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PROPOSED MARINE TELECOMMUNICATIONS SYSTEM (2AFRICA/GERA (EAST) CABLE SYSTEM) TO BE LANDED AT AMANZIMTOTI, KWAZULU-NATAL ON THE EAST COAST OF SOUTH AFRICA

FINAL ENVIRONMENTAL IMPACT ASSESSMENT REPORT

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

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Date	3 September 2021	13 September 2021	September 2021

ENVIRONMENTAL IMPACT ASSESSMENT REPORT DISTRIBUTION

Please note that due to the Covid-19 National State of Disaster and Lockdown in the country, the Department of Forestry, Fisheries and the Environment (DFFE) requires Environmental Assessment Practitioners to undertake public participation in innovative ways that respect social distancing and other measures to contain the spread of the Corona virus.

ACER has created a project domain on the company website (https://acerafrica.co.za/) where all documents (including this Final Environmental Impact Assessment Report (FEIAR)) pertaining to this environmental authorisation process have been uploaded for public review. In addition, ACER has or will undertake the following:

- ❑ Notification letters about the submission of the FEIAR to DFFE for decision making have been sent to all registered Interested & Affected Parties (I&APs).
- ❑ All comments received on the Draft EIAR were incorporated into the FEIAR and were captured in a Comments and Response Report that will accompany the submission of the FEIAR to the Department of Forestry, Fisheries and the Environment (DFFE) for decision-making.

Note that the authorities and key role-players which have been notified of the submission of the FEIAR and where these documents are available for review, include:

- ❑ DFFE (Oceans and Coasts)
- ❑ DFFE (Fisheries Management)
- ❑ DFFE (Aquaculture and Economic Development)
- ❑ DFFE (Biodiversity & Conservation)
- ❑ DFFE (Forestry Regulations and Support)
- ❑ KZN Department of Economic Development, Tourism and Environmental Affairs
- ❑ eThekwini Metropolitan Municipality
- ❑ Department of Human Settlements, Water and Sanitation
- ❑ Department of Public Works and Infrastructure
- ❑ Department of Minerals and Energy
- ❑ Ezemvelo KZN Wildlife
- ❑ The South African Heritage Resource Agency
- ❑ KwaZulu-Natal Amafa and Research Institute
- ❑ Petroleum Agency of South Africa
- ❑ Transnet Freight Rail
- ❑ Transnet National Ports Authority
- ❑ South African Navy Hydrographic Office
- ❑ South African Maritime Safety Authority

EXECUTIVE SUMMARY

Introduction

Submarine telecommunication cables are important for international telecommunication networks as they transport almost 100% of the trans-oceanic Internet traffic throughout the world. It is widely recognised that access to affordable international bandwidth is key to economic development in every country. As such, the improvement in Africa's information technology infrastructure via telecommunication cables will remove one of the current key inhibitors to development in Africa and support economic growth and opportunities on the continent.

Alcatel Submarine Networks (ASN) has been contracted to supply and install the proposed 2AFRICA/GERA (East) Cable System, which has three proposed landing points on the South African coast, viz. Amanzimtoti, Gqeberha (Port Elizabeth) and Duynefontein. This report deals with the proposed landing at Amanzimtoti, located within the eThekwini Metropolitan Municipality, KwaZulu-Natal province (KZN), on the East Coast. The cable landing at Amanzimtoti will be operated by West Indian Ocean Cable Company (WIOCC) (Project Applicant).

The project requires environmental authorisation from the Department of Forestry, Fisheries and the Environment (DFFE[1]) in terms of the 2014 Environmental Impact Assessment (EIA) Regulations (as amended), published under the National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA) (as amended). ACER (Africa) Environmental Consultants (ACER) has been appointed as the independent Environmental Assessment Practitioner (EAP) to assist with the application for environmental authorisation as well as other environmental permitting/licensing requirements (including a Sea Shore Lease from the KZN Department of Economic Development, Tourism and Environmental Affairs (DEDTEA) and water use approval from the Department of Human Settlements, Water and Sanitation (DHSWS)).

This FEIA Report (FEIAR) and accompanying Environmental Management Programme (EMPr) have been prepared in accordance with the 2014 EIA Regulations.

Project Location and Scope

The project involves the installation and operation of the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing), which comprises marine and terrestrial components.

The marine cable component is the branch line that extends from the main trunk line of the 2AFRICA/GERA (East) Cable to Pipeline Beach, Amanzimtoti. From the main cable trunk (located in the Indian Ocean approximately 188 km from the shoreline off Durban, within South Africa's Exclusive Economic Zone (EEZ), the branch line enters South African Territorial Waters approximately 22 km from the seashore (12 Nm) and will link into a Beach Manhole (BMH) on shore.

On land, the BMH will be constructed at Pipeline Beach carpark and the cable will link up to the Cable Landing Station (CLS) which will be accommodated within an existing building located at Arbour Junction 2, Arbour Road, Umbogintwini. A cable trench (approximately 5 km in length) will be required for the section of cable from the BMH to the CLS site.

Note that the width of offshore corridor assessed for the marine cable was 500 m (250 m either side of the cable), although the cable footprint itself is only 6 m wide (the width of the sea plough skids although the actual disturbed footprint is less than 5 m (skids and ploughshare)). The entire beach where the cable is to land was assessed; however the construction corridor on the beach will be limited to 50 m each side of the cable. On land, the cable trench is less than 1 m in width, however a construction corridor of 10 m (5 m either side of the cable) will require approval.

[1] Previously named Department of Environment, Forestry and Fisheries (DEFF).

Relevant GPS co-ordinates (approximate) are provided below. Project activities are described further under the technical description.

GPS Co-ordinates (approximate) of the proposed infrastructure for the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing)		
Location	**Latitude (S)**	**Longitude (E)**
Start of marine branch cable (at trunkline)	31° 00.500'	32° 15.788'
Mid-point of marine branch cable	30° 44.032'	31° 20.948'
End of Branch Cable	30° 02.409’	30° 53.933’
Approximate length of marine branch cable	188 km	
Width of the offshore cable corridor to be authorised	500 m (250 m each side of cable)	
Width of the beach crossing corridor to be authorised	100 m (50 m each side of cable)	
Sea Earth Plate at Amanzimtoti Pipeline Beach	30° 02.408’	30° 54.004’
BMH (Alternative 3 - Preferred)	30° 02.409’	30° 53.933’
CLS	30° 01.229’	30° 54.591’
Mid-point of trench line for ducting from BMH to CLS	30° 02.184’	30° 54.022'
Approximate length of trench line for ducting to CLS	5.0 km	
Width of the land cable corridor to be authorised	10 m (5 m each side of cable)	

Legal Requirements

There are many legal requirements (International, National, Provincial and Local Government spheres) to which the project proponent must adhere for the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing). These were detailed in the Final Scoping Report (ACER, 2021) and a summary of applicable legislation and guidelines is provided in Chapter 2 of this report.

In terms of the 2014 EIA Regulations (as amended 2017), the project potentially triggers activities in Listing Notices 1, 2 and 3, as shown in Table 2 of this report. The application for environmental authorisation therefore requires a full Scoping and Environmental Impact Assessment process.

Technical Description

Marine fibre-optic cables range in diameter from 17 mm to 50 mm. They are essentially inert, as any heat emissions, electric or electro-magnetic associated with the cable are of negligible magnitude. Cables are laid on the seabed surface in deep water and buried under the seabed where possible, generally in waters shallower than approximately 1,000 m depth (as is the case for the 2AFRICA/GERA (East) Amanzimtoti landing).

The proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) includes the following project components:

- Pre-installation activities including cable route survey and route engineering. The Marine Cable Route Survey has already been undertaken to determine the suitability of the substrate and topography of the ocean floor. This includes a geophysical survey using echosounders and sonar techniques and a geotechnical survey involving cone penetrometer tests and core sampling and analysis.
- Route clearance and Pre-Lay Grapnel Run (PLGR).
- Laying of the cable in the offshore environment, preceded by route clearance and including cable burial in water depths less than approximately 1,000 m.
- 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, assisted by small boats and divers.

- Burial in the seabed to a target depth of 2 m where possible. The route will be adjusted where possible to avoid obvious visible rock. This burial is intended to provide protection to the cable from the hazards posed by ships' anchors, fishing trawls/lines and the like. However, where cables cross outcropping rock, cables are surface laid and clamped to the rock where possible to prevent movement and abrasion of the cable.
- Excavations within the intertidal zone are undertaken to bury the cable before it is anchored into a cable anchor block and BMH. (The BMH is a concrete utility vault where the marine portion of the subsea cable is connected to the terrestrial portion.)
- Excavations within the intertidal zone and beach to bury the System Earth cable and sea earth plate on Pipeline Beach.
- On the beach, the cable will be buried to a target depth of 2 meters, substrate permitting. Horizontal Directional Drilling (HDD) will be used over a short section to route the cable underneath the vegetated dune.
- The BMH and underground ducting to the CLS will be constructed in readiness for the cable landing.

Once installed, marine telecommunications cables generally require little to no maintenance unless the cable is damaged by natural disasters or through human activities. A detailed description of the various project components and the proposed construction methods are provided in Chapter 4 of this report.

Project Alternatives

Various project alternatives were considered during Scoping. Out of these, one marine cable route, two BMH sites and one fronthaul route to the CLS were taken forward for assessment in this FEIA Report, as described in the project scope and technical description. The No Development Alternative formed the baseline against which all other options were assessed.

Need and Desirability

The need and desirability of a proposed development is a key consideration of an application for environmental authorisation and differs from the developer's aims and purpose of the development. The Guideline on Need and Desirability in terms of the EIA Regulations (DEA, 2017) states that *"consistent with national priorities, environmental authorities must support "increased economic growth and promote social inclusion" while ensuring that such growth is "ecologically sustainable"*. In essence, need and desirability are based on the principle of sustainability, viz. that a development is ecologically sustainable and socially and economically justifiable. Chapter 3 of this report deals with aspects of Need and Desirability, in terms of the Guideline.

Description of the Environment

The proposed construction and operation of the 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) takes place within the marine and terrestrial environments, and, as such, a description of both environments is provided in Chapter 6 of this report.

Natural environment (terrestrial and marine)

Ecological drivers of relevance to the project include ocean currents, the natural oceanic wave climate, wind, mobility of sand, nearshore sand circulation and offshore sediment transport and colonisation of dunes by vegetation.

While the study area intersects with Critical Biodiversity Areas (CBA) and D'MOSS areas on land, due to the transformed nature of the affected site, and the use of HDD under the vegetated dune near the BMH, no sensitive ecosystems (or habitat) on land will be directly affected by the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing). Adjacent to the cable route is Coastal Thicket which is considered as sensitive habitat.

No Marine Protected Areas (MPA) are traversed and there is only very minimal overlap by the marine section of the cable with CBA1 and CBA2 areas, beyond 2,500 m depth. The alignment overlaps slightly with the edge of an Ecologically Sensitive Area (ESA) adjacent to the Aliwal Shoal MPA and skirts the northern edge of the Protea Banks and Sardine Route Ecologically or Biologically Significant Area (EBSA). No Important Bird Areas (IBA) are affected.

While the alignment as far as possible avoids rocky substrates, the cable will cross both outcropping and sub cropping rock from just beyond the beach at the shore crossing to approximately 1.3 km offshore. The inshore reef system off Pipeline Beach supports abundant life with no bare rock recorded although sand patches, narrow gullies and areas with a thin sand veneer are present. Growth forms on the reef are indicative of a highly dynamic, exposed habitat. The extent of outcropping reef crossed by the cable is narrow (17 m wide). The seabed will be disturbed by pre-installation and installation activities along the route alignment of the marine cable, which will injure or crush benthic invertebrates in their path. As indicated in the specialist findings (Section 9.4) affected benthic communities will recover over time and the impacts of the project on benthic organisms is deemed to be of low significance. The larger and more mobile marine organisms in the water body, including fish, whales, dolphins, as well as seabirds and shorebirds, will be able to move out of the direct area of disturbance caused by cable survey and laying activities.

Social/socio-economic environment

From a development planning perspective, this project aligns with the objectives of the New Partnership for Africa's Development (NEPAD) and the South African Government's Strategic Infrastructure Project 15 (SIP 15: Expanding Access to Communication Technology), which is also compatible with district and local development plans.

The cable landing will take place at Amanzimtoti, a busy suburban area south of Durban City, well developed with seaside residential and other suburban facilities. Amanzimtoti's beaches are part of the tourist destination termed the "Sapphire Coast". The area is administered by the eThekwini Metropolitan Municipality. The eThekwini Environmental Planning and Climate Protection Department (EPCPD) is the primary role player with respect to conservation issues in the Metro. Ezemvelo KwaZulu-Natal Wildlife (EKZNW) manages MPAs on the KZN coast. DEDTEA is responsible for the issuing of a Sea Shore Lease permit.

Offshore in the study area, a number of economic interests and activities need to be considered, including commercial fisheries, the presence of other subsea cables and Oil and Gas exploration blocks on the seabed. Additionally, the proposed cable will come into shore just north of two marine outfall pipelines and through an area of seabed which is monitored for contaminants associated with past and current industrial effluent discharges. The benthic monitoring programme involves sampling with grab buckets to a depth of 30 cm. While the exact nature of toxins (chromium, manganese, lead, vanadium, zinc and mercury) believed locked into sediments in the nearshore area in the vicinity of the marine outfall pipelines is not known (below a depth of 30 cm below the seabed), it is expected that the release thereof during cable burial will be followed by rapid dilution and the possible uptake by marine organisms will be once off and temporary. The affected cable section is very limited (619 m in length) and burial of the cable through this section of the alignment is anticipated to be completed within 1.5 hours. It is recommended cable burial (as planned to a depth of 2 m) is conducted but only using mechanical ploughing. This means that the water jet system which is used to lubricate the ploughshare would not be turned on, thus, limiting the potential for the release of subsurface contaminated sediments to become suspended in the water column.

Alternatively, the cable could be buried to a depth of 0.5 m using only mechanical ploughing. This would reduce the depth to which ploughing takes place, thus, satisfying Physalia Associates Limited (Physalia[2]) concerns that the chemical properties of deeper sediments are unknown[3].

For both burial depths the potential to resuspend contaminated sediments is similar as the only sediments which will be resuspended occur on the surface where the plough skid and ploughshare have the potential to disturb surface sediments. When considering the potential impact on the receiving environment and risks associated to the cable through shallower burial depths (anchors, fishing, etc.) it is the EAP's opinion that the preferred burial depth of 2 m be authorised.

Cultural heritage

The are no identified land-based cultural heritage resources that will be affected and the likelihood of encountering them during construction is very low, due to the built up nature of the site. Although potentially present, submerged prehistoric archaeological resources in the marine environment, palaeontological features and fossil material are highly unlikely to be affected. The general area is rich in maritime archaeological resources, however the two shipwrecks identified as occurring within 2 km of the cable alignment are relatively young and not protected by the National Heritage Resources Act, 1999 (Act 25 of 1999).

The Environmental Assessment Process and Methodology

The assessment process began with Scoping, which is a process designed to define the limits of the assessment, to elicit inputs from Interested and Affected Parties (I&APs), and to focus the scope of the assessment. The Impact Assessment process has followed Scoping, in accordance with the approved Plan of Study for Impact Assessment, with the main activities being:

- Focused scientific studies with contributions from specialists, engineers and the EAP team.
- Ongoing communication and participation with stakeholders.
- Integration of the findings into an EIAR, inclusive of mitigation measures. The final assessment of the significance of impacts was undertaken by the EAP, in accordance with assessment conventions stipulated in GNR 326.
- Preparation of an Environmental Management Programme.

Public Participation Process

The public participation process was designed to comply with the 2014 EIA Regulations (as amended) and NEMA and also taking into account Covid-19 restrictions. The project team has been available for communication with I&APs throughout Scoping and the Impact Assessment. However, formal stages at which the public were notified, provided with information and given an opportunity to raise concerns and provide input were:

- Project Announcement, which included media adverts, Background Information Document, on site notices and written correspondence (02 December 2020).
- Notifications by telephone.
- Posting of all relevant documents on ACER's website www.acerafrica.co.za.
- Circulation of the Draft Scoping Report for comment (19 March 2021 – 22 April 2021).
- Notification of submission of the Final Scoping Report (30 April 2021).
- Circulation of the DEIAR for comment.

2 Physalia is a company appointed to undertake the annual sampling of sediments around the marine outfall pipeline operated by AECI Property Services (APS). The marine outfall pipeline (known as the Huntsman Pipeline) receives wastewater from various points of generation within the Umbogintwini Industrial Complex and discharges the wastewater into the marine environment under a permit (2011/001/KZN/HEARTLANDLEASING).

3 Note that after reviewing the DEIAR, Physalia supported the final proposal to undertake the cable trenching to 2 m using the ploughshare without the water jet (refer to the CRR in Appendix E).

Issues raised by I&APs and responses thereto, have been captured in Comments and Responses Reports (CRR) appended to this FEIAR. Where relevant, they have been addressed in this FEIAR. To date, the comments received from I&APs and relevant authorities relate to the following topics:

- General I&AP registration, requests for information, etc.
- Affected Oil and Gas Exploration Blocks (marine).
- Crossing of Transnet Pipeline Servitudes (on land).
- Potential impact on indigenous forest.
- Coastal Navigation Safety.
- Protection of Water Resources.
- Comments from DEDTEA in regard to the application for a Sea Shore lease Permit.
- Maritime/underwater heritage.
- Environmental Health.
- Crossings of electrical and telecommunications cables on land.
- Traffic impacts.
- Slope stability in regard to trenching.
- Comments from DFFE on requirements for specialist studies, Plan of Study for Scoping, Public Participation, Cumulative Impacts, EMPR and other process Issues regarding Scoping and EIA.
- Concerns associated with the AECI Property Services Marine Outfall Pipeline and benthic sampling programme.
- Comments from SAHRA regarding cultural heritage impacts and process requirements.
- Co-ordinated comments from eThekwini Metropolitan Municipality Line Departments.
- Comments and recommendations from DFFE (Oceans and Coasts) relating to the protection of the coastal environment and access to the coastal public property, in line with the ICMA.

All relevant public participation documentation is appended to this report.

Summary of specialist findings

Eight specialist reports were compiled. The table below summarises the main conclusions of these specialist reports.

	Specialist Study	Organisation	Main conclusions
1	Compliance Statement for Terrestrial and Freshwater Ecosystems (Appendix B1)	Environmental Assurance (Pty) Ltd	With mitigation, the significance of identified impacts on threatened vegetation and/or protected species; the dune cordon and seashore zone, as well as fauna, is low. The proposed development (BMH Alternative 3 and the preferred fronthaul alignment) should proceed, provided that the mitigation measures and recommendations are strictly implemented and subsequently monitored. It will be vital for the High sensitivity Coastal Thicket to be avoided as far as reasonably possible. HDD is the recommended means of connecting the marine cable to the terrestrial BMH, primarily due to the cumulative impacts recorded within the study area and the sensitivity of the Seashore habitat unit, as well as it being situated within D'MOSS and CBA: Irreplaceable conservation planning units.
2	Commercial Fisheries Specialist Study (Appendix B2)	Capricorn Marine Environmental (Pty) Ltd (CapMarine)	The causes of potential impacts of the project on the fishing industry were identified as noise emissions; temporary exclusion from fishing grounds from vessels during cable laying (up to 1, 500 m) and long-term exclusion of anchoring and trawling 500 m either side of the cable. Fishing sectors potentially affected will be the large pelagic longline, traditional line fish, crustacean trawl and small scale fisheries. With or without mitigation (where applicable) the significance of all related impacts on fishing sectors (including the crustacean trawl) is assessed as very low or low.

	Specialist Study	Organisation	Main conclusions
3	Coastal Impact Assessment (beach and dunes) (Appendix B3)	SDP Ecological & Environmental Services	The proposed cable landing point is in a highly altered state. In addition, the beach can be considered to be dissipative in nature and therefore inflated, with a fine to medium sand, which would facilitate the excavation, cable laying and reinstatement of sand across the beach and the back of beach. It follows from the above that the establishment of a submarine telecommunications cable at Pipeline Beach will have little impact on the eco-morphology of the sand sharing system at this point and the coastline in general.
4	Marine Ecology Assessment (Appendix B4)	Pisces Environmental Services (Pty) Ltd	The report identifies various impacts resulting from vessels and other activities during geophysical survey, installation and operation of the cable. There will be impacts on marine benthic biota due to disturbance of the upper beach and intertidal and shallow subtidal sandy habitats, as well as the unconsolidated seabed beyond the surf-zone and across the shelf. There will also be impacts on marine biota including fish, marine mammals, seabirds and shorebirds. However, the significance of all these impacts is assessed as very low or low. With regard to possible remobilisation of toxins: depending on the degree of contamination of the sediments and the dilution factor of those contaminants that become bio-available once released from the sediments, concentrations would likely remain at sub-lethal levels and acute toxicity effects are likely to be negligible. It is recommended that during nearshore cable burial, use of the water jet system is avoided as it generates a plume of suspended sediments, thereby potentially remobilising contaminants from deeper sediments. The impact is assessed to be of LOW significance.
5	Marine benthic shallow water impact assessment (Appendix B5)	Aquatic Ecosystem Services	The report concludes that the nearshore (<30 m) marine substrate composition was dominated by soft sands, and both reef (outcropping rock) and sub-cropping reef habitats were limited. No unique or range restricted species were identified and all species or taxa observed occur within the region. All construction impacts were rated as low significance post-mitigation. Care must be taken to limit disturbance to the seabed and resuspension of contaminants as far as possible using appropriate industry acceptable, installation methods, including mechanical plough use (i.e. No water jetting). All operational impacts are considered to be of LOW significance and there will be no long-term impacts on macrobenthic communities. The contribution of the overall project to the cumulative impacts is considered LOW. For this reason, no follow on or long-term monitoring is required.
6	Heritage Impact Assessment (Appendix B6)	ACO Associates cc	Provided the recommended mitigation measures are implemented, the installation of the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) 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 the HIA.

	Specialist Study	Organisation	Main conclusions
7	Submarine Telecommunications Cables Environmental Impact Assessment. Generic Avifaunal Impact Assessment (Appendix B7)	WildSkies Ecological Services (Pty) Ltd	In general, the significance of anticipated impacts of submarine telecommunications cables projects on seabirds and shorebirds is low , provided the cable avoids particularly sensitive bird areas such as MPAs, IBAs, sensitive onshore areas and any islands. (For the Amanzimtoti landing, all these areas are avoided).
8	A review of the potential effects of submarine telecommunications cables on marine mammals in Southern Africa (Appendix B8)	Sea Search Research and Conservation	The main impacts which might affect marine mammals are: 1) avoidance of noise and masking of vocalisations by general ship noises and depth sounders and 2) potential startle responses of marine mammals to multi-beam echosounders, which could lead to mass stranding events. Mitigation options for these activities are limited. Entanglement of cetaceans in the cable is not regarded as a threat. There are concerns for the general impact of cable deployment operations on coastal species such as Heaviside's and humpback dolphins and southern right whales during work in the nearshore environment. The use of a suitably trained crew member as a Marine Mammal / Protected Species Observer (MMO/PSO) is recommended, and cable laying should take place outside of the main migration seasons for whales where possible.

Environmental Issues and Potential Impacts

The key issues identified during Scoping and carried through to the Impact Assessment are formulated as seven key questions[4]:

- What are the potential social and socio-economic impacts associated with the construction and operation of the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing)?
- What impacts will the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) have on terrestrial and freshwater aquatic habitat and biodiversity (vegetation, wetlands/rivers and fauna)?
- What impacts will the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) have on the marine environment (including sensitive benthic ecosystems and areas of conservation value)?
- What impacts will the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) have on commercial and recreational fisheries?
- What impacts will the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) have on the beach and coastal dunes?
- What impacts will the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) have on terrestrial and marine cultural heritage resources, including paleontological features?
- What cumulative impacts will result from the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing)?

[4] Note that changes have been made to the questions as originally framed in the FSR, however they continue to address all key issues identified in the FSR.

Potentially significant impacts associated with each of the above issues were discussed and assessed. **Where relevant**, significance ratings were assigned to impacts, both before mitigation, as well as after application of recommended mitigation measures.

Environmental Impact Statement

Taking the key issues and the assessment of associated potential impacts into account, a summary of the environmental impacts of the proposed activity, and their significance (after mitigation, where applicable) is provided below.

Social and socio-economic impacts

Overall, the project is expected to contribute positively to the goal of improving livelihoods for South Africans through the education and economic opportunities opened up as a result of access to improved telecommunications networks. While expanding access to communication technology will be done primarily through broadband infrastructure roll-out, this requires a national backbone connected to the rest of the world.

In this case, the proposed 2AFRICA/GERA (East) Cable System supports SIP 15 via is international telecoms connectivity, capacity and speed. The significance of this positive impact is assessed as medium.

Operation of the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) will render a very limited area of the seabed unavailable to some concession holders in the Oil and Gas sector. To eliminate negative interactions with future Oil and Gas activities on cable system infrastructure and operations, the landing partner must undertake the following[5]:

- Obtain No Objection letters from existing Oil & Gas Rights Holders as required by the MPRDA (being undertaken by WIOCC separately from the EIA process)[6].
- Conclude Co-operation Agreements between the cable landing partner and the various offshore concession holders (if applicable) to ensure that the activities of both parties can co-exist without limiting each other's commercial operations (being undertaken by WIOCC separately from the EIA process).
- Map the marine cable system route and formally register the cable routing as a real right against the Deed and against the Oil and Gas Rights at the Mineral and Petroleum Titles Registration Office.

The cable *in situ* is not expected to have any impact on beach and sea users, and during installation, due to the brief installation period, disruption to beach and sea-based recreation will be minimal. Other minor, short term disruption and nuisance impacts may arise during construction activities on the beach and inland. However, provided these negative social and socio-economic impacts are suitably managed, they will be of low significance.

Impacts on terrestrial ecosystems, vegetation and fauna

The implementation of the project on land affects an area which is transformed by urban development. CBAs in the area are outside of the construction footprint, as are areas of natural habitat (coastal thicket).

5 In terms of Section 53 of the Mineral and Petroleum Resources Development Act (Act 28 of 2002) (MPRDA), any person who intends to use the surface of any land in a manner which may be contrary to the objectives of the MPRDA or is likely to impede such objectives, must obtain consent from the rights holder and apply to the Minister for approval in the prescribed manner. Proof is required that no prospecting or mining right holders have objected to the proposed development based on its incompatibility with their interests.

6 The marine cable (Amanzimtoti branch line) crosses an offshore O&G lease area under SP/ENI who have been consulted and have issued ASN with a letter of no objection in terms of the proposed installation of the 2AFRICA/GERA (East) Cable System.

However, it will be important to ensure that adjacent coastal thicket, regarded as high sensitivity, is not encroached upon by the project. No wetlands or freshwater habitat will be negatively affected. Consequently, there will be negligible impact on terrestrial (non-marine) fauna.

Impacts on marine ecosystems, flora, fauna and avifauna
The branch cable to Amanzimtoti traverses offshore habitats of varying conservation status, ranging from Near Threatened to Endangered. It does not traverse any MPAs but does skirt the Protea Banks and Sardine Route EBSA. There is minimal overlap with areas defined in the recent National Coastal & Marine Spatial Biodiversity Plan (Version 1.1) as CBA1, CBA2 and ESA. No Important Bird Areas are affected. The potential negative impacts of the project on marine flora and fauna (small and large) on shore, nearshore and offshore, are all of low significance (after applying mitigation where feasible). Similarly, the impacts on seabirds and shorebirds will be of low significance.

While the exact nature of toxins (chromium, manganese, lead, vanadium, zinc and mercury) believed locked into sediments in the nearshore area in the vicinity of the marine outfall pipelines is not known (below a depth of 30 cm below the seabed), it is expected that the possible release thereof (subsurface toxins) during cable burial will be followed by rapid dilution and the possible uptake by marine organisms will be once off and temporary. The affected cable section is very limited (619 m in length) and burial of the cable through this section of the alignment is anticipated to be completed within 1.5 hours. It is recommended cable burial (as planned to a depth of 2 m) is conducted but only using mechanical ploughing. This means that the water jet system which is used to lubricate the ploughshare would not be turned on, thus, limiting the potential for contaminated sediment to become suspended in the water column. Alternatively, the cable could be buried to a depth of 0.5 m using only mechanical ploughing. This would reduce the depth to which ploughing takes place, thus, satisfying Physalia's concerns that the chemical properties of deeper sediments are unknown[7].

For both burial depths the potential to resuspend contaminated sediments is similar as the only sediments which will be resuspended occur on the surface where the plough skid and ploughshare have the potential to disturb surface sediments. When considering the potential impact on the receiving environment and risks associated to the cable through shallower burial depths (anchors, fishing, etc.) it is the EAP's opinion that the preferred burial depth of 2 m be authorised.

The cable, once in place, will afford a section of the seabed long term protection due to the exclusion of anchoring and trawling 500 m either side of the cable, which is considered a positive impact of low significance.

Impacts on fisheries
The cable alignment intersects with areas used by various fishing sectors, which may potentially be negatively affected by the project. A potential decline in catch rates due to temporary noise disturbance is assessed as being of low significance. The potential effect on fishing activities and decline in catch rates due to the temporary exclusion zones (to a maximum of 1,500 m) around cable laying vessels is assessed as being of low significance. The long term effect on operational activities due to the 500 m exclusion zone either side of the cable will negatively impact the outer western edge of the area (2 km^2) which has seen very limited trawling activity in the past decade by the crustacean trawl sector. Any future trawling in this area will require operators to lift gear when crossing the exclusion zone. Overall, the significance of the impact on all fisheries is assessed as low. The potential for mitigation of identified impacts is very low.

[7] Note that after reviewing the DEIAR, Physalia acknowledged the final proposal to undertake the cable trenching to 2 m using the ploughshare without the water jet, thus minimising the disturbance of sub-surface sediment. Physalia had no further comments or objections to this proposal (refer to the CRR – DEIAR Period in Appendix E).

Impacts on the beach and coastal dunes

The project will have little impact on the beach and coastal dunes. The significance of potential negative impacts on drivers of coastal processes, sediment transport and habitat/eco-morphology of the beach and dunes will be low, both before and after mitigation.

Impacts on cultural heritage

The likelihood of the project impacting on submerged pre-historic archaeological resources, palaeontological or fossil material is negligible. As the impacts would be non-reversable if they should occur, and the potential for mitigation is low, the significance of impacts on these cultural heritage resources is assessed as medium. While there are two recorded shipwrecks within 2 km of the cable alignment, the likelihood of these being negatively impacted is low and furthermore, they are relatively modern and not protected by the NHRA. The *Griqualand* is, however, classified as a dangerous wreck and has been avoided by the proposed cable alignment. The potential for direct impacts on terrestrial archaeological sites or material as a result of the installation of the terrestrial cable is negligible. With mitigation, the significance of the impact on cultural heritage resources is low.

Cumulative impacts

Cable landings at Amanzimtoti currently include the METISS cable, with proposed landings by 2AFRICA (this project) and the T3 cable (EIA in progress). In general, the positive and negative impacts resulting from the proposed 2AFRICA/GERA (East) Submarine Cable System, along with those of other existing or future cables around the coast of South Africa, will have cumulative effects on the social and biophysical environment. Conflicts of interest may increase over time between the subsea fibre optic cable developers and the trawling industry, as increasing areas become excluded due to cables crossing trawling grounds. Similarly, conflicts of interest may increasingly arise between the subsea fibre optic cable developers and the Oil & Gas (O&G) industry, particularly as offshore exploration activities ramp up and drilling plans materialise. For this project, direct and early engagement has taken place between role-players, to ameliorate cumulative impacts. Further cables into the area could impact on the benthic sampling program being conducted by APS around the marine outfalls, and will need to take this into account when planning final routing. As the cable installation is once-off and of short duration, with a relatively quick recovery of the disturbed benthic habitat, no negative cumulative impacts on marine ecology are anticipated. Activities on land are occurring in an area that is already transformed and thus the project is not considered to contribute significantly to cumulative impacts on land.

The No Development Alternative

The No-Development Alternative would avoid potential negative impacts on the natural environment and competing seabed users. However, it would preclude the positive impacts which improved telecommunications would have on the country's socio-economic environment and would fail to support the country's development goals. It is anticipated that, with required mitigation of negative impacts, the advantages of the project will outweigh the disadvantages.

Concluding Remarks

Based on the findings of the specialists and the assessment of key issues and associated impacts undertaken in this report, it is the professional opinion of the EAP that there are no fatal flaws associated with the proposed project and that the negative impacts resulting from the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) can be mitigated to acceptable levels. Therefore, the project should be granted environmental authorisation by DFFE, conditional on compliance with the mitigation measures as recommended in this report and contained within the EMPr. Additionally, it is recommended cable burial (as planned to a depth of 2 m) is conducted but only using mechanical ploughing through the contaminated sediments near the AECI outfall pipeline

The project components to be authorised are the installation and operation of the marine cable, along the alignment as proposed, with the shore landing at Pipeline Beach to link up to a new BMH at the carpark area (preferred Alternative 3) and on to the CLS building via new underground ducting.

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DEFINITIONS

Alternatives - In relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to –

i. The property on which or location where it is proposed to undertake the activity.
ii. The type of activity to be undertaken.
iii. The design or layout of the activity.
iv. The technology to be used in the activity.
v. The operational aspects of the activity.

Baseline - Information gathered at the beginning of a study which describes the environment prior to development of a project, and against which predicted changes (impacts) are measured.

Benthic - Referring to organisms living in, or on, the sediments of aquatic habitats (lakes, rivers, ponds, etc.).

Biodiversity - The diversity, or variety, of plants, animals and other living things in a particular area or region. It encompasses habitat diversity, species diversity and genetic diversity.

Community - Those people who may be impacted upon by the construction and operation of the project. This includes neighbouring landowners, local communities and other occasional users of the area.

Construction Phase - The stage of project development comprising site preparation as well as all construction activities associated with the development.

Consultation - A process for the exchange of views, concerns and proposals about a project through meaningful discussions and the open sharing of information.

Critical Biodiversity Area - Areas of the landscape that must be conserved in a natural or near-natural state in order for the continued existence and functioning of species and ecosystems and the delivery of ecosystem services.

Cumulative Impacts - Direct and indirect impacts that act together with current or future potential impacts of other activities or proposed activities in the area/region that affect the same resources and/or receptors.

Ecosystem - A community of plants, animals and organisms interacting with each other and with the non-living (physical and chemical) components of their environment.

Environment - The surroundings within which humans exist and that are made up of

i. The land, water and atmosphere of the earth;
ii. Micro-organisms, plant and animal life;
iii. Any Part or combination of (i) and (ii) and the interrelationships among and between them; and
iv. The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing.

Environmental Assessment Practitioner – The person responsible for planning, management and co-ordination of environmental impact assessment, strategic environmental assessments, environmental management plans or any other appropriate environmental instrument introduced through regulations.

Environmental Authorisation (EA) – The authorisation by a competent authority of a listed activity.

Environmental Impact Assessment – In relation to an application to which scoping must be applied, means the process of collecting, organizing, analysing, interpreting and communicating information that is relevant to the consideration of that application. This process necessitates the compilation of an Environmental Impact Report, which describes the process of examining the environmental effects of a proposed development, the anticipated impacts and proposed mitigatory measures.

Environmental Impact Assessment Report (EIAR) - A report assessing the potential significant impacts as identified during the Scoping phase.

Environmental Management Programme - A management programme designed specifically to introduce the mitigation measures proposed in the Reports and contained in the Conditions of Approval in the Environmental Authorisation.

Epifauna[8] - Organisms, which live at or on the sediment surface being either attached (sessile) or capable of movement.

Habitat - The place where a population (*.e.g.* animal, plant, micro-organism) lives and its surroundings, both living and non-living.

Hazardous waste – means any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical, or toxicological characteristics of the waste, have a detrimental impact on health and the environment.

Hydrocarbons – Oils used in machinery as lubricants, including diesel and petrol used as fuel.

Impact - A change to the existing environment, either adverse or beneficial, that is directly or indirectly due to the development of the project and its associated activities.

Infauna - Animals of any size living within the marine sediment. They move freely through interstitial spaces between sedimentary particles or they build burrows or tubes.

Interested and Affected Party – Any individual, group, organization or associations which are interested in or affected by an activity as well as any organ of state that may have jurisdiction over any aspect of the activity.

Marine environment - Marine environment includes estuaries, coastal marine and nearshore zones, and open-ocean-deep-sea regions.

NEMA EIA Regulations - The EIA Regulations means the regulations made under section 24(5) of the National Environmental Management Act (Act 107 of 1998) (Government Notice No. R 982, R 983, R984 and R 985 in the Government Gazette of 4 December 2014 refer as amended by GNR 324, 325, 326 and 327 of 7 April 2017.

No-Go Alternative – The option of not proceeding with the activity, implying a continuation of the current situation / status quo

Public Participation Process (PPP) - A process in which potential Interested and Affected Parties are given an opportunity to comment on, or raise issues relevant to, specific matters.

[8] Marine Ecology Report (Appendix 5.4).

Registered Interested and Affected Party – All persons who, as a consequence of the Public Participation Process conducted in respect of an application, have submitted written comments or attended meeting with the applicant or environmental assessment practitioner; all persons who have requested the applicant or the EAP in writing, for their names to be placed on the register and all organs of state which have jurisdiction in respect of the activity to which the application relates.

Scoping process - A procedure for determining the extent of and approach to an EIA, used to focus the EIA to ensure that only the significant issues and reasonable alternatives are examined in detail

Scoping Report - The report describing the issues identified during the scoping process.

Sediment - Unconsolidated mineral and organic particulate material that settles to the bottom of aquatic environment.

Significant impact - Means an impact that by its magnitude, duration, intensity or probability of occurrence may have a notable effect on one or more aspects of the environment.

Specialist study - A study into a particular aspect of the environment, undertaken by an expert in that discipline.

Species - A group of organisms that resemble each other to a greater degree than members of other groups and that form a reproductively isolated group that will not produce viable offspring if bred with members of another group.

Stakeholders - All parties affected by and/or able to influence a project, often those in a position of authority and/or representing others.

Subtidal - The zone below the low-tide level, *e.g.* it is never exposed at low tide.

Surf-zone - Also referred to as the 'breaker zone' where water depths are less than half the wavelength of the incoming waves with the result that the orbital pattern of the waves collapses and breakers are formed

Sustainable development - Sustainable development is generally defined as development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs. NEMA defines sustainable development as the integration of social, economic and environmental factors into planning, implementation and decision-making so as to ensure that development serves present and future generations.

Turbidity - Measure of the light-scattering properties of a volume of water, usually measured in nephelometric turbidity units.

ABBREVIATIONS AND ACRONYMS

ACER	ACER (Africa) Environmental Consultants
AECI	African Explosives and Chemical Industries
AIPS	Alien Invasive Plant Species
ANZECC	Australian and New Zealand Environment and Conservation Council
APS	AECI Property Services
ASN	Alcatel Submarine Networks
AWAC	Armour Wire Anchor Clamp
BID	Background Information Document
BMH	Beach Manhole
°C	Degrees Centigrade
CA	Competent Authority
CBA	Critical Biodiversity Area
CITES	Convention on International Trade in Endangered Species
CLS	Cable Landing Station
CMS	Convention on Migratory Species
CPTs	Cone Penetrometer Tests
CR	Critically Endangered
CRR	Comments and Responses Report
DEA	Department Environmental Affairs (national)
DEDTEA	Department of Economic Development, Tourism and Environmental Affairs
DEFF	Department of Environment, Forestry and Fisheries
DEIAR	Draft Environmental Impact Assessment Report
DFFE	Department of Forestry, Fisheries and the Environment (previously DEFF, as above)
DGPS	Differential Global Positioning System
DHSWS	Department of Human Settlements, Water and Sanitation
D'MOSS	Durban Metropolitan Open Space System
DSR	Draft Scoping Report
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EAPASA	Environmental Assessment Practitioners Association of South Africa
EBSA	Ecologically or Biologically Significant Area
ECO	Environmental Control Officer
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EIS	Ecological Importance and Sensitivity
EKZNW	Ezemvelo KwaZulu-Natal wildlife
EMF	Environmental Management Framework
EMPr	Environmental Management Programme
EN	Endangered
EPCPD	eThekwini Environmental Planning and Climate Protection Department
ESA	Ecologically Sensitive Area
ESS	Ecosystem Services
FSR	Final Scoping Report
GA	General Authorisation
GDP	Gross Domestic Product
GNR	Government Notice Regulation
GPS	Global Positioning System
HDD	Horizontal Directional Drilling
HIA	Heritage Impact Assessment
HU	Habitat Unit
I&APs	Interested and Affected Parties
IBA	Important Bird Area

ICMA	Integrated Coastal Management Act (Act No. 24 of 2008)
ICPC	International Cable Protection Committee
IDP	Integrated Development Plan
IFC	International Finance Corporation
IUCN	International Union for Conservation of Nature
KZN	KwaZulu-Natal
LWM	Low Water Mark
MARISMA	Marine Spatial Management and Governance Programme (2014-2020)
MARPOL	International Convention for the Prevention of Pollution from Ships
MBES	Multi-beam echo sounder
METISS	Melting Pot Indianoceanic Submarine System
MMO	Marine Mammal Observer
MPAs	Marine Protected Area
MRPDA	Mineral and Petroleum Resources Development Act
MSP	Marine Spatial Planning
NAVTEX	Navigational Telex
NDP	National Development Plan
NEMA	National Environmental Management Act
NEMBA	National Environmental Management: Biodiversity Act
NEPAD	New Partnership for Africa's Development
NFEPA	National Freshwater Ecosystem Priority Areas
NGO	Non-Government Organisation
NHRA	National Heritage Resources Act
Nm	Nautical Mile
NOAA	National Oceanographic and Atmospheric Administration
NT	Near Threatened
O&G	Oil and Gas
OC	Department of Forestry, Fisheries and the Environmental – Oceans and Coasts
PAM	Passive acoustic monitoring
PASA	Petroleum Agency South Africa
PEL	Probable Effects Level
PES	Present Ecological State
PICC	Presidential Infrastructure Coordinating Commission
PLGR	Pre-Lay Grapnel Run
PPP	Public Participation Process
PRASA	Passenger Rail Agency of South Africa
PSO	Protected Species Observer
ROV	Remote Operated Vehicle
SABAP2	South African Bird Atlas Project 2
SACNASP	South African Council for Natural Scientific Professions
SADSTIA	South African Deep Sea Trawling Industry Association
SAFE	South Africa Far West Cable
SAHRA	South African Heritage Resources Agency
SAMSA	South African Maritime Safety Authority
SAN	South African Navy
SANBI	South African National Botanical Institute
SANRAL	South African National Roads Agency
SCA	Systematic Conservation Assessment
SCC	Species of Conservation Concern
SDF	Spatial Development Framework
SEI	Site Ecological Importance
SIP	Strategic Infrastructure Project
TAE	Total Applied Effort
TEL	Threshold Effects Level
TLB	Tractor Loader Backhoe
TOPS	Threatened or Protected Species

UNCLOS	United Nations Convention on the Laws of the Sea
USBL	Ultra-short base line
VU	Vulnerable
WACS	West Africa Cable System
WIOCC	West Indian Ocean Cable Company South Africa (Pty) Ltd
WMA	Water Management Area

AUTHORS

The author of this Final Environmental Impact Assessment Report is Ms A McKenzie of ACER (Africa) Environmental Consultants (ACER). An internal review was conducted by Mr G Churchill (ACER). An external review was conducted by Mr V Steyn from WIOCC.

