PALAEONTOLOGICAL IMPACT ASSESSMENT OF THE ESTABLISHMENT OF THE PROPOSED METALS INDUSTRIAL CLUSTER AND ASSOCIATED INFRASTRUCTURE ON PORTION 6253 OF ERF 1 NEAR KURUMAN, NORTHERN CAPE PROVINCE

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EXECUTIVE SUMMARY

.. The Northern Cape Department of Economic Development and Tourism proposes the establishment of a Metals Industrial Cluster on Portion 6253 of Erf 1 (Fig.1), located approximately 2 km south east from Kuruman, within the jurisdiction of the Ga-Segonyana Local Municipality and within the greater John Taolo Gaetsewe District Municipality in the Northern Cape Province. According to the National Heritage Resources Act (Act No 25 of 1999, section 38), a palaeontological impact assessment is required to detect the presence of fossil material within the proposed development footprint and to assess the impact of the construction and operation of the Metals Industrial Cluster on the palaeontological resources.

The site (Portion 6253 of Erf 1) is completely underlain by sediments of the Early Precambrian, Transvaal Supergroup, Ghaap Group and Campbell Rand Subgroup. The Campbell Subgroup sediments were deposited on the shallow submerged Kaapvaal Craton, approximately 2.6 to 2.5 Ga (billion years ago). Stromatolites are concentrated on the north, eastern and central portion of the proposed site. Most of the stromatolites are found *in situ* although several specimens were found loose. Exposed stromatolites are badly weathered, but there is a possibility that specimens still covered by sediments could be better preserved.

The development site near Kuruman consists of a flat-lying terrain and vegetation cover of grassy thornveld. Mapping of the stromatolites was difficult due to the vegetation and gravelly soil. The PalaeoMap (SAHRA website) indicates that the palaeontological significance of the Transvaal Group, Campbell Rand Subgroup is moderate and thus the overall impact of the proposed Metals Cluster development on Portion 6253 of Erf 1 is rated as **negative medium significance** (without the implementation of mitigation measures).

Mitigation is recommended which involves the sampling, collection and recording of fossils as well as obtaining relevant data concerning the surrounding sedimentary matrix within the proposed site by a palaeontologist. The implementation of mitigation measures will reduce the significance of the impact to low. This should take place after the initial vegetation removal has taken place but *before* the ground is levelled or compacted. Where relevant, excavation of this fossil heritage will require a permit from SAHRA and the material must be housed in a permitted institution. All fieldwork and reports should meet the minimum standards for palaeontological impact studies developed by SAHRA. These recommendations should be incorporated into the Environmental Management Plan for the Metals Industrial Cluster project.

CONTENTS

1 INTRODUCTION

Savannah Environmental (Pty) Ltd has been appointed as the independent Environmental Assessment Practitioner (EAP) by the Northern Cape Department of Economic Development and Tourism for the undertaking of the Environmental Impact Assessment process for the proposed Metals Industrial Cluster. The construction and operation of the Cluster, as well as associated infrastructure will be located on Portion 6253 of Erf 1 about 2km south east from Kuruman, within the Ga-Segonyana Local Municipality and the greater John Taolo Gaetsewe District Municipality in the Northern Cape Province is proposed.

The Cluster is planned to be developed beyond a 20-year timeframe and in four phases i) a short term Phase 1; ii) a medium term Phase 2; iii) a long term Phase 3 and iv) and a final Phase 4 which is proposed to cater for the expansion of the Cluster. The Cluster is planned to be an industrial park secured around steel and metals manufacturing and other related industries will be permitted to be located and operate within the Cluster. The total development footprint of the Metals Cluster will occupy an area of 47ha, with the intention that the whole property (Portion 6253 of Erf 1) will be developed for the Cluster. The property is owned by the Ga-Segonyana Local Municipality and the project will initially be sponsored and funded by the Northern Cape Department of Economic Development and Tourism.

Infrastructure associated with the Cluster includes:

- Buildings (warehousing, administrative buildings, skills development centre etc.);
- Landscaping;
- Parking
- Fencing Connectivity infrastructure
- Bulk services
- Utility; and
- Security

The different Enterprises who will be located within the Cluster will share infrastructure which will include a common boundary fence, a security checkpoint, utility connection points and roads within the Cluster.

