Proposed Umgeni Water Desalination Plant and associated infrastructure at Tongaat
eThekweni Municipality, KwaZulu-Natal

Prepared for

Council for Scientific and Industrial Research
Stellenbosch

Prepared by

eThembeni Cultural Heritage

Len van Schalkwyk
Box 20057 Ashburton 3213 Pietermaritzburg
Telephone 033 326 1815 / 082 655 9077
thembeni@iafrica.com

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Management Summary

eThembeni Cultural Heritage was appointed by the CSIR to undertake a heritage impact assessment of the proposed Umgeni Water Desalination Plant and associated infrastructure at Tongaat, within the eThekweni Metropolitan Municipality, in terms of the National Heritage Resources Act No 25 of 1999.

The proposed desalination plant and attendant water supply infrastructure aims to ensure the promotion of sustainable economic development by serving the interests of a growing population, as well as other commercial and agricultural interests in the region. It is recognised that the future of the KwaZulu-Natal region is greatly dependent on an alternative water source to augment current supply.

eThembeni staff inspected the site on 23 February and again on 22 July 2015, completing a controlled-exclusive surface survey, as well as a database and literature search. The proposed Tongaat plant site is of low sensitivity from all aspects of archaeological heritage.

The SAHRIS Palaeosensitivity Map indicates that the area has high sensitivity. However, the proposed intake/outlet pipelines are to be tunnelled 10–15m below sea-level from the desalination plant to beyond the surf zone in the ocean. For the rest of their length thereafter the pipelines will be aligned on the sea-bed. Consequently, impacts on the sensitive foreshore are minimised.

The proposed 32kV powerline alignment between La Mercy and Mt. Moreland should be monitored by an archaeologist at tower positions and the establishment of transformer yard infrastructure, once these have been surveyed by Eskom.

The majority of the bulk water supply pipelines into the eThekweni water supply system are along existing servitudes that have been previously surveyed by eThembeni for Tongaat Hulett Developments and Dube Trade Port / ACSA (see SAHRIS Cases and Report's mapping). However, the proposed La Mercy-Waterloo Reservoir pipeline is a "greenfield" alignment to its junction with the existing Waterloo-Mhlothi Reservoirs' servitude. This too should be monitored by an archaeologist once surveyed and during inception.

Should middens, or subterranean archaeological material be exposed during these activities, a Phase Two assessment will have to determine their significance and appropriate mitigation.

A maritime archaeological assessment of the off-shore pipelines has been commissioned from Maritime Archaeologists at the African Centre for Heritage Activities. This is submitted under separate cover.

Conclusion

Accordingly, we request that Amafa aKwaZulu-Natali provide in-principle support for the proposed development to proceed, subject to the terrestrial and maritime archaeological monitoring advocated.

The client may contact the Amafa Case Officer, **Mrs. Bernadet Pawandiwa**, (Telephone **033 3946543**; Email: bernadetp@amafapmb.co.za) in due course to enquire about Amafa's decision.

If permission is granted for the development to proceed, the client is reminded that the Act requires that a developer cease all work immediately and notify Amafa should any heritage resources, as defined in the Act, be discovered during the course of development activities.

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1. Introduction

eThembeni Cultural Heritage was appointed by the CSIR to undertake a heritage impact assessment of the proposed Umgeni Water Desalination Plant and associated infrastructure at Tongaat, within the eThekweni Metropolitan Municipality, in terms of the National Heritage Resources Act No 25 of 1999 (refer to Appendix A). The proposed desalination plant and attendant water supply infrastructure aims to ensure the promotion of sustainable economic development by serving the interests of a growing population, as well as other commercial and agricultural interests in the region. It is recognised that the future of the KwaZulu-Natal region is greatly dependent on an alternative water source to augment current supply.

South Africa's heritage resources are both rich and widely diverse, encompassing sites from all periods of human history. Resources may be tangible, such as buildings and archaeological artefacts, or intangible, such as landscapes and living heritage. Their significance is based upon their aesthetic, architectural, historical, scientific, social, spiritual, linguistic, economic or technological values; their representivity of a particular time period; their rarity; and their sphere of influence.

The integrity and significance of heritage resources can be jeopardized by natural (e.g. erosion) and human (e.g. development) activities. In the case of human activities, a range of legislation exists to ensure the timeous identification and effective management of heritage resources for present and future generations.

This report represents compliance with a full Heritage Impact Assessment for the proposed development, including a Palaeontological Impact Assessment compiled by Dr Alan Smith; and a Maritime Archaeological Assessment compiled by Maritime Archaeologists at the African Centre for Heritage Activities, respectively submitted to Amafa under separate cover.

2. Terms of reference

A Heritage Impact Assessment must address the following key aspects:

- the identification and mapping of all heritage resources in the area affected;
- an assessment of the significance of such resources in terms of heritage assessment criteria set out in regulations;
- an assessment of the impact of the development on heritage resources;
- an evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;
- the results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;
- if heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and
- plans for mitigation of any adverse effects during and after completion of the proposed development.

3. Project description

eThembeni Cultural Heritage was appointed by the CSIR to undertake a heritage impact assessment of the proposed Umgeni Water Desalination Plant and associated infrastructure at Tongaat, within the eThekweni Metropolitan Municipality, KwaZulu-Natal.

The combined footprint of the desalination plant will occupy an area of ±70 000 m² (7ha). Linear Infrastructure includes –

- Seawater intake (source water) system with screening and sea-bed pipelines to the desalination plant location;
- Brine outfalls constructed in the sea and discharge sea-bed pipelines;
- Terrestrial pipelines transporting brine/permeate between the sea and the desalination plant, and existing bulk water infrastructure;
- A source water pump station located at the desalination plant operational site;
- Electrical power line and transformer yard infrastructure; and
- Bulk water supply reticulation into the eThekweni water supply system.