AFFIRMATION BY THE ENVIRONMENTAL IMPACT ASSESSMENT PRACTITIONER

I, Ashleigh McKenzie, affirm that the information submitted for the purposes of this application is true and correct with respect to:

(i) the information provided (as drawn from information from multiple sources including the Client, specialists, design engineers, national provincial and metropolitan databases, Google Earth images, Interested and Affected Parties, observation form site visits, websites, publications and other referenced documentation which are assumed true and correct at the time of writing this report).

(ii) the inclusion of comments and inputs from stakeholders and I&APs.

(iii) the inclusion of inputs and recommendations from the specialist reports where relevant.

(iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties.

(v) I further affirm that, the issues identified include those submitted by I&APs to date (as relevant to the assessment).

Signature of the Environmental Assessment Practitioner

ACER (AFRICA) ENVIRONMENTAL MANAGEMENT CONSULTANTS
Name of Company

13 September 2021
Date

Signature of the Commissioner of Oaths

13/09/21
Date

SENZO EMMANUEL MABASO
EX OFFICIO COMMISSIONER OF OATHS
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ADHERANCE TO REGULATORY REQUIREMENTS

Table i Content of an EIA Report as per the 2014 EIA Regulations (GNR 326) published in terms of the National Environmental Management Act, 1998 (Act 107 of 1998) (as amended)

CONTENT OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REPORT AS PER THE 2014 EIA REGULATIONS (APPENDIX 3)		RELEVANT SECTION WITHIN THE EIA REPORT
(a)	Details of:	-
	(i) the EAP who prepared the report; and	Section 1.3
	(ii) the expertise of the EAP, including a curriculum vitae;	Section 1.3; Appendix A
(b)	The location of the development footprint of the activity on the approved site as contemplated in the accepted scoping report including:	Section 1.2, Figure 1, 2, 3 6 and 9
	(i) the 21 digit Surveyor General code of each cadastral land parcel;	Appendix C
	(ii) where available, the physical address and farm name;	Appendix C
	(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	N/A
(c)	A plan which locates the proposed activity or activities applied for as well as the associated structure and infrastructure at an appropriate scale, or, if it is:	Figure 1, 2, 3, 6 and 9
	(i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken;	Section 1.2
	(ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	Section 1.2
(d)	A description of the scope of the proposed activity, including:	Section 1.2
	(i) all listed and specified activities triggered and being applied for; and	Section 1.4 (Table 2)
	(ii) a description of the associated structures and infrastructure related to the development;	Chapter 4
(e)	A description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context;	Section 2.1 and 2.2
(f)	A motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred development footprint within the approved site as contemplated in the accepted scoping report;	Chapter 3
(g)	A motivation for the preferred development footprint within the approved site as contemplated in the accepted scoping report;	Chapter 5
(h)	A full description of the process followed to reach the proposed development footprint within the approved site as contemplated in the accepted scoping report including:	
	(i) details of all the alternatives considered;	Chapter 5
	(ii) details of the Public Participation Process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	Chapter 8 and Appendix D and Appendix E

CONTENT OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REPORT AS PER THE 2014 EIA REGULATIONS (APPENDIX 3)		RELEVANT SECTION WITHIN THE EIA REPORT
	(iii) a summary of the issues raised by I&APs, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;	Section 8.5 and Comments and Responses Report (Appendix E)
	(iv) the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Chapter 6
	(v) the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts: (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;	Chapter 10
	(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;	Section 7.4
	(vii) positive and negative impacts that the proposed activity will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Chapter 9 and Chapter 10
	(viii) the possible mitigation measures that could be applied and level of residual risk;	Chapter 10 (mitigation measures)
	(ix) If no alternative development footprints for the activity were investigated, the motivation for not considering such; and	N/A
	(x) A concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted scoping report;	Chapter 12
(i)	A full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity, including -	Chapter 7
	(i) A description of all environmental issues and risks that were identified during the environmental impact assessment process; and	Chapter 10
	(ii) An assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;	Chapter 10
(j)	An assessment of each identified potentially significant impact and risk, including	
	(i) Cumulative impacts;	Chapter 10
	(ii) The nature, significance and consequences of the impact and risk;	Chapter 10
	(iii) The extent and duration of the impact and risk;	Chapter 10
	(iv) The probability of the impact and risk occurring;	Chapter 10
	(v) The degree to which the impact and risk can be reversed;	Chapter 10
	(vi) The degree to which the impact and risk may cause irreplaceable loss of resources; and	Chapter 10

CONTENT OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REPORT AS PER THE 2014 EIA REGULATIONS (APPENDIX 3)		RELEVANT SECTION WITHIN THE EIA REPORT
	(vii) The degree to which the impact and risk can be mitigated;	Chapter 10
(k)	Where applicable, a summary of the finding and recommendation of any specialist report complying with Appendix 6 to these Regulation and an indication as to how these finding and recommendation have been included in the final assessment report;	Chapter 9
(l)	An environmental impact statement which contains	Chapter 11
	(i) A summary of the key findings of the environmental impact assessment	Chapter 11
	(ii) A map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred development footprint on the approved site as contemplated in the accepted scoping report indicating any areas that should be avoided, including buffers; and	Figure 6, 9-39
	(iii) A summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	Chapter 10
(m)	Based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;	Chapter 10
(n)	The Final proposed alternatives which respond to the impact management measures, avoidance, the mitigation measures identified through the assessment;	Chapter 5
(o)	Any aspects which were conditional to the finding of the assessment either by the EAP or specialist which are to be included as conditions of authorisation	Chapter 12
(p)	A description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	Section 1.7
(q)	A reasoned opinion as to whether the proposed activity should or shouldn't be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	Chapter 11 and Chapter 12
(r)	Where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded, and the post construction monitoring requirements finalised;	N/A
(s)	An undertaking under oath or affirmation by the EAP in relation to -	Near the front of this report (Affirmation by the Environmental Impact Assessment Practitioner)
	(i) the correctness of the information provide in the reports;	As above
	(ii) the inclusion of comments and inputs from stakeholders and I&APs;	As above
	(iii) The inclusion of inputs and recommendation from the specialist reports where relevant; and	As above
	(iv) Any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made interested or affected parties;	As above

CONTENT OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REPORT AS PER THE 2014 EIA REGULATIONS (APPENDIX 3)		RELEVANT SECTION WITHIN THE EIA REPORT
(t)	Where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	N/A
(u)	An indication of any deviation from the approved scoping report, including the plan of study, including	N/A
	(i) any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and	N/A
	(ii) a motivation for the deviation;	N/A
(v)	Any specific information that may be required by the competent authority; and	Refer to the Comments and Responses Report in Appendix E
(w)	Any other matters required in terms of section 24(4)(a) and (b) of the Act.	N/A

1 INTRODUCTION

1.1 Background

2AFRICA is one of the largest subsea telecommunications projects in the world and will serve the African Continent and Middle East region (Figure 1). At 37,000km long, the 2AFRICA subsea fibre optic cable system will interconnect Europe (eastward via Egypt), the Middle East (via Saudi Arabia), and 21 landings in 16 countries in Africa. The venture is partnered by China Mobile International, Facebook, MTN Global Connect, Orange, Saudi Telecom Group, Telecom Egypt, Vodafone and West Indian Ocean Cable Company. The parties have appointed Alcatel Submarine Networks to build the cable. The 2AFRICA Cable System comprises several sub systems to be delivered via different contracts. **This report deals with the cable landing at Amanzimtoti on the east coast of South Africa, which is part of the 2AFRICA/GERA (East) Cable System** (Figures 2 and 3)**.** This landing will be operated by WIOCC.

The proposed project requires environmental authorisation from the Department of Forestry, Fisheries and the Environment[9] in terms of the 2014 Environmental Impact Assessment Regulations (as amended April 2017) (EIA Regulations) published under the National Environmental Management Act, 1998 (Act 107 of 1998) (as amended). ASN, on behalf of WIOCC, has appointed ACER (Africa) Environmental Consultants as the independent Environmental Assessment Practitioner to undertake the application for environmental authorisation for the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing).

The application to DFFE requires a process of Scoping and Impact Assessment. Scoping has been completed, with the Final Scoping Report (FSR) and Plan of Study for Impact Assessment having been accepted by DFFE on 09 June 2021.The Draft Environmental Impact Assessment Report (DEIAR) was completed and circulated for comment during the period 30th July to 31st August 2021. This Final Environmental Impact Assessment Report (FEIAR) presents the final findings of the Impact Assessment and has been compiled in accordance with NEMA, in particular, Government Notice Regulation (GNR) 326 (April 2017), which outlines the requirements of an EIA process to be undertaken as part of the application for environmental authorisation for activities in Listing Notices 1, 2 and 3 of the EIA Regulations.

The purpose of the project is to improve Africa's information technology infrastructure via telecommunication cables. Submarine telecommunication cables are important for international telecommunication networks as they transport almost 100% of transoceanic Internet traffic throughout the world (www.iscpc.org). It is widely recognised that access to affordable international bandwidth is key to economic development in every country. Today, Africa relies primarily on satellites with few submarine cables to provide its international communications. Communication via submarine telecommunication cables generally allows for lower cost, better performance, and greater capacity (throughput) than that available via satellite.

Improvement in the technology will assist in removing one of the current key inhibitors to overall development in Africa and support economic growth and opportunities on the continent. By supplying increased bandwidths, the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) will support the primary objective of the New Partnership for Africa's Development to eradicate poverty in Africa and to place African countries both individually and collectively on a path of sustainable growth and development, to thereby halt the marginalisation of Africa in the globalisation process.

[9] Previously Department of Environment, Forestry and Fisheries. The name change came into effect 1 April 2021.

At the core of the NEPAD process is its African ownership, which must be retained and strongly promoted, so as to meet the legitimate aspirations of the African people (http://www.dirco.gov.za/au.nepad/nepad_overview.htm).

Telecommunications is one of the fastest growing sectors of South Africa's economy which has been driven by rapid growth in the number of mobile phone users and their need for broadband connectivity. The proposed project will provide an opportunity to facilitate the growth of the telecommunications infrastructure in South Africa and in this way support the country's national development goals, including the goals of the Strategic Integrated Project 15: Expanding Access to Communication Technology.

Figure 1 **General overview of the proposed 2AFRICA/GERA (East) and (West) Cable Systems** (Source: 2africacable.com)

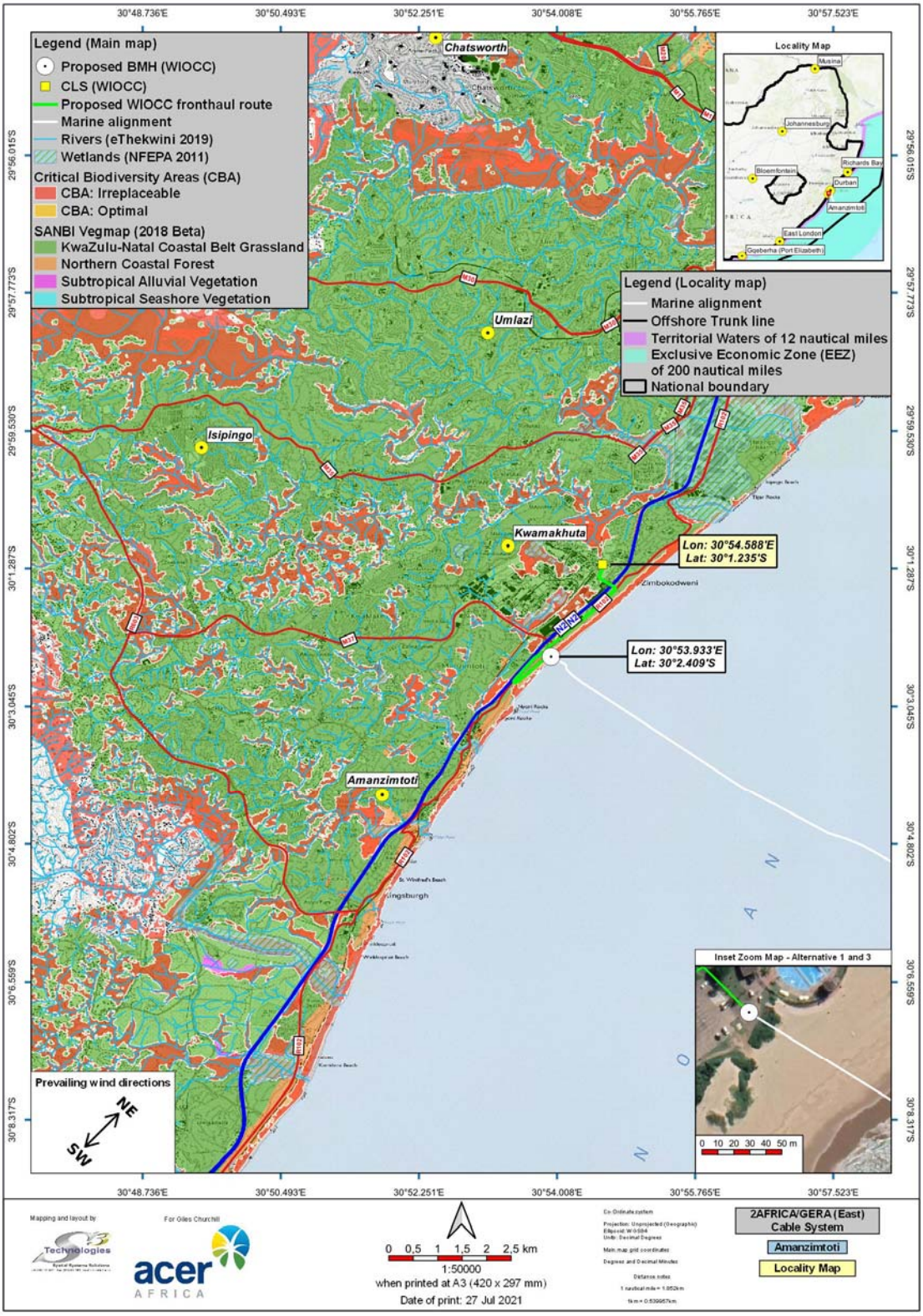


Figure 2 **General locality of the proposed 2AFRICA/GERA (East) Cable System (Amanzimtoti Landing), Amanzimtoti, KwaZulu-Natal, South Africa**

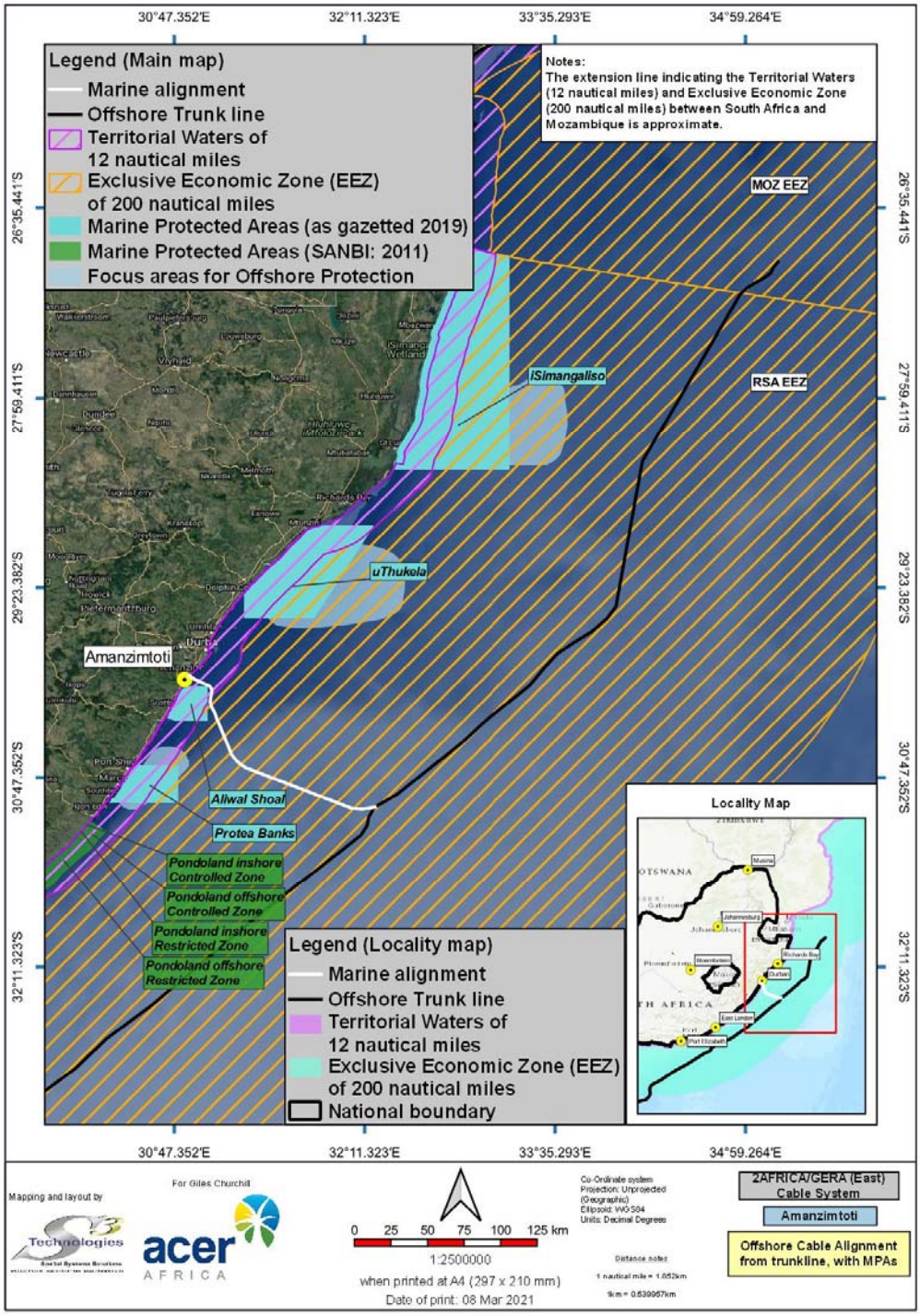


Figure 3 **Locality of marine cable for the proposed 2AFRICA/GERA (East) Cable System (Amanzimtoti Landing) off the east coast of South Africa (note that only the branch cable to Amanzimtoti forms part of this assessment)**

1.2 General location and scope of the project

The project involves the installation and operation of the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing), which comprises marine and terrestrial components, as shown generally in Figure 2 and Figure 3[10].

The marine cable component is the branch line that lands at Amanzimtoti, south of the Port of Durban. The marine cable extends from the main trunk line of the 2AFRICA/GERA (East) Cable to Amanzimtoti Pipeline Beach. From the main cable trunk (located in the Indian Ocean approximately 188 km from the shoreline off Durban, within South Africa's EEZ), the branch line enters South African Territorial Waters approximately 22 km from the seashore (12 Nm) and will link into a Beach Manhole on shore.

On land, the BMH will be constructed at Amanzimtoti. Two BMH site alternatives are assessed in this report. The cable will link up from the BMH to the Cable Landing Station which will be accommodated within an existing building located at Arbour Junction 2, Arbour Road, Umbogintwini. A cable trench (approximately 5 km in length) will be required for the front haul alignment from the BMH to the CLS site.

Note that the width of offshore corridor assessed for the marine cable was 500 m (250 m either side of the cable), although the cable footprint to be disturbed is only 6 m wide (the width of the sea plough skids although the actual disturbed footprint is less than 5 m (skids and ploughshare)). The entire beach where the cable is to land was assessed; however, the construction corridor on the beach will be limited to 50 m each side of the cable. On land, the cable trench is less than 1 m in width, however a construction corridor of 10 m (5 m either side of the cable) will require approval.

Relevant Global Positioning System (GPS) co-ordinates (approximate) are provided below.

GPS Co-ordinates (approximate) of the proposed infrastructure for the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing)		
Location	**Latitude (S)**	**Longitude (E)**
Start of marine branch cable (at trunkline)	31° 00.500'	32° 15.788'
Mid-point of marine branch cable	30° 44.032'	31° 20.948'
End of Branch Cable	30° 02.409'	30° 53.933'
Approximate length of marine branch cable	188 km	
Width of the offshore cable corridor to be authorised	500 m (250 m each side of cable)	
Width of the beach crossing corridor to be authorised	100 m (50 m each side of cable)	
Sea Earth Plate at Amanzimtoti Pipeline Beach	30° 02.408'	30° 54.004'
BMH (Alternative 3 - Preferred)	30° 02.409'	30° 53.933'
CLS	30° 01.229'	30° 54.591'
Mid-point of trench line for ducting from BMH to CLS	30° 02.184'	30° 54.022'
Approximate length of trench line for ducting to CLS	5.0 km	
Width of the land cable corridor to be authorised	10 m (5 m each side of cable)	

[10] A3 maps are provided in Appendix 7.

Project activities include:

- Pre-installation.
  - Cable Route Survey.
  - Route engineering.
  - Route Clearance.
  - Pre-Lay Grapnel Run.
  - Construction of a BMH and cable ducting to the existing CLS site
- Installation
  - Cable Surface Lay (> 1,000 m depths- approximate).
  - Cable Burial (<1,000 m water depths- approximate).
  - Cable surface lay on rock outcropping nearshore, clamping/pinning to rock if required/feasible and provision of armoured casing where required.
  - Shore End Landing.
  - Beach Burial (including sea earth system). (HDD will be used for a section of the cable burial under the dune).
  - Post Lay Inspection and Inshore Burial (burial in shallow water off the beach).
  - Installation of the terrestrial Fibre Optic Cable from the newly constructed BMH to the existing CLS site, via the new underground ducting.
- Operation of the cable (maintenance only, should breakages occur).
- Decommissioning of the cable (only after expected life span of > 25 years).

The above provides a summary. Refer to Chapters 4 and 5 for detailed descriptions of the project activities and alternatives.

1.3 Qualifications and experience of the Environmental Assessment Practitioner

ACER (Africa) Environmental Consultants is a well-established company with wide ranging expertise in environmental management and assessment processes. ACER has twice won the IAIAsa National Premium Award for excellence in environmental management and assessment. The qualifications and experience of the primary assessors and report compilers are listed in Table 1 and *curriculum vitae* are provided in Appendix A.

Table 1 Qualifications and experience of the Environmental Assessment Practitioner Team

Name	Academic Qualification	Relevant Work Experience
Ms A McKenzie (EAP, Pr. Sci. Nat. Author)	MSc	More than 21 years' experience in the field of environmental management. She is registered with the Environmental Assessment Practitioners Association of South Africa (EAPASA) (2019/1337) and the South African Council for Natural Scientific Professions (SACNASP) in the field of environmental science (Registration No 400026/05).
Mr Giles Churchill (EAP, Pr. Sci. Nat. internal review)	MSc	More than 13 years' experience in environmental management, impact assessments and the monitoring of compliance with specifications contained in Environmental Management Programmes. He is registered with EAPASA (2019/1687) and SACNASP in the field of environmental science (Registration No 116348).
Glenda du Toit (Public Participation)	Matric	More than 25 years of broad administrative and technical experience in industry (AngloGold Ashanti and Mondi Richards Bay) before joining ACER in 2021, to train as a public participation consultant.

1.4 Triggered listed activities, environmental assessment requirements and process

In terms of the EIA Regulations published under Section 24(5) read with Sections 24, 24D and 44 of NEMA, the proposed project potentially triggers activities in Listing Notices 1, 2 and 3 (GNR 327, GNR 325 and GNR 324 respectively - 7 April 2017) as shown in Table 2. As such, the project may not commence without environmental authorisation from the relevant competent authority, in this case, DFFE[11] (in close consultation with the KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs.

Given that the proposed project triggers listed activities in Listing Notice 2, the application for environmental authorisation requires a process of Scoping and Impact Assessment with specified timeframes (Figure 4), as outlined in GNR 326 (April 2017). The process is currently in the Impact Assessment Phase.

Based on the current regulations, the EAP must complete Scoping and the Impact Assessment within 300 days of acceptance of the Application for Authorisation by DFFE, which is the Competent Authority (CA).

It is important to note that timeframes in the 2014 EIA Regulations (as amended) are based on calendar days and the following conditions apply:

- 15 December to 5 January are excluded from the calculation.
- No Public Participation between 15 December and 5 January unless justified by exceptional circumstances.
- Organs of State to comment within 30 days from the date on which it was requested to submit comments.

[11] DFFE is the authorising authority as the project crosses international boundaries and is of national importance.

- For both Basic Assessments and Environmental Impact Assessments, the Competent Authority must issue a decision within 107 days.
- Notification of decision by CA within 5 days of date of decision.

1.5 Environmental Impact Assessment Report

The purpose of this FEIAR is to collate, integrate, summarise, and evaluate the findings of the specialist studies and to consider each of the issues raised during Scoping. This aims at providing the reader with a holistic understanding of the potential positive and negative impacts of the proposed development in a singular congruent unit. Several inputs have informed the content of the FEIAR, most notably the outcomes of the different specialist studies that were commissioned as part of the Impact Assessment and comments received from I&APs and authorities following the review of the DEIAR.

The information provided in this FEIAR complies with the legal requirements of GNR 326, as referenced in Table (i). The FEIAR will be finalised and submitted to DFFE for review and decision-making and I&APs will be notified of its submission and its availability for review and comment on ACER's website.

The following documentation is appended to this report:

- Appendix A: EAP *Curriculum Vitae.*
- Appendix B: Specialist reports, *Curriculum Vitae* and Declarations.
- Appendix C: Property Details.
- Appendix D: Public Participation Documentation.
- Appendix E: Comments and Responses Report.
- Appendix F: Environmental Management Programme.
- Appendix G: Supporting Maps.

Table 2 Listed activities potentially triggered by the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing)

Activity	Reason
Listing Notice 1 (No. R. 327 of 2017)	
Activity 15 The development of structures in the coastal public property where the development footprint is bigger than 50 square metres, excluding - (i) […]; (ii) […]; (iii) […]; or (iv) […].	The project will entail the landing of a marine telecommunications cable at Amanzimtoti Beach. This will require digging of a trench across the beach into the intertidal zone and the installation of the telecommunications cable, system earth and associated activities. It will also involve the construction of an underground Beach Manhole on the sea edge of the beach carpark (approximate dimensions: 3m length x 1.8 m height x 2m width) and installation of a terrestrial cable that will traverse inland to reach the Cable Landing Station at Umbogintwini.
Activity 17 Development- a. in the sea; b. […]; c. within the littoral active zone; d. in front of a development setback; or e. if no development setback exists, within a distance of 100 metres inland of the high- water mark of the sea or an estuary, whichever is the greater; in respect of- i. […]; ii. […]; iii. […]; iv. […]; or v. infrastructure with a development footprint of 50 square metres or more - but excluding- (aa) […]; (bb) […]; (cc) […]; or (dd) […].	The project will entail the landing of a marine telecommunications cable at Amanzimtoti Beach. This will require the digging of a trench along the beach into the intertidal zone and the installation of the telecommunications cable, as well as the system earth. The subsea cable will be buried to a depth of approx. 2m, at water depths < 1,000 m, to provide additional protection. It will also involve the construction of an underground Beach Manhole on the sea edge of the beach carpark (approximate dimensions: 3m length x 1.8 m height x 2m width) and installation of a terrestrial cable that will traverse inland to reach the Cable Landing Station at Umbogintwini. Horizontal Directional Drilling will be used to lay the cable under the dune.
Activity 18 The planting of vegetation or placing of any material on dunes or exposed sand surfaces of more than 10 square metres, within the littoral active zone, for the purpose of preventing the free movement of sand, erosion or accretion, excluding where - i. the planting of vegetation or placement of material relates to restoration and maintenance of indigenous coastal vegetation undertaken in accordance with a maintenance management plan; or […].	Rehabilitation of dune vegetation at Amanzimtoti Beach will be undertaken if construction activities associated with the laying of the underground telecommunications cable disturb vegetation on the shoreline. Horizontal Directional Drilling is proposed from the Beach Manhole seawards, to avoid impacting dune vegetation.

Activity	Reason
Activity 19A The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from - (i) the seashore; (ii) the littoral active zone, an estuary or a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever distance is the greater; or (iii) the sea; — but excluding where such infilling, depositing, dredging, excavation, removal or moving - (a) […]; (b) […]; (c) […]; (d) […]; or (e) […].	The project will entail the excavation and deposition of more than 5 m^3 of material within 100 m of the high-water mark of the sea. This will result from construction of the Beach Manhole on the sea edge of the beach carpark at Amanzimtoti Pipeline Beach and when trenching for, and backfilling of, the terrestrial portion of the cable occurring within 100 m of the high water mark of the sea, as well as for the marine telecommunications cable and system earth across the beach. Horizontal Directional Drilling will be used to lay the cable under the dune.
Listing Notice 2 (No. R. 325 of 2017)	
Activity 14 The development and related operation of- (i) […]; (ii) an anchored platform; or (iii) any other structure or infrastructure – on, below or along the seabed; excluding - (a) […]; or (b) […].	The marine cable will be placed on the surface of the seabed in deep water. In shallow waters (less than approx. 1,000 m in depth) the cable will be buried under the seabed to provide extra protection, where the substrate allows.
Activity 26 Development-- i. in the sea; ii. […]; iii. within the littoral active zone; iv. […]; or v. if no development setback exists, within a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever is the greater; in respect of– a) […]; b) […]; c) inter- and sub-tidal structures for entrapment of sand; d) […]; e) […]; f) […]; g) […]; or h) underwater channels; but excluding the development of structures within existing ports or harbours that will not increase the development footprint of the port or harbour.	Although unlikely to be triggered, this listed activity has been included as the trench for the marine cable may result in the entrapment of sand within the inter- and sub-tidal zones. In addition, the trench in which to bury the cable may be construed as an underwater channel.

Activity	Reason
Listing Notice 3 (No. R. 324 of 2017)	
Activity 12 The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. d. In KwaZulu Natal (iv) Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; (v) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (vi) Within the littoral active zone or 100 metres inland from high water mark of the sea or an estuarine functional zone, whichever distance is the greater, excluding where such removal will occur behind the development setback line on erven in urban areas.	The trenching and laying of the cable across the beach and inland of the Beach Manhole will require limited clearance of indigenous vegetation and, potentially, indigenous vegetation within a Critical Biodiversity Area and/or within 100 m inland of the high-water mark of the sea. This may add up to an area of greater than 300 square meters. As such, this activity is being applied for.
Activity 14 The development of— (ii) structure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) .. (b) in front of a development setback; or (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; D In KwaZulu-Natal, in vii Critical biodiversity areas or ecological support areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; i. Inside urban areas: (aa) Areas zoned for use as public open space; (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority, zoned for a conservation purpose; or (cc) Areas seawards of the development setback line or within 100 metres from the high-water mark of the sea if no such development setback line is determined.	The project will entail development of infrastructure with a physical footprint of more than 10 square meters (Beach Manhole and ducting towards the Cable Landing Station) in public open space and/or within a Critical Biodiversity Area and/or within 100 m inland of the high water mark of the sea.

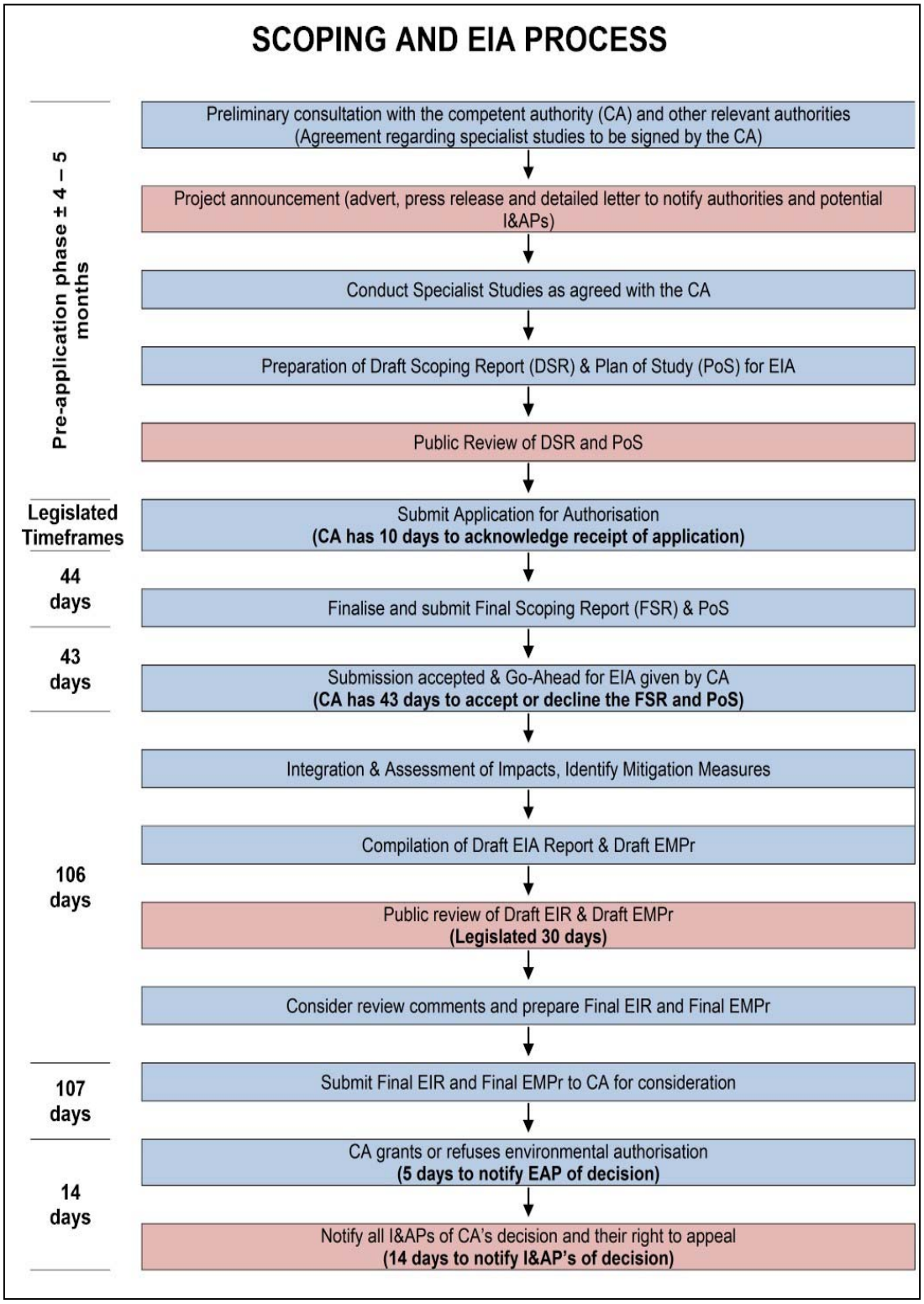


Figure 4 The phases of an environmental impact assessment, including legislated timeframes

1.6 Environmental Management Programme

An Environmental Management Programme has been prepared as part of this assessment. It contains mitigation measures to prevent, limit or enhance impacts identified during this EIA process. These measures may be applied at different stages of the project (design, construction or rehabilitation).

1.7 Assumptions, limitations and gaps in knowledge

Key assumptions, limitations and/or gaps in knowledge applying to the EAP are listed below. Additional discipline specific ones are listed in the individual specialist reports contained in Appendix B.

- This FEIAR has drawn on primary and secondary information from various sources including the client; engineering team; national, provincial and municipal databases; municipal planning documents; specialist studies and input from Interested and Affected Parties. It is assumed that this information from these sources was true and correct at the time of writing this report.
- It is assumed that the project scope and information, including maps, GPS co-ordinates and kml files, provided by the client and the engineering/survey team to the EAP and specialists, are accurate.
- The impact assessment conventions are more applicable to the biophysical environment. Therefore, for social/socio-economic impacts, professional judgement is applied to the conventions to arrive at the assessment of impact significance.
- At the time of writing the DEIAR, chemical analyses relating to potential remobilisation of toxins from contaminated subsurface sediments (below 30 cm sediment depth) near the marine outfall pipelines just offshore of Pipeline Beach are unknown. Given the short length of cable passing through this area and the anticipated 1.5 h to bury the cable, the proposed mitigation measures are considered sufficient to mitigate potential impacts pertaining to the resuspension of contaminated subsurface sediments.
- Economic impacts are not quantified.

2 FRAMEWORK FOR THE ENVIRONMENTAL ASSESSMENT

The Scoping process defined the limits of the assessment, identified and elicited inputs from I&APs, and defined the assessment framework with the purpose of focusing the scope of the assessment ensuring a focus on key issues and associated impacts.

2.1 Concept of sustainability

The framework (Figure 5) within which environmental aspects arising from or influencing the proposed project (and its alternatives) are considered is the concept of sustainability. This considers the inter-related dimensions of the environment, viz. the social, economic and biophysical dimensions, underpinned by a system of sound governance through the legal/statutory requirements of South Africa (particularly NEMA).

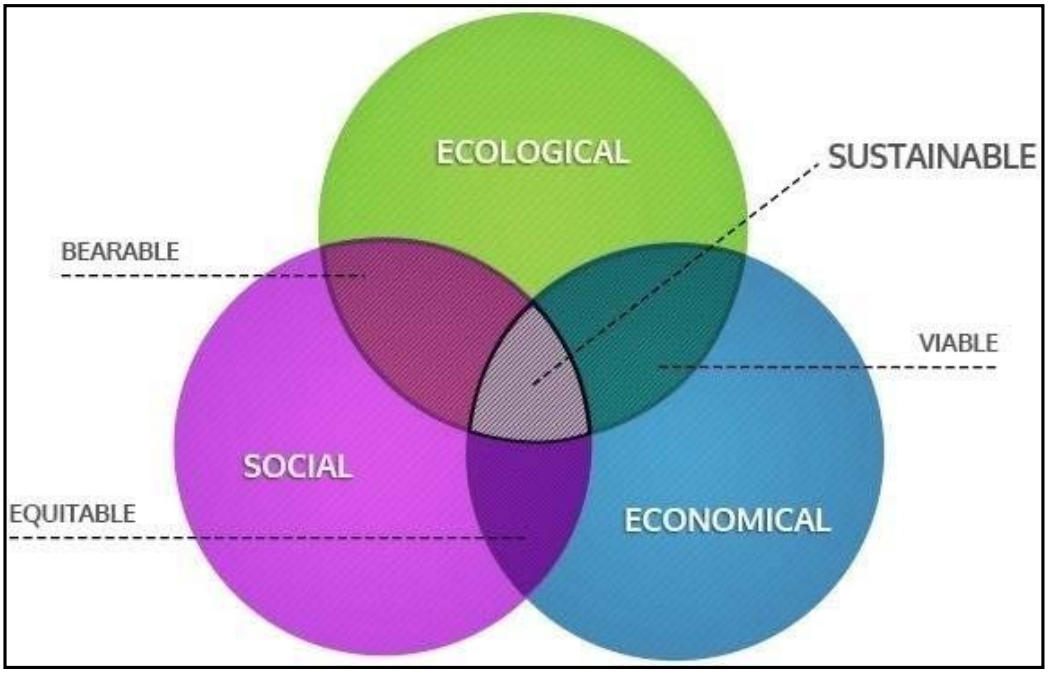


Figure 5 Assessment framework based on the concept of sustainability

All three dimensions of the environment, and the interactions between them (two- and three - dimensional), contribute to achieving sustainability and, therefore, each dimension, individually and its combined interaction with the other two dimensions, needs to be taken into account when assessing a proposed option or project, taking due cognisance that the three dimensions are seldom in perfect balance, with optimised solutions often being dictated by local circumstances, and requiring trade-offs between the dimensions.

