



APPENDIX 12: Palaeontology Impact Assessment

FINAL ENVIRONMENTAL IMPACT ASSESSMENT REPORT

**SCOPING & ENVIRONMENTAL IMPACT ASSESSMENT (S&EIA) FOR THE
PROPOSED 2 MEGALITRES PER DAY (MLD) SOLAR POWERED SEAWATER
DESALINATION PLANT IN THE PORT OF EAST LONDON, BUFFALO CITY
METROPOLITAN MUNICIPALITY, EASTERN CAPE PROVINCE, BY TRANSNET
NATIONAL PORTS AUTHORITY**

DFFE EA Application Reference Number: 14/12/16/3/3/2/2845

September 2026



ANCHOR
environmental

PART OF



**Palaeontological Impact Assessment for the
proposed 2ML/D Solar powered seawater
desalination plant at the Port of East London, for
Transnet National Ports Authority,
Eastern Cape Province**

Desktop Study (Phase 1)

For

TerraMare Archaeology (Pty) Ltd

Draft: 13 December 2024

Final: 8 May 2025

Prof Marion Bamford

Palaeobotanist

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Johannesburg, South Africa

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Expertise of Specialist

The Palaeontologist Consultant: Prof Marion Bamford

Qualifications: PhD (Wits Univ, 1990); FRSSAf, mASSAf, PSSA

Experience: 35 years research and lecturing in Palaeontology

27 years PIA studies and over 350 projects completed

Declaration of Independence

This report has been compiled by Professor Marion Bamford, of the University of the Witwatersrand, sub-contracted by TerraMare Archaeology (Pty) Ltd, Cape Town, South Africa. The views expressed in this report are entirely those of the author and no other interest was displayed during the decision-making process for the Project.

Specialist: Prof Marion Bamford

Signature: *MKBamford*

Executive Summary

A Palaeontological Impact Assessment was requested for the proposed 2ML/D Solar powered seawater desalination plant at the Port of East London, Buffalo City Metropolitan Municipality, for Transnet National Ports Authority, Western Cape Province.

To comply with the regulations of the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA), a desktop Palaeontological Impact Assessment (PIA) was completed for the proposed development.

The proposed site lies on the potentially very highly sensitive sands of the Nanaga Formation, Algoa Group of Quaternary age, that might preserve fossil marine shells but they in fact very rare and frequently very weathered. Nonetheless, a Fossil Chance Find Protocol should be added to the EMPr. Based on this information it is recommended that no further palaeontological impact assessment is required unless fossils are found by the contractor, environmental officer or other designated responsible person once excavation activities have commenced. Since the impact will be low, as far as the palaeontology is concerned, the project should be authorised.

ASPECT	SCREENING TOOL SENSITIVITY	VERIFIED SENSITIVITY	OUTCOME STATEMENT/ PLAN OF STUDY	RELEVANT SECTION MOTIVATING VERIFICATION
Palaeontology	Very High	Low	Palaeontological Impact Assessment	Section 7.2. SAHRA Requirements

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Figure 3: SAHRIS palaeosensitivity map for the site for the proposed Desalination Plant and infrastructure for TNPA East London shown within the yellow rectangles. Background colours indicate the following degrees of sensitivity: red = very highly sensitive; orange/yellow = high; green = moderate; blue = low; grey = insignificant/zero. 9

Figure 4: Photographs of modern and fossil marine shells to assist the on-site responsible person. Note – it is difficult to distinguished between fossil and modern forms. 1

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Figure 4: Photographs of modern and fossil marine shells to assist the on-site responsible person. Note – it is difficult to distinguished between fossil and modern forms. 1

1. Background

Transnet National Ports Authority (TNPA) is applying for Environmental Authorisation (EA) for the construction and operation of a reverse osmosis (RO) desalination plant with the purpose of producing fresh potable water from saltwater, which has been abstracted from the estuarine/ marine environment. The proposed development will be situated within the Port of East London, in the Buffalo City Metropolitan Municipality, Eastern Cape Province (Figure 1). Although alternatives were initially considered and assessed as part of this study, these options have since been screened out by the engineering team.

