a chance that fossils can be discovered even deeper. **Mining permit should, therefore, be granted**. If fossils are discovered after prospecting has begun, they should be saved, and a palaeontologist should be contacted to evaluate them and gather a representative sample. An EMPr should include a Fossil Find Procedure.

11. EXPOSURE OF PALAEONTOLOGICAL MATERIAL

The following protocol must be followed in the case of prospecting revealing new palaeontological material, such as a big fossil find:

> The relevant officer (such as the ECO or contractor manager) shall inform the appropriate Palaeontologist of any significant or unexpected discoveries made by the contractor crew while prospecting.
>
> If a significant in situ occurrence is discovered, excavation and/or mining in that area shall cease immediately so as to prevent the discovery from being disturbed or changed in any manner until the designated specialist or scientists from the North West Provincial Heritage Resources Agency or their designated representatives have had a reasonable opportunity to investigate the finding.

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