In terms of sustainability and the assessment framework, key principles included:

- Development must not irretrievably degrade the natural, built, social, economic and governance resources on which it is based.
- Current actions should not cause irreversible damage to natural and other resources, as this potentially precludes sustainable options.

- Where there is uncertainty about the impact of activities on the environment, caution should be exercised in favour of the environment.
- Land-use and environmental planning need to be integrated.
- Immediate and long-term actions need to be identified and planned for, so that urgent needs can be met while still progressing towards longer-term sustainable solutions.

Issues and impacts were identified by way of interlinked technical and public participation processes. Information gathering focused on gaining an understanding of the interactions between the different dimensions of the environment to identify potentially significant issues and associated impacts. This involved site visits, reference to existing documentation and maps, liaison with the project proponent and technical team, as well as consideration and incorporation of the issues raised during the public participation process. Information was collated, integrated and evaluated, and potentially significant issues and impacts were identified. This enabled the EAP to focus and tailor the scope of work for Specialist Studies and further detailed investigations, the results of which are documented in this report.

In addition to the requirement for Scoping and an Impact Assessment, a review of legislation applicable to the project was undertaken to establish licencing and permitting requirements. Included in this review of legislation were the permit requirements of the Department of Human Settlements, Water and Sanitation (water use licences), the permit requirements of the DFFE – Oceans and Coasts (OC) (in terms of the proposed cable laying activities and beach access), plant permit requirements from DFFE and Ezemvelo KZN Wildlife, permit requirements from the South African Heritage Resources Agency (SAHRA) and permit requirements of DFFE in terms of the National Environmental Management: Waste Act, 2008 (Act 59 of 2008). Findings from this review of applicable legislation and the required licence and permits are included in Section 2.2.

It should be noted that OC is also directly involved with Operation Phakisa which includes the sustainable utilisation of the oceans around South Africa to meet Government's development targets. It is estimated that the oceans around South Africa have the potential to contribute up to ZAR 177 billion to the country's Gross Domestic Product (GDP) and create just over one million jobs by 2033 (http://www.operationphakisa.gov.za).

Operation Phakisa consists of four critical areas to unlock the potential of South Africa's coastline:

- Marine Transport and Manufacturing.
- Offshore Oil and Gas Exploration.
- Aquaculture.
- Marine Protection Services and Ocean Governance.

2.2 Legal or statutory requirements

There are a host of legal requirements (national, provincial and local government spheres) to which WIOCC must adhere for the installation of the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) and related infrastructure. Fundamentally, WIOCC is required to include and integrate environmental principles and values into all planning and implementation procedures taken for development purposes.

Underlying the above reasoning is the constitutional right that people have to environmental protection as set out in the Bill of Rights in the Constitution (Section 24). These rights have been interpreted and included into NEMA, which, together with other national and provincial legislation, governs the way environmental principles are incorporated into any form of development.

The Scoping Report (Draft and Final) have dealt in detail with the key pieces of legislation relevant to the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing). Furthermore, the specialist reports contained in Appendix B focus on the legislation particular to the issues under investigation. These are not repeated in this FEIAR. Rather, for completeness, the key pieces of legislation are listed below:

2.2.1 Legislation

- Constitution of the Republic of South Africa Act, 1996 (Act No. 108 of 1996) as amended by the Constitution of the Republic of South Africa, Amendment Act, 1997 (Act No. 35 of 1997).
- National Environmental Management Act, 1998 (Act 107 of 1998) and associated EIA Regulations, 2014 (as amended 2017).
- National Water Act, 1998 (Act 36 of 1998).
- National Heritage Resources Act, 1999 (Act 25 of 1999).
- National Forest Act, 1998 (Act 84 of 1998).
- Hazardous Substance Act, 1973 (Act 15 of 1973).
- Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983).
- National Environmental Management: Waste Act, 2008 (Act 59 of 2008).
- National Environmental Management: Biodiversity, 2004 (Act 10 of 2004).
- National Environmental Management: Protected Areas Act, 2003 (Act 57 of 2003).
- National Environmental Management: Integrated Coastal Management Act, 2008 (Act 24 of 2008).
- National Environmental Management: Integrated Coastal Management Amendment Act, 2014 (Act 36 of 2014).
- Seashore Act. 1935 (Act 21 of 1935).
- The Marine Living Resources Act, 1998 (Act 18 of 1998).
- Maritime Zones Act, 1994 (Act 15 of 1994).
- Telecommunications Act, 1996 (Act 103 of 1996).
- Marine Traffic Act, 1981 (Act 2 of 1981).

For the proposed project, the Constitution of the Republic of South Africa Act, 1996 (Act No. 108 of 1996) as amended by the Constitution of the Republic of South Africa, Amendment Act, 1997 (Act No. 35 of 1997) is the overarching legislation of over-riding importance. Chapter 2 of the Constitution contains the Bill of Rights, which is the cornerstone of democracy in South Africa. It enshrines the rights of all people in our country and affirms the democratic values of human dignity, equality and freedom. It is within this context that all legislation since 1996 has been formulated.

There are several other pieces of key legislation through which the protection of human rights, community health, and safety and security will be assured:

- Labour Relations Act.
- Basic Conditions of Employment Act.

- Employment Equity Act.
- Occupational Health and Safety Act.
- Promotion of Access to Information Act.

And some key associated Regulations:

- Labour Relations Regulations.
- Compensation for Occupational Injuries and Diseases Regulations.
- Construction Regulations.
- General Safety Regulations.
- Hazardous Chemical Substances Regulations.

2.2.2 Provincial legislation

- KwaZulu-Natal Nature Conservation Management Act, 1997 (Act 9 of 1997).
- Natal Nature Conservation Ordinance (Act 15 of 1974).
- KwaZulu-Natal Heritage Act, 2008 (Act 4 of 2008).
- eThekwini Coastal Management By-Law 2017.

2.2.3 Guidelines

- DEA Integrated Environmental Management Guidelines Series (2010).
- DEA Companion Guideline on the Implementation of the Environmental Impact Assessment Regulations (2014).
- DEA Public Participation Guideline (2017).
- DEA Guideline on Need & Desirability (2017).
- DEA South African Water Quality Guidelines for Coastal Marine Waters (2012).

2.2.4 National, provincial and local policies and plans

- National Development Plan 2030 (NDP).
- South African National Infrastructure Plan 2012 (with reference specifically to SIP 15 - expanding access to communication technology).
- National Coastal and Marine Spatial Biodiversity Plan (Version 1, Beta 2) (Harris, L.R., Sink, K.J., Holness, S.D., Kirkman, S.P., Driver, A. 2020).
- eThekwini Spatial Development Framework, 2019 (SDF).
- eThekwini Integrated Development Plan (IDP).
- Ezemvelo KZN Wildlife Systematic Conservation Assessment/Planning (SCA).
- eThekwini's Systematic Conservation Assessment.
- Durban's Metropolitan Open Space System (D'MOSS).

2.2.5 International treaties, conventions and protocols

There are various international treaties, conventions and protocols of relevance to this project:

- The National Convention for the Prevention of Pollution by Ships of 1973 and 1978, and the Protocol of 1997.
- The Convention on the Prevention of Marine Pollution through the Disposal of Waste and Other Matter, 1972 or the London Convention, 1972.
- The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal.
- United Nations Convention on the Laws of the Sea (UNCLOS).

2.2.6 Permits required

The main licenses/permits[12] required or potentially required for the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) are summarised in Table 3.

Table 3 Main licenses/permit obligations for the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing)

	License/Permit	Authority
1	Environmental Authorisation	DEFF: Integrated Environmental Authorisations
2	Beach Driving Permit	DEFF: Oceans and Coast
3	Seashore Lease Permit	Department of Economic Development, Tourism and Environmental Affairs
4	Permit to construct infrastructure in the Coastal Public Property*	Department of Public Works
5	Section 53 License[13]*	Department of Mineral Resources and Energy
6	Municipal approval	eThekwini Metropolitan Municipality
7	Heritage Permit (Offshore)	South African Heritage Resources Agency
8	Heritage Permit (Onshore)	Amafa
9	Protected Tree Permits	DEFF: Forestry
10	Protected Plant Permits	EKZNW
11	Water Use License	Department of Human Settlements, Water and Sanitation

It is within this framework that the proposed development will need to be constructed and operated.

It should also be noted that due to the Covid -19 pandemic, South Africa declared a national state of disaster on 15 March 2020 in terms of the Disaster Management Act, 2002 (Act No. 57 of 2002). Since this date, a host of Regulations have been promulgated in terms of the Disaster Management Act, dealing with a wide range of matters affected by the pandemic. Of possible relevance to the implementation of this project will be the effect on various government department's processes of engagement with applicants and the public, as well as time frames for permitting and authorisation processes. The Regulations also govern the manner in which public participation can be carried out, with a view to limiting social interaction via social distancing.

[12] Excluded from the above are the following which are the responsibility of the cable operator (i) Telecommunications operators' licenses, cable landing station licences and similar licenses required from the national telecommunications regulators (ii) Operational clearances (iv) Agreements to cross other submarine cables, oil and gas concession blocks, pipelines and other seabed assets.

[13] License to undertake a different land use on the sea floor other than prospecting or mining.

3 NEED AND DESIRABILITY

The need and desirability of a proposed development is a key consideration of an application for environmental authorisation and differs from the developer's aims and purpose of the development. The Guideline on Need and Desirability in terms of the EIA Regulations (DEA, 2017) states that *"consistent with national priorities, environmental authorities must support "increased economic growth and promote social inclusion" while ensuring that such growth is "ecologically sustainable"*. In essence, need and desirability are based on the principle of sustainability, viz. that a development is ecologically sustainable and socially and economically justifiable.

Sustainability in this context implies ecological sustainability, recognising that the maintenance of healthy ecosystems and natural resources are preconditions for human wellbeing and recognising that there are limits to the goods and services that can be provided by the environment. Sustainable development is the process that is followed to achieve the goal of sustainability.

Over recent years, private sector finance for infrastructure projects, both in the developed and developing world, has increased in importance. This has exposed financial institutions to increasing pressure from Non-Governmental Organisations (NGOs) for their involvement in a variety of controversial projects and the need for greater transparency, accountability and tighter standards in the operations of commercial banking. Stemming from these demands and concerns is a set of standards known as the Equator Principles, which are based on the International Finance Corporation (IFC) performance standards on social and environmental sustainability, and on the World Bank Group's Environmental, Health and Safety General Guidelines. The Equator Principles promote socially responsible conduct and sound environmental practices in relation to project financing initiatives.

The single most important factor in reducing the environmental (and social) impacts of marine telecommunications infrastructure projects is good site selection and the ease at which marine telecommunications cable can tie into the existing land based telecommunications network (distance from landing site to the CLS and existing network). The best option is, as much as possible, to avoid negative impacts on the environment from the outset, thereby minimising the amount of environmental mitigation measures required.

Tables 4 and 5 are derived directly from the Guideline and contain the *"questions to be engaged with when considering need and desirability"* as highlighted in the guideline. Responses to these questions are correspondingly provided in the table, based on the information and knowledge gained during this EIA.

Table 4 Need and desirability aspects considered for securing ecological sustainable development and use of natural resources

Ref #	Description	Comment
1	How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?	Implementation of the marine component of the cable is expected to have localised impacts on the marine benthic and shallow benthic environment. Excavation across the beach and dune will have a temporary, but minimal, impact. The terrestrial cable component affects an area that is already transformed by urban development and will not impact on the ecological integrity of terrestrial habitat.
1.1	How will the following ecological integrity considerations be taken into account?	
1.1.1	Threatened ecosystems.	The proposed marine cable is aligned, as far as possible, to avoid sensitive reef areas and has been realigned to avoid the Aliwal Shoal MPA. It will overlap minimally with various areas identified in the National Coastal and Marine Spatial Biodiversity Plan (Version 1.1, 2021) as ecologically sensitive (CBA1, CBA2 and ESA). However, the impact of the cable on these areas is assessed by marine specialists to be of low significance. The study area for the proposed 2AFRICA/GERA (East) Cable System (Amanzimtoti landing) falls within the Southern Coastal Grasslands ecosystem and intersects with areas categorised as CBA1 according to EKZNW's systematic conservation planning. DMOSS areas are also traversed. However the terrestrial portions of the project will be located in transformed areas and clearance of vegetation (natural habitat) will be minimal.
1.1.2	Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems which require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure.	Refer to 1.1.1 above.
1.1.3	Critical Biodiversity Areas and Ecological Support Areas.	Refer to 1.1.1 above.
1.1.4	Conservation targets.	Findings from the specialist studies indicate that the proposed cable will have no significant negative impacts on terrestrial or marine areas of conservation significance or on planned conservation targets.
1.1.5	Ecological drivers of the ecosystem.	Findings from the specialist studies indicate that there will be no significant impact on ecological drivers of the marine or beach ecosystems.
1.1.6	Environmental Management Frameworks (EMF).	eThekwini does not have an EMF. However, for this project, the principles of sustainable development are incorporated into the identification, avoidance, and mitigation of impacts.
1.1.7	Spatial Development Frameworks.	The proposed development is in line with the SDF's objectives of sustainable development, as it is aimed at improving telecommunications that will stimulate local economic growth through data connectivity.

Ref #	Description	Comment
1.1.8	Global and international responsibilities relating to the environment (e.g. RAMSAR sites, climate change, etc).	Climate change is recognised in terms of the cumulative impact of sea-level rise and increased storm events on the beach environment. The implications for associated beach and dune erosion and mitigation thereof, are considered in this EIA.
2	How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity? What measures were explored to firstly avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	Benthic ecosystems are associated with microorganisms that are essential for ecological functions. Initially, the installation of the marine cable will disturb both shallow and deep benthic ecosystems along its alignment. However, once installed, the cable and its legislated buffer zone and the continuation of this buffer zone will have a positive impact on benthic communities as no trawling or anchoring of ships is permitted in the buffer zone. This will preserve the ecological longevity of these sensitive systems. Specialist studies (Appendix B) were commissioned to investigate impacts and identify mitigation measures.
3	How will this development pollute and/or degrade the biophysical environment? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	Potential pollution onshore will be limited to hydrocarbon spills and light industrial and domestic waste. Specifications for the handling of waste and dealing with incidents are contained in the EMPr. The potential for remobilisation of toxic sediments near the AECI Pipeline have been investigated and assessed as low significance. It is recommended cable burial (as planned to a depth of 2 m) is conducted but only using mechanical ploughing. This means that the water jet system which is used to lubricate the ploughshare would not be turned on, thus, limiting the potential for contaminated sediment to become suspended in the water column. Alternatively, the cable could be buried to a depth of 0.5 m using only mechanical ploughing. This would reduce the depth to which ploughing takes place thus satisfying Physalia's concerns that the chemical properties of deeper sediments are unknown. A burial depth of 0.5 m would also ensure that the cable cannot be snagged by the grab bucket when annual sampling of the sediments takes place. For both burial depths the potential to resuspend contaminated sediments is similar as the only sediments which will be resuspended occur on the surface where the plough skid and ploughshare have the potential to disturb surface sediments. When considering the potential impact on the receiving environment and risks associated to the cable through shallower burial depths (anchors, fishing, etc.) it is the EAP's opinion that the preferred burial depth of 2 m be authorised[14]. Potential offshore pollution will be isolated and maintained, until disposed of at a registered landfill site. Further details are included in the EMPr.
4	What waste will be generated by this development? What measures were explored to firstly avoid waste, and where	Waste will be limited to light industrial waste (cable offcuts and reclaimed cable from the seabed) in the marine

[14] Note that after reviewing the DEIAR, Physalia supported the final proposal to undertake the cable trenching to 2 m using the ploughshare without the water jet (refer to the CRR – DEIAR Period in Appendix E).

Ref #	Description	Comment
	waste could not be avoided altogether, what measures were explored to minimise, reuse and/or recycle waste? What measures have been explored to safely treat and/or dispose of unavoidable waste?	environment and domestic and construction waste in the terrestrial environment. Volumes are anticipated to be very small. Waste management specifications are provided in the EMPr.
5	How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	A specialist heritage study was undertaken to identify potential impacts of the cable installation on cultural heritage resources under the sea and on land. The findings indicate that the likelihood of negatively impacting heritage resources is negligible (refer to Appendix B).
6	How will this development use and/or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	Electricity is required to power the optical amplifiers (repeaters) to transmit the telecommunications signals over greater distances through the marine cable. It is possible that the generation of this power is from non-renewable energy sources. The source of energy originating at the start of the cable is outside the scope of this EIA.
7	How will this development use and/or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and/or impact on the ecosystem jeopardise the integrity of the resource and/or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts?	Electricity is required to transmit the telecommunication signal through the marine cable. It is possible that the generation of this power is from renewable energy sources. The source of energy originating at the start of the cable is outside the scope of this EIA.
7.1	Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. de-materialised growth)? (Sustainability requires that settlements reduce their ecological footprint by using less material and energy demands and reduce the amount of waste	The development is neutral in terms of resource use, as once the cable has been laid it functions in its purposes of improving international telecommunications without further resource investment. Only cable repairs will be required on an *ad hoc* basis.

Ref #	Description	Comment
	they generate, without compromising their quest to improve their quality of life).	
7.2	Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and inter-generational equity and are there more important priorities for which the resources should be used (e.g. what are the opportunity costs of using these resources for this proposed development?).	The natural resource to which the Applicant needs access to install a telecommunications cable is the "seabed". Telecommunications is one of the optimal uses of the "seabed". The other current "priority" for the use of the seabed, includes Oil & Gas. There are existing Oil & Gas Exploration Rights Holders in terms of the MPRDA who have rights to conduct exploration and rights to use the natural resource to install seabed infrastructure (such as well heads) as part of their exploration activities. The use of the seabed for both "telecommunications" and "Oil & Gas" is not mutually exclusive. The seabed resource is sufficiently abundant for multiple types of uses, when considering intra- and inter-generational equity. In addition, multiple uses can occur without undue and conflicting negative impact by the different activities on each other and on the seabed resource. The opportunity cost of preventing other uses and activities in future and for sterilizing hydrocarbon resources, can be minimised if the different parties share information early and consult with one another during the execution of their plans.
7.3	Do the proposed location, type and scale of development promote a reduced dependency on resources?	Improved digital telecommunications between distant locations is reducing dependency on travel.
8	How will a risk-averse and cautious approach be applied in terms of ecological impacts?	The cable alignment both offshore and onshore has been selected to minimise ecological impacts. Specialist studies have been undertaken to identify ecological impacts and how to mitigate them. The potential for remobilisation of toxic sediments near the AECI Pipeline have been investigated and assessed as low significance. It is recommended cable burial (as planned to a depth of 2 m) is conducted but only using mechanical ploughing.
8.1	What are the limits of current knowledge (the gaps, uncertainties and assumptions must be clearly stated)?	Assumptions, limitations, and gaps in knowledge are clearly stated in section 1.7 of this report and in each individual specialist report in Appendix B.
8.2	What is the level of risk associated with the limits of current knowledge?	Based on knowledge of previous (similar) projects and current knowledge of, the proposed project and study area, the risk is considered low.
8.3	Based on the limits of knowledge and the level of risk, how and to what extent will a risk-averse and cautious approach be applied to the development?	Please see Item 8.
9	How will the ecological impacts arising from this development impact on people's environmental rights in terms following:	
9.1	Negative impacts, e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc), health impacts, visual impacts, etc. What measures will be taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?	To effectively plan cable routes, armouring and burial and prevent cable system damage on the seabed (from other marine users who have current legal rights to perform activities in the marine environment and who have rights to install infrastructure on the seabed), the Applicant undertakes to implement the objectives of the International Cable Protection Committee to "share the seabed in harmony with others".

Ref #	Description	Comment
		The applicant will be applying the guidance from the International Cable Protection Committee to proactively inform all current marine users who have legal rights of its concept designs (for cable laying and routing) and to collaboratively plan on an ongoing basis its detailed installation designs and operational procedures. To promote spatial awareness and information sharing, and to formally document the cable routing, the Applicant undertakes to ensure that the cable routing is formally mapped on hydrographic and navigational charts by the South African Navy Hydrographic Office. With respect to Oil and Gas right Holders the applicant will obtain a right of access to the seabed by way of a No Objection/Consent Letter from existing Oil & Gas Rights Holders as required by the MPRDA for the Section 53 License Application. If required, a Cooperation Agreement with Oil and Gas right Holders outlining the principles of cooperation to limit the disruption of parties' commercial interests will be formalised[15].
9.2	Positive impacts, e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures will be taken to enhance positive impacts?	The project is expected to have a significant positive impact on the South African economy through improved telecommunications which, in turn, promotes economic development, job creation and education.
10	Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage sites, opportunity costs, etc).	No ecological impacts associated with this development that result in significant negative socio-economic impacts, have been identified for this project.
11	Based on the above, how will this development positively or negatively impact on ecological integrity objectives/targets/considerations of the area?	The impacts of this project on ecological integrity objectives/targets/considerations (marine and terrestrial). have been assessed by specialists to be of low significance, after mitigation. Recovery of the marine benthic environment will occur after the cable is installed and the terrestrial components of the project are located in a transformed environment.
12	Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being projected) will result in the selection of the "best practicable environmental option" in terms of ecological considerations.	The impacts of the selected alignments on ecological integrity objectives/targets/considerations (marine and terrestrial) have been assessed by specialists to be of low significance, after mitigation.
13	Describe the positive and negative cumulative ecological/biophysical impacts	No negative cumulative impacts of high significance were identified by the EAP or specialists.

[15] The marine cable (Amanzimtoti branch line) crosses an offshore O&G lease area under SP/ENI who have been consulted and have issued ASN with a letter of no objection in terms of the proposed installation of the 2AFRICA/GERA (East) Cable System. As such, no Cooperation Agreement is required.

Ref #	Description	Comment
	bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area.	

Table 5 Need and desirability aspects considered for promoting justifiable economic and social development

Ref #	Description	Comment
1	What is the socio-economic context of the area, based on, amongst other considerations, the following considerations?	
1.1	The Integrated Development Plan and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks or policies applicable to the area.	The proposed development is in line with eThekwini's objectives in terms of improving telecommunications technologies to facilitate investment and stimulate both the regional and national economy.
1.2	Spatial priorities and desired spatial patterns (e.g. need for the integration of segregated communities, need to upgrade informal settlements, need for densification, etc.).	N/A
1.3	Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.)	The project will not alter existing land uses or landscapes.
1.4	Municipal Economic Development Strategy.	The proposed development is in line with eThekwini's objectives in terms of improving telecommunications technologies to facilitate investment and stimulate both the regional and national economy.
2	Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects) and specifically also on the socio-economic objectives of the area?	Overall, the project is expected to contribute positively to the goal of improving livelihoods for South Africans through the educational and economic opportunities opened up as a result of access to improved telecommunications networks. The cable will exclude a small area previously used by the crustacean trawl sector. A 500 m exclusion zone would cover approximately 2 km^2 of trawl fishing ground over the depth range of 260 – 270 m During installation, there is potential to negatively impact other existing cables if not well managed. The project will cause minor nuisance impacts during the installation phase (temporary).
2.1	Will the development complement the local socio-economic initiatives (such as local economic development initiatives), or skills development programs?	Improved telecommunications capacity in South Africa is anticipated to positively impact on skills development programs and education.
3	How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?	Improved telecommunications, as a key driver for economic development, is expected to benefit all communities within South Africa.
4	Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and long-term? Will the impact be socially and	The investment in the 2AFRICA (East) Cable System is substantial and the telecommunications cable is anticipated to stay

Ref #	Description	Comment
	economically sustainable in the short- and long-term?	in operation for 25 years. There is no planned decommissioning date; however, technology will improve, and it is possible that the cable system will be replaced by enhanced technology in years to come.
5	In terms of location, describe how the placement of the proposed development will:	
5.1	Result in the creation of residential and employment opportunities in proximity to or integrated with each other.	The improved technology facilitates working from home, which has increased substantially due to the Covid-19 pandemic.
5.2	Reduce the need for transport of people and goods.	Improved telecommunications will reduce the need for people to travel to work meetings, conferences, etc.
5.3	Result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms of public transport?).	N/A
5.4	Complement other uses in the area.	The improved telecommunications will support all other uses that make use of telecommunications in the area.
5.5	Be in line with the planning for the area.	The proposed development complements the development initiatives at the Local, District, Provincial level, including the rest of South Africa.
5.6	For urban related development, make use of under-utilised land available within the urban edge.	N/A
5.7	Optimise the use of existing resources and infrastructure.	The proposed development will make use of an existing building for the CLS.
5.8	Opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement).	N/A
5.9	Discourage urban sprawl and contribute to compaction/densification.	N/A
5.10	Contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs.	Improved telecommunications will be accessible to all communities/locations with internet connections.
5.11	Encourage environmentally sustainable land development practices and processes.	N/A
5.12	Take into account special locational factors that might favour the specific location (e.g. the location of a strategic mineral resource, access to a port, access to rail, etc.).	The location selection is driven by available existing networks to be connected and the ability to safely land a submarine cable.
5.13	The investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential).	N/A
5.14	Impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area.	The proposed project will have no significant impact on sense of place as the infrastructure is buried below ground. The potential to impact on subsea or terrestrial heritage resources is considered to be negligible.
5.15	In terms of the nature, scale and location of the development, promote or act as a catalyst to create a more integrated settlement.	N/A
6	How will a risk-averse and cautious approach be	The cable alignment is selected and refined to

Ref #	Description	Comment
	applied in terms of socio-economic impacts?	avoid sensitive areas and to minimise impacts on other commercial sea and land-based activities. The EIA process assists to identify socio-economic impacts and measures to mitigate negative impacts.
6.1	What are the limits of current knowledge? (The gaps, uncertainties and assumptions must be clearly stated).	Assumptions, limitations and gaps in knowledge are clearly stated in section 1.7 of this report and in each individual specialist report in Appendix B.
6.2	What is the level of risk? (Related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge).	Negligible.
6.3	Based on the limits of knowledge and the level of risk, how and to what extent will a risk-averse and cautious approach be applied to the development?	See Item 6.
7	How will the socio-economic impacts resulting from this development impact on people's environmental right in terms following?	
7.1	Negative impacts: e.g. health (e.g. HIV/AIDS), safety, social ills, etc. What measures will be taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?	The EMPr (Appendix F) provides specifications aimed at reducing negative impacts on health and wellbeing.
7.2	Positive impacts. What measures will be taken to enhance positive impacts?	Measures include local employment opportunities and improved telecommunications with a positive socio-economic impact.
8	Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socio-economic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.).	N/A
9	What measures will be taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?	The proposed cable alignment seeks to avoid or minimise socio-economic impacts.
10	What measures will be taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)? Considering the need for social equity and justice, do the alternatives identified allow the "best practicable environmental option" to be selected or is there a need for other alternatives to be considered?	Improved telecommunications enabled by the proposed project will benefit all South Africans, including the disadvantaged.
11	What measures will be taken to pursue equitable access to environmental resources, benefits, and services to meet basic human needs and ensure human wellbeing, and what special measures will be taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?	The technology enabled by the cable will be widely accessible.
12	What measures will be taken to ensure that the	Environmental considerations are actioned by

Ref #	Description	Comment
	responsibility for the environmental health and safety consequences of the development have been addressed throughout the development's life cycle?	the Developer through all phases of the project (design, construction, operation and maintenance) by various measures, including: • Technical research and development. • Risk analyses. • Compliance with environmental and safety legislation. • Environmental Screening, Scoping and Impact Assessment. • EMPRs. • Ongoing maintenance and monitoring.
13	What measures will be taken to:	
13.1	Ensure the participation of all interested and affected parties.	The minimum requirements of the EIA Regulations were followed with respect to public participation, also taking into account special requirements to reduce the spread of Covid 19. Refer to Chapter 8 and to Appendix D and Appendix E.
13.2	Provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation.	The regulated public participation process is designed to share information and facilitate public comment. ACER staff make themselves available to discuss the project telephonically and respond to queries throughout the duration of the project. Given the current Covid risk, public meetings are not recommended but ACER will be available to hold virtual focus group meetings.
13.3	Ensure participation by vulnerable and disadvantaged persons.	Disadvantaged individuals will be involved in the project during the construction phase, via local contractors who adopt unskilled, disadvantaged workers as part of their company policies/ BEE principles.
13.4	Promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means.	The regulated public participation process is designed to share information and raise awareness.
13.5	Ensure openness and transparency, and access to information in terms of the process.	The Scoping Report and DEIAR are circulated for comment, and all documents are made available on ACER's website. All issues raised during the Public Participation Process are responded to and captured in a CRR (Appendix E). The EAP team is available throughout the EIA process to respond to project related queries and concerns.
13.6	Ensure that the interests, needs and values of all interested and affected parties will be taken into account, and that adequate recognition is given to all forms of knowledge, including traditional and ordinary knowledge.	Refer to all responses under Item 13.
13.7	Ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein is	Internal empowerment was promoted during the EIA process, with both women and younger EAP team members.

Ref #	Description	Comment
	promoted.	The Public Participation Process in terms of the 2014 EIA Regulations is open to all I&APs including women and youth. The improved telecommunications resulting from the proposed project will benefit all segments of society, including those involved in education.
14	Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments of the community (e.g. a mixture of low-, middle-, and high-income housing opportunities) that are consistent with the priority needs of the local area (or that are proportional to the needs of an area).	The improved telecommunication provision will benefit all segments of society.
15	What measures will be taken to ensure that current and/or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?	Environmental awareness training was employed during the cable survey and will be provided to staff once cable laying commences. Furthermore, ASN is an internationally acclaimed cable laying company with stringent Health, Safety and Environment protocols.
16	Describe how the development will impact on job creation in terms of, amongst other aspects:	
16.1	The number of temporary versus permanent jobs that will be created.	Job creation during the installation phase of the project will be limited to temporary jobs during cable landing activities. The project is, however, expected to promote economic development within South Africa which could result in significant job opportunities (albeit not directly related to the project).
16.2	Will the labour available in the area be able to take up the job opportunities (e.g. do the required skills match the skills available in the area?).	Specific skills are required for the cable landing activities and, therefore, the use of local labour will be limited.
16.3	The distance from where labourers will have to travel.	N/A
16.4	The location of job opportunities versus the location of impacts (e.g. equitable distribution of costs and benefits).	The project will not result in any additional permanent local job opportunities directly related to the project.
16.5	The opportunity costs in terms of job creation (e.g. a mine might create 100 jobs but impact on 1,000 agricultural jobs, etc.).	Temporary jobs created during project implementation are limited and will not be at the expense of job losses in other sectors either directly or indirectly affected by the proposed development.
17	What measures will be taken to ensure:	
17.1	That there is inter-governmental coordination and harmonisation of policies, legislation and actions relating to the environment.	Local, provincial, and national Government departments are consulted during the EIA process, with the purpose of aligning requirements.
17.2	That actual or potential conflicts of interest between organs of state are resolved through conflict resolution procedures.	This is ongoing to achieve alignment between the three spheres of Government.
18	What measures will be taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will	The environmental authorisation process is being undertaken as per the prescribed environmental legislation and associated

Ref #	Description	Comment
	serve the public interest, and that the environment will be protected as the people's common heritage?	regulations. Impacts will be mitigated to ensure the long-term sustainability of the proposed development.
19	Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?	It is the EAP's opinion that the proposed mitigation measures will be realistic and achievable. The possible decommissioning of the marine cable in 25 years' time is likely to require an impact assessment at the time.
20	What measures will be taken to ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?	These are addressed in the EMPr and the conditions of authorisation issued by the competent authority.
21	Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), will result in the selection of the best practicable environmental option in terms of socio-economic considerations.	The alignment alternatives have been selected to minimise negative ecological and social/socio-economic impacts.
22	Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments in the area.	Various socio-economic impacts resulting from the proposed project are identified in the EIA report. They are both positive and negative and along with other existing or future cables in the area can have cumulative effects on the environment. However, there are no cumulative impacts that have been identified as being of high significance. Refer to Section 10.7 of this report.

4 PROJECT DESCRIPTION

This chapter describes the infrastructure and operational aspects of the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing). The aim of this chapter is to enable readers to gain an understanding of how the cable system will be installed and maintained in order to understand the possible impacts the development may have on the receiving environment.

4.1 General description of project activities

The main 2AFRICA/GERA (East) cable trunk will be located approximately 200 to 500 km from the shoreline in international waters and will run down the East Coast of Africa as shown in Figure 1 (generally parallel to the coastline). From the main cable, branches will run through EEZs and territorial waters to the landing sites in each country. Once the main cable trunk reaches a point roughly opposite Amanzimtoti, South Africa, it will be located approximately 188 km from the shoreline and within South Africa's EEZ. The proposed branch cable to Amanzimtoti (Figure 3) is routed from the main trunk to the shore in a roughly west-north-west direction, a section passing through the EEZ before entering South African territorial waters approximately 22 km (12 Nm) from the seashore. The cable will approach Amanzimtoti Pipeline Beach between the Aliwal Shoal and Thukela Banks Marine Protected Areas (Figure 3).

The proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) involves the following activities:

- Pre-installation activities including cable route survey and route engineering. The Marine Cable Route Survey has already been undertaken to determine the suitability of the substrate and topography of the ocean floor. This includes a geophysical survey using echosounders and sonar techniques and a geotechnical survey involving cone penetrometer tests and core sampling and analysis.
- Route clearance and Pre-Lay Grapnel Run.
- Laying of the cable in the offshore environment, preceded by route clearance and including cable burial in water depths less than approximately 1,000 m where possible.
- 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, assisted by small boats and divers.
- In the shallow water and beach environment articulated pipe will be used to provide additional protection to the cable from the cable anchor block to a water depth of approximately 10 – 15 m.
- Burial in the seabed to a target depth of 2 m where possible. The route will be adjusted to avoid obvious visible rock. This burial is intended to provide protection to the cable from the hazards posed by ships' anchors, fishing trawls/lines and the like. However, where cables cross outcropping rock, cables are surface laid and pinned to the rock where possible.
- Excavations within the intertidal zone are undertaken to bury the cable before it is anchored into a cable anchor block and BMH which need to be constructed. The BMH is a concrete utility vault where the marine portion of the subsea cable is connected to the terrestrial portion.
- Excavations within the intertidal zone and beach to bury the system earth cable and installation of a system earth on Pipeline Beach.
- On the beach, the cable will be buried to a target depth of 2 meters, substrate permitting. Horizontal Directional Drilling will be used to install the section of cable underneath the vegetated dune.
- The BMH and underground ducting to the CLS will be constructed in readiness for the cable landing.

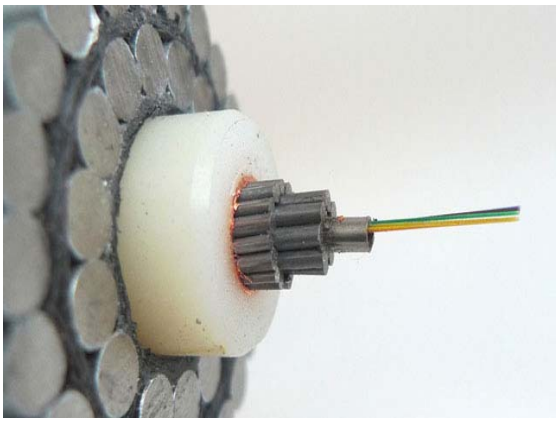
4.2 Marine components and installation methods

4.2.1 Marine fibre optic cable

Offshore, the cable is laid by a purpose-built cable-laying ship. Consistent with industry practice, the unarmoured cable (Plates 1 and 2) will rest on the seabed in water depths greater than approximately 1,500 m (cable burial will be to 1,000 m for the 2AFRICA/GERA (East) Cable system landing at Amanzimtoti), where the risk of inadvertent damage from human activities is negligible.

At depths less than approximately 1,000 m, the cable will be buried beneath the sandy seabed of these shallower marine waters. This is typically achieved with the use of a specially designed plough which is submerged onto the seabed by the cable laying ship. The cable is then fed from the ship to the plough which effectively buries the cable to a target depth of approximately 2 m. This burial is intended to provide protection to the cable from the hazards posed by ships' anchors, fishing trawls/lines and the like.

The diameters of the marine fibre optic cables range in size from 17 mm diameter (cables installed at a water depth of between 7,000 – 1,500 m) to a maximum of 50 mm diameter (armoured cable which is installed in shallow water depths (< 200 m). In shallow waters close to the beach (generally less than 10 m water depth) articulated pipes may be used to protect the armoured cable which have a diameter of 148 mm. These articulated pipes protect the cable and aid in cable burial due to their weight.



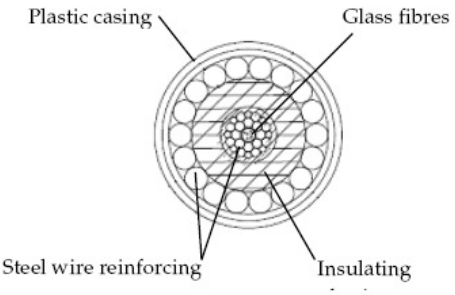


Plate 1 Cross section of a typical marine telecommunications cable

Plate 2 Examples of cable armouring and operational depths

4.2.1.1 Repeaters

Repeaters are optical amplifiers that are installed along the length of the cable and are used to extend the reach of optical communications links by overcoming loss due to attenuation of the optical fibre (Plate 3). Repeaters will be installed at specific distances along the route making up the cable system.

Repeaters are designed to function continuously without maintenance for 25 years in depths of up to 8,000m with no degradation in mechanical, electrical and optical performance. This requires among other, a controlled ambient internal climate and a durable enclosure.

Internal atmosphere is controlled to 20% relative humidity over the operating temperature range by the hydrogen getters[16] and moisture absorbing desiccants. The controlled internal gas atmosphere is suitable for maintaining the life expectations of all internal components.

The main structural component of the repeater housing is a monobloc tubular case fabricated from high tensile steel. The bulkhead and composite gland assembly provide full protection against water and gas ingress, either directly from the surrounding sea or from axial cable leakage due to a cable break close to the repeater.

[16] A “getter” is a deposit of reactive material placed inside a vacuum system to maintaining the vacuum. Gas molecules striking the getter material combine with it chemically or by absorption, and the gas is removed from the evacuated space.

The repeater housing is protected against corrosion with an organic electrically insulating barrier coating with additional mechanical reinforcement. This prevents seawater contact with the repeater housing steel surface and eliminates risk of metal wastage and galvanic corrosion and magneto-hydrodynamic effects that could generate hydrogen.

Repeaters are electrically powered. Voltage insulation is maintained between the internal unit and the repeater housing by two insulation paths: the polyethylene liner and the power conductor feeding through the gland assembly.

The repeaters will have the following specifications:

- The diameter of the rigid sea-case (white tube section in the photo) is approximately 270mm.
- The length of the sea-case section of the repeater is approximately 980 mm.
- The total length of repeater is approximately 3900 mm to 4240 mm depending on cable coupling.
- The spacing between repeaters is approximately 75 km to 83 km varying with the route plan.

Plate 3 Example of a repeater

4.2.2 Physical characteristics of fibre optic cables

4.2.2.1 External chemical properties of the cable

The external protection of the cable comprises a naturally occurring bitumen (asphalt) as a compound to adhere the outer polypropylene roving to the armour wires on the armoured shallow water cables. No form of additive to prevent bio-degradation or anti-fouling is used in the cable's outermost layers. The other cable components in contact with the sea are the galvanized steel armour wires and the polyethylene sheath, which also contain no additives harmful to marine life (Heath; 2001).

4.2.2.2 Electrical Current

According to Heath (2001), optical fibre cables carry a constant dc[17] current of 1.6 Amps to feed power to the underwater repeaters. This current is fed along the copper clad steel inner conductor and depending on the length of the cable span it may require several thousands of volts to maintain it. In very approximate terms the cable resistance is about 1 Ohm per kilometre and the repeaters, spaced at 50 km, drop about 30 volts each. Therefore, a cable spanning 4,000 km would have about 80 repeaters and require a power feed voltage of about 6500 volts. It is normal practice to apply half this voltage at positive polarity to one end of the system and half the voltage at negative polarity to the other end to establish a zero voltage point midway along the cable span. This reduces the level of voltage stress on the cable and repeaters.

There is no external electric field associated with the power on the inner conductor. The ratio of the conductivity of the polyethylene insulation to that of seawater means that the electric field remains only within the cable insulation.

4.2.2.3 Electromagnetic Fields

Electromagnetic fields are generated by current flow passing through cables and can be divided into electric fields (called E-fields, measured in volts per metre, V m^{-1}) and magnetic fields (called B-fields, measured in µT) (Taormina *et al*., 2018). The DC current in the inner conductor does set up a stationary magnetic field in the form of concentric rings emanating from the cable. The magnetizing force produced by this field diminishes with increasing radius from the cable. Electromagnetic fields are generally effectively confined inside cables by armouring (Taormina *et al*., 2018). As referenced from Heath (2001), for a cable carrying 1.6 amps this means that the magnetic flux density due to the cable at a distance 1 metre away is 0.32 micro Tesla. This is two orders of magnitude lower than the vertical component of the earth's magnetic field on the West Coast of the United States, which is about 43 micro Tesla. This means that marine life forms would need to approach to within less than half an inch of the cable to detect its magnetic field above that of the earth.