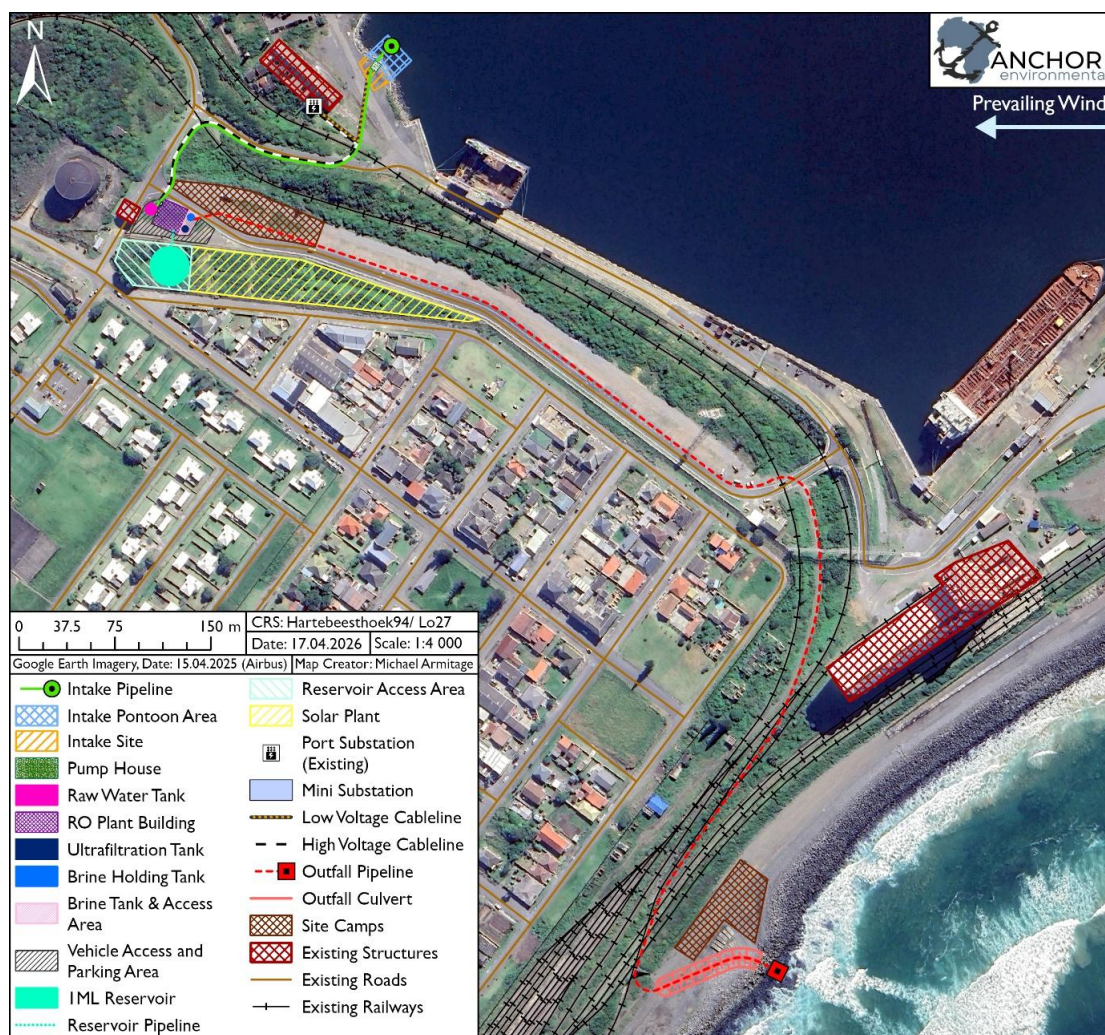


Figure 1: Aerial Earth Map of the preferred development layout of the proposed desalination plant for TNPA at the Port of East London. Map supplied by Anchor Environmental.

Approximately 5 500 cubic meters (m^3) (5.5 Megalitres (ML) or 5.5 million litres) of saline water will be abstracted daily from the Buffalo River Estuary and desalinated (salt removed) at the RO plant to produce potable water (freshwater), which meets SANS 241

standards. Some of the water will be stored in a 1000 cubic metres (1 ML) freshwater reservoir. During the initial stages of the project, freshwater production will be approximately 500 cubic metres per day (0.5 ML per day (MLD)) and will gradually increase as the project advances. At full capacity, the plant will produce 2 000 cubic metres (2 MLD / two million litres). This water will be used to support port operations and reduce dependence on municipal water supplies. The desalination plant will be powered by a hybrid system that uses both solar energy and municipal grid electricity with the former being primary. If more electricity is generated than needed, batteries might be used in the future to store excess electricity in containers housed at the RO plant site. Brine, a by-product of desalination with elevated salt concentrations, will be discharged via a pipeline to a marine outfall where rapid dilution with ocean water is expected. It should be noted that brine is classified as effluent and may contain traces of chemicals used during the desalination process (such as cleaning agents and anti-scalants), but at highly periodic and very dilute concentrations.

A Palaeontological Impact Assessment was requested for the TNPA Port of East London desalination project. To comply with the regulations of the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA), a desktop Palaeontological Impact Assessment (PIA) was completed for the proposed development and is reported herein.

Table 1: National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and Environmental Impact Assessment (EIA) Regulations, 2014 (as amended) - Requirements for Specialist Reports (Appendix 6). Includes the requirements from GNR Appendix 6 of GN 326 EIA Regulation 2017.

	A specialist report prepared in terms of the Environmental Impact Regulations of 2017 must contain:	Relevant section in report
ai	Details of the specialist who prepared the report,	Appendix B
aii	The expertise of that person to compile a specialist report including a curriculum vitae	Appendix B
b	A declaration that the person is independent in a form as may be specified by the competent authority	Page 1
c	An indication of the scope of, and the purpose for which, the report was prepared	Section 1
ci	An indication of the quality and age of the base data used for the specialist report: SAHRIS palaeosensitivity map accessed – date of this report	Yes
cii	A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change	Section 5
d	The date and season of the site investigation and the relevance of the season to the outcome of the assessment	N/A
e	A description of the methodology adopted in preparing the report or carrying out the specialised process	Section 2