(See Figure 1 and Appendix D)

4. Project location

Tongaat is a sugarcane growing township in KwaZulu-Natal situated on the banks of the Tongati River about 37 km north of Durban. It now forms part of eThekwini, the Greater Durban metropolitan area. Its population is predominantly people of Indian descent who arrived in the Natal Colony in the late 1860's as indentured labour for the expanding sugar industry.[1] Aesthetically English colonial but distinctly cosmopolitan in flavour, the Tongaat district once supported one of the largest sugar-producing districts in the world. Today, rapid residential, commercial and light industrial developments, most associated with the Dube Trade Port and King Shaka International Airport, are fundamentally transforming the previously rural landscape.

Tongaat was established in 1845 and its name was corrupted from the river's name, Tongati, the Zulu word for the Strychnos *spp* trees that flourished on its banks. It comprises a number of townships, those of relevance to this study being Tongaat Beach, Desainager and La Mercy.[2]

The location of the proposed desalination plant is along South Dune Road at Desainager (29°37'22.38"S 31°e8'48.35"E) and comprises about 7ha of currently farmed market-gardens (See Figure 2).

The relevant map sheet is 2831 CA Verulum.

[1]125 Years -The Arrival of Natal's Indians in Pictures. http://natalia.org.za/Files/15/Natalia%20v15%20article%20p18-35%20C.pdf

[2] http://www.southafrica.com/kwazulu-natal/tongaat/

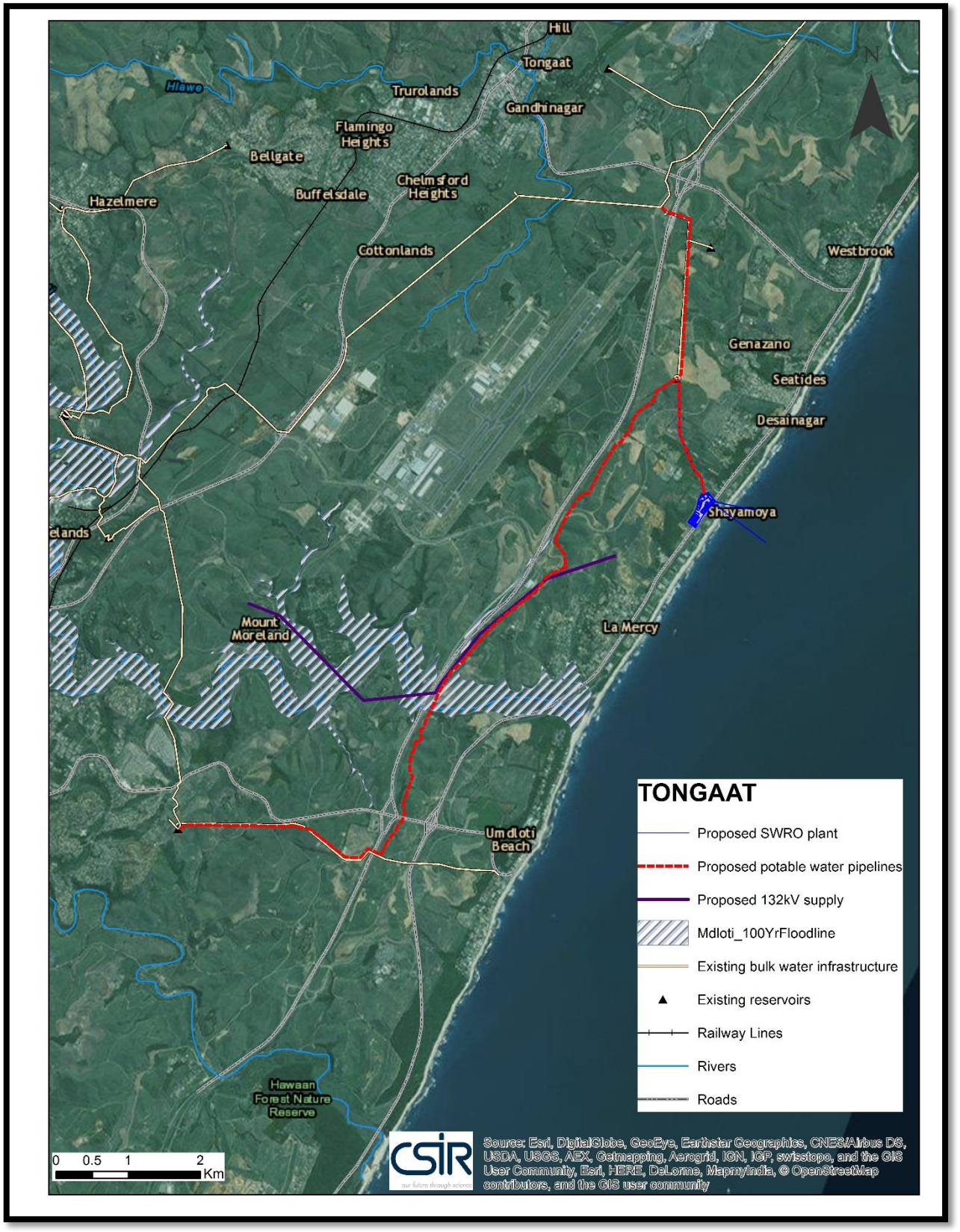

FIGURE 1 **SATELLITE IMAGERY INDICATING PROJECT LOCATION AND EXTENT**

FIGURE 2 PLANT FOOTPRINT AND LINEAR INFRASTRUCTURE

5. Cultural context of the study area

The archaeological and historical context of the study area is summarised in Appendix B and readers are referred to the bibliography section for primary sources.

Heritage resources that could require significant mitigation procedures are summarised in Table 1. The client is advised that subsurface remains of such heritage resources might be uncovered during the construction phase of the proposed project, and is referred to the protocol contained in Section 9 below.

Table 1. Typical heritage resources and mitigation measures associated with the project area.

Heritage resource	Typical mitigation measures
Iron Age Archaeological sites and shell middens	Visual assessment and sampling and/ or rescue excavation to acquire samples for further scientific study.
Palaeontological deposits and trace fossils	Desktop study, Visual assessment and sampling for further scientific study.
Maritime Archaeological Resources	Geophysical survey to determine ground conditions for the seabed elements of the project in order to inform the requirements for a maritime archaeological assessment.