4.2.2.4 Audible sound and frequency association with "toning"

Audible sound lies in the range 15 to 40,000 Hertz and neither coaxial nor optical cables emit this range, or any other frequencies, during their normal operation. During the laying of the cable, it does vibrate as a result of regular vortex shedding as it descends the water column. This is a low frequency phenomenon, at approximately 10 Hertz, is short lived and ceases when the cable comes to rest on the bottom.

The injection of a low frequency electrical signal from the land station is known as "electroding" (also referred to as "toning"). Toning is undertaken as an aid to cable location in the event of a fault on the cable or where other marine work is being conducted, which involves keeping a safe distance from the working cable. Toning works on the principle of a coaxial transmission line, formed by the inner conductor of the cable and the external armouring, providing a circuit for a low frequency signal.

At low frequency, a current applied to the inner conductor will propagate along the line, with its return path provided by a combination of the steel armour wires and the surrounding seawater. It is the proportion of current in the seawater, which enables electrodes trailed from a ship to detect the cable by locating the maximum level of the tone.

[17] DC is direct current: the one directional or unidirectional flow electric charge.

During toning the level of the signal injected is usually around 160 mA at 25 Hz as the threshold level of detection on the ship electrodes is normally around 20 mA. The attenuation of the cables at low frequency is such that the tone injected at the terminal should be detectable across the length of the cable.

Toning is undertaken infrequently and is only really required prior to or during a repair operation on the cable. Toning is also undertaken during the installation of new cables, which have to cross or come close to the existing working cables. To increase safety margins in this situation, it helps the new installer to know the precise whereabouts of existing cables, which are mostly buried on the shelf area. Although toning is less effective in buried cables, it is much more reliable than visual or magnetometer detection in shallow water regions.

Toning has been used for many years on telegraph, coaxial, and optical fibre submarine cables throughout the world. From video evidence of ROV's tracking toned cables, the short-term presence of a low frequency, low level electric field in seawater does not appear to have any influence on the behaviour of fish.

4.2.2.5 Heat dissipation

When electric energy is transported, a certain amount is lost as heat by the Joule effect, leading to an increase in temperature at the cable surface and subsequent warming of the immediate surrounding environment (OSPAR, 2012). This is commonly referred to as thermal radiation. Thermal radiation in buried cables can warm the surrounding sediment in direct contact with a high voltage cable (Emeana *et al*., 2016). High voltage cables are used for transferring electricity related to offshore energy projects. Heat emission is higher in AC than DC cables at equal transmission rates (Taormina *et al*., 2018). According to Taormina *et al*. (2018), the impacts of local temperature increase caused by electric cables on benthic communities have rarely been examined and *in situ* investigations are lacking. They refer to this knowledge gap as preventing conclusions from being drawn about ecological impacts of long-lasting thermal radiation on ecosystems. They conclude that considering the narrowness of the corridor and the expected weakness of thermal radiation, impacts are not considered to be significant, referring to the need for new field measurements and experiments under operational conditions.

4.2.3 Marine fibre optic cable installation

Prior to the installation of the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) taking place, the following offshore marine investigations will be performed by a contractor appointed by ASN to install the cable system.

4.2.3.1 Cable Route Survey

The proposed cable routes were surveyed by the project team to identify whether the substrate and topography of the ocean floor were suitable for the installation of the 2AFRICA/GERA (East) Cable System. The survey included the following activities:

- A geophysical survey of the deep water, shallow water, and inshore sections of each proposed cable route was undertaken. This included the establishment of bathymetric corridor widths of 500 m (inshore and up to a depth of 500 m). In deeper water this corridor extended up to three times the water depth centred on the proposed cable route.
- Conducting a side scan sonar and survey of a 500 m corridor width (inshore and up to a depth of 500 m) centred along the proposed cable route.

- Bottom samples were taken at an average 10 km spacing in shallow water (less than 500 m in depth) (Sample sizes were approximately the size of a standard 10 l bucket).
- The cable route was surveyed using a multi-beam echo sounder (MBES) Swath Bathymetry system (the MBES equipment is integrated with the ship's surface navigation equipment (GPS)).
- Bathymetric data was processed using the onboard workstation with specialised software to verify the coverage and accuracy of the collected bathymetry data and to provide colour contour charts. These charts were used to review the proposed route and where necessary plan offset lines.
- In the shallow water sections, an integrated Side Scan Sonar and a Sub-bottom Profiler was used. These were housed in a device which was towed behind the ship to get to an optimum position close to the seabed. The position of this towed device was tracked acoustically using an ultra-short base line (USBL) tracking system.
- A burial assessment survey was undertaken from the shoreline up to a depth of 1,000 m to test the suitability of the substrate for cable burial. The survey included Cone Penetrometer Tests (CPTs) with an average of 1 CPT taken at 4 km intervals in planned burial areas.
- The landing sites for all cable segments were positioned utilising Global Positioning System and topographic surveying practices. (The in-shore survey vessels used a GPS navigation system).
- At each landing site, the survey of the shore approaches was supported where appropriate by a diver/swim team equipped with both video camera and bar probes. Any obstructions, potential hazards or engineering constraints to the submarine cable were located and fully documented.

4.2.3.2 Cable Route Clearance Operations

Prior to the installation of the cable, route clearance operations will be conducted along those sections of the route where burial is to be performed to ensure that, as far as practically possible, the burial operation will not be hindered by out of service cables or discarded fishing gear. This route clearance operation is typically called the Pre-Lay Grapnel Run. The objective of the PLGR operation is the clearance of any seabed debris, for example wires or hawsers, fishing equipment etc., which may have been deposited along the route.

PLGR is undertaken by dragging grapnels (Plate 4) behind a ship along the proposed cable route in order to clear the route of debris. Different types of grapnels can be used depending on the seabed conditions (Gifford in rockier areas and Rennies and Flat Fish in softer sandy sediments). The PLGR operations are normally carried out by a vessel specifically fitted out with winches and grapnels, and capable of sustaining good slow speed positional control. The vessel will be equipped with navigation and positioning systems to the same specification as the main lay vessel.

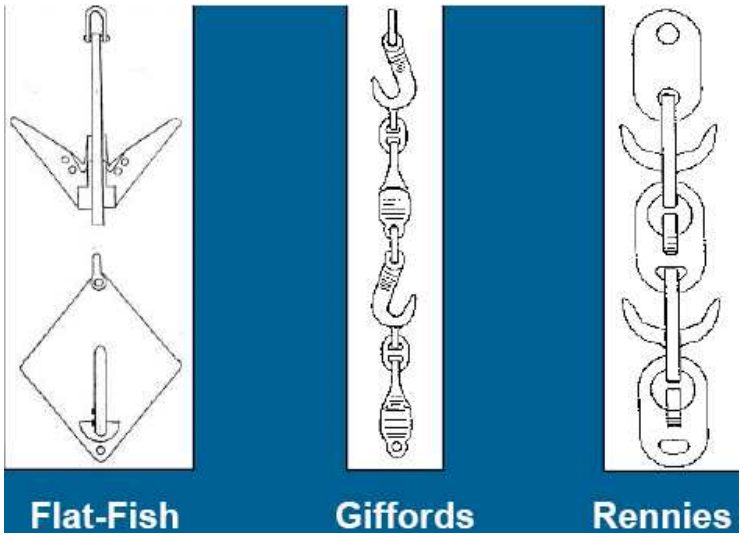


Plate 4 Types of grapnels used to clear the cable route of debris

Any debris recovered during these operations will be discharged ashore on completion of the operations and disposed in accordance with local regulations. If any debris cannot be recovered, then a local re-route of the cable system will be planned to avoid the debris.

4.2.3.3 Installation of the marine telecommunications cable

The marine fibre-optic cable will be installed using a purpose-built cable ship fully equipped with all the necessary equipment, tools and facilities to safely handle and install, join, test, and power the submerged plant, including simultaneous lay and plough burial. The vessel will have sufficient power and dynamic positioning capability to carry out the installation in the expected weather and current conditions. During cable laying an automatic log of all critical operational parameters will be kept including navigational data, speed, tension, slack, cable counter and plough data.

SURFACE LAYING OPERATIONS

Surface laying implies that the cable will be laid on the surface of the seabed. The objective is to install the cable as close as possible to the planned route with the correct amount of cable slack to enable the cable to conform to the contours of the seabed without loops or suspensions.

PLOUGH BURIAL OPERATIONS

The cable will be buried to a target depth as defined in the burial plan, and as determined by the cable route and burial assessment surveys. Burial depth will be controlled by adjusting the height of the plough's front skids. The depth of burial achieved will be continuously recorded by the plough and logged with the ship's data. In areas where plough burial is planned, the cable will be buried to a target depth of 2 m (Plate 5). The footprint of the cable trench is generally less than 1 m in width with the disturbance from the plough skids being limited to less than 6m either side of the trench. The trench created for burial of the cable is narrow and usually closes soon after the plough has passed. No active backfilling is undertaken, and the trench closes naturally.

CROSSING OF EXISTING SUBMARINE CABLES AND PIPELINES

For cable route planning, ASN uses the Global Marine Cable Database (Global Marine, 2019) augmented by ASN's own internal databases and Admiralty Charts (UKHO, 2019) to identify all known existing and proposed telecommunication and power cable systems that will be crossed by the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing)[18]. Where existing cables are crossed, the industry norm is to ensure that the crossing is undertaken using a similar type of cable, i.e. an armoured cable crosses an armoured cable or an un-armoured cable crosses an un-armoured cable. Where seabed conditions allow, post lay cable burial using a Remote Operated Vehicle (ROV) can be performed to afford additional protection to the cables at the crossing point.

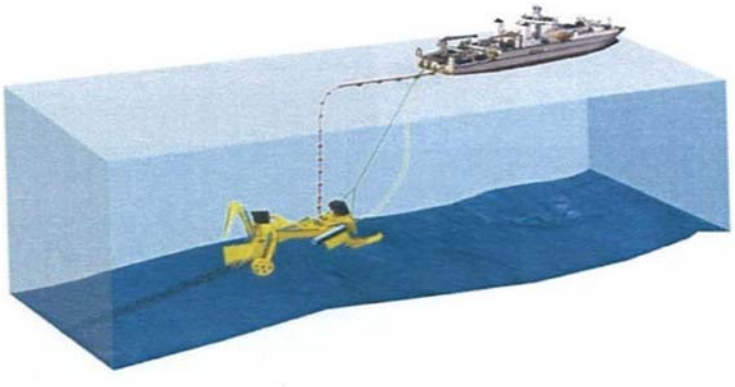


Plate 5 **Sea plough to be used to bury the cable along sections of the cable alignment (less than 100 m deep) where conditions permit burial**

PROTECTION – PIPELINE CROSSINGS

For pipeline crossings, ASN recommends the application of Uraduct (or similar product) (Plate 6) to the cable at the point of contact with the pipeline. Uraduct is a protection system designed and developed to protect subsea fiber optic cables, power cables, umbilicals, flexible flowlines, rigid flowlines, hoses and bundled products from abrasion and impact. Generally, the length of Uraduct required for a pipeline crossing is 50 m each side of the crossing or quarter the water depth either side of the crossing. Mattressing[19] can also be used when crossing pipelines; however, this is not considered necessary for standard pipeline crossings but may be installed in special circumstances at the request of the pipeline operator.

18 The 2AFRICA/GERA (East) Cable System (Amanzimtoti landing) will cross the METISS cable.

19 Generally, mattresses are made of high strength concrete segments linked together with a network of high strength polypropylene ropes to form a continuous flexible concrete barrier which is used to separate structures ensuring the protection of infrastructure.

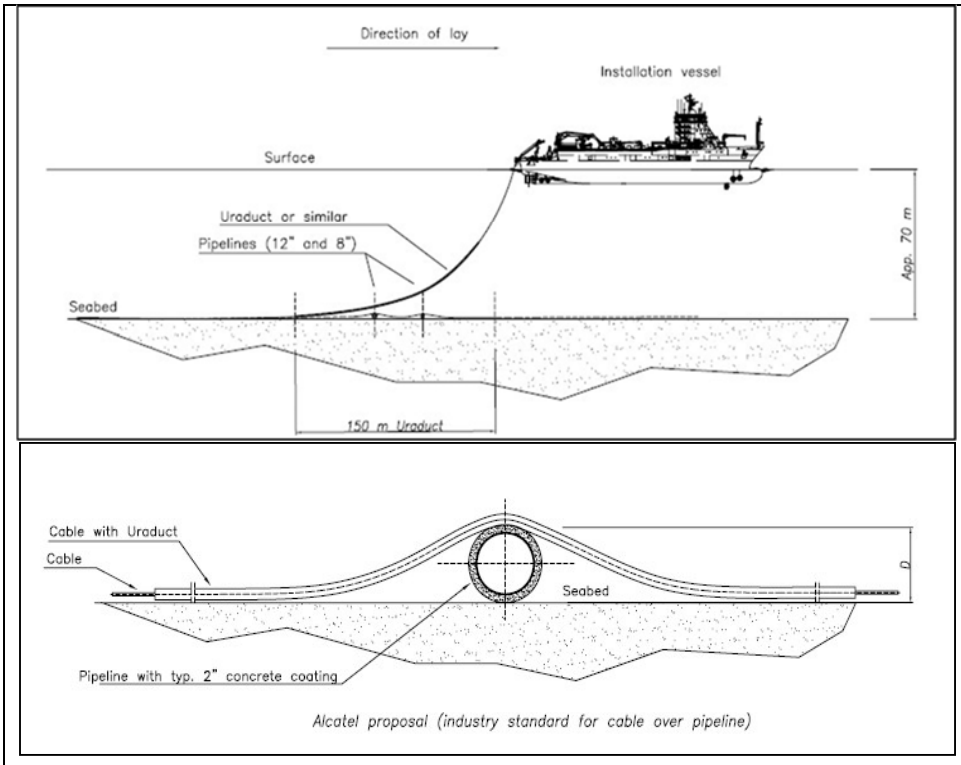


Plate 6 **Example of a cable crossing using Uraduct or similar product (Source: ASN REH, 2019)**

SHORE END OPERATIONS

Shore end operations refer to the installation of the cable through the shallow water near shore, through the intertidal zone and up onto the beach (Plates 7 and 8). The Pipeline Beach shore-end landing will be performed directly from the main cable installation vessel.

Plate 7 **Landing of a cable on shore. Similar works will be undertaken for the 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing)**

Plate 8 **Bringing the cable to shore from the cable laying vessel. Cable is buoyed off and pulled to shore with smaller vessels**

During cable landing at Pipeline Beach (Amanzimtoti), the following activities will be performed by the appointed contractor:

- Preparation of a detailed operational plan based on the findings of the survey, with site visits, as necessary.
- Provision of an advance party to establish the beach equipment and to prepare the beach, cordon off a working area to protect the public, etc.
- The marking of any existing in-service cables at the shore end location (with the assistance of the cable owners).
- Performance of the installation of the shore end section of the sea cable and support of the cable vessel activity.
- Installation of cable slack at the beach, as required.
- Installation of a cable loop in the BMH to facilitate re-terminations.
- Securing the cable in the BMH by means of an armour wire anchor clamp (AWAC).
- Burial of the cable from the BMH to the Low Water Mark (LWM) to a target depth of 2 m. At Pipeline Beach, HDD will be used for a short section (approx. 30 m), to route the cable under the dune to the BMH.
- Installation and burial of the sea earth plate and earth cable (System Earth) (Figure 6).
- All digging with an excavator will start the day before the planned cable landing. HDD however will require a longer period of preparation.
- Reinstatement of the beach to the required standards.

- In the nearshore environment of the landing at Amanzimtoti Pipeline Beach, the first approximately 900 m of the cable will be buried with the assistance of divers, with the remainder inserted by plough burial methods commencing at approximately 20 m depth. The cable will be surface laid over the narrow outcropping reef (approx. 17 m wide) and stabilised through burial either side of the rock outcrop (Figure 7).
- All testing, reporting, and accurate as-built records.
- Articulated pipe (Plate 9), where required in shallow waters and across the beach up to the beach anchor block.
- The cable will be fixed to the BMH to secure the cable in place.

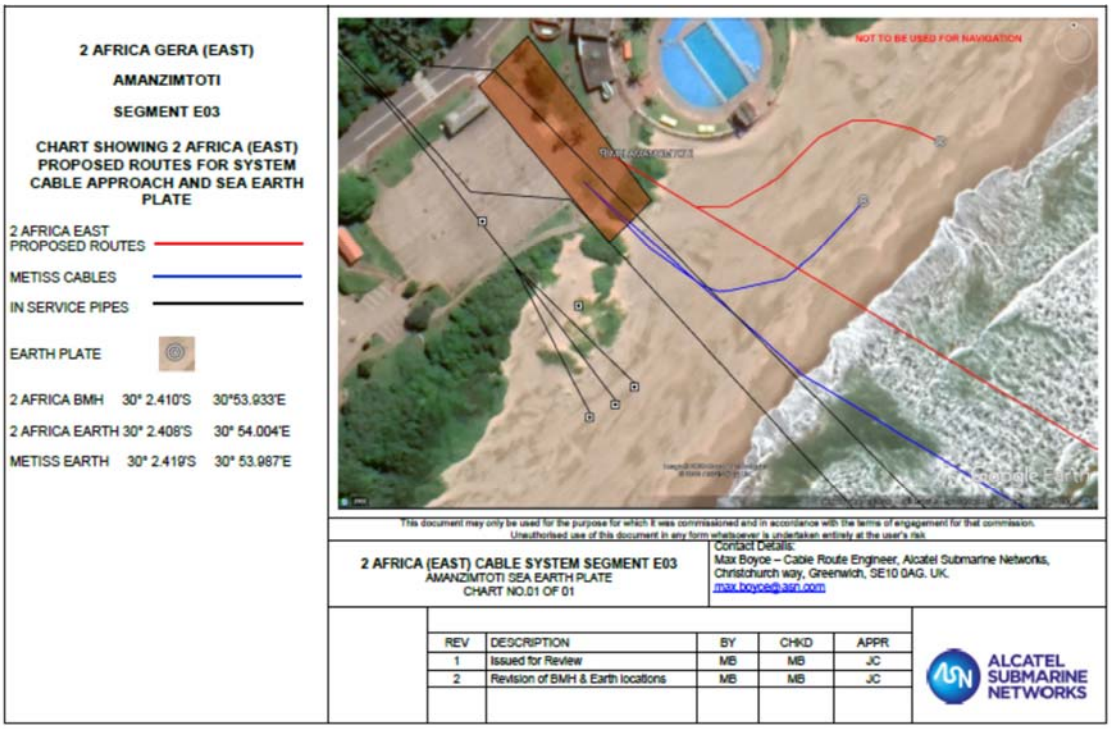


Figure 6 Approximate position of the sea earth cable and sea earth plate (System Earth) for the proposed proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing)

In the near shore zone (generally in waters less than 9m in depth) external protective measures such as articulated split pipes will be installed around the cable to guard against damage due to the following:

- Surf zone wave action.
- Small vessel anchoring.
- Nearshore currents and tidal ebb and flow.

Using articulated pipe in the near shore environment increases cable protection against chafing by providing an additional physical barrier of protection against external forces. Articulated pipe (Plate 9) is usually made of cast iron and the additional weight it provides to the cable aids in stabilising the cable and in maintaining cable burial depth where that is possible. Standard practice is to apply articulated pipe to beyond the surf zone, however, at landings where burial may prove difficult, articulated pipe can be extended further offshore.

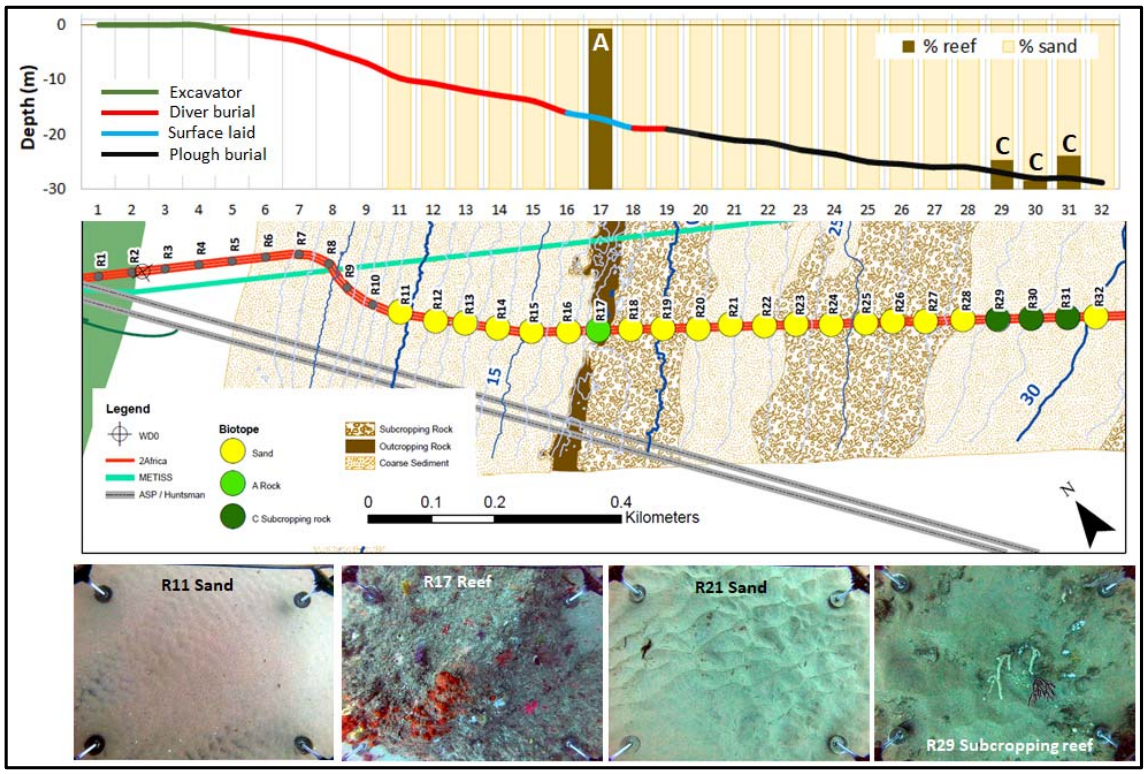


Figure 7 **Anticipated cable burial methods across the three habitat types along the nearshore cable alignment based on cable survey data (Fugro, 2020) and visual observations by Aquatic Ecosystem Services (2021). Proposed cable burial methods are colour coded along the depth chart (Source: Aquatic Ecosystem Services, 2021)**

Plate 9 **Articulated pipe sections which are installed around the cable in shallow water to offer additional protection**

4.2.4 Horizontal Directional Drilling

For the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing), HDD will be used from the BMH, under the dune to approximately 30 m seawards. HDD is a method of installing underground pipelines, cables, and service conduits through trenchless methods. It involves the use of a directional drilling machine, and associated attachments, to accurately drill along the chosen bore path and back ream the required pipe. Directional drilling is typically a three-stage process, which is described below. Note however, that for this particular cable installation, it is anticipated that due to unconsolidated material on site, thrust boring (rod pushing/micro tunnelling) will be used, which does not require bentonite.

Stage 1
The first stage consists of drilling a small diameter pilot hole. Drilling fluid is pumped through the drill pipe to the drill bit where high-pressure jets and the bit will grind the soils ahead of the drill stem. The drilling fluid will also carry the cuttings back to the entrance pit at the drill rig. Tracking of the pilot hole can be done in several ways depending on the size and complexity of the shot. Smaller shots are done using a walkover guidance system whereas the larger more complex shots have a wire line magnetics type system. With both methods there is a transmitter or steering tool located near the drill head which sends a signal to the location engineer giving the exact coordinates of the drill stem. Readings are constantly taken which check the depth, alignment and percent slope of the drill head.

Stage 2
The second step is to enlarge the hole to a size sufficient to safely install the 2AFRICA/GERA (East) Cable System. A reamer is pulled back and rotated while pumping drilling fluid to cut and remove solids to enlarge the hole. Pre-reaming speeds will vary depending on existing soil conditions and the amount of cuttings that are removed from the hole. Bentonite and other additives will be used to ensure a clean and stable hole. Bentonite is used to create a “cake layer” around the outside of the hole during pre-reaming. This will help with the stability of the bore hole and with fluid loss or infiltration.

Stage 3
The final step is to remove the drilling head and pipe from the hole and to install the 2AFRICA/GERA (East) Cable System

HDD is a minimally intrusive construction method for installing underground utilities and pipelines. Today, HDD is becoming widely accepted as a cost-effective alternative to traditional open-cut construction and is considered environmentally friendly, as long as appropriate working standards are maintained.

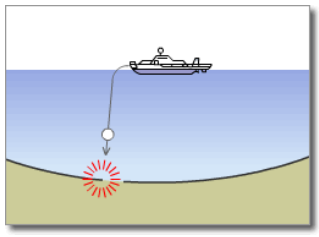
When HDD is undertaken, a drilling fluid is required to facilitate movement of the drilling head and pipe through the hole. Bentonite is commonly used as a drilling fluid as it is water absorptive and helps seal the sides of the hole. Bentonite is a nontoxic material which can also be used for the removal of toxic chemicals from the environment, the reduction of contamination, spread in soil, water, and air, as well as, typically, in the sealing of landfills. Bentonite can also be used in environmental engineering, where it is widely used in water and wastewater treatment technologies to absorb various types of contaminants.

Due to unconsolidated sediments on site (beach sand) and the short drilling length required, the method employed will be to simply push the drill boring rods pipes through the sediment without the need for of drilling fluid.

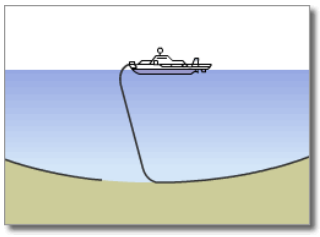
4.2.5 Post construction maintenance of the cable

Once installed, marine telecommunications cables generally require little to no maintenance if the cable is not damaged by natural disasters (underwater landslides, earthquakes, etc.) or through human activities (fishing trawlers, anchors, etc.). If the cable is damaged, a cable repair ship is dispatched to repair the cable fault (Plate 10), which usually entails the following:

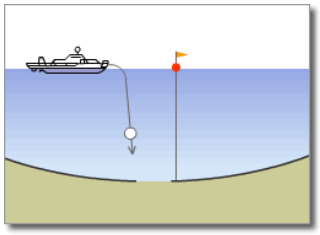
- ❑ Localization of the cable failure point and recovery of the failed cable section onto the ship.
- ❑ Cutting and removal of the cable failure section and then joining the recovered cable to the new cable section on board the ship.
- ❑ Testing of the cable followed by reburial of the cable on the exact same alignment.

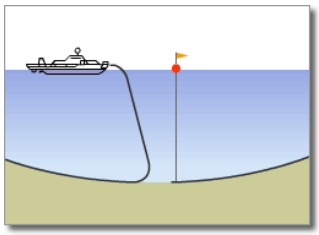


The cable ship is navigated to the location by a Differential GPS (DGPS). Once the fault is located, a cable cutting tool attached to the rope is paid out to the seabed. This tool and grapnel (Cable Catch) are then used to hook the cable before cutting the cable.

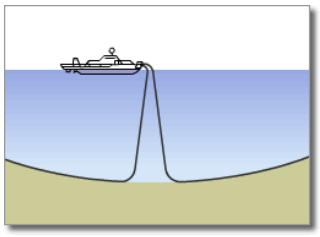


Once cut, the cable is recovered to the ship (Cable Recovery). Once on board the cable is tested to find the fault and that section of cable is removed. The cable is then waterproofed and dropped back to the sea floor attached to a buoy.





The same procedure is then carried out on the other section of cable still on the sea floor.



Once both sides of the fault have been repaired, the cables are once again bought up to the ship where a new section of cable is joined to the cable sections. Once completed the cable is placed back onto its original alignment and if necessary reburied.

Plate 10 Protocol for repairing cable faults to marine telecommunications cables
(Source: http://www.k-kcs.co.jp/english/solutionRepairingMethod.html)

4.2.6 Cables in operation – life cycle analysis

A life cycle analysis study suggests that over a typical operational lifetime of 25 years (manufacture-to-decommissioning)[20] the main environmental impacts of a cable system are carbon emissions emanating from power consumption at the terminal station (chiefly related to air conditioning and powering of the terminal equipment); and b) vessel transits for cable maintenance.

"The results show that the use and maintenance phase clearly dominate all impact categories at an average of 66 percent. By comparison, the raw materials and design and manufacturing phases account for, on average, only 6 percent of the total potential impact.

This clearly highlights that the greatest impact over the life cycle of a submarine cable system comes from the use and maintenance activities. Namely, electricity use at the terminal to power the terminal equipment and the combustion of marine fuel during cable maintenance with purpose-built ships."

4.3 Terrestrial components and installation methods

4.3.1 Beach Manhole

A BMH is typically an underground chamber made of reinforced concrete, with the approximate dimensions: 3m (length) x 1.8 m (height) x 2m (width) (Figure 8). It usually houses 4 cable ducts (two spare for future use). Once complete, the only visible sign of the structure is the manhole covers and cement roof slab which will cause minimal interference with vehicle movement or other activities. Plate 11 shows an example of a BMH during construction and becoming operational. Once the fibre optic cable has made landfall and been buried through the beach section of the cable alignment, it will be anchored to a BMH located at Pipeline Beach carpark (Alternative 3 being the preferred option) (Figure 9a). Figure 9b indicates the width of the assessed corridor for the beach crossing as 50 m either side of the cable.

[20] Donavan, 2009. "Twenty thousand leagues under the sea: A life cycle assessment of fibre optic submarine cable systems".

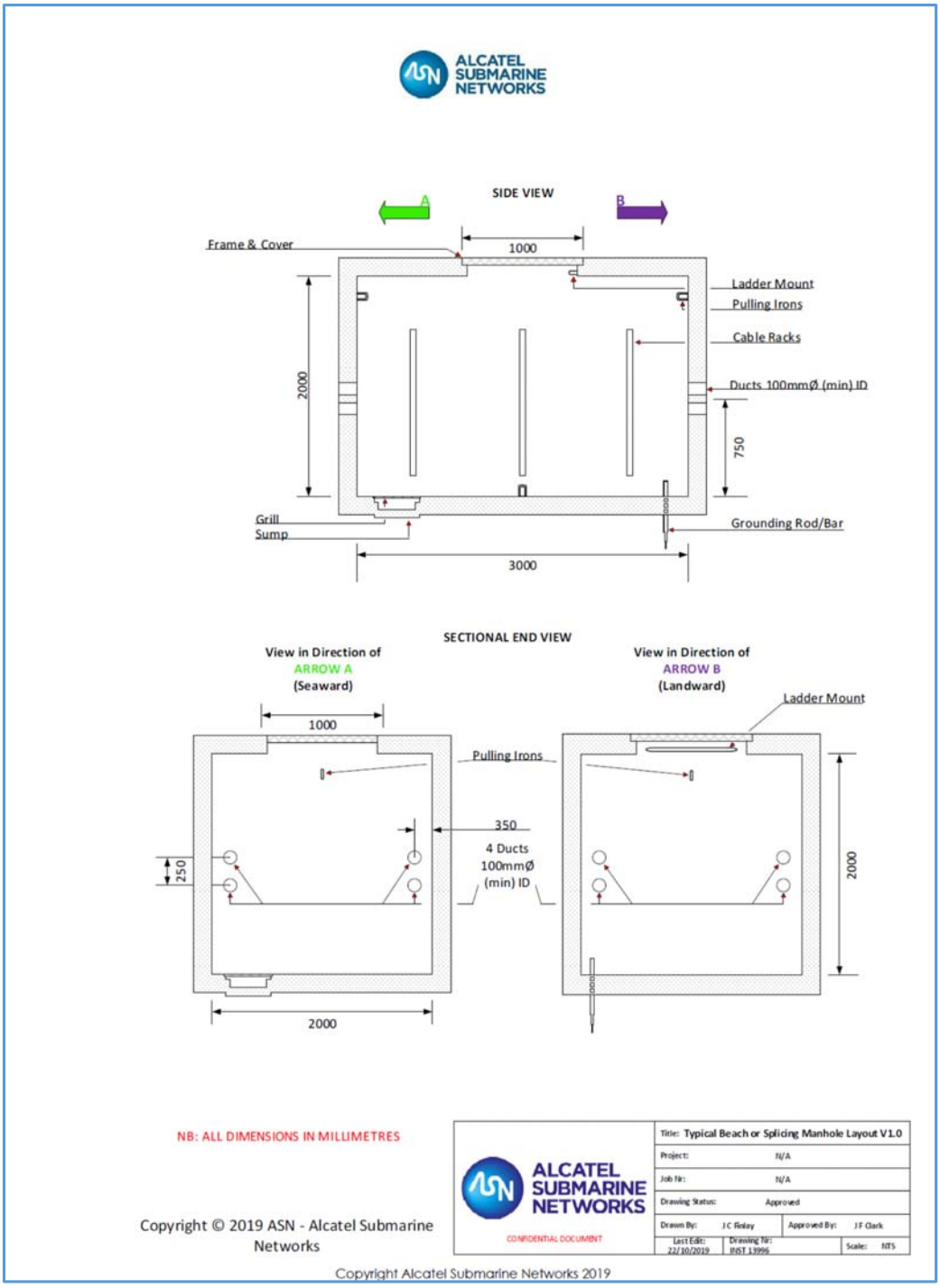


Figure 8 Typical Layout of a Beach Manhole (ASN, 2019)

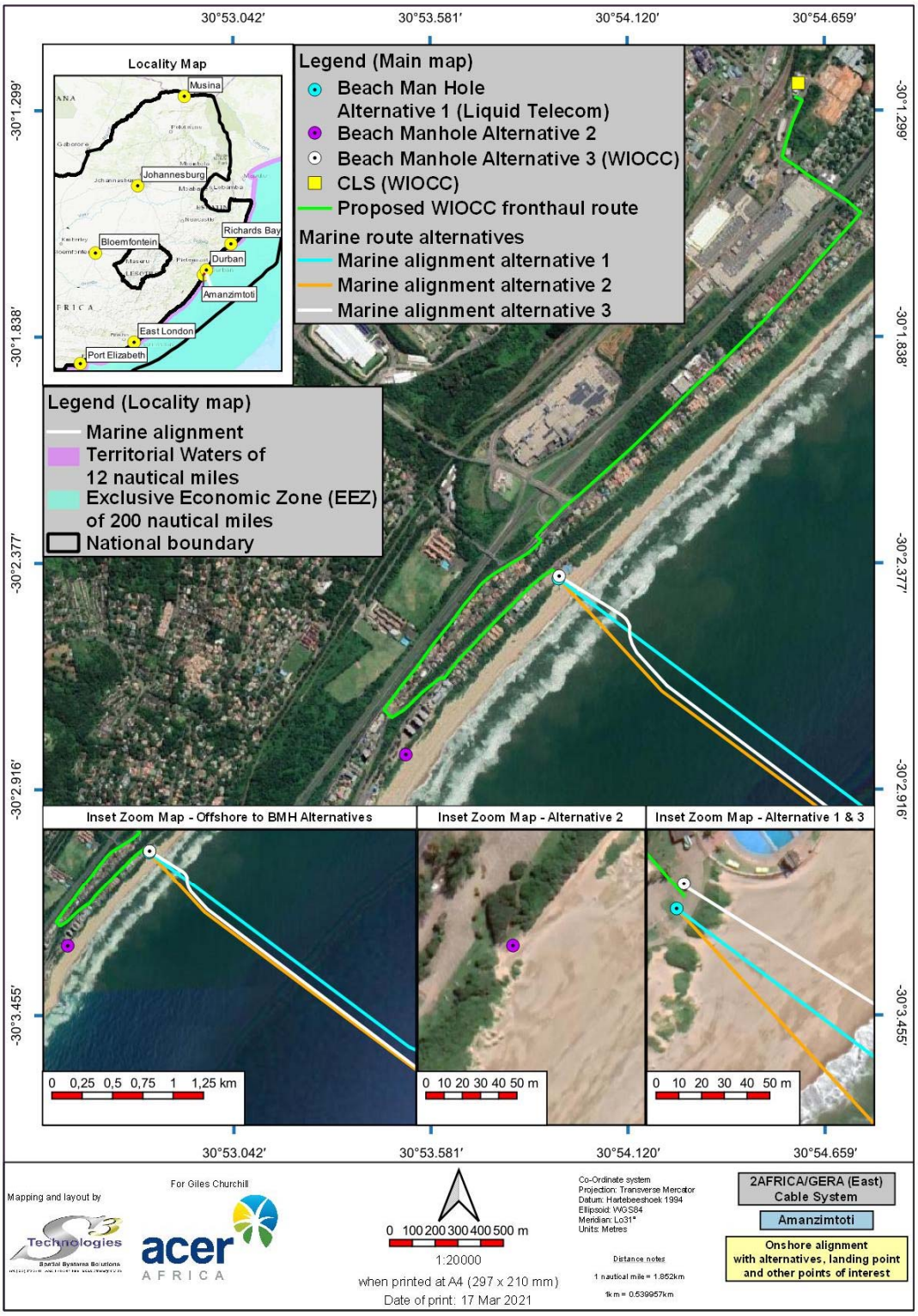


Figure 9a **Project components and alternatives investigated for the 2AFRICA/GERA (East) Cable System (Amanzimtoti Landing) (note that BMH 3 and Marine Alignment 3 are the preferred options)**




Plate 1 **Example of a BMH during and after construction (top); cable ducting to the CLS (bottom left) and fibre-optic cable being pulled through once landed (bottom right)**

4.3.2 Cable ducting from BMH to CLS

From the BMH, a trench line will be dug to house the PVC ducts to the CLS. 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 cable route, approximately 5,0 km in length (as shown in Figure 9a), will be routed within road reserve along Beach Road to the intersection with Kingsway. It will then follow Kingsway to Oppenheimer Road, and thence into Arbour Road to the CLS. The width of the trench will be no wider than reasonably necessary for the execution of the work (approx.1 m); however the construction footprint assessed is 5 m either side of the cable (Figure 9b).

From the BMH to the CLS, new manholes will be constructed along the proposed cable alignment which will be located within existing road reserves. Driveways (paved and concrete), tarred roads and grassed verges will be crossed and will require reinstatement post-installation.

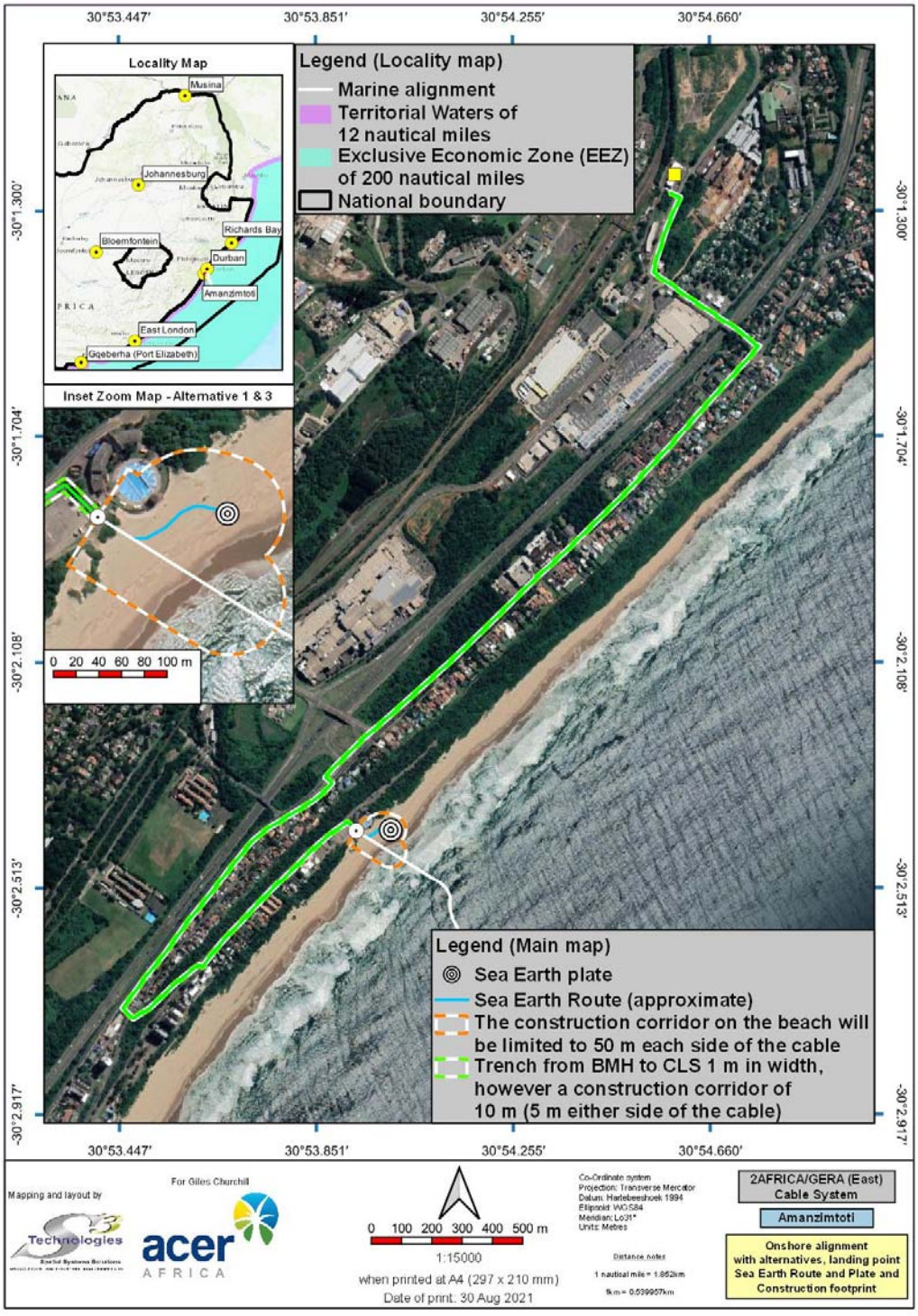


Figure 9b 2AFRICA/GERA (East) Cable System (Amanzimtoti Landing) land cable route and beach crossing, with corridor widths indicated

4.3.3 Cable Landing Station

A CLS is a building that functions as a control centre for the subsea cable system and where the system is connected to the domestic telecommunication network. The cable landing at Amanzimtoti will connect to the network via a new CLS to be established within an existing building located in Arbour Road, Umbogintwini, just inland of the N2 (Plate 12 and also see Figure 9b).