	A specialist report prepared in terms of the Environmental Impact Regulations of 2017 must contain:	Relevant section in report
f	The specific identified sensitivity of the site related to the activity and its associated structures and infrastructure	Section 4
g	An identification of any areas to be avoided, including buffers	N/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;	N/A
i	A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 5
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	Section 4
k	Any mitigation measures for inclusion in the EMPr	Section 8, Appendix A
l	Any conditions for inclusion in the environmental authorisation	N/A
m	Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 8, Appendix A
ni	A reasoned opinion as to whether the proposed activity or portions thereof should be authorised	Section 6
nii	If the opinion is that the proposed activity 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	Sections 6, 8
o	A description of any consultation process that was undertaken during the course of carrying out the study	N/A
p	A summary and copies of any comments that were received during any consultation process	N/A
q	Any other information requested by the competent authority.	N/A
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.	N/A

2. Methods and Terms of Reference

The Terms of Reference (ToR) for this study were to undertake a PIA and provide feasible management measures to comply with the requirements of SAHRA.

The methods employed to address the ToR included:

1. Consultation of geological maps, literature, palaeontological databases, published and unpublished records to determine the likelihood of fossils occurring in the affected areas. Sources include records housed at the Evolutionary Studies Institute at the University of the Witwatersrand and SAHRA databases; eg <https://sahris.sahra.org.za/map/palaeo>
2. Where necessary, site visits by a qualified palaeontologist to locate any fossils and assess their importance (*not applicable to this assessment*);
3. Where appropriate, collection of unique or rare fossils with the necessary permits for storage and curation at an appropriate facility (*not applicable to this assessment*); and
4. Determination of fossils' representativity or scientific importance to decide if the fossils can be destroyed or a representative sample collected (*not applicable to this assessment*).

3. Geology and Palaeontology

i. Project location and geological context

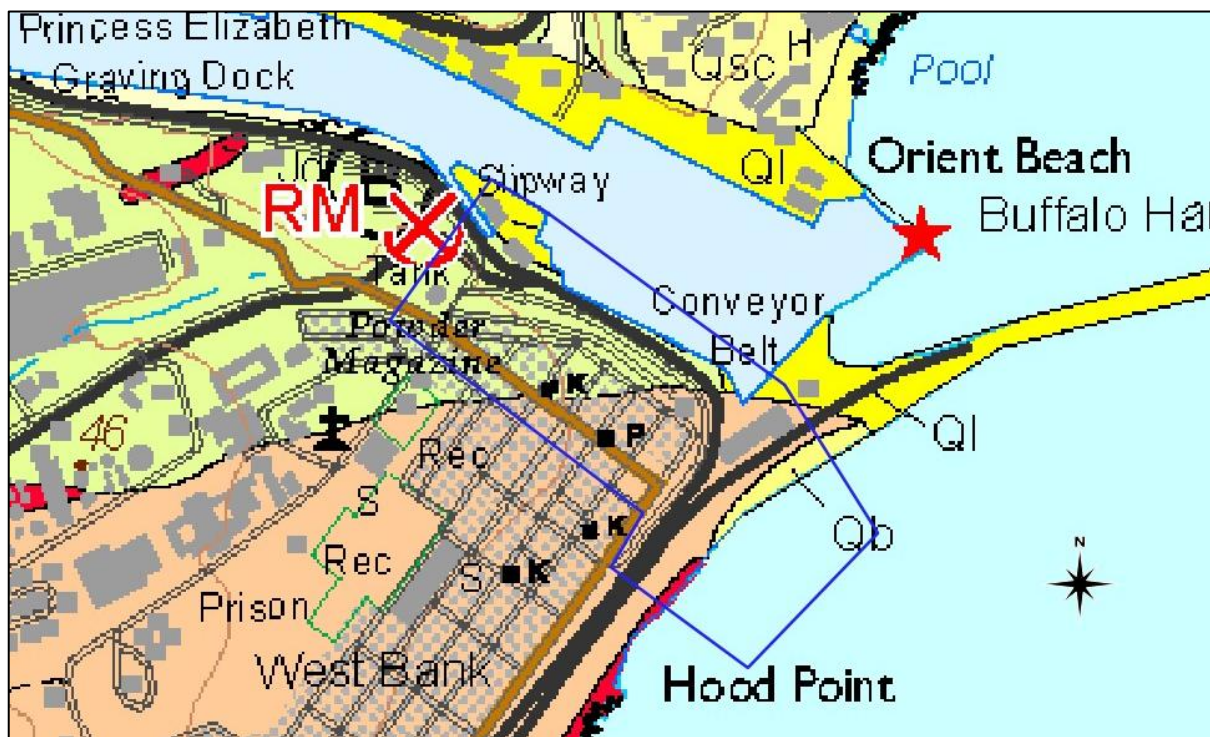


Figure 2: Geological map of the area around the Port of East London. The location of the proposed project is indicated within the blue polygon. Abbreviations of the rock types are explained in Table 2. Map enlarged from the Geological Survey 1: 50 000 map 3327BB East London.

Table 2: Explanation of symbols for the geological map and approximate ages (Johnson et al., 2006; Roberts et al., 2006). SG = Supergroup; Fm = Formation; Ma = million years; grey shading = formations impacted by the project.