6. Observations and Assessment of Impacts

eThembeni staff inspected the site on 23 February and again on 22 July 2015, completing a controlled-exclusive surface survey, as well as a database and literature search. No development activities associated with the proposed project had begun at the time of our visits, in accordance with heritage legislation.

- **Archaeological sites**

The proposed Tongaat plant site is of low sensitivity from all aspects of archaeological heritage. The plant location within the slack of a primary paleo-dune that has been the subject of intensive market gardening since at least the early 1970's precludes the presence of any primary context archaeological sites. None were observed upslope of the plant site, along the proposed bulk water supply pipeline servitude. This alignment should, however, be assessed during excavation and inception (see below).

The access servitudes for the intake/outlet pipelines under the coastal foreshore dunes and the immediate environs were "red-flagged" for the very probable presence of Iron Age shell middens. Site inspections revealed no immediate evidence of such although tertiary dune vegetation may well currently mask any middens present. The intertidal zone where the intake/outlet pipes are proposed is a contiguous rocky shoreline. Intertidal rocky outcrops occur from Westbrooke Beach in the north to 3km south of the abstraction point which argues strongly for the likely presence of shell middens at this l*ocale*. The KwaZulu-Natal Museum archaeological data base records a number Iron Age shell midden sites in close proximity to La Mercy, Desainager and Westbrooke beaches, and numerous others on the Topographical Map Sheet 2931 CA Verulum.[3]

- **Maritime Archaeology**

A maritime archaeological assessment has been commissioned from Maritime Archaeologists at the African Centre for Heritage Activities. This is submitted under separate cover.

- **Palaeontology**

The SAHRIS Palaeosensitivity Map indicates that the area has high sensitivity. However, the proposed intake/outlet pipelines are to be tunnelled 10–15m below sea-level from the desalination plant to beyond the surf zone in the ocean. For the rest of their length thereafter the pipelines will be aligned on the sea-bed. Consequently, impacts on possible fossil bearing strata along the foreshore are probably minimised (Alan Smith, *pers comm;* see independent report under separate cover)[4].

[3] See for example Natal Museum Archaeological Data Base: 2931CA 153. Anderson 1996.

[4] Alan Smith - Department of Geology University of KwaZulu-Natal
http://www.researchgate.net/profile/Alan_Smith5.

The following table summarises the heritage resources assessed, and our observations follow.

Table 2. Heritage resources and observations.

Heritage resource type	Observation
Living heritage	None were identified within the proposed development areas.
Ecofacts	None were identified within the proposed development areas.
Places, buildings, structures and equipment	None were identified within the proposed development areas.
Places to which oral traditions are attached or which are associated with living heritage	None were identified within the proposed development areas.
Historical settlements and townscapes	None were identified within the proposed development areas.
Landscapes and natural features	None were identified within the proposed development areas.
Geological sites of scientific or cultural importance	None were identified within the proposed development areas but please see below.
Archaeological sites	None were identified within the proposed development areas but please see below.
Graves and burial grounds	None were identified within the proposed development areas.
Movable objects excluding any object made by a living person	None were identified within the proposed development areas.
Battlefields	None were identified within the proposed development areas.
Traditional building techniques	None were identified within the proposed development areas.

6.1 Description and assessment of significance

- **Iron Age midden material may be exposed below dune vegetation along the foreshore in the vicinity of pipeline laying activities. These can only be assessed for significance during monitoring of such activities.**

- **Palaeontological deposits may be exposed along the foreshore in the vicinity of pipeline laying activities. These are assessed in Appendix F.**

- **Potential maritime archaeological remains can only be assessed once a geophysical survey has been undertaken (see Appendix G).**

6.2 Assessment of impact

No construction activities associated with the proposed project had begun prior to our visit, in accordance with provincial heritage legislation.

⇒ **Places, buildings, structures and equipment**

- None will be affected.

⇒ **Places to which oral traditions are attached or which are associated with living heritage**

- None will be affected.

⇒ **Historical settlements and townscapes**

- None will be affected.

⇒ **Landscapes and natural features**

- None will be affected.

⇒ **Geological / Palaeontological sites of scientific or cultural importance**

- See appended Palaeontology report.

⇒ **Archaeological sites**

- Our only concern would be that activities associated with the excavation, drilling and laying of the abstraction and exhaust pipe lines may cause disturbance on the immediate foreshore. These may expose Iron Age midden deposits located below the current surface of the tertiary dune vegetation.
- Potential Maritime archaeological resources are assessed and mitigated in the attached report by the African Centre for Heritage Activities.

- ⇒ **Graves and burial grounds**

  - None will be affected.

⇒ **Sites of significance relating to the history of slavery in South Africa**

- None will be affected.

⇒ **Movable objects excluding any object made by a living person**

- None will be affected.

In conclusion, the proposed development is considered generally to be benign and of low impact potential to possible archaeological and palaeontological deposits described above.

7. Recommended mitigation measures

We would advocate however that an archaeological watching brief, in conjunction with the appointed Environmental Control Officer, be required at the time of drilling of the inlet and outlet pipes under the dune cordon. Albeit that the pipelines are proposed to be drilled 10-15m below sea level, any ancillary above surface activities in this highly sensitive zone would be detrimental to *in situ* archaeological deposits. Should middens, or subterranean archaeological material be exposed during these activities, a Phase Two assessment will have to determine their significance and appropriate mitigation.

8. Recommended monitoring

The proposed 32kV powerline alignment between La Mercy and Mt. Moreland should be monitored by an archaeologist at tower positions and the establishment of transformer yard infrastructure, once these have been surveyed by Eskom.

The majority of the bulk water supply pipelines into the eThekweni water supply system are along existing servitudes that have been previously surveyed by eThembeni for Tongaat Hulett Developments and Dube Trade Port / ACSA (see SAHRIS Cases and Reports mapping). However, the proposed La Mercy-Waterloo Reservoir pipeline is a "greenfield" alignment to its junction with the existing Waterloo-Mhlothi Reservoirs' servitude. This too should be monitored by an archaeologist once surveyed and during inception.

