REPORT

GOSA GGV Pipeline - Baseline Palaeontology Report

Glencore South Africa

Submitted to:

Nhlanhla Mkhonto
PO Box 3711
Birnam Park
2015

Submitted by:

Golder Associates Africa (Pty) Ltd.
Building 1, Maxwell Office Park, Magwa Crescent West, Waterfall City, Midrand, 1685, South Africa
P.O. Box 6001, Halfway House, 1685

+27 11 254 4800

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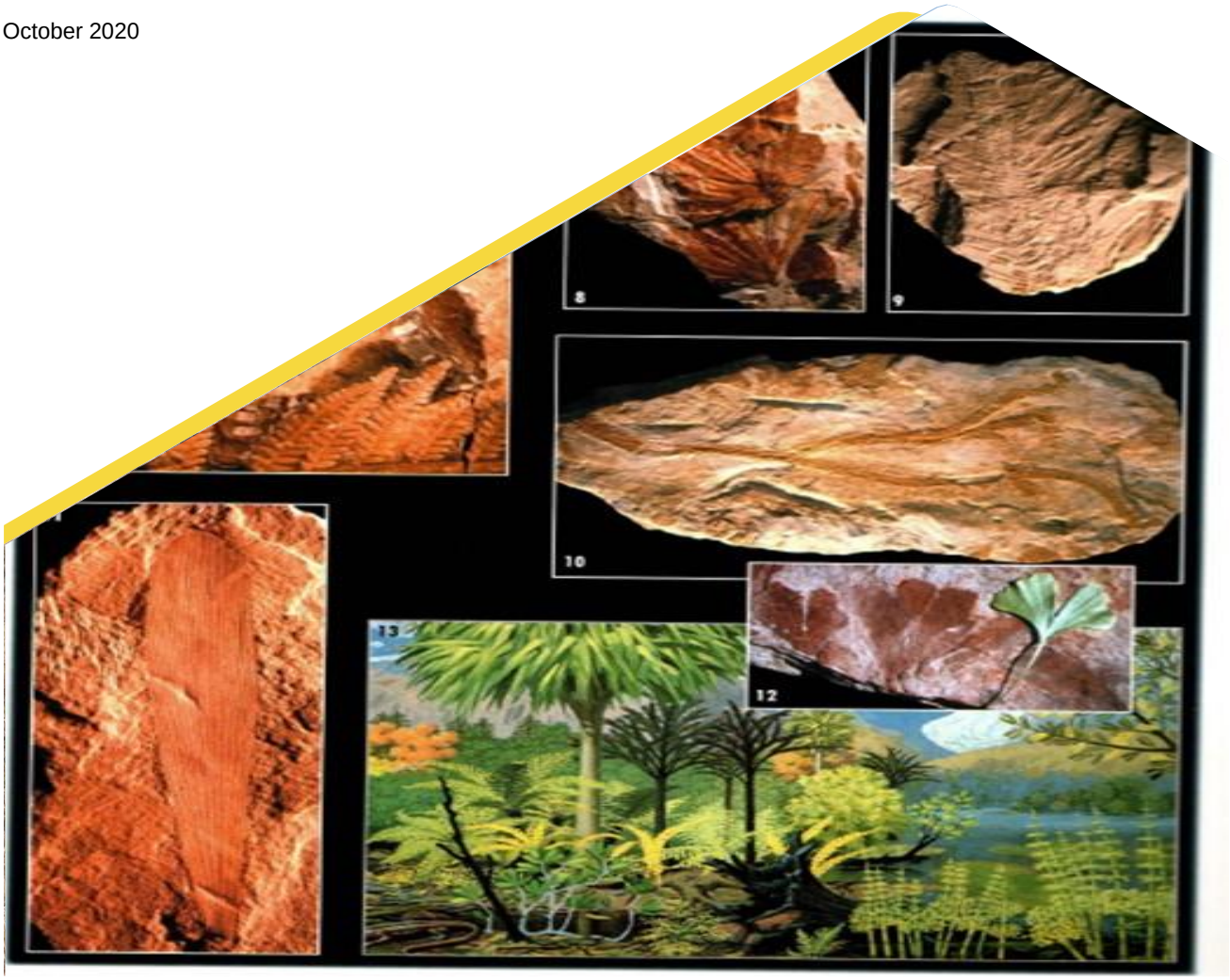

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1.0 INTRODUCTION AND BACKGROUND

Outline of the development project: Golder Associates Africa (Pty) Ltd has facilitated the appointment of Dr H. Fourie, a Palaeontologist, to undertake a Palaeontological Impact Assessment (PIA), Phase 1: Field Study of the South Witbank Pipeline on Farms Portion 2 Goedgevonden 10-IS, Portion 1, 7, 18 Zaaiwater 11-IS, Portion 2, 9, 16 Springboklaagte 33-IS, Portion 1, 10, 11, 19 Klippoortje 32-IS, and Portion 0, 12, 13, 14 Nooitgedacht 37-IS in the eMalahleni Local Municipality, Nkangala District Municipality within the Mpumalanga Province.

Glencore Operations South Africa (Pty) Ltd. (GOSA) Goedgevonden Colliery (GGV) Joint Venture (JV) intends to develop a pipeline for the conveyance of excess mine affected water from GGV to the underground workings at South Witbank Colliery (SWC) (now Tweefontein South). This report documents the baseline palaeontology assessment undertaken for the project.

The National Heritage Resources Act (Act No. 25 of 1999) (NHRA) requires that all heritage resources, that is, all places or objects of aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance are protected. The Republic of South Africa (RSA) has a remarkably rich fossil record that stretches back in time for some 3.5 billion years and must be protected for its scientific value. Fossil heritage of national and international significance is found within all provinces of the RSA. South Africa's unique and non-renewable palaeontological heritage is protected in terms of the National Heritage Resources Act. According to this act, palaeontological resources may not be excavated, damaged, destroyed or otherwise impacted by any development without prior assessment and without a permit from the relevant heritage resources authority.

The main aim of the assessment process is to document resources in the development area and identify both the negative and positive impacts that the development brings to the receiving environment. The PIA therefore identifies palaeontological resources in the area to be developed and makes recommendations for protection or mitigation of these resources.

The potential impact of the development on fossil heritage is VERY HIGH for the Vryheid Formation, Ecca Group therefore a field survey was necessary for this development in accordance with SAHRA protocol.

Potential concerns, threats and mitigation that may be posed by the development are contained in Appendix 2 of the Palaeontology. Amongst other the potential concerns and threats include the following and will be added to the EMPr:

- Earth moving equipment/machinery (for example haul trucks, front end loaders, excavators, graders, dozers) during construction, the sealing-in or destruction of the fossils by development, vehicle traffic, and human disturbance.
- Drilling, blasting, and excavating of foundations, trenches, channels and footings and removal of overburden as a site visit may have missed a fossiliferous outcrop. An appropriate Protocol and Management plan is attached for the Environmental Control Officer (Appendix 2) (borrow pit).

The project can be implemented in any of the routes investigated however the mitigations contained in Appendix 2 of the Palaeontology report must be adhered to. Field Study finds fossils or fossils are found during construction excavations. See APPENDIX A for the full report.

Golder Associates Africa (Pty) Ltd.

Phillemon Mahlangu
Environmental Consultant

Olivia Allen
Environmental Assessment Practitioner

PM/OA/nbh

Reg. No. 2002/007104/07
Directors: RGM Heath, MQ Mokulubete, MC Mazibuko (Mondli Colbert), GYW Ngoma

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https://golderassociates.sharepoint.com/sites/129600/project files/6 deliverables/final client deliverables/paleontology study/20146454-336174-4_gosa_ggvpipeline_palaeontology_15oct2020.docx

APPENDIX A

Baseline Palaeontological Impact Assessment

South Witbank Pipeline

eMalahleni Local Municipality, Nkangala District Municipality, Mpumalanga Province

Farm: Portion 2 Goedgevonden 10-IS, Portion 1, 7, 18 Zaaiwater 11-IS, Portion 2, 9, 16 Springboklaagte 33-IS, Portion 1, 10, 11, 19 Klippoortje 32-IS, and Portion 0, 12, 13, 14 Nooitgedacht 37-IS

Fourie, H. Dr heidicindy@yahoo.com

012 322 7632/079 940 6048

Palaeontological Impact Assessment: Phase 1: Field Study

Commissioned by: Golder Associates Africa (Pty) Ltd

P.O. Box 6001,

Halfway House,

1685

011 254 4970

Ref: Pending

2020/09/22

Plant fossil - Irrigasie Formation

B. Executive summary

Outline of the development project: Golder Associates Africa (Pty) Ltd has facilitated the appointment of Dr H. Fourie, a palaeontologist, to undertake a Palaeontological Impact Assessment (PIA), Phase 1: Field Study of the South Witbank Pipeline on Farms Portion 2 Goedgevonden 10-IS, Portion 1, 7, 18 Zaaiwater 11-IS, Portion 2, 9, 16 Springboklaagte 33-IS, Portion 1, 10, 11, 19 Klippoortje 32-IS, and Portion 0, 12, 13, 14 Nooitgedacht 37-IS in the eMalahleni Local Municipality, Nkangala District Municipality within the Mpumalanga Province.

The applicant, Glencore Operations South Africa (Pty) Ltd. (GOSA) Goedgevonden Colliery (GGV) Joint Venture (JV) intends to develop a pipeline for the conveyance of excess mine affected water from GGV to the underground workings at South Witbank Colliery (SWC) (now Tweefontein South).