Symbol	Group/Formation	Lithology	Approximate Age
Qn	Nahoon Fm, Algoa Group	Calcareous sandstone (aeolian), palaeosols	Pleistocene
Qs	Salnova Fm, Algoa Group	Calcareous sandstone, conglomerate, coquinite	Pleistocene
Cn	Nanaga Fm, Algoa Group	Calcareous sandstone (aeolian), sandy limestone	Plio-Pleistocene
Ta	Alexandria Fm, Algoa Group	Conglomerate, calcareous sandstone, coquinite	Miocene-Pliocene
Jd	Jurassic Dolerite	dolerite	Jurassic Ca 183 Ma
Pb	Balfour Fm, Adelaide Subgroup, Beaufort Group, Karoo SG	Grey mudstone, sandstone	Late Permian Ca 256-252 Ma
Pm	Middelton Fm, Adelaide subgroup, Beaufort Group, Karoo SG	Grey and red mudstone, sandstone	Middle Permian Ca 260–256 Ma

The project lies in the southeastern margin of the Karoo Basin where the Adelaide Subgroup rocks of the Beaufort Group are exposed (Figure 2). They are unconformably overlain by the much younger Algoa Group sands.

Overlying the Ecca Group are the rocks of the Beaufort Group that has been divided into the lower **Adelaide Subgroup** for the Upper Permian strata, and the Tarkastad Subgroup for the Early to Middle Triassic strata. As with the older Karoo sediments, the formations vary across the Karoo Basin.

In this part of the basin, east of 24°E, three formations are recognised in the Adelaide Subgroup, the basal Koonap Formation, the Middleton Formation and the thick Balfour Formation. The latter has been divided into five members, from the base up are the Oudeberg, Daggaboersnek, Ripplemead, Elandsberg and Palingkloof Members. The topmost member is in the Triassic (Rubidge, 2005; Smith et al., 2020).

The Cenozoic Algoa Group extends along the entire Eastern Cape coast and has been divided into six formations (Roberts et al., 2006). The basal Bathurst Formation, centred around the town of Bathurst, comprises a soft marine limestone at its base, with overlying pebbly coquina. It is Eocene in age and rests unconformably on Karoo Supergroup bedrock (ibid). the next formation is the Alexandria Formation that is composed of three strata, a basal conglomerate with scattered oyster shell, pebbly coquinite overlain with calcareous sandstone, horizontal lamination and herringbone cross-bedding. The Alexandra Formation is Miocene to Pliocene in age and is overlain by the very thick **Nanaga Formation** that is composed of semi-consolidated calcareous sandstone with aeolian cross-bedding (Roberts et al., 2006; Hassan et al., 2022). The Salnova Formation is much thinner and sporadic with the incorporation of some of the underlying reworked Alexandra Formation materials. The Nahoon Formation aeolianites rests on Mesozoic

rocks or disconformably on the Salnova Formation. It has some very high dunes and represents the lithification of aeolian sands prior to the Eemian highstand (Roberts et al., 2006). The topmost layer, the Skelm Hoek Formation, represents the most recent phase of aeolian sedimentation and occurs extensively along the Eastern Cape Coast.

ii. Palaeontological context

The palaeontological sensitivity of the area under consideration is presented in Figure 3. The site for development is in the Nanaga Formation.

A small section of the project is underlain by the Middleton Formation that is indicated as very highly sensitive (red) but this is more applicable to the central Karoo Basin that has not been impacted by sea-level rise. There are no records of Permian vertebrates or plants from this area which is mostly covered by sands and alluvium.

The Plio-Pleistocene Nanaga Formation aeolianites are indicated as very highly sensitive (red) because there are rare occurrences of oyster beds, invertebrate marine shells from road-cuttings farther inland (Goedhart and Hattingh, 1997). A palaeosensitivity of LOW is recommended by Almond (2011) with mitigation not required unless rich fossil accumulations are exposed during excavations. Much of the exposed aeolianites have been degraded due to extensive post-depositional diagenesis, such as dissolution and re-precipitation of carbonate by groundwater (Roberts et al., 2006; Almond, 2011).