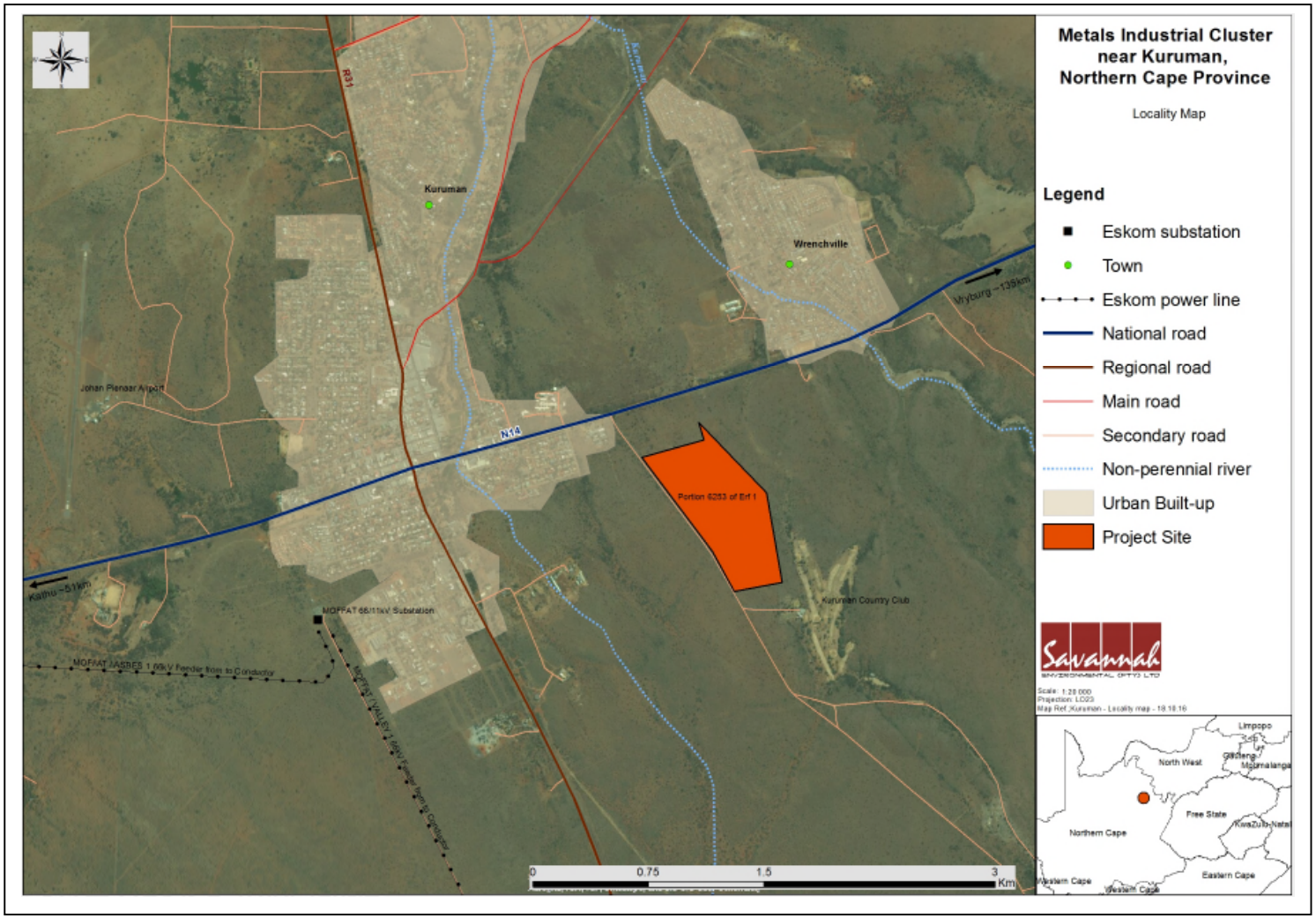

Figure 1. The location of the Metals Industrial Cluster, approximately 2 km south east from Kuruman, within the Ga-Segonyana Local Municipality and the greater John Taolo Gaetsewe District Municipality in the Northern Cape Province. (Map provided by Savannah Environmental).

1.1 LEGISLATION

Cultural Heritage in South Africa is governed by the National Heritage Resources Act (Act 25 of 1999). This Palaeontological Environmental Impact Assessment forms part of the Heritage Impact Assessment (HIA) and complies with the requirements of the above mentioned Act. In accordance with Section 38, an HIA is required to assess any potential impacts to palaeontological heritage within the site.

