HERITAGE IMPACT ASSESSMENT OF PROPOSED 2AFRICA/GERA (EAST) SUBMARINE FIBRE OPTIC CABLE SYSTEM, LANDING AT AMANZIMTOTI, KWAZULU-NATAL

Assessment conducted under Section 38 (8) of the National Heritage Resources Act (No. 25 of 1999) as part of an Environmental Impact Assessment

EIA Reference: 14/12/16/3/3/2/2058

Prepared for

Acer (Africa) Environmental Consultants

On behalf of

WIOCC South Africa (Pty) Ltd

Draft for comment: 3 June 2021

Final: 2 July 2021

Prepared by

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CONTENTS OF THE SPECIALIST REPORT – CHECKLIST

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(a) details of the specialist who prepared the report; and the expertise of that specialist to compile a specialist report including a *curriculum vitae*;	Page 5 and Appendices D and E
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Page 4
(c) an indication of the scope of, and the purpose for which, the report was prepared;	Section 3: Terms of Reference
(cA) an indication of the quality and age of base data used for the specialist report;	Section 5: Methodology
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 10: Impact Assessment
(d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 5: Methodology
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 3: Terms of Reference Section 5: Methodology
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Sections 6 to 9
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(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;	Figures 2, 3, 5-8, 11,12 and 14
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 5.3: Limitations
(j) a description of the findings and potential implications of such findings on the	Section 10: Impact

impact of the proposed activity, including identified alternatives on the environment, or activities;	Assessment
(k) any mitigation measures for inclusion in the EMPr;	Section 11: Mitigation
(l) any conditions for inclusion in the environmental authorisation;	Section 11: Mitigation
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	N/A
(n) a reasoned opinion— i. as to whether the proposed activity, activities or portions thereof should be authorised; iA. Regarding the acceptability of the proposed activity or activities; and ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr or Environmental Authorization, and where applicable, the closure plan;	Section 11: Mitigation and Section 12: Conclusion
(o) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Comments from the South African Heritage Resources Agency– see Sections 4
(p) any other information requested by the competent authority	N/A
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.	

DETAILS OF THE SPECIALIST

This study has been undertaken by John Gribble BA Hons, MA (ASAPA) and Gail Euston-Brown BA of ACO Associates CC, archaeologists and heritage consultants.

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CONSULTANT DECLARATION OF INDEPENDENCE

I, John Gribble, declare that:

- I act as the independent specialist in this application;
- 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 Act.

Signature of the specialist:

Name of company (if applicable): ACO Associates CC

Date: 4 June 2021

EXECUTIVE SUMMARY

ACO Associates cc has been commissioned by ACER (Africa) Environmental Consultants on behalf of Alcatel Submarine Networks to undertake a desktop heritage impact assessment of the marine and terrestrial route of the proposed 2AFRICA/GERA (East) submarine fibre optic cable system which makes landfall at Amanzimtoti in KwaZulu-Natal.

This heritage impact assessment report, supported by recommendations for implementable mitigation measures will form part of an Environmental Impact Assessment for the proposed cable system.

Findings: Evidence from South Africa and elsewhere in the world indicates that there is the potential for the survival in submerged, seabed contexts of archaeological material and palaeoenvironmental evidence deposited on the continental shelf, to approximately the -120 m contour, during periods of lower sea level within the last 900,000 years. Although no comprehensive geophysical dataset for KZN coastline as a whole was available for this assessment, the rivers that presently debouch into the sea are likely to have done so at times of lower sea levels and will have palaeo-channels which extend offshore across the present seabed. Where archaeological material and palaeoenvironmental evidence have survived post-glacial marine transgressions, there is the potential for this material to be within or associated with now submerged palaeo-channels.

Where such material has survived post-glacial marine transgression, it will form part of the sedimentary make-up of the seabed and may be impacted by interventions on and in the seabed. The small footprint of the seabed intervention that will result from the installation of the cable system, however, makes the potential for direct impacts on submerged prehistoric archaeological material in the study area unlikely.

In terms of palaeontological potential within the study area, the onshore portion of the cable route is underlain by Umkwelane Formation aeolianites which can contain fossilised marine molluscs, shark teeth and foraminifera. Occasionally trace fossils such as worm burrows or rhizoliths are also preserved. The beach and nearshore seabed sediment comprises of Holocene sands which will contain no fossil material, unless it is reworked from other sediments. Offshore, the seabed sediments along the portion of the marine cable route that is the subject of this assessment are reworked delta-fan sands from the Tugela Cone which are unlikely to contain any *in situ* fossils.

The burial of the terrestrial cable may result in interactions with the Umkwelane Formation, but the limited extent and depth of the burial trenches and the low palaeontological potential of the

aeolianites means that that direct palaeontological impacts are considered to be negligible.

According to the available records, there are no known or recorded wrecks within the 1 km marine study area around the proposed subsea cable route alignment in the contiguous zone and territorial waters. Two wrecks are located immediately south of the study area (*Griqualand*/Dangerous Wreck and *Mary Kate*) and the *John Bull* and *Tonga* lie less than 7km north and south of the cable alignment, respectively. With the exception of the *Tonga*, none of the wrecks are currently old enough to be protected by the National Heritage Resources Act. However, the *Griqualand* still contains part of its cargo of liquid chlorine, is considered dangerous and should be avoided.

The Landfall and Inshore and Shallow Water geophysical surveys noted the presence along the route of occurrences of possibly anthropogenic debris and magnetic anomalies. With the exception of a possible anchor block and anchor chain, none of the other potentially anthropogenic contacts could be more accurately described or positively identified. It is therefore not known whether any of these anomalies represent historical shipwrecks or related material, although from the size of the anomalies this seems unlikely.

The small footprint of the seabed intervention suggests that the potential for direct impacts on maritime archaeological sites or material in the study area is negligible.

Although previous archaeological assessments in the Amanzimtoti area indicate the presence in places of Stone Age and Iron Age archaeological sites and material, the urban development of the area that includes the beach manhole alternatives and the terrestrial cable route alignment suggests that archaeological material is unlikely to be preserved in this area.

Furthermore, the small footprint of the terrestrial interventions to construct the beach manhole and install the cables, and the likely disturbed nature of the substrate under roads and pavements suggests that the potential for direct impacts on archaeological sites or material in the study area is low.

Recommendations: No specific mitigation is required or proposed in respect of potential submerged prehistoric archaeology, but it is recommended that an alert for the occurrence of such material be included in the EMPr for the project, specifically for the divers working in the shoreface and the operators excavating the trench in the beach and dune during cable installation. The project archaeologist should provide the ECO and contractors with information about the type of material that could be encountered.

In respect of palaeontology, there is a very small chance that fossils may occur in the Umkwelane

Formation aeolianites so a Fossil Chance Find Protocol should be added to the EMPr for the terrestrial cable trenching.

In the inshore waters and on the beach crossing, it is recommended that an alert for the occurrence of palaeontological material be included in the EMPr for the project, for the divers working in the shoreface and the operators excavating the trench in the beach and dune.

Due to the dynamic nature of the offshore environment, should any possible archaeological or palaeontological material be accidentally disturbed during these activities it must be immediately reported to the ECO and/or the monitoring archaeologist for further advice. Any finds accidentally disturbed must be recorded, and their contextual information (a report) must be lodged with a SAHRA-approved institution.

In respect of shipwrecks and maritime archaeology, the following is recommended:

- The potentially anthropogenic seabed anomalies (SSS contacts E2-G-S210, E2-G-S213, E2-G-S214 and E2-G-S219) and magnetic anomaly E3-G-M001) are avoided during cable installation;

- Any further geophysical data generated to support to installation of the cable system must be archaeologically reviewed for the presence of historical shipwrecks or related material;

- Any shipwreck-related material recovered from the seabed during the pre-lay grapnel runs must be retained, kept wet, and the maritime archaeological must be notified of the find.

- Should any maritime archaeological sites or material be accidentally encountered during the course of laying the cable, work must cease in that area until the project archaeologist and SAHRA have been notified, the find has been assessed by the archaeologist, and agreement has been reached on how to deal with it.

Lastly, in respect of terrestrial archaeology, should any archaeological sites or material be accidentally encountered during the course of installing the cable, work must immediately cease in that area, the area must be cordoned off and the material made safe but left in situ, a suitably qualified archaeologist must be called to site to assess the significance of the find and Amafa must be notified of the find.

In the event of human remains being uncovered during work, all activities in the vicinity must cease and the site made secure until a suitably qualified archaeologist and Amafa have been notified, the significance of the material has been assessed and a decision has been taken as to how to deal with it.

Based on the information and assessment above, it is our reasoned opinion that the proposed installation of the 2AFRICA/GERA (East) cable system to Amanzimtoti raises no red flags, contains no fatal flaws and is unlikely to have any significant impact on heritage resources. It is, therefore, considered acceptable.

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1 INTRODUCTION

ACO Associates cc (ACO) has been commissioned by ACER (Africa) Environmental Consultants (ACER) on behalf of Alcatel Submarine Networks (ASN) to undertake a desktop heritage impact assessment of the marine and terrestrial route of the proposed 2AFRICA/GERA (East) submarine fibre optic cable system which makes landfall at Amanzimtoti in KwaZulu-Natal.

ASN has been contracted to supply and install the proposed cable system which will be operated by West Indian Ocean Cable Company (WIOCC) as the South African landing partner.

ACER is the appointed Environmental Assessment Practitioner (EAP) and is responsible for the Environmental Authorisation (EA) requirements, including identifying environmental aspects relevant to the proposed telecommunications infrastructure and construction of the cable system.

2 PROJECT DESCRIPTION

The following description of the project is summarised from information presented in the Final Scoping Report (ACER (Africa) Environmental Consultants 2021).

The proposed submarine cable system known as 2AFRICA/GERA (East) circumnavigates Africa, connecting Africa to Europe and parts of the Middle East (**Error! Reference source not found.**).

The cable system will enter South Africa’s Exclusive Economic Zone (EEZ) from the EEZ of Mozambique on the east coast. Thereafter the cable system follows a course south and west around the South African coast, before tracking north-east from a point approximately 100 km west of Cape Point to cross the contiguous zone and territorial waters to make a final landfall at Duynefontein, north of Cape Town in the Western Cape.

There will be two branch lines off the main cable, to Amanzimtoti and Port Elizabeth (Gqeberha), respectively (Figure 1). The Amanzimtoti branch will run from the main cable, through the EEZ, contiguous zone and territorial waters to a landing site at either Amanzimtoti Main Beach in front of the Main Beach carpark (Alternative 2) or at Amanzimtoti Pipeline Beach (Alternative 3) of which Alternative 3 is preferred (ACER (Africa) Environmental Consultants 2021) (Figure 2 and Figure 3 and Plate 1 and Plate 2).

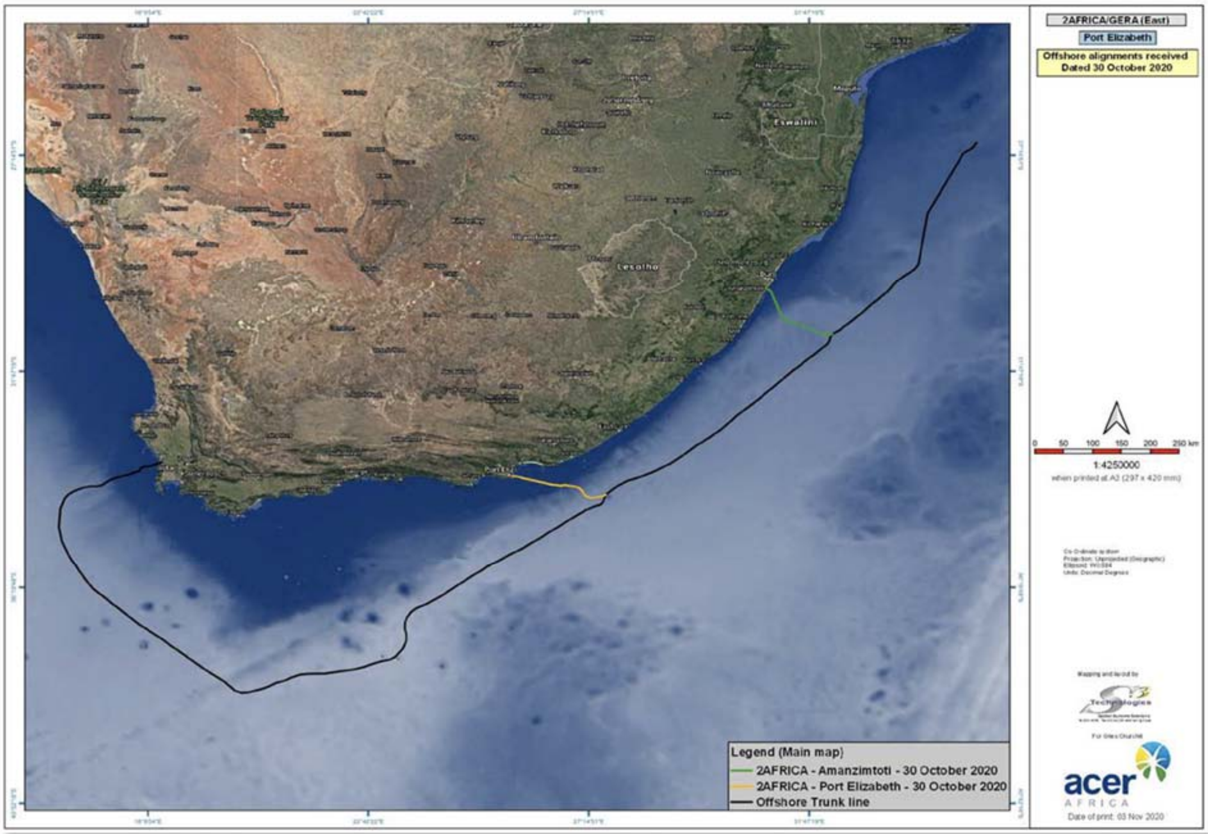

Figure 1: 2AFRICA/GERA (East) Cable System showing the Amanzimtoti (green line) and Port Elizabeth Branch Cables (yellow line) (After ACER (Africa) Environmental Consultants 2021).

Plate 1: View of the location of BMH Alternative 2 below the carpark at Amanzimtoti Main Beach (Source: ACER (Africa) Environmental Consultants 2021).

Plate 2: View of the location of preferred BMH Alternative 3 at Amanzimtoti Pipeline Beach. Note the nearby METISS BMH (Source: ACER (Africa) Environmental Consultants 2021).

The proposed 2AFRICA/GERA (East) branch to Amanzimtoti will include the following activities (ACER (Africa) Environmental Consultants 2021):

- Pre-installation activities including cable route survey, route engineering, route clearance and pre-lay grapnel run;

- Laying of the cable in the offshore environment within South Africa's EEZ from where it branches off the trunk line until it reaches the shore. The cable will be laid on the seabed surface where water depth is >1000 m, and buried where water depth is <1000 m;

- The laying of the cable within the shallow water environment which is likely to involve a direct shore end operation where the shore end of the subsea cable is installed directly from the main subsea cable installation vessel and floated to the beach landing point using buoys and assisted by small boats and divers. It will then be buried in the seabed using the diver jet burial technique. The cable will be buried in sediment wherever possible, and the route will be adjusted to avoid obvious visible rock. The aim is to bury the cable to a depth of 2 m where possible. This burial is intended to provide protection to the cable from the hazards posed by ships' anchors, fishing trawls/lines and the like;

- Excavations within the intertidal zone and across the beach to bury the cable and the sea earth system before the former is anchored into a cable anchor block and the new beach manhole (BMH) which will need to be constructed. Horizontal Directional Drilling (HDD) will be undertaken from the BMH to approximately 30m seawards so as not to disturb the surface of the site; and

- Once the cable has been installed to the BMH, a cable trench will be required for the front haul alignment from the BMH to the Cable Landing Station (CLS) site, which will be accommodated will be housed in an existing building in McGowan Place, Umbogintwini (Figure 3 and Plate 3 - Plate 13).

The details of the these activities are given in Chapter 6 of the Final Scoping Report (ACER (Africa) Environmental Consultants 2021) and will be addressed, as relevant in the impact assessment below.