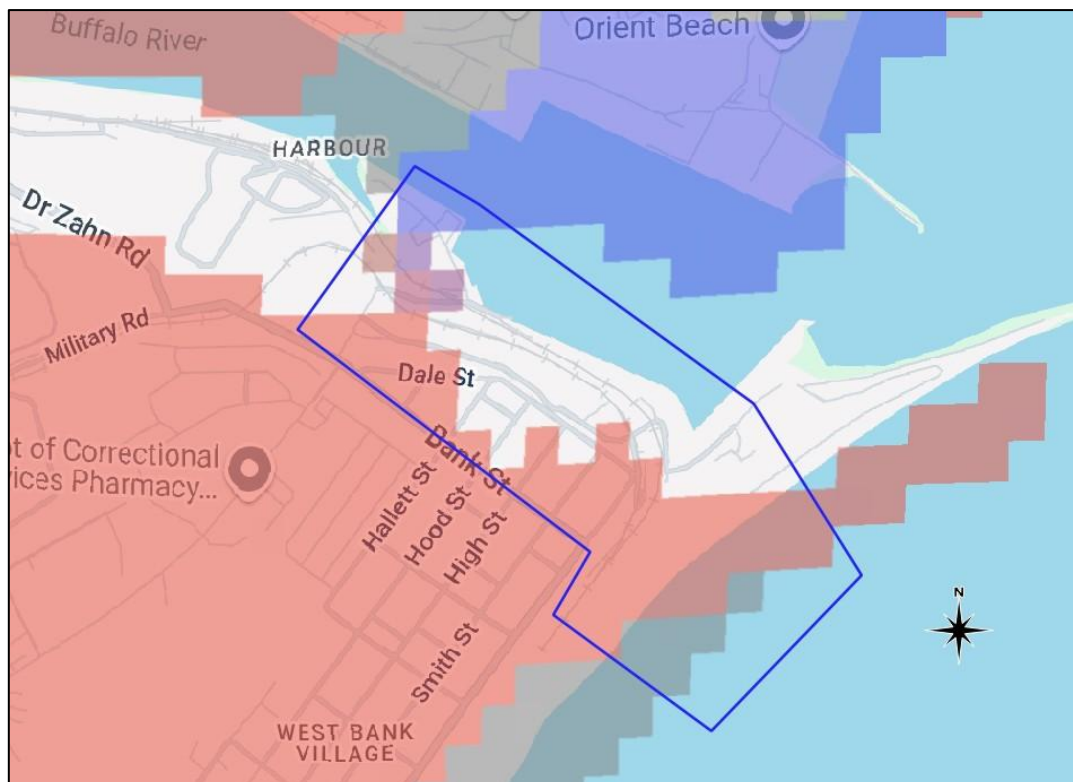


Figure 3: SAHRIS palaeosensitivity map for the site for the proposed Desalination Plant and infrastructure for TNPA East London shown within the yellow rectangles.

Background colours indicate the following degrees of sensitivity: red = very highly sensitive; orange/yellow = high; green = moderate; blue = low; grey = insignificant/zero.

From the SAHRIS map above the area is indicated as very highly sensitive (red) for the Nanaga Formation but this is not correct as explained above.

4. Impact assessment

An assessment of the potential impacts to possible palaeontological resources considers the criteria encapsulated in Table 3:

Table 3a: Criteria for assessing impacts

PART A: DEFINITION AND CRITERIA		
Criteria for ranking of the SEVERITY/NATURE of environmental impacts	H	Substantial deterioration (death, illness or injury). Recommended level will often be violated. Vigorous community action.
	M	Moderate/ measurable deterioration (discomfort). Recommended level will occasionally be violated. Widespread complaints.
	L	Minor deterioration (nuisance or minor deterioration). Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints.
	L+	Minor improvement. Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints.
	M+	Moderate improvement. Will be within or better than the recommended level. No observed reaction.
	H+	Substantial improvement. Will be within or better than the recommended level. Favourable publicity.
Criteria for ranking the DURATION of impacts	L	Quickly reversible. Less than the project life. Short term
	M	Reversible over time. Life of the project. Medium term
	H	Permanent. Beyond closure. Long term.
Criteria for ranking the SPATIAL SCALE of impacts	L	Localised - Within the site boundary.
	M	Fairly widespread – Beyond the site boundary. Local
	H	Widespread – Far beyond site boundary. Regional/ national
PROBABILITY (of exposure to impacts)	H	Definite/ Continuous
	M	Possible/ frequent
	L	Unlikely/ seldom

Table 3b: Impact Assessment

PART B: Assessment		
SEVERITY/NATURE	H	-
	M	-
	L	Soils and sand do not preserve fossils; so far there are no records from the Nanaga Fm of plant or animal fossils, only rarely shells occur in this region so it is very unlikely that fossils occur on the site. The impact would be negligible
	L+	-

PART B: Assessment		
	M+	-
	H+	-
DURATION	L	-
	M	-
	H	Where manifest, the impact will be permanent.
SPATIAL SCALE	L	Since the only possible fossils within the area would be marine fossil shells in the aeolianites, the spatial scale will be localised within the site boundary.
	M	-
	H	-
PROBABILITY	H	-
	M	-
	L	It is extremely unlikely that any fossils would be found in the loose soils and sands that cover the area or in the aeolianites, of present, that might be excavated. Nonetheless, a Fossil Chance Find Protocol should be added to the eventual EMPr.

Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks are too transported and friable to contain fossils. Furthermore, the material to be excavated for foundations is soil and sand and they do not preserve fossils. Since there is an extremely small chance that fossils from the Nanaga Formation may be disturbed a Fossil Chance Find Protocol has been added to this report. Taking account of the defined criteria, the potential impact to fossil heritage resources is low.

5. Assumptions and uncertainties

Based on the geology of the area and the palaeontological record as we know it, it can be assumed that the formation and layout of the aeolianites, sandstones, shales and sands are typical for the country and only some might contain fossil invertebrate material. The sands of the Quaternary period would not preserve fossils.

