

**SAHRA Case ID: 15850**

**BASIC PALAEOLOGICAL ASSESSMENT**

**Letter of Recommendation for Exemption from further Palaeontological Studies**

**CONSOLIDATION OF SALT PAN MINING RIGHTS ON GROOT WITPAN 327**

**INDUSTRIAL SALT (PTY) LTD.**

**Portions 10, 13, 18 & 20 of Groot Witpan 327, Gordonia District, Northern Cape**

By

**John Pether, M.Sc., Pr. Sci. Nat. (Earth Sci.)**

**Geological and Palaeontological Consultant**

P. O. Box 48318, Kommetjie, 7976

Tel./Fax (021) 7833023

Cellphone 083 744 6295

[jpether@iafrica.com](mailto:jpether@iafrica.com)

Prepared at the Request of

**Agency for Cultural Resource Management (ACRM)**

5 Stuart Road, Rondebosch, 7700

Ph/Fax: 021 685 7589

Mobile: 082 321 0172

E-mail: [jonathan@acrm.co.za](mailto:jonathan@acrm.co.za)

For

**SITE PLAN CONSULTING**

**CLIENT**

**Industrial Salt (Pty) Ltd**

**24 October 2022**

## SUMMARY

The Applicant, Industrial Salt (Pty) Ltd., proposes to consolidate existing prospecting and mining rights for established salt extraction operations from the Groot Witpan salt pan in the Northern Cape (Figure 1), involving portions 10, 13, 18 and 20 of the property Groot Witpan 327 (Figure 2). Groot Witpan 327 is located ~100 km north of Upington along the R360 road (Figure 1) and is approached via the turnoff to the village of Noenieput, in the Gordonia District.

The proposed consolidation and addition of the Mining Rights on Groot Witpan 327 are summarised in Figure 2. The Mining Right on Portion 10 held by Gordonia Salts (Pty) Ltd is to be incorporated with the northern Industrial Salt (Pty) Ltd Mining Right for Portion 13. The Mining Right areas to be increased by the incorporation of portions 18 and 20.

The salt mining operation derives the salt from the saline water table beneath the pan. The brine is pumped from boreholes and piped to shallow evaporation ponds on the pan perimeter. The crystallized salt is scraped up and transported to the stockpile area where it is dried and then further processed by crushing, washing, spinning and final drying. The evaporation ponds and processing facilities are already established. Further activity involves the siting of more brine abstraction boreholes.

The pan is underlain by bedrock of Karoo Supergroup sedimentary rocks of the Dwyka Group (Mbizane Formation). The fossils in these Karoo formations include trace fossils, plant material, a low diversity of invertebrates (molluscs, brachiopods) and fish remains

The pan deposits (Goeboe Goeboe Fm.) are mapped as of uncertain palaeontological sensitivity (Figure 5). The pans are quite ancient features and have been fresher water bodies in the past, as is evident by pan carbonates, diatomaceous layers and aquatic molluscs. Excavations in pans have also uncovered fossil bones and Stone Age artefacts.

The boreholes for brine abstraction will penetrate a small volume of pan deposits and the underlying Karoo bedrock. The “point” nature of the boreholes renders the likelihood of intersecting fossil bones in the pan deposits improbable. The Karoo bedrock beneath the pans is expected to be weathered and friable and is unlikely to yield well-preserved fossils.

In view of the very small footprint of the proposed boreholes the anticipated palaeontological impact of the brine abstraction is considered to be LOW to MARGINAL. Notwithstanding, although improbable, a chance occurrence of fossil material cannot be entirely dismissed. It is recommended that the bore holes be regarded as an exploration opportunity for the nature of the pan deposits and be observed for the possible occurrence of Stone Age artefacts and bone and teeth fragments. Fossil bones and archaeological material may also be uncovered in minor earthworks associated with pond maintenance.