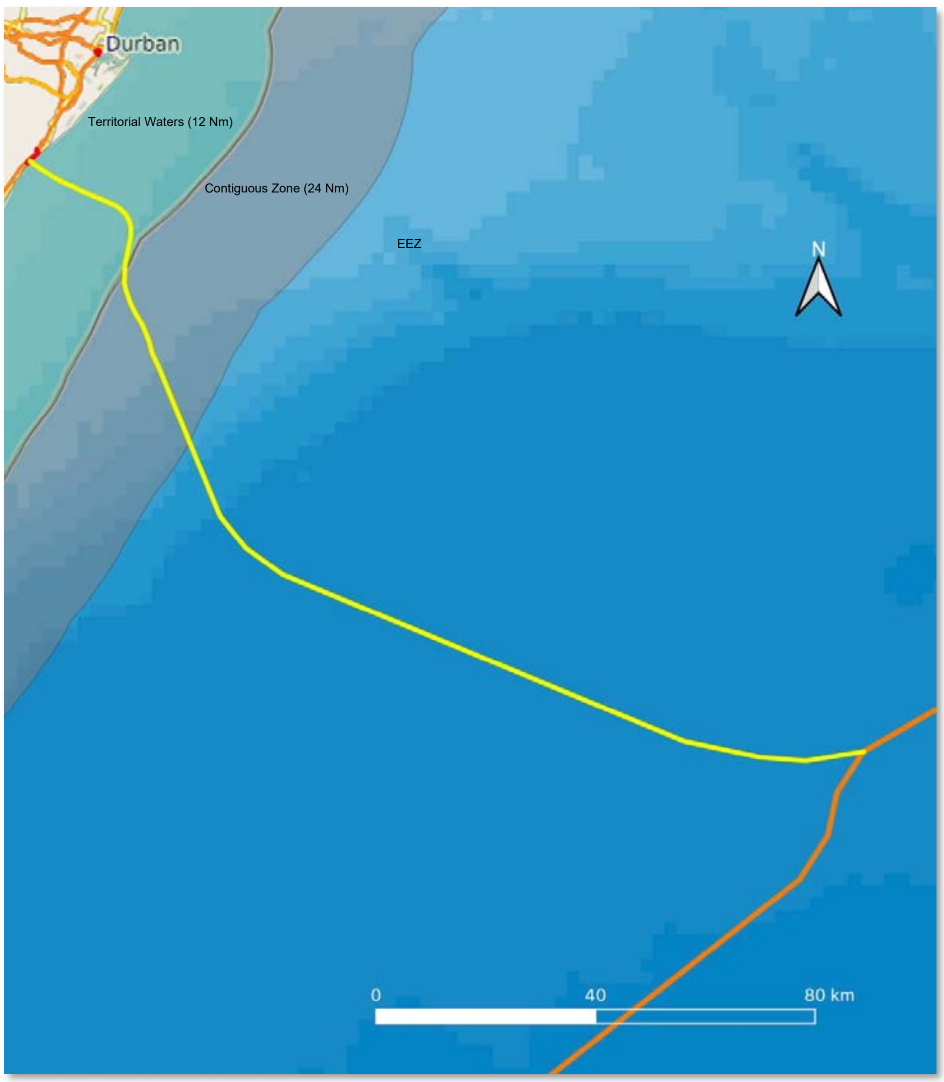

Figure 2: Alignment of 2AFRICA/GERA Amanzimtoti branch line (yellow) from main cable route (orange) to the landfall (Google Earth).

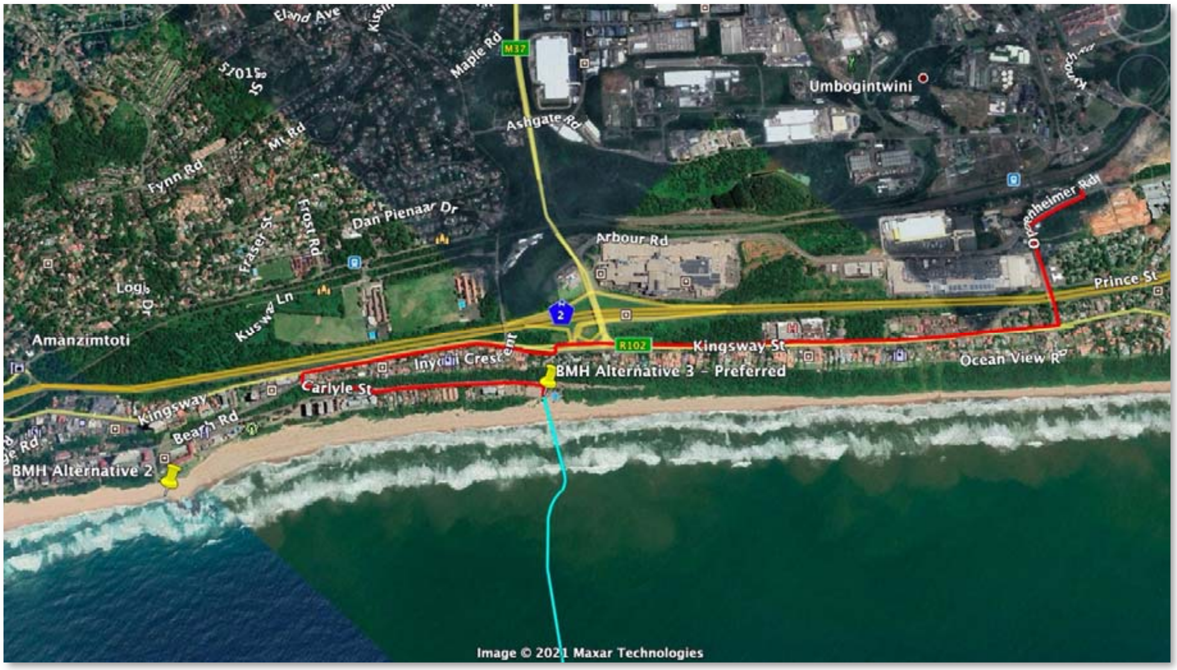

Figure 3: 2AFRICA/GERA terrestrial cable route showing the preferred terrestrial route option (red) and BMH Alternatives 2 and 3. The preferred marine cable alignment is shown in blue (Source: Google Maps).

Plate 3: BMH Alternative 3 will be positioned beyond the line of trees on the left and the route will then cross the car park and follow Beach Road south (right of image) (Source: Google Earth).

Plate 4: View of proposed cable route south from approximately midway along Beach Road (Source: Google Earth).

Plate 5: View of proposed cable route north along Kingsway from intersection with Beach Road on right (Source: Google Earth).

Plate 6: View of proposed cable alignment along portion of Kingsway (Source: Google Earth).

Plate 7: View north along Kingsway where cable crosses road (Source: Google Earth).

Plate 8: View along Kingsway showing routing of cable along existing pavement (Source: Google Earth).

Plate 9: View of cable route alignment at Kingsway / Oppenheimer Road intersection (Source: Google Earth).

Plate 10: View of cable alignment along section of Oppenheimer road (Source: Google Earth).

Plate 11: View of alignment at Oppenheimer Road / McGowan Place intersection (Source: Google Earth).

Plate 12: View of cable alignment along McGowan Place (Source: Google Earth).

Plate 13: Cable Landing Station in McGowan Place (Source: ACER (Africa) Environmental Consultants 2021).

3 TERMS OF REFERENCE

ACO Associates was commissioned to produce a Heritage Impact Assessment (HIA) of the portion of the proposed 2AFRICA/GERA (East) cable system to be landed at Amanzimtoti, as part of the Environmental Impact Assessment (EIA) process for the project required by the

National Environmental Management Act (No. 107 of 1998), as amended.

This HIA deals with both the marine and terrestrial portions of the cable system. The marine portion of the cable route is located between the outer edge of the contiguous zone (i.e. 24 nautical miles offshore) and the high water mark, which is the extent of the jurisdiction of the South African Heritage Resources Agency (SAHRA). The terrestrial element of the cable route lies between the BMH and the CLS and falls under the jurisdiction of the KwaZulu-Natal Amafa and Research Institute (Amafa).

This report aims to identify heritage resources which may be impacted during the construction, operation and decommissioning phases of the project, assess their significance and provide recommendations for any mitigation than may be necessary.

This document therefore includes the following:

- A desk-top level literature review to assess the potential for maritime archaeological sites, and submerged pre-colonial sites along the marine route of the cable system;
- A desk-top level literature review to assess the potential for archaeological and other heritage sites along the terrestrial route of the cable system;
- A desk-top palaeontological assessment of the potential for palaeontological features along both the terrestrial and marine routes of the cable system; and
- A review of the offshore geophysical survey reports for the cable system for seabed anomalies that may represent heritage resources.

The results of the studies listed above are integrated in this HIA report along with an assessment of the sensitivity and significance of any heritage resources, an evaluation of the potential impacts on them of the construction, operation and decommissioning of the project, and recommendations for measures to mitigate any negative impacts on them.

The HIA must be submitted for comment to SAHRA and Amafa as the relevant statutory commenting bodies under the National Environmental Management Act for the offshore and terrestrial elements of the project respectively.

4 RELEVANT LEGISLATION

4.1 National Heritage Resources Act (No 25 of 1999)

The National Heritage Resources Act (NHRA) came into force in April 2000 with the establishment of SAHRA, replacing the National Monuments Act (No. 28 of 1969 as amended) and the National Monuments Council as the national agency responsible for the management of South Africa's cultural heritage resources.

The NHRA reflects the tripartite (national/provincial/local) nature of public administration under the South African Constitution and makes provision for the devolution of cultural heritage management to the appropriate, competent level of government, in this case Amafa.

Because national government is responsible for the management of the seabed below the high-water mark, however, the management of maritime and underwater cultural heritage resources under the NHRA does not devolve to provincial or local heritage resources authorities but remains the responsibility of the national heritage agency, SAHRA.

The NHRA gives legal definition to the range and extent of what are considered to be South Africa's heritage resources. According to Section 2(xvi) of the Act a heritage resource is "any place or object of cultural significance". This means that the object or place has aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance.

Of the heritage resource types protected by the NHRA, the installation and operation of the 2AFRICA/GERA (East) cable system has the potential to impact the following, which are defined in Section 2 of the NHRA:

- Submerged pre-colonial archaeological sites and materials older than 100 years;
- Maritime and underwater cultural heritage sites and material older than 60 years, which are principally historical shipwrecks;
- Palaeontological features and material, which are defined by the NHRA as the fossilised remains or fossil trace of animals or plants which lived in the geological past;
- Terrestrial archaeological sites and materials older than 100 years;
- Structures older than 60 years;
- Graves and human remains older than 60 years and located outside of a formal cemetery administered by a local authority; and
- Public monuments and memorials.

These cultural heritage resources are protected by the NHRA and a permit from SAHRA or Amafa, as appropriate, is required to destroy, damage, excavate, alter, deface or otherwise disturb any such site or material.

It is also important to be aware that in terms of Section 35(2) of the NHRA, all archaeological objects and palaeontological material is the property of the State and must, where recovered from a site, be lodged with an appropriate museum or other public institution.

Section 38(8) of the NHRA states that if an impact assessment is required under any legislation other than the NHRA then it must include a heritage component that satisfies the requirements of Section 38(3). Furthermore, the comments of the relevant heritage authority must be sought and considered by the consenting authority prior to the issuing of a decision.

4.2 KwaZulu-Natal Amafa and Research Institute Act (No 5 of 2018)

KwaZulu-Natal (KZN) has its own provincial heritage legislation, the KwaZulu-Natal Amafa and Research Institute Act (No 5 of 2018).

The KZN legislation provides for the conservation, protection and administration of both the physical and the living or intangible heritage resources of the Province of KwaZulu-Natal. In terms of the Act the provincial heritage agency, KwaZulu-Natal Amafa and Research Institute, is responsible for the management and protection within KZN of battlefield sites, archaeological sites, rock art sites, palaeontological sites, historic fortifications, and meteorite or meteorite impact sites.

As described above in relation to the NHRA, national government is responsible for the management of the seabed below the high-water mark and the management of maritime and underwater cultural heritage resources in KZN therefore takes place under the NHRA and by SAHRA and does not devolve to Amafa.

4.3 Maritime Zones Act (No 15 of 1994)

South Africa’s Maritime Zones Act of 1994 is the national legislative embodiment of the international maritime zones set out in the United Nations Convention on the Law of the Sea (UNCLOS).

The Act defines the extent of the territorial waters, contiguous zone, exclusive economic zone and continental shelf, which together comprise some 4.34 million square kilometres of seabed around the South African coast and sets out South Africa’s rights and responsibilities in respect of these various maritime zones.

Under the terms of the maritime zones established by the Act, the application of the NHRA applies within South Africa’s territorial waters (12 nautical miles seaward of the baseline) and extends to the outer limit of the maritime cultural zone (24 nautical miles seaward of the baseline). Any offshore activities that have the potential to disturb or damage cultural heritage resources located in or on the seabed within the territorial waters and maritime cultural zone require the involvement of SAHRA, as a commenting body in respect of the National Environmental Management Act EIA process and as permitting authority where impacts to sites or material cannot be avoided and damage or destruction will occur.

The maritime portion of the proposed 2AFRICA/GERA (East) cable system crosses the EEZ, the contiguous zone and the territorial waters, and comes ashore at Amanzimtoti (Figure 2 above).

With respect to the portion of the cable system to be installed within the EEZ, Section 9 of the Maritime Zones Act states that activities undertaken from installations operating within these areas may be subject to the requirements of any law in force in the Republic. The definition of "installation" (which includes vessels) provided in the Act, however, appears to limit this to activities related to seabed mining and mineral exploitation.

The extent of the application of the NHRA and Maritime Zones Act in respect of the 2AFRICA/GERA (East) cable system to Amanzimtoti is therefore, limited to the area between the high-water mark and the outer edge of the contiguous zone.

4.4 National Environmental Management Act (Act No 107 of 1998)

The 1998 National Environmental Management Act (NEMA) provides a framework for the integration of environmental issues into the planning, design, decision-making and implementation of plans and development proposals that are likely to have a negative effect on the environment.

Regulations governing the environmental authorisation (EA) process have been promulgated in terms of NEMA and include the EIA Regulations (GNR R326/2017) and Listing Notices (LN) 1-3 (R327, R325 and R324) that list activities requiring EA.

The proposed 2AFRICA/GERA (East) cable system triggers a number of activities in the Listing Notices and the project is thus be subject to a full Scoping and Environmental Impact Assessment process and must obtain a positive Environmental Authorisation from the national Department of Environment, Forestry and Fisheries (DEFF) prior to commencement of the proposed activities

As NEMA commenting bodies, SAHRA and Amafa were both asked to comment on the Background Information Document (BID), Draft Scoping Report (DSR) and Final Scoping Report (FSR). SAHRA responded to each invitation to comment (on 4 December 2020, 31 March 2021 and 30 April 2021, respectively) noting in its responses that the need for a HIA is addressed in each of the documents. SAHRA also supports the proposal that the maritime archaeologist would review the geophysical survey data collected for the alignment of the subsea cable as an important aid to inform the specialist report.

No response to any of the requests for comment has been received from Amafa.

5 METHODOLOGY

This desktop report provides an assessment of both the maritime and underwater cultural heritage and terrestrial heritage potential of the 2AFRICA/GERA (East) cable system to be landed at Amanzimtoti. The study area for this assessment is defined in Section 5.2 below.

The report includes a short description of what comprises South Africa's maritime and underwater cultural heritage, with particular emphasis on the maritime history of the KZN coast in the vicinity of the cable landfall. This is followed by a discussion of potential maritime heritage resources along that portion of cable system within the contiguous zone and territorial waters, framed within that wider context.

The potential for heritage resources to be associated with the terrestrial portion of the cable route between the BMH and CLS is also addressed, through a review of the pre-colonial and more recent history of the project area.

A palaeontological impact assessment by Dr Marion Bamford of the University of the Witwatersrand (see Appendix A) considers the potential for palaeontological features and resources to be present along the cable route, both onshore and in the seabed.

The report draws information from readily available documentary sources and databases, including SAHRA's Maritime and Underwater Cultural Heritage database, a database of underwater heritage resources maintained by ACO Associates, and from relevant primary and secondary sources, and current geophysical data collected along route to identify as accurately as possible any known and potential heritage resources along the proposed cable route alignment.

The potential impacts arising from the proposed installation of the 2AFRICA/GERA (East) Amanzimtoti branch cable on maritime, terrestrial and palaeontological heritage resources are assessed and, where necessary, recommendations are made to mitigate such impacts.

5.1 Geophysical Survey

The geophysical survey report prepared by Fugro Germany Marine (Bielefeld 2020) for Segment E3 of the 2AFRICA/GERA (East) cable system, between the Amanzimtoti BMH and offshore

Amanzimtoti Branching Unit (BU) (see Figure 4), was reviewed for this HIA to ascertain whether any shipwrecks or other potential heritage resources had been identified within the sidescan sonar (SSS), multibeam bathymetry (MBES) and magnetometer data collected during the survey of the cable route.