Plate 12 WIOCC's Cable Landing Station building at Umbogintwini

4.4 General activities on land during installation

4.4.1 Beach access, site access, roads, private property and other services/wayleaves

The landing site and area between the BMH and CLS are all accessible via tarred public roads. Access to the beach will be from the public beach carpark(s). Permission to work on the beach and beachfront area, including any temporary closure or restriction of public access will be prearranged with eThekwini prior to construction. Alternative access will be provided should any (temporary) public or private road closures or pedestrian access to the beach be required.

Vehicle access to the beach is available via the pathway in front of Liquid Telecom's BMH. Permits to drive on the beach will be applied for and obtained at the local beach office as well as from the ORV permitting office of the DFFE:OC.

Trenching will affect pavements, verges and roads. Where major roads need to be crossed by the cable, HDD may be employed to install the cable. This will allow the cable to be installed without disrupting traffic and road users.

Since it is a densely populated urban area, land-based services and infrastructure above or below ground, e.g. telecommunications cables, electricity cables, stormwater and sewage infrastructure, signage and lighting will be identified by WIOCC and eThekwini to ensure they are accommodated by the 2AFRICA cable servitude and that risk of damage to these facilities is avoided.

If the cable alignment is installed within the road reserve, some impacts on private property and driveways are anticipated. Where possible, these will be avoided but if trenching results in damage to private properties along the cable alignment this damage will be recorded, and the areas affected be reinstated to what is currently in place. Prior to construction commencing, the appointed contractor and WIOCC will notify all surrounding landowners of the construction activities to take place and the scheduling thereof.

4.4.2 Parking of plant/equipment and stockpile area

WIOCC's appointed sub-contractor will negotiate with the eThekwini Municipality regarding parking of machinery and storage of materials at the carpark near the site, for the shore end operations. Security will need to be provided.

4.4.3 Water use

Municipal water supply is available close to the site, on eThekwini's premises. During construction, the Contractor may bring his own water to site in a water tanker, for construction activities.

4.4.4 Effluent management

The project is not expected to generate effluent, other than domestic waste. It is likely that ready-mix cement or pre-cast will be used for concrete structures, rather than mixing of cement on site. Chemical toilets will be provided for construction workers. These chemical toilets will be serviced by an appointed service provider and all waste will be disposed at a licensed waste treatment works within the area.

4.4.5 Storm water management

The proposed development should not have any impact on storm water once construction is completed. During construction, however, the appointed contractor will take cognisance that eThekwini does have storm water structures within the project area and damage to these structures must be avoided during construction. While trenching of the cable alignment is underway, stockpiles of soil will be located outside any storm water drains to prevent the wash away of material and siltation of downstream habitats.

4.4.6 Solid waste management

Little waste is expected to be generated on site and will be limited to litter and material off cuts. It is envisaged that a skip will be hired for the duration of the installation period, where all waste will be stored. Disposal will be undertaken by an appointed service provider, in separate waste streams where possible and to authorised waste disposal sites.

Note that reclaimed cable from the seabed will be disposed of in accordance with the International Convention for the Prevention of Pollution from Ships (MARPOL). MARPOL is the main international convention covering prevention of pollution of the marine environment by ships from operational or accidental causes.

4.4.7 Noise

The use of a HDD rig, excavators and construction vehicles will increase noise levels on site during the shore landing period, however this will be temporary and of short duration. Ambient noise levels along the road and on the beach are generally high and therefore additional noise during construction is not anticipated to cause significant disturbance.

4.4.8 Job creation and procurement

Specific skills are required for the cable landing activities and the land-based work will be of short duration. Therefore, for the landing, the use of unskilled, local labour will be limited. The construction of the BMH, trenching and installation of ducting to the CLS is anticipated to benefit local SMMEs with a limited number of temporary jobs or a 30% value of the works. SMMEs will be offered part of the backhaul work provided they are compliant with respect to Health and Safety. A tender process will be set up for work available to SMMEs.

4.4.9 Anticipated construction dates and programme

WIOCC intends to have the cable installed at Amanzimtoti and operational by the last quarter of 2022. However, the landing of the cable is entirely dependent on receiving a positive environmental authorisation from DEFF. Only when the environmental authorisation process is nearing completion, will the project proponent be able to realistically set dates for project implementation.

Construction of the BMH and associated trenching from the BMH to the CLS site is anticipated to take place prior to landing of the cable and will take approximately 3 – 6 months to complete. It is anticipated that the actual landing of the cable at Amanzimtoti and its installation will take less than two weeks to complete (the main work of landing the cable from the vessel should be completed in one day; thereafter the shore-end team will fix the articulated pipe on the cable and bury it in the near-shore waters).

Scheduling is critical in that the purpose-built ship needs to run on a strict and coordinated schedule, enabling it to sequentially implement the various landings as it moves around the African continent. Once the cable laying ship has commenced, at a significant daily cost, the project cannot afford for the ship to stand idle or to double back on account of administrative or other avoidable delays to the scheduled cable landings.

4.4.10 Decommissioning

Submarine Cables are designed to have a lifespan of 25 years. With fibre optic cables implemented in the last 20 years or so, it is normally possible to increase capacity during the cable's lifetime by modifying the land based parts of the system to provide significant increases in speed (in many cases to hundreds of times the original installed capacity). This means that many old cables that might have once been taken out of service and replaced with a new more capable cable are actually reused *in situ*. In some cases, it is possible to re-use a cable in a different place, or to leave the cable in place and re-purpose it for scientific research (https://www.quora.com/What-happens-to-decommissioned-undersea-communication-cables-Are-they-left-in-place-or-removed-for-scrap)

If cables are removed, recovery is assumed to be the exact opposite of the installation process (Donavon, 2009) and therefore will have the same impacts as discussed in Chapter 10.

Decommissioning of the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) in the near future is unlikely, given the current growth in the telecommunications sector within South Africa. If and when decommissioning takes place, all activities would be subject to legislation relevant at the time.

5 PROJECT ALTERNATIVES

Alternatives are different means of achieving the purpose and need of a proposed development and include alternative sites, layouts or designs, technologies and the "no development" or "no go" alternative. This chapter describes the various alternatives applicable to the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing).

5.1 Landing alternatives (East Coast of South Africa)

The landing point is primarily selected by the landing party and is based on developing robust communication networks by improving the country's infrastructure. The location selection is driven by available existing networks to be connected and the ability to safely land a submarine cable. General strategic considerations include:

- Proximity to existing terrestrial telecommunications infrastructure for housing of equipment; and services such as power, sewerage, and water.
- Proximity to risk factors such as offshore explosives dumping grounds, busy shipping areas, fishing and trawling areas.
- Proximity to risk factors on land.
- Proximity to sensitive or protected areas such as marine reserves, coastal dunes, or sensitive ecosystems.
- Level of worker health and safety risk during installation and operation.
- Government permitting and approval processes.

On the east coast of South Africa, Mtunzini and Amanzimtoti, due to their favorable characteristics, are currently already used as landing points for other subsea cables. Amanzimtoti was selected as one of the east coast landing points for the 2AFRICA/GERA (East) Cable System, primarily for the following reasons:

- Location and access to Durban which is a central hub for technical and telecom/communication services.
- Landing is suitable for submarine cable, viz. no hard seabed, no major dune crossings, very short beach area to cross, pro-grading beach, low vessel traffic, low risk from external aggression such as anchoring of heavy vessels, fishing, trawling. No military exclusion zones, known/confirmed oil fields, or major pipeline or other crossings. The fronthaul is relatively short, with no major risk factors on land.
- Cables landing at or very close to each other (in this case, the METISS cable) are of benefit, as system operators can monitor multiple cable security.

This report deals only with the Amanzimtoti landing point. The other landing point on the East Coast of South Africa is Gqeberha (Port Elizabeth), which is undergoing a separate impact assessment process. The terminal station of the 2AFRICA/GERA (East) Cable System makes landfall on the West Coast of South Africa at Duynefontein which is also undergoing a separate impact assessment process.

5.2 BMH site alternatives at Amanzimtoti

As described in the FSR, three sites for a BMH on the beach at Amanzimtoti were initially screened by the project team (see Figure 9 and Plate 13), with two taken forward for assessment in this EIA, viz. BMH Site Alternatives 2 and 3, as described below. BMH Site Alternative 1 was the initial preferred option, as it proposed to use the existing BMH at Amanzimtoti Pipeline Beach, currently housing the METISS cable. This as would have resulted in the least additional disturbance to the environment. However, negotiations to share the infrastructure, were unsuccessful.

- **BMH Site Alternative 2 (30°02.834'S; 30°53.513'E)**: This site is located at the Amanzimtoti Main Beach in front of the Main Beach carpark, south of the Strandborg Holiday Flats and north of Splash World[21], the beach swimming pool and Nyoni Rocks. It is situated approximately 1 km south of Alternatives 1 and 2. It would require trenching across the beach and the installation of a sea earth plate, as well as the construction of a new BMH at the sea edge of the carpark (Plate 13). From the BMH, Alternative 2 will link up to a new CLS via new ducting (the option of linking into Liquid Telecom's ducting to their existing CLS is no longer an available option). Overall, this site is not preferred compared with Amanzimtoti Pipeline Beach, as it is a busier public beach, there is a possibility of rock outcropping and a greater possibility of damage to the foredunes as well as existing infrastructure (beach pathways, etc.).

- **BMH Site Alternative 3 (Preferred option) (30° 2.409'S 30° 53.933'E):** This site is located at Amanzimtoti Pipeline Beach, approximately 10 m north of Liquid Telecom's existing BMH (Plate 13). This site has been selected as the current preferred option, given the more favourable conditions at Amanzimtoti Pipeline Beach over Main Beach. BMH Site Alternative 3 will require trenching across the beach and the installation of a sea earth plate, as well as the construction of a new BMH at the sea edge of the carpark. It will be routed on the north side of the existing METISS cable. Horizontal Directional Drilling will be undertaken so as not to disturb the surface of the site (from the BMH approximately 15m seawards). The cable will connect to the new WIOCC CLS via new cable ducting (ducting may share a servitude with Liquid Telecom's cable ducting, where space constraints dictate).

[21] Splash World is a recreational water slide park.

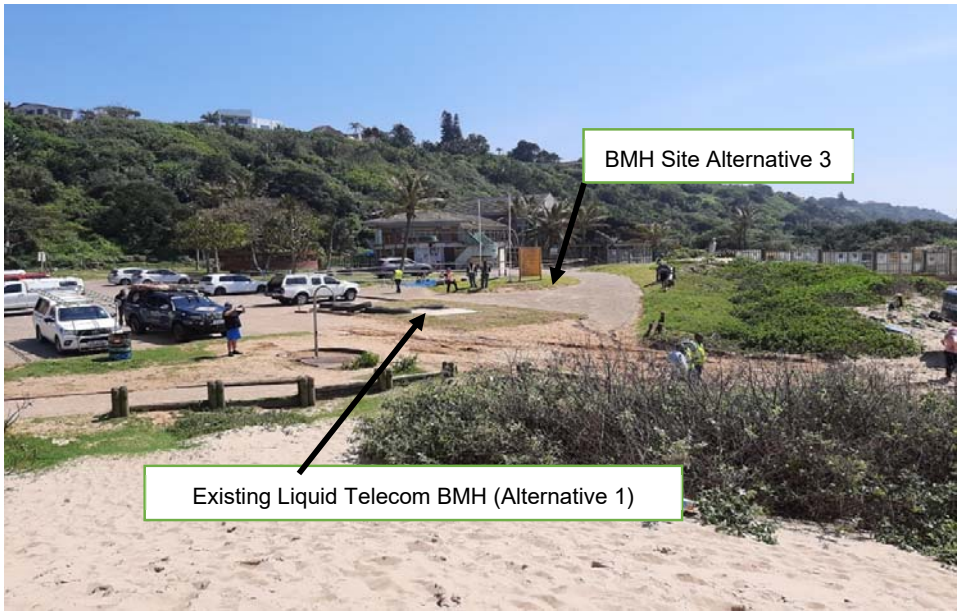


Plate 2 **BMH Site Alternatives Top - BMH Site Alternative 2 at Amanzimtoti Main Beach carpark; Bottom - BMH Site Alternative 3 approximately 10 m to the north of the Liquid Telecom BMH Alternative 1[22]**

[22] The Existing Liquid Telecom BMH (Alternative 1) was ruled out early in the assessment as contractual agreements could not be concluded by the system operators on the sharing of the BMH. Additionally, WIOCC considered the sharing of a single BMH as an added risk to the 2AFRICA/GERA (East) Cable System.

5.3 Terrestrial cable alignment alternatives

The 2 AFRICA cable between the BMH and CLS will follow a similar route to the METISS cable, however extending further north to reach the WIOCC CLS at Arbour Road, Umbogintwini, as shown in Figure 9a and Figure 9b. No other routes are proposed, as the route has been selected to avoid coastal dune forest vegetation and minimises impacts on any other natural habitat in the area by being aligned within the existing road reserves and transformed areas.

5.4 Beach burial alternatives

Sand depths and conditions at Amanzimtoti beach are suitable for cable burial by excavating a trench across the entire beach to the BMH. However, to minimise impacts on dune vegetation, HDD will be used over a short section of the alignment underneath the dune to the BMH.

5.5 Marine cable alignment alternatives

As described in the Scoping Report (ACER, 2021) many factors influenced the selection of the cable alignment for the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing). These included proximity to other cables, avoidance of high intensity fishing and anchoring areas, avoidance of unfavourable seabed bathymetry and physical obstacles on the seabed, conditions for cable burial, currents[23] and avoidance of sensitive ecosystems and MPAs. Three alternatives were considered during Scoping. From a cable engineering perspective the original preferred alignment was Marine Route Alternative 2. However, this intersected with the northern edge of the Aliwal Shoal MPA, and was not supported by EKZNW. The alignment was therefore shifted northwards to avoid this MPA and Marine Route Alternative 3 taken forward as the final alignment (Figure 10). The width of the assessed corridor is 250 m either side of the cable

The nearshore section of the cable alignment has also been further fine-tuned to consider, in particular:

- Minimise intersection with rock outcropping (rocky reefs).
- Avoidance of the AECI offshore pipelines.
- Minimising impact on AECI benthic sampling area in the vicinity of the AECI offshore pipelines.
- Minimise impact on the existing METISS cable.
- Avoidance of known shipwrecks (including the *Griqualand* considered dangerous due to its cargo of liquid chlorine).
- Minimise impact on known trawling grounds.

[23] By carefully selecting the direction of the cable route, the impact of seabed currents can be reduced by ensuring the cable is at an as oblique angle as possible to the prevailing current flow, because the more perpendicular the cable is to the current flow, the more exposed the cable it is to abrasion/damage. (Similarly, abrasion to rocky reefs can be minimised by careful alignment in relation to the current).

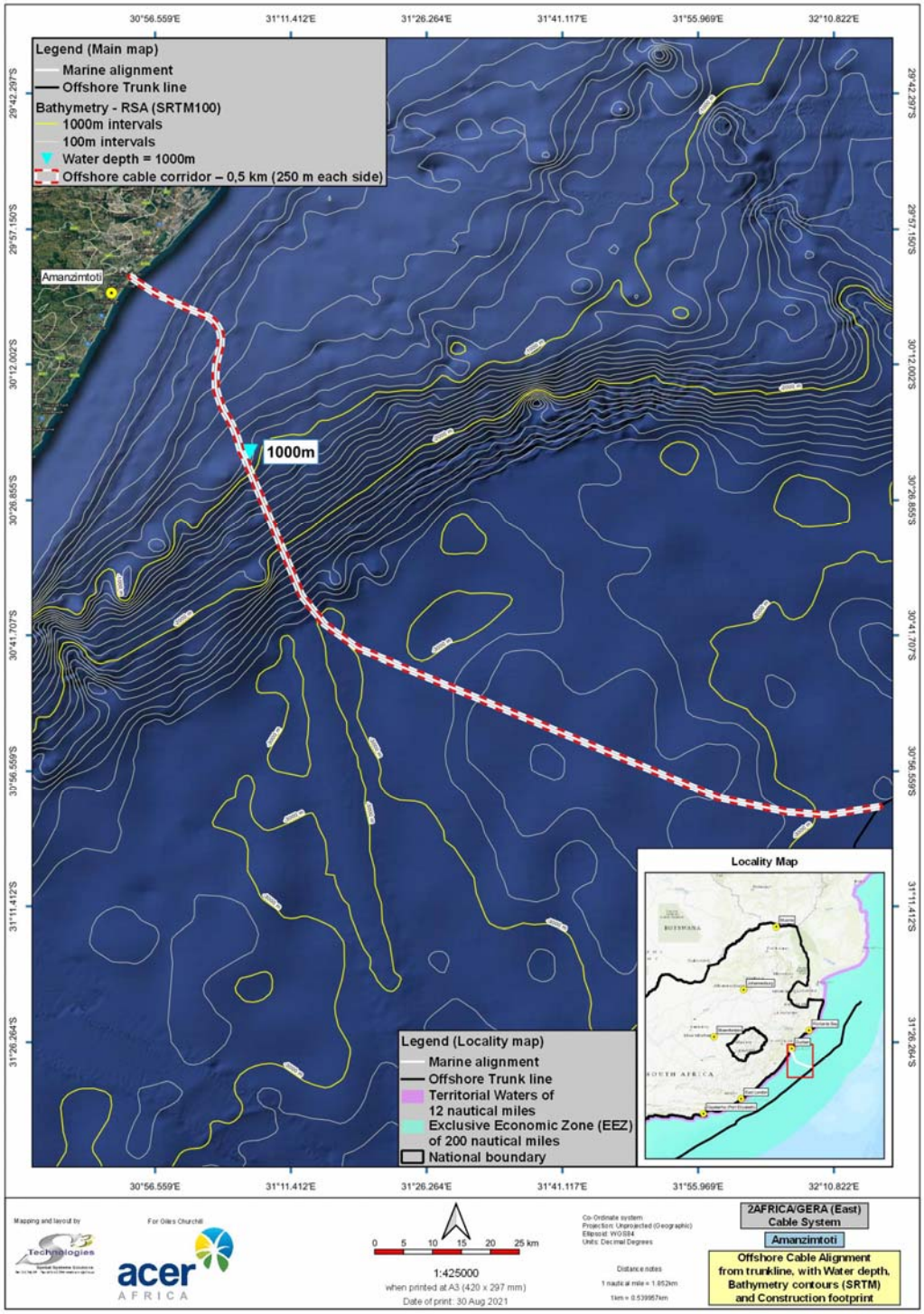


Figure 10 Alignment of the 2AFRICA/GERA (East) Cable System branch line to Amanzimtoti, showing bathymetric contours and water depths relative to 1000 m

5.6 Nearshore burial method alternatives through area of contaminated sediments

Concerns have been raised regarding the burial of the cable through the area of contamination north/northeast of the marine outfall pipelines (Refer to Section 6.1.8, 6.1.9, 9.4.3 and 9.5.3 for further detail). Sediments around the outfall are monitored through a regular sampling program co-ordinated by AECI property services (APS). The main concerns revolve around the following:

- Current sampling by APS is done by grab buckets to a depth of 30 cm. However, the toxic properties of the sediment below this depth are unknown. The cable burial could potentially disperse these deeper sediments, with a possible remobilisation of toxins from these deeper sediments into the water column, with potential negative impacts on marine and benthic communities within the area.
- Should unforeseen impacts occur as a result of remobilisation of toxic sediments, APS has raised the concern that the proposed cable installation could impact on their current discharge permit[24].
- Should the cable be laid on the surface (to avoid disturbing deeper sediments) the possibility exists during sampling for the grab bucket to snag the cable, as the bucket takes sediment samples down to a depth of 30 cm. The cable will also be vulnerable to other possible snagging and damage, e.g. by small boat anchors.

Generally, at depths less than 1,000 m, the cable will be buried beneath the sandy seabed. This is typically achieved with the use of a specially designed plough, which is submerged onto the seabed by the cable laying ship (https://www.youtube.com/watch?v=SXRG5rpYUP4).

The cable will be fed from the ship to the plough which then feeds the cable into the trench created by the ploughshare. Effectively, the ploughing involves the ploughshare cutting through the sediment to a depth of 2 m through which the cable is fed (plough shear has a width of 20 cm) by pushing the sediment apart. Once the ploughshare moves on, the sediment is simply allowed to close on itself again, burying the cable. Although water jetting is sometimes used to lubricate the ploughshare to make ploughing easier, the plough can also be operated 100% mechanically. If this takes place, there is limited disturbance to the sediment and little or no plumes are created due to slow towing speed (it will be like dragging an anchor over the seabed at a speed of 600 m/h = 10 m/min or 0.16 m/s). The only visible disturbance to the seabed will be limited to the tracks made by the plough skids and the plough scar which falls back on itself once the plough moves on. Alternatives for cable installation over the area of contamination (619 m in length, which will take approximately 1.5 hours to plough) are discussed in the sections that follow.

5.6.1 Nearshore burial Alternative 1

Undertake cable burial as planned to a depth of 2.0 m, with use of the water jet system. Use of the water jet system increases the plume of suspended sediments in the water, compared with mechanical ploughing without the water jet. This alternative may result in the release of deeper sediments (for which the exact chemical properties are unknown) into the water column, with possible remobilisation of contaminants.

[24] It must be noted that DFFE have confirmed with APS that if the environmental authorisation is approved for the 2AFRICA/GERA (East) cable alignment the Department will not revoke or suspend the Coastal Waters Discharge Permit of APS due to the impacts caused by the propose Marine Telecommunication System

5.6.2 Nearshore burial Alternative 2

Undertake cable burial as planned to a depth of 2.0 m using mechanical ploughing only. This means that the water jet system which is used to lubricate the ploughshare would not be turned on, thus, limiting the potential for contaminated sediment to become suspended in the water column. The cable burial at this depth ensures that the cable cannot be snagged by the grab bucket when annual sampling of the sediments takes place and will be protected for external factors such as ship anchors or trawling gear.

5.6.3 Nearshore burial Alternative 3

Undertake cable burial to a depth of approximately 0.5 m using only mechanical ploughing. This means that the water jet system which is used to lubricate the ploughshare would not be turned on, thus, limiting the potential for contaminated sediment to become suspended in the water column. This alternative would also reduce the depth of the ploughed trench, appreciably reducing the volume of potentially contaminated sediments that are disturbed. A burial depth of 0.5 m would still provide protection from being snagged by the grab bucket when annual sampling of the sediments takes place however it would not provide the same protection to the cable from ship anchors or trawling nets when buried to the target depth of 2 m.

5.6.4 Assessment of Nearshore burial Alternatives

Of the three alternatives investigated, the near shore burial Alternative 1 is not recommended since the use of water jetting during cable burial has the potential to release and resuspend contaminated sediments from below the seafloor into the water column, thus, increasing the impacts associated with the release of contaminated sediments.

Both Alternative 2 and 3 make use of mechanical cable burial which involves the ploughshare cutting through the sediment with no water jets aiding plough burial (water jets aid in lubricating the share making it easier to cut through the sediment). For both alternatives the potential to resuspend contaminated sediments is similar as the only sediments which will be resuspended occur on the surface where the plough skid and plough shear disturb surface sediments. When considering the potential impact on the receiving environment and risks associated to the cable through shallower burial depths (anchors, fishing, etc.) it is the EAP's opinion that the Alternative 2 burial option (i.e. a target burial depth to 2 m) be selected for the following reasons:

- Aiming for a target burial depth of 2 m ensures the cable is suitably protected.
- Reduces the likelihood of cable damage from external factors during operation. This in turn reduces the likelihood of future disturbance to these contaminated sediments through cable repairs which have the potential resuspend contaminated sediments.

It must be noted that following discussions with AECI where they requested the cable be realigned or surface laid, both ASN and the EAP investigated these options which were found to be impractical for the following reasons:

- Realignment of the cable is not feasible given the existing infrastructure in the nearshore environment (offshore outfall pipelines and existing and future marine telecommunications cables).

- Surface laying of the 2AFRIC/GERA (East) Cable System poses a significant risk to the cable due to external factors (anchors, fishing, benthic sampling, etc.). The option of surface laying the cable was not considered a viable option by the cable operator as it does not meet the cable protection requirements of the 2AFRICA/GERA (East) Cable System.

5.7 Technology alternatives

Although there are a number of available telecommunication mechanisms used world-wide and in South Africa, the scale of customer demand and expectation of ever faster data transfer have made many of these inadequate or obsolete. Radio has largely been phased out due to restricted bandwidth and poor data transmission. Until more recently, Africa relied primarily on satellites with few submarine cables to provide its international communications. Satellite and microwave transmissions are unable to offer the capacity required for South Africa and other African countries to remain part of the global community in terms of communication services.

Within South Africa, fibre optic networks are currently the only available technology able to transmit sufficiently high volumes of voice and data traffic, with higher security, reliability and at a lower cost. This is the current preferred technology for meeting demand for data and voice transmission on a global scale and is one of the main reasons why the 2AFRICA/GERA (East) Cable System is based on a fibre optic network.

5.8 No development (no-go) alternative

In the context of the proposed development, the No-Go alternative would involve WIOCC not landing and installing the proposed Amanzimtoti branch cable of the 2AFRICA/GERA (EAST) Submarine Cable System. Although impacts on the marine and terrestrial environments would be avoided entirely, the anticipated benefits from the proposed submarine telecommunication cable, in line with the country's development goals, would not be realised. This needs to be understood in the context that access to affordable international bandwidth is widely recognised as being key to economic development in every country.

Communication via submarine telecommunications cables generally allows for lower cost, better performance, and greater capacity (throughput) than that available via satellites. If the No-Go alternative is selected, WIOCC and South Africa as a whole, would miss an opportunity to unlock economic development within the Country. In addition, should the No-Go alternative be selected, it would mean that WIOCC would be unable to increase their supply of international fibre-optic bandwidth and they will be unable to facilitate more affordable and effective transport of voice, data, Internet and television services to South Africa's population.

For these reasons, the No-Go alternative is not preferred.

6 DESCRIPTION OF THE RECEIVING ENVIRONMENT

A broad description of the receiving environment was provided in the Scoping Report for the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing). Where applicable, further detailed information is provided in this section, most of it sourced directly from the specialist reports contained in Appendix B, unless otherwise cited. Note that the primary literature references for the information presented in this section can be found in the corresponding specialist reports and have not been cited here.

6.1 Marine and offshore environment

6.1.1 The physical environment

6.1.1.1 Bathymetry and sediments

The orientation of the coastline along the East Coast is relatively uniform, and north-northeast trending. The coastline is divided into gentle bays by short, low headlands. The majority of the East Coast region has a narrow continental shelf and a steep continental slope. A prominent feature on the continental shelf along the KZN coast is the Thukela Bank located between 28°30' S and 30°20' S. Here the continental shelf widens to 50 km offshore, the maximum width reached along the East Coast, and the continental slope is gentler. To the south, the continental margin descends into the Natal Valley, while to the north-eastwards it develops into the Central Terrace (**Error! Reference source not found.**).

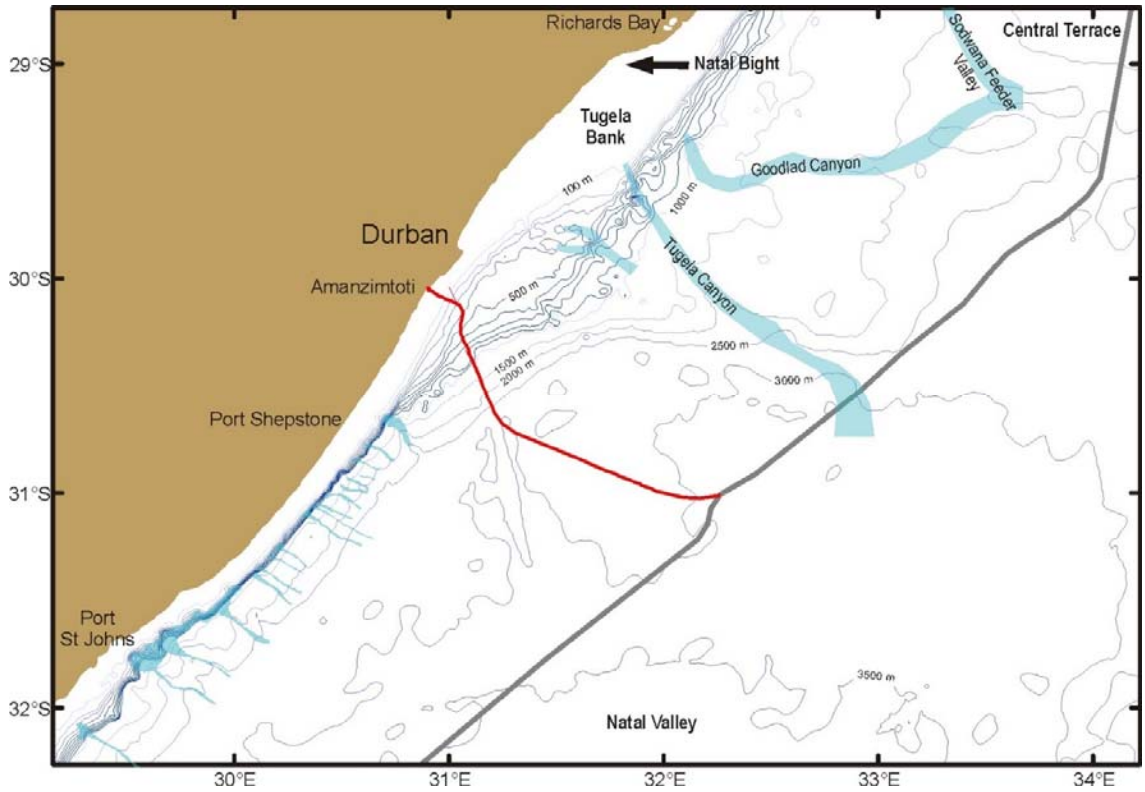


Figure 11 Map indicating proposed Amanzimtoti branch (red line) off the main trunk (grey line) of the 2AFRICA/GERA (East) Cable System in relation to bathymetry and bathymetric features off the South African East coast

The Thukela Bank (Figure 11) is the major sedimentary deposition centre of the KZN continental shelf, being characterised by fluvial deposits of Thukela River and Mgeni River origin. South of Durban, sand dominates both the inshore and offshore surficial sediments, although a substantial gravel component is present on the middle and outer shelf to as far as Port St Johns, occurring as coarse lag deposits in areas of erosion or non-deposition. The geophysical cable route planning survey undertaken by Fugro (2020) identified that the inshore portion of the cable at depths <-30 m comprised primarily coarse sediments (57%), sub-cropping reef (41%), with less than 1% being outcropping reef. Refer to Pisces, 2021 (Appendix B) for further detail.

6.1.1.2 Benthic Habitats

The seabed communities along the inshore portions (<500 m) of the proposed subsea cable route fall within the Natal photic and sub-photic biozones, which extend from the low water mark to the shelf edge. The benthic habitats of South Africa were mapped as part of the 2018 National Biodiversity Assessment (Sink *et al.,* 2019) to develop assessments of the ecosystem threat status and ecosystem protection level. The substratum and ecosystem types were subsequently mapped (**Error! Reference source not found.** and Figure 13) and assigned an ecosystem threat status based on their level of protection (Figure 14). The ecosystem threat status of the benthic habitat types beyond -300 m depth along most of the East Coast, have been rated as ‘Least Concern’ reflecting the great extent of these habitats within the South African EEZ (Sink *et al.,* 2019) (Figure 14). However, in the coastal zone and on the shelf of the project area, the Natal Delagoa Intermediate Sandy Shore and Southern KZN Shelf Edge Mosaic ecosystem types are considered ‘Near Threatened’, whereas the Southern KZN Inner Shelf Mosaic and Southern KZN Mid Shelf Mosaic habitats through which the cable crosses are considered ‘Endangered’. The intertidal beach at the shore crossing at Amanzimtoti is rated as ‘Near Threatened’ (Sink *et al.,* 2019).

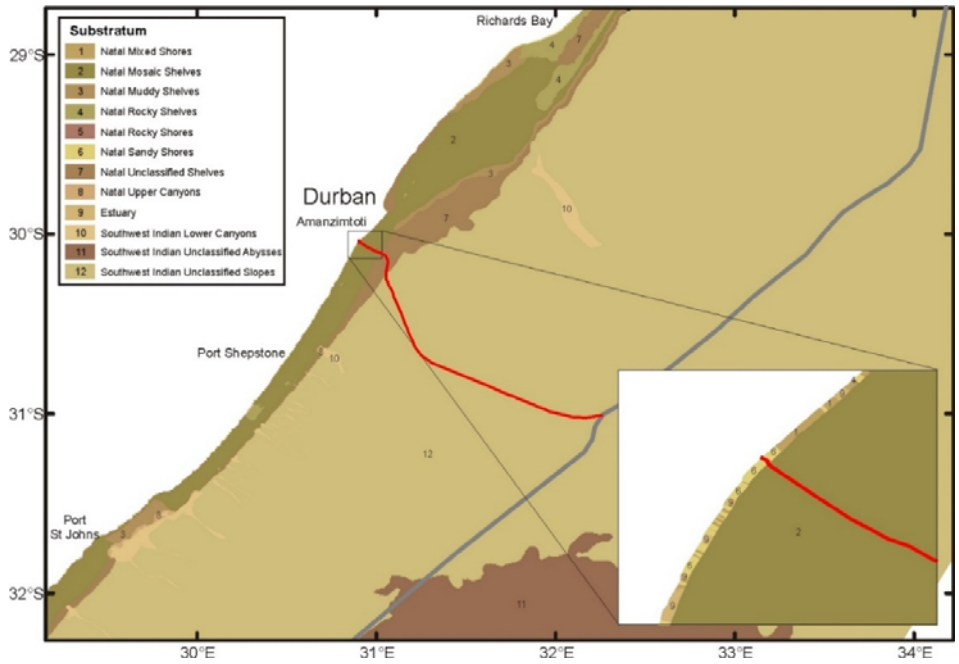


Figure 12 The proposed Amanzimtoti branch (red line) of the main trunk (grey line) of the 2AFRICA/GERA (East) Cable System in relation to coastal and offshore benthic habitat types off the South African East Coast (adapted from Sink *et al*., 2019, cited in Pisces, 2021)

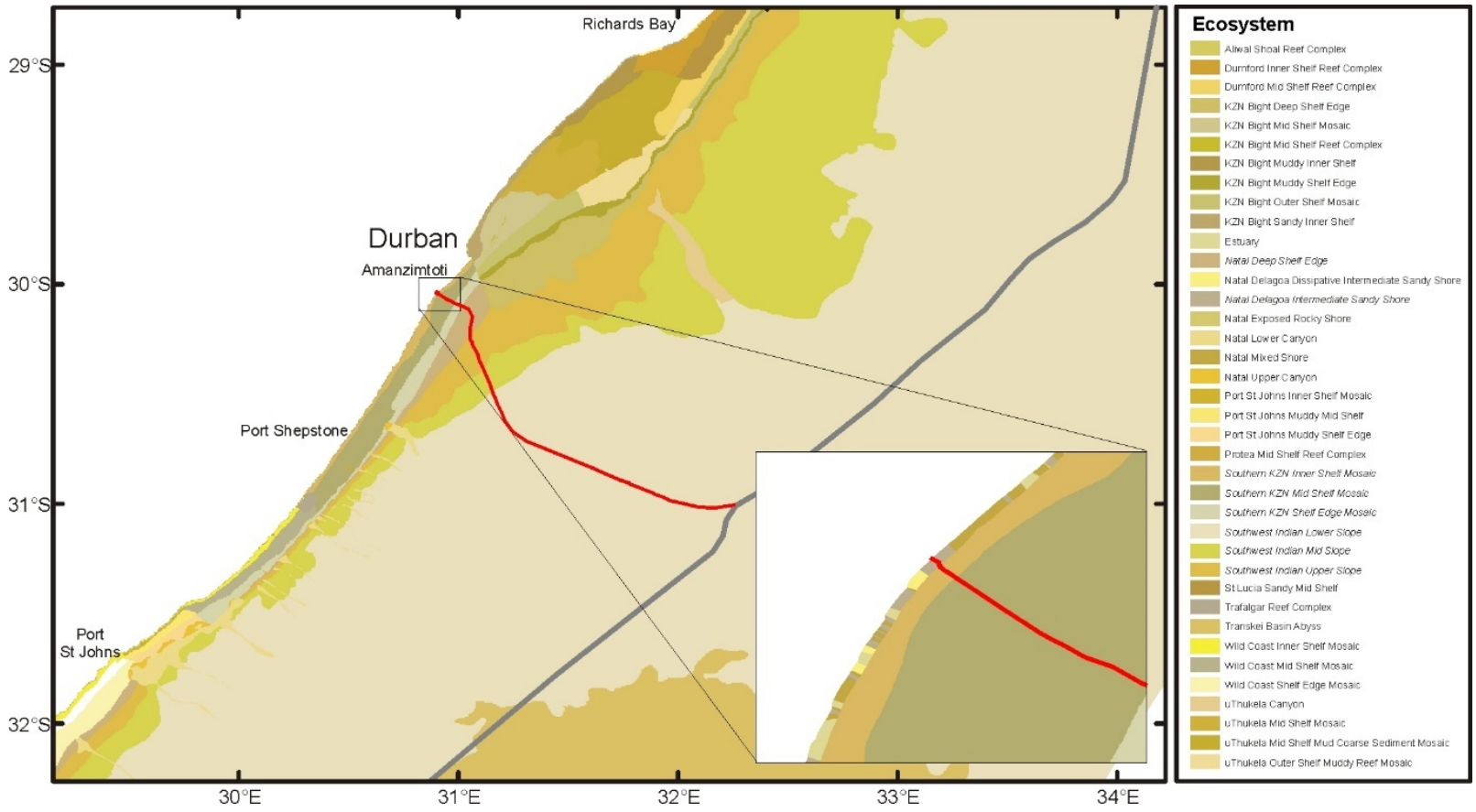


Figure 13 The proposed Amanzimtoti branch (red line) of the main trunk (grey line) of the 2AFRICA/GERA (East) Cable System in relation to the distribution of ecosystem types along the East Coast (adapted from Sink *et al*., 2019). Those ecosystem types affected by the cable are indicated in italics (Source: Pisces, 2021)

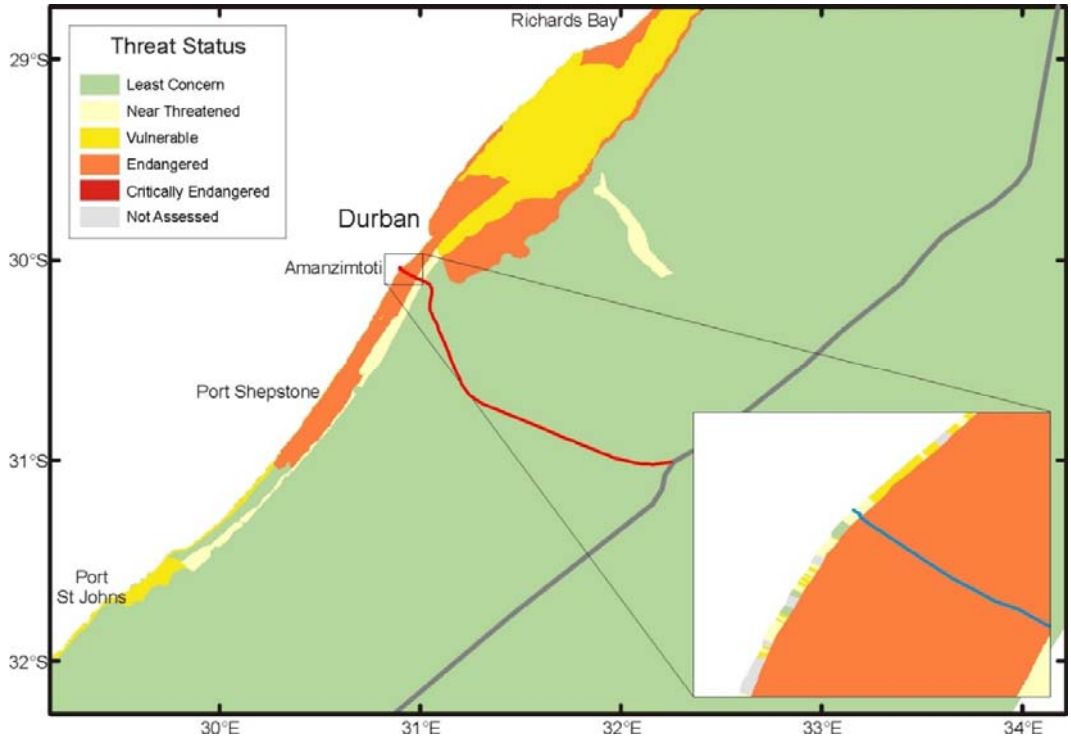


Figure 14 The proposed Amanzimtoti branch (red line) of the main trunk (black line) of the 2AFRICA/GERA (East) Cable System in relation to the ecosystem threat status for coastal and offshore benthic habitat types (adapted from Sink *et al*., 2019). The insert provides details of the threat status of intertidal habitas at the cable shore crossing (Source: Pisces, 2021)

6.1.1.3 Nearshore benthic habitats/reefs near Pipeline Beach

The shallow water (<30 m depth) section of the proposed cable alignment landing at Amanzimtoti Pipeline Beach is approximately 1,5 km from the BMH to the 30m isobath. It traverses Natal Delagoa Intermediate Sandy Shoreline (0-9 m) and then Southern KZN Inner (9-26 m) and Mid Shelf Mosaic (26 m onwards) habitat. The substrate types encountered are sub cropping rock, outcropping rock and course sediment (Figure 15). The only outcropping reef is a narrow ridge which runs parallel to the shore at approximately 17-18m water depth (Aquatic Ecosystem Services, 2021) (Appendix B).