SECTION 35 OF THE NATIONAL HERITAGE RESOURCES ACT 25 OF 1999

- The protection of archaeological and palaeontological sites and material and meteorites is the responsibility of a provincial heritage resources authority.
- All archaeological objects, palaeontological material and meteorites are the property of the State.
- Any person who discovers archaeological or palaeontological objects or material or a meteorite in the course of development or agricultural activity must immediately report the find to the responsible heritage resources authority, or to the nearest local authority offices or museum, which must immediately notify such heritage resources authority.
- No person may, without a permit issued by the responsible heritage resources authority—
    - destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;
    - destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;
    - trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or
    - bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites.
- When the responsible heritage resources authority has reasonable cause to believe that any activity or development which will destroy, damage or alter any archaeological or palaeontological site is under way, and where no application for a permit has been submitted and no heritage resources management procedure in terms of section 38 has been followed, it may—
    - serve on the owner or occupier of the site or on the person undertaking such development an order for the development to cease immediately for such period as is specified in the order; and/or
    - carry out an investigation for the purpose of obtaining information on whether or not an archaeological or palaeontological site exists and whether mitigation is necessary.

2 Objective

According to the SAHRA APM Guidelines: Minimum Standards for the Archaeological and Palaeontological Components of Impact Assessment Reports' the aims of the palaeontological impact assessment are:

- to identify exposed and subsurface rock formations that are considered to be palaeontologically significant;
- to assess the level of palaeontological significance of these formations;
- to comment on the impact of the development on these exposed and/or potential fossil resources; and
- To make recommendations as to how the developer should conserve or mitigate damage to these resources.

The objective is therefore to conduct a Palaeontological Impact Assessment, which forms of part of the Heritage Impact Assessment (HIA) and the EIA Report, to determine the impact of the development on potential palaeontological material at the site.

When a palaeontological desktop/scoping study is conducted, the potentially fossiliferous rocks (i.e. groups, formations, members, etc.) represented within the study area are determined from geological maps. The known fossil heritage within each rock unit is collected from published scientific literature; fossil sensitivity maps; consultations with professional colleagues, previous palaeontological impact studies in the same region and the databases of various institutions may be consulted. This data is then used to assess the palaeontological sensitivity of each rock unit of the study area on a desktop level. The likely impact of the proposed development on local fossil heritage is subsequently established on the basis of the palaeontological sensitivity of the rocks and the nature and scale of the development itself (extent of new bedrock excavated).

If rocks of moderate to high palaeontological sensitivity are present within the study area, a Phase 1 field-based assessment by a professional palaeontologist is necessary. Generally, damaging impacts on palaeontological heritage occur during the construction phase. These excavations will modify the existing topography and may disturb, damage, destroy or permanently seal-in fossils at or below the ground surface that are then no longer available for scientific study.

When specialist palaeontological mitigation is suggested, it may take place prior to construction or, even more successfully, during the construction phase when new, potentially fossiliferous bedrock is still exposed and available for study. Mitigation usually involves the careful sampling, collection and recording of fossils as well as relevant data concerning the surrounding sedimentary matrix. Excavation of the fossil heritage will require a permit from SAHRA and the material must be housed in a permitted institution. With appropriate mitigation, many developments involving bedrock excavation will have a *positive* impact on our understanding of local palaeontological heritage.

3 GEOLOGICAL AND PALAEONTOLOGICAL HISTORY

3.1 GEOLOGY

The site is completely underlain by sediments of the Early Precambrian, Transvaal Supergroup, Ghaap Group and Campbell Rand Subgroup (Fig. 2-3). The Campbell Subgroup sediments were deposited on the shallow submerged Kaapvaal Craton, approximately 2.6 to 2.5 Ga (billion years ago). This Subgroup is a very thick (1.6-2.5 km) carbonate platform succession of dolomites, dolomitic limestones and cherts with some subordinated ironstone and lenses of siltstone or shale. A variety of shallow water facies, often developed depositional cycles reflecting sea level changes, including stromatolitic limestones and dolomites, oolites, oncolites, laminated calcilutites, cherts and marls, with subordinate siliclastics (shales, siltstones) and minor tuffs (Eriksson *et al.* 2006) are recorded.

3.2 STROMATOLITES

Figure 2. Example of a well preserved stromatolite from the Archaean Era. (www.fossilmuseum.net/Tree_of_Life/Stromatolites.htm).

Stromatolites are layered mounds, columns and sheet-like sedimentary rocks. Originally they were formed by the growth of layer upon layer of cyanobacteria, a single-celled photosynthesizing microbe. Cyanobacteria are prokaryotic cells (simplest form of modern carbon-bases life). Stromatolites are first found in Precambrian rocks and are known as the earliest known fossils. The oxygen atmosphere that we depend on was generated by numerous cyanobacteria photosynthesizing during the Archaean and Proterozoic Era.