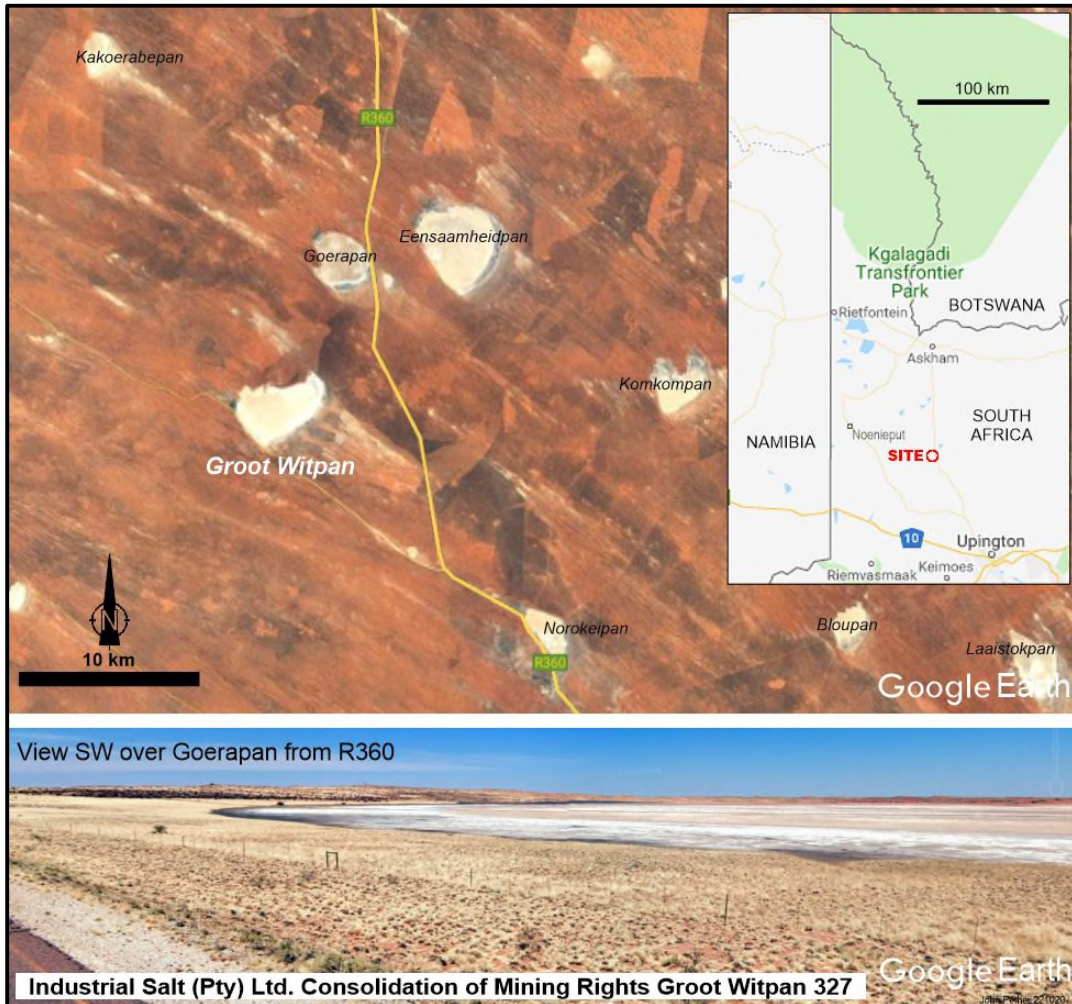
It is recommended that a protocol for finds of potential archaeological and/or fossil bones, the Fossil Finds Procedure (FFP), is included in the Environmental Management Plan (EMP) for the Operations of the Industrial Salt saltworks, basically “If fossil bones are uncovered during any earthworks, stop work at that spot and report to SAHRA and/or the McGregor Museum, providing via email images of the find and its contextual information for assessment and decision on a suitable response”. Heritage Western Cape has provided a Fossil Finds Procedure and a form for the reporting of fossil finds which is available from the HWC website (link provided).

## **CONTENTS**

<b>1</b>	<b>BACKGROUND</b>	<b>1</b>
<b>2</b>	<b>LOCATION</b>	<b>1</b>
<b>3</b>	<b>LOCALITY PLAN</b>	<b>2</b>
<b>4</b>	<b>DESCRIPTION OF THE PROPOSED ACTIVITY</b>	<b>2</b>
<b>5</b>	<b>HERITAGE RESOURCES IDENTIFIED</b>	<b>2</b>
<b>6</b>	<b>ANTICIPATED IMPACTS ON PALAEOLOGICAL HERITAGE RESOURCES</b>	<b>4</b>
<b>7</b>	<b>RECOMMENDATIONS</b>	<b>5</b>
<b>8</b>	<b>REFERENCES</b>	<b>6</b>
<b>9</b>	<b>APPENDIX 1. PALAEOLOGICAL SENSITIVITY RATING</b>	<b>7</b>
<b>10</b>	<b>APPENDIX 2. DECLARATION OF INDEPENDENCE</b>	<b>8</b>
<b>11</b>	<b>APPENDIX 3. CURRICULUM VITAE</b>	<b>9</b>

## 1 BACKGROUND

The Applicant, Industrial Salt (Pty) Ltd., proposes to consolidate existing prospecting and mining rights for established salt extraction operations from the Groot Witpan salt pan in the Northern Cape (Figure 1), involving portions 10, 13, 18 and 20 of the property Groot Witpan 327 (Figure 2).