9. Protocol for the identification, protection and recovery of heritage resources during construction and operation

It is possible that sub-surface heritage resources could be encountered during the construction phase of this project. The Environmental Control Officer (ECO) and all other persons responsible for site management and excavation should be aware that indicators of sub-surface sites could include:

- Ash deposits (unnaturally grey appearance of soil compared to the surrounding substrate);
- Bone concentrations, either animal or human;
- Ceramic fragments, including potsherds; and
- Stone concentrations that appear to be formally arranged (may indicate the presence of an underlying burial).

In the event that such indicator(s) of heritage resources are identified, the following actions should be taken immediately:

- All construction within a radius of at least 20m of the indicator should cease. This distance should be increased at the discretion of supervisory staff if heavy machinery or explosives could cause further disturbance to the suspected heritage resource.
- This area must be marked using clearly visible means, such as barrier tape, and all personnel should be informed that it is a no-go area.
- A guard should be appointed to enforce this no-go area if there is any possibility that it could be violated, whether intentionally or inadvertently, by construction staff or members of the public.
- No measures should be taken to cover up the suspected heritage resource with soil, or to collect any remains such as bone or stone.
- If a heritage practitioner has been appointed to monitor the project, s/he should be contacted and a site inspection arranged as soon as possible. The heritage practitioner should notify Amafa (see below).
- If no heritage practitioner has been appointed to monitor the project, **Amafa's Pietermaritzburg office** should be contacted (**telephone 033 3946543**)
- The South African Police Services should be notified by an Amafa staff member or an independent heritage practitioner if human remains are identified. No SAPS official may disturb or exhume such remains, whether of recent origin or not.

- All parties concerned should respect the potentially sensitive and confidential nature of the heritage resources, particularly human remains, and refrain from making public statements until a mutually agreed time.
- Any extension of the project beyond its current footprint involving vegetation and/or earth clearance should be subject to prior assessment by a qualified heritage practitioner, taking into account all information gathered during this initial heritage impact assessment.

10. Summary of findings in terms of the National Heritage Resources Act 1999 Section 38(3)

- The identification and mapping of all heritage resources in the area affected
  None.
- An assessment of the significance of such resources in terms of the heritage assessment criteria set out in regulations
  Not applicable.
- An assessment of the impact of development on such heritage resources
  Not applicable.
- An evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development
  Not applicable.
- The results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources
  The client has undertaken such consultation in terms of statutory requirements and retains the relevant documentation.
- If heritage resources will be adversely affected by the proposed development, the consideration of alternatives
  Not applicable.
- Plans for mitigation of any adverse effects during and after completion of the proposed development
  We advocate that an archaeological watching brief, in conjunction with the appointed Environmental Control Officer, be required at the time of drilling of the inlet and outlet pipes under the dune cordon; and that the 32 kV powerline and the La Mercy – Waterloo bulk water supply line be monitored for potential archaeological sites once surveyed and during inception.

11. Conclusion

We request that Amafa provide in-principle support for the proposed development to proceed, subject to the archaeological monitoring advocated, and have submitted this report to KwaZulu-Natal Heritage / Amafa aKwaZulu-Natali in fulfilment of the requirements of the National Heritage Resources Act.

According to Section 38(4) of the Act the report shall be considered timeously by the Council which shall, after consultation with the person proposing the development, decide –

- whether or not the development may proceed;
- any limitations or conditions are to be applied to the development;
- what general protections in terms of this Act apply, and what formal protections may be applied to such heritage resources;
- whether compensatory action shall be required in respect of any heritage resources damaged or destroyed as a result of the development; and
- whether the appointment of specialists is required as a condition of approval of the proposal.

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APPENDIX A

STATUTORY REQUIREMENTS

GENERAL

The identification, evaluation and management of heritage resources in South Africa is required and governed by the following legislation:

- National Environmental Management Act (NEMA) Act No 107 of 1998
    a. Basic Environmental Assessment – Section (23)(2)(d)
    b. Environmental Scoping Report – Section (29)(1)(d)
    c. Environmental Impacts Assessment – Section (32)(2)(d)
    d. Environmental Management Plan – Section (34)(b)
- KwaZulu-Natal Heritage Act No 4 of 2008
    a. Protection of heritage resources – Chapters 8 and 9
    b. Heritage Resources Management – Chapter 10
- National Heritage Resources Act (NHRA) Act No 25 of 1999
    a. Definition and management of the national estate – Chapter I
    b. Protection and management of heritage resources – Chapter II
    c. Heritage Resources Management – Section 38
- Minerals and Petroleum Resources Development Act (MPRDA) Act No 28 of 2002
    a. Section 39(3)
- Development Facilitation Act (DFA) Act No 67 of 1995.
    a. The GNR.1 of 7 January 2000: Regulations and rules in terms of the Development Facilitation Act, 1995 Section 31.

NATIONAL HERITAGE RESOURCES ACT NO 25 OF 1999

Heritage Impact Assessments

Section 38(1) of the National Heritage Resources Act of 1999 requires a heritage impact assessment in case of:

- the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
- the construction of a bridge or similar structure exceeding 50 m in length;
- any development or other activity which will change the character of a site—
    (i) exceeding 5 000 m² in extent; or
    (ii) involving three or more existing erven or subdivisions thereof; or
    (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or
    (iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;
- the re-zoning of a site exceeding 10 000 m² in extent; or
- any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority.

Reports in fulfilment of Section 38(3) of the Act must include the following information:

- the identification and mapping of all heritage resources in the area affected;
- an assessment of the significance of such resources in terms of the heritage assessment criteria set out in regulations;
- an assessment of the impact of the development on such heritage resources;
- an evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;
- the results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;
- if heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and
- plans for mitigation of any adverse effects during and after completion of the proposed development.