Stromatolites and oolites from the Transvaal Supergroup have been described by various authors (Eriksson and Altermann, 1998). Detailed descriptions of South African Archaean stromatolites are available in the literature (Altermann, 2001; Buick, 2001; and Schopf, 2006). The stromatolitic carbonates are interpreted to be intertidal (Altermann and Wotherspoon, 1995).

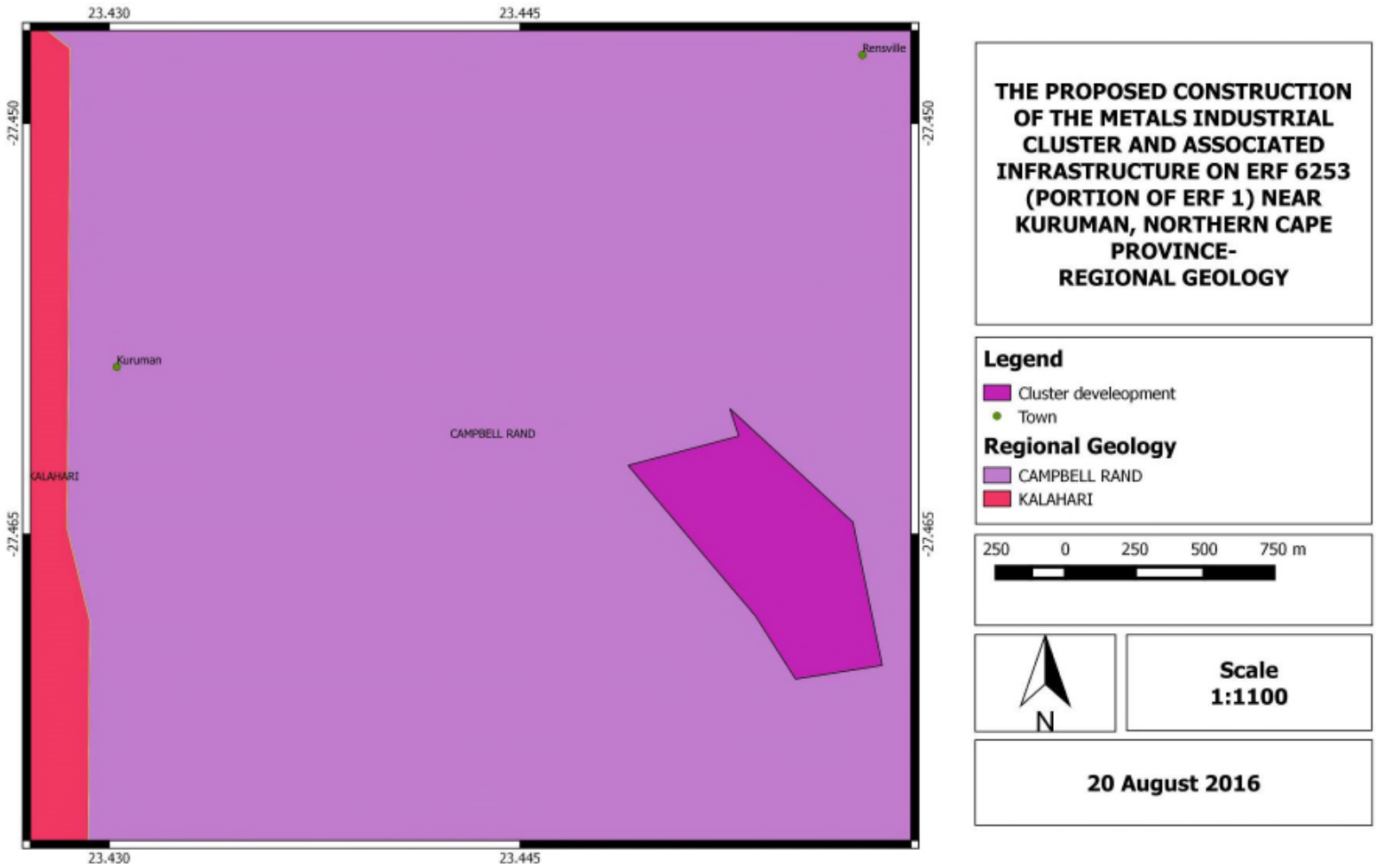

Figure 3. The surface geology of the proposed Metals Industrial Cluster on Portion 6253 of Erf 1 located south east of Kuruman, Northern Cape Province. The site is completely underlain by the Campbell Rand Subgroup. (Ghaap Group, Transvaal Supergroup) (Modified from the 1: 250 000 geological map 2722 Kuruman (Council for Geoscience, Pretoria).