**Figure 1. Location of Groot Witpan 327 and the typical landscape of salt pans and red Kalahari dune ridges.**

Site Plan Consulting has been appointed to conduct the Environmental Authorization process for the application and has appointed the Agency for Cultural Resource Management (ACRM) to undertake the Heritage Impact Assessment (HIA), as required by the South African Heritage Resources Agency (SAHRA). This brief report is part of the HIA and its intention is to provide a summary of the main aspects of the geology and the palaeontological sensitivity of the affected formations.

## 2 LOCATION

The property Groot Witpan 327 is located ~100 km north of Upington along the R360 road (Figure 1) and is approached via the turnoff to the village of Noenieput, in the Gordonia District, Northern Cape. Centre co-ordinate of pan: -27.744637 °S / 20.752008 °E.

### 3 LOCALITY PLAN

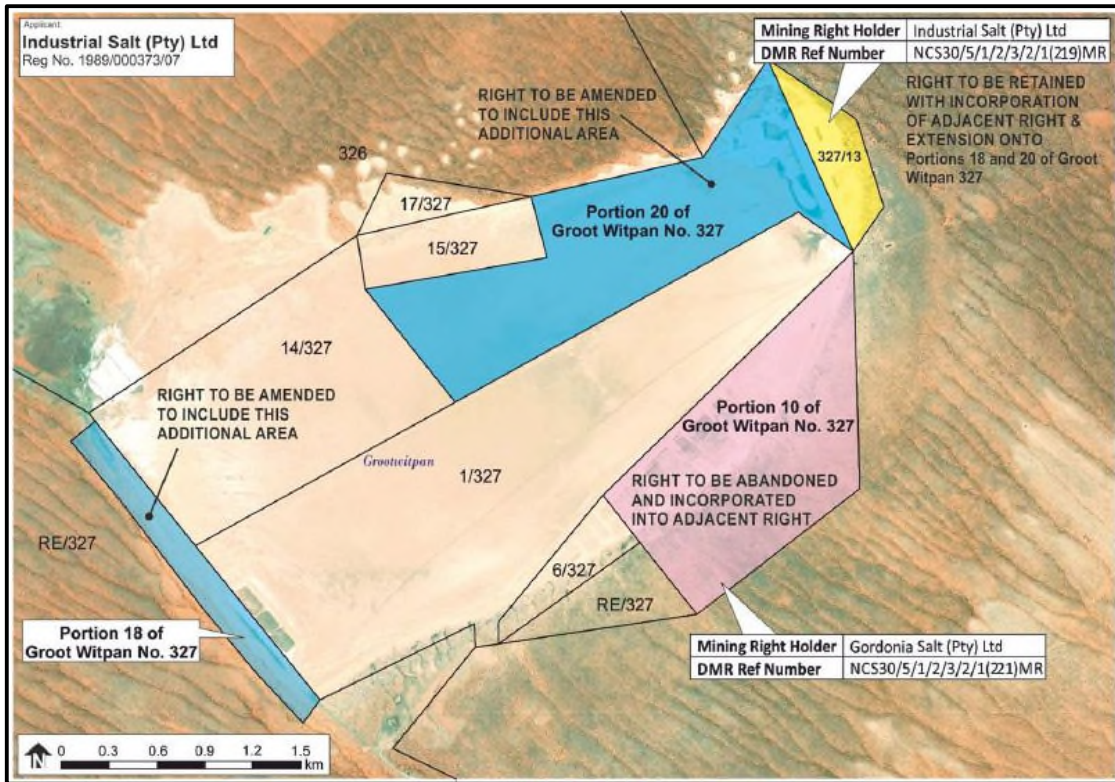


Figure 2. Industrial Salt (Pty) Ltd. - Consolidation of Mining Rights – Groot Witpan 327

### 4 DESCRIPTION OF THE PROPOSED ACTIVITY

The proposed consolidation and addition of the Mining Rights on Groot Witpan 327 are summarised in Figure 2. The Mining Right on Portion 10 held by Gordonia Salts (Pty) Ltd is to be incorporated with the northern Industrial Salt (Pty) Ltd Mining Right for Portion 13. The Mining Right areas to be increased by the incorporation of portions 18 and 20.