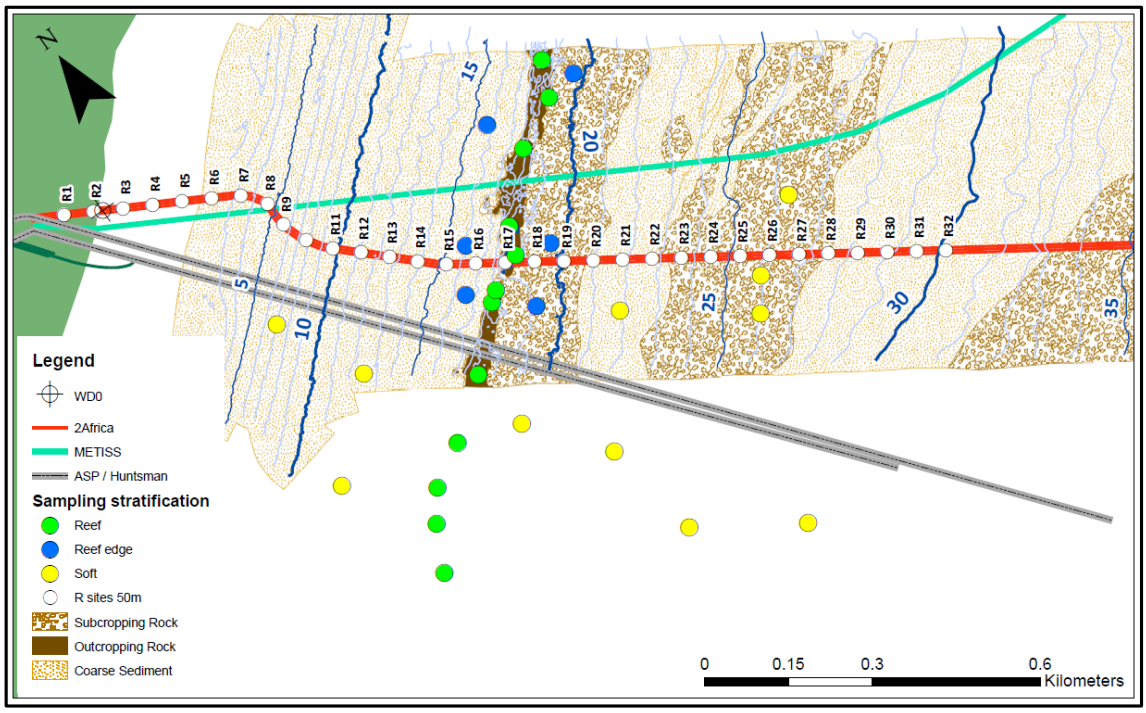


Figure 15 Substrate types along the inshore portion of the cable alignment (0-30 m water depths) (Source: Aquatic Ecosystem Services, 2021)

6.1.1.4 Large scale circulation and coastal currents

The oceanography of the East Coast is almost totally dominated by the warm Agulhas Current that flows southwards along the shelf edge (**Error! Reference source not found.**). The current forms between 25° and 30° S, its main source coming from recirculation in a South-West Indian Ocean subgyre. Further contributions to the Agulhas Current come from the Mozambique Current and the East Madagascar Current in the form of eddies that act as important perturbations to the flow. Detailed information regarding currents in the region are provided in the marine specialist report (Appendix B).

Locally, the Agulhas Current influences rainfall and climate over southern Africa and sets up the background environment for local fisheries, playing an important role in the distribution of species in the KZN region. Unlike the cooler nutrient rich waters associated with the Benguela Current, KZN waters are a typical oligotrophic[25] system with low productivity. Average sea temperatures near Amanzimtoti range between a low of 21.2°C in winter and high of 26.3°C in summer (ACER, 2021).

25 Rrelatively poor in plant nutrients and containing abundant oxygen in the deeper parts.

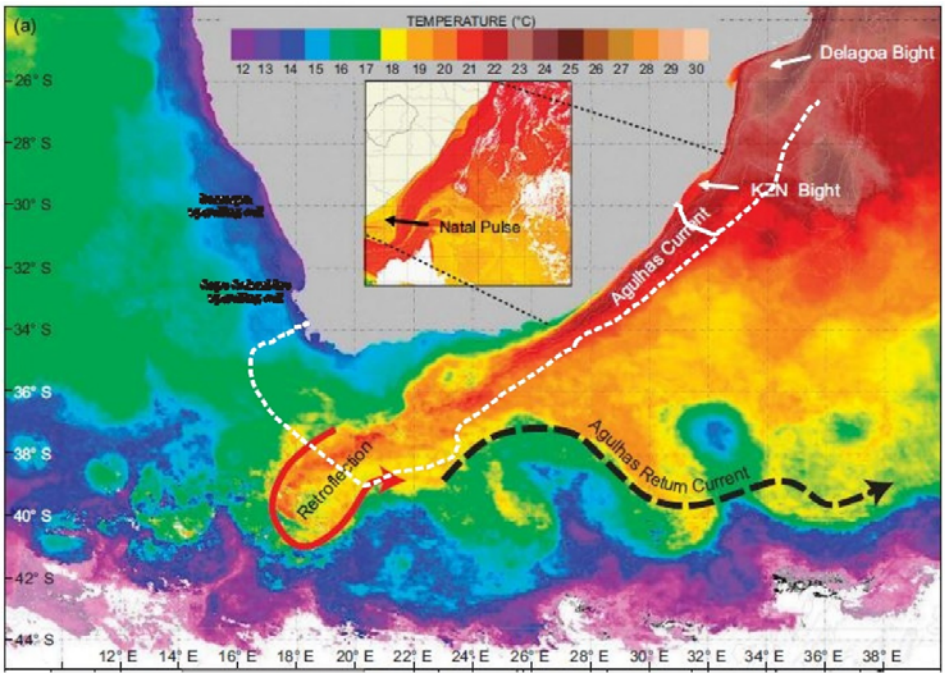


Figure 16 The predominance of the Agulhas current in the oceanography of the East Coast The proposed Amanzimtoti branch (white line) of the main trunk (dashed line) of the 2AFRICA/GERA (East) Cable System are shown (Source: Pisces, 2021)

6.1.1.5 Winds, swells and tides

The prevailing winds off the KZN coast are north-north easterly and south-south westerly. The north easterlies are associated with sunny and hot weather and the south easterlies are usually stronger winds associated with cooler, overcast or rainy weather. In the sea areas off Durban, the majority of swells are from the south and south-southwest, with the largest attaining >7 m. The KZN coastline is microtidal with the highest astronomical tide of 2.3 m for Durban. It is subject to a general south-to-north net littoral drift driven by the predominant south to south-easterly swells which are generally higher in winter. The swell pattern changes to a greater easterly component in summer.

The less regular weather patterns affecting the East Coast (e.g. low-pressure cells present north east of Durban, cut-off low pressure cells and tropical cyclones) strongly influence the wave climate, resulting in swells in excess of 10 m. The large waves (>20 m high) that are at times encountered within the Agulhas Current arise from the meeting of the south-westerly swells and the southerly flowing Agulhas Current, and may be a navigation hazard at times.

6.1.2 The biological environment

6.1.2.1 Overview of ecoregions, ecosystems and habitat types encountered by the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing)

Biogeographically, the proposed subsea cable route falls into the Natal and Southwest Indian Deep Ocean ecoregion (**Error! Reference source not found.**) (Sink *et al.,* 2019). The inshore area comprises the Thukela Banks, whereas the offshore areas comprise deep water benthic habitats and the water body. Little is known of the pelagic and demersal communities of the shelf edge, continental slope, and upper and lower bathyal are very poorly known, due to limited opportunities for sampling. Much of the information on the baseline environment provided, relates to the inshore (<50 m) and continental shelf (<200 m) regions, which fall within the Natal Ecoregion.

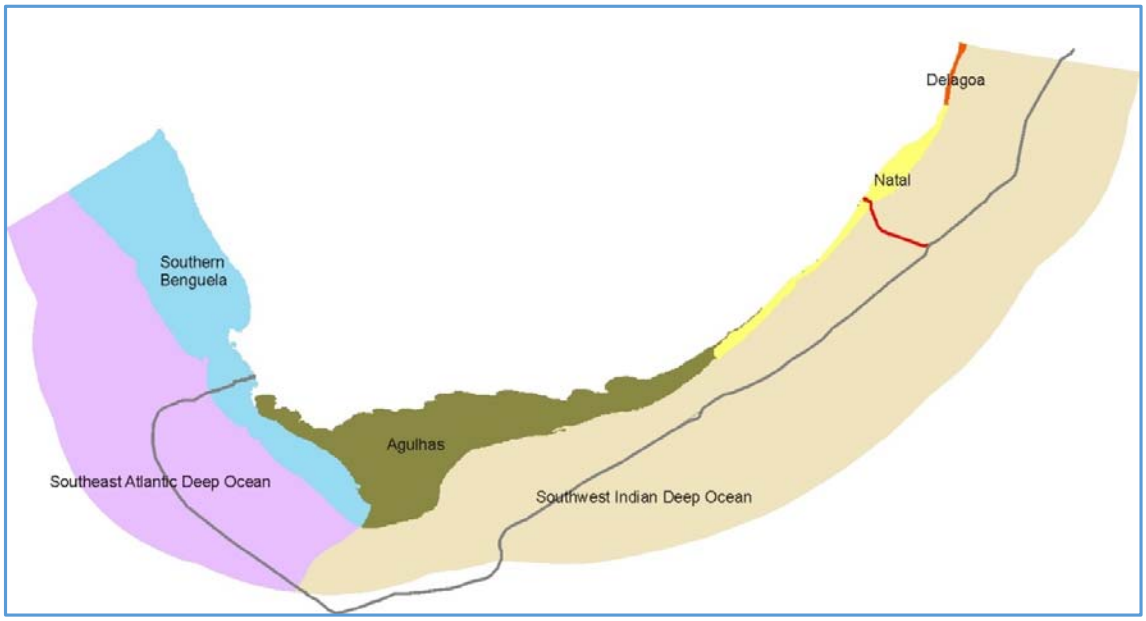


Figure 17 The proposed Amanzimtoti branch (red line) of the main trunk (black line) of the 2AFRICA/GERA (East) Cable System in relation to the South African inshore and offshore ecoregions (adapted from Sink *et al*., 2019, cited in Pisces, 2021)

The biota of nearshore marine habitats on the East Coast are relatively robust, being naturally adapted to an extremely dynamic environment, where biophysical disturbances are commonplace. Communities within this region are largely ubiquitous, particular only to substrate type (i.e. hard vs. soft bottom), exposure to wave action, or water depth. Habitats specific to the study area include:

- ❑ Sandy intertidal and subtidal substrates.
- ❑ Subtidal reefs.
- ❑ The water body.

A comprehensive description of the above habitats and the biological communities 'typical' of these habitats, as relevant to the proposed cable landing, are described in the marine ecology specialist report (Pisces, 2021) (Appendix B). The biological communities consist of many hundreds of species, often displaying considerable temporal and spatial variability (even at small scales). No rare or endangered species have been recorded.

6.1.2.2 Sandy substrate habitats and biota

The benthic biota of soft bottom substrates constitutes invertebrates that live on, or burrow within, the sediments, and are generally divided into megafauna (>10 cm), macrofauna (animals >1 mm) and meiofauna (<1 mm). The seabed communities along the inshore portions of the proposed cable route fall within the Natal photic and sub-photic biozones, which extend from the low water mark to the shelf edge.

INTERTIDAL SANDY BEACHES

The beaches in central and northern KZN comprise coarse grained sediments and are typically exposed to high wave energy. The KZN sandy beaches are dominated by intermediate beaches and rock, with approximately equal proportions of dissipative and reflective beaches. The preferred landing site at Amanzimtoti Pipeline beach is characterized by a stretch of intermediate sandy beach.

The macrofaunal communities characterising the beaches south of Durban are dominated by a diversity of crustaceans, polychaete worms and bivalve molluscs. Although no rare or endangered species have been reported, as many as 47% of the species recorded were only found at a single site suggesting that some of the invertebrate macrofauna could be considered relatively rare.

NEARSHORE AND OFFSHORE UNCONSOLIDATED HABITATS

The offshore soft-sediment habitat characterising the Thukela Banks is home to a unique fauna dominated by benthic and deposit feeders that favour muddy sediments and turbid waters. In particular, the seabed in the nearshore areas off the KZN coast tends to be patchy in terms of sediment composition, with significant sediment movement being frequently induced by the typically dynamic wave and current regimes. Consequently, the benthic macrofauna of inshore regions will be adapted to typically harsh conditions and frequent disturbance.

A number of larger crustacean species form the basis for a small multispecies trawl fishery on the Thukela Bank and the shallow-water mud banks along the northeast coast of KZN. The species in question include various penaeid prawns, langoustines and red crab. Other deep-water crustaceans that may occur along the proposed subsea cable route are the shovel-nosed crayfish and the Natal deep-sea rock lobster (Plate 14).

Please refer to the marine ecology specialist report in Appendix B, for detailed information.

Plate 14 The tiger prawn (left) occurs on shallow-water mud banks along the KwaZulu-Natal coast, whereas the Natal deep-sea rock lobster (right) occurs on mud and rubble at depths of 100-600 m (Source: Pisces, 2021)

6.1.2.3 Rocky shores and subtidal reefs

The intertidal and shallow subtidal reefs along the East Coast of South Africa range from rich, coral-encrusted sandstone reefs in the north to the more temperate rocky reefs further south, and support a wide diversity of marine flora and fauna and a relatively high percentage of endemic species (
Figure 1 and
Figure 1).

Consolidated reef benthos along the southern KZN coast colonise fossil dune and beach rock and does not consist of coral built reef systems and are not classified as true coral reefs. The study site nearshore is situated within the transitional zone between tropical/subtropical Maputaland reefs off the northern coast of KZN off Sodwana Bay, and warm temperate Pondoland reefs to the south located offshore between the Mtamvuna River and Port St Johns in the Eastern Cape Province. Relative to sandy habitats, reefs are scarce off Amanzimtoti. The cable alignment, however, crosses outcropping as well as sub cropping rock from just beyond the beach at the shore crossing to approximately 1.3 km offshore (see Figure 15). The closely located Aliwal Shoal is a large reef system situated four kilometres offshore between a depth of 8-22m and consists of aeolianite or dune limestone formations. The cable route has been aligned to avoid the Aliwal Shoal MPA.

The community composition along the depth gradient of the inshore (0-30 m) cable alignment was categorised into three distinct reef biotopes. Shallow water reefs were dominated by mats of mixed biota tufts and crusts including sponges, hydroids, ascidians, algae and sponges, while deeper reefs were characterised by high sand cover and mixed biota tufts. Although no prominent hard coral colonies were recorded, a few individuals of black corals were observed. Off the shelf edge, the deep water habitats may be characterised by a number of Vulnerable Marine Ecosystem indicator species such as sponges, soft corals and hard corals.

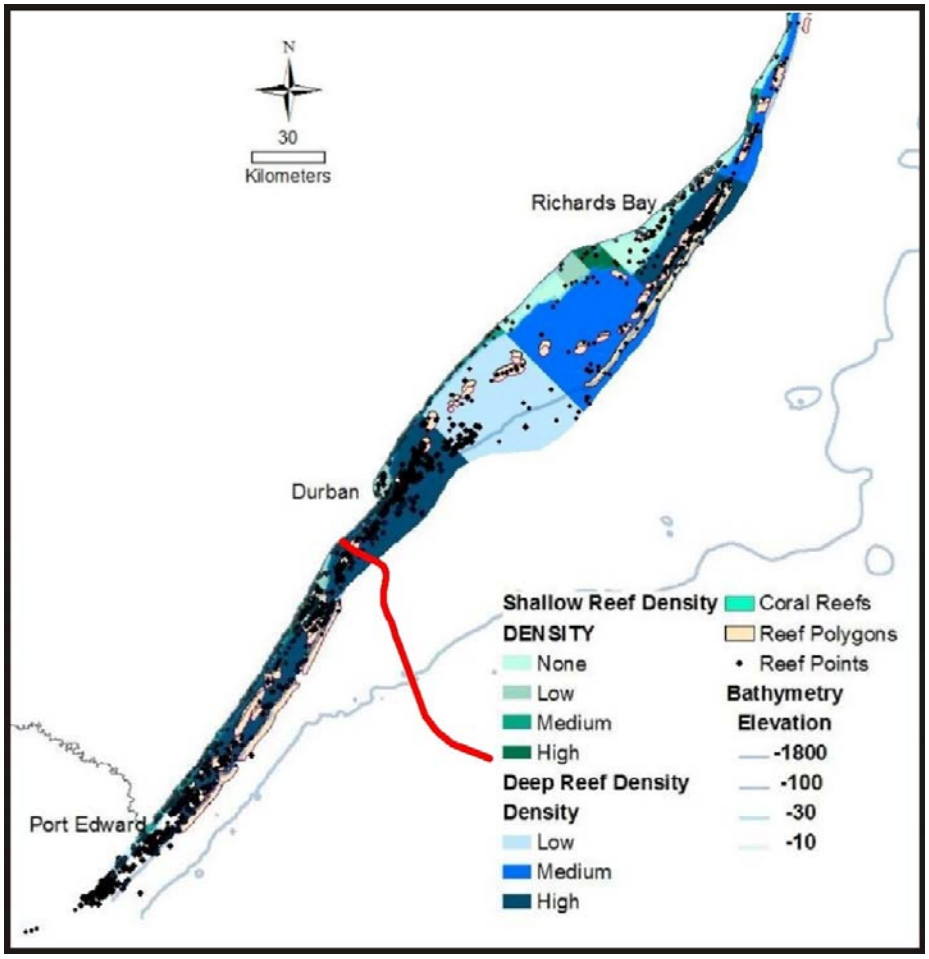


Figure 1 **Reefs in KwaZulu-Natal inshore of ~ 200 m depth in relation to the Amanzimtoti branch of the 2AFRICA/GERA (East) Cable System (red line) (Source: Pisces, 2021)**

Figure 2 **The reefs in KwaZulu-Natal are characterized by highly diverse invertebrate benthic communities and their associated fish fauna (Left). The annual 'sardine run' attracts a large number of pelagic predator, which follow the shoals along the coast (Right) (Source: Pisces, 2021)**

6.1.2.4 Pelagic invertebrates

Pelagic invertebrates that may be encountered along the subsea cable route include the giant squid *Architeuthis* sp., a deep dwelling species usually found near continental and island slopes all around the world's oceans. Giant squid could thus potentially occur along the subsea cable route, although the likelihood of encounter is extremely low. Nothing is known of their vertical distribution, but data from trawled specimens and sperm whale diving behaviour suggest they may span a depth range of 300 – 1,000 m.

6.1.2.5 Pelagic and demersal fish

The East Coast ichthyofauna is diverse, comprising a mixture of subtropical and tropical species. Some of the more important line fish species landed by commercial and recreational boat fishers along the East Coast are recorded in Table 6.

The sardine run is a notable event occurring in the study area, where pilchards, a small pelagic shoaling species move from the cooler southern areas, northwards along the coast during the winter months of June to August. Other pelagic shoaling species 'running' with the sardines but often occupying different depths in the water column include anchovy, West Coast round herring, East Coast round herring and chub mackerel. The cool band of inshore water is critical to the 'run' as the sardines will either remain in the south or only move northwards further offshore if the inshore waters are above 20 °C. The shoals can attain lengths of 20-30 km and are typically pursued by Great White Sharks, Copper Sharks, Common Dolphins (Figure 2, right), Cape Gannets and various other large pelagic predators. The sardine run occurs along the continental shelf and therefore crosses the inshore sections of the proposed subsea cable route.

On the shelf, beyond the shelf break and in the offshore waters of the project area, the fish most likely to be encountered are the large migratory pelagic species, including various tunas, billfish and sharks (Table 7). Two species of particular note likely to be encountered along the subsea cable route are the great white shark *Carcharodon carcharias* (Plate 16, left) and the whale shark *Rhincodon typus* (**Error! Reference source not found.**, right). Both species have a cosmopolitan distribution and although not necessarily threatened with extinction, the great white shark is described as 'vulnerable' and the whale shark as 'endangered' in the IUCN Red listing, and feature on various other international and South African listings.

Table 6 Some of the more important line fish species landed by commercial and recreational boat fishers along the East Coast (adapted from CCA & CMS 2001)

Common Name	Species Name
Demersal teleosts	
Blue hottentot	*Pachymetopon aeneum*
Cape stumpnose	*Rhabdosargus holubi*
Dageraad	*Chrysoblephus christiceps*
Englishman	*Chrysoblephus anglicus*
Mini kob	*Johnius dussumieri*
Natal stumpnose	*Rhabdosargus sarba*
Poenskop/Musselcracker	*Cymatoceps nasutus*
Pompano	*Trachinotus africanus*
Red steenbras	*Petrus rupestris*
Red stumpnose	*Chrysoblephus gibbiceps*
River bream	*Acanthopagrus berda*
Rockcod	*Epinephalus spp.*
Santer	*Cheimerius nufar*
Scotsman	*Polysteganus praeorbitalis*
Slinger	*Chrysoblephus puniceus*
Snapper salmon	*Otolithes ruber*
Spotted grunter	*Pomadasys commersonnii*
Squaretail kob	*Argyrosomus thorpei*
White steenbras	*Lithognathus*
Pelagic species	
Elf	*Pomatomus saltatrix*
Garrick/leerfish	*Lichia amia*
Geelbek	*Atractoscion aequidens*
Green jobfish	*Aprion virescens*
King mackerel	*Scomberomorus commerson*
Kob	*Argyrosomus spp*
Kingfish species	*Caranx* spp.
Queenfish	*Scomberoides commersonianus*
Queen mackerel	*Scomberomorus plurilineatus*
Tenpounder	*Elops machnata*
Wahoo	*Acanthocybium solandri*
Yellowtail	*Seriola lalandi*
Chondrichthyans	
Bronze whaler shark	*Carcharhinus brachyurus*
Dusky shark	*Carcharhinus obscurus*
Hammerhead shark	*Sphyrna* spp.
Sandshark	Rhinobatidae
Milkshark	*Rhizoprionodon acutus*
Skates	Rajiformes
Stingray	Dasyatidae

Table 7 Some of the more important large migratory pelagic fish likely to occur in the offshore regions of the East Coast. The Global IUCN Conservation Status and NEMBA listing are also provided

Common Name	Species	IUCN Conservation Status	NEMBA Marine TOPS
Tunas			
Southern Bluefin Tuna	*Thunnus maccoyii*	Critically Endangered	
Bigeye Tuna	*Thunnus obesus*	Vulnerable	
Longfin Tuna/Albacore	*Thunnus alalunga*	Near Threatened	
Yellowfin Tuna	*Thunnus albacares*	Near Threatened	
Frigate Tuna	*Auxis thazard*	Least concern	
Eastern Little Tuna	*Euthynnus affinis*	Least concern	
Skipjack Tuna	*Katsuwonus pelamis*	Least concern	
Billfish			
Blue Marlin	*Makaira nigricans*	Vulnerable	
Striped Marlin	*Kajikia audax*	Near Threatened	
Sailfish	*Istiophorus platypterus*	Least concern	
Swordfish	*Xiphias gladius*	Least concern	
Black Marlin	*Istiompax indica*	Data deficient	
Pelagic Sharks			
Great Hammerhead Shark	*Sphyrna mokarran*	Endangered	Endangered
Scalloped Hammerhead	*Sphyrna lewini*	Endangered (SWIO subpop.)	Endangered
Smooth Hammerhead	*Sphyrna zygaena*	Vulnerable	
Pelagic Thresher Shark	*Alopias pelagicus*	Vulnerable	
Bigeye Thresher Shark	*Alopias superciliosus*	Vulnerable	
Common Thresher Shark	*Alopias vulpinus*	Vulnerable	
Oceanic Whitetip Shark	*Carcharhinus longimanus*	Vulnerable	
Dusky Shark	*Carcharhinus obscurus*	Vulnerable	
Great White Shark	*Carcharodon carcharias*	Vulnerable	Vulnerable
Shortfin Mako	*Isurus oxyrinchus*	Vulnerable	
Longfin Mako	*Isurus paucus*	Vulnerable	
Whale Shark	*Rhincodon typus*	Endangered	Vulnerable
Blue Shark	*Prionace glauca*	Near Threatened	
Tiger Shark	*Galeocerdo cuvier*	Near Threatened	Protected

6.1.2.6 Coelacanths

Although coelacanths occur in the submarine canyons off the northern KZN coastline, the Durban, Tugela and Goodlad Canyons are thought to be suboptimal habitats for coelacanths, as excessive sediment movement is expected to result in slumping along unstable canyon margins and destruction of their preferred cave habitats.

6.1.2.7 Turtles

Five species of sea turtles occur along the East Coast of South Africa; the green turtle (*Chelonia mydas*), olive ridley (*Lepidochelys olivacea*), leatherback (*Dermochelys coriacea*), hawksbill (*Eretmochelys imbricata*) and loggerhead (*Caretta caretta*).

Leatherback Turtles are listed as “Vulnerable” worldwide by the IUCN and are in the highest categories in terms of need for conservation in CITES (Convention on International Trade in Endangered Species), and CMS (Convention on Migratory Species). Loggerhead turtles are globally listed as “Vulnerable”, whereas Green turtles are globally listed as “Endangered”. As a signatory of CMS, South Africa has endorsed and signed a CMS International Memorandum of Understanding specific to the conservation of marine turtles. South Africa is thus committed to conserve these species at an international level.

6.1.2.8 Marine Mammals

The marine mammal fauna of the East Coast South Africa comprises between 28 and 38 species of cetaceans (whales and dolphins) known or likely to occur here (**Error! Reference source not found.**, Plates 15 and 16) and one seal species, the Cape fur seal (*Arctocephalus pusillus*). The Blue Whale is ‘critically endangered’, the Indian Ocean humpback dolphin, fin whale and sei whale are considered ‘endangered’ and the Ifafi-Kosi Bay sub-population of the Indo-Pacific bottlenose dolphin, Sperm whale and Bryde’s whale (inshore population) are considered ‘vulnerable’ in the South African Red List Assessment. Altogether 11 species are listed as ‘data deficient’ in the SA Red List Assessment underlining how little is known about cetaceans, their distributions and population trends.

Plate 15 The humpback whale (left) and the southern right whale (right) migrate along the South and East Coasts during winter (Source: Pisces, 2021)

Table 8 Cetaceans occurrence off the East Coasts of South Africa, their seasonality and likely encounter frequency with cable-laying operations (adapted from Best 2007). IUCN Conservation Status is based on the SA Red List Assessment (2014) (sourced from Pisces, 2021)

Common Name	Species	Shelf	Offshore	Seasonality	IUCN Conservation Status
Delphinids					
Common bottlenose dolphin	*Tursiops truncatus*	Yes	Yes	Year round	Least Concern
Indo-Pacific bottlenose dolphin	*Tursiops aduncus*-Ifafa-Kosi Bay subpopulation	Yes		Year round	Vulnerable
	Tursiops aduncus-Ifafa-False Bay subpopulation	Yes		Year round	Near threatened
	Tursiops aduncus-Seasonal subpopulation	Yes		Year round	Data Deficient
Common (short-beaked) dolphin	*Delphinus delphis*	Yes	Yes	Year round	Least Concern
Common (long-beaked) dolphin	*Delphinus capensis*	Yes		Year round	Least Concern
Fraser's dolphin	*Lagenodelphis hosei*		Yes	Year round	Least Concern
Pan tropical Spotted dolphin	*Stenella attenuata*	Yes	Yes	Year round	Least Concern
Striped dolphin	*Stenella coeruleoalba*		Yes	Year round	Least Concern
Spinner dolphin	*Stenella longirostris*	Yes		Year round	Data Deficient
Indian Ocean humpback dolphin	*Sousa chinensis*	Yes		Year round	Endangered
Long-finned pilot whale	*Globicephala melas*		Yes	Year round	Least Concern
Short-finned pilot whale	*Globicephala macrorhynchus*		Yes	Year round	Least Concern
Killer whale	*Orcinus orca*	Occasional	Yes	Year round	Least Concern
False killer whale	*Pseudorca crassidens*	Occasional	Yes	Year round	Least Concern
Risso's dolphin	*Grampus griseus*	Yes (edge)	Yes	Year round	Least Concern
Pygmy killer whale	*Feresa attenuata*		Yes	Year round	Least Concern

Common Name	Species	Shelf	Offshore	Seasonality	IUCN Conservation Status
Sperm whales					
Pygmy sperm whale	*Kogia breviceps*		Yes	Year round	Data Deficient
Dwarf sperm whale	*Kogia sima*		Yes	Year round	Data Deficient
Sperm whale	*Physeter macrocephalus*		Yes	Year round	Vulnerable
Beaked whales					
Cuvier's	*Ziphius cavirostris*		Yes	Year round	Least Concern
Arnoux's	*Berardius arnouxii*		Yes	Year round	Data Deficient
Southern bottlenose	*Hyperoodon planifrons*		Yes	Year round	Least Concern
Hector's	*Mesoplodon hectori*		Yes	Year round	Data Deficient
Strap-toothed whale	*Mesoplodon layardii*		Yes	Year round	Data Deficient
Longman's	*Mesoplodon pacificus*		Yes	Year round	Data Deficient
True's	*Mesoplodon mirus*		Yes	Year round	Data Deficient
Gray's	*Mesoplodon grayi*		Yes	Year round	Data Deficient
Blainville's	*Mesoplodon densirostris*		Yes	Year round	Data Deficient
Baleen whales					
Antarctic minke	*Balaenoptera bonaerensis*	Yes	Yes	AMJJASO	Least Concern
Dwarf minke	*Balaenoptera acutorostrata*	Yes		Year round	Least Concern
Fin whale	*Balaenoptera physalus*		Yes	MJJASON	Endangered
Antarctic Blue whale	*Balaenoptera musculus intermedia*		Yes	MJJASON	Critically Endangered
Sei whale	*Balaenoptera borealis*		Yes	MJJASON	Endangered
Bryde's (inshore)	*Balaenoptera brydei (subspp)*	Yes		Year round	Vulnerable
Pygmy right	*Caperea marginata*	Yes		Year round	Least Concern
Humpback	*Megaptera novaeangliae*	Yes	Yes	AMJJASOND	Least Concern
Southern right	*Eubalaena australis*	Yes		MJJASOND	Least Concern

Plate 16 Sperm whales Physeter macrocephalus (left) and killer whales Orcinus orca (right) are toothed whales likely to be encountered in offshore waters (Source: Pisces, 2021)

6.1.2.9 Seabirds

Twenty-nine seabird species occur commonly along the KZN coast (Table 9). As the East Coast provides few suitable breeding sites for coastal and seabirds, only three species (Grey-headed gull, Caspian tern and Swift tern) (Plate 17) breed regularly along the coast. Many of the river mouths and estuaries along the East Coast, however, serve as important roosting and foraging sites for coastal and seabirds, especially those at St Lucia and Richards Bay.

In the offshore environment along the subsea cable route, the birds most likely to be encountered are the pelagic migrant species such as albatross, petrels and shearwaters. Encounter rates are likely to be higher during winter months and during the inshore sardine 'run', when many of the pelagic species come inshore to follow the shoals northwards up the coast. Coastal species may be encountered along the inshore sections of the subsea cable route.

Plate 17 Typical plunge-diving seabirds on the East Coast are the Swift Tern (left) and the Cape Gannet (right) (Source: Pisces, 2021)

Table 9 Resident and fairly-common to common visiting seabirds present along the KwaZulu-Natal coast (from CSIR, 1998) and their Regional and Global IUCN status

Species Name	Common Name	Regional IUCN Status	Global IUCN Status
Diomedea exulans	Wandering albatross	Vulnerable	Vulnerable
Thalassarche cauta	Shy albatross	Near Threatened	Near Threatened
Thalassarche melanophris	Blackbrowed albatros	Endangered	Least Concern
Thalassarche chlororhynchos	Yellownosed albatross	Endangered	Endangered
Macronectes giganteus	Southern giant petrel	Near Threatened	Least Concern
Macronectes halli	Northern giant petrel	Near Threatened	Least Concern
Daption capense	Pintado petrel	Least Concern	Least Concern
Pterodroma macroptera	Great-winged petrel	Near Threatened	Least Concern
Pterodroma mollis	Soft-plumaged petrel	Near Threatened	Least Concern
Pachyptila vittata	Broadbilled prion	Least Concern	Least Concern
Procellaria aequinoctialis	White-chinned petrel	Vulnerable	Vulnerable
Calonectris diomedea	Cory's shearwater	Least Concern	Least Concern
Ardenna gravis	Great shearwater	Least Concern	Least Concern
Ardena griseus	Sooty shearwater	Near Threatened	Near Threatened
Hydrobates pelagicus	European storm petrel	Least Concern	Least Concern
Oceanodroma leucorhoa	Leach's storm petrel	Critically Endangered	Vulnerable
Oceanites oceanicus	Wilson's storm petrel	Least Concern	Least Concern
Morus capensis	Cape gannet	Vulnerable	Endangered
Stercorarius parasiticus	Parasitic Jaeger	Least Concern	Least Concern
Catharacta skua	Antarctic skua	Endangered	Least Concern
Larus dominicanus	Kelp gull	Least Concern	Least Concern
Larus cirrocephalus	Greyheaded gull	Least Concern	Least Concern
Hydroprogne caspia	Caspian tern	Vulnerable	Least Concern
Sterna bergii	Swift tern	Least Concern	Least Concern
Sterna paradisaea	Arctic tern	Least Concern	Least Concern
Sterna sandvicensis	Sandwich tern	Least Concern	Least Concern
Sterna bengalensis	Lesser crested tern	Least Concern	Least Concern
Sterna albifrons	Little tern	Least Concern	Least Concern
Sterna hirundo	Common tern	Least Concern	Least Concern

6.1.3 Marine biodiversity, MPAs and marine areas of conservation significance

Numerous coastal and offshore areas of conservation significance exist along the coastline of the East Coast of South Africa, affording protection to the marine ecosystems and biota. Those relevant to the proposed 2AFRICA/GERA (East) Cable System (Amanzimtoti landing) are discussed in the sections below.

6.1.3.1 Biodiversity Priority Areas as per the National Coastal and Marine Spatial Biodiversity Plan

The 2018 National Biodiversity Assessment, with its updated ecosystem maps and assessments, provided an opportunity for the first National Coastal and Marine Critical Biodiversity Areas map to be developed, as described in the National Coastal and Marine Spatial Biodiversity Plan (Version 1, Beta 2) (Harris, L.R., Sink, K.J., Holness, S.D., Kirkman, S.P., Driver, A. 2020). The CBA map aims to consolidate several past and present spatial assessment and planning initiatives to provide a coherent map of the coastal and marine biodiversity priority areas in South Africa that require focused management measures to support sustainable development of the blue economy. These initiatives include: the most recent classification, mapping and assessment of coastal and marine biodiversity in South Africa; previous and new work to support MPA expansion; identification, revised delineation and proposed management of Ecologically or Biologically Significant Marine Areas (EBSAs; MARISMA Project 2020); and other spatial prioritisations done at local, provincial or other sub-national scales.

Figure 20 indicates that the proposed 2AFRICA/GERA (East) Cable System (Amanzimtoti landing) passes through areas categorised as ESA, CBA1 and CBA2. Whereas the inshore portions of the cable routing largely avoid CBA1 and CBA2 regions, the cable will pass through a minimal area of CBA1 and CBA2 beyond 2,500 m depth. The alignment overlaps slightly with the edge of an ESA adjacent to the Aliwal Shoal MPA. CBA 1 indicates irreplaceable or near-irreplaceable sites that are required to meet biodiversity targets with limited, if any, option to meet targets elsewhere, whereas CBA 2 indicates optimal sites that generally can be adjusted to meet targets in other areas. ESAs represent EBSAs outside of MPAs and not already selected as CBAs. The management objectives for these CBA and ESA categories is shown in Table 10.

The management objective for CBA1 areas is to maintain them in a natural or near natural state as the areas represent sites in which the features they contain are irreplaceable or near-irreplaceable. Undersea cables are indicated as being ‘Conditional’ in the proposed sea-use guidelines for CBAs. The principles outlined for assessing the compatibility of activities within CBAs is based on the level of likely degradation caused by the project. This is based on a three tier impact-based scale: Very Severe/Severe, Moderate and Low/Very Low degradation. Activities causing Moderate Degradation are Conditionally Compatible and require careful regulation and controls over and above the general rules and legislation to avoid unacceptable impact. Activities with Low to Very Low impact are compatible and should be allowed and regulated by the general rules of the area.

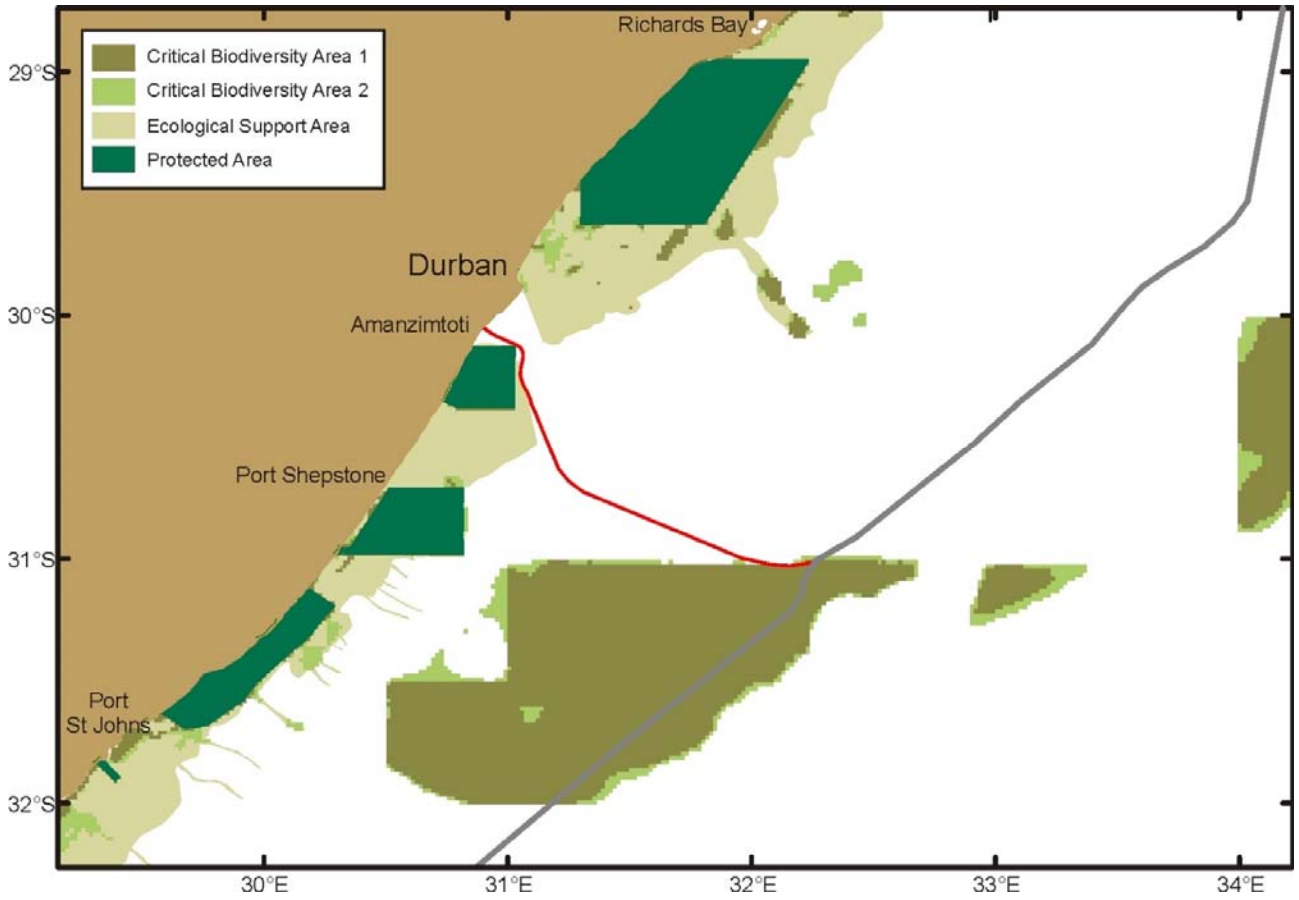


Figure 20 The proposed 2AFRICA/GERA (East) Cable System (Amanzimtoti landing) (red line) in relation to the National Coastal and Marine Critical Biodiversity Areas (version 1.1, June 2021) (adapted from Harris *et al*. (2020))

The National Coastal and Marine Spatial Biodiversity Plan further proposes a list of sea use activities under various proposed Marine Spatial Planning (MSP) Zones, in accordance with their compatibility with MPAs, CBAs and ESAs. Under the present draft National Coastal and Marine Spatial Biodiversity Plan (Version 1, Beta 2), undersea cables are proposed under an MSP Zone named "Underwater Infrastructure" and may be conditionally allowed in CBA areas and considered compatible in ESAs. These proposals are considered draft and still under discussion.