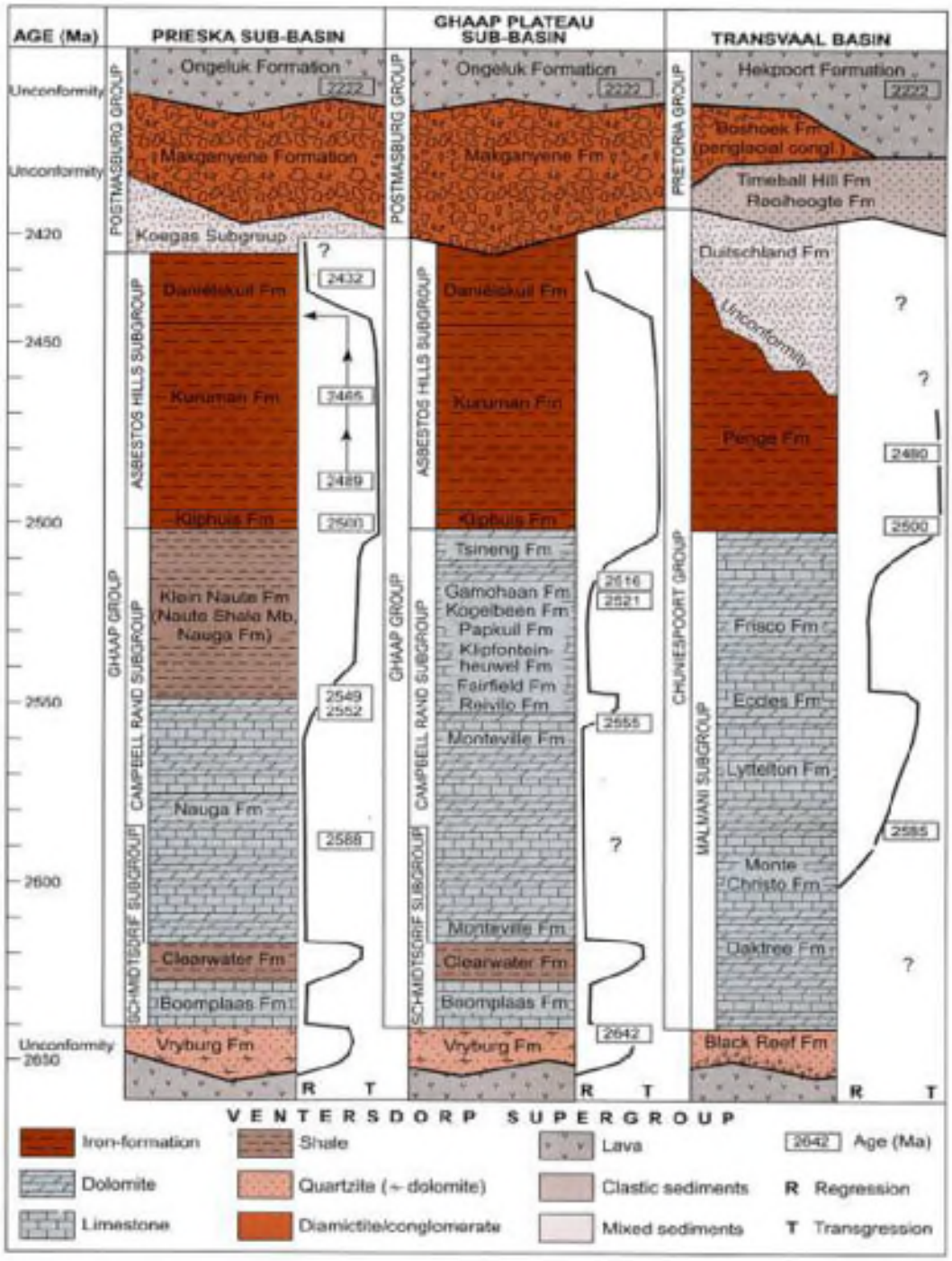

Figure 4. Stratigraphy of the Transvaal Supergroup of the Ghaap Plateau Basin. The middle column (Campbell Rand Subgroup) shows the rock units represented in the proposed site (Eriksson, *et al.* 2006).

4 GEOGRAPHICAL LOCATION OF THE SITE

The proposed site is located approximately 2 km south east of Kuruman. The site can be accessed via the national road (N14), which is located approximately 300m to the north of the site (Fig. 1). A secondary road connects to the N14 and is located along the western boundary of the site which provides direct access to the site.