The salt mining operation derives the salt from the saline water table beneath the pan. The brine is pumped from boreholes and piped to shallow evaporation ponds on the pan perimeter. The crystallized salt is scraped up and transported to the stockpile area where it is dried and then further processed by crushing, washing, spinning and final drying. The evaporation ponds and processing facilities are already established. Further activity involves the siting of more brine abstraction boreholes.

### 5 HERITAGE RESOURCES IDENTIFIED

The bedrock of the area comprises sedimentary rocks of the lowermost formations of the Karoo Supergroup, viz. the basal **Dwyka Group** glacial tillites (Figures 3 & 4, C-Pd). Southern Africa, then part of the Gondwana supercontinent, was in the vicinity of the South Pole about 300 Ma (Ma = million years ago) and covered with glaciers and ice sheets. The Dwyka sediments represent the melt-out content from the ice, when ice sheets melted back to the highlands, depositing massive tillites in the ice-scoured valleys which were then succeeded by marine muds, with melt-out dropstones from floating icebergs (the “boulder shales”). These valley and inlet deposits, named the **Mbizane Formation** (Visser *et al.*, 1990), are therefore very variable, comprising tillites, conglomerates, sandstones and

mudrocks which were left behind on the ice-scoured landscape by the retreating glaciers.

Much later, subsequent to the breakup of Gondwana 140-130 Ma, most of the Karoo Supergroup was eroded away and by the late Cretaceous (80-70 Ma) a wide, shallow basin had formed in the interior of the subcontinent by crustal warping. This Kalahari Basin accommodates the **Kalahari Group** sedimentary basin infill deposited mainly during the Cenozoic Era (Partridge *et al*, 2006).

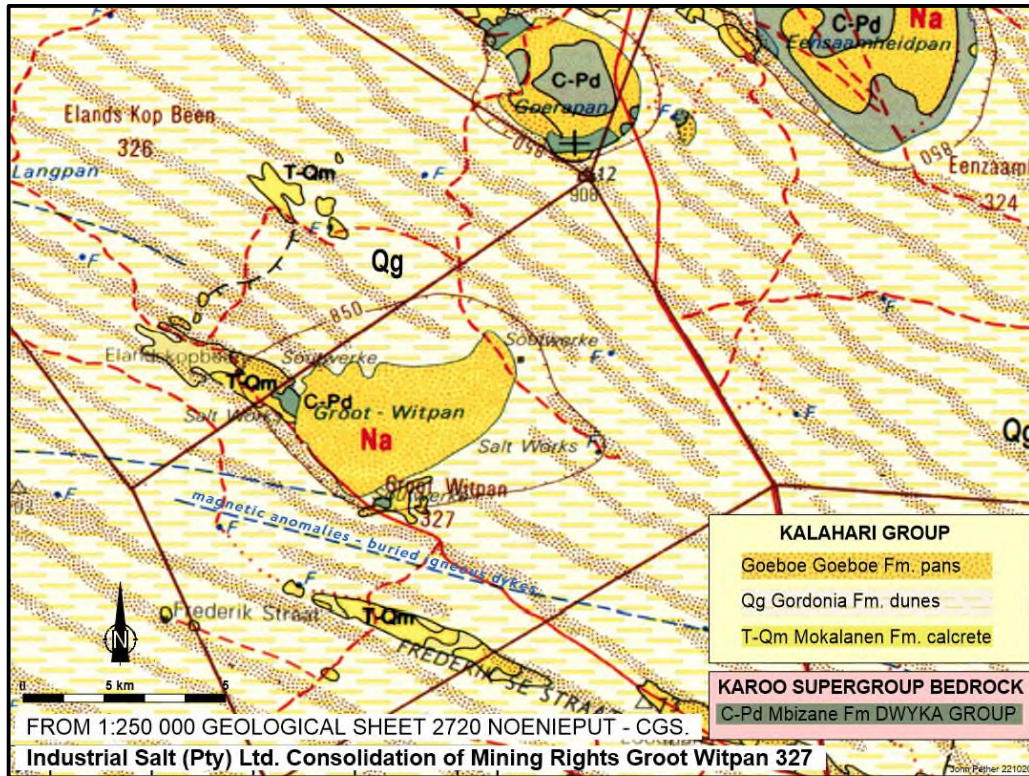


Figure 3. Surface geology of the Groot Witpan 327 area.