The geophysical survey, for cable route design and engineering, was conducted during August and September 2020 along the Shallow (including inshore) and Deep Water sections of the Amanzimtoti branch cable. The route survey comprised an investigation of the bathymetry, seabed features and shallow geology of the proposed route. A geotechnical sampling programme was also undertaken to establish sediment types for correlation with geophysical data (Bielefeld 2020).

This archaeological review of the geophysical data relied on the survey report and the seabed feature characterisation it contained, processed seabed bathymetric maps attached to the report and other geophysical data within the contiguous zone and territorial waters.

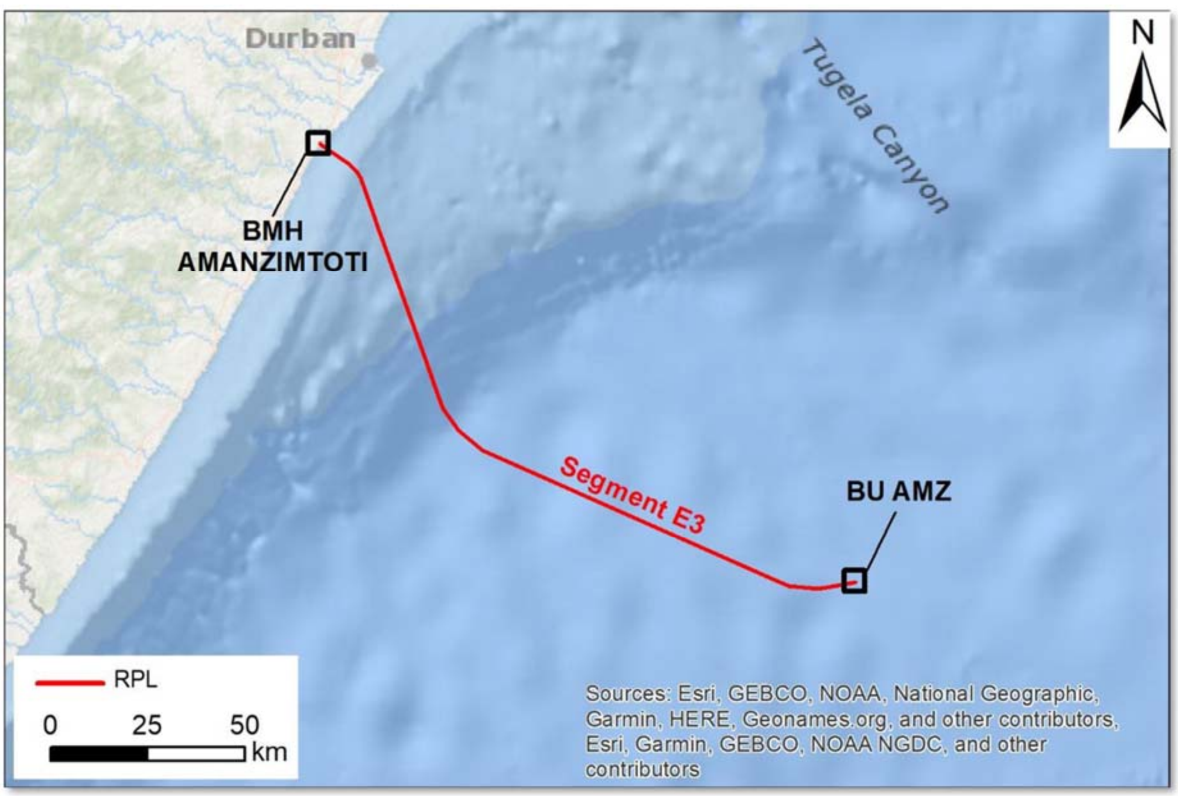

Figure 4: 2AFRICA/GERA (East) Segment E3 – Amanzimtoti BMH to Amanzimtoti BU (After: Bielefeld 2020).

5.2 Study Areas

The study area for the marine element of this heritage impact assessment has been defined as a 1 km buffer on either side of the proposed marine route alignment between the Mean High Water Mark at Amanzimtoti Pipeline Beach and the outer edge of the contiguous zone, 24 nautical miles from the baseline (Figure 11 below).

On shore, the study area is confined to the road reserves within which cable installation is proposed.

5.3 Limitations and Assumptions

South Africa's record of both maritime and terrestrial archaeological resources is based on a mix of information derived from historical documents and other secondary sources. Where available this is supplemented by primary sources such as geophysical data and other field-based observations and site recordings.

While every effort has been made to ensure the accuracy of the information presented below, therefore, the reliance on secondary data sources does mean that there are considerable gaps and inaccuracies in this record. For example, in the marine environment the positions given for most of the wrecks referred to in the following sections are estimated rather than known locations and are based on descriptions of their loss or positions taken at the time of loss (often by third parties). The potential also exists for currently unknown and/or unrecorded maritime heritage sites to be encountered on the seabed in the course of activities associated with this project.

6 UNDERWATER CULTURAL HERITAGE

South Africa has a rich and diverse underwater cultural heritage. South Africa's rugged and dangerous coastline is strategically located on the historical trade route between Europe and the East and has witnessed more than its fair share of shipwrecks and maritime dramas since the early 16th century.

At least 2400 vessels are known to have sunk, grounded, or been wrecked, abandoned or scuttled in South African waters since the early 1500s. This doesn't include the as yet unproven potential for shipwrecks and other sites that relate to pre-European, Indian Ocean maritime exploration, trade and interactions along the South African east coast.

In addition to historical shipwrecks, the record of South Africa's long association with the sea is much broader and extends far back into prehistory. This element of our maritime and underwater cultural heritage is represented around the South African coast by thousands of pre-colonial shell middens and large numbers of tidal fish traps, which reflect prehistoric human exploitation of marine resources since at least the Middle Stone Age (MSA), more than 150,000 years ago

Another, until recently, largely unacknowledged and unexplored aspect of our maritime and underwater cultural heritage are pre-colonial terrestrial archaeological sites and palaeolandscapes which are now inundated by the sea.

The marine portion of this assessment considers maritime and underwater cultural heritage resources along the 2AFRICA/GERA (East) cable system landward of the EEZ/contiguous zone boundary, namely submerged prehistoric resources and historical shipwrecks and also comments on the palaeontological potential of the seabed to be affected.

6.1 Submerged Prehistory

Since the start of the Quaternary approximately 2.6 million years ago, the world has been subject to a series of cooling and warming climatic cycles during which sea level has generally been lower than it is today. Within the last 900,000 years, these cycles have caused global sea levels to fluctuate substantially on at least three occasions, with other lesser fluctuations in between. This has been the result of increased and decreased polar glaciation and falls in sea level were caused by the locking up in the polar ice caps of huge quantities of seawater as global temperatures cooled.

The most extreme recent sea level drop occurred between circa 20,000 and 17,000 years ago when at the height of the last glaciation (Marine Isotope Stage 2 (MIS)) global sea levels were more than 120 m lower than they are today (Waelbroeck *et al*, 2002; Rohling *et al*, 2009).

As with the MIS 2 low sea level stand, those which corresponded with MIS 4 (~70,000 years ago), MIS 6 (~190,000 years ago), MIS 8 (~301,000 years ago) and MIS 12 (~478,000 years ago) would have "added a large coastal plain to the South African land mass" (Van Andel 1989:133) where parts of the continental shelf were exposed as dry land (see Cawthra *et al*, 2016). The exposure of the South African continental shelf would have been most pronounced on the wide Agulhas Bank off the southern Cape coast, and it is estimated that a new area of land, as much as 80,000 km^2 in extent, was exposed during the successive glacial maxima (Fisher *et al*, 2010) (Figure 5).

The exposed continental shelf was quickly populated by terrestrial flora and fauna, and also by our human ancestors who were dependant on these resources (Compton, 2011). As a result, for periods numbering in the tens of thousands of years on at least three occasions during the last 500,000 years our ancestors inhabited areas of what is now seabed around the South African coast.

This means that a large part of the archaeological record of the later Earlier, Middle and early

Late Stone Age is located on the continental shelf and is now "inundated and for all practical purposes absent from [that] record" (Van Andel, 1989:133-134).

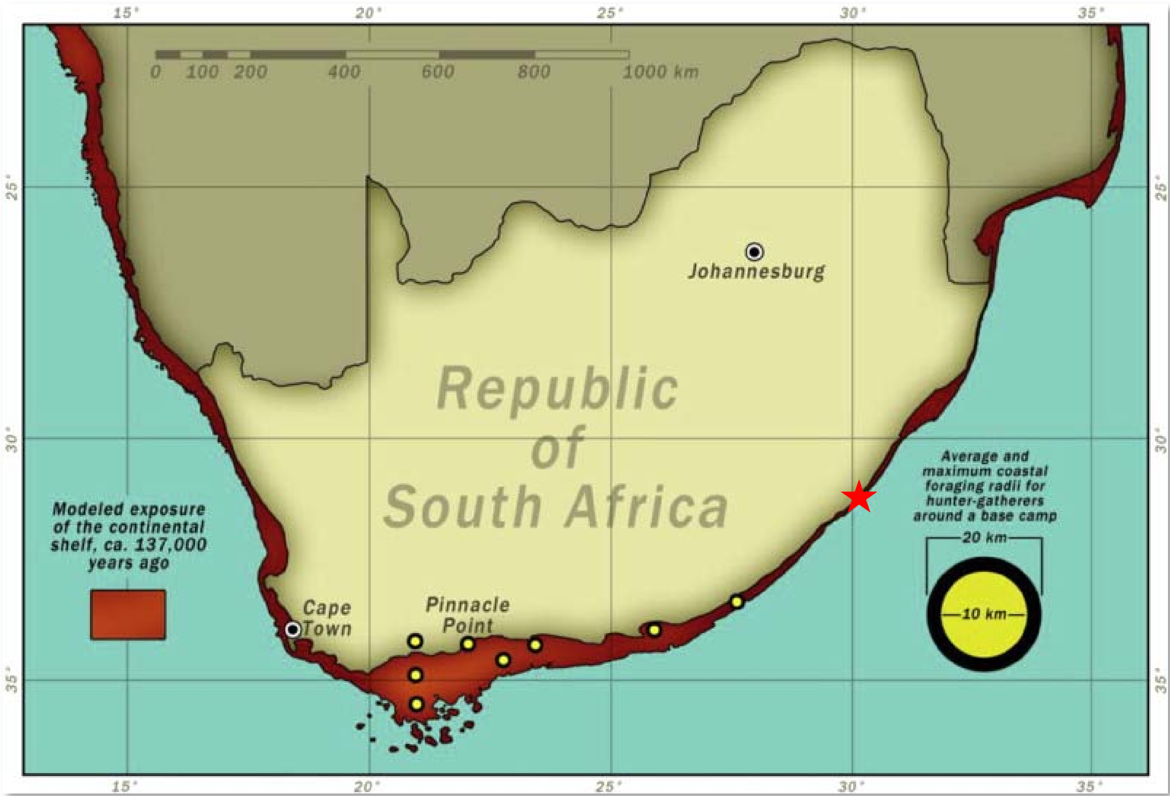

Figure 5: Possible extent of the South African continental shelf during MIS 6. The approximate location of Amanzimtoti is marked by the red star (Source: Franklin et al, 2105)

Until relatively recently there was little or no access to the submerged prehistoric landscapes and sites on the continental shelf, although evidence from various parts of the world of drowned, formerly terrestrial landscapes hinted at the tantalising prospect of prehistoric archaeological sites on and within the current seabed.

Perhaps the best-known example of such evidence is archaeological material and late Pleistocene faunal remains recovered in the nets of fishing trawlers in the North Sea between the United Kingdom and the Netherlands throughout the 20th century (Peeters *et al*, 2009; Peeters, 2011) and the University of Birmingham's archaeological interpretation of 3D seismic data, collected in the same area by the oil and gas industry, which has revealed well-preserved prehistoric landscape features across the southern North Sea (Fitch *et al*, 2005, Gaffney *et al*, 2010).

Closer to home, there is archaeological evidence for a prehistoric human presence in what is now Table Bay. In 1995 and 1996 during the excavation of two Dutch East India Company shipwrecks, the *Oosterland* and *Waddinxveen*, divers recovered three Early Stone Age, Acheulian handaxes from the seabed under the wrecks. The stone tools, which are between 300,000 and 1.4 million years old, were found at a depth of 7-8 m below mean sea level and were associated with Pleistocene sediments from an ancient submerged and infilled river channel. Their unrolled and unworn condition indicate that they had not been carried to their current position by the ancient river and suggests that they were found more or less where they were dropped by Early Stone Age hominins more than 300,000 years ago, when the sea level was at least 10 m lower than it is today (Werz and Flemming, 2001; Werz *et al*, 2014).

6.2 Potential for Submerged Prehistory in the Amanzimtoti Area

Although there are currently no known submerged prehistoric sites in the Amanzimtoti area or along the proposed subsea cable route, several studies of the wider KZN continental shelf describe Pleistocene and Holocene palaeolandscape features and sediments which have archaeological potential.

Martin and Flemming (1988) describe three Quaternary sequences overlying older strata: consolidated and fossilised aeolian foredune complexes, buried fluvial channels with infill sediments, and unconsolidated Holocene sediments.

Rugged and linear aeolianite shoals like the Protea Banks and Aliwal Shoal form prominent features on the KZN shelf and Cawthra *et al* (2012) identified aeolianite deposits off The Bluff in Durban. These aeolianites form a succession of shore-parallel reef systems extending to depths of more than 100 m below mean sea level. They are linked to global Quaternary sea level fluctuations and are thought to represent Late Pleistocene palaeocoastlines. They formed as coastal dunes associated with barrier beaches and are interpreted as submerged coastal dune cordons (Martin and Flemming 1988; Bosman *et al* 2005; Cawthra *et al* 2012). Martin and Flemming (1988) suggest that they were formed duringthe last glacial, between 120 000 and 30 000 years ago. An Infrared Stimulated Luminescenceage of 60 ka obtained by Cawthra *et al* (2012) supports this dune building during the Marine Isotope Stage 4, last glacial period.

Coastal dunes are a known focus of pre-colonial human activity, and sites are often found in dune slacks which provide shelter from the prevailing wind. It is possible, therefore, that there will be archaeological sites and material associated with the aeolianite deposits off the KZN coast, although such material has not yet been identified.

Other studies (see for example, Green and Garlick 2011, Dladla 2013) have also described incised valleys on the continental shelf which were cut during sea-level low stands when river courses extended onto the shelf. This downcutting would have occurred during glacial periods and the resultant channels are filled by fluvial sediment and are overlain by Holocene sediments deposited when sea-level regained levels near to those of present day (Martin and Flemming 1988). Such palaeo-rivers would have been attractive resources to our human ancestors on the now submerged continental shelf and just as on land, archaeological sites and material can be expected to be associated with these river valleys. Where fluvial deposits within the palaeochannels have survived subsequent marine transgression these have the potential to preserve palaeoenvironmental information useful in the reconstructing the environment and thus contributing to the study of our early ancestors in South Africa.

Across much of the continental shelf modern seabed sediments laid down during the Holocene as the sea level rose to the level it is today are draped over and infill the incised palaeochannels. Although this unconsolidated surface sediment is likely to have some archaeological potential, it is likely to be low.

7 PALAEONTOLOGY: MARINE AND TERRESTRIAL

7.1 Project Location and Geological Context

Amanzimtoti is on the KwaZulu Natal South Coast where the older intrusive rocks of the Natal Sector of the Namaqua-Natal Province are overlain by the Karoo Supergroup rocks and adjacent to the present day coastline by the much younger Maputaland Group sediments (Figure 6 and Table 1).

The sediments of the Karoo Supergroup that filled in the huge Karoo Basin during Palaeozoic times have been divided into four groups, each with a number of formations within them. The basal Dwyka Group (not subdivided) is composed of the transported sediments and rocks that were entrapped in the glacial ice sheets that had formed when southern Africa was positioned over the South Pole. As the supercontinent Gondwana, of which Africa was a central part, slowly moved northwards, the ice sheets melted and dropped their rocks and sediments. These are diamictites, tillites, mudstones and rare dropstones.

As the continent warmed and sediments from the northern Cargonian highlands and southern Cape Fold Mountains were washed into the basin. These are known as the Pietermaritzburg Formation.

Vegetation around the basin and rivers, plus the sediments were washed into the basin and these sandstones, siltstones and mudstones are known as the Vryheid Formation. Overlying that is the Volksrust Formation. Then the Beaufort Group and Stormberg Group filled the basin. The upper sediments are not present in this region. There is a big gap in time between these and the much younger sediments.