5 METHODS

As part of the Palaeontological Impact Assessment, a field-survey of the site proposed for the Kuruman Metals Industrial was conducted on 20 August 2016, to assess the potential risk to palaeontological material in the proposed footprint of the development (i.e. the entire Portion 6253 of Erf 1). A physical field-survey was conducted on foot within the proposed site. The results of the field-survey, the author's experience, aerial photos (using Google Earth, 2016) topographical and geological maps and other reports from the same area were used to assess the proposed site. No consultations were undertaken for this Impact Assessment.

5.1 ASSUMPTIONS AND LIMITATIONS

The accuracy and reliability of desktop Palaeontological Impact Assessments as components of heritage impact assessments are normally limited by the following restrictions:

- Old fossil databases that have not been kept up-to-date or are not computerised. These databases do not always include relevant locality or geological information. South Africa has a limited number of professional palaeontologists that carry out fieldwork and most development study areas have never been surveyed by a palaeontologist.
- The accuracy of geological maps where information may be based solely on aerial photographs and small areas of significant geology have been ignored. The sheet explanations for geological maps are inadequate and little to no attention is paid to palaeontological material.
- Impact studies and other reports (*e.g*. of commercial mining companies) - is not readily available for desktop studies.

Large areas of South Africa have not been studied palaeontologically. Fossil data collected from different areas but in similar Assemblage Zones might however provide insight on the possible occurrence of fossils in an unexplored area. Desktop studies therefore usually assume the presence of unexposed fossil heritage within study areas of similar geological formations. Where considerable exposures of bedrocks or potentially fossiliferous superficial sediments are present in the study area, the reliability of a Palaeontological Impact Assessment may be significantly improved through field-survey by a professional palaeontologist.

6 FIELD OBSERVATIONS

The following photographs were taken on the site visit on Portion 6253 of Erf 1, on 20 August 2016. Several weathered stromatolites were located *in situ* in the site. Fossil heritage is more prominent in the north eastern and central portion of the site. More vegetation is prominent towards the south end of the site. There is evidence of human activities and the area is used as uncontrolled agricultural land (mainly grazing).

The site consists of characteristics associated with the flat-lying terrain of the Ghaap Plateau (Fig. 1) region. This terrain is currently used for agricultural purposes, primary cattle farming (grazing). The climate is semi-arid and the vegetation cover of grassy thornveld is mapped as Ghaap Plateau Vaalbosveld. Small, low and scattered bedrock exposures are present within the site. Images from Google Earth show a flat relief and bedrock mantled by reddish-brown soils.

Figure 5. Google Earth 2016 image of Portion 6253 of Erf 1 (outlined in red) and locations where stromatolite outcrops were identified (filled in white) (medium palaeontological sensitivity without the implementation of mitigation measures). Map modified from Google Earth 2016).

Figure 6. Typical vegetation of the Ghaap Plateau Vaalbosveld at the site.

Figure 7. Example of a loose stromatolite.

Figure 8. Human activities within the proposed site.

Figure 9. *In situ* weathered stromatolite.

Figure 10. Weathered dolomite results in a surface resembling elephant skin.

7 IMPACT ASSESSMENTS

An assessment of the impact significance of the proposed Metals Industrial Cluster within Portion 6253 of Erf 1 on local fossil heritage is presented here:

7.1 Nature of the impact

The excavations and site clearance will involve substantial excavations into the superficial sediment cover as well as locally into the underlying bedrock. These excavations will modify the existing topography and may disturb, damage, destroy or permanently seal-in fossils at or below the ground surface that are then no longer available for scientific research.

7.2 Sensitive areas

The site is underlain by the Ghaap Group (Campbell Rand Subgroup) (Fig.3-4). Although stromatolites (weathered) are present the likelihood of significant fossil heritage in the Kuruman area is considered to be medium.

7.3 Geographical extent of impact

The impact on fossil materials and thus palaeontological heritage will be limited to the construction phase when new excavations into fresh potentially fossiliferous bedrock take place. The extent of the area of potential impact is thus restricted to the project site and therefore categorised as **local**.

7.4 Duration of impact

The expected duration of the impact is assessed as potentially permanent to long term. In the absence of mitigation procedures (should fossil material be present within the affected area) the damage or destruction of any palaeontological materials will be **permanent.**

7.5 Potential significance of the impact

Should the project progress without due care to the possibility of fossils being present at the proposed site within the Campbell Rand Subgroup the resultant damage, destruction or inadvertent relocation of any affected fossils will be **permanent and irreversible**. Thus, any fossils occurring within the site are potentially scientifically and culturally significant and any negative impact on them would be of medium significance (without the implementation of mitigation measures).