The Project includes three Alternatives (Figure 1):
A polygon outlined in white with the R 555 Road to the north, The R 545 to the east and the town of Ogies to the north-west. The approximate length of the pipe is 13 kilometres.
Alternative 1: +++ runs from the current dam, around the TSF in a southerly direction through the corn field, over the mine road and down next to the gravel road and stops halfway down the gravel road.
Alternative 2: ------ runs from the current dam, around the TSF in a southerly direction through the corn field, over the mine road and down next to the gravel road and continues next to the Skoolpad to the end.
Alternative 3: ____ runs from the current dam, around the TSF in a southerly direction through the corn field, over the mine road and down next to the gravel road and stops three-quarter way down the gravel road.

Legal requirements:-

The **National Heritage Resources Act (Act No. 25 of 1999) (NHRA)** requires that all heritage resources, that is, all places or objects of aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance are protected. The Republic of South Africa (RSA) has a remarkably rich fossil record that stretches back in time for some 3.5 billion years and must be protected for its scientific value. Fossil heritage of national and international significance is found within all provinces of the RSA. South Africa's unique and non-renewable palaeontological heritage is protected in terms of the National Heritage Resources Act. According to this act, palaeontological resources may not be excavated, damaged, destroyed or otherwise impacted by any development without prior assessment and without a permit from the relevant heritage resources authority.

The main aim of the assessment process is to document resources in the development area and identify both the negative and positive impacts that the development brings to the receiving environment. The PIA therefore identifies palaeontological resources in the area to be developed and makes recommendations for protection or mitigation of these resources.

For this study, resources such as geological maps, scientific literature, institutional fossil collections, satellite images, aerial maps and topographical maps were used. It provides an assessment of the observed or inferred palaeontological heritage within the study area, with recommendations (if any) for further specialist palaeontological input where this is considered necessary.

A Palaeontological Impact Assessment is generally warranted where rock units of **LOW to VERY HIGH** palaeontological sensitivity are concerned, levels of bedrock exposure within the study area are adequate; large scale projects with high potential heritage impact are planned; and where the distribution and nature of fossil remains in the proposed area is unknown. The specialist will inform whether further monitoring and mitigation are necessary.

Types and ranges of heritage resources as outlined in Section 3 of the National Heritage Resources Act (Act No.25 of 1999):

(i) (i) objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens.
This report adheres to the guidelines of Section 38 (1) of the National Heritage Resources Act (Act No. 25 of 1999). Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as (a) the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length; (b) the construction of a bridge or similar structure exceeding 50 m in length; (c) any development or other activity which will change the character of a site (see Section 38); (d) the re-zoning of a site exceeding 10 000 m² in extent; (e) or any other category of development provided for in regulations by SAHRA or a PHRA authority.

This report aims (**1c)** to provide comment and recommendations on the potential impacts that the proposed development project could have on the fossil heritage of the area and to state if any mitigation or conservation measures are necessary.

Outline of the geology and the palaeontology:

The geology was obtained from map 1:100 000, Geology of the Republic of South Africa (Visser 1984) and 1:250 000, 2628 East Rand (Keyser *et al* 1986).

Figure 3: The geology of the development area.

Legend to map and short explanation.

M – Alluvium (yellow). Quaternary.

Jd – Dolerite (pink). Jurassic.

Pv – Shale, shaly sandstone, grit, sandstone, conglomerate and coal in places near base and top (grey). Vryheid Formation, Ecca Group, Karoo Supergroup. Permian.

Vse – Volcanic rocks (amber). Selonsrivier Formation, Rooiberg Group, Transvaal Supergroup. Vaalian.

------ – (blue) Lineament (Landsat, aeromagnetic).

------ - Concealed geological boundary.

⊥10 – Strike and dip of bed.

□ – Proposed project (blocked in black).

The Karoo Supergroup is renowned for its fossil wealth. The Vryheid Formation is named after the type area of Vryheid-Volksrust. In the north-eastern part of the basin the Vryheid Formation thins and eventually wedges out towards the south, southwest and west with increasing distance from its source area to the east and northeast (Johnson 2009). The Vryheid Formation consists essentially of sandstone, shale, and subordinate coal beds, and has a maximum total thickness of 500 m. It forms part of the Middle Ecca (Kent 1980). This formation has the largest coal reserves in South Africa. The pro-delta sediments are characterised by trace and plants fossils (Snyman 1996).

Palaeontology - Fossils in South Africa mainly occur in rocks of sedimentary nature and not in rocks from igneous or metamorphic nature. Therefore, if there is the presence of Karoo Supergroup strata the palaeontological sensitivity can generally be **LOW** to **VERY HIGH**, and here locally **VERY HIGH** for the Vryheid Formation (SG 2.2 SAHRA APMHOB, 2012).

The Ecca Group, Vryheid Formation may contain fossils of diverse non-marine trace, *Glossopteris* flora, mesosaurid reptiles, palaeoniscid fish, marine invertebrates, insects, and crustaceans (Johnson 2009). *Glossopteris* trees rapidly colonised the large deltas along the northern margin of the Karoo Sea. Dead vegetation accumulated faster than it could decay, and thick accumulations of peat formed, which were ultimately converted to coal. It is only in the northern part of the Karoo Basin that the glossopterids and cordaitales, ferns, clubmosses and horsetails thrived (McCarthy and Rubidge 2005).

Summary of findings (**1d**): The PIA Phase 1: Field Study was undertaken in September 2020 in the spring in mild and dry conditions during the official covid-19 Level 2 lockdown, and the following is reported:

Field Observation – The area is large, the pipeline mostly follows the roads; both sides of the roads were assessed, as the exact route position has not yet been finalised. The routes cross crop fields, vegetation, and areas with trees and long grass. No fossils were found.

The Project includes three Alternatives (Figure 1) mostly present on the Vryheid Formation:
A polygon outlined in white with the R 555 Road to the north, The R 545 to the east and the town of Ogies to the north-west. The approximate length of the pipe is 13 kilometres.
Alternative 1: +++ runs from the current dam, around the TSF in a southerly direction through the corn field, over the mine road and down next to the gravel road and stops halfway down the gravel road.
Alternative 2: ------ runs from the current dam, around the TSF in a southerly direction through the corn field, over the mine road and down next to the gravel road and continues next to the Skoolpad to the end.
Alternative 3: ____ runs from the current dam, around the TSF in a southerly direction through the corn field, over the mine road and down next to the gravel road and stops three-quarter way down the gravel road.

As all of the Alternatives are entirely situated on the Vryheid Formation, they have the same impact and should all be possible.

Recommendation:
The potential impact of the development on fossil heritage is **VERY HIGH** for the Vryheid Formation, Ecca Group therefore a field survey was necessary (see above comment) for this development (according to SAHRA protocol). A Phase 2 PIA and or Mitigation are generally only recommended if a Phase 1: Field Study finds fossils or fossils are found during construction excavations.

Concerns/threats (**1g)** to be added to the EMPr:

1. Threats are earth moving equipment/machinery (for example haul trucks, front end loaders, excavators, graders, dozers) during construction, the sealing-in or destruction of the fossils by development, vehicle traffic, and human disturbance.
2. Special care must be taken during the digging, drilling, blasting and excavating of foundations, trenches, channels and footings and removal of overburden as a site visit may have missed a fossiliferous outcrop. An appropriate Protocol and Management plan is attached for the Environmental Control Officer (Appendix 2) (borrow pit).

The recommendations are (**1ni,1nA,1nii)**:

1. Mitigation may be needed (Appendix 2) if fossils are found.
2. No consultation with parties was necessary. The Environmental Control Officer must familiarise him- or herself with the formation present and its fossils.
3. The development may go ahead.
4. The EMPr already covers the conservation of heritage and palaeontological material that may be exposed during development activities. For a chance find, the protocol is to immediately cease all construction activities, construct a 30 m no-go barrier, and contact SAHRA for further investigation. It is recommended that the EMPr be updated to include the involvement of a palaeontologist (pre-construction training of ECO).
5. The ECO together with the mine geologist must visit the site after clearing, drilling, blasting and excavating.

Stakeholders:

Developer – Glencore Operations South Africa (Pty) Ltd., Private Bag X17, Leraatsfontein, 1038, Tel: 013 686 4380.

Environmental – Golder Associates, P.O. Box 6001, Halfway House, 1685. Tel. 011 254 4970.

Landowner – Several.

C. Table of Contents

D. Background information on the project

Report

This report is part of the environmental impact assessment process under the National Environmental Management Act, as amended (Act No. 107 of 1998) (NEMA) and includes Appendix 6 (GN38282 of 4 December 2014) of the Environmental Impact Assessment Regulations (see Appendix 3). It is also in compliance with The Minimum Standards for Palaeontological Components of Heritage Impact Assessment Reports, SAHRA, APMHOB, Guidelines 2012, Pp 1-15 (**2)**.

Outline of development

This report discusses and aims to provide the applicant with information regarding the location of palaeontological material that will be impacted by the development. In the construction phase, it may be necessary for the applicant to apply for the relevant permit from the South African Heritage Resources Agency (SAHRA / PHRA) if a fossil is unearthed.