Definitions of heritage resources

The Act defines a heritage resource as any place or object of cultural significance i.e. of aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance. This includes, but is not limited to, the following wide range of places and objects:

- living heritage as defined in the National Heritage Council Act No 11 of 1999 (cultural tradition; oral history; performance; ritual; popular memory; skills and techniques; indigenous knowledge systems; and the holistic approach to nature, society and social relationships);
- ecofacts (non-artefactual organic or environmental remains that may reveal aspects of past human activity; definition used in KwaZulu-Natal Heritage Act 2008);
- places, buildings, structures and equipment;
- places to which oral traditions are attached or which are associated with living heritage;
- historical settlements and townscapes;
- landscapes and natural features;
- geological sites of scientific or cultural importance;
- archaeological and palaeontological sites;
- graves and burial grounds;
- sites of significance relating to the history of slavery in South Africa;
- movable objects, but excluding any object made by a living person;
- battlefields; and
- traditional building techniques.

Furthermore, a place or object is to be considered part of the national estate if it has cultural significance or other special value because of—

- its importance in the community, or pattern of South Africa's history;
- its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
- its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
- its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
- its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;

- its importance in demonstrating a high degree of creative or technical achievement at a particular period;
- its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons; and
- its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa.

A '**place**' is defined as:
- a site, area or region;
- a building or other structure which may include equipment, furniture, fittings and articles associated with or connected with such building or other structure;
- a group of buildings or other structures which may include equipment, furniture, fittings and articles associated with or connected with such group of buildings or other structures;
- an open space, including a public square, street or park; and
- in relation to the management of a place, includes the immediate surroundings of a place.

'**Structures**' means any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith.

'**Archaeological**' means –
- material remains resulting from human activity which are in a state of disuse and are in or on land and are older than 100 years, including artefacts, human and hominid remains and artificial features and structures;
- rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and is older than 100 years including any area within 10 m of such representation;
- wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the culture zone of the Republic, as defined respectively in sections 3, 4 and 6 of the Maritime Zones Act, 1994 (Act No. 15 of 1994), and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation;
- features, structures and artefacts associated with military history which are older than 75 years and the sites on which they are found.

'**Palaeontological**' means any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace.

MANAGEMENT OF GRAVES AND BURIAL GROUNDS

- **Graves younger than 60 years** fall under Section 2(1) of the Removal of Graves and Dead Bodies Ordinance No 7 of 1925 as well as the Human Tissues Act No 65 of 1983 and the National Health Act (Act 61 of 2003) Regulations relating to the management of human remains No.R.363 of 22 May 2013. Such graves are the jurisdiction of the National Department of Health and the relevant Provincial Department of Health and must be submitted for final approval to the Office of the relevant Provincial Premier. This function is usually delegated to the Provincial Member of the Executive Council for Local Government and Planning, or in some cases the MEC for Housing and Welfare.

  Authorisation for exhumation and reinterment must also be obtained from the relevant local or regional council where the grave is situated, as well as the relevant local or regional council to where the grave is being relocated. All local and regional provisions, laws and by-laws must also be adhered to. In order to handle and transport human remains the institution conducting the relocation should be authorised under Section 24 of the Human Tissues Act No 65 of 1983 and the National Health Act (Act 61 of 2003) Regulations relating to the management of human remains No.R.363 of 22 May 2013.

- **Graves older than 60 years situated outside a formal cemetery administered by a local authority** fall under Section 36 of the National Heritage Resources Act No 25 of 1999 as well as the Human Tissues Act of 1983. Accordingly, such graves are the jurisdiction of the South African Heritage Resources Agency (SAHRA). The procedure for Consultation Regarding Burial Grounds and Graves (Section 36(5) of NHRA) is applicable to graves older than 60 years that are situated outside a formal cemetery administrated by a local authority. Graves in the category located inside a formal cemetery administrated by a local authority will also require the same authorisation as set out for graves younger than 60 years over and above SAHRA authorisation.

  If the grave is not situated inside a formal cemetery but is to be relocated to one, permission from the local authority is required and all regulations, laws and by-laws set by the cemetery authority must be adhered to.

The **protocol for the management of graves older than 60 years situated outside a formal cemetery administered by a local authority** is detailed in Section 36 of the National Heritage Resources Act:

(3) *(a)* No person may, without a permit issued by SAHRA or a provincial heritage resources authority—
(a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;
(b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or
(c) bring onto or use at a burial ground or grave referred to in paragraph *(a)* or *(b)* any excavation equipment, or any equipment which assists in the detection or recovery of metals.
(4) SAHRA or a provincial heritage resources authority may not issue a permit for the destruction or damage of any burial ground or grave referred to in subsection (3)*(a)* unless it is satisfied that the applicant has made satisfactory arrangements for the exhumation and re-interment of the contents of such graves, at the cost of the applicant and in accordance with any regulations made by the responsible heritage resources authority.

(5) SAHRA or a provincial heritage resources authority may not issue a permit for any activity under subsection (3)*(b)* unless it is satisfied that the applicant has, in accordance with regulations made by the responsible heritage resources authority—

(a) made a concerted effort to contact and consult communities and individuals who by tradition have an interest in such grave or burial ground; and

(b) reached agreements with such communities and individuals regarding the future of such grave or burial ground.

(6) Subject to the provision of any other law, any person who in the course of development or any other activity discovers the location of a grave, the existence of which was previously unknown, must immediately cease such activity and report the discovery to the responsible heritage resources authority which must, in co-operation with the South African Police Service and in accordance with regulations of the responsible heritage resources authority—

(a) carry out an investigation for the purpose of obtaining information on whether or not such grave is protected in terms of this Act or is of significance to any community; and

(b) if such grave is protected or is of significance, assist any person who or community which is a direct descendant to make arrangements for the exhumation and re-interment of the contents of such grave or, in the absence of such person or community, make any such arrangements as it deems fit.

APPENDIX B

ARCHAEOLOGICAL AND HISTORICAL CONTEXT OF THE STUDY AREA

The Stone Age[5]

No systematic Early and Middle Stone Age research has been undertaken in the immediate proposed development area. However, open air scatters of stone artefacts, probably with low heritage significance, have been reported along the coastal littoral by Davies (O. Davies, 1970. Pleistocene beaches of Natal. Annals of Natal Museum 20(2). Sibidu Cave, along the middle reaches of the Tongaat River, is the focus of current Middle Stone Age investigation and is serially nominated for World Heritage status.[6]

At a general level, South Africa's prehistory has been divided into a series of phases based on broad patterns of technology. The primary distinction is between a reliance on chipped and flaked stone implements (the Stone Age) and the ability to work iron (the Iron Age). Spanning a large proportion of human history, the Stone Age in Southern Africa is further divided into the Early Stone Age, or Paleolithic Period (about 2 500 000–150 000 years ago), the Middle Stone Age, or Mesolithic Period (about 150 000–30 000 years ago), and the Late Stone Age, or Neolithic Period (about 30 000–2 000 years ago). The simple stone tools found with australopithecine fossil bones fall into the earliest part of the Early Stone Age.