7.6 Severity / benefit scale

The development of the proposed Metals Cluster is **beneficial** on not only a local level, but regional and national levels as well. The facility will provide a long term benefit to the community in terms of creating jobs and would thus provide an economical boost to the area.

A potential **secondary advantage** of the construction of the project would be that the excavations may uncover fossils that were hidden beneath the surface exposures and, as such, would have remained unknown to science.

7.7 Intensity

Probable significant impacts on palaeontological heritage during the construction phase are moderate to high, but the intensity of the impact on fossil heritage is rated as moderate.

7.8 Probability of the impact occurring

Since concentrations of small to large stromatolites were recorded within the site, the probability of impacts on palaeontological heritage during the construction phase is high (definite).

8 DAMAGE MITIGATION, REVERSAL AND POTENTIAL IRREVERSIBLE LOSS

8.1 Mitigation

Should fossil material exist within the area proposed for the development any negative impact upon it could be mitigated by surveying, recording, describing and sampling of well-preserved fossils by a professional palaeontologist. This should take place after the initial vegetation clearance but *before* the ground is levelled for construction. Excavation of fossil heritage will require a permit from SAHRA and the material must be housed in a permitted institution. In the event that an excavation is impossible or inappropriate the fossil or fossil locality could be protected and the site of any planned construction and infrastructure moved.

8.2 Degree to which the impact can be mitigated

Recommended mitigation of the inevitable damage and destruction of fossil stromatolites within the proposed site would involve the surveying, recording, description and collecting of fossils within the development footprint by a professional palaeontologist. This work should take place after the initial vegetation clearance has taken place but *before* the ground is levelled for construction.

8.3 Degree of irreversible loss

Impacts on fossil heritage are generally irreversible. Well-documented records and further palaeontological studies of any fossils exposed during construction would represent a positive impact from a scientific perspective. The possibility of a negative impact on the palaeontological heritage of the area can be reduced by the implementation of adequate mitigation procedures. If mitigation is properly undertaken the benefit scale for the project will lie within the beneficial category.

8.4 Degree to which the impact may cause irreplaceable loss of resources

Stratigraphic and geographical distribution of Archaean stromatolites within the Campbell Rand Subgroup has been documented in the literature. Weathered stromatolite assemblages have been documented within the site, although better

preserved specimens could be present in other areas in the Campbell Rand Subgroup. By taking a precautionary approach, an insignificant loss of fossil resources is expected.

8.5 Cumulative impacts

The cumulative effect of the development of the Metals Industrial Cluster within the proposed location is considered to be low. This is as a result of the broader Kuruman area not being considered as fossiliferous.

9 FINDINGS AND RECOMMENDATIONS

The site located on Portion 6253 of Erf 1 near Kuruman is completely underlain by sediments of the Early Precambrian, Transvaal Supergroup, Ghaap Group and Campbell Rand Subgroup. The Campbell Rand Subgroup is known for the presence of stromatolites. Stromatolites were identified within the proposed site. Most of the stromatolites were found *in situ* although several specimens were found loose. Stromatolites are concentrated on the north, eastern and central portion of the proposed site. Exposed stromatolites are badly weathered, but specimens still covered by sediments could be better preserved. The impact of the development will have a medium significance on palaeontological resources, which will be reduced to a low significance with the implementation of appropriate mitigation measures. It is therefore proposed that a process of mitigation must be undertaken. These recommendations should be incorporated into the Environmental Management Plan for the Metals Industrial Cluster project. The construction and operation of the proposed Metals Industrial Cluster is considered appropriate from a palaeontological perspective with the implementation of the proposed mitigation measures.

10 ASSESSMENT OF IMPACTS

10.1 Assessment Methodology

Direct, indirect and cumulative impacts of the impacts identified above will be assessed according to the following standard methodology:

- The **nature** which shall include a description of what causes the effect, what will be affected and how it will be affected.
- The **extent** wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high).
- The **duration** wherein it will be indicated whether:
    - The lifetime of the impact will be of very short duration (0 - 1 years) – assigned a score of 1;
    - The lifetime of the impact will be of short duration (2 - 5 years) – assigned a score of 2;
    - Medium-term (5 - 15 years) – assigned a score of 3;
    - Long-term (> 15 years) – assigned a score of 4; or
    - Permanent – assigned a score of 5.
- The **magnitude** quantified on a scale from 0 - 10 where 0 is small and will have no effect on the environment, 2 is minor and will result in an impact on processes, 4 is low and will cause a slight impact on processes, 6 is moderate and will result in processes continuing but in a modified way, 8 is high (processes are altered to the extent that they temporarily cease) and 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- The **probability** of occurrence, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale of 1 - 5 where 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but of low likelihood), 3 is probable (distinct possibility), 4 is highly probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).
- The **significance** which shall be determined through a syntheses of the characteristics described above and can be assessed as low, medium or high; and
- The **status**, which is described as positive, negative or neutral.
- The degree to which the impact can be reversed.
- The degree to which the impact may cause irreplaceable loss of resources.
- The degree to which the impact can be mitigated.