The applicant, Glencore Operations South Africa (Pty) Ltd. (GOSA) Goedgevonden Colliery (GGV) Joint Venture (JV) intends to develop a pipeline for the conveyance of excess mine affected water from GGV to the underground workings at South Witbank Colliery (SWC) (Tweefontein South). The total remaining storage capacity at GGV has severely decreased, therefore there is a need for a 13 km to transport excess water from GGV to SWC.

Local benefits of the proposed development include benefits to the local economy and community through possible job creation and local supplier procurement during the construction activities, as well as protection of water resources.

Related infrastructure (**1f)**:

1. Trench and or channel,
2. Pipeline.

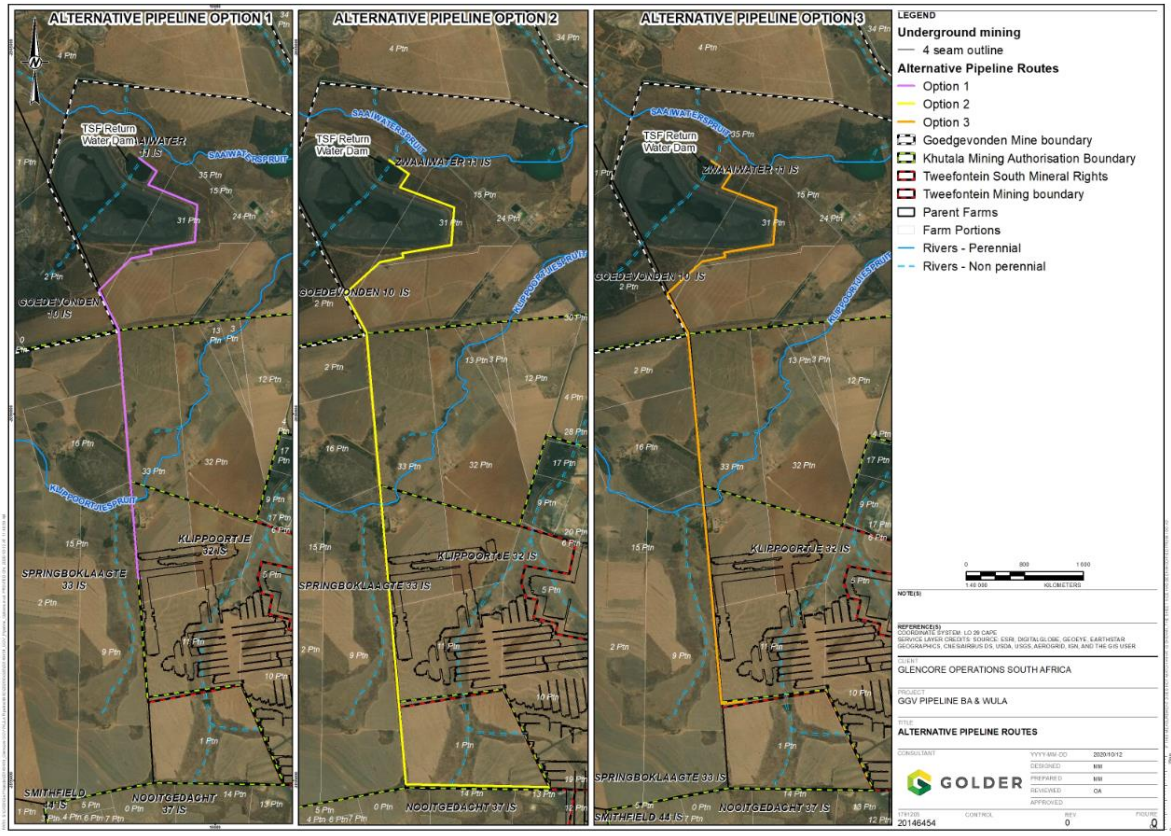

Figure 1: Figure showing the Alternative pipeline routes (Golder).

The Project includes three Alternatives (Figure 1):

A polygon outlined in white with the R 555 Road to the north, The R 545 to the east and the town of Ogies to the north-west. The approximate length of the pipe is 13 kilometres.

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Alternative 3: ____ runs from the current dam, around the TSF in a southerly direction through the corn field, over the mine road and down next to the gravel road and stops three-quarter way down the gravel road.

Rezoning or subdivision of land: No.

Name of developer and consultant: Glencore Operations South Africa (Pty) Ltd and Golder Associates Africa (Pty) Ltd.

Terms of reference: Dr H. Fourie is a palaeontologist commissioned to do a palaeontological impact assessment: desktop study to ascertain if any palaeontological sensitive material is present in the development area. This study will advise on the impact on fossil heritage mitigation or conservation necessary, if any.

Short *Curriculum vitae* ***(1ai,1aii)***: Dr Fourie obtained a Ph.D from the Bernard Price Institute for Palaeontological Research (now ESI), University of the Witwatersrand. Her undergraduate degree is in Geology and Zoology. She specialises in vertebrate morphology and function concentrating on the Therapsid Therocephalia. She is currently employed by Ditsong: National Museum of Natural History as Curator of the fossil plant, invertebrate, amphibian, fish, reptile, dinosaur and Therapsid collections. For the past 14 years she carried out field work in the Eastern Cape, Western Cape, North West, Northern Cape, Free State, Gauteng, Limpopo, Kwazulu Natal, and Mpumalanga Provinces. Dr Fourie has been employed at the Ditsong: National Museum of Natural History in Pretoria (formerly Transvaal Museum) for 26 years.

Legislative requirements: South African Heritage Resources Agency (SAHRA) for issue of permits if necessary. National Heritage Resources Act (Act No. 25 of 1999). An electronic copy of this report must be supplied to SAHRA.

E. Description of property or affected environment

Location and depth:

The South Witbank Pipeline will be situated on Farms Portion 2 Goedgevonden 10-IS, Portion 1, 7, 18 Zwaaiwater 11-IS, Portion 2, 9, 16 Springboklaagte 33-IS, Portion 1, 10, 11, 19 Klippoortje 32-IS, and Portion 0, 12, 13, 14 Nooitgedacht 37-IS in the eMalahleni Local Municipality, Nkangala District Municipality within the Mpumalanga Province.

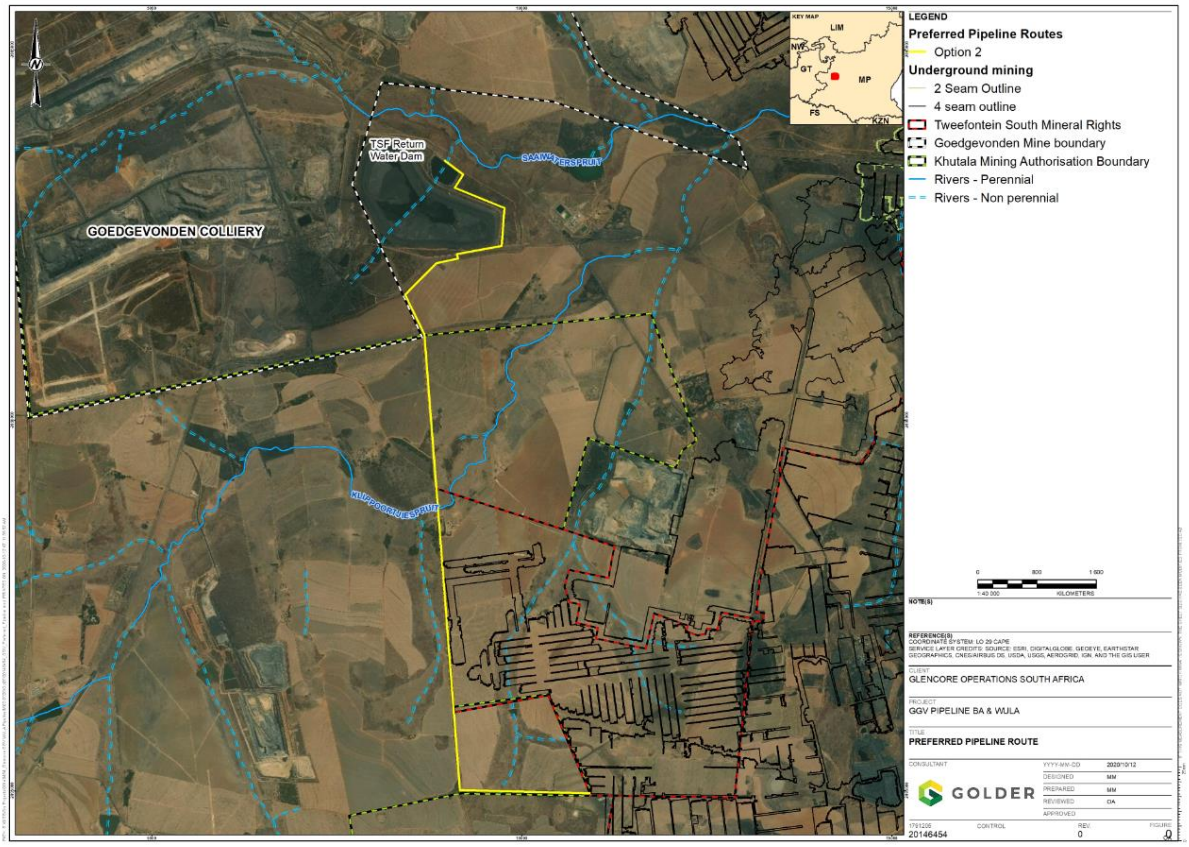

Figure 2: Location map (Golder).