Table 10 Definitions of biodiversity priority areas, including the management objective of each category (adapted from SANBI, 2017) (CBA= Critical Biodiversity Area; ESA= Ecological Support Area)

Category	Definition	Broad management objective
Protected Areas	Protected areas declared or recognised in the National Environmental Management: Protected Areas Act (No. 57 of 2003)	As per each Protected Area Management Plan
CBA 1	Irreplaceable or near-irreplaceable sites where there are no other options to represent the features they contain in the planning area. Ideally these sites are natural or near-natural, but exceptions can be made if the only sites where a feature exists are degraded.	Must be kept in a natural or near-natural state
CBA 2	Sites that are the best option available for representing the features in a spatial prioritisation. Ideally these sites are natural or near-natural, but exceptions can be made if the only sites where a feature exists are degraded.	
ESA 1	Sites that are not CBAs but are still important for meeting targets for biodiversity and ecological processes. These sites must be in natural, near-natural or moderately modified ecological condition.	Must be kept in at least a functional state (ideally at least in a moderately modified ecological condition)
ESA 2	Sites that are not CBAs but are still important for meeting targets for biodiversity and ecological processes. These sites are generally in severely modified ecological condition.	

6.1.3.2 Hope Spots

Hope Spots are defined by Mission Blue of the Sylvia Earle Alliance as special conservation areas that are critical to the health of the ocean. The first six Hope Spots were launched in South Africa in 2014 and include Aliwal Shoal, Algoa Bay in the Eastern Cape, and Plettenberg Bay, Knysna, the Cape Whale Coast (Hermanus area) and False Bay in the Western Cape. The proposed 2AFRICA/GERA (East) Cable System (Amanzimtoti landing) passes just north of Aliwal Shoal.

6.1.3.3 Marine Protected Areas

Figure 21 shows the location of MPAs on the East Coast, in relation to the proposed 2AFRICA/GERA (East) Cable System (Amanzimtoti landing). The cable makes landfall in between the Aliwal Shoal MPA and the uThukela MPA. The proposed cable alignment was specifically re-routed to avoid the Aliwal Shoal MPA and at its closest point, is located 600 m from the north-eastern seaward corner of this MPA. The cable alignment lies well south of the uThukela MPA. These MPAs are described briefly below.

- **The Aliwal Shoal MPA** is between the Lovu and Mzimayi estuaries, is 125 km^2 in size, approximately 18 km long and stretches ~4 nautical miles offshore. In 2019, the coastal MPA was expanded to approximately 670 km^2 to protect deep reefs and the upper continental slope to depths of 2,200 m, as well as the Crown Area - the main area of the Aliwal Shoal Reef popular with divers. The MPA provides protection to the historical spawning grounds of the overexploited Seventy Four and the spawning, nursery, foraging, aggregation and refuge areas for various threatened or overexploited species such as tiger sharks, red steenbras, geelbek and dusky kob. It also protects and conserves the biodiversity and ecological processes associated with the sardine run and areas of life history importance for migratory species including seabirds, turtles, sharks, and seabreams.

- **The uThukela Banks MPA** is located between the Mlalazi and Seteni estuary. The purpose of this MPA is to protect interconnected coastal and offshore ecosystems including sandy beaches, rocky shores and estuaries as well as offshore habitats including fluvial fans, soft sediment, gravel and reefs on the shelf, submarine canyons, the shelf edge and slope ecosystems.

6.1.3.4 Ecologically or Biologically Significant Areas (EBSAs)

Figure 21 shows the location of EBSAs on the East Coast in relation to the proposed 2AFRICA/GERA (East) Cable System (Amanzimtoti landing). Together with MPAs, EBSAs represent a network of sites that are important for biodiversity and contribute towards including connectivity in the CBA Map. They also encompass areas that are important for ecological processes. As shown in Figure 21, the proposed cable alignment skirts the northern edge of the Protea Banks and Sardine Route EBSA.

The **Protea Banks and Sardine Route EBSA** includes a key component of the migration path for several fish (known as the sardine run) and an offshore area of high habitat complexity. Benthic features include a unique deep-reef system known as Protea Banks, a relatively shallow “seamount” that drops to extensive rocky flats that extend towards the shelf edge. This EBSA includes five existing coastal MPAs, two of which were expanded to improve protection of key marine biodiversity assets. Habitat diversity is high, with 40 ecosystem types represented in the EBSA, 20 of which are ‘Vulnerable’ and a further seven are ‘Near Threatened’.

Under the current Marine Spatial Management and Governance (MARISMA) Programme (MARISMA 2014-2020), South Africa has revised its EBSAs and is preparing management recommendations for each one. It is proposed that EBSAs comprise two zones, a Biodiversity Conservation Zone and an Environmental Impact Management Zone, with recommendations for management per zone. There is alignment in the management objectives of CBAs and the Biodiversity Conservation Zone, and of ESAs and the Environmental Impact Management Zone. Therefore, the National Coastal and Marine CBA map has been adopted as the tool by which South Africa’s EBSAs are zoned for recommended inclusion in the national Marine Spatial Planning processes. This careful and deliberate alignment of the National Coastal and Marine CBA Map and the EBSA zones is important for identifying a single, coherent portfolio of coastal and marine biodiversity priorities.

The management objective in the zones marked for ‘Conservation’ is “*strict place-based biodiversity protection aimed at securing key biodiversity features in a natural or semi-natural state, or as near to this state as possible*”. The management objective in the zones marked for ‘Impact Management’ is “*management of impacts on key biodiversity features in a mixed-use area to keep key biodiversity features in at least a functional state*”.

Activities within these two zones can be placed into one of four different Marine Spatial Planning categories depending on their compatibility with the EBSA features and management objective of that zone.

6.1.3.5 Sensitive Areas

Despite the development of the offshore MPA network a number of 'Endangered' and 'Vulnerable' ecosystem types in the project area are currently 'moderately protected' or 'poorly protected' and further effort is needed to improve protection of these threatened ecosystem types (Sink *et al.,* 2019). Ideally, all highly threatened ('Critically Endangered' and 'Endangered') ecosystem types should be well protected. Although most of the ecosystem types in the inshore portions of the project area at depths of <1,000 m are either moderately or well protected (with the exception of the KZN Bight Mid Shelf Mosaic, which is poorly protected), most of the offshore areas beyond 1,000 m depth of the proposed Amanzimtoti branch route are poorly protected or not protected at all (Figure 2).

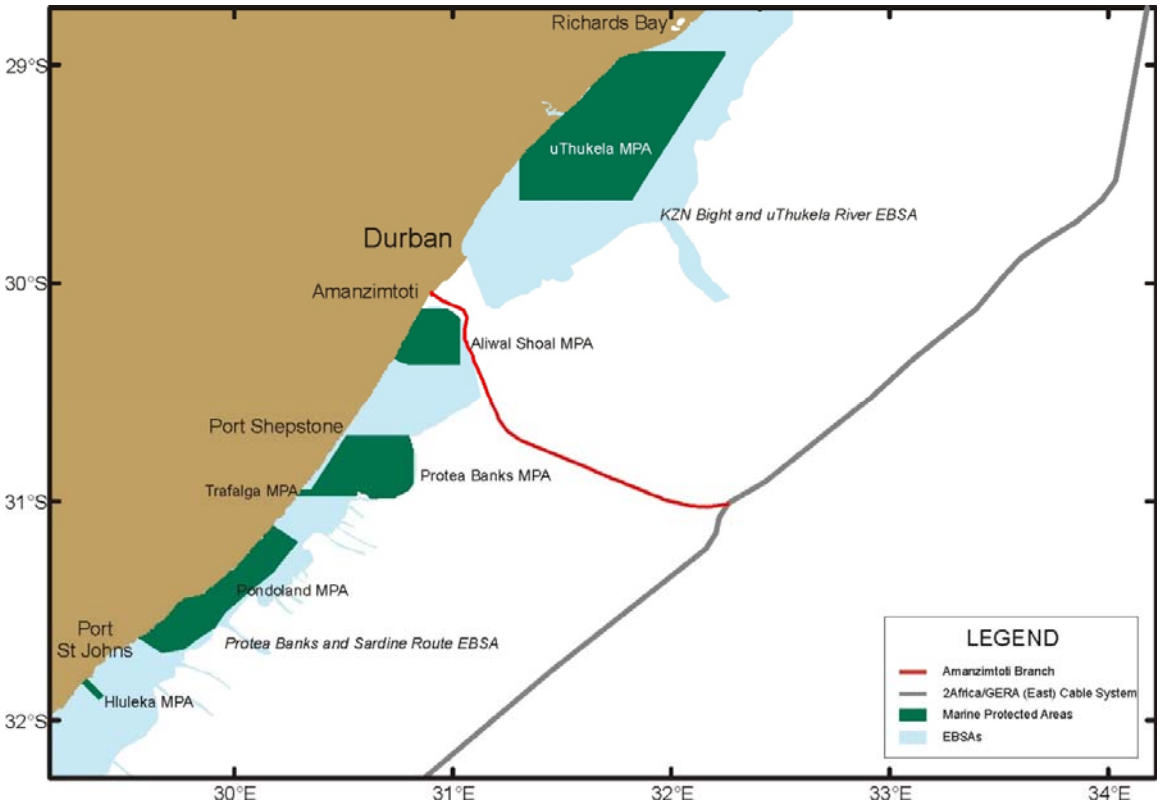


Figure 21 The proposed 2AFRICA/GERA (East) Cable System (Amanzimtoti landing) (red line) in relation to Marine Protected Areas and Ecologically and Biologically Significant Areas on the South African East Coast (Source: Pisces, 2021)

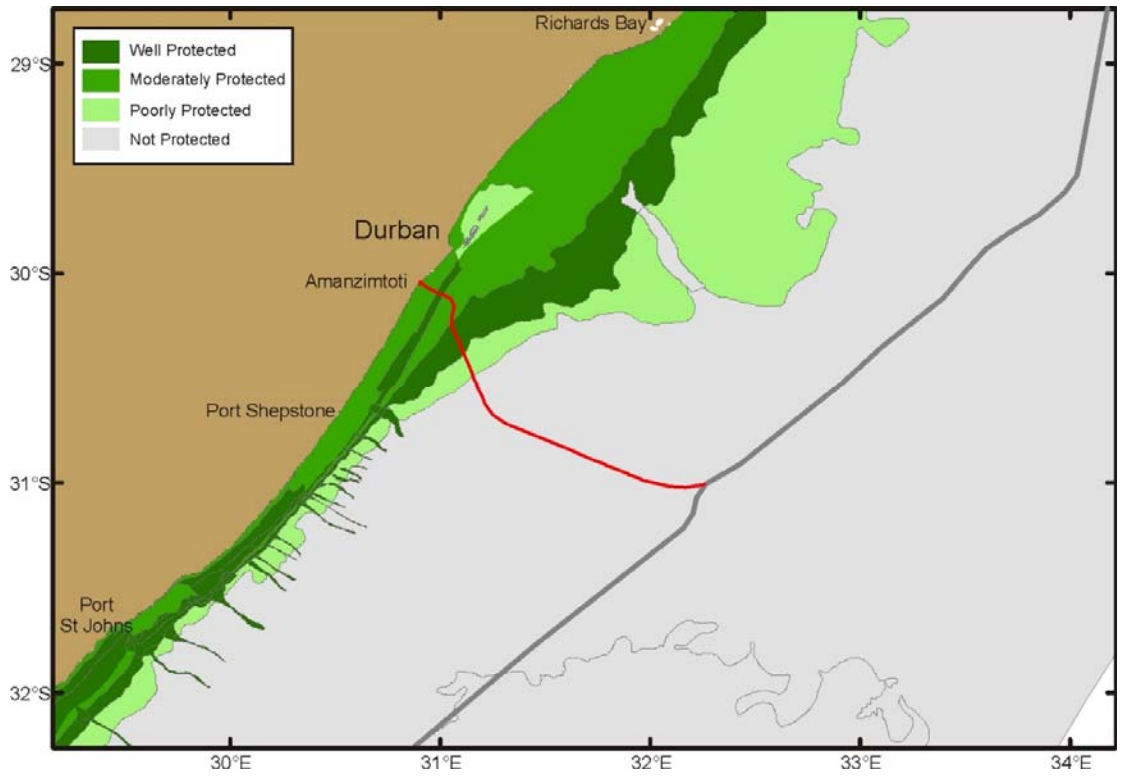


Figure 22 Protection levels of 150 marine ecosystem types as assessed by Sink *et al*. (2019) in relation to the proposed Amanzimtoti branch (red line) of the main trunk (grey line) of the 2AFRICA/GERA (East) Cable System (Source: Pisces, 2021)

6.1.4 Offshore fishing industry

The South African offshore commercial fishing industry is an important contributor to the economy, with the wholesale value of production in 2017 estimated at approximately R9.8 billion. Approximately 14 different commercial fisheries sectors currently operate within South African waters. The primary fisheries in terms of highest economic value are the demersal (bottom) trawl and long-line fisheries targeting the Cape hakes (*Merluccius paradoxus* and *M. capensis*), and the pelagic-directed purse-seine fishery targeting pilchard (*Sardinops sagax*), anchovy (*Engraulis encrasicolus*), and red-eye round herring (*Etrumeus whiteheadi*. Fisheries relevant to the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) are described briefly below. Refer to the specialist report (CAPMarine, 2021) (Appendix B) for further information.

6.1.4.1 Large Pelagic Longline

Highly migratory tuna and tuna-like species are caught on the high seas and seasonally within the South African EEZ by the pelagic longline and pole fisheries. Targeted species include albacore (*Thunnus alalunga*), bigeye tuna (*T. obesus*), yellowfin tuna (*T. albacares*) and swordfish (*Xiphias gladius*). The total number of active long-line vessels within South African waters is 22, 18 of which fished in the Atlantic (West of 20°E) during 2017. These were exclusively domestic vessels, with three Japanese vessels fishing exclusively in the Indian Ocean (East of 20°E) during 2017.

Gear consists of monofilament mainlines of between 25 km and 100 km in length which are suspended from surface buoys and marked at each end. As gear floats close to the water surface it would present a potential obstruction to surface navigation as well as a snagging risk to the gear array towed by the seismic survey vessel; however it would not affect the subsea cable once buried. Lines are usually set at night, and may be left drifting for a considerable length of time before retrieval, which is done by means of a powered hauler at a speed of approximately one knot. During hauling, vessel manoeuvrability is severely restricted. In the event of an emergency, the line may be dropped and hauled in at a later stage.

The fishery operates year round and extensively within the South African EEZ, primarily along the continental shelf break and further offshore. Fishing effort in relation to the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) is shown in Figure 23. Fishing activity can be expected offshore of the 500 m depth contour, where lines are set and drift with surface currents in a south-westerly direction. Over the period 2017 to 2019, 26 lines were set across the proposed cable route yielding 45 tons of catch. This is equivalent to 0.6% and 0.6%, respectively of the overall effort and catch reported by the fishery.

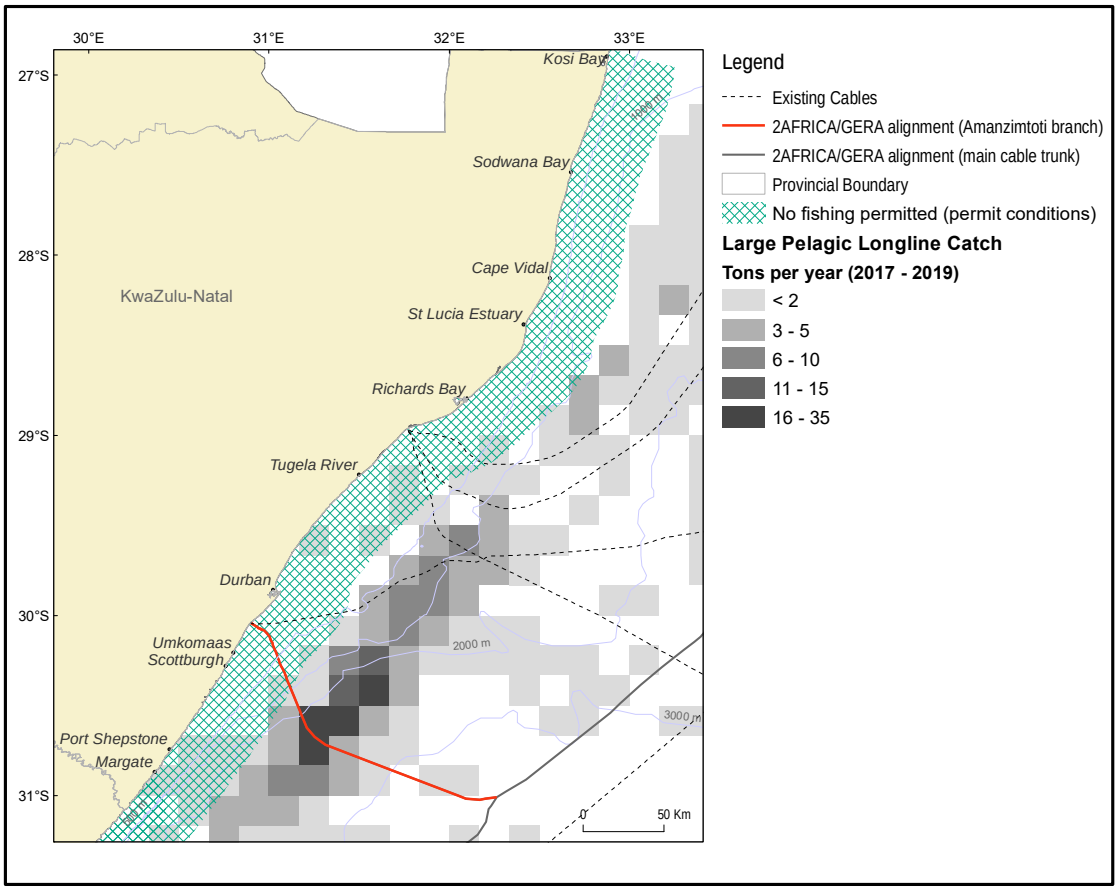


Figure 23 Spatial distribution of fishing effort expended by the long-line sector targeting large pelagic fish species in relation to the proposed proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) (Source - Capmarine, 2021)

6.1.4.2 Traditional Line Fish

The traditional line fishery is the country's third most important fishery in terms of tonnage landed and economic value. It is a long-standing, nearshore fishery based on a large assemblage of different species using hook and line, but excludes the use of longlines. Within the Western Cape the predominant catch species is snoek (*Thyrsites atun*), while other species such as Cape bream (hottentot) (*Pachymetopon blochii*), geelbek (*Atractoscion aequidens*), kob (*Argyrosomus japonicus*), and yellowtail (*Seriola lalandi*) are also important. Towards the East Coast, the number of catch species increases and includes resident reef fish (*Sparidae* and *Serranidae*), pelagic migrants (*Carangidae* and *Scombridae*) and demersal migrants (*Sciaenidae* and *Sparidae*). In 2017, the wholesale value of catch was reported as R122.1 million.

The traditional line fishery is a boat-based activity and has since December 2000 consisted of 3450 crew operating from 455 commercial vessels. DFFE proposed an increase in the apportionment of Total Applied Effort (TAE) to small-scale fishing from 13% to 50% commencing in 2021 in order to boost economic possibilities for coastal communities.

Crew use hand line or rod-and-reel to target approximately 200 species of marine fish along the full 3 000 km coastline, of which 50 species may be regarded as economically important. The fishery is widespread along the country's shoreline from Port Nolloth, Northern Cape on the West Coast to Cape Vidal, KZN on the East Coast. Most of the catch (up to 95%), however, is landed by the Cape commercial fishery, which operates on the continental shelf from the Namibian border on the West Coast to the Kei River in the Eastern Cape.

Figure 24 shows the spatial extent of the commercial line fish catch in relation to the proposed cable routing at Amanzimtoti. The route coincides with fishing locations referred to as Isipingo and Inyoni Rocks. Catch and effort reported at these locations amounted to 0.5 tons per year (0.01% of the overall landings) and 147 hours (0.02% of total effort) over the period 2017 to 2019.

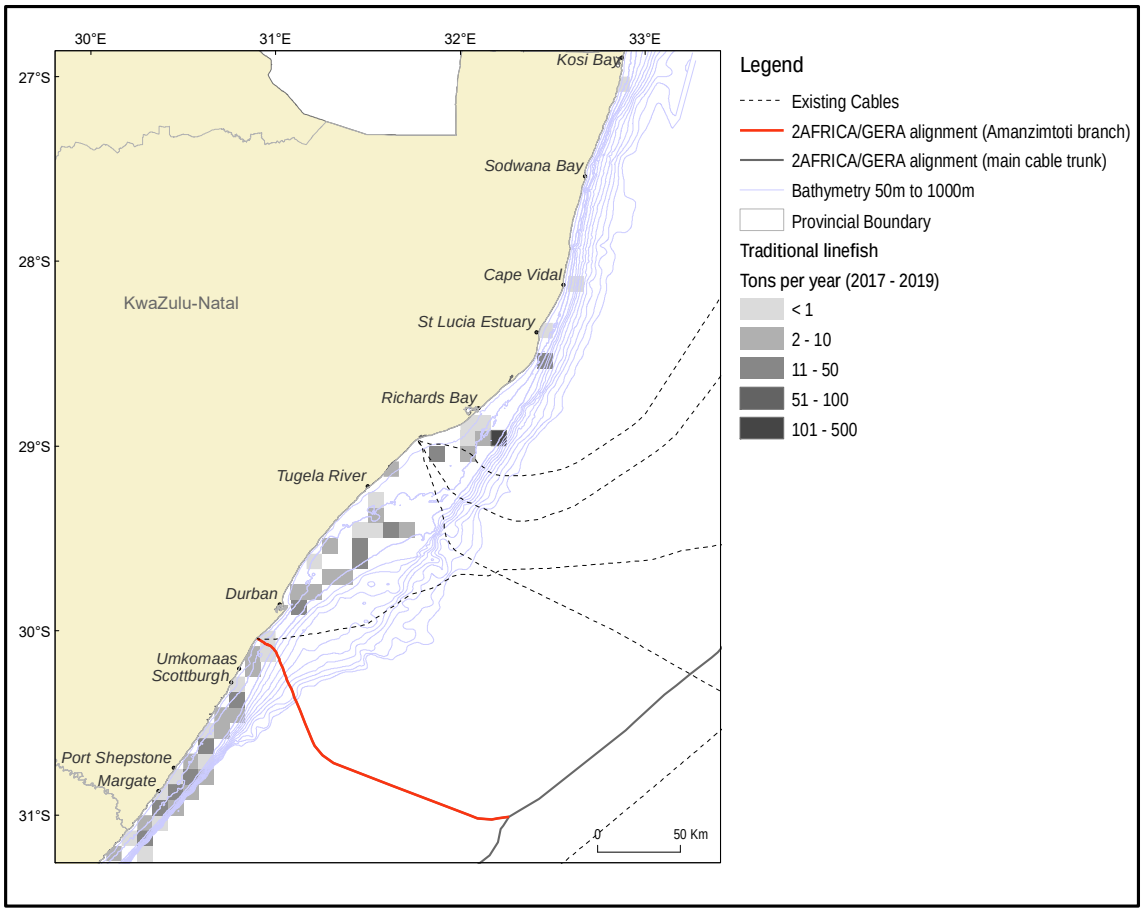


Figure 24 Spatial distribution of catch (2017 – 2019) by the linefish sector in relation to the proposed 2AFRICA/GERA (East) cable landing at Amanzimtoti) (Source - Capmarine, 2021)

6.1.4.3 Crustacean trawl

South Africa's crustacean trawl fishery operates exclusively within the province of KZN. Also referred to as the KwaZulu-Natal prawn trawl sector, the fishery comprises two components: a shallow-water (5–40 m) fishery on the Thukela Bank and off St Lucia across an area of roughly 500 km^2, and a deep-water fishery (100–600 m) that extends between Cape Vidal to Amanzimtoti. The inshore and offshore sectors differ not only in the fishing grounds in which they operate but also in their targeted species and gear types.

The deep-water fishery operates from Amanzimtoti in the south to Cape Vidal in the north, covering approximately 1,700 km^2 along the edge of the continental shelf. The boundary between the delimitation of offshore and inshore fisheries is about seven nautical miles from the shore. Offshore trawling takes place year-round. Targeted species include pink prawns (*Haliporoides triarthus*), red prawns and langoustines (*Metanephrops andamanicus* and *Nephropsis stewarti*), red crab (*Chaceon macphersoni*), and deep-water rock lobster (*Palinurus delagoae*). Catches are packed and frozen at sea and landed at the ports of Richards Bay or Durban.

Many vessels fish in KZN only when prawns are abundant, but then re-locate to other areas (such as Mozambique) in periods when yields in KZN decline and the operation becomes uneconomical. Historically, the nominal fishing effort in the KZN prawn trawl fishery has remained virtually unchanged since 1993, although many of the vessels operate in KZN waters only occasionally. The number of vessels active in the fishery is currently largely dependent on economic factors, with only four vessels active in 2018.

Figure 25 shows the location of fishing grounds in relation to the proposed cable route. Total catch (all species combined) is shown at a display resolution of 5' x 5'. The proposed cable routing coincides with the southern-most extent of crustacean trawl grounds. During the period 2010 to 2019, a total of four trawls crossed the exclusion zone of the proposed cable routing at a depth range of 260 – 270 m. Fishing time in the area amounted to 15 hours (0.03% of total fishing time). Note however that there has been no evidence of trawling across this area since 2012.

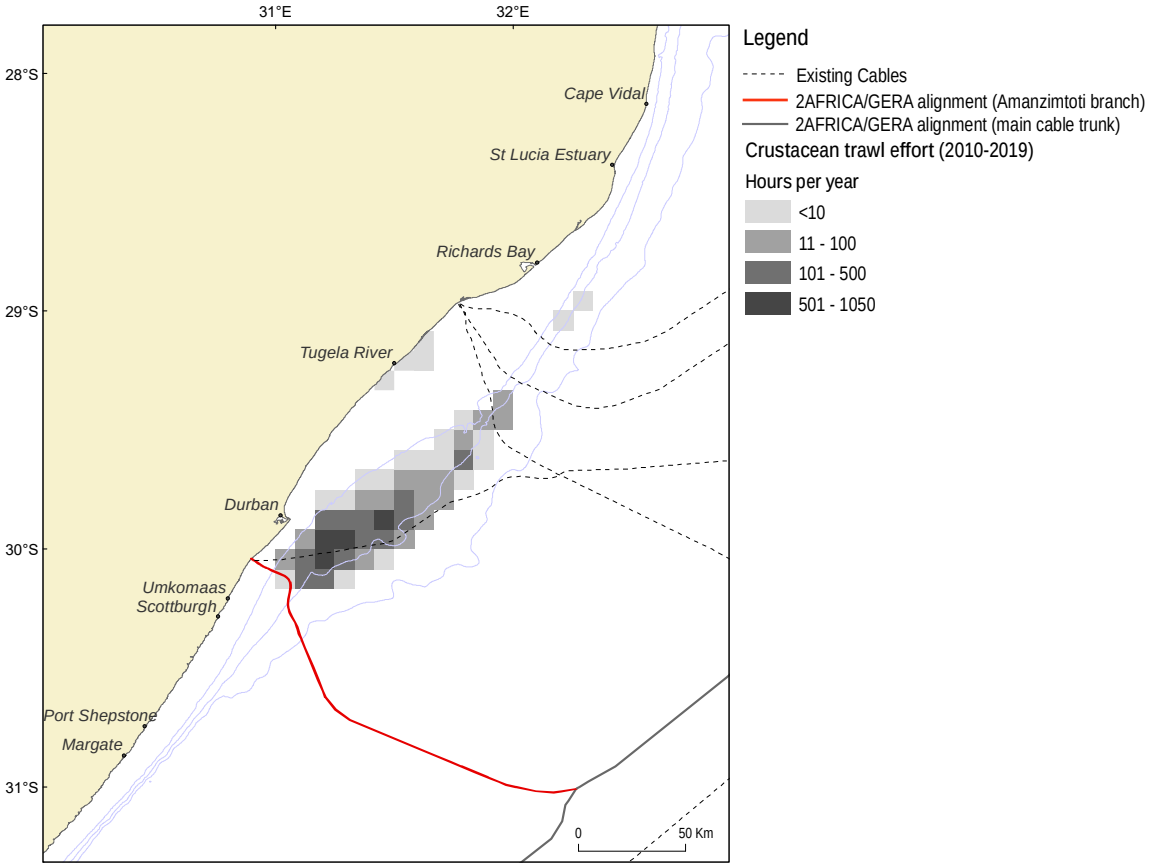


Figure 25 Spatial distribution of fishing effort expended by the crustacean trawl sector in relation to the proposed cable route. Bathymetry shown: 100 m, 500 m, 1,000 m (Source - Capmarine, 2021)

6.1.4.4 Net fish (beach-seine and gill net)

There are a number of active beach-seine and gill-net operators throughout South Africa (collectively referred to as the "net fish" sector). Initial estimates indicate that there are at least 7 000 fishermen active in fisheries using beach-seine and gill nets, mostly (86%) along the West and South coasts. The fishery changes in nature from a largely commercial venture on the West Coast to an artisanal/subsistence fishery on the East Coast. Fishing effort is coastal, with beach-seines set between 50 m and 100 m offshore and gill-nets unlikely to be set in waters deeper than 50 m.

The KwaZulu-Natal Sardine Beach Seine Fishery relies exclusively on the Sardine Run. There are currently 25 operators operating the KZN seashore. It is an opportunistic fishery operation targeting migrating sardines stranded in the shallow waters of the KZN beaches during what is known as the sardine run, which occurs during the winter months. Whilst the run is expected annually, it does not always arrive annually. When it does arrive its duration and size varies. Some runs are longer with more fish whilst others are shorter with fewer fish and sometimes its duration may be longer with less fish.

The mixed shoaling fish beach-seine fishery in KZN has one active right-holder. Netting occurs only in the Vetch's Bight in Durban, when the sea is calm, and generally after a south-westerly wind. The operator has a crew of around 6 people who assist in deploying and/or retrieving the net. Annual catches are extremely variable, owing to the unpredictability of fish shoals occurring within a catchable distance from the shore.

The exploratory KwaZulu-Natal purse-seine fishery targets redeye sardine *Etrumeus wongratanai* (previously *E. teres*) *and E. whiteheadi* which occurs to the east of Port Alfred up to KZN during the sardine run season. There is one permit holder. The fishery uses a small pelagic seine net deployed from a skiboat, targeting redeyes for bait.

The commercial drag net fishery is confined to Richards Bay harbour/estuary; it targets bait organisms (mainly mullet and prawns *Penaeus spp*) by means of a small frame net towed behind a small motorized skiboat. The fishery has not been in operation for the past four years but even when it was in operation, effort was irregular. From the 1970s to 1990 effort varied between 100-300 boat days per year.

6.1.4.5 Oyster

The Oyster fishery targets mainly the Cape rock oyster (*Striostrea margaritacea*) which occurs on rocky reefs from Cape Agulhas to Mozambique. The harvesting of oysters is managed by DFFE within four broad areas namely, Southern Cape, Port Elizabeth, KZN North and KZN South. The northern and southern oyster harvesting zones within KZN are shown in Figure 26. Shore-based collectors pry oysters off rocks and sell the oysters locally. Harvesting takes place during spring low tides from the intertidal zone and shallow subtidal rocky reefs and areas of operation can be considered to extend from the shoreline to the 10 m depth contour.

The number of pickers is limited based on the TAE and a daily bag limit of 190 oysters applies in KZN. Currently, the overall TAE is 145 pickers, 40 of which operate in KZN. A rotational harvesting system is implemented in KZN, whereby the north and south coast are each divided into four zones. Harvesting is limited to only one zone on the north coast and one zone on the south coast for a period of one year, affording each zone a fallow period of three years.

The change over to a new zone occurs on the 1 November each year, which is the start of the peak oyster breeding season in KZN and thus, promotes the recovery of the exploited oyster beds. Oysters are broadcast spawners and those along the KZN coast spawn throughout the year, with peaks during spring and summer.

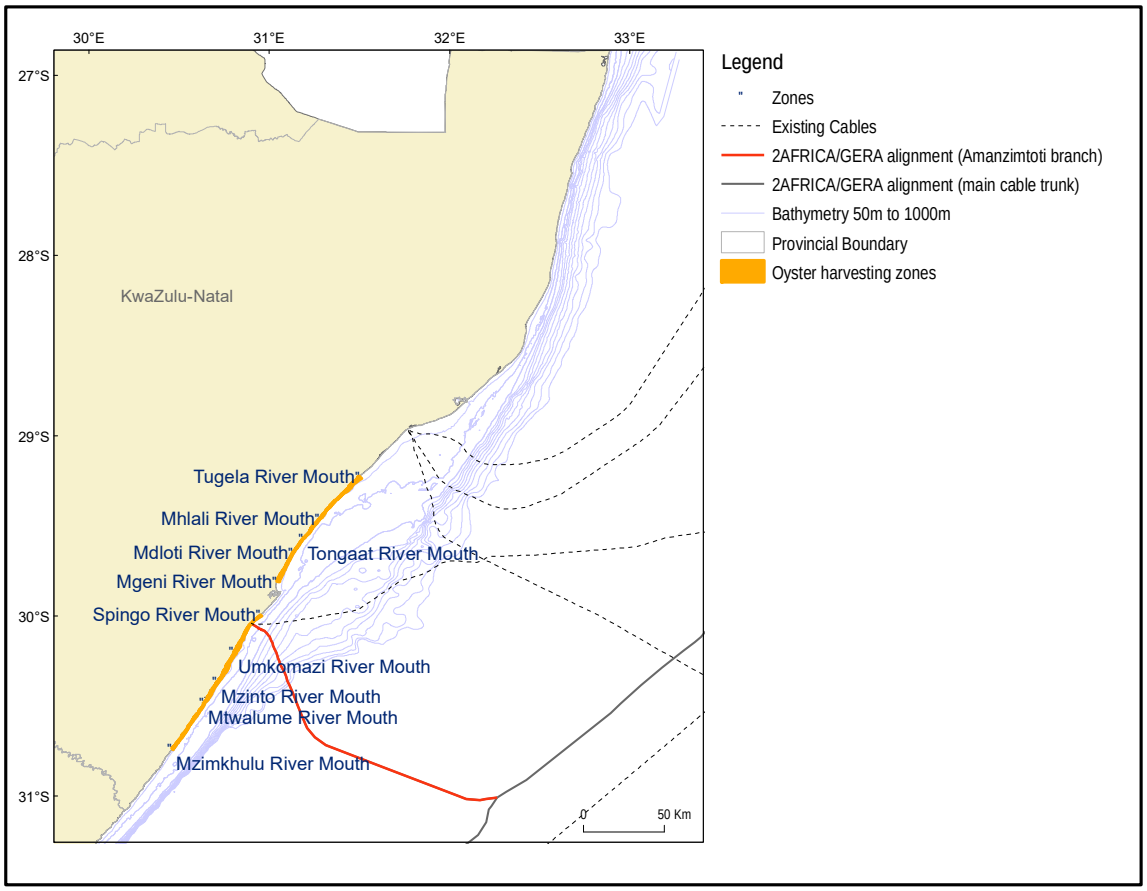


Figure 26 North coast and south coast oyster harvesting zones in KZN (Source - Capmarine, 2021)

6.1.4.6 Exploratory Redeye Jig

An experimental fishery for redeye was commenced in 2013 and three permits in this fishery have been granted annually since then. Participants with experimental permits use small surf-launched paddle skis or inflatable boats and rod and line with small lures to catch redeye sardines (*Etrumeus* spp) which are then sold to fishing shops for re-sale as bait. There are currently three exploratory permit holders but also numerous illegal participants. Almost all of the fishing takes place in the region of Scottburgh, which is located some 30 km north of Amanzimtoti. Catch patterns indicate that this is predominantly a winter fishery with elevated catches over the period April to September.

6.1.4.7 Small-Scale Fisheries

The term small-scale is usually used to distinguish between capital intensive commercial fisheries and low technology, labour intensive fishing activities. Small-scale fishers fish to meet food and basic livelihood needs, and may also directly be involved in fishing for commercial purposes. These fishers traditionally operate on nearshore fishing grounds, using traditional, low technology or passive fishing gear to harvest marine living resources on a full-time, part-time or seasonal basis. Fishing trips are usually of short-duration and fishing/harvesting techniques are labour intensive[26].

Small-scale fishers are an integral part of the rural and coastal communities in which they reside, and this is reflected in the socio-economic profile of such communities. In the Eastern Cape, KZN and the Northern Cape, small scale fishers live predominantly in rural areas while those in the Western Cape live mainly in urban areas. A small-scale fishing right is the right to catch different species of fish in the near shore. These rights are allocated to communities and not to individuals. Small-scale fishing rights have been allocated to 37 communities across the five districts. Approximately 190 small-scale fishers have been registered in the eThekwini district, which comprises five communities closest to Amanzimtoti).

Small-scale fishers along the East Coast are typically involved in traditional line fishery as well as oyster harvesting. SSF are defined as a fishery although specific operations and dynamics are not yet fully defined as they are subject to an ongoing process by DFFE. The small-scale fishery rights cover the nearshore area (defined in section 19 of the MLRA as being within close proximity of the shoreline). In practice these are unlikely to extend beyond 3 nm from the coast.

The location of these coastal communities and the number of fishers per community are shown in Figure 27.

[26] The equipment used by small scale fishers includes rowing boats in some areas, motorized boats on the south and west coast and simple fishing gear including hands, feet, screw drivers, hand lines, prawn pumps, rods with reels, gaffs, hoop nets, gill nets, seine/trek nets and semi-permanently fixed kraal traps.

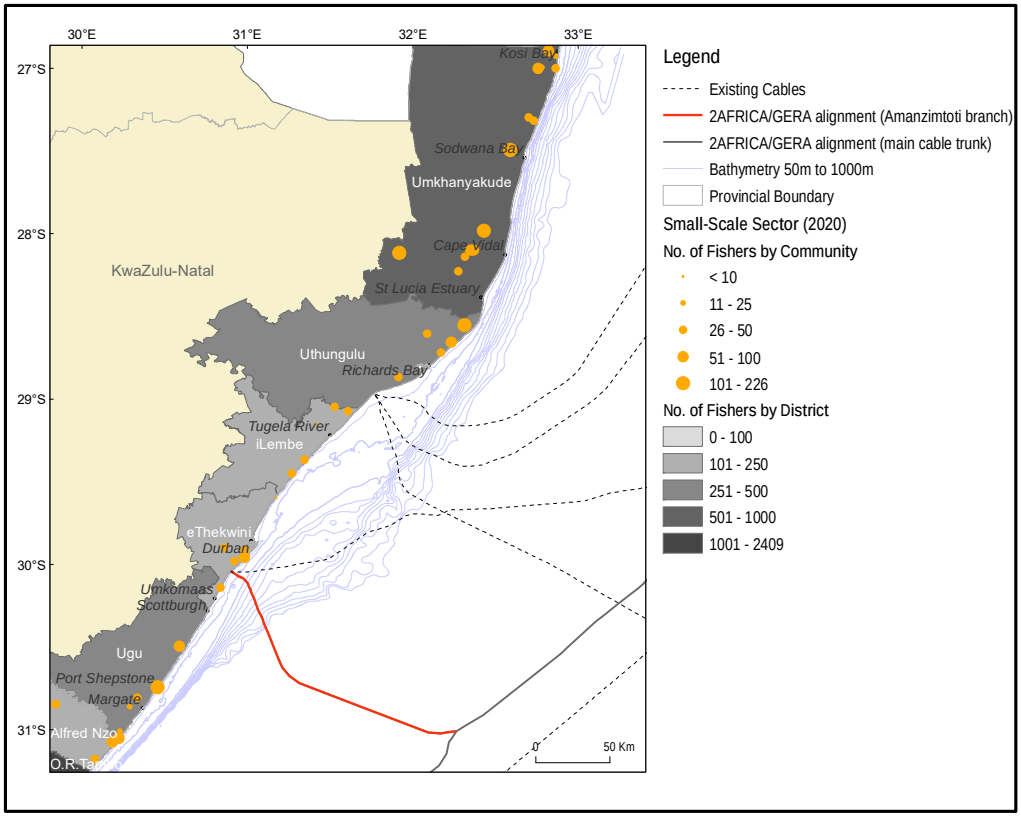


Figure 27 Overview of the spatial distribution of registered small-scale fishing communities and the number of participants by municipal district along the KZN coastline (Source - Capmarine, 2021)

6.1.4.8 Summary of seasonality of catches for commercial fishing sectors

The seasonality of each of the main commercial fishing sectors that operate in the vicinity of the proposed branch cable routing to Amanzimtoti, is indicated in Table 11; also presented is the relative intensity of fishing effort on a month-by-month basis.