- The Early Stone Age

Most Early Stone Age sites in South Africa can probably be connected with the hominin species known as *Homo erectus*. Simply modified stones, hand axes, scraping tools, and other bifacial artifacts had a wide variety of purposes, including butchering animal carcasses, scraping hides, and digging for plant foods. Most South African archaeological sites from this period are the remains of open camps, often by the sides of rivers and lakes, although some are rock shelters, such as Montagu Cave in the Cape region.

- The Middle Stone Age

The long episode of cultural and physical evolution gave way to a period of more rapid change about 200 000 years ago. Hand axes and large bifacial stone tools were replaced by stone flakes and blades that were fashioned into scrapers, spear points, and parts for hafted, composite implements. This technological stage, now known as the Middle Stone Age, is represented by numerous sites in South Africa.

Open camps and rock overhangs were used for shelter. Day-to-day debris has survived to provide some evidence of early ways of life, although plant foods have rarely been preserved. Middle Stone Age bands hunted medium-sized and large prey, including antelope and zebra, although they tended to avoid the largest and most dangerous animals, such as the elephant and the rhinoceros. They also ate seabirds and marine mammals that could be found along the shore and sometimes collected tortoises and ostrich eggs in large quantities.

[5] http://www.britannica.com; article authored by Colin J. Bundy, Julian R. D. Cobbing, Martin Hall and Leonard Monteath Thompson.

[6] (Wadley,L. and Jacobs,Z. 2004. SAJS. 100 (3). 146-151; Sibudu Cave, KwaZulu-Natal: Background to the excavations of Middle Stone Age and Iron Age occupations.
Wadley, L. 2006. Partners in grime: results of multi-disciplinary archaeology at Sibudu Cave. *Southern African Humanities* 18:315-341.

- The Late Stone Age

Basic toolmaking techniques began to undergo additional change about 40 000 years ago. Small finely worked stone implements known as microliths became more common, while the heavier scrapers and points of the Middle Stone Age appeared less frequently. Archaeologists refer to this technological stage as the Late Stone Age. The numerous collections of stone tools from South African archaeological sites show a great degree of variation through time and across the subcontinent.

The remains of plant foods have been well preserved in numerous cave and shelter sites in KwaZulu-Natal. Animals were trapped and hunted with spears and arrows on which were mounted well-crafted stone blades. Bands moved with the seasons as they followed game into higher lands in the spring and early summer months, when plant foods could also be found. When available, rock overhangs became shelters; otherwise, windbreaks were built. Shellfish, crayfish, scavenged cetaceans and seabirds were also important sources of food, as were fish caught on lines, with spears, in traps, and possibly with nets.

In the foothills of the Drakensberg and above the escarpment a large number of rock shelters with occupation deposits occur in the Clarence Formation formerly known as Cave Sandstone. These sandstones provide the canvas for the wealth of rock art sites that have been recorded in the Okhahlamba/Drakensberg mountains.

Dating from the Later Stone Age are numerous engravings on rock surfaces, mostly on the interior plateau, and paintings on the walls of rock shelters in the mountainous regions, such as the Drakensberg and Cederberg ranges. The images were made over a period of at least 25 000 years. Although scholars originally saw the South African rock art as the work of exotic foreigners such as Minoans or Phoenicians or as the product of primitive minds, they now believe that the paintings were closely associated with the work of medicine men, shamans who were involved in the well-being of the band and often worked in a state of trance. Specific representations include depictions of trance dances, metaphors for trance such as death and flight, rainmaking, and control of the movement of antelope herds:

'Most rock art researchers accept that southern African hunter-gatherer (Bushman/San) painters used animal imagery to model beliefs and concepts central to their cosmology. The eland is probably the best-known model, but species choice varies according to geographical area. Previous studies have tended to focus on morphology in order to identify painted and engraved animal depictions that the painters used as natural models. Morphology, however, is not always sufficient to positively identify a motif's zoological affinities [including] therianthropic images from the Western Cape Province and adjacent parts of the Eastern Cape Province, South Africa, popularly known as 'mermaids'' (Hollmann 2005b:84).

Iron Age[7]

Archaeological evidence shows that Bantu-speaking agriculturists first settled in southern Africa around AD 300. Bantu-speakers originated in the vicinity of modem Cameroon from where they began to move eastwards and southwards, sometime after 400 BC, skirting around the equatorial forest. An extremely rapid spread throughout much of sub-equatorial Africa followed: dating shows that the earliest communities in Tanzania and South Africa are separated in time by only 200 years, despite the 3 000 km distance between the two regions. It seems likely that

[7] Whitelaw (1997). Whitelaw (2009). Whitelaw (2015).

the speed of the spread was a consequence of agriculturists deliberately seeking iron ore sources and particular combinations of soil and climate suitable for the cultivation of their crops.

The earliest agricultural sites in KwaZulu-Natal date to between AD 400 and 550. All are situated close to sources of iron ore, and within 15 km of the coast. Current evidence suggests it may have been too dry further inland at this time for successful cultivation. From 650 onwards, however, climatic conditions improved and agriculturists expanded into the valleys of KwaZulu-Natal, where they settled close to rivers in savanna or bushveld environments. There is a considerable body of information available about these early agriculturists.

Seed remains show that they cultivated finger millet, bulrush millet, sorghum and probably the African melon. It seems likely that they also planted African groundnuts and cowpeas, though direct evidence for these plants is lacking from the earlier periods. Faunal remains indicate that they kept sheep, cattle, goats, chickens and dogs, with cattle and sheep providing most of the meat. Men hunted, perhaps with dogs, but hunted animals made only a limited contribution to the diet in the region.