Depth is determined by the related infrastructure to be developed and the thickness of the formation in the development area as well as depth of the foundations, footings and channels to be developed. Details of the location and distribution of all significant fossil sites or key fossiliferous rock units are often difficult to determine due to thick topsoil, subsoil, overburden and alluvium. Depth of the overburden may vary a lot. Geological maps do not provide depth or superficial cover, it only provides mappable surface outcrops. The depth can be verified with test pit results or drill cores. The Vryheid Formation consists essentially of sandstone, shale, and subordinate coal beds, and has a maximum total thickness of 500 m.

The Project includes three Alternatives (Figure 1) near the town of Ogies:

A polygon outlined in white with the R 555 Road to the north, The R 545 to the east and the town of Ogies to the north-west. The approximate length of the pipe is 13 kilometres.

Alternative 1: +++ runs from the current dam, around the TSF in a southerly direction through the corn field, over the mine road and down next to the gravel road and stops halfway down the gravel road.

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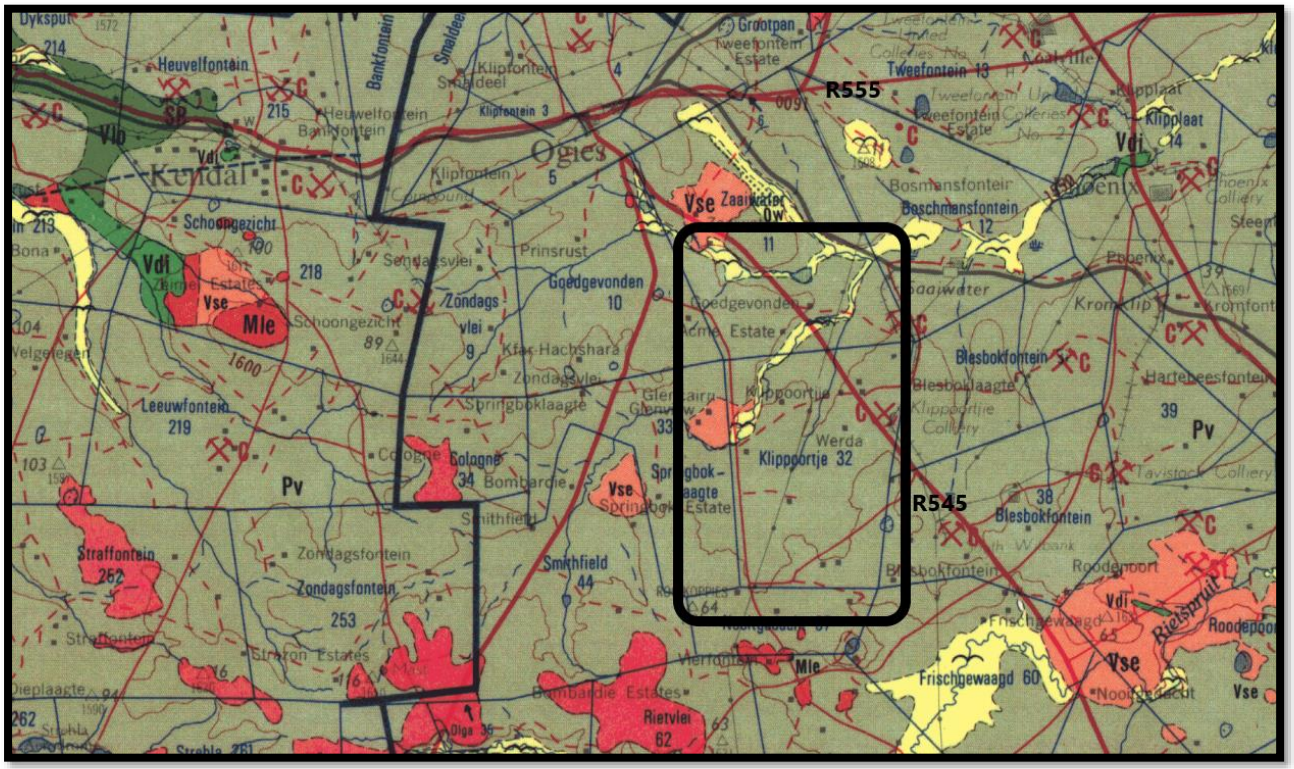
F. Description of the Geological Setting

Description of the rock units:

The Karoo Supergroup is renowned for its fossil wealth (Kent 1980, Visser 1989). Large areas of the southern African continent are covered by the Karoo Supergroup. An estimated age is 150 – 180 Ma. and a maximum thickness of 7000 m is reached in the south. Three formations overlie the middle Beaufort Group, they are the Molteno, Elliot and Clarens Formations. At the top is the Drakensberg Basalt Formation with its pillow lavas, pyroclasts, and basalts (Kent 1980, Snyman 1996). The Beaufort Group is underlain by the Ecca Group which is underlain by the Dwyka Group.

The Ecca Group is early to mid-Permian (545-250 Ma) in age. Sediments of the Ecca group are lacustrine and marine to fluvio-deltaic (Snyman 1996). The Ecca group is known for its coal (mainly the Vryheid Formation) (five coal seams) and uranium. Coalfields formed due to the accumulation of plant material in shallow and large swampy deltas (see Appendix 1). The Ecca Group conformably overlies the Dwyka Group and is conformably overlain by the Beaufort Group, Karoo Supergroup. It consists essentially of mudrock (shale), but sandstone-rich units occur towards the margins of the present main Karoo basin in the south, west and north-east, with coal seams also being present in the north-east (Kent 1980, Johnson 2009).

Figure 3: Excerpt of 1:250 000 Geological Map East Rand (Keyser *et al.* 1986) (**1h)**.



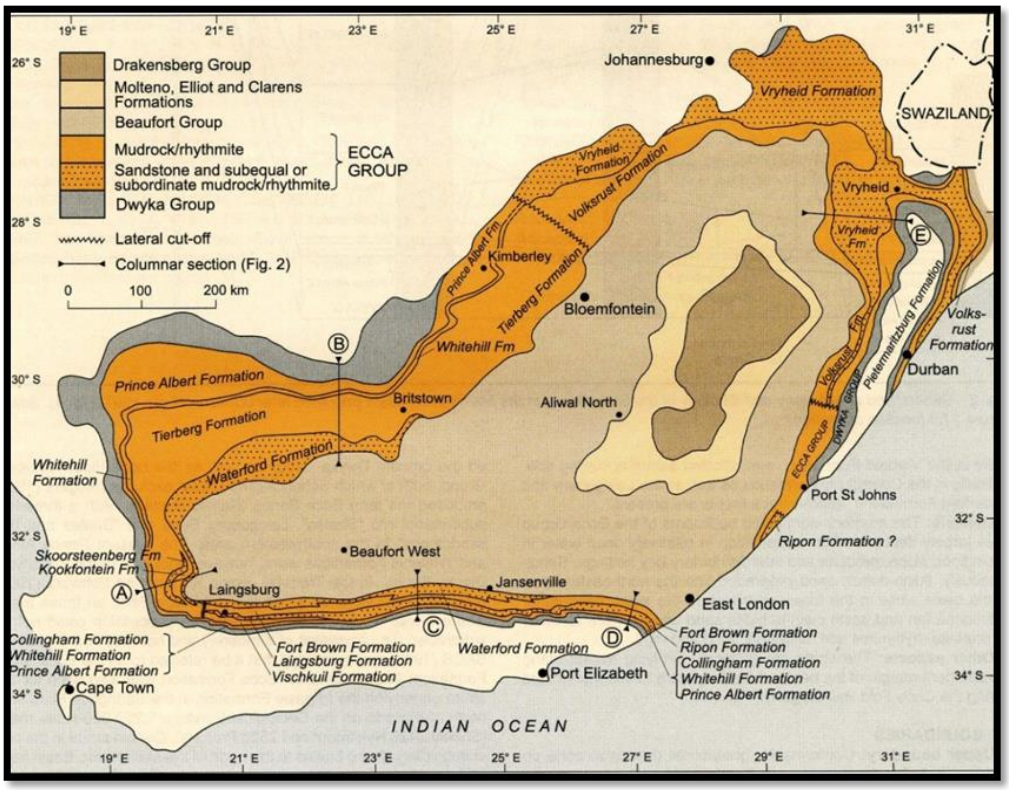
Legend to map and short explanation.
M – Alluvium (yellow). Quaternary.
Jd – Dolerite (pink). Jurassic.

Pv – Shale, shaly sandstone, grit, sandstone, conglomerate and coal in places near base and top (grey). Vryheid Formation, Ecca Group, Karoo Supergroup. Permian.
Vse – Volcanic rocks (amber). Selonsrivier Formation, Rooiberg Group, Transvaal Supergroup. Vaalian.
------ – (blue) Lineament (Landsat, aeromagnetic).
------ - Concealed geological boundary.
⊥10 – Strike and dip of bed.
□ – Proposed development area (blocked in black).

Mining Activities on Figure:
C – Coal.
The mining past and present has an influence on the development.

The Vryheid Formation is named after the type area of Vryheid-Volksrust. In the north-eastern part of the basin the Vryheid Formation thins and eventually wedges out towards the south, southwest and west with increasing distance from its source area to the east and northeast (Johnson 2009). The Vryheid Formation consists essentially of sandstone, shale, and subordinate coal beds, and has a maximum total thickness of 500 m. It forms part of the Middle Ecca (Kent 1980). This formation has the largest coal reserves in South Africa. The pro-delta sediments are characterised by trace and plants fossils (Snyman 1996).