Table 11 Summary table showing seasonal variation in fishing effort in the vicinity of the project area

Sector	Fishing Intensity by Month H = High; M = Low to Moderate; N = None											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Large Pelagic Longline	M	M	M	H	H	H	H	H	H	H	M	M
Commercial Line fish	H	M	M	M	M	M	M	M	M	M	M	H
Crustacean Trawl	M	M	M	M	M	M	M	M	M	M	M	M
Small-Scale Fisheries	M	M	M	M	M	M	M	M	M	M	M	M
Recreational Line fish (boat-based)	H	M	M	H	M	M	M	M	M	M	M	H

6.1.5 Recreational fishing

KZN has a large diversity of marine and estuarine organisms and the methods of harvesting them are equally diverse.The recreational sectors that are active off the KZN coastline comprise shore-based, estuarine and boat-based line fisheries as well as spearfishing. Net fisheries for recreational purposes include cast, drag and hoop net techniques.

Recreational shore-based fishing (angling), is a recreational activity that takes place from the shoreline, using a hook and line. The fishery is open access and widely distributed along the entire KZN coastline, including at Amanzimtoti. A wide variety of fish species are targeted, including shad (*Pomatomus saltatrix*), karanteen (*Sarpa salpa*) and blacktail (*Diplodus capensis*).

Boat based recreational fishing (primarily ski-boats) is very popular and a wide variety (approx. 78 species) of pelagic and demersal reef fish species are caught using rod and reel. The launch sites closest to Amanzimtoti include Umkomaas, Warner Beach, Chain Rocks and Reunion/Isipingo and used for recreational fishing, charter scuba diving and charter fishing. Effort is focused on reefs and Aliwal Shoal is a favoured fishing area in the vicinity of the proposed cable routing to Amanzimtoti. The spatial distribution of offshore fishing activity by recreational, charter and spearfishing launches during 2012 is shown in Figure 28.

Several marine and estuarine invertebrate species are collected by recreational harvesters in KZN estuaries, along sandy beaches, within the intertidal zone on rocky shores and on shallow inshore reefs.

Other recreational fisheries along the KZN coast, for which there is little data, are the cast net, drag net and hoop net fisheries.

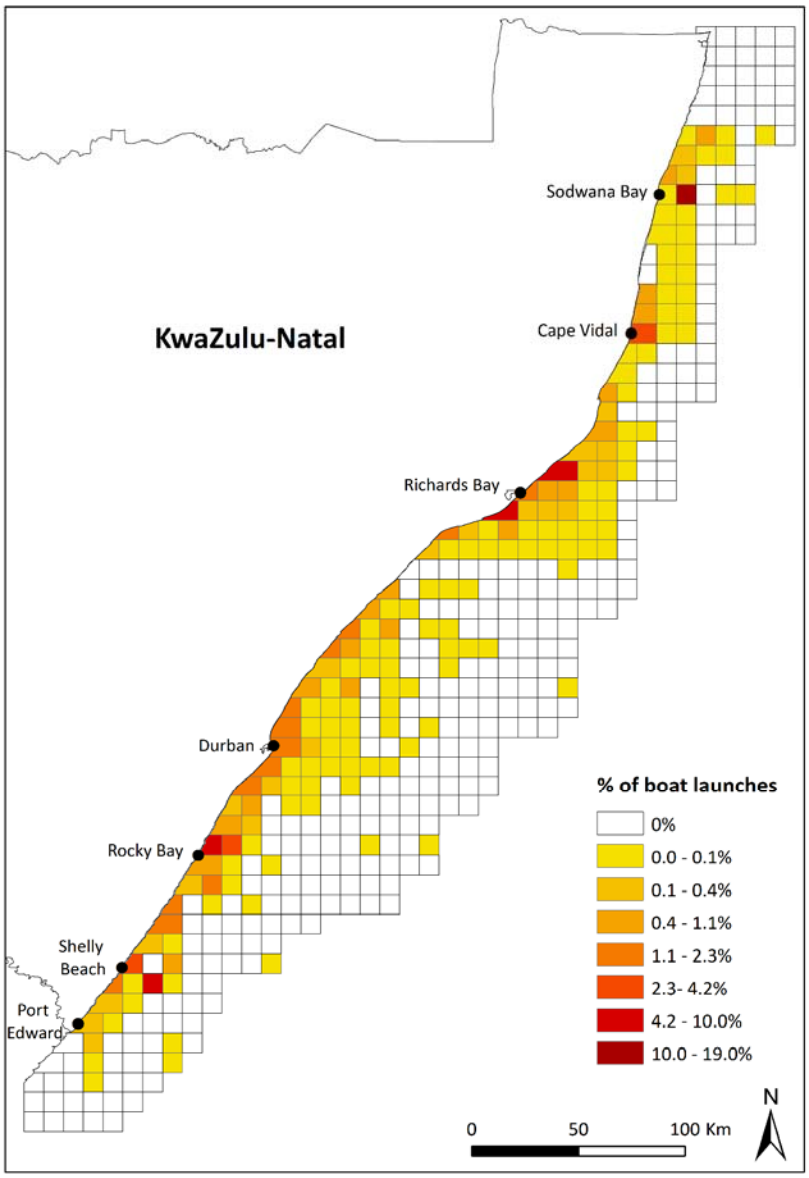


Figure 28 Map of the KwaZulu-Natal coastline showing the spatial distribution and intensity of use by recreational fishing, charter fishing and spearfishing launches recorded in 2012. Data are expressed in terms of percentage of launches where destination was specified (Source Mann *et al*., 2015, cited in Capmarine, 2021)

6.1.6 Aquaculture

No areas under aquaculture are affected by the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing).

6.1.7 Offshore mining and exploration concessions holders

Approximately 98% of South Africa's EEZ is subject to a right or lease for offshore oil and gas exploration or production[27]. The Petroleum Agency South Africa (PASA) is responsible for the 'promotion and regulation of offshore exploration and production' and maintains a national database of petroleum exploration and production. Over the past decade (since 2006) this database has shown a rapid increase in the application and grant of offshore rights and leases. The South African government has also actively promoted offshore oil and gas exploration through Operation Phakisa, which seeks to support the rapid development of the offshore oil and gas sector by "*creating an environment that promotes exploration*"

The South African continental shelf and economic exclusion zone have been partitioned into Licence blocks for petroleum exploration and production activities. Exploration has included extensive 2D and 3D seismic surveys and the drilling of four exploration wells on the Thukela Bank (Figure 29). Although no wells have recently been drilled in the area, further exploratory drilling is proposed for two areas of interest in ER236. The marine cable (Amanzimtoti branch line) crosses an offshore O&G lease area under SP/ENI who have been consulted and have issued ASN with a letter of no objection in terms of the proposed installation of the 2AFRICA/GERA (East) Cable System.

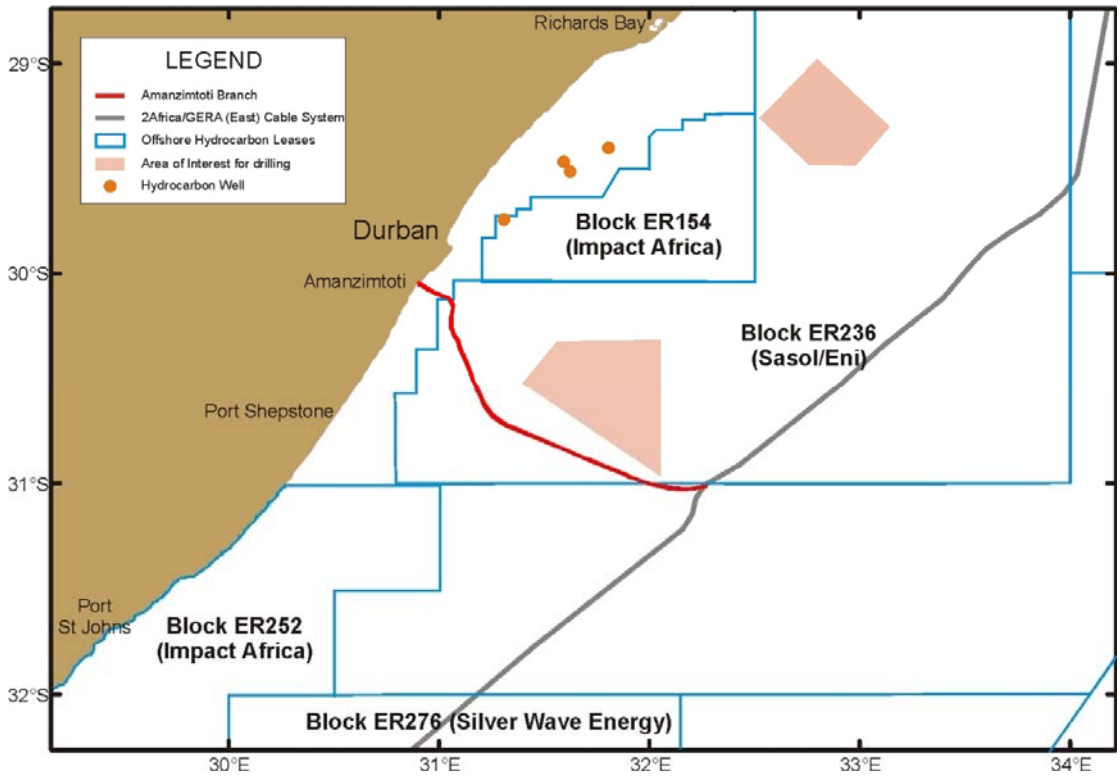


Figure 29 The proposed Amanzimtoti branch (red line) of the main trunk (grey line) of the 2AFRICA/GERA (East) Cable System in relation to hydrocarbon Exploration Rights Blocks, areas of interest for drilling and existing hydrocarbon wells (Source: Pisces, 2021)

27 https://www.seafoodsource.com/news/environment-sustainability/proposed-oil-exploration-raises-concerns-from-south-africa-s-fishing-industry.

6.1.8 Offshore submarine cable and pipeline infrastructure

6.1.8.1 Submarine cables

The Amanzimtoti branch cable of the 2AFRICA/GERA (East) Cable System (will cross the METISS cable close to the landing point (Figure 30). Further offshore, the cable is located in proximity to the SAFE cable (Figure 31).

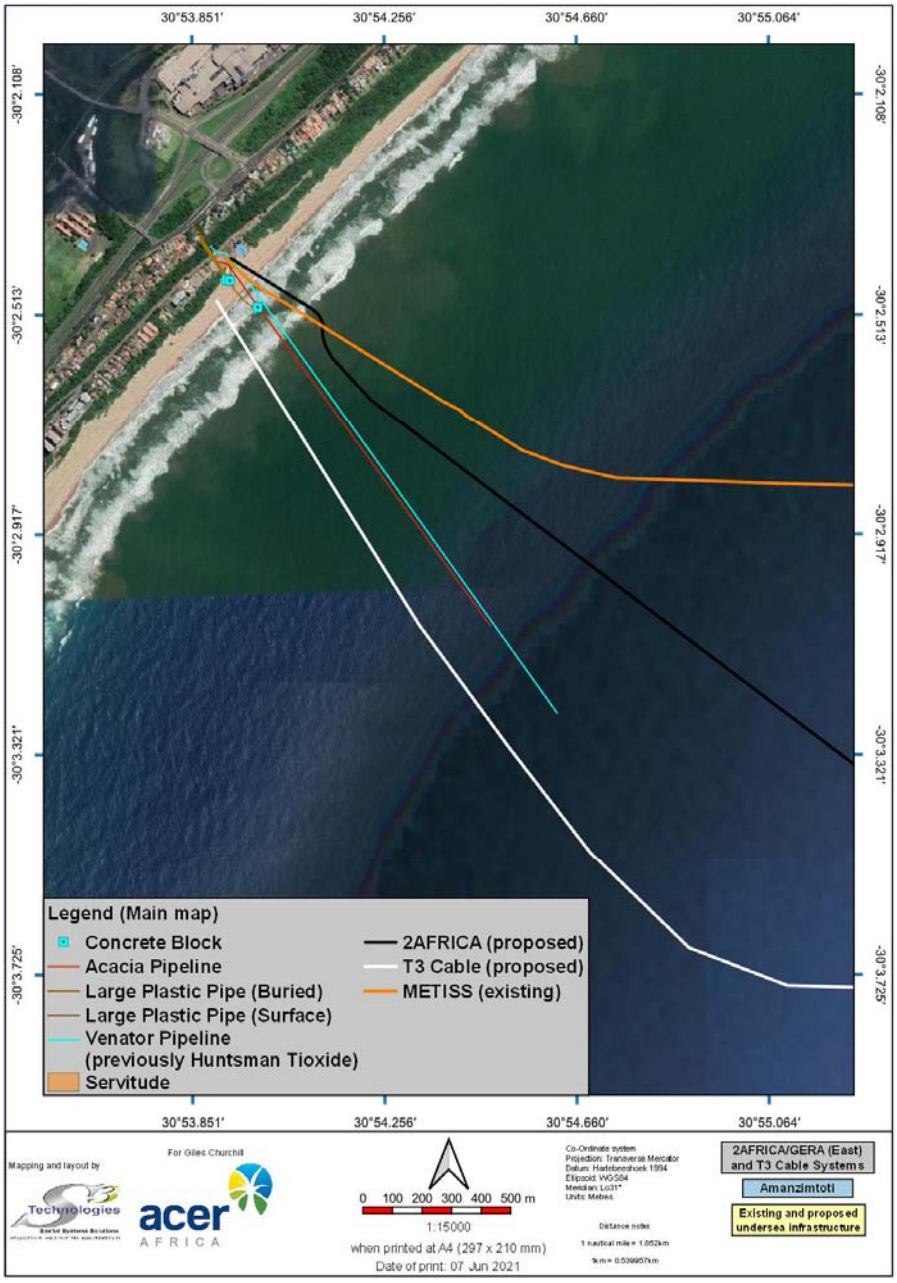


Figure 30 2AFRICA/GERA (East) Cable System in relation to other submarine cables and effluent pipelines near the landing point at Pipeline Beach

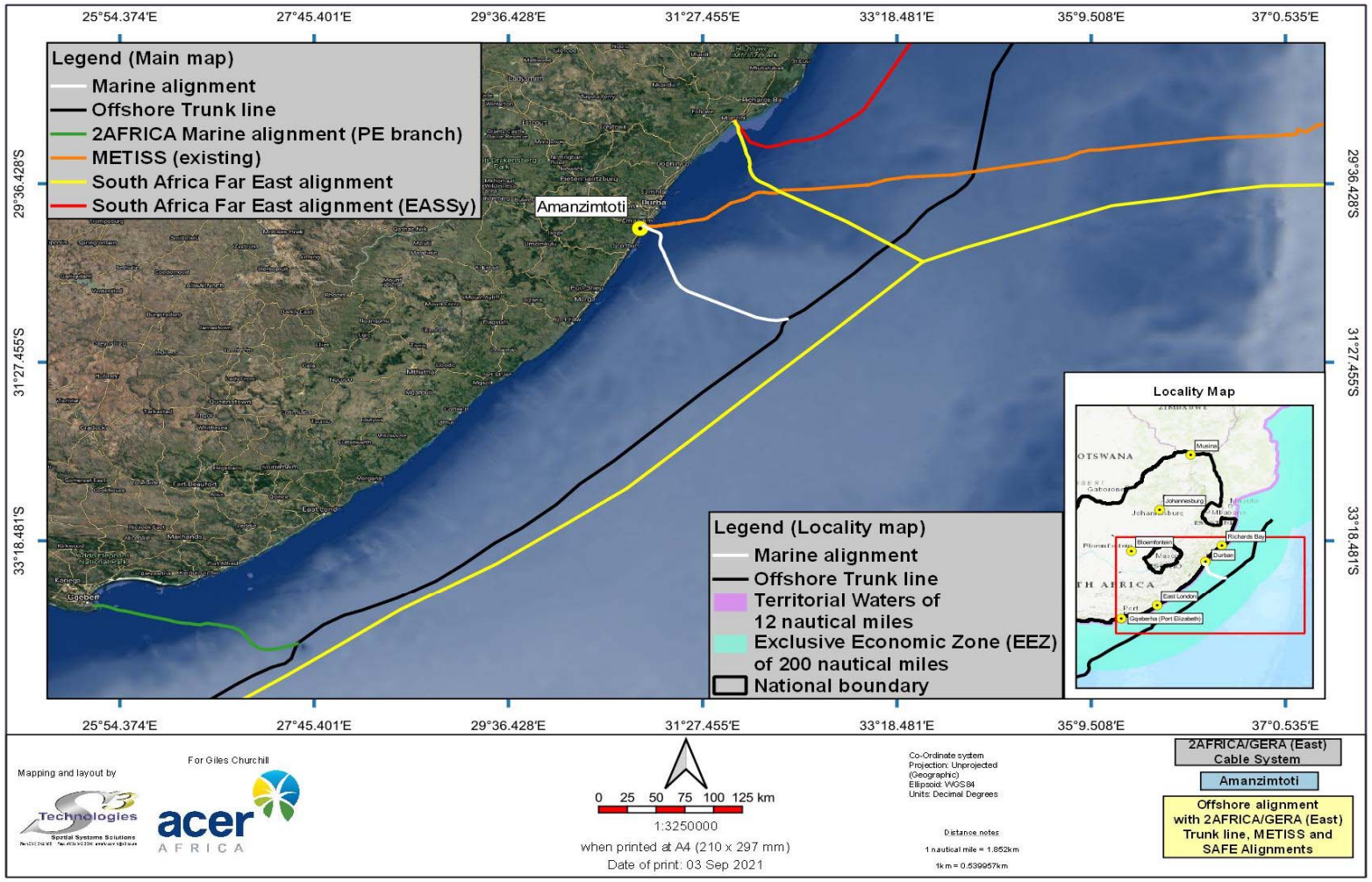


Figure 313 2AFRICA/GERA (East) Cable System in relation to other submarine cables along the south and east coasts of South Africa

6.1.8.2 Submarine pipelines

No pipeline crossings have been identified for the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing).

6.1.8.3 Offshore single buoy mooring for offloading of crude oil

Eighty percent of all crude oil imports to South Africa, come through Durban's single buoy mooring which is anchored 2.6 km off Reunion (on the Bluff), with a 1.6 km exclusion zone around it. Two pipelines connect the single buoy mooring south of Durban to the SAPREF refinery at Isipingo (about 9 km north of the proposed landing at Amanzimtoti). TNPA has been notified about the proposed cable system landing at Amanzimtoti.

6.1.8.4 Outfall Pipelines

Pipeline Beach as the name implies, is host to various pipelines (as shown in Figure 30).

- ❒ Three large plastic pipes, of which two terminate in concrete blocks on the upper beach and one in a concrete block in the surf zone.
- ❒ The Venator (previously Huntsman) pipeline (1.8 km) discharging from the Titanium dioxide plant, which closed in 2016.
- ❒ The Acacia (AECI) pipeline discharging wastewater from the AECI laboratory in Umbogintwini is buried under the ground and extends 1.5 km out to sea[28].

While the proposed 2AFRICA/GERA (East) Cable System (Amanzimtoti landing) does not cross the pipelines mentioned above, it does traverse the area where benthic sampling is undertaken near the pipeline outfall (refer to next section).

6.1.9 Marine benthic research sampling near Amanzimtoti Pipeline Beach (marine outfall)

AECI Property Services receives wastewater from various points of generation within the Umbogintwini Industrial Complex and treats the wastewater at the effluent treatment plant on site. Thereafter, the effluent is discharged under permit issued in terms of Section 69 of the ICMA into the coastal environment via the marine outfall (known as the Venator Pipeline, previously the Huntsman Pipeline).

[28] AECI Property Services receives wastewater from various points of generation within the Umbogintwini Industrial Complex and treats the wastewater at the effluent treatment plant on site. Thereafter, the effluent is discharged under permit issued in terms of Section 69 of the ICMA into the coastal environment via the marine outfall.

APS engages annually in the Amanzimtoti Marine Benthic Monitoring program to document the marine environmental impacts of the titanium dioxide (TiO_2) production acid iron effluent and subsequently the effects of the combined wastewater from other companies operating from the Umbogintwini Industrial Complex site. The sampling points are offshore on the seabed, in proximity to the Venator Pipeline as described above (Figure 32).

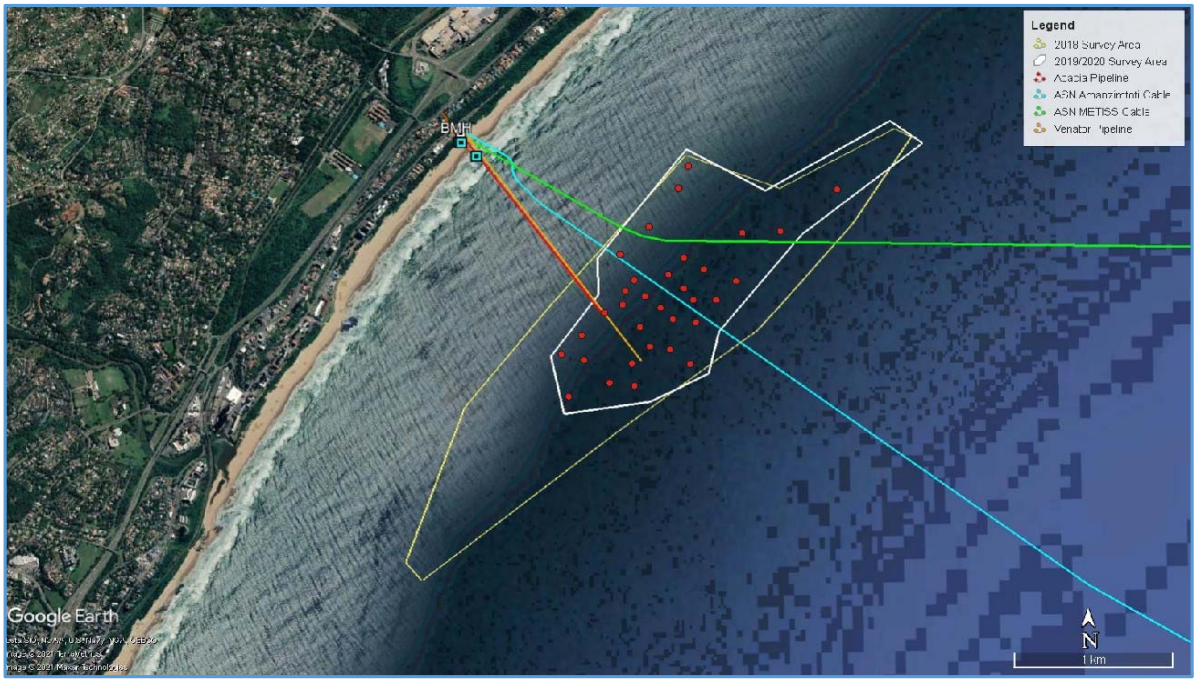


Figure 32 Benthic sampling area in relation to the effluent pipelines and the proposed 2AFRICA/GERA (East) Cable System (Amanzimtoti landing) at Pipeline Beach

6.1.10 Shipping and ports

South Africa is positioned on a major shipping route and has 8 commercial ports and 44 non-commercial harbours (CSIR, 2016). The Ports of Richards Bay and Durban both lie on the East Coast. A large number of vessels in transit navigate along the East Coast on their way around the southern African subcontinent (Figure 33). Most of this marine traffic, including commercial and fishing vessels, remains relatively close inshore on the East Coast. North- and south-bound cargo vessels usually remain over the mid-shelf (100 m isobath). In contrast, tankers and bulk carriers remain further offshore, unless needing to move inshore to avoid extremely rough conditions that develop in the Agulhas Current.

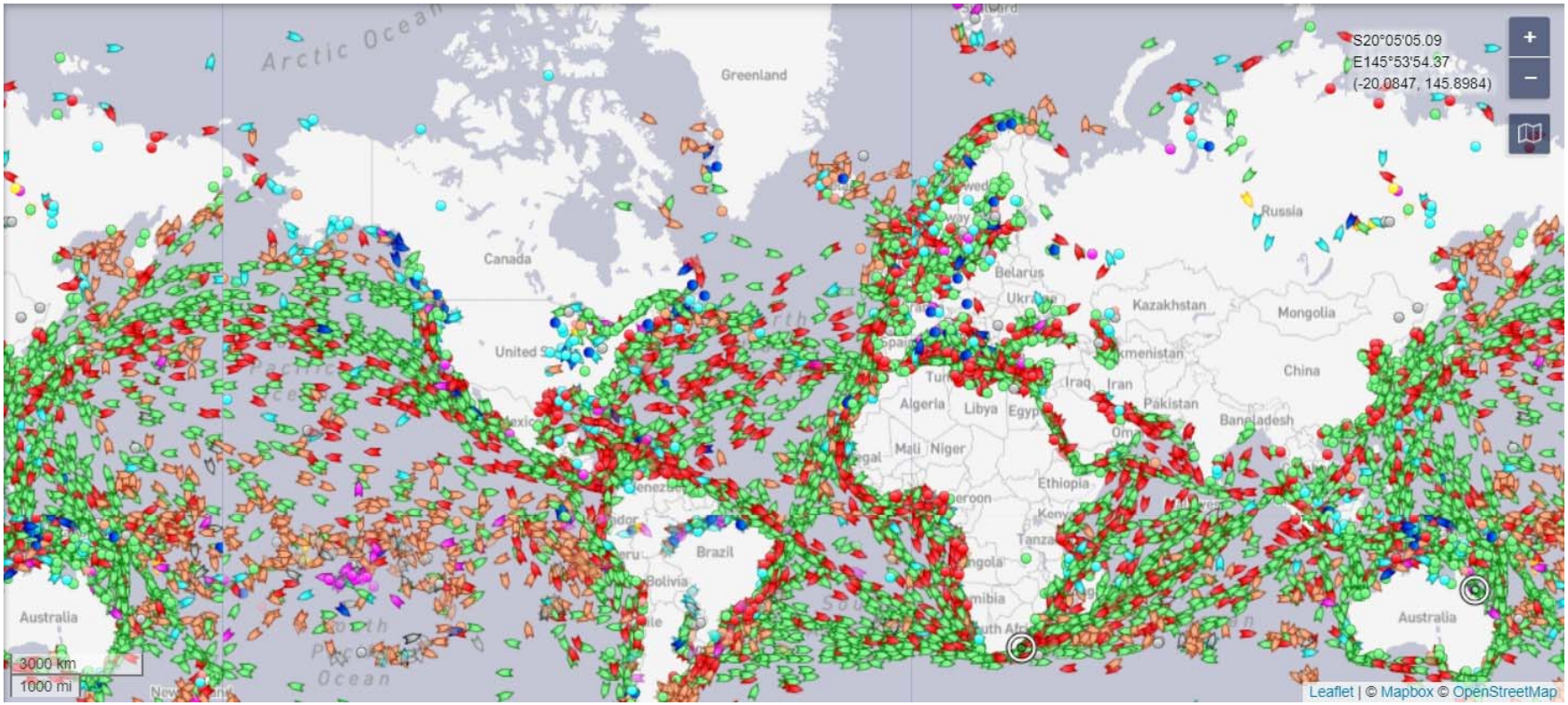


Figure 33 Screenshot of world marine traffic (live map 27 August 2021, source https://www.marinetraffic.com)

6.1.11 Military bases

Various military bases are situated in Durban, including the Naval Base at the Durban Harbour and the Air Force Base at the site of the old Durban International Airport. The South African National Defence Force has been notified about the proposed 2AFRICA/GERA (East) Cable System landing at Amanzimtoti.

6.1.12 Boat launching sites

The nearest boat launch sites to Amanzimtoti are at Chain Rocks and Warner Beach (≤ 6 km away). They are administered by eThekwini Municipality.

6.1.13 Beach and nearshore based tourism and activities at Amanzimtoti

The public beaches at Amanzimtoti are well used and busy, especially during peak season (November to April). The beaches are used for general recreational activities and for shore fishing. There are various facilities such as public pools, water slides, and food outlets at the beachfront. During the sardine run (June/July), the beaches see a flurry of fishing and spectating activities. Activities nearshore include swimming, wave-surfing, windsurfing, kitesurfing, fishing (on and offshore), ski-boating, scuba diving and spearfishing. Shark nets are provided, as well as lifeguards at designated swimming areas on weekends and during other peak times.

6.2 Beach and terrestrial environment

6.2.1 Threatened Terrestrial Ecosystems

The South African National Biodiversity Institute (SANBI) and DFFE, in accordance with the National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004), provides a listing of Threatened or Protected ecosystems, categorised by four categories, namely Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Protected.

The study area for the proposed 2AFRICA/GERA (East) Cable System (Amanzimtoti landing) falls within the Southern Coastal Grasslands (CR) ecosystem. Although the study area is substantially transformed by urban development, there are sections of indigenous coastal thicket considered to be of conservation importance.

6.2.2 Reference vegetation types

The terrestrial components of the proposed 2AFRICA/GERA (East) Cable System (Amanzimtoti landing) fall within the following reference vegetation types (ENVASS, 2021) (Figure 34):

- KZN Coastal Belt Grassland (CR)
- KZN Dune Forest: East Coast Dune Forest (CR)
- Subtropical Seashore Vegetation (Least Threatened).

It should be noted, however, that the project footprint does not impact directly on grassland or forest vegetation.

6.2.3 Provincial conservation planning (terrestrial)

According to EKZNW's Systematic Conservation Plan for KZN, the proposed BMH alternatives and a portion of the front haul alignment fall within conservation planning units classified as CBA: Irreplaceable (Figure 35). Irreplaceable units are "considered critical for meeting biodiversity targets and thresholds, and which are required to ensure the persistence of viable populations of species and the functionality of ecosystems". No Environmentally Sensitive Areas or areas protected under the Protected Areas Act (Act no 57 of 2003) fall within the study area.

6.2.4 Municipal Conservation Planning and D'MOSS

The city does not have an Environmental Management Framework as it relies on D'MOSS and its own Systematic Conservation Assessment (Mclean *et al*., 2016) to perform the same role.

While the affected study area has no formally protected areas, it does contain areas which form part of the Durban Metropolitan Open Space System. The D'MOSS, currently 94 000 hectares in extent, is a spatial layer of interconnecting open spaces in public, private and traditional authority ownership that seeks to protect the biodiversity and associated ecosystem services of Durban for future generations. Examples of areas included in D'MOSS are nature reserves, large rural landscapes in the upper catchments and riverine and coastal corridors. D'MOSS is mapped by the EPCPD in consultation with relevant experts (http://www.durban.gov.za/).

D'MOSS presents a unique opportunity to conserve many local, regional and even internationally important ecosystems and species, which is also a tool used to meet the provincial and national biodiversity conservation targets. Natural and semi-natural systems within the eThekwini Municipality are reported to give rise to flows of Ecosystem Services (ESS) worth at least R 4.2 billion per annum (ENVASS, 2021)). The total value of the natural assets conserved within D'MOSS was estimated to be at least R 48 to R 62 billion (ENVASS, 2021). These areas are therefore essential to the natural and anthropogenic environments and must therefore be conserved as far as reasonably possible.

As shown in Figure 35, the dune which the cable will cross to link into the BMH, forms part of D'MOSS.

6.2.5 Ecological drivers

The key ecological drivers in coastal ecosystems and of relevance to this project include:

- The prevailing wave regime.
- Wind.
- Mobility of sand.
- Nearshore sand circulation, and offshore sediment transport.
- Colonisation of dune vegetation.

6.2.6 Amanzimtoti beach and coastal dunes

As illustrated in Plate 18, Plate 19 and Figure 36, the beach and dune environment at Amanzimtoti- North can be described as being a relatively straight portion of shoreline, stretching between the Nyoni Rocks in the south and the Umbogintwini River in the north, forming a shallow embayment. At the point of the cable landing, the sand sharing system can

be considered to be relatively wide and generally shows a wide sub-tidal and inter-tidal environment with an offshore bar that ranges up to 200m from the shoreline. The beach is backed by a steep vegetated dune cordon that shows a high level of transgression[29] in and around the beach facilities. It is described as a dissipative beach with sustained moderate to high inflation (SDP, 2021) (Appendix B). Figure 36 illustrates the direction of the literal drift and also indicates the prevailing winds and wave roses for the region.

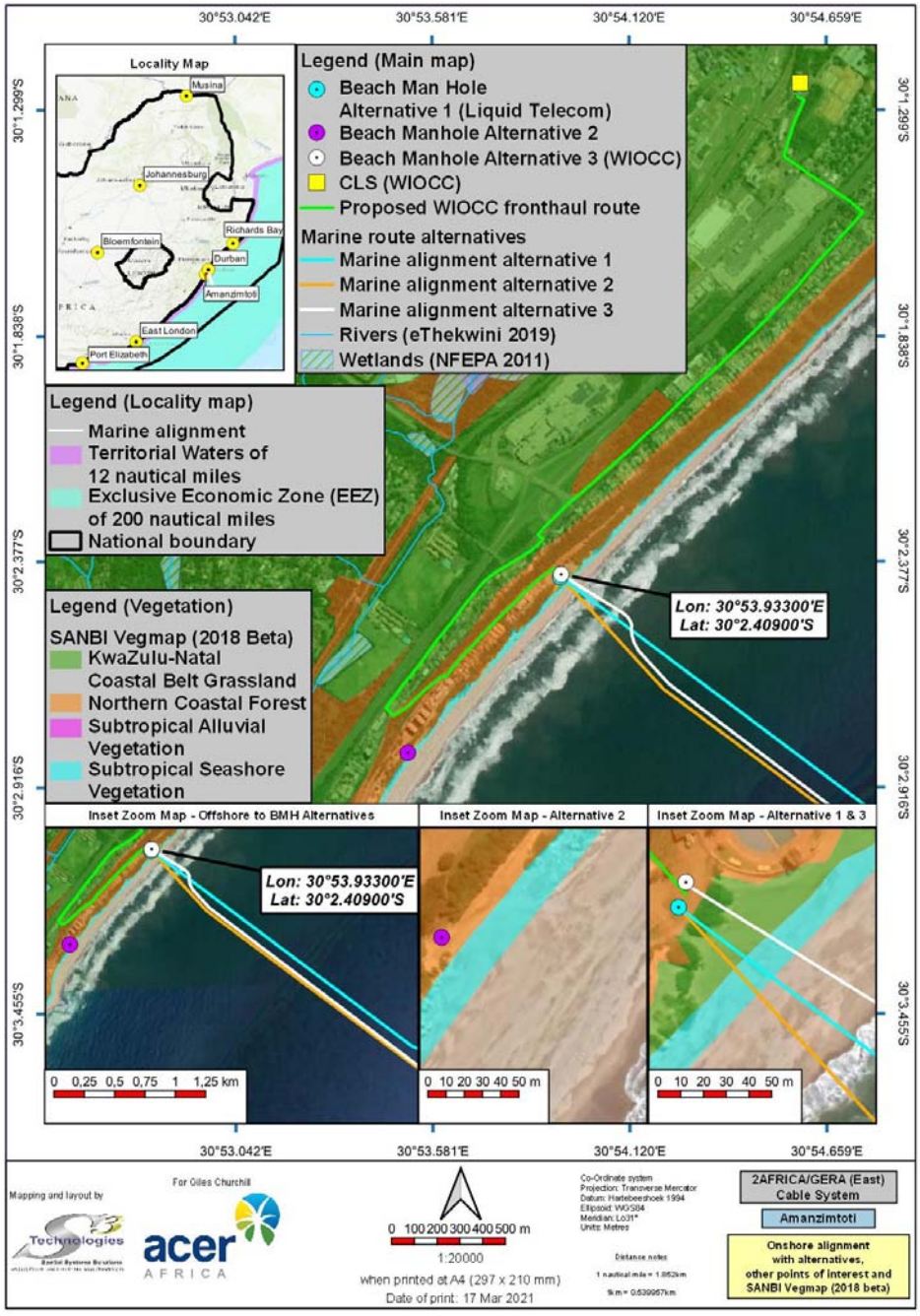


Figure 34 Reference Vegetation Types in the study area (SANBI, 2018)

29 Transgressive dune fields have also been termed mobile dunes, sand drifts, and migratory dunes.

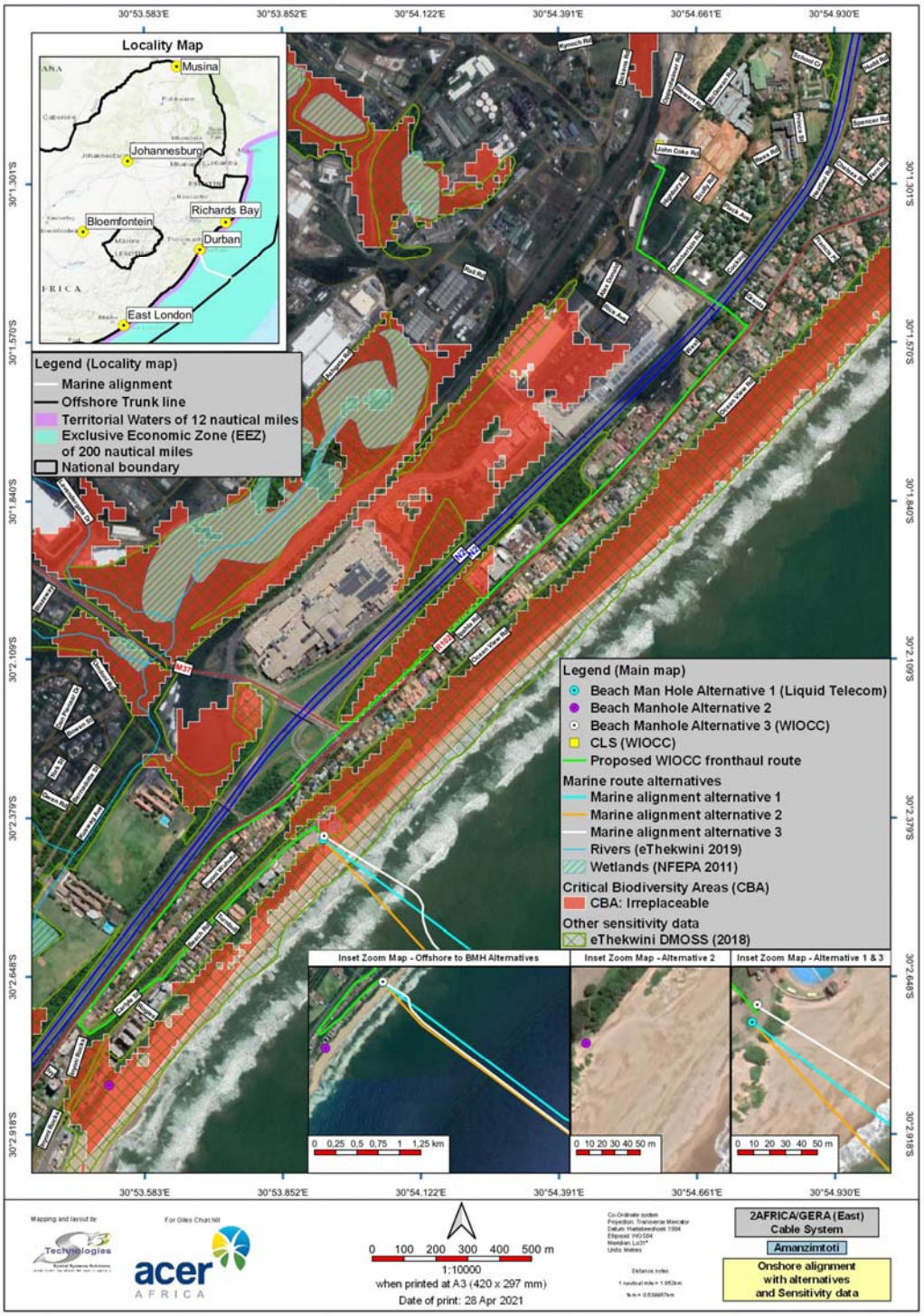


Figure 35 Critical Biodiversity Areas and D'MOSS areas occurring in the study area

Plate 3 **Photo of beach and dune showing dissipative beach and ephemeral vegetated dune in background in the vicinity of the proposed Amanzimtoti landing site (Source: SDP, 2021)**

Plate 4 **Google Earth image showing the extent of transformation of the coastal dunes Amanzimtoti Beach**