6. Recommendation

Based on experience and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would be preserved in the overlying soils of the Quaternary. There is a very small chance that fossils may occur in the aeolianites of the Quaternary Nanaga Formation (Algoa Group) so a Fossil Chance Find Protocol should be added to the EMPr. If fossils are found by the environmental officer, or other responsible person once excavations for foundations have commenced then they should be rescued and ECPHRA notified to determine whether a palaeontologist should be called to assess and collect a representative sample. The impact on the palaeontological heritage would be low, as far as the palaeontology is concerned, so the project should be authorised.

ASPECT	SCREENING TOOL SENSITIVITY	VERIFIED SENSITIVITY	OUTCOME STATEMENT/ PLAN OF STUDY	RELEVANT SECTION MOTIVATING VERIFICATION
Palaeontology	Very High	Low	Palaeontological Impact Assessment	Section 7.2. SAHRA Requirements

7. References

Almond, J. 2010 (March). Algoa group in: Palaeontological impact Assessment for the IDZ Coega.

Hassan, S.M., Anderson, C.R., de Wit, M.J., 2022. Facies analyses and depositional environments of the Mio-Pliocene Alexandria Formation, Algoa Basin, South Africa. *Journal of African Earth Sciences* 192 (104555).

Hattingh, J., Goedhart, M.L., 1997. Neotectonic control on drainage evolution in the Algoa basin, southeastern Cape Province. *South African Journal of Geology* 100, 43–52.

Johnson, M.R., van Vuuren, C.J., Visser, J.N.J., Cole, D.I., Wickens, H.deV., Christie, A.D.M., Roberts, D.L., Brandl, G., 2006. Sedimentary rocks of the Karoo Supergroup. In: Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J., (Eds). *The Geology of South Africa*. Geological Society of South Africa, Johannesburg / Council for Geoscience, Pretoria. Pp 461 – 499.

Plumstead, E.P., 1969. Three thousand million years of plant life in Africa. Geological Society of southern Africa, Annexure to Volume LXXII. 72pp + 25 plates.

Roberts, D.L., Botha, G.A., Maud, R.R., Pether, J., 2006. Coastal Cenozoic deposits. In: Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J., (Eds). *The Geology of South Africa*. Geological Society of South Africa, Johannesburg / Council for Geoscience, Pretoria. Pp 605-628.

8. Chance Find Protocol

Monitoring Programme for Palaeontology – to commence once the excavations / drilling activities begin.

1. The following procedure is only required if fossils are seen on the surface and when drilling/excavations commence.
2. When excavations begin the rocks and discard must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (plants, insects, bone or coal) should be put aside in a suitably protected place. This way the project activities will not be interrupted.
3. Photographs of similar fossils must be provided to the developer to assist in recognizing the fossil plants, vertebrates, invertebrates or trace fossils in the shales and mudstones (for example see Figure 4). This information will be built into the EMP's training and awareness plan and procedures.
4. Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.
5. If there is any possible fossil material found by the developer/environmental officer then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the selected material and check the dumps where feasible.
6. Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site an ECPHRA or SAHRA permit must be obtained. Annual reports must be submitted to ECPHRA or SAHRA as required by the relevant permits.
7. If no good fossil material is recovered then no site inspections by the palaeontologist will be necessary. A final report by the palaeontologist must be sent to ECPHRA or SAHRA once the project has been completed and only if there are fossils.
8. If no fossils are found and the excavations have finished then no further monitoring is required.

9. Appendix A – Examples of fossils from the Algoa Group.



Figure 4: Photographs of modern and fossil marine shells to assist the on-site responsible person. Note – it is difficult to distinguished between fossil and modern forms.

10. Appendix B – Details of specialist

Curriculum vitae (short) - Marion Bamford PhD July 2024

Present employment: Professor; Director of the Evolutionary Studies Institute.
Member Management Committee of the NRF/DSI Centre of Excellence Palaeosciences, University of the Witwatersrand, Johannesburg, South Africa

Telephone : +27 11 717 6690
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ii) Academic qualifications

Tertiary Education: All at the University of the Witwatersrand:

1980-1982: BSc, majors in Botany and Microbiology. Graduated April 1983.

1983: BSc Honours, Botany and Palaeobotany. Graduated April 1984.

1984-1986: MSc in Palaeobotany. Graduated with Distinction, November 1986.

1986-1989: PhD in Palaeobotany. Graduated in June 1990.

iii) Professional qualifications

Wood Anatomy Training (overseas as nothing was available in South Africa):

1994 - Service d'Anatomie des Bois, Musée Royal de l'Afrique Centrale, Tervuren, Belgium, by Roger Dechamps

1997 - Université Pierre et Marie Curie, Paris, France, by Dr Jean-Claude Koeniguer

1997 - Université Claude Bernard, Lyon, France by Prof Georges Barale, Dr Jean-Pierre Gros, and Dr Marc Philippe

iv) Membership of professional bodies/associations

Palaeontological Society of Southern Africa

Royal Society of Southern Africa - Fellow: 2006 onwards

Academy of Sciences of South Africa - Member: Oct 2014 onwards

International Association of Wood Anatomists - First enrolled: January 1991

International Organization of Palaeobotany – 1993+

Botanical Society of South Africa

South African Committee on Stratigraphy – Biostratigraphy - 1997 - 2016

SASQUA (South African Society for Quaternary Research) – 1997+

PAGES - 2008 –onwards: South African representative

ROCEEH / WAVE – 2008+

INQUA – PALCOMM – 2011+onwards

v) Supervision of Higher Degrees

All at Wits University

Degree	Graduated/completed	Current
Honours	13	0
Masters	13	3
PhD	13	7
Postdoctoral fellows	14	4

vi) Undergraduate teaching

Geology II – Palaeobotany GEOL2008 – average 65 students per year

Biology III – Palaeobotany APES3029 – average 25 students per year

Honours – Evolution of Terrestrial Ecosystems; African Plio-Pleistocene Palaeoecology;