Figure 4: Karoo Supergroup distribution and lithostratigraphy (Johnson 2009).

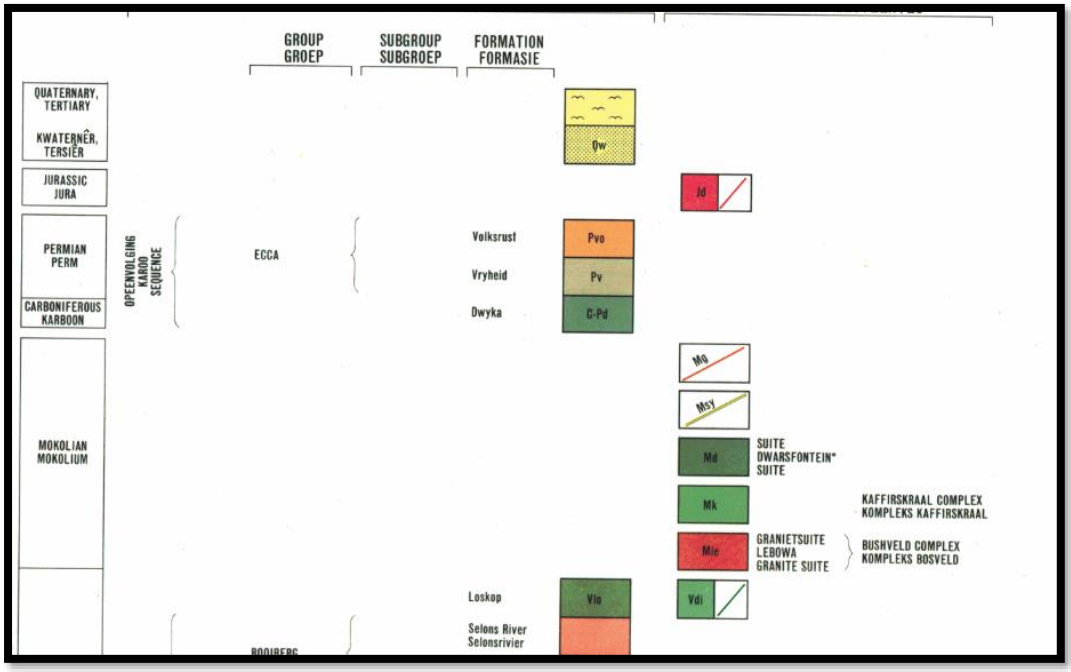


Coal has always been the main energy source in industrial South Africa. It is in Mpumalanga, south of the N4, that most of the coal-fired power stations are found. Eskom is by far the biggest electricity generator in Africa. Thick layers of coal just below the surface are suited to open-cast mining and where the overlying sediments are too thick, shallow underground mining. In 2003, coal was South Africa's third most valuable mineral commodity and is also used by Sasol for fuel- and chemicals-from-coal (Norman and Whitfield 2006). Grodner and Cairncross (2003) proposed a 3-D model of the Witbank Coalfield to allow easy evaluation of the sedimentary rocks, both through space and time. Through this, one can interpret the environmental conditions present at the time of deposition of

the sediments. This can improve mine planning and mining techniques. The Vryheid Formation is underlain by the Dwyka Group and is gradually overlain by mudstones (and shale) and sandstones of the Volksrust Formation. The typical colours for the Vryheid Formation are grey and yellow for the sediments and black for the coal seam. The thickness of the grey shale can vary and this is interlayered with the also variable yellow sandstone and coal seams.

Ecca rocks are stable and lend themselves well to developments. It is only unstable in or directly above mining activities (Snyman 1996). The site itself is partly situated on the flat-lying Vryheid Formation, Ecca Group, Karoo Supergroup. Dolerite dykes occur throughout the Karoo Supergroup. Structural geological features such as dykes and faults can have a measurable influence on ground water flow and mass transport. The Vryheid Formation sediments may attain a thickness of 120 – 140 m. A typical profile includes soil and clay, sandstone and siltstone, shale, 2 upper seam, shale, 2 seam, sandstone, no 1 seam, shale and dolomite at the bottom. The typical colours for the Vryheid Formation are grey and yellow for the sediments and black for the coal seam.

Figure 5: Lithostratigraphy of area (Keyser *et al* 1986).



The Transvaal Supergroup fills an east-west elongated basin in the south-central part of the old Transvaal (now North – West, Gauteng and Mpumalanga) as far south as Potchefstroom. It is Vaalian in age, approximately 2600 Ma to 2100 Ma. A maximum thickness of the Transvaal Supergroup reaches 2000 m in the north-eastern section. The east-west elongated basin is filled with clastic, volcanic and chemical sedimentary rocks. Three groups based on lithological differences have been established: they are the Rooiberg, Pretoria and Chuniespoort Groups as well as other smaller groups (Kent 1980, Snyman 1996). It is the Bushveld Complex that is responsible for the tilting of the Transvaal sediments and the heat of its intrusion having created andalusite crystals (Norman and Whitfield 2006). This Supergroup is underlain by the Ventersdorp, Witwatersrand and Pongola Supergroups, and the Dominion Group. Three prominent ridges are present from the oldest to the youngest, the Time Ball Hill, Daspoort and Magaliesberg Formations (Norman and Whitfield 2006).

The Rooiberg Group is a 2500-6000m thick succession of feldspathic quartzites, arkoses and shales, with interbedded volcanics and felsites. It consists of two formations, the lower Damwal (Vdr) and the upper Selons River (Vs), restricted in its distribution to the central part of the basin (Kent 1980, Snyman 1996). The Selons River Formation has either a sandstone or a quartzite at its base and mainly consists of red riolite. It was further

subdivided into the lower Doornkloof Felsite Member and an upper Klipnek Felsite Member (Kent 1980, Visser 1989). West of Warmbath (Bela Bela) it is again subdivided into two units, the Kwaggasnek Formation and the Schrikkloof Formation. This group has an estimated age of 2,150 Ma (Visser 1989).

The project includes three Alternatives (Figure 1) all present entirely on mainly the Vryheid Formation. Some Selons River Formation and Quaternary are present on the gravel road.
A polygon outlined in white with the R 555 Road to the north, The R 545 to the east and the town of Ogies to the north-west. The approximate length of the pipe is 13 kilometres.
Alternative 1: +++ runs from the current dam, around the TSF in a southerly direction through the corn field, over the mine road and down next to the gravel road and stops halfway down the gravel road.
Alternative 2: ------ runs from the current dam, around the TSF in a southerly direction through the corn field, over the mine road and down next to the gravel road and continues next to the Skoolpad to the end.
Alternative 3: ____ runs from the current dam, around the TSF in a southerly direction through the corn field, over the mine road and down next to the gravel road and stops three-quarter way down the gravel road.

Field Observation – The area is large, the pipeline mostly follows the roads, since the exact route position has not yet been finalised, both sides of the roads were assessed. The routes cross crop fields, vegetation, and areas with trees and long grass. No fossils were found.

Figure 6: View in the north where the current TFS is located.

Figure 7: View towards area where all the Alternative routes run towards the south, this is below the TSF.

Figure 9: View of shoulder next to south-west gravel road.

Figure 10: View at bridge.

Figure 11: View on other side of bridge.

Figure 12: View before the intersection with the Skoolpad.

Figure 13: View of shoulder of the Skoolpad road.

Figure 14: View at end of Route 2.

Figure 15: The presence of shale and sandstone is indicative of the Vryheid Formation.

G. Background to Palaeontology of the area (1j)

Summary: When rock units of moderate to very high palaeontological sensitivity are present within the development footprint, a desk top and or field scoping (survey) study by a professional palaeontologist is usually warranted. The

main purpose of a field scoping (survey) study would be to identify any areas within the development footprint where specialist palaeontological mitigation during the construction phase may be required (SG 2.2 SAHRA AMPHOB, 2012).

The Ecca Group, Vryheid Formation may contain fossils of diverse non-marine trace, *Glossopteris* flora, mesosaurid reptiles, palaeoniscid fish, marine invertebrates, insects, and crustaceans (Johnson 2009). *Glossopteris* trees rapidly colonised the large deltas along the northern margin of the Karoo Sea. Dead vegetation accumulated faster than it could decay, and thick accumulations of peat formed, which were ultimately converted to coal. It is only in the northern part of the Karoo Basin that the glossopterids and cordaitales, ferns, clubmosses and horsetails thrived (McCarthy and Rubidge 2005).

The Glossopteris flora is thought to have been the major contributor to the coal beds of the Ecca. These are found in Karoo-age rocks across Africa, South America, Antarctica, Australia and India. This was one of the early clues to the theory of a former unified Gondwana landmass (Norman and Whitfield 2006).

Table 1: Section taken form The Palaeotechnical Report to show sensitivity of the Vryheid Formation (Groenewald and Groenewald 2014) (**1cA)**.

Rich fossil plant assemblages of the Permian Glossopteris Flora (lycopods, rare ferns and horsetails, abundant glossopterids, cordaitaleans, conifers, ginkgoaleans), rare fossil wood, diverse palynomorphs. Abundant, low diversity trace fossils, rare insects, possible conchostracans, non-marine bivalves, fish scales.	Globally important fossil floras from Middle Permian Gondwana. Seriously under-collected in recent years, despite ongoing mining for coal

Fossils in South Africa mainly occur in rocks of sedimentary nature and not in rocks from igneous or metamorphic nature. Therefore, if there is the presence of Karoo Supergroup strata the palaeontological sensitivity is generally **LOW** to **VERY HIGH**.