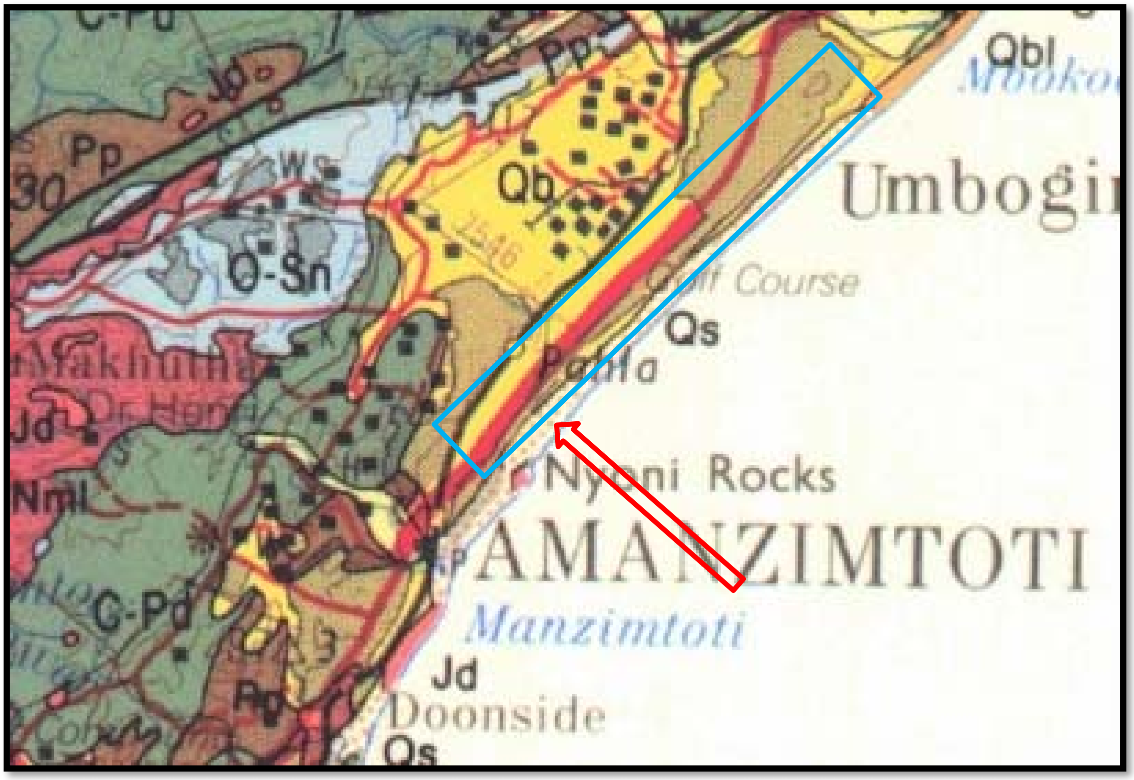

Figure 6: Geological map of the area around Amanzimtoti. The location of the proposed landfall site is indicated by the red arrow. Onshore cables are within the blue rectangle. Abbreviations of the rock types are explained in Table 2. (Source: Geological Survey 1: 250 000 map 3030 Port Shepstone).

Table 1: Explanation of symbols for the geological map and approximate ages (Botha, 2018). SG = Supergroup; Fm = Formation; Ma = million years; grey shading = formations impacted by the project.

Symbol	Group/Formation	Lithology	Approximate Age
Qs	Sibaya Fm, Mfolosi Subgroup, Maputaland Group	Dune sand	Holocene ca 10.5ka to present
Qb	Umkwelane Fm (formerly Berea Fm), Uloa Subgroup, Maputaland Group	Aeolianite, decalcified to “Berea-type” reddish-brown soil profile	Mid Miocene – Pliocene 10 – 2.5 Ma
Qbl	Umkwelane Fm (formerly Bluff Fm), Uloa Subgroup, Maputaland Group	Calcarenite, calcareous sandstone, conglomerate	Mid Miocene – Pliocene 10 – 2.5 Ma
Jd	Jurassic dykes	dolerite	
Pp	Pietermaritzburg Fm, Ecca Group, Karoo SG	Mudstones, siltstones	Lower Ecca, Early Permian
C-Pd	Dwyka Group, Karoo SG	Tillites, diamictites, mudstones, shales	Upper Carboniferous – Early Permian
O-Sn	Natal Group	Micaceous sandstone, grit, conglomerate, siltstone, mudstone	Ordovician to Silurian Ca 490 – 416 Ma
Nmk	Nkomazi Gneiss	Gneiss	Ca 1000 Ma

The aeolianites of the Umkwelane Formation which cover the area affected by the terrestrial cable route alignment are part of the early Miocene marine transgression that was followed by epeirogenic uplift, then a eustatic marine regression, starting in the middle Miocene (Botha 2018). This marine regression deposited littoral marine sediments on the marine planed coastal platform that had incised across the entire range of rock types that were exposed along the eastern seaboard of southern Africa (ibid).

7.2 Terrestrial Palaeontological Context

From the SAHRIS map below (Figure 7) the landfall site and terrestrial cable route is indicated as an area of high sensitivity (orange) for the Umkwelane Formation aeolianites. Fossils typical of this formation are marine molluscs, shark teeth and foraminifera (microscopic marine organisms). The latter are not visible to the naked eye, and the molluscs are similar to the modern counterparts so would be difficult to distinguish. Occasionally trace fossils such as worm burrows or rhizoliths are preserved in the Umkwelane Formation.

Figure 7: Palaeontological sensitivity (orange = high) of the terrestrial cable route (red line). The low sensitivity Holocene beach sands are shown as in blue (Source: SAHRIS, https://sahris.sahra.org.za/map/palaeo).

The beach and nearshore seabed sediment comprises of Holocene sands which will contain no fossil material, unless it is reworked from other sediments such as the Umkwelane Formation aeolianites.

7.3 Offshore Paleontological Context

The coastal platform along KwaZulu Natal has been well mapped north of Durban but less research has been done south of the city (Dingle et al. 1983; see review in Green et al. 2017). Recent research for potential geological traps for carbon dioxide (Hicks and Green 2017) has looked more closely at the southern section of the coastline (Figure 8).

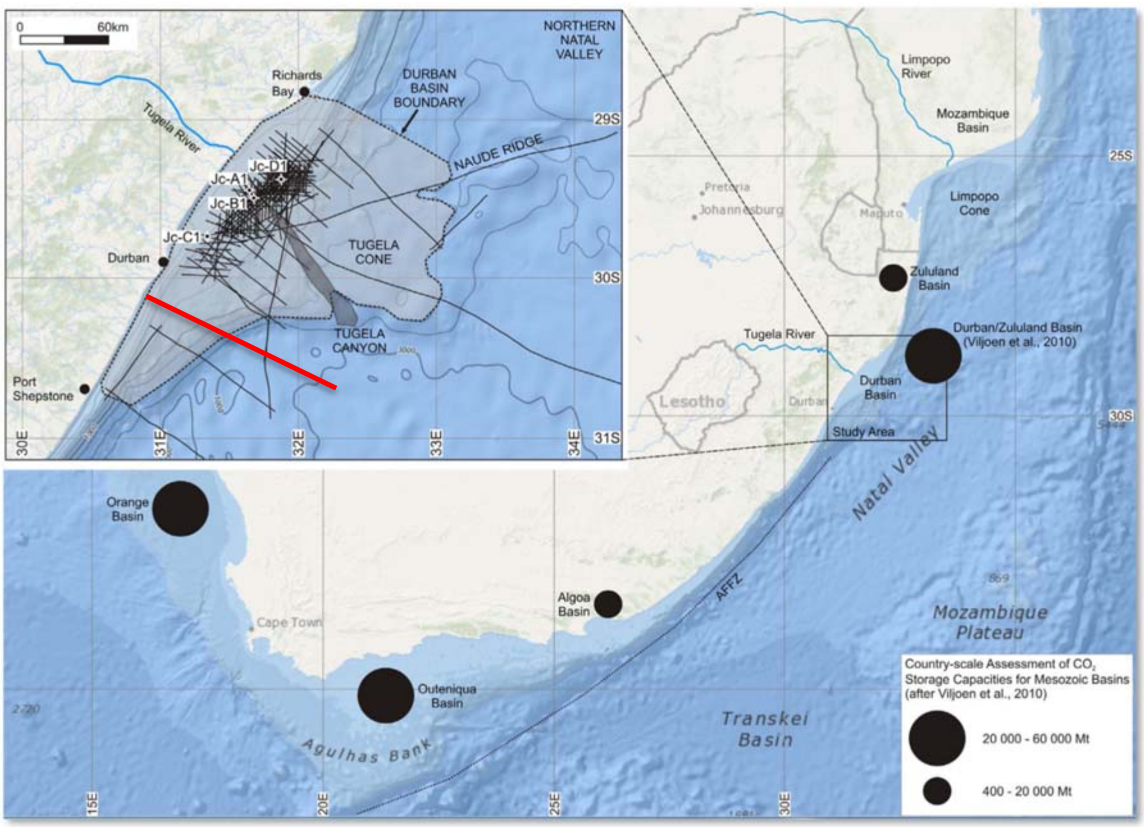

Figure 8: Coastal bathymetry off KwaZulu Natal from Figure 1 of Hicks and Green (2017). The 2Africa/GERA pipeline is indicated by the red line.

The Tugela Cone (see top left on Figure 8) extends seawards of the Tugela River Mouth and southwards along the coastline and is composed of sands and fine-grained sediments. The basin is structurally complex with basement comprising rifted Carboniferous-Jurassic sedimentary and volcanic lithologies of the Karoo Supergroup. Upper Jurassic to Cenozoic age sediments (Broad et al. 2006) comprise the basin-fill with the main focus of sedimentation occurring within the Tugela Cone. Since the late Cretaceous, deposition along the continental shelf is marked by several hiatuses that have resulted in incomplete preservation of the drift stratigraphy (Green 2011, Hicks and Green, 2016).

Since the seabed sediments along the portion of the marine cable route that is the subject of this assessment are reworked delta-fan sands it is unlikely to that any *in situ* fossils would be found along this dynamic coastline with the strong southerly Agulhas current.

8 MARITIME HISTORY OF SOUTH AFRICA'S COAST AND SURROUNDS

In 1498 the Portuguese explorer Vasco da Gama finally pioneered the sea route around Africa from Europe to the East. Since then, the southern tip of the African continent has played a vital role in global economic and maritime affairs, and until the opening of the Suez Canal in 1869, represented the most viable route between Europe and the markets of the East (Axelson 1973; Burman 1976; Turner 1988; Gribble 2002; Gribble and Sharfman 2013).

The South African coast is rugged and the long fetch and deep offshore waters mean that the force and size of seas around the coast are considerable; a situation exacerbated by prevailing seasonal winds. The geographical position of the South African coast on the historical route to the East and the physical conditions mariners could expect to encounter in these waters have, in the last five centuries, been responsible for the large number of maritime casualties which today form the bulk of South Africa's maritime and underwater cultural heritage (Gribble 2002).

At least 2,400 vessels are known to have sunk, grounded, or been wrecked, abandoned or scuttled in South African waters since the early 1500s. More than 1,900 of these wrecks are older than 60 years of age and are thus protected by the NHRA as archaeological resources. The existing list of wrecks is by no means complete and does not include the as yet unproven potential for shipwrecks and other sites that relate to pre-European, Indian Ocean maritime exploration, trade and interactions along the South African east coast. It is anticipated that further research in local and foreign archives, together with physical surveys to locate the remains of historical shipwrecks will produce a final tally of more than 3,000.

The earliest known South African wrecks are Portuguese, dating to the sixteenth century when that country held dominated the route to the East. Due to the later, more prolonged ascendancy of the Dutch and British in European trade with the East and control at the Cape, the majority of wrecks along the South African coast belong to these two nations. However, at least 36 other nationalities are represented amongst the wrecks that litter the South African coast.

Da Gama's maritime incursion into the Indian Ocean laid the foundation for more than 500 years of subsequent European maritime activity in the waters around the South African coast (Figure 9). The Portuguese and other European nations who followed their lead around the Cape and into the Indian Ocean, however, joined a maritime trade network that was thousands of years old and in which east and south east Africa was an important partner.

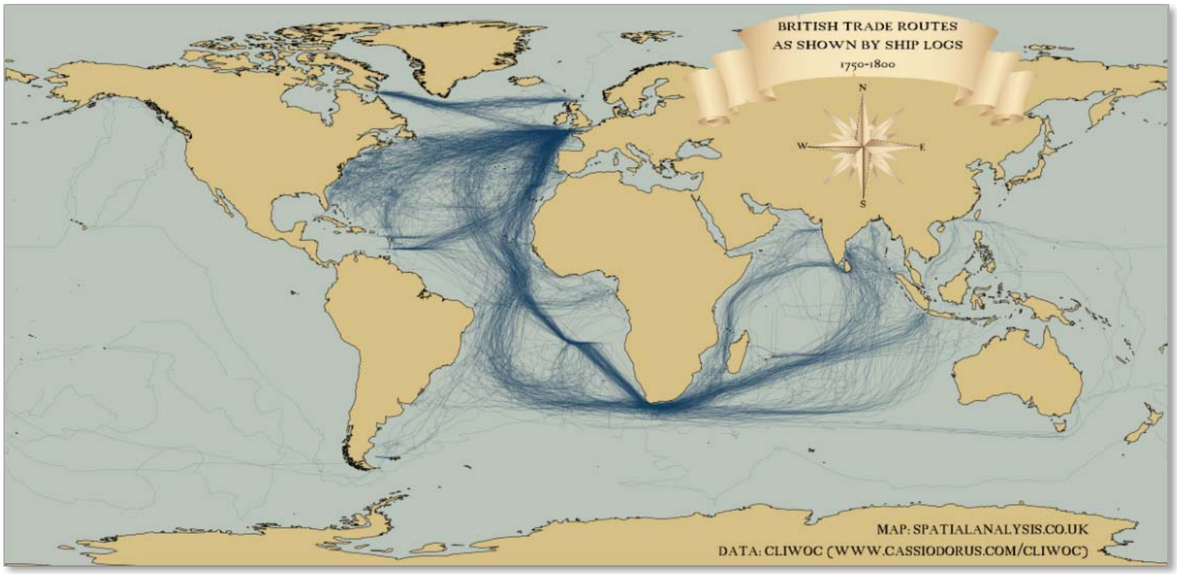

Figure 9: Example of the density of British shipping around the South African coast between 1750 and 1800 (Source: http://www.theguardian.com/news/datablog/2012/apr/13/shipping-routes-history-map).

This trade spanned the Indian Ocean and linked the Far East, South East Asia, India, the Indian Ocean islands and Africa. Archaeological evidence from Africa points to an ancient trade in African products – gold, skins, ivory and slaves – in exchange for beads, cloth, porcelain, iron and copper. The physical evidence for this trade includes Persian and Chinese ceramics excavated sites on African Iron Age like Khami, Mapungubwe and Great Zimbabwe (see Garlake 1968, Huffman 1972, Chirikure 2014), glass trade beads found in huge numbers on archaeological sites across eastern and southern Africa (Wood 2012).

There is shipwreck evidence on the East African coast for this pre-European Indian Ocean trade (see for example Pollard et al 2016) and clear archaeological and documentary evidence that this trade network extended at least as far south as Maputo in Mozambique. This suggests that there is the potential for shipwrecks and other sites that relate to pre-European, Indian Ocean maritime exploration, trade and interactions to exist along the South African east coast and offshore waters.

The historical shipwrecks that form part of South Africa's underwater cultural heritage are thus a unique and highly cosmopolitan repository of information about global maritime trade during the last five centuries and potentially much further back into the past. These sites contain a wealth of cultural material associated with that trade and clues to the political, economic, social and cultural changes that accompanied this trade and which contributed to the creation of the modern world.

8.1 Maritime History of the KZN Coast

The earliest detailed description of the KZN coast by a European was by the Portuguese navigator and cartographer Manuel de Mesquita Perestrelo who charted the South African coast between November 1575 and January 1576 (Figure 10).