Micropalaeontology – average 12 - 20 students per year.

vii) Editing and reviewing

Editor: *Palaeontologia africana*: 2003 to 2013; 2014 – Assistant editor

Guest Editor: *Quaternary International*: 2005 volume

Member of Board of Review: *Review of Palaeobotany and Palynology*: 2010 –

Associate Editor: *Cretaceous Research*: 2018-2020

Associate Editor: *Royal Society Open*: 2021 -

Review of manuscripts for ISI-listed journals: 30 local and international journals

viii) Palaeontological Impact Assessments

27 years' experience in PIA site and desktop projects

Selected from recent projects only – list not complete:

- Beaufort West PV Facility 2021 for ACO Associates
- Copper Sunset MR 2021 for Digby Wells
- Sannaspos PV facility 2021 for CTS Heritage
- Smithfield-Rouxville-Zastron PL 2021 for TheroServe
- Glosam Mine 2022 for AHSA
- Wolf-Skilpad-Grassridge OHPL 2022 for Zutari
- Iziduli and Msenge WEFs 2022 for CTS Heritage
- Hendrina North and South WEFs & SEFs 2022 for Cabanga
- Dealesville-Springhaas SEFs 2022 for GIBB Environmental
- Vhuvhili and Mukondeleli SEFs 2022 for CSIR
- Chemwes & Stilfontein SEFs 2022 for CTS Heritage
- Equestria Exts housing 2022 for Beyond Heritage
- Zeerust Salene boreholes 2022 for Prescali
- Tsakane Sewer upgrade 2022 for Tsimba
- Transnet MPP inland and coastal 2022 for ENVASS
- Ruighoek PRA 2022 for SLR Consulting (Africa)
- Namli MRA Steinkopf 2022 for Beyond Heritage
- Adara 2 SEF 2023 for CTS Heritage
- Buffalo & Lyra SEFs 2023 for Nextec
- Camel Thorn Group Prospecting Rights 2023 for AHSA
- Dalmanutha SEFs 2023 for Beyond Heritage

- Elandsfontein Residential 2023 for Beyond Heritage
- Waterkloof Samancor 2023 for Elemental Sustainability
- Zonnebloem WTP 2023 for WSP
- Elders Irrigation 2023 for SRK
- Leghoya WEFS 2023 for Red Cap & SLR

ix) **Research Output**

Publications by M K Bamford up to July 2024 peer-reviewed journals or scholarly books: over 175 articles published; 5 submitted/in press; 14 book chapters.

Scopus h-index = 32; Google Scholar h-index = 40; -i10-index = 121 based on 7261 citations.

Conferences: numerous presentations at local and international conferences.

Curriculum vitae (short) - Marion Bamford PhD

May 2026

Present employment: Professor; Director of the Evolutionary Studies Institute, University of the Witwatersrand, Johannesburg, South Africa. Co-Director Wits-CNRS International Research Centre

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Cell : 082 555 6937
E-mail : marion.bamford@wits.ac.za ; marionbamford12@gmail.com

ii) Academic qualifications

Tertiary Education: All at the University of the Witwatersrand:

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1997 - Université Pierre et Marie Curie, Paris, France, by Dr Jean-Claude Koeniguer

1997 - Université Claude Bernard, Lyon, France by Prof Georges Barale, Dr Jean-Pierre Gros, and Dr Marc Philippe

iv) Membership of professional bodies/associations

Palaeontological Society of Southern Africa

Royal Society of Southern Africa - Fellow: 2006 onwards

Academy of Sciences of South Africa - Member: Oct 2014 onwards

International Association of Wood Anatomists - First enrolled: January 1991

International Organization of Palaeobotany - 1993+

Botanical Society of South Africa

South African Committee on Stratigraphy - Biostratigraphy - 1997 - 2016

SASQUA (South African Society for Quaternary Research) - 1997+

PAGES - 2008 -onwards: South African representative

ROCEEH / WAVE - 2008+

INQUA - PALCOMM - 2011+onwards

v) Supervision of Higher Degrees

All at Wits University

Degree	Graduated/completed	Current
Honours	13	1
Masters	16	0
PhD	19	2

Postdoctoral fellows	15	3
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vi) **Undergraduate teaching**

Geology II – Palaeobotany GEOL2008 – average 65 students per year

Biology III – Palaeobotany APES3029 – average 25 students per year

Honours – Evolution of Terrestrial Ecosystems; African Plio-Pleistocene Palaeoecology;

Micropalaeontology – average 12 - 20 students per year.

vii) **Editing and reviewing**

Editor: *Palaeontologia africana*: 2003 to 2013; 2014 – Assistant editor

Guest Editor: *Quaternary International*: 2005 volume

Member of Board of Review: *Review of Palaeobotany and Palynology*: 2010 –

Associate Editor: *Cretaceous Research*: 2018-2020

Review of manuscripts for ISI-listed journals: 30 local and international journals

viii) **Palaeontological Impact Assessments**

28 years' experience in PIA site and desktop projects with over 450 projects completed.