Selons River(Vs; Vse) (now renamed subdivided into Kwaggasnek Schrikkloof Fms)		Volcanics plus minor, thin but extensive horizons of metamorphosed sediments (quartzites, sandstones, mudrocks, cherts), mainly of fluvial origin. Volcanics are related to intrusives of the underlying Bushveld Magmatic Province 2.06 Ga Vaalian	Fossils within minor sedimentary units unlikely because of fluvial depositional setting and subsequent metamorphism.	Possible evidence for a catastrophic event at the base of Rooiberg Group (basin floor collapse, slumping, volcanism) Selons River and Kwaggasnek units previously included within upper Pretoria Group by some geologists

Table 2: Criteria used (Fossil Heritage Layer Browser/SAHRA) (**1cB)**.

Rock Unit	Significance/vulnerability	Recommended Action
Vryheid Formation (Pv) (Pe)	**Very High**	Field assessment and protocol for finds is required
Selons River Formation (Vse)	**Very Low**	Protocol for Finds

Databases and collections: Ditsong: National Museum of Natural History. Evolutionary Studies Institute, University of the Witwatersrand (ESI).

Impact: **VERY HIGH** There are significant fossil resources that may be impacted by the development (shale).
The project includes three Alternatives (Figure 1) all entirely with a **VERY HIGH** palaeontological sensitivity.
A polygon outlined in white with the R 555 Road to the north, The R 545 to the east and the town of Ogies to the north-west. The approximate length of the pipe is 13 kilometres.
Alternative 1: +++ runs from the current dam, around the TSF in a southerly direction through the corn field, over the mine road and down next to the gravel road and stops halfway down the gravel road.
Alternative 2: ------ runs from the current dam, around the TSF in a southerly direction through the corn field, over the mine road and down next to the gravel road and continues next to the Skoolpad to the end.
Alternative 3: ____ runs from the current dam, around the TSF in a southerly direction through the corn field, over the mine road and down next to the gravel road and stops three-quarter way down the gravel road.

H. Description of the Methodology (1e)
The palaeontological impact assessment field study was undertaken in September 2020. A Phase 1: Field Study includes a walk through and drive through of the affected portion and photographs (in 20 mega pixels) taken of the site with a digital camera (Canon PowerShot SX620HS). It may be necessary to use a Global Positioning System (GPS) (Garmin eTrex 10) to record outcrops if not covered with topsoil, subsoil, overburden, and vegetation. A literature survey is included and the study relied on literature, geological maps, google.maps, and google.earth images.

SAHRA Document 7/6/9/2/1 (2017) requires track records/logs from archaeologists not palaeontologists as palaeontologists concentrate on outcrops which may be recorded on a GPS. Isolated occurrences of rocks usually do not constitute an outcrop. Fossils can occur in dongas, as nodules, in fresh rock exposures, and in riverbeds. Finding fossils require the experience and technical knowledge of the professional palaeontologist, but that does not mean that an amateur can't find fossils. The geology of the region is used to predict what type of fossil and zone will be found in any particular region. An archaeozoologist can be called upon to survey for more recent fossils in the Quaternary and Tertiary deposits, if present.

Assumptions and Limitations (**1e**):-
The accuracy and reliability of the report may be limited by the following constraints:

1. Most development areas have never been surveyed by a palaeontologist or geophysicist.
2. Variable accuracy of geological maps and associated information.
3. Poor locality information on sheet explanations for geological maps.
4. Lack of published data.
5. Lack of rocky outcrops.
6. Inaccessibility of site.
7. Insufficient data from developer and exact lay-out plan for all structures.

A Phase 1 Palaeontological Impact Assessment: Field Study will include:

1. Recommendations for the future of the site.
2. Background information on the project.
3. Description of the property of affected environment with details of the study area.
4. Description of the geological setting and field observations.
5. Background to palaeontology of the area.
6. Heritage rating.
7. Stating of significance (Heritage Value).

A Phase 2 Palaeontological Impact Assessment: Mitigation will include:

1. Recommendations for the future of the site.
2. Description of work done (including number of people and their responsibilities).
3. A written assessment of the work done, fossils excavated, not removed or collected and observed.
4. Conclusion reached regarding the fossil material.
5. A detailed site plan.
6. Possible declaration as a heritage site or Site Management Plan.

The National Heritage Resources Act No. 25 of 1999 further prescribes -

> Act No. 25 of 1999. National Heritage Resources Act, 1999.
> The National Estate as: 3 (2) (f) archaeological and palaeontological sites, (i)(1) objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens,
> Heritage assessment criteria and grading used: (a) Grade 1: Heritage resources with qualities so exceptional that they are of special national significance;
> (b) Grade 2: Heritage resources which, although forming part of the national estate, can be considered to have special qualities which make them significant within the context of a province or a region; and (c) Grade 3: Other heritage resources worthy of conservation.
> SAHRA is responsible for the identification and management of Grade 1 heritage resources.
> Provincial Heritage Resources Authority (PHRA) identifies and manages Grade 2 heritage resources.
> Local authorities identify and manage Grade 3 heritage resources.
>
> No person may damage, deface, excavate, alter, remove from its original position, subdivide or change the planning status of a provincially protected place or object without a permit issued by a heritage resources authority or local authority responsible for the provincial protection.
>
> Archaeology, palaeontology and meteorites: Section 35.
> (2) Subject to the provisions of subsection (8) (a), all archaeological objects, palaeontological material and meteorites are the property of the State.
> (3) 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.

Mitigation involves planning the protection of significant fossil sites, rock units or other palaeontological resources and/or excavation, recording and sampling of fossil heritage that might be lost during development, together with pertinent geological data. The mitigation may take place before and / or during the construction phase of development. The specialist will require a Phase 2 mitigation permit from the relevant Heritage Resources Authority before a Phase 2 may be implemented.

The Mitigation is done in order to rescue representative fossil material from the study area to allow and record the nature of each locality and establish its age before it is destroyed and to make samples accessible for future research. It also interprets the evidence recovered to allow for education of the public and promotion of palaeontological heritage.

Should further fossil material be discovered during the course of the development (*e. g.* during bedrock excavations), this must be safeguarded, where feasible *in situ,* and reported to a palaeontologist or to the Heritage Resources authority. In situations where the area is considered palaeontologically sensitive (*e. g.* Karoo Supergroup Formations, ancient marine deposits in the interior or along the coast) the palaeontologist might need

to monitor all newly excavated bedrock. The developer needs to give the palaeontologist sufficient time to assess and document the finds and, if necessary, to rescue a representative sample.

When a Phase 2 palaeontological impact study is recommended, permission for the development to proceed can be given only once the heritage resources authority has received and approved a Phase 2 report and is satisfied that (a) the palaeontological resources under threat have been adequately recorded and sampled, and (b) adequate development on fossil heritage, including, where necessary, *in situ* conservation of heritage of high significance. Careful planning, including early consultation with a palaeontologist and heritage management authorities, can minimise the impact of palaeontological surveys on development projects by selecting options that cause the least amount of inconvenience and delay.

Three types of permits are available; Mitigation, Destruction and Interpretation. The specialist will apply for the permit at the beginning of the process (SAHRA 2012).

I. Description of significant fossil occurrences

All Karoo Supergroup geological formations are ranked as **LOW** to **VERY HIGH**, and here the impact is potentially **VERY HIGH** for the Vryheid Formation, Ecca Group. Rocks of Permian age in South Africa are particularly rich in fossil plants (Rayner and Coventry 1985). The fossils are present in the grey shale interlayered with the coal seams. The fossils are not very rare and occur also in other parts of the Karoo stratigraphy. It is often difficult to spot the greyish fossils as they are the same colour as the grey shale in which they are present as these coalified compressions have been weathered to leave surface replicas on the enclosing shale matrix. The pollen of the Greenside Colliery near Witbank also on the Vryheid Formation was the focus of a Ph.D study. A locality close to Ermelo, also Vryheid Formation, has yielded *Scutum, Glossopteris* leaves, *Neoggerathiopsis* leaves, the lycopod *Cyclodendron leslii,* and various seeds and scale leaves (Prevec 2011).

Fossils likely to be found are mostly plants (Appendix 1) such as '*Glossopteris* flora' of the Vryheid Formation. The aquatic reptile *Mesosaurus* and fossil fish may also occur with marine invertebrates, arthropods and insects. Trace fossils can also be present. During storms a great variety of leaves, fructifications and twigs accumulated and because they were sandwiched between thin films of mud, they were preserved to bear record of the wealth and the density of the vegetation around the pools. They make it possible to reconstruct the plant life in these areas and wherever they are found, they constitute most valuable palaeobotanical records (Plumstead 1963) and can be used in palaeoenvironmental reconstructions.

Details of the location and distribution of all significant fossil sites or key fossiliferous rock units are often difficult to be determined due to thick topsoil, subsoil, overburden and alluvium. Depth of the overburden may vary a lot. The vast coal mining industry (Vryheid Formation) provides palaeontologists with fantastic access to coal-associated plant fossils, while simultaneously resulting in the destruction of important National Palaeontological Heritage.

The threats to the National Palaeontological Heritage are:- earth moving equipment/machinery (for example haul trucks, front end loaders, excavators, graders, dozers) during construction, the sealing-in or destruction of fossils by development, vehicle traffic, and human disturbance. See Description of the Geological Setting (F) above.