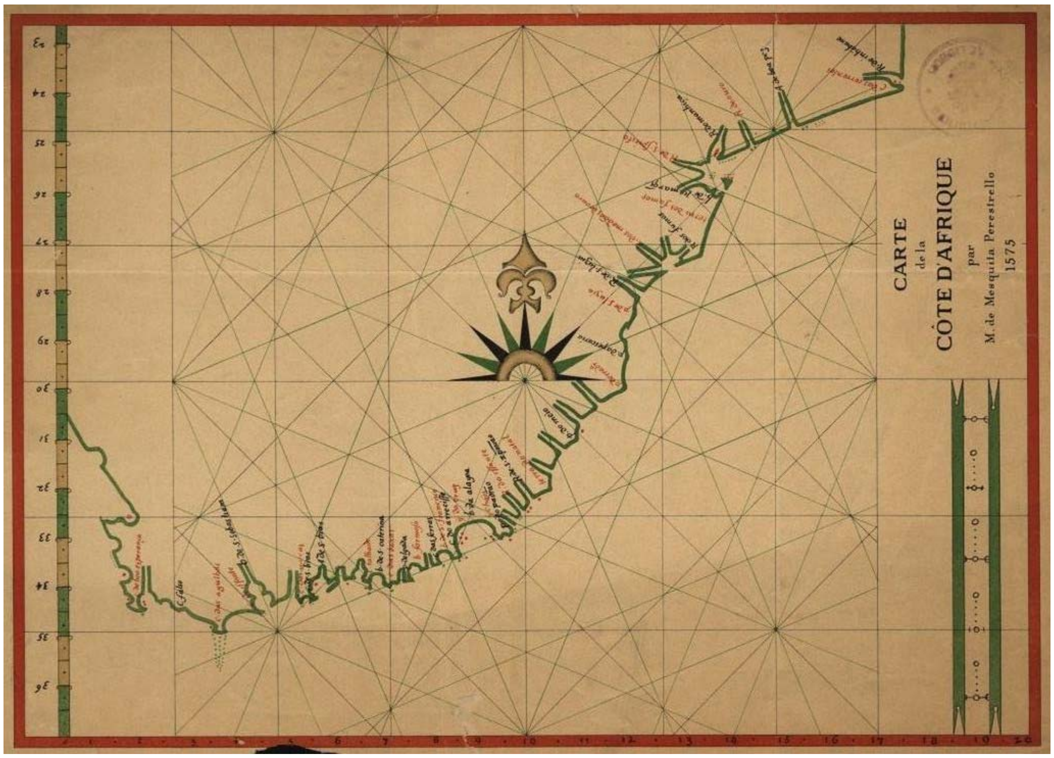

Figure 10: Manuel de Mesquita Perestrelo's map of the South African coast (Source: Wikipedia, . https://en.wikipedia.org/wiki/Manuel_de_Mesquita_Perestrelo)

One of the major coastal landmarks noted by Perestrelo was Durban Bluff, which he named Ponta Pescaria (Knox-Johnston 1989). Sheltered behind the Bluff is Natal Bay (now Durban Harbour), a shallow and swampy lagoon surrounded by mangrove forests when the first visited by European shipwreck survivors in the16th and 17th centuries.

Until the 1820s the KZN coastline was avoided whenever possible by European sailors because of its lack of safe anchorages. The coast is characterised by long stretches of sandy beach punctuated by river mouths, very few of which are accessible from the sea or navigable.

After a Royal Navy survey of the coast by Captain Owen in 1822, however, a small group of settlers led by James King and Francis Farewell arrived at Port Natal, one of the few natural harbours on the coast, and established an agricultural community in 1824 (Knox-Johnston 1989).

During the 19th century Port Natal (renamed Durban after of the Governor of the Cape in 1835) was the principal harbour on the KZN coast, although small harbours were established at Scottburgh and Umkomaas in 1850 and 1861 respectively to export sugar (https://en.wikipedia.org/wiki/Scottburgh, https://en.wikipedia.org/wiki/Umkomaas), at Port Shepstone on the Mzimkulu River 120 km south of Durban in 1867 after the discovery of marble in the area (https://en.wikipedia.org/wiki/Port_Shepstone), and at Richards Bay in the Mhlatuze River lagoon during the Anglo-Zulu War of 1879 (https://en.wikipedia.org/wiki/Richards_Bay)

As a result, the records consulted for this study show a concentration of historical shipwrecks at KZN's historical ports, with relatively few wrecks in the areas between.

There are, for example, at least 170 recorded wrecks in the immediate vicinity of Durban. In addition, the remains of nearly a dozen whalers and other vessels that were scuttled during the 20th century are charted by the South African Naval Hydrographer's Office (SANHO) to the east and south-east of Durban (see Figure 11 below). The positions for these charted wrecks are relatively accurate, but those availablefor most of the other historical shipwrecks are less so.

8.2 Amanzimtoti

Amanzimtoti, named according to local legend by the Zulu king, Shaka, for the sweetness of the water in the river, has no specific maritime history or heritage. The town developed around the Adams Mission, established inland of the modern town in 1836 by an American missionary,Dr Newton Adams. A mission school, Adams College, was established in 1853 and still exists.

In 1897 the area was still largely rural (Plate 14) when a railway station was built at Amanzimtoti on the new line down the coast from Durban, and this improved access from Durban resulted in the growth of the town into the modern beach resort it is today (https://en.wikipedia.org/wiki/Amanzimtoti) (Plate 15).

8.3 Shipwrecks in and Around the Marine Study Area

According to the available records, there are no known or recorded wrecks within the 1 km marine study area around the proposed subsea cable route alignment in the contiguous zone and territorial waters.

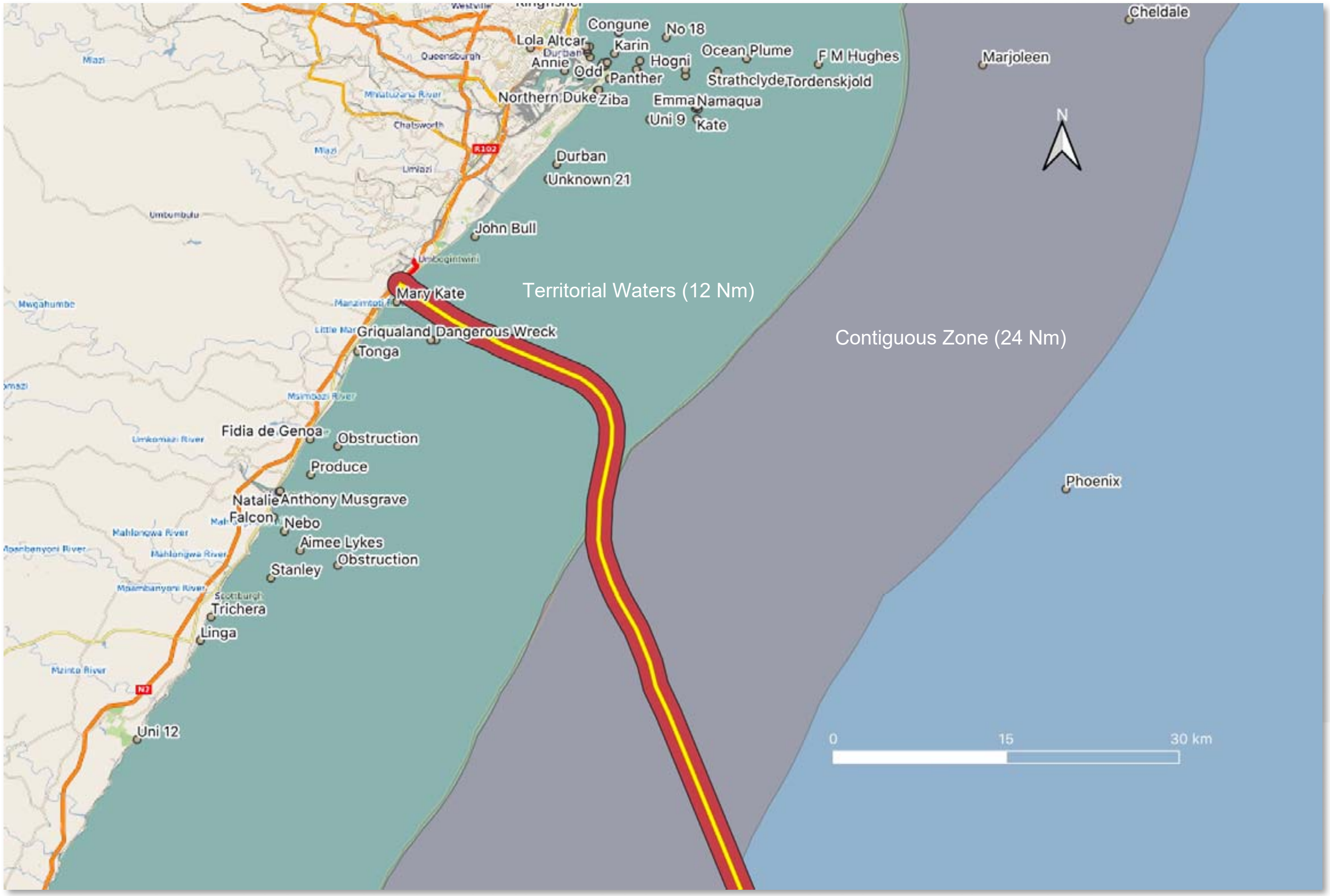

Figure 11: Proposed alignment of the 2AFRICA/GERA (East) cable system to Amanzimtoti within the Contiguous Zone and Territorial Waters. The 1 km buffer of the maritime assessment study area is shown on either side of the route as are the recorded wrecks in the vicinity. Please note that the number of wrecks shown around Durban is not a true reflection of the total number known (Source: Google Earth).

Plate 14: Photograph of Amanzimtoti c. 1895-1900 (Source: http://www.oberlinlibstaff.com/omeka_anthro/items/show/86)

Plate 15: Bathing at the Chain Rocks, Amanzimtoti late 19th/early 20th century (Source: https://southcoastsun.co.za).

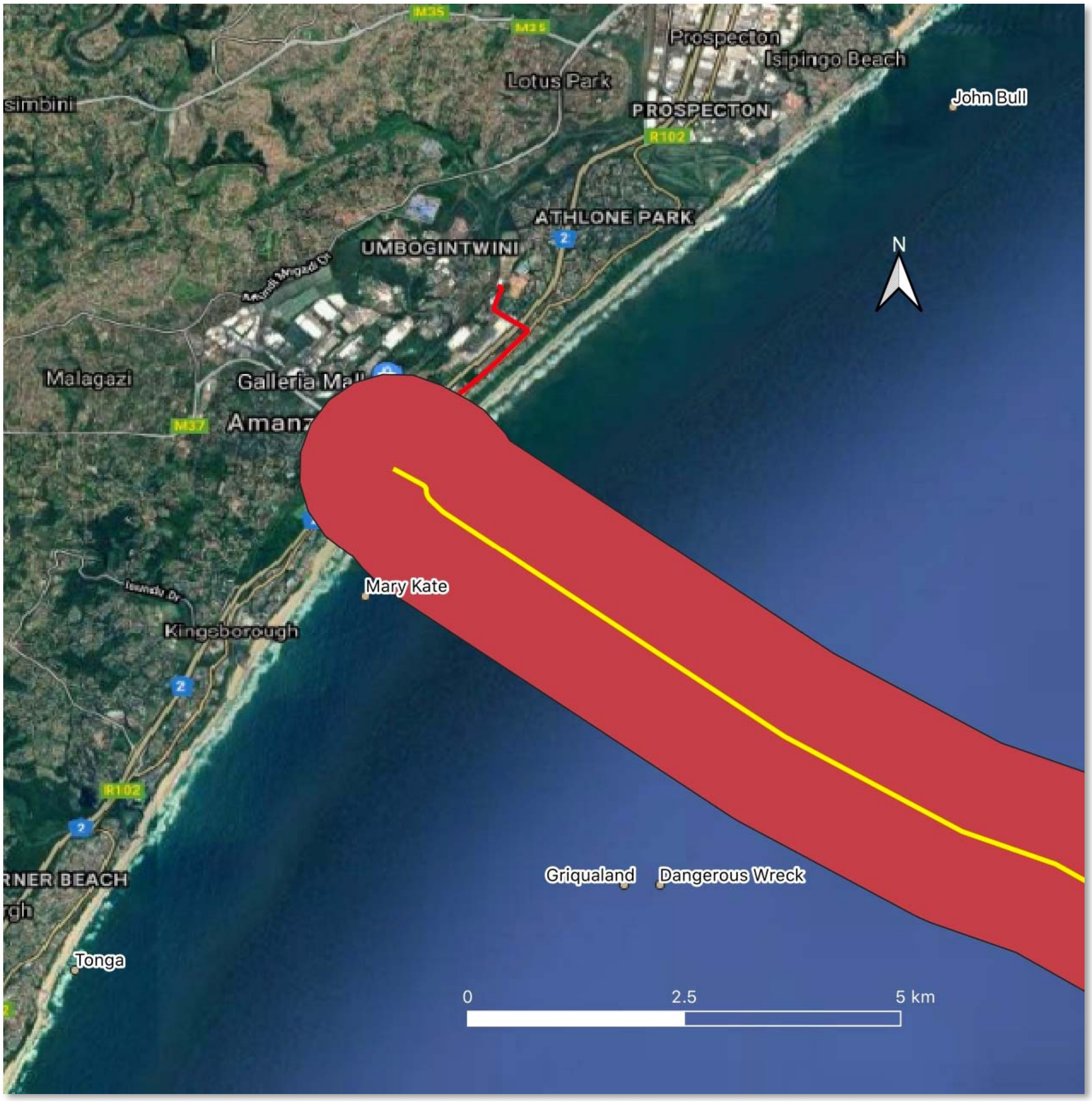

Figure 12: Known and recorded wrecks in immediate vicinity of the 2AFRIA/GERA cable route to Amanzimtoti. Cable route shown as yellow line and 1 km study area shown in red (Google Earth).

However, two wrecks are located immediately south of the study area (*Griqualand*/Dangerous Wreck and *Mary Kate*) and the *John Bull* and *Tonga* lie less than 7km north and south of the cable alignment, respectively (see Figure 12 and Appendix B).

Griqualand (1970)

The *Griqualand* was a 499 ton motor coaster built in 1962 and chartered by the Green 'R' Line which served ports around the South African coast (Plate 16).

She was lost in strange circumstances in November 1970 when, shortly after leaving Durban with a cargo of spirits and petrochemicals, there was an explosion in her holds which set her highly inflammable cargo alight. After futile attempts by salvage tugs to douse the blaze and tow her offshore she was sunk by gunfire from HMS *Dido* (Plate 17). There were no casualties (Ingpen 1979).

Plate 16: The coaster *Griqualand* (Source: https://www.balticshipping.com/vessel/imo/5329293).

Plate 17: The *Griqualand* ablaze in November 1970 with the tug standing by (Source: https://www.wrecksite.eu/).

The Dangerous Wreck shown on Figure 12 in proximity to the position marked as the *Griqualand* is likely to be the wreck of this vessel. The position of the Dangerous Wreck originates from the

SANHO.

The wreck of the *Griqualand* is currently less than 60 years of age and thus not currently subject to the NHRA. However, the wreck still contains part of its cargo of liquid chlorine and is considered dangerous and should be avoided.

***Mary Kate* (1976)**

The *Mary Kate* was another fishing vessel which foundered off Amanzimtoti on 27 December 1976. No further information about this vessel is available.

As with the *Griqualand*, the *Mary Kate* is currently outwith the ambit of the NHRA.

***John Bull* (1948)**

The *John Bull* was a 15 ton Durban-based fishing boat which sank off Isipingo on 2 December 1948 after being hit by a freak 10 m wave. Four people died. No further information about this vessel is available.

***Tonga* (1875)**

The *Tonga* was a 299 ton British wooden schooner wrecked at Winkelspruit, north of the Lovu River Mouth in May 1875 while carrying a general cargo. There were no casualties. The position of this wreck shown in Figure 10 is approximate.

Although the accurate positions of the *Mary Kate*, *John Bull* and *Tonga* are not known, based on the descriptions of these casualties in the historical record it is safe to assume that they are sufficiently distant from the cable route to be discounted as potential risks to the 2AFRICA/GERA cable route.

8.4 Review of Geophysical Survey Results

The proposed cable route was surveyed by Fugro Germany Marine using sidescan sonar (SSS), multibeam bathymetry (MBES) and magnetometer to provide primary evidence of seabed hazards, seabed geomorphology and other oceanographic and anthropogenic data (Bielefeld 2020). As well as being essential for planning of the installation of the cable, these data are also of interest from a maritime archaeological perspective as they can provide concrete evidence of wrecks and other heritage resources on or in the seabed.

The archaeological review of the geophysical survey report and accompanying digital mapping for Segment E3 of the 2AFRICA/GERA (East) cable system concentrated on the results of the Shallow (including inshore) water section of the survey between the low water mark and the outer edge of the contiguous zone and found the following:

8.4.1 Landfall and Inshore Survey Area

The Inshore Survey covered an area from the position of the proposed preferred BMH Alternative 3 (KP 0.000) south-west of the Pipeline Aquatic Centre across the beach and offshore to KP 2.500 in approximately 40.5 m water depth at lowest astronomical tide (LAT). On the seabed the proposed route crosses fine sand less than 2 m deep, which alternates with subcropping rock from KP 0.910 until the end of the Inshore Survey area at KP 2.500 (Figure 13).