Metal production was a key activity since it provided the tools of cultivation and hunting. The evidence indicates that people who worked metal lived in almost every village, even those that were considerable distances from ore sources.

Large-scale excavations in recent years have provided data indicating that first-millennium agriculturist society was patrilineal and that men used cattle as bridewealth in exchange for wives. On a political level, society was organised into chiefdoms that, in our region, may have had up to three hierarchical levels. The villages of chiefs tended to be larger than others, with several livestock enclosures, and some were occupied continuously for lengthy periods. Social forces of the time resulted in the concentration of unusual items on these sites. These include artefacts that originated from great distances, ivory items (which as early as AD 700 appear to have been a symbol of chieftainship), and initiation paraphernalia.

This particular way of life came to an end around AD 1000, for reasons that we do not yet fully understand. There was a radical change in the decorative style of agriculturist ceramics at this time, while the preferred village locations of the last four centuries were abandoned in favour of sites along the coastal littoral. In general, sites dating to between 1050 and 1250 are smaller than most earlier agriculturist settlements. It is tempting to see in this change the origin of the Nguni settlement pattern. Indeed, some archaeologists have suggested that the changes were a result of the movement into the region of people who were directly ancestral to the Nguni-speakers of today. Others prefer to see the change as the product of social and cultural restructuring within resident agriculturist communities.

Whatever the case, it seems likely that this new pattern of settlement was in some way influenced by a changing climate, for there is evidence of increasing aridity from about AD 900. A new pattern of economic inter-dependence evolved that is substantially different from that of earlier centuries, and is one that continued into the colonial period nearly 500 years later.

APPENDIX C

METHODOLOGY

Site survey

eThembeni staff inspected the site on 23 February and again on 22 July 2015. We completed a controlled-exclusive surface survey, where 'sufficient information exists on an area to make solid and defensible assumptions and judgements about where [heritage resource] sites may and may not be' and 'an inspection of the surface of the ground, wherever this surface is visible, is made, with no substantial attempt to clear brush, turf, deadfall, leaves or other material that may cover the surface and with no attempt to look beneath the surface beyond the inspection of rodent burrows, cut banks and other exposures that are observed by accident' (King 1978; see bibliography for other references informing methodological approach).

The site survey comprised a non-systematic or random walk across accessible portions of the area proposed for development. Photographs were taken with a Nikon Coolpix camera and a representative selection is included in Appendix D. Geographic coordinates were obtained using a handheld Garmin global positioning unit.

Database and literature review

A concise account of the pre and postcolonial history of the broader study area was compiled from sources including those listed in the bibliography and is included in Appendix B.

Assessment of heritage resource value and significance

Heritage resources are significant only to the extent that they have public value, as implicitly demonstrated by the following guidelines for determining site significance developed by the South African Heritage Resources Agency and utilised during this assessment.

Type of Significance

1. Historical Value: It is important in the community, or pattern of history

- Importance in the evolution of cultural landscapes and settlement patterns.
- Importance in exhibiting density, richness or diversity of cultural features illustrating the human occupation and evolution of the nation, Province, region or locality.
- Importance for association with events, developments or cultural phases that have had a significant role in the human occupation and evolution of the nation, Province, region or community.
- Importance as an example for technical, creative, design or artistic excellence, innovation or achievement in a particular period
- It has strong or special association with the life or work of a person, group or organisation of importance in history
- Importance for close associations with individuals, groups or organisations whose life, works or activities have been significant within the history of the nation, Province, region or community.
- Importance for a direct link to the history of slavery in South Africa.

2. Aesthetic Value: It is important in exhibiting particular aesthetic characteristics valued by a community or cultural group

- Importance to a community for aesthetic characteristics held in high esteem or otherwise valued by the community.
- Importance for its creative, design or artistic excellence, innovation or achievement.
- Importance for its contribution to the aesthetic values of the setting demonstrated by a landmark quality or having impact on important vistas or otherwise contributing to the

identified aesthetic qualities of the cultural environs or the natural landscape within which it is located.
- In the case of an historic precinct, importance for the aesthetic character created by the individual components which collectively form a significant streetscape, townscape or cultural environment.

3. Scientific Value: It has potential to yield information that will contribute to an understanding of natural or cultural heritage
- Importance for information contributing to a wider understanding of natural or cultural history by virtue of its use as a research site, teaching site, type locality, reference or benchmark site.
- Importance for information contributing to a wider understanding of the origin of the universe or of the development of the earth.
- Importance for information contributing to a wider understanding of the origin of life; the development of plant or animal species, or the biological or cultural development of hominid or human species.
- Importance for its potential to yield information contributing to a wider understanding of the history of human occupation of the nation, Province, region or locality.
- It is important in demonstrating a high degree of creative or technical achievement at a particular period.
- Importance for its technical innovation or achievement.

4. Social Value: It has strong or special association with a particular community or cultural group for social, cultural or spiritual reasons
- Importance as a place highly valued by a community or cultural group for reasons of social, cultural, religious, spiritual, symbolic, aesthetic or educational associations.
- Importance in contributing to a community's sense of place.

Degrees of Significance
Rarity: It possesses uncommon, rare or endangered aspects of natural or cultural heritage
- Importance for rare, endangered or uncommon structures, landscapes or phenomena.

Representivity: It is important in demonstrating the principal characteristics of a particular class of natural or cultural places or objects
- Importance in demonstrating the principal characteristics of a range of landscapes or environments, the attributes of which identify it as being characteristic of its class.
- Importance in demonstrating the principal characteristics of human activities (including way of life, philosophy, custom, process, land-use, function, design or technique) in the environment of the nation, Province, region or locality.

Sphere of Significance: High, Medium, Low
- International; National; Provincial; Regional; Local

Assessment of impacts
A heritage resource impact may be defined broadly as the net change, either beneficial or adverse, between the integrity of a heritage site with and without the proposed development. Beneficial impacts occur wherever a proposed development actively protects, preserves or enhances a heritage resource, by minimising natural site erosion or facilitating non-destructive public use, for example. More commonly, development impacts are of an adverse nature and can include:

- destruction or alteration of all or part of a heritage site;
- isolation of a site from its natural setting; and / or
- introduction of physical, chemical or visual elements that are out of character with the heritage resource and its setting.