J. Recommendation (1o,1p,1q)

a. There is no objection (see Recommendation B) to the development, it was necessary to request a Phase1: Palaeontological Impact Assessment: Field Study to determine whether the development will affect fossiliferous outcrops as the palaeontological sensitivity is **VERY HIGH**. A Phase 2 Palaeontological Mitigation is only required if the Phase 1 Palaeontological Assessment identified a fossiliferous formation or surface fossils or if fossils are found during construction excavations and blasting. Fossils were not found during the walk through. The Protocol for Chance Finds and Management Plan is attached (Appendix 2) for the ECO.
b. This project will benefit the environment, economy, and social development of the community.
c. Preferred choice: Any of the Alternatives can be developed. The shortest rout is preferred.
d. The following should be conserved: if any palaeontological material is exposed during digging, excavating, drilling or blasting SAHRA must be notified. All construction activities must be stopped, a 30 m no-go barrier constructed and a palaeontologist should be called in to determine proper mitigation measures.
e. This report must be submitted to SAHRA together with the Heritage Impact Assessment.
f. No consultation with parties was necessary.

Sampling and collecting:
Wherefore a permit is needed from the South African Heritage Resources Agency (SAHRA / PHRA).

a. Objections: Cautious. See heritage value and recommendation.
b. Conditions of development: See Recommendation.
c. Areas that may need a permit: Only if a fossil is unearthed.
d. Permits for mitigation: **SAHRA/PHRA**.

K. Conclusions

a. All the land involved in the development was assessed and none of the property is unsuitable for development (see Recommendation B).
b. All information needed for the Phase 1 Palaeontological Impact Assessment and Field scope was provided by the Consultant. All technical information was provided by Golder Associates.
c. Areas that would involve mitigation and may need a permit from the South African Heritage Resources Agency are discussed.
d. The following should be conserved: if any palaeontological material is exposed during digging, excavating, drilling or blasting, SAHRA must be notified. All development activities must be stopped, a 30 m no-go barrier constructed and a palaeontologist should be called in to determine proper mitigation measures.
e. Condition in which development may proceed: It is further suggested that a Section 37(2) agreement of the Occupational, Health and Safety Act 85 of 1993 is signed with the relevant contractors to protect the environment (fossils) and adjacent areas as well as for safety and security reasons.

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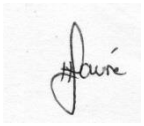
Declaration (disclaimer) (1b)

I, Heidi Fourie, declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed development project for which I was appointed to do a palaeontological assessment. There are no circumstances that compromise the objectivity of me performing such work.

I accept no liability, and the client, by receiving this document, indemnifies me against all actions, claims, demands, losses, liabilities, costs, damages and expenses arising from or in connection with services rendered, directly or indirectly by the use of the information contained in this document.

It may be possible that the Phase 1: Field Study may have missed palaeontological resources in the project area as outcrops are not always present or visible due to vegetation while others may lie below the overburden of earth and may only be present once development commences.

This report may not be altered in any way and any parts drawn from this report must make reference to this report.



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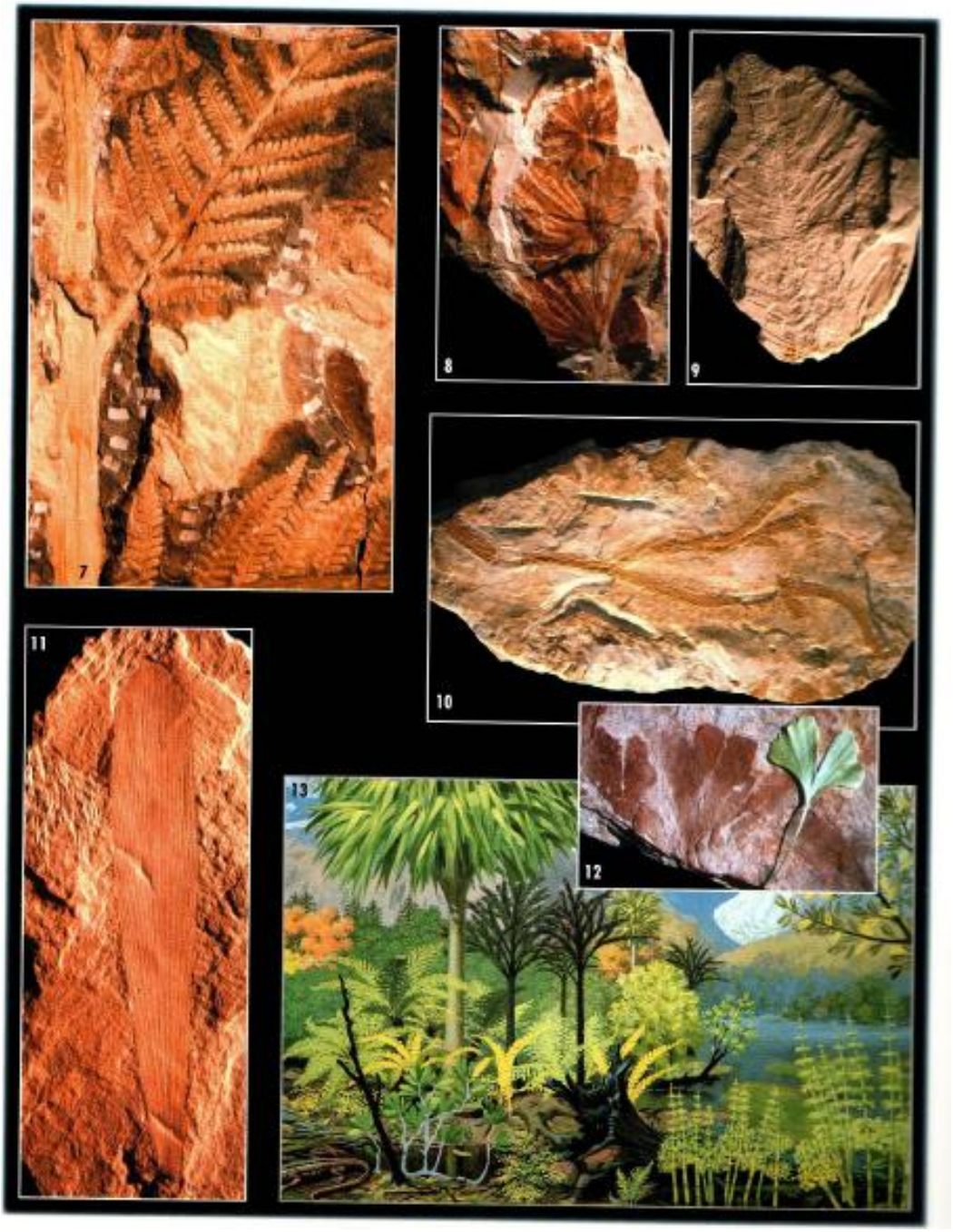
Heidi Fourie
2020/09/22

Appendix 1: Examples of Vryheid Formation fossils (MacRae 1999).



Appendix 2 (**1k,1l,1m**): **Protocol for Chance Finds and Management plan**

This section covers the recommended protocol for a Phase 2 Mitigation process as well as for reports where the Palaeontological Sensitivity is **LOW**; this process guides the palaeontologist / palaeobotanist on site and should not be attempted by the layman / developer. As part of the Environmental Authorisation conditions, an Environmental Control Officer (ECO) will be appointed to oversee the construction activities in line with the legally binding Environmental Management Programme (EMPr) so that when a fossil is unearthed they can notify the relevant department and specialist to further investigate. Therefore, the EMPr must be updated to include the involvement of a palaeontologist during the digging and excavation (ground breaking) phase of the development.

The EMPr already covers the conservation of heritage and palaeontological material that may be exposed during construction activities:

- The protocol is to immediately cease all construction activities if a fossil is unearthed and contact SAHRA for further investigation. Fossil material can be put aside in a safe place for later inspection by a palaeontologist.
- The area must be fenced-off with a 30 m barrier and the construction workers must be informed that this is a 30 m fenced no-go area.
- The ECO should familiarise him- or herself with the fossiliferous formations and its fossils.
- A site visit by the ECO is recommended after drilling, excavating and blasting and the keeping of a photographic record.
- A regular monitoring presence over the period during which excavations are made, by a palaeontologist, is generally not practical, but the ECO must receive pre-development training.
- The Evolutionary Studies Institute, University of the Witwatersrand has good examples of Ecca Group Fossils.
- The developer may be asked to survey the areas affected by the development and indicate on plan where the construction / development will take place. Trenches may have to be dug to ascertain how deep the sediments are above the bedrock (can be a few hundred metres). This will give an indication of the depth of the topsoil, subsoil, and overburden, if need be trenches should be dug deeper to expose the interburden.

Mitigation will involve recording, rescue and judicious sampling of the fossil material present in the layers sandwiched between the geological / coal layers (if present). It must include information on number of taxa, fossil abundance, preservational style, and taphonomy. This can only be done during mining or excavations. In order for this to happen, in case of coal mining operations, the process will have to be closely scrutinised by a professional palaeontologist / palaeobotanist to ensure that only the coal layers are mined and the interlayers (siltstone and mudstone) are surveyed for fossils or representative sampling of fossils are taking place.

The palaeontological impact assessment process presents an opportunity for identification, access and possibly salvage of fossils and add to the few good fossil localities. Mitigation can provide valuable onsite research that can benefit both the community and the palaeontological fraternity.