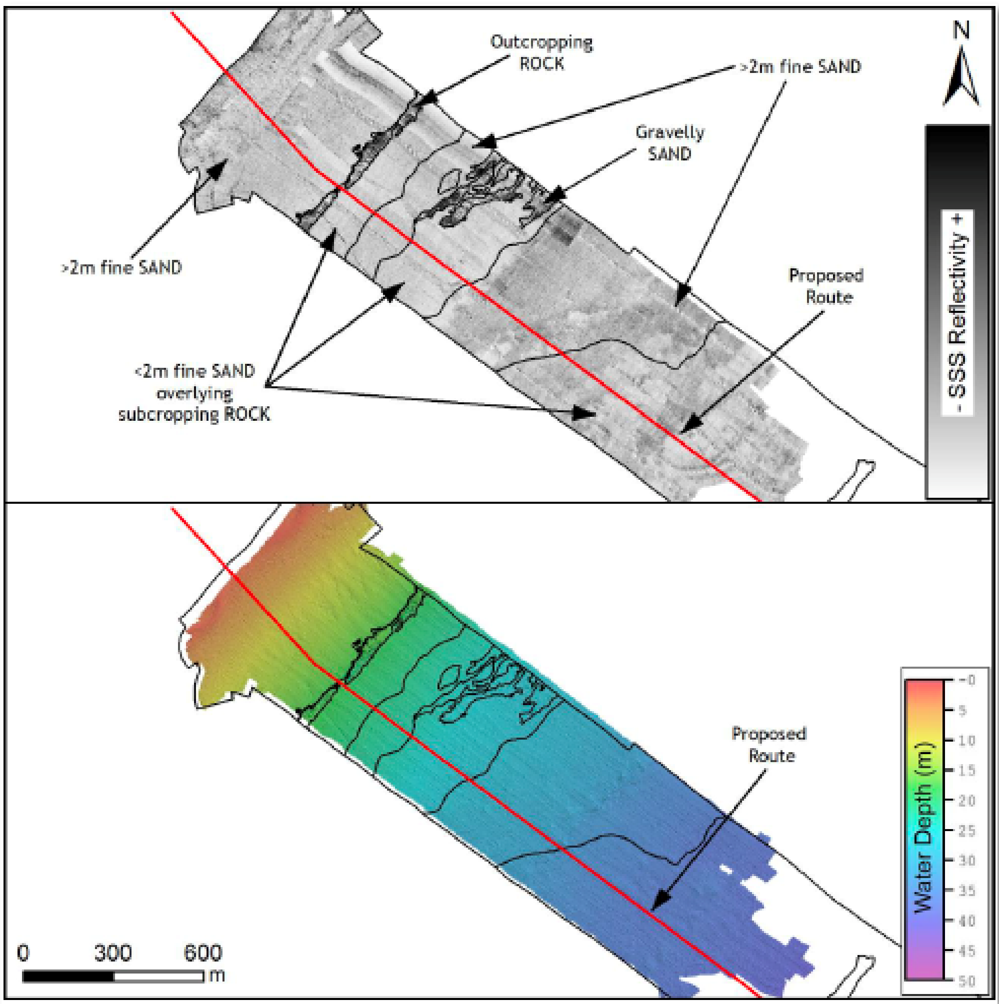

Figure 13: SSS mosaic (top) and MBES bathymetry (bottom) illustrating Inshore Survey Area. The cable route is the red line (After Bielefeld 2020).

Sonar Contacts - A total of five sonar contacts were detected in the side scan sonar data in the

Inshore Survey area (Figure 14). Four were interpreted as boulders, and one as a possible anchor block (Plate 18). Additionally, a linear contact (possibly an anchor chain) running more than 320 m across the seabed and visible from roughly 20 m southwest of the anchor block, was also identified in the data (Plate 19 and Figure 14). This chain may be attached to the anchor block.

Magnetometer Contacts - No cable or pipeline crossings were listed on the available databases and as a result, no magnetometer data were acquired for the Inshore survey area.

Figure 14: SSS contacts (red dots) including the anchor block (E3-A-S005) and possible associated linear contact (anchor chain?) (light blue) (Source: Fugro Marine Germany survey data).

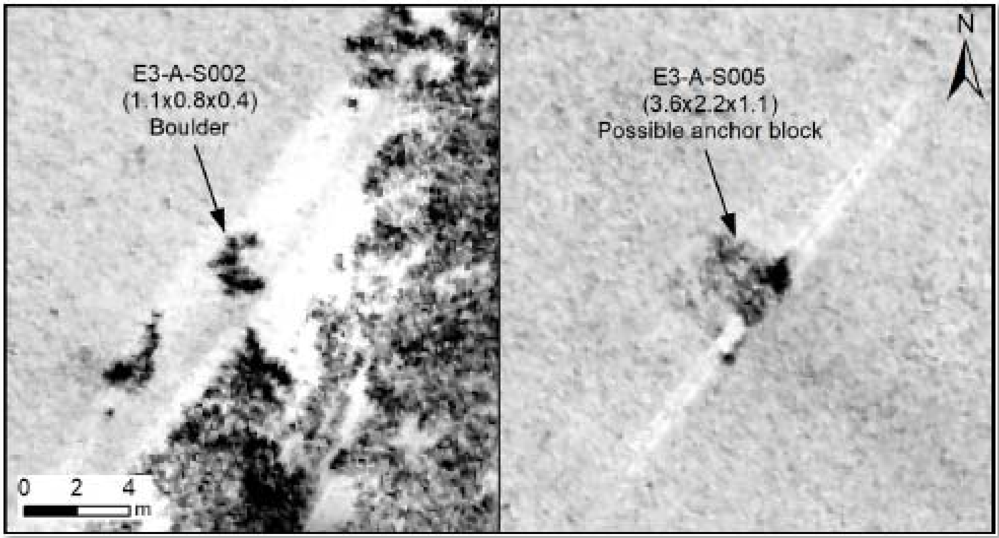

Plate 18: SSS data examples from the Inshore Survey area of boulder (left) and debris (right) (After Bielefeld 2020).

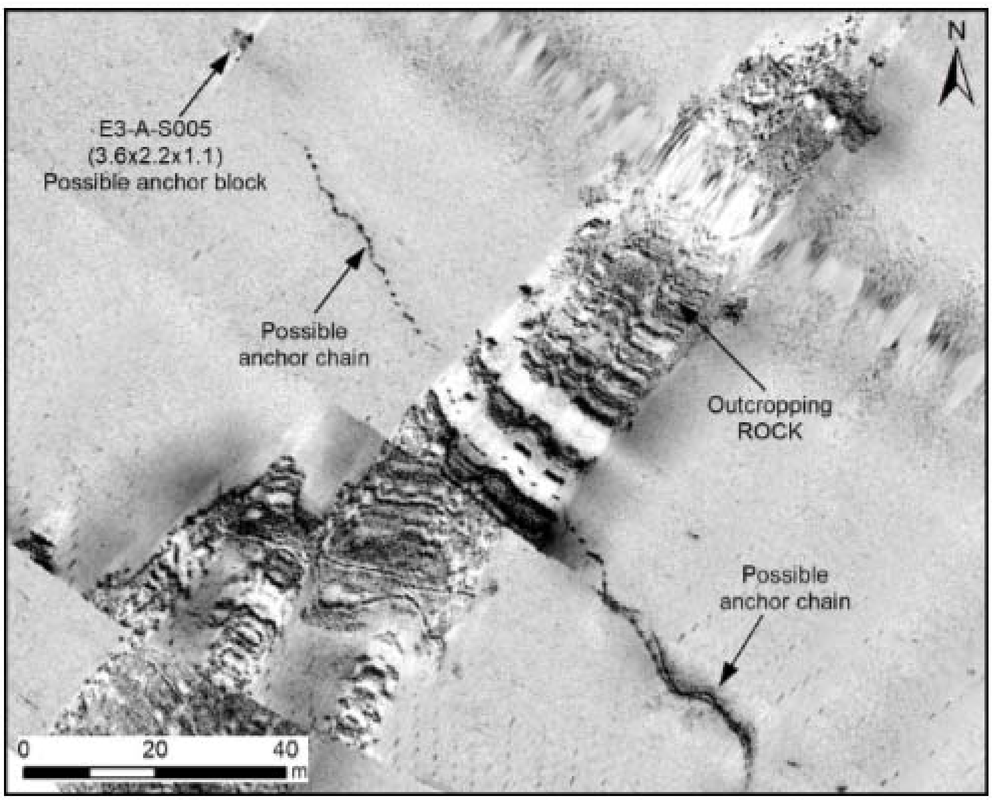

Plate 19: Possible anchor chain approximately 100 m SW of proposed route within the Inshore Survey area. Note the possible anchor block shown in Plate 5 above at the top right of the image. (After Bielefeld 2020).

8.4.2 Shallow Water Survey Area

The Shallow Water Survey began at KP 1.488 in approximately 30 m water depth. The Inshore and Shallow Water SSS survey data therefore overlap by approximately 900 m.

Within this survey area the proposed route runs south-eastward across a gently, south-eastward dipping seabed. The seabed is characterised by sand, subcropping rock (see for example, Plate 20), localised areas with a veneer of gravelly sand over rock and, further offshore between approximately KP 29 and KP39, medium dense silty sand overlying soft to firm sandy clay.

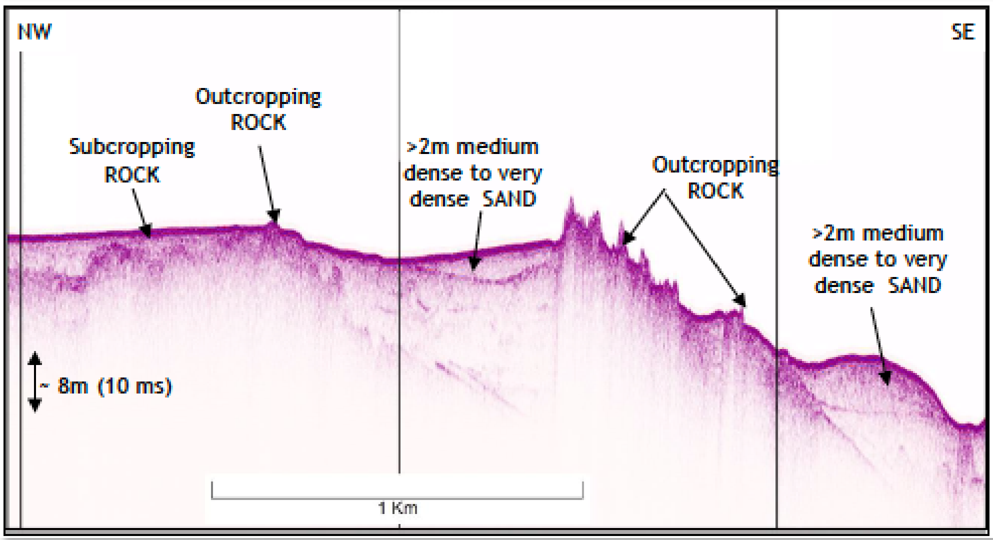

Plate 20: Sub-bottom profiler data illustrating areas of sand and rock (outcropping and subcropping) between KP 5.000 and KP 8.107, approximately 200 m northeast of the proposed route (After Bielefeld 2020).

From KP 38.760 seabed gradients are steep to very steep with a water depth at the end of end of the Shallow Water survey at KP 45.145 of approximately 1,010 m LAT (Bielefeld 2020).

Sonar Contacts – One hundred thirty-two sonar contacts were detected along the proposed route, of which one hundred twenty-eight were interpreted as boulders. The remaining four were classed as debris although of an unknown nature (see for example Plate 21).

All of the contacts interpreted as debris lie in relatively deep water, within the Contiguous Zone and all are small, with dimensions not exceeding 4 x 1.3 x 1 m. Two of the contacts (E3-G-S0213 and E3-G-S214) are within approximately 50 m of each other, and E3-G-S219 is less than 180 m east of these two seabed anomalies. E3-G-S210 lies approximately 2 km to the north.

All four anomalies are within between 40 and 100 m of the proposed cable alignment and care should be taken to avoid them during cable installation.

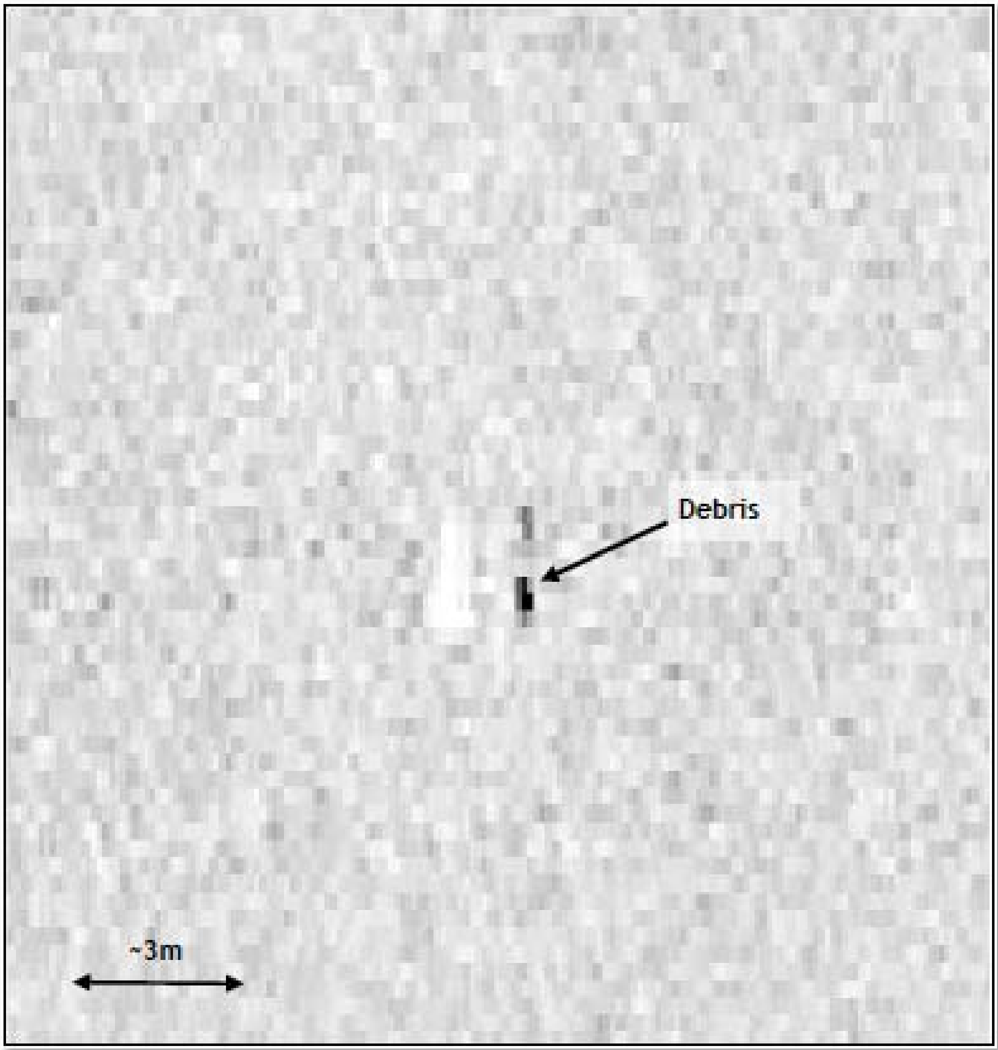

Plate 21: SSS debris contact E3-G-S210. The resolution of the survey data precludes any identification of the nature of this anomaly (After Bielefeld 2020).

Magnetometer Contacts - Five magnetometer contacts were identified in the Shallow Water survey data, all with an amplitude of less that 3 nT, and in the absence of known cable or pipeline crossings in the area have been interpreted as being either anthropogenic seabed debris or geological in nature.

Magnetic anomaly E3-G-M001 lies approximately 300 m southwest of the loose E3-GS213 / E3-GS214 / E3-GS219 cluster of sonar debris contacts, but there is no way to tell whether it is related or confirm the anthropogenic nature of any of the geophysical contacts.

In summary, no wrecks or obvious anthropogenic objects were observed in any of the geophysical datasets. And while some of the sidescan and magnetometer anomalies identified in or on the seabed may to be anthropogenic debris, the nature of these anomalies was not possible to discern from the available data. It is, nevertheless, recommended that the sonar and magnetic anomalies described above are avoided during cable installation.