Beneficial and adverse impacts can be direct or indirect, as well as cumulative, as implied by the aforementioned examples. Although indirect impacts may be more difficult to foresee, assess and quantify, they must form part of the assessment process. The following assessment criteria have been used to assess the impacts of the proposed development on identified heritage resources:

Criteria	Rating Scales	Notes
Nature	Positive	An evaluation of the type of effect the construction, operation and management of the proposed development would have on the heritage resource.
	Negative	
	Neutral	
Extent	Low	Site-specific, affects only the development footprint.
	Medium	Local (limited to the site and its immediate surroundings, including the surrounding towns and settlements within a 10 km radius);
	High	Regional (beyond a 10 km radius) to national.
Duration	Low	0-4 years (i.e. duration of construction phase).
	Medium	5-10 years.
	High	More than 10 years to permanent.
Intensity	Low	Where the impact affects the heritage resource in such a way that its significance and value are minimally affected.
	Medium	Where the heritage resource is altered and its significance and value are measurably reduced.
	High	Where the heritage resource is altered or destroyed to the extent that its significance and value cease to exist.
Potential for impact on irreplaceable resources	Low	No irreplaceable resources will be impacted.
	Medium	Resources that will be impacted can be replaced, with effort.
	High	There is no potential for replacing a particular vulnerable resource that will be impacted.

Consequence (a combination of extent, duration, intensity and the potential for impact on irreplaceable resources).	Low	A combination of any of the following: - Intensity, duration, extent and impact on irreplaceable resources are all rated low. - Intensity is low and up to two of the other criteria are rated medium. - Intensity is medium and all three other criteria are rated low.
	Medium	Intensity is medium and at least two of the other criteria are rated medium.
	High	Intensity and impact on irreplaceable resources are rated high, with any combination of extent and duration. Intensity is rated high, with all of the other criteria being rated medium or higher.
Probability (the likelihood of the impact occurring)	Low	It is highly unlikely or less than 50 % likely that an impact will occur.
	Medium	It is between 50 and 70 % certain that the impact will occur.
	High	It is more than 75 % certain that the impact will occur or it is definite that the impact will occur.
Significance (all impacts including potential cumulative impacts)	Low	Low consequence and low probability. Low consequence and medium probability. Low consequence and high probability.
	Medium	Medium consequence and low probability. Medium consequence and medium probability. Medium consequence and high probability. High consequence and low probability.
	High	High consequence and medium probability. High consequence and high probability.

Assumptions and limitations of this heritage impact assessment

- The description of the proposed project, provided by the client, is accurate.
- The public consultation process undertaken as part of the Environmental Impact Assessment is sufficient and adequate and does not require repetition as part of the heritage impact assessment.
- Soil surface visibility was low to moderate. Heritage resources might be present below the surface or in areas of dense vegetation and we remind the client that the Act requires that a developer cease all work immediately and notify SAHRA should any heritage resources, as defined in the Act, be discovered during the course of development activities.
- No subsurface investigation (including excavations or sampling) were undertaken, since a permit from SAHRA is required to disturb a heritage resource.
- A key concept in the management of heritage resources is that of non-renewability: damage to or destruction of most resources, including that caused by bona fide research endeavours, cannot be reversed or undone. Accordingly, management recommendations for heritage resources in the context of development are as conservative as possible.
- Human sciences are necessarily both subjective and objective in nature. We strive to manage heritage resources to the highest standards in accordance with national and international best practice, but recognise that our opinions might differ from those of other heritage practitioners.
- Staff members involved in this project have no vested interest in it; are qualified to undertake the tasks as described in the terms of reference (refer to Appendix E); and comply at all times with the Codes of Ethics and Conduct of the Association of Southern African Professional Archaeologists.
- eThembeni staff members take no responsibility for the misuse of the information contained in this report, but take every reasonable precaution to prevent such misuse.

APPENDIX D

PHOTOGRAPHS

See SAHRIS Case ID: 8446

PLANT FOOTPRINT AND LINEAR INFRASTRUCTURE

PROPOSED PLANT LOCATION CURRENTLY UNDER MARKET GARDEN CULTIVATION

PROPOSED PIPELINE TUNNELS BELOW M4 MOTORWAY AND UNDER TERTIARY DUNE CORDON TO BEYOND SURF ZONE (1)

PROPOSED PIPELINE TUNNELS BELOW M4 MOTORWAY AND UNDER TERTIARY DUNE CORDON TO BEYOND SURF ZONE (2)

APPENDIX E

SPECIALIST COMPETENCY AND DECLARATION OF INDEPENDENCE

Len van Schalkwyk is accredited by the Cultural Resources Management section of the Association of South African Professional Archaeologists to undertake heritage impact assessments in South Africa. Mr van Schalkwyk has a master's degree in archaeology (specialising in the history of early farmers in southern Africa) from the University of Cape Town and 25 years' experience in heritage management. He has worked on projects as diverse as the establishment of the Ondini Cultural Museum in Ulundi, the cultural management of Chobe National Park in Botswana and various archaeological excavations and oral history recording projects. He was part of the writing team that produced the KwaZulu-Natal Heritage Act 1997. He has worked with many rural communities to establish integrated heritage and land use plans and speaks good Zulu.

Mr van Schalkwyk left his position as assistant director of Amafa aKwaZulu-Natali, the provincial heritage management authority, to start eThembeni in partnership with Beth Wahl, who was head of archaeology at Amafa at the time. Over the past decade they have undertaken almost 1000 heritage impact assessments throughout South Africa, as well as in Mozambique.

Declaration of independence

I declare that, Len van Schalkwyk and eThembeni Cultural Heritage have no financial or personal interest in the proposed development, nor its developers or any of its subsidiaries, apart from in the provision of heritage impact assessment and management consulting services.

L.O. van Schalkwyk.
30 October 2015.

APPENDIX F

Palaeontological Desktop Assessment

APPENDIX G

Maritime Archaeology Desktop Assessment