Selected from recent projects only – list not complete:

- Buffalo & Lyra SEFs 2023 for Nextec
- Camel Thorn Group Prospecting Rights 2023 for AHSA
- Dalmanutha SEFs 2023 for Beyond Heritage
- Elandsfontein Residential 2023 for Beyond Heritage
- Waterkloof Samancor 2023 for Elemental Sustainability
- Zonnebloem WTP 2023 for WSP
- Elders Irrigation 2023 for SRK
- Leghoya WEFS 2023 for Red Cap & SLR
- Aberdeen Solar 1,2,3 2024 for Beyond Heritage
- BeauNero Mining 2024 for Lwethuma
- Brakfontein 264 IR Mining 2024 for Eco-elementum
- Hugo & Khoa SEFs 2024 for TerraMare
- Pakamani Senior Sec. School 2025 for Afroteam
- Ufudu SEF and Grid 2025 for CES
- Bloemhoek SEF 2025 for Beyond Heritage
- Carolina township 2026 for AEB
- Exxarro Grootgeluk Dam 2026 for Shangoni
- Gromis-Nama-Groeipunt PL 2026 for Nsovo
- Kangra Coal SEFs 2026 for Envass

ix) **Research Output**

Publications by M K Bamford up to May 2026 peer-reviewed journals or scholarly books: over 210 articles published; 5 submitted/in press; 18 book chapters.

Scopus h-index = 35; Google Scholar h-index = 48; i10-index = 149 based on 9145 citations.

Conferences: numerous presentations at local and international conferences.



forestry, fisheries & the environment

Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

Private Bag X447, Pretoria, 0001, Environment House, 473 Steve Biko Road, Pretoria, 0002 Tel: +27 12 399 9000, Fax: +27 86 625 1042

SPECIALIST DECLARATION FORM – AUGUST 2023

Specialist Declaration form for assessments undertaken for application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

REPORT TITLE

Port of East London desalination plant

Kindly note the following:

1. This form must always be used for assessment that are in support of applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting, where this Department is the Competent Authority.
2. This form is current as of August 2023. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at <https://www.dffe.gov.za/documents/forms>.
3. An electronic copy of the signed declaration form must be appended to all Draft and Final Reports submitted to the department for consideration.
4. The specialist must be aware of and comply with 'the Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the act, when applying for environmental authorisation - GN 320/2020', where applicable.

1. SPECIALIST INFORMATION

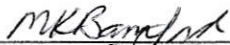
Title of Specialist Assessment	Palaeontology
Specialist Company Name	Marion Bamford Consulting
Specialist Name	Marion Bamford
Specialist Identity Number	Click or tap here to enter text.
Specialist Qualifications:	PhD Palaeontology
Professional affiliation/registration:	PSSA, SASQUA, INQUA, IOP, FRSSAf, mASSAf
Physical address:	42A Eighth Avenue Parktown North
Postal address:	PO Box 652
Postal address	2050
Telephone	0117176690
Cell phone	0825556937
E-mail	

SPECIALIST DECLARATION FORM – AUGUST 2023

2. DECLARATION BY THE SPECIALIST

I, Marion Bamford, declare that –

- I act as the independent specialist in this application;
- I am aware of the procedures and requirements for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act (NEMA), 1998, as amended, when applying for environmental authorisation which were promulgated in Government Notice No. 320 of 20 March 2020 (i.e. "the Protocols") and in Government Notice No. 1150 of 30 October 2020.
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing –
 - any decision to be taken with respect to the application by the competent authority; and;
 - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 48 and is punishable in terms of section 24F of the NEMA Act.



Signature of the Specialist

Click or tap here to enter text.

Name of Company:



Click or tap to enter a date.

Date

SPECIALIST DECLARATION FORM – AUGUST 2023

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, Marion Bamford, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

MKBamford
Signature of the Specialist

Click or tap here to enter text.

Name of Company

18 May 2026
Click or tap here to enter text.

Date

Click or tap here to enter text.

Signature of the Commissioner of Oaths

Click or tap to enter a date.

Date

I certify that the DEPONENT has acknowledged that he/she knows and understands the contents of this affidavit, that he/she does not have any objection to taking the oath, and that he/she considers it to be binding on his/her conscience, and which was sworn to and signed before me	
at <u>18</u>	on this day of <u>MAY</u> 20 <u>26</u>
and that the administering oath complied with the regulations contained in Government Gazette No. R 1258 of 21 July 1972, as amended.	
Signature: <u>[Signature]</u>	
Name: <u>T. KRUGER</u>	
Commissioner of Oaths, District of Johannesburg	
Ex Officio Title: <u>PAYROLL</u>	
Faculty/Office: <u>FINANCE</u>	
University of the Witwatersrand, Johannesburg,	
1 Jan Smuts Avenue, Braamfontein 2000; Johannesburg	