9 TERRESTRIAL ARCHAEOLOGY

The Amanzimtoti area has been relatively well surveyed for archaeological sites by the KwaZulu-Natal Museum and by heritage consultants in course of impact assessments the last few decades. Although no deep, stratified cave sites are known in this area, evidence from other sites in the wider area such as Umlatuzana rockshelter near Marianhill (see Kaplan 1990, Sifogeorgaki et al. 2020), Sebudu Cave near Stanger (see Wadley and Jacobs 2004) and Shongweni Shelter in the Umlazi River Valley (see Davies 1975, Mitchell 2002) indicate a long hominin presence in the region ranging from Early Stone Age, Middle Stone Age and into the Later Stone Age.

Around 1700 years ago an initial wave of Early Iron Age people settled along the inland foot of the sand dune cordon along the coast of the Durban / Amanzimtoti area, on sandy but humus-rich soils which would have ensured good crops for the first year or two after they had been cleared (Prins 2014). These early agro-pastoralists produced a characteristic pottery style known as Matola and seem to have comprised of small groups of perhaps a few dozen slash-and burn cultivators, moving into a landscape inhabited by Later Stone Age hunter-gatherers.

Another wave of Iron Age migrants entered the area c.1700 years ago and settled inland along the major river valleys of KwaZulu-Natal, below the 1000 m contour (Maggs 1989, Huffman 2007). Their distinct ceramic pottery is classified to styles known as “Msuluzi” (AD 500-700), Ndondondwane (AD 700-800) and Ntshekane (AD 800-900).

A desktop study for the 2AFRICA/GERA terrestrial cable indicated that no archaeological sites or material has been reported along the proposed route although SAHRIS does contain a number of records, uploaded by the KwaZulu-Natal Museum, of sites reported in the wider vicinity of the cable route. These include a severely disturbed and mixed surface assemblage of ESA handaxes and choppers, MSA unifacial points, blades, scrapers, flakes and cores, LSA adzes, cores and flakes and several undecorated sherds of indeterminate Iron Age pottery recorded by Gavin Anderson on the former AECI site on Beechgate Crescent in Umbogintwini, about 1,3 km west of the cable route (https://sahris.sahra.org.za/node/72954).

More than 2,5 km south of the cable landfall and terrestrial route along Beach Road there are reports of Iron Age pottery and MSA lithics on a bluff overlooking the Amanzimtoti River (https://sahris.sahra.org.za/node/72912) and two Iron Age middens on the dunes south of the river mouth (https://sahris.sahra.org.za/node/72878, https://sahris.sahra.org.za/node/72879). In 2012 a partial human burial was reported at 74 Umdoni Road, Amanzimtoti during the construction of a retaining wall in 2012. Material found associated with the remains indicates that the burial was probably mid-19th century in age (https://sahris.sahra.org.za/node/72910).

No physical survey of the proposed terrestrial cable route was conducted for this assessment as the proposed alignment is routed along existing roadways and pavements. The sub-surface sediments along the entire route have thus been subject to substantial alteration and impacts during the construction of the roadways and pavements, which suggests that the survival of any archaeological material along the route is unlikely.

There are no known graves or graveyards within or adjacent to the road reserve that could be subject to impacts arising from the proposed installation of the cable. Should human remains be accidentally uncovered during work, however all activities in the vicinity must cease and the site made secure until a suitably qualified archaeologist and Amafa have been notified, the significance of the material has been assessed and a decision has been taken as to how to deal with it.

10 IMPACT ASSESSMENT

Among the potential impacts associated with the proposed 2AFRICA/GERA (East) cable system to Amanzimtoti are impacts on submerged prehistoric and maritime archaeological heritage resources, on palaeontological features and fossil material and on pre-colonial and historical terrestrial archaeological sites and materials.

In all cases impacts can arise where interventions on and in the seabed or terrestrial sediments intersect with heritage resources: either directly where sites or material are damaged or disturbed, or indirectly where particularly the downstream effects of seabed activities can affect sites or material.

Direct impacts to buried heritage resources are caused by the cable burial process itself, where trenching or jetting cut into the seabed, or trenching disturbs terrestrial sediments. Where cables are laid on the seabed rather than buried, their placement can also have a direct impact on heritage sites and materials in their footprint. Interactions between cables, seabed ploughs and other equipment and historical wrecks can also have a direct impact in the form of damage to the former and it is thus desirable to ensure that direct interactions between project infrastructure and heritage resources are avoided.

Indirect impacts on heritage resources in seabed development contexts usually arise from the downstream effects of interventions on or in the seabed on nearby heritage resources. For example, the placement of cables on the seabed may affect local current patterns, causing seabed scour, which can in turn affect nearby heritage sites, both on or within the sea bed.

That said, the small footprint and low profile of the proposed 2AFRICA/GERA (East) cable is unlikely to cause downstream effects on the surrounding seabed.

On the basis of the heritage resources review in the preceding sections, the heritage receptors defined for this impact assessment are:

- Submerged prehistoric archaeological resources;
- Palaeontological features and fossil material;
- Maritime archaeological resources, mostly historical shipwrecks; and
- Terrestrial pre-colonial and historical archaeological sites and materials.

The assessment of impacts on these receptor classes is based on the methodology set out in Appendix C below.

10.1 Submerged Prehistory

Available evidence from South Africa and elsewhere in the world indicates that there is the potential for the survival in submerged, seabed contexts of archaeological material and palaeoenvironmental evidence deposited on the continental shelf, to approximately the -120 m contour, during periods of lower sea level within the last 900,000 years.

Although no comprehensive geophysical dataset for the Amanzimtoti area as a whole was available for this assessment, the rivers that presently debouch into the sea along the coast are likely to have done so at times of lower sea levels and will have palaeo-channels which extend offshore across the present seabed. Where archaeological material and palaeoenvironmental evidence have survived post-glacial marine transgressions, there is the potential for this material to be within or associated with now submerged palaeo-channels.

Where such material has survived post-glacial marine transgression, it will form part of the sedimentary make-up of the seabed and may be impacted by interventions on and in the seabed.

The small footprint of the seabed intervention that will result from the installation of the cable system, however, makes the potential for **direct** impacts on submerged prehistoric archaeological material in the study area <u>unlikely</u>.

The nature of the proposed seabed intervention, namely the burial of the cable in the seabed or its placement on the seabed surface in areas where burial is no possible suggests that **indirect** impacts, which manifest themselves after and/or downstream of the activity are also unlikely.

Based on the likely limited direct and indirect impacts of the installation of this and other past or future seabed cables off the KZN coast, the **cumulative impacts** of this cable system on submerged prehistorical archaeological material are likely to be low.

The **nature** of impacts, were they to occur, will be negative because the finite and non-renewable nature of heritage resources means that they cannot recover if disturbed, damaged or destroyed.

The potential impacts of the installation of the 2AFRICA/GERA (East) cable system on submerged prehistoric archaeological resources can be summarised as follows:

	Spatial Extent	**Duration**	**Intensity**	**Frequency**	**Probability**	**Irreplaceability & Reversibility**	**Significance**	**Confidence**
Without mitigation	Site specific	Short-term	Low	Once off	Improbable	- High irreplaceability - Non-reversible	Medium	Low
	Essential mitigation measures: No specific mitigation proposed but it is recommended that an alert for the occurrence of submerged prehistoric archaeological material be included in the EMPr for the project, specifically for the divers working in the shoreface and the operators excavating the trench in the beach and dune during cable installation.							
With mitigation	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

10.2 Palaeontology: Marine and Terrestrial

The PIA indicates that the sediments, both onshore and offshore, that may be affected by the proposed cable route are relatively young and unlikely to preserve fossil material.

The Umkwelane Formation aeolianites which underlie the terrestrial portion of the cable route have a low potential to preserve significant fossils while the nearshore seabed sediments that will be subject to disturbance comprise of Holocene sands which will contain no fossil material, unless it is reworked from other sediments such as the Umkwelane Formation aeolianites. Further offshore the reworked delta-fan sands of the Tugela Cone are unlikely to contain *in situ* fossils given the dynamic coastline with the strong southerly Agulhas current.

Where the maritime section of the cable will be placed on the surface of the seabed that is covered with a thin layer of modern sediment and sea debris, **direct** impacts on the potentially fossiliferous sediments below the seabed are expected to be negligible.

Where burial is required, although the seabed plough method of cable burial means that it is not possible to perform palaeontological mitigation as seabed materials are not brought up to the vessel for inspection and sampling, the limited subsurface seabed disturbance entailed in burying the cable by plough, means that **direct** palaeontological impacts are also considered to be negligible.

Where the cable crosses the shoreface and beach sands and along its terrestrial alignment, trenching may encounter the Umkwelane Formation aeolianites but given the nature of these sediments, **direct** impacts on palaeontological material is unlikely and this impact is therefore considered to be low to negligible.

The nature of the proposed seabed intervention also suggests that **indirect** impacts, which manifest themselves after and/or downstream of the activity are likely to be negligible.

Based on the likely limited direct and indirect impacts of the installation of this and other past or future cables both on land and offshore, the **cumulative impacts** of this cable system on palaeontological material are likely to be low.

The **nature** of impacts, were they to occur, will be negative because the finite and non-renewable nature of palaeontological material means that they cannot recover if disturbed, damaged or destroyed.

The potential impacts of the installation of the 2AFRICA/GERA (East) cable system on palaeontological resources can be summarised as follows:

	Spatial Extent	**Duration**	**Intensity**	**Frequency**	**Probability**	**Irreplaceability & Reversibility**	**Significance**	**Confidence**
Without mitigation	Site specific	Short-term	Low	Once off	Improbable	- High irreplaceability - Non-reversible	Medium	Low
	Essential mitigation measures: • No mitigation proposed • There is a very small chance that fossils may occur in the Umkwelane Formation aeolianites so a Fossil Chance Find Protocol should be added to the EMPr: if fossils are found once mining has							

	commenced then they should be rescued and a palaeontologist called to assess and collect a representative sample. • Inshore Waters and on the beach crossing, it is recommended that an alert for the occurrence of palaeontological material be included in the EMPr for the project, specifically for the divers working in the shoreface and the operators excavating the trench in the beach and dune. Fossil material noted during these activities must be collected immediately by the divers.							
With mitigation	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

10.3 Maritime Archaeology and Shipwrecks

Based on the discussion of maritime heritage resources in the Amanzimtoti area and the results of the seabed surveys above, two wrecks (the *Mary Kate* and *Griqualand*) may be present within 2 km of the proposed cable alignment. Both of these sites are relatively modern and are not currently protected by the NHRA. The *Griqualand* is, however, classified as a dangerous wreck and should be avoided.

The inshore and shallow waters seabed surveys noted the presence along the route of a handful of possibly humanly-derived debris and magnetic anomalies, including a possible anchor block and apparently associated chain. The other anomalies could not be more accurately described or positively identified and it is thus not known whether they represent historical shipwrecks or related material.

The small footprint of the seabed intervention and the potential for seabed debris to damage the cable plough, which means that the wrecks in the vicinity of the cable alignment and the geophysical contacts are likely to be carefully avoided during cable installation, suggests that the potential for **direct** impacts on maritime archaeological sites or material in the study area is negligible.

The nature of the proposed seabed intervention suggests that **indirect** impacts, which manifest themselves after and/or downstream of the activity and can take the form of, for example, seabed scour, are unlikely to affect any of the known wrecks in vicinity of the cable system.

Based on the likely limited direct and indirect impacts of the installation of this and other past or future seabed cables off Amanzimtoti, the **cumulative impacts** of this cable system on maritime heritage resources are likely to be low.

The **nature** of impacts, should they to occur, will be negative because the finite and non-renewable nature of heritage resources means that they cannot recover if disturbed, damaged or destroyed.

The potential impacts of the installation of the 2AFRICA/GERA (East) cable system on maritime heritage resources can be summarised as follows:

	Spatial Extent	**Duration**	**Intensity**	**Frequency**	**Probability**	**Irreplaceability & Reversibility**	**Significance**	**Confidence**
Without mitigation	Site specific	Short-term	Low	Once off	Improbable	- High irreplaceability - Non-reversible	Medium	Low
	Essential mitigation measures: • The potentially anthropogenic seabed anomalies (SSS contacts E2-G-S210, E2-G-S213, E2-G-S214 and E2-G-S219) and magnetic anomaly E3-G-M001) are avoided during cable installation. • Any further geophysical data generated to support to installation of the cable system must be archaeologically reviewed for the presence of historical shipwrecks or related material; • Any shipwreck-related material recovered from the seabed during the pre-lay grapnel runs must be retained, kept wet, and the maritime archaeological must be notified of the find. • Should the data identify wreck material at or near the location of any portion of the cable, micro-siting of the cable and/or the possible implementation of an exclusion zone around the archaeological feature should be sufficient to mitigate the risks to the site; • Should any maritime archaeological sites or material be accidentally encountered during the course of laying the cable, work must cease in that area until the project archaeologist and SAHRA have been notified, the find has been assessed by the archaeologist, and agreement has been reached on how to deal with it.							
With mitigation	Site specific	Short-term	Low	Once off	Improbable	- High irreplaceability - Non-reversible	Low	Low

10.4 Terrestrial Archaeology

The proposed cable route from the preferred BMH site will be routed along the north side of the existing METISS cable along Beach Road to the intersection with Kingsway. The cable route will then follow Kingsway to Oppenheimer Road, and thence into McGowan Place to the CLS.

The cable will be installed, as far as possible, along existing roads and servitudes up to the point where it joins existing infrastructure. The cabling will require a trench to house PVC cable ducts.

The trench depth will be approximately 1.5 m to allow at least 1 m of soil cover over the ducts. Steel ducts can be used where insufficient burial depth cannot be achieved. The width of the trench will be no wider than reasonably necessary for the execution of the work. For the most part, the cable trench will be dug under the pavements and verges alongside existing roads and, where space constraints dictate, the cable may share the servitude in which the existing METISS cable ducting runs.

The small footprint of the cable trench, the likelihood that any archaeological material, including human remains, in the area will have already been substantially disturbed, and the possible sharing of the servitude in which the existing METISS cable suggests that the potential for **direct** impacts on archaeological sites or material as a result of the installation of the terrestrial cable is negligible.

The nature of the proposed cable installation process suggests that **indirect** impacts on any archaeological sites or material or unknown graves or burials in the vicinity of the cable system are very unlikely.

Based on the likely limited direct and indirect impacts of the installation of this and other past or future cables, the **cumulative impacts** of this cable system on archaeological heritage resources are likely to be low.

The **nature** of impacts, should they to occur, will be negative because the finite and non-renewable nature of heritage resources means that they cannot recover if disturbed, damaged or destroyed.

The potential impacts of the installation of the 2AFRICA/GERA (East) cable system on terrestrial archaeological heritage resources can be summarised as follows:

	Spatial Extent	**Duration**	**Intensity**	**Frequency**	**Probability**	**Irreplaceability & Reversibility**	**Significance**	**Confidence**
Without mitigation	Site specific	Short-term	Low	Once off	Improbable	- High irreplaceability - Non-reversible	Medium	Low
	Essential mitigation measures: • Should any archaeological sites or material be accidentally encountered during the course of installing the cable, work must immediately cease in that area and the area must be cordoned off. • No archaeological material may be removed from the site, the material must be made safe but left in situ;							

<table>
<tr><td></td><td colspan="8">• A suitably qualified archaeologist must be called to site to assess the significance of the find and Amafa must be notified of the find;
• Only once the archaeologist gives the go-ahead can work in the area of the find re-commence;
• Under no circumstances may any archaeological material be destroyed or removed from site unless under direction of the archaeologist;
• In the event of human remains being uncovered during work, all activities in the vicinity must cease and the site made secure until a suitably qualified archaeologist and Amafa have been notified, the significance of the material has been assessed and a decision has been taken as to how to deal with it.</td></tr>
<tr><td>With mitigation</td><td>Site specific</td><td>Short-term</td><td>Low</td><td>Once off</td><td>Improbable</td><td>- High irreplaceability
- Non-reversible</td><td>Low</td><td>Low</td></tr>
</table>

11 MITIGATION

No specific mitigation is required or proposed in respect of potential submerged prehistoric archaeology, although it is recommended that an alert for the occurrence of such material be included in the EMPr for the project, specifically for the divers working in the shoreface and the operators excavating the trench in the beach and dune during cable installation. The project archaeologist should provide the ECO and contractors with information about the type of material that could be encountered.

In respect of palaeontology, there is a very small chance that fossils may occur in the Umkwelane Formation aeolianites so a Fossil Chance Find Protocol should be added to the EMPr for the terrestrial cable trenching. If fossils are found once trenching has commenced then they should be rescued and a palaeontologist called to assess and collect a representative sample.