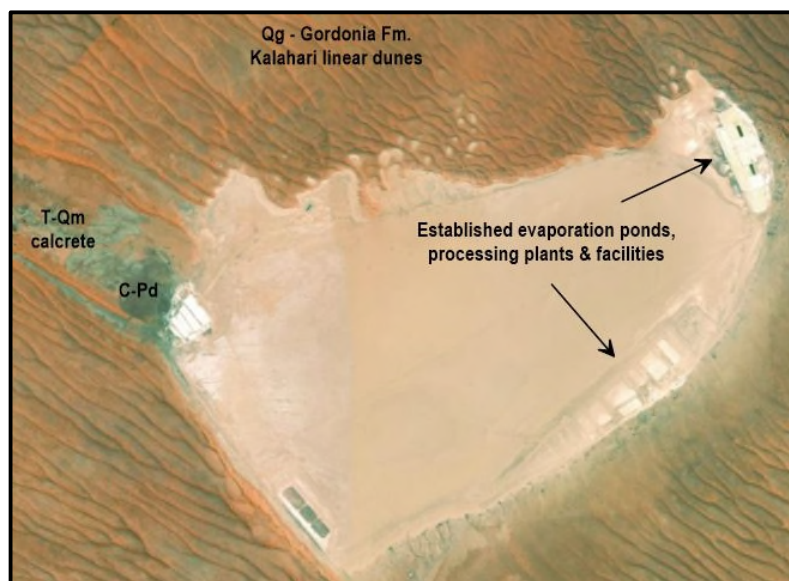
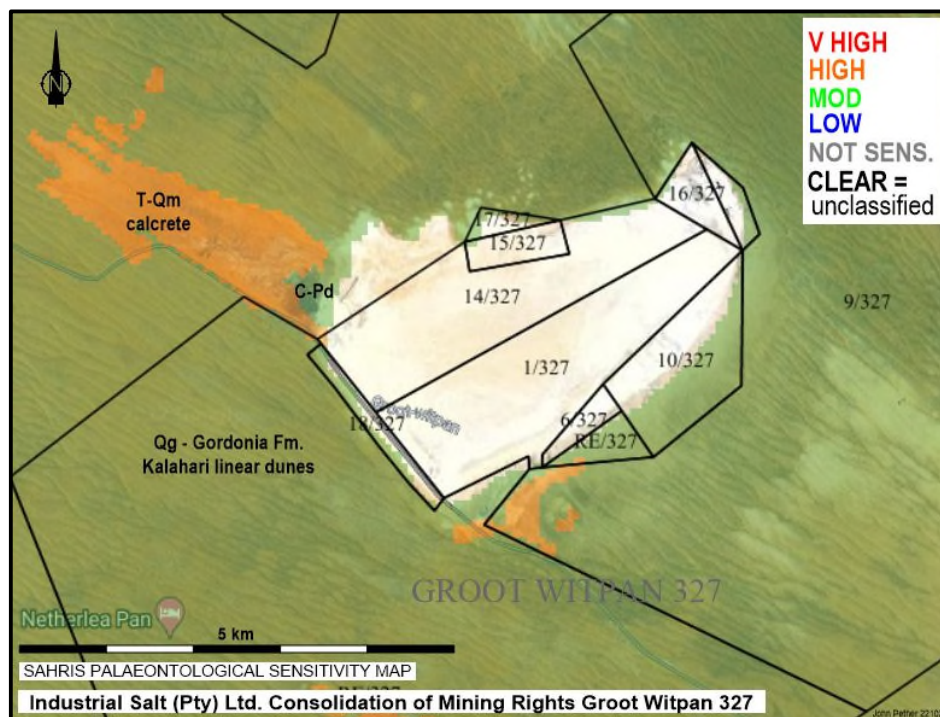


Figure 4. Locations of the existing Industrial Salt salt harvesting plants.

The Kalahari Basin has a buried topography of palaeovalleys in which the thickest deposits occur. Basal fluvial gravels of the Wessels Formation are succeeded by red and brown calcareous muds of the Budin Formation, the latter being mainly lake sediments extensively deposited in the palaeovalleys. The lacustrine muds pass upwards into alluvial sandstones and gravels of the Eden Formation which, not being mapped, lacks outcrops in this area. The sequence is capped by a regional calcrete named the **Mokalanen Formation** (Figure 3, T-Qm), considered to reflect aridification since the late Pliocene. The typical reddened aeolian sands of the Kalahari linear dune ridges, the **Gordonia Formation**, overlie the calcrete and dominate the landscape. Pans are numerous and are related to local groundwater surfacing in the flat, poorly drained landscape, concomitant salt accumulation and wind erosion. The pan deposits of mud, fine-grained sand and evaporitic salt layers have been named the **Goeboe Goeboe Formation** (Malherbe, 1984) (Figure 3).