The **significance** is calculated by combining the criteria in the following formula:

$S = (E + D + M) \times P$

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

The **significance weightings** for each potential impact are as follows:

- < 30 points: Low (i.e. where this impact would not have a direct influence on the decision to develop in the area);
- 30 – 60 points: Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated); and
- > 60 points: High (i.e. where the impact must have an influence on the decision process to develop in the area).

Nature: The excavations and site clearance during the construction phase will involve substantial excavations into the superficial sediment cover as well as locally into the underlying bedrock. These excavations will modify the existing topography and may disturb, damage, destroy or permanently seal-in fossils at or below the ground surface that are then no longer available for scientific research. The excavations could also impact on the stromatolites present within the site.

This impact is likely to occur only during the construction phase. No impacts are expected to occur during the operation phase.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Long term/permanent (5)	Long term/permanent (4)
Magnitude	Low (4)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (30)**	**Low (14)**
Status (positive or negative)	Negative	Neutral
Reversibility	Irreversible	Irreversible
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	Yes

Mitigation: Mitigation includes surveying, recording, describing and sampling of well-preserved fossils within the area proposed for the development by a palaeontologist. This should take place after the initial vegetation clearance was undertaken but *before* the ground is levelled for construction. Excavation of this fossil heritage (stromatolites) will require a permit from SAHRA and the material must be housed in a permitted institution.
Residual Risk: Residual risk will be low after mitigation has been implemented as all relevant fossils will be documented and removed from the site.

11 ASSESSMENT OF CUMULATIVE IMPACTS

Nature: Cumulative impacts on fossil remains preserved at or beneath the ground surface		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	Low (1)
Duration	Long-term (4)	Long-term (5)
Magnitude	Minor (2)	Low (4)
Probability	Improbable (2)	Probable (3)
Significance	**Low (14)**	**Medium (30)**
Status (positive/negative)	Positive	Positive
Reversibility	Irreversible	Irreversible
Loss of resources?	No	No
Can impacts be mitigated?	Yes	Unknown
Confidence in findings: High.		
Mitigation: Necessary Stromatolites concentrations were identified on the north eastern and central portion of the proposed development site. Most of the stromatolites are found *in situ* although several specimens were found loose. Exposed stromatolites are badly weathered, but specimens still covered could be better preserved. The likelihood of significant fossil heritage is considered to be medium within the Kuruman area, therefore the cumulative impacts would be medium with the establishment of various developments.		

12 RECOMMENDATIONS CONCERNING FOSSIL HERITAGE MANAGEMENT DURING THE CONSTRUCTION PHASE

OBJECTIVE: Prevent the loss of Palaeontological Heritage	
Project component/s	Damaging impacts on palaeontological heritage occur during the **construction** phase which will modify the existing topography. Project components include: • Buildings (warehousing, administrative buildings, skills development centre etc.); • Landscaping; • Parking • Fencing Connectivity infrastructure • Bulk services • Utility; and Security
Potential Impact	Disturb, damage, destroy or permanently seal-in fossils at or below the ground surface that are then no longer available for scientific study
Activity/risk source	Excavation of the ground surface
Mitigation: Target/Objective	Surveying, recording, describing, sampling and removal of well-preserved fossil heritage before construction starts.

Mitigation: Action/control	**Responsibility**	**Timeframe**
Survey, record and describe fossil heritage A permit from SAHRA (South African Heritage Research Agency) must be obtained to sample fossils in the development footprint and fossils must be curated in a approved collection	A qualified Palaeontologist	Pre-construction

Performance Indicator	Removal of palaeontological resources without significant damage and appropriate reporting thereof.
Monitoring	A Palaeontologist must **apply** for a SAHRA permit and field work would entail **surveying, recording** and **describing** fossil

	heritage, and obtaining relevant data concerning the surrounding sedimentary matrix) and the well preserved fossils must be **excavated** and sent to a **permitted institution**. All of the information regarding the process followed must be compiled into a **report** after fossils have been excavated.

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14 QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR

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15 DECLARATION OF INDEPENDENCE

I Elize Butler, declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed project, application or appeal in respect of which I was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise my objectivity in this work.