In the inshore waters and on the beach crossing, it is recommended that an alert for the occurrence of palaeontological material be included in the EMPr for the project, for the divers working in the shoreface and the operators excavating the trench in the beach and dune.

Should any possible archaeological or palaeontological material be accidentally disturbed during these activities it must be immediately reported to the ECO and/or the monitoring archaeologist for further advice. Any finds accidently disturbed must be recorded, and their contextual information (a report) must be lodged with a SAHRA-approved institution.

In respect of shipwrecks and maritime archaeology, the following is recommended:

- The potentially anthropogenic seabed anomalies (SSS contacts E3-A-S005 and associated linear contact, E3-G-S0213, E3-G-S214, E3-G-S210 and E3-G-S219 and magnetic anomalies E3-G-M001 - E3-G-M005) are avoided during cable installation;

- Any further geophysical data generated to support to installation of the cable system must be archaeologically reviewed for the presence of historical shipwrecks or related material;

- Any shipwreck-related material recovered from the seabed during the pre-lay grapnel runs must be retained, kept wet, and the maritime archaeological must be notified of the find.

- Should any maritime archaeological sites or material be accidentally encountered during the course of laying the cable, work must cease in that area until the project archaeologist and SAHRA have been notified, the find has been assessed by the archaeologist, and agreement has been reached on how to deal with it.

Lastly, in respect of terrestrial archaeology, should any archaeological sites or material be accidentally encountered during the course of installing the cable, work must immediately cease in that area, the area must be cordoned off and the material made safe but left in situ, a suitably qualified archaeologist must be called to site to assess the significance of the find and Amafa must be notified of the find.

In the event of human remains being uncovered during work, all activities in the vicinity must cease and the site made secure until a suitably qualified archaeologist and Amafa have been notified, the significance of the material has been assessed and a decision has been taken as to how to deal with it.

12 CONCLUSION

Provided the mitigation measures recommended above are implemented, the installation of the proposed 2AFRICA/GERA cable system at Amanzimtoti is unlikely to have any impact on known or unknown cultural heritage resources and is considered acceptable.

Any impact from the project on previously unknown heritage resources can be dealt with through the implementation of the mitigation measures proposed in this report.

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APPENDIX A: PALAEONTOLOGICAL IMPACT ASSESSMENT

See attached report by Bamford (2021)

APPENDIX B: RECORDED WRECKS AND SHIPPING CASUALTIES WITHIN & PROXIMATE TO THE MARITIME ARCHAEOLOGICAL STUDY AREA

Ship Name	Place	Latitude/Longitude (estimated)*	Event Type	Vessel Category	Type	Date Wreck
Griqualand / Dangerous Wreck	Amanzimtoti / 24.5 km 199 deg of Durban	-30.0833 / 30.9226	Scuttled	Steel Motor Vessel	Coaster	1970/11/14
	Amanzimtoti area	-30.0833 / 30.9263				
John Bull	Isipingo	-30.0025 / 30.9567	Foundered	Fishing Vessel		1948/12/02
Mary Kate	Amanzimtoti	-30.0533 / 30.8958	Foundered	Motor Vessel	Trawler	1976/12/27
Tonga	Winkelspruit	-30.0921 / 30.8656	Wrecked	Wooden Sailing Vessel	Schooner	1875/05/16

APPENDIX C: IMPACT ASSESSMENT METHODOLOGY

The following conventions have been adopted and applied to this impact assessment:

- Direct impacts are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity. These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable.
- Indirect impacts of an activity are indirect or induced changes that may occur because of the activity. These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken, or which occur at a different place because of the activity.
- Cumulative impacts are those that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities. Cumulative impacts can occur from the collective impacts of individual minor actions over time and can include both direct and indirect impacts.
- Nature – the evaluation of the nature is impact specific. Most negative impacts will remain negative, however, after mitigation, significance should reduce:
  - Positive.
  - Negative.
- Spatial extent – the size of the area that will be affected by the impact:
  - Site specific.
  - Local (limited to the immediate areas around the site; < 2 km from site).
  - Regional (would include a major portion of an area; within 30 km of site).
  - National or International.
- Duration – the timeframe during which the impact will be experienced:
  - Short-term (0-3 years or confined to the period of construction).
  - Medium-term (3-10 years).
  - Long-term (the impact will only cease after the operational life of the activity).
  - Permanent (beyond the anticipated lifetime of the project).
- Intensity – this provides an order of magnitude of whether the intensity (magnitude/size/frequency) of the impact would be negligible, low, medium or high):
  - Negligible (inconsequential or no impact).
  - Low (small alteration of natural systems, patterns or processes).
  - Medium (noticeable alteration of natural systems, patterns or processes).

    - High (severe alteration of natural systems, patterns or processes).
- Frequency – this provides a description of any repetitive, continuous or time-linked characteristics of the impact:
    - Once off (occurring any time during construction).
    - Intermittent (occurring from time to time, without specific periodicity).
    - Periodic (occurring at more or less regular intervals).
    - Continuous (without interruption).
- Probability – the likelihood of the impact occurring:
    - Improbable (very low likelihood that the impact will occur).
    - Probable (distinct possibility that the impact will occur).
    - Highly probable (most likely that the impact will occur).
    - Definite (the impact will occur).
- Irreplaceability – of resource loss caused by impacts:
    - High irreplaceability of resources (the project will destroy unique resources that cannot be replaced).
    - Moderate irreplaceability of resources (the project will destroy resources, which can be replaced with effort).
    - Low irreplaceability of resources (the project will destroy resources, which are easily replaceable).
- Reversibility – this describes the ability of the impacted environment to return/be returned to its pre-impacted state (in the same or different location):
    - Impacts are non-reversible (impact is permanent).
    - Low reversibility.
    - Moderate reversibility of impacts.
    - High reversibility of impacts (impact is highly reversible at end of project life).
- Significance – the significance of the impact on components of the affected environment (and, where relevant, with respect to potential legal infringement) is described as:
    - Low (the impact will not have a significant influence on the environment and, thus, will not be required to be significantly accommodated in the project design).
    - Medium (the impact will have an adverse effect or influence on the environment, which will require modification of the project design, the implementation of mitigation measures or both).
    - High (the impact will have a serious effect on the environment to the extent that, regardless of mitigation measures, it could block the project from proceeding).
- Confidence – the degree of confidence in predictions based on available information and specialist knowledge:

- Low.
- Medium.
- High.

APPENDIX D: SPECIALIST CV – JOHN GRIBBLE

Name:	John Gribble
Profession:	Archaeologist
Date of Birth:	15 November 1965
Parent Firm:	ACO Associates cc
Position in Firm:	Senior Archaeologist
Years with Firm:	2+
Years of experience:	27
Nationality:	South African
HDI Status:	n/a

Education:

1979-1983	Wynberg Boys' High School (1979-1983)
1986	BA (Archaeology), University of Cape Town
1987	BA (Hons) (Archaeology), University of Cape Town
1990	Master of Arts, (Archaeology) University of Cape Town

Employment:

- ACO Associates, Senior Archaeologist and Consultant, September 2017 – present
- South African Heritage Resources Agency, Manager: Maritime and Underwater Cultural Heritage Unit, 2014 – 2017 / Acting Manager: Archaeology, Palaeontology and Meteorites Unit, 2016-2017
- Sea Change Heritage Consultants Limited, Director, 2012 – present
- TUV SUD PMSS (Romsey, United Kingdom), Principal Consultant: Maritime Archaeology, 2011-2012
- EMU Limited (Southampton, United Kingdom), Principal Consultant: Maritime Archaeology, 2009-2011

- Wessex Archaeology (Salisbury, United Kingdom), Project Manager: Coastal and Marine , 2005-2009
- National Monuments Council / South African Heritage Resources Agency, Maritime Archaeologist, 1996-2005
- National Monuments Council, Professional Officer: Boland and West Coast, Western Cape Office, 1994-1996

Professional Qualifications and Accreditation:

- Member: Association of Southern African Professional Archaeologists (No. 043)
- Principal Investigator: Maritime and Colonial Archaeology, ASAPA CRM Section
- Field Director: Stone Age Archaeology, ASAPA CRM Section
- Member: Chartered Institute for Archaeologists (CIfA), United Kingdom
- Class III Diver (Surface Supply), Department of Labour (South Africa) / UK (HSE III)

Experience:

I have nearly 30 years of combined archaeological and heritage management experience. After completing my postgraduate studies, which were focussed on the vernacular architecture of the West Coast, and a period of freelance archaeological work in South Africa and aboard, I joined the National Monuments Council (NMC) (now the South African Heritage Resources Agency (SAHRA)) in 1994. As the Heritage Officer: the Boland I was involved in day to day historical building control and heritage resources management across the region. In 1996 I become the NMC's first full-time maritime archaeologist in which role was responsible for the management and protection of underwater cultural heritage in South Africa under the National Monuments Act, and subsequently under the National Heritage Resources Act.

In 2005 I moved to the UK to join Wessex Archaeology, one of the UK's biggest archaeological consultancies, as a project manager in its Coastal and Marine Section. In 2009 I joined Fugro EMU Limited, a marine geosurvey company based in Southampton to set up their maritime archaeological section. I then spent a year at TUV SUD PMSS, an international renewable energy consultancy based in Romsey, where I again provided maritime archaeological consultancy services to principally the offshore renewable and marine aggregate industries.

In August 2012 I set up Sea Change Heritage Consultants Limited, a maritime archaeological consultancy. Sea Change provides archaeological services to a range of UK maritime sectors, including marine aggregates and offshore renewable energy. It also actively pursues opportunities to raise public awareness and understanding of underwater cultural heritage through educational and research projects and programmes, including some projects being developed in South Africa.

Projects include specialist archaeological consultancy for more than 15 offshore renewable energy projects and more than a dozen offshore aggregate extraction licence areas.

In addition to managing numerous UK development-driven archaeological projects, I have also been involved in important strategic work which developed guidance and best practice for the offshore industry with respect to the marine historic environment. This has included the principal authorship of two historic environment guidance documents for COWRIE and the UK renewable energy sector, and the development of the archaeological elements of the first Regional Environmental Assessments for the UK marine aggregates industry. In 2013-14 I was lead author and project co-ordinator on the Impact Review for the United Kingdom of the 2001 UNESCO Convention on the Protection of the Underwater Cultural Heritage. In 2016 I was co-author of a Historic England / Crown Estate / British Marine Aggregate Producers Association funded review of marine historic environment best practice guidance for the UK offshore aggregate industry.

I returned to South African in mid-2014 where I was re-appointed to my earlier post at SAHRA: Manager of the Maritime and Underwater Cultural Heritage Unit. In July 2016 I was also appointed Acting Manager of SAHRA's Archaeology, Palaeontology and Meteorites Unit.

I left SAHRA in September 2017 to join ACO Associates as Senior Archaeologist and Consultant.

I have been a member of the ICOMOS International Committee for Underwater Cultural Heritage since 2000 and have served as a member of its Bureau since 2009. I am currently the secretary of the Committee.

I have been a member of the Association of Southern African Professional Archaeologists for more than twenty years and am accredited by ASAPA's CRM section. I have been a member of the UK's Chartered Institute for Archaeologist's (CIfA) since 2005, and served on the committee of its Maritime Affairs Group between 2008 and 2010. Since 2010 I have been a member of the UK's Joint Nautical Archaeology Policy Committee.

I am currently a member of the Advisory Board of the George Washington University / Iziko Museums of South Africa / South African Heritage Resources Agency / Smithsonian Institution 'Southern African Slave Wrecks Project' and serve on the Heritage Western Cape Archaeology, Palaeontology and Meteorites Committee.

Books and Publications:

Gribble, J. and Scott, G., 2017, *We Die Like Brothers: The sinking of the SS Mendi*, Historic England, Swindon

Lloyd Jones, D., Langman, R., Reach, I., Gribble, J., and Griffiths, N., 2016, Using Multibeam and Sidescan Sonar to Monitor Aggregate Dredging, in C.W. Finkl and C. Makowski (eds) *Seafloor Mapping along Continental Shelves: Research and Techniques for Visualizing Benthic Environments, Coastal Research Library 13*, Springer International Publishing, Switzerland, pp 245-259.

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Gribble, J., 2009, HMS Birkenhead and the British warship wrecks in South African waters in *Proceedings of the Shared Heritage Seminar*, University of Wolverhampton, 8 July 2008

Gribble, J., Parham, D. and Scott-Ireton, D., 2009, Historic Wrecks: Risks or Resources? In *Conservation and Management of Archaeological Sites*, Vol. 11 No. 1, March, 2009, 16–28.

Gribble, J. and Athiros, G., 2008, *Tales of Shipwrecks at the Cape of Storms*, Historical Media, Cape Town.

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Thackeray, F. and Gribble, J., 2001, Historical Note on an Attempt to Salvage Iron from a Shipwreck, *Looking Back*, Vol 40, November 2001, pp 5-7.

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APPENDIX E: SPECIALIST CV – MARION BAMFORD

Personal details

Surname : **Bamford**

First names : **Marion Kathleen**

Present employment : Professor; Director of the Evolutionary Studies Institute.

Member Management Committee of the NRF/DST Centre of

Excellence Palaeosciences, University of the Witwatersrand,

Johannesburg, South Africa-

Telephone : +27 11 717 6690

Fax : +27 11 717 6694

Cell : 082 555 6937

E-mail : marion.bamford@wits.ac.za ; marionbamford12@gmail.com

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.

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

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

Supervision of Higher Degrees

All at Wits University

Degree	Graduated/completed	Current

Honours	11	0
Masters	10	4
PhD	11	4
Postdoctoral fellows	10	5

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 2-8 students per year.

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 –

Review of manuscripts for ISI-listed journals: 25 local and international journals

Palaeontological Impact Assessments

Selected – list not complete:

- Thukela Biosphere Conservancy 1996; 2002 for DWAF
- Vioolsdrift 2007 for Xibula Exploration
- Rietfontein 2009 for Zitholele Consulting

- Bloeddrift-Baken 2010 for TransHex
- New Kleinfontein Gold Mine 2012 for Prime Resources (Pty) Ltd.
- Thabazimbi Iron Cave 2012 for Professional Grave Solutions (Pty) Ltd
- Delmas 2013 for Jones and Wagener
- Klipfontein 2013 for Jones and Wagener
- Platinum mine 2013 for Lonmin
- Syferfontein 2014 for Digby Wells
- Canyon Springs 2014 for Prime Resources
- Kimberley Eskom 2014 for Landscape Dynamics
- Yzermyne 2014 for Digby Wells
- Matimba 2015 for Royal HaskoningDV
- Commissiekraal 2015 for SLR
- Harmony PV 2015 for Savannah Environmental
- Glencore-Tweefontein 2015 for Digby Wells
- Umkomazi 2015 for JLB Consulting
- Ixia coal 2016 for Digby Wells
- Lambda Eskom for Digby Wells
- Alexander Scoping for SLR
- Perseus-Kronos-Aries Eskom 2016 for NGT
- Mala Mala 2017 for Henwood
- Modimolle 2017 for Green Vision
- Klipoortjie and Finaalspan 2017 for Delta BEC

- Ledjadja borrow pits 2018 for Digby Wells
- Lungile poultry farm 2018 for CTS
- Olienhout Dam 2018 for JP Celliers
- Isondlo and Kwasobabili 2018 for GCS
- Kanakies Gypsum 2018 for Cabanga
- Nababeep Copper mine 2018
- Glencore-Mbali pipeline 2018 for Digby Wells
- Remhoogte PR 2019 for A&HAS
- Bospoort Agriculture 2019 for Kudzala
- Overlooked Quarry 2019 for Cabanga
- Richards Bay Powerline 2019 for NGT
- Eilandia dam 2019 for ACO
- Eastlands Residential 2019 for HCAC
- Fairview MR 2019 for Cabanga
- Graspan project 2019 for HCAC
- Lieliefontein N&D 2019 for EnviroPro
- Skeerpoort Farm Mast 2020 for HCAC
- Vulindlela Eco village 2020 for 1World
- KwaZamakhule Township 2020 for Kudzala
- Sunset Copper 2020 for Digby Wells
- McCarthy-Salene 2020 for Prescali
- VLNR Lodge 2020 for HCAC

- Madadeni mixed use 2020 for EnviroPro

Research Output

Publications by M K Bamford up to December 2019 peer-reviewed journals or scholarly books: over 150 articles published; 5 submitted/in press; 10 book chapters.

Scopus h-index = 29; Google scholar h-index = 35; -i10-index = 92

Conferences: numerous presentations at local and international conferences.

NRF Rating

NRF Rating: B-2 (2016-2020)

NRF Rating: B-3 (2010-2015)

NRF Rating: B-3 (2005-2009)

NRF Rating: C-2 (1999-2004)