## 6 ANTICIPATED IMPACTS ON PALAEOONTOLOGICAL HERITAGE RESOURCES

Groot Witpan is underlain by the bedrock of the Mbizane Formation (Figures 3, 4). The overall palaeontological sensitivity of this Dwyka Group formation is rated “Moderate” (Figure 5). The fossils in these rocks include trace fossils, plant material (typically the *Glossopteris* Flora), a low diversity of invertebrates (molluscs, brachiopods) and fish remains (Almond & Pether, 2009).



**Figure 5. General palaeontological sensitivities of the local formations.**

Outcrop and shallowly sand-covered calcrete pedocrete of the Mokalanen Fm. is mapped to the west of the pan (Figures 3-5, T-Qm) and it is probable that under the surrounding aeolian sands the pan is rimmed by the calcrete, as is typical of the landscape. The overall palaeontological sensitivity of the Mokalanen Fm. is indicated as “HIGH” (Figure 5). The calcrete is likely to have been superimposed on the surficial regolith and also involves the Dwyka bedrock. The calcrete generally includes fossil roots and trace fossils such as termitaria and thick calcretes conceal amalgamated palaeosurfaces on which fossil bones

and land snails occur. However, calcrete outcrop is not mapped in the eastern part of the pan and the salt harvesting operation does not affect the calcrete.

The Gordonia Fm. Kalahari dunes are rated as “Moderate” overall palaeontological sensitivity (Figure 5), but fossil bones are very sparse in the dunes which were active in phases during the late Quaternary. Trace fossils such as termite burrows and termitaria, the burrows of other insects, spiders and scorpions, mole tunnels and plant root casts are the most common fossils, while land snails, rodents, mole and tortoise remains and ostrich eggs and bones are expected to occur. Associated fossil bones and archaeological material occurs on the peripheries of pans.

The current pan deposits (Goeboe Goeboe Fm.) are mapped as of uncertain palaeontological sensitivity (Figure 5, clear). However, the pans are quite ancient features and have been fresher water bodies in the past, as is evident by pan carbonates, diatomaceous layers and aquatic molluscs. Unsurprisingly, excavations in pans have also uncovered fossil bones and Stone Age artefacts (e.g. Kiberd, 2001).

The boreholes for brine abstraction will penetrate a small volume of the pan deposits and partly the underlying Dwyka bedrock. The “point” nature of the drill holes renders the likelihood of intersecting fossil bones in the pan deposits improbable. The Dwyka bedrock beneath the pans is expected to be weathered and friable and is unlikely to yield well-preserved fossils.

## **7 RECOMMENDATIONS**

In view of the very small footprint of the proposed boreholes the anticipated palaeontological impact of the brine abstraction is considered to be LOW to MARGINAL and no additional palaeontological interventions are required.

Notwithstanding, although improbable, a chance occurrence of fossil material cannot be entirely dismissed. It is recommended that the bore holes be regarded as an exploration opportunity for the nature of the pan deposits and be observed for the possible occurrence of Stone Age artefacts and bone and teeth fragments. Fossil bones and archaeological material may also be uncovered in minor earthworks associated with pond maintenance.

It is recommended that a protocol for finds of potential archaeological and/or fossil bones, the Fossil Finds Procedure (FFP), is included in the Environmental Management Plan (EMP) for the Operations of the Industrial Salt saltworks, basically “If fossil bones are uncovered during any earthworks, stop work at that spot and report to SAHRA and/or the McGregor Museum, providing via email images of the find and its contextual information for assessment and decision on a suitable response”.

Heritage Western Cape has provided a Fossil Finds Procedure and a form for the reporting of fossil finds:

[https://www.hwc.org.za/sites/default/files/3\\_11%20Protocol%20Fossil%20Finds%20Final%20June%202016.pdf](https://www.hwc.org.za/sites/default/files/3_11%20Protocol%20Fossil%20Finds%20Final%20June%202016.pdf)

SAHRA: 021 462 4502.

McGregor Museum, Kimberley: 053 839 2700.



## 8 REFERENCES

Almond, J.E. & Pether, J. 2009. Palaeontological Heritage of the Northern Cape. SAHRA Palaeotechnical Report, Natura Viva cc., Cape Town.

Kiberd, P. 2001. Bundu Farm. A Middle and Later Stone Age Pan Site, Northern Cape, South Africa. Preliminary results of fieldwork 1998-2000. *Nyame Akuma* 55: 51-55.

Malherbe, S.J. 1984. The Geology of the Kalahari Gemsbok National Park. Supplement to *Koedoe*: 33-34.

Partridge, T.C., Botha, G.A. & Haddon, I.G. 2006. Cenozoic deposits of the Interior. In: Johnson, M.R., Anhaeusser, C.R. & Thomas, R.J. (Eds.) *The Geology of South Africa*, pp. 585-604. Geological Society of South Africa, Marshalltown.

Visser, J.N.J., Von Brunn, V. & Johnson, M.R. 1990. Dwyka Group. *Catalogue of South African Lithostratigraphic Units* 2: 15-17. Council for Geoscience, Pretoria.

## 9 APPENDIX 1. PALAEOLOGICAL SENSITIVITY RATING

Palaeontological Sensitivity refers to the likelihood of finding significant fossils within a geologic unit.

**VERY HIGH:** Formations/sites known or likely to include vertebrate fossils pertinent to human ancestry and palaeoenvironments and which are of international significance.

**HIGH:** Assigned to geological formations known to contain palaeontological resources that include rare, well-preserved fossil materials important to on-going palaeoclimatic, palaeobiological and/or evolutionary studies. Fossils of land-dwelling vertebrates are typically considered significant. Such formations have the potential to produce, or have produced, vertebrate remains that are the particular research focus of palaeontologists and can represent important educational resources as well.

**MODERATE:** Formations known to contain palaeontological localities and that have yielded fossils that are common elsewhere, and/or that are stratigraphically long-ranging, would be assigned a moderate rating. This evaluation can also be applied to strata that have an unproven, but strong potential to yield fossil remains based on its stratigraphy and/or geomorphologic setting.

**LOW:** Formations that are relatively recent or that represent a high-energy subaerial depositional environment where fossils are unlikely to be preserved, or are judged unlikely to produce unique fossil remains. A low abundance of invertebrate fossil remains can occur, but the palaeontological sensitivity would remain low due to their being relatively common and their lack of potential to serve as significant scientific resources. However, when fossils are found in these formations, they are often very significant additions to our geologic understanding of the area. Other examples include decalcified marine deposits that preserve casts of shells and marine trace fossils, and fossil soils with terrestrial trace fossils and plant remains (burrows and root fossils)

**MARGINAL:** Formations that are composed either of volcanoclastic or metasedimentary rocks, but that nevertheless have a limited probability for producing fossils from certain contexts at localized outcrops. Volcanoclastic rock can contain organisms that were fossilized by being covered by ash, dust, mud, or other debris from volcanoes. Sedimentary rocks that have been metamorphosed by the heat and pressure of deep burial are called metasedimentary. If the meta sedimentary rocks had fossils within them, they may have survived the metamorphism and still be identifiable. However, since the probability of this occurring is limited, these formations are considered marginally sensitive.

**NO POTENTIAL:** Assigned to geologic formations that are composed entirely of volcanic or plutonic igneous rock, such as basalt or granite, and therefore do not have any potential for producing fossil remains. These formations have no palaeontological resource potential.

*Adapted from Society of Vertebrate Paleontology. 1995. Assessment and Mitigation of Adverse Impacts to Nonrenewable Paleontologic Resources - Standard Guidelines. News Bulletin, Vol. 163, p. 22-27.*

## 10 APPENDIX 2. DECLARATION OF INDEPENDENCE

### BASIC PALAEOLOGICAL ASSESSMENT

Recommendation for Exemption from further Palaeontological Studies

CONSOLIDATION OF SALT PAN MINING RIGHTS ON GROOT WITPAN 327

INDUSTRIAL SALT (PTY) LTD.

Portions 10, 13, 18 & 20 of Groot Witpan 327, Gordonia District, Northern Cape.

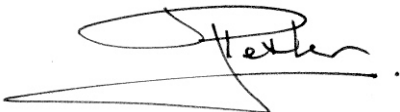
#### **Terms of Reference**

This assessment forms part of the Heritage Assessment and it assesses the overall palaeontological (fossil) sensitivities of formations underlying the Project Area.

#### **Declaration**

I ...**John Pether**....., as the appointed independent specialist hereby declare that I:

- act/ed as the independent specialist in the compilation of the above report;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2014 and any specific environmental management Act;
- have and will not have any vested interest in the proposed activity proceeding;
- have disclosed to the EAP any material information that has or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the Environmental Impact Assessment Regulations, 2014 and any specific environmental management act;
- have provided the EAP with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not; and
- am aware that a false declaration is an offence in terms of regulation 48 of the 2014 NEMA EIA Regulations.



Signature of the specialist

Date: 24 October 2022

## 11 APPENDIX 3. CURRICULUM VITAE

### John Pether, M.Sc., Pr. Sci. Nat. (Earth Sci.)

Independent Consultant/Researcher recognized as an authority with 38 years' experience in the field of coastal-plain and continental-shelf palaeoenvironments, fossils and stratigraphy, mainly involving the West Coast/Shelf of southern Africa. Has been previously employed in academia (South African Museum) and industry (Trans Hex, De Beers Marine). At present an important involvement is in Palaeontological Impact Assessments (PIAs) and mitigation projects in terms of the National Heritage Resources Act 25 (1999) (~300 PIA reports to date) and is an accredited member of the Association of Professional Heritage Practitioners (APHP). Continues to be involved as consultant to offshore and onshore marine diamond exploration ventures. Expertise includes:

- Coastal plain and shelf stratigraphy (interpretation of open-pit exposures, on/offshore cores and exploration drilling).
- Sedimentology and palaeoenvironmental interpretation of shallow marine, aeolian and other terrestrial surficial deposits.
- Marine macrofossil taxonomy (molluscs, barnacles, brachiopods) and biostratigraphy.
- Marine macrofossil taphonomy.
- Sedimentological and palaeontological field techniques in open-cast mines (including finding and excavation of vertebrate fossils (bones)).

### Membership of Professional Bodies

- South African Council of Natural Scientific Professions. Earth Science. Reg. No. 400094/95.
- Geological Society of South Africa.
- Palaeontological Society of Southern Africa.
- Southern African Society for Quaternary Research.
- Association of Professional Heritage Practitioners (APHP), Western Cape. Accredited Member No. 48.

### Past Clients Palaeontological Assessments

AECOM SA (Pty) Ltd.	Guillaume Nel Environmental Management Consultants.
Agency for Cultural Resource Management (ACRM).	Klomp Group.
AMATHEMBA Environmental.	Megan Anderson, Landscape Architect.
Anél Blygnaut Environmental Consultants.	Ninham Shand (Pty) Ltd.
Arcus Gibb (Pty) Ltd.	PD Naidoo & Associates (Pty) Ltd.
ASHA Consulting (Pty) Ltd.	Perception Environmental Planning.
Aurecon SA (Pty) Ltd.	PHS Consulting.
BKS (Pty) Ltd. Engineering and Management.	Resource Management Services.
Bridgette O'Donoghue Heritage Consultant.	Robin Ellis, Heritage Impact Assessor.
Cape Archaeology, Dr Mary Patrick.	Savannah Environmental (Pty) Ltd.
Cape EAPrac (Cape Environmental Assessment Practitioners).	Sharples Environmental Services cc
CCA Environmental (Pty) Ltd.	Site Plan Consulting (Pty) Ltd.
Centre for Heritage & Archaeological Resource Management (CHARM).	SRK Consulting (South Africa) (Pty) Ltd.
Chand Environmental Consultants.	Strategic Environmental Focus (Pty) Ltd.
CK Rumboll & Partners.	UCT Archaeology Contracts Office (ACO).
CNdV Africa	UCT Environmental Evaluation Unit
CSIR - Environmental Management Services.	Urban Dynamics.
Digby Wells & Associates (Pty) Ltd.	Van Zyl Environmental Consultants
Enviro Logic	Western Cape Environmental Consultants (Pty) Ltd, t/a ENVIRO DINAMIK.
Environmental Resources Management SA (ERM).	Wethu Investment Group Ltd.
Greenmined Environmental	Withers Environmental Consultants.

### Stratigraphic consulting including palaeontology

Afri-Can Marine Minerals Corp	Council for Geoscience
De Beers Marine (SA) Pty Ltd.	De Beers Namaqualand Mines.
Geological Survey Namibia	IZIKO South African Museum.
Namakwa Sands (Pty) Ltd	NAMDEB