A Phase 2 study is very often the last opportunity we will ever have to record the fossil heritage within the development area. Fossils excavated will be stored at a National Repository.

A Phase 2 Palaeontological Impact Assessment: Mitigation will include (SAHRA) -

1. Recommendations for the future of the site.
2. Description and purpose of work done (including number of people and their responsibilities).
3. A written assessment of the work done, fossils excavated, not removed or collected and observed.

4. Conclusion reached regarding the fossil material.
5. A detailed site plan and map.
6. Possible declaration as a heritage site or Site Management Plan.
7. Stakeholders.
8. Detailed report including the Desktop and Phase 1 study information.
9. Annual interim or progress Phase 2 permit reports as well as the final report.
10. Methodology used.

Three types of permits are available; Mitigation, Destruction and Interpretation. The specialist will apply for the permit at the beginning of the process (SAHRA 2012).

The Palaeontological Society of South Africa (PSSA) does not have guidelines on excavating or collecting, but the following is suggested:

1. The developer needs to clearly stake or peg-out (survey) the areas affected by the mining (if applicable)/ construction/ development operations and dig representative trenches and if possible supply geological borehole data.
2. When clearing topsoil, subsoil or overburden and hard rock (outcrop) is found, the contractor needs to stop all work.
3. A Palaeobotanist / palaeontologist (contact SAHRIS for list) must then inspect the affected areas and trenches for fossiliferous outcrops / layers. The contractor / developer may be asked to move structures, and put the development on hold.
4. If the palaeontologist / palaeobotanist is satisfied that no fossils will be destroyed or have removed the fossils, development and removing of the topsoil can continue.
5. After this process the same palaeontologist / palaeobotanist will have to inspect and offer advice through the Phase 2 Mitigation Process. Bedrock excavations for footings may expose, damage or destroy previously buried fossil material and must be inspected.
6. When permission for the development is granted, the next layer can be removed, if this is part of a fossiliferous layer, then with the removal of each layer of sediment, the palaeontologist / palaeobotanist must do an investigation (a minimum of once a week).
7. At this stage the palaeontologist / palaeobotanist in consultation with the developer / mining company (if applicable) must ensure that a further working protocol and schedule is in place. Onsite training should take place, followed by an annual visit by the palaeontologist / palaeobotanist.

Fossil excavation if necessary during Phase 2:

1. Photography of fossil / fossil layer and surrounding strata.
2. Once a fossil has been identified as such, the task of extraction begins.
3. It usually entails the taking of a GPS reading and recording lithostratigraphic, biostratigraphic, date, collector and locality information.
4. Use Paraloid (B-72) as an adhesive and protective glue, parts of the fossil can be kept together (not necessarily applicable to plant fossils).
5. Slowly chipping away of matrix surrounding the fossil using a geological pick, brushes and chisels.
6. Once the full extent of the fossil / fossils is visible, it can be covered with a plaster jacket (not necessarily applicable to plant fossils).
7. Chipping away sides to loosen underside.
8. Splitting of the rock containing palaeobotanical material should reveal any fossils sandwiched between the layers.

SAHRA Documents:
Guidelines to Palaeontological Permitting Policy.
Minimum Standards: Palaeontological Component of Heritage Impact Assessment reports.
Guidelines for Field Reports.
Palaeotechnical Reports for all the Provinces.

Appendix 3: Table listing points in Appendix 6 of the Act and portion in report.

Section in Report	**Point in Act**	**Requirement**
B	1(c)	Scope and purpose of report
B	1(d)	Duration, date and season
B	1(g)	Areas to be avoided
D	1(ai)	Specialist who prepared report
D	1(aii)	Expertise of the specialist
F Figure 3	1(h)	Map
B	1(ni)(niA)	Authorisation
B	1(nii)	Avoidance, management, mitigation and closure plan
G Table 1	1(cA)	Quality and age of base data
G Table 2	1(cB)	Existing and cumulative impacts
D	1(f)	Details or activities of assessment
G	1(j)	Description of findings
H	1(e)	Description of methodology
H	1(i)	Assumptions
J	1(o)	Consultation
J	1(p)	Copies of comments during consultation
J	1(q)	Information requested by authority
Declaration	1(b)	Independent declaration
Appendix 2	1(k)	Mitigation included in EMPr
Appendix 2	1(l)	Conditions included in EMPr
Appendix 2	1(m)	Monitoring included in EMPr
D	2	Protocol or minimum standard

APPENDIX B

Document limitations

DOCUMENT LIMITATIONS

This document has been provided by Golder Associates Africa Pty Ltd ("Golder") subject to the following limitations:

i) This Document has been prepared for the particular purpose outlined in Golder's proposal and no responsibility is accepted for the use of this Document, in whole or in part, in other contexts or for any other purpose.

ii) The scope and the period of Golder's Services are as described in Golder's proposal, and are subject to restrictions and limitations. Golder did not perform a complete assessment of all possible conditions or circumstances that may exist at the site referenced in the Document. If a service is not expressly indicated, do not assume it has been provided. If a matter is not addressed, do not assume that any determination has been made by Golder in regard to it.

iii) Conditions may exist which were undetectable given the limited nature of the enquiry Golder was retained to undertake with respect to the site. Variations in conditions may occur between investigatory locations, and there may be special conditions pertaining to the site which have not been revealed by the investigation and which have not therefore been taken into account in the Document. Accordingly, additional studies and actions may be required.

iv) In addition, it is recognised that the passage of time affects the information and assessment provided in this Document. Golder's opinions are based upon information that existed at the time of the production of the Document. It is understood that the Services provided allowed Golder to form no more than an opinion of the actual conditions of the site at the time the site was visited and cannot be used to assess the effect of any subsequent changes in the quality of the site, or its surroundings, or any laws or regulations.

v) Any assessments made in this Document are based on the conditions indicated from published sources and the investigation described. No warranty is included, either express or implied, that the actual conditions will conform exactly to the assessments contained in this Document.

vi) Where data supplied by the client or other external sources, including previous site investigation data, have been used, it has been assumed that the information is correct unless otherwise stated. No responsibility is accepted by Golder for incomplete or inaccurate data supplied by others.

vii) The Client acknowledges that Golder may have retained sub-consultants affiliated with Golder to provide Services for the benefit of Golder. Golder will be fully responsible to the Client for the Services and work done by all its sub-consultants and subcontractors. The Client agrees that it will only assert claims against and seek to recover losses, damages or other liabilities from Golder and not Golder's affiliated companies. To the maximum extent allowed by law, the Client acknowledges and agrees it will not have any legal recourse, and waives any expense, loss, claim, demand, or cause of action, against Golder's affiliated companies, and their employees, officers and directors.

viii) This Document is provided for sole use by the Client and is confidential to it and its professional advisers. No responsibility whatsoever for the contents of this Document will be accepted to any person other than the Client. Any use which a third party makes of this Document, or any reliance on or decisions to be made based on it, is the responsibility of such third parties. Golder accepts no responsibility for damages, if any, suffered by any third party because of decisions made or actions based on this Document.

GOLDER ASSOCIATES AFRICA (PTY) LTD

APPENDIX C

Appendix 6 of the EIA Regulations

APPENDIX 6 OF THE EIA REGULATIONS

Where applicable, this baseline report has been written in compliance with Appendix 6 of the EIA Regulations.

Section	Requirements	Section addressed in report
1.(1)	A specialist report prepared in terms of these Regulations must contain	
(a)	Details of	Page i, of Appendix A
(i)	the specialist who prepared the report; and	
(ii)	the expertise of that specialist to compile a specialist report including a curriculum vitae	
(b)	a declaration that the specialist is independent in a form as may be specified by the competent authority	
(c)	an indication of the scope of, and the purpose for which, the report was prepared;	Sections 1 and 2 of Appendix A
(cA)	an indication of the quality and age of base data used for the specialist report;	Section 4.2, Section 6 of Appendix A
(cB)	a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 6.2 of Appendix A, results of field assessment Section 3 of Appendix A, legislative requirements
(d)	the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 4.2 of Appendix A
(e)	a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 4 of Appendix A
(f)	details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Section 6 of Appendix A
(g)	an identification of any areas to be avoided, including buffers;	Section 6 of Appendix A
(h)	a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	This will be completed in the impact assessment report.
(i)	a description of any assumptions made and any uncertainties or gaps in knowledge;	Limitations to the field assessment are highlighted in Section 6.2 of Appendix A

Section	Requirements	Section addressed in report
(j)	a description of the findings and potential implications of such findings on the impact of the proposed activity (including identified alternatives on the environment) or activities;	Not applicable at this stage. This will be addressed in the impact assessment report.
(k)	any mitigation measures for inclusion in the EMPr;	
(l)	any conditions for inclusion in the environmental authorisation;	
(m)	any monitoring requirements for inclusion in the EMPr or environmental authorisation;	
(n)	a reasoned opinion—	
(i)	(as to) whether the proposed activity, activities or portions thereof should be authorised;	Not applicable at this stage. This will be addressed in the impact assessment report.
(iA)	regarding the acceptability of the proposed activity or activities; and	
(ii)	if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	
(o)	a description of any consultation process that was undertaken during the course of preparing the specialist report;	Not applicable at this stage. This will be addressed in the EIA process for the project
(p)	a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	
(q)	any other information requested by the competent authority.	None, thus far.
2.	Where a government notice *gazetted* by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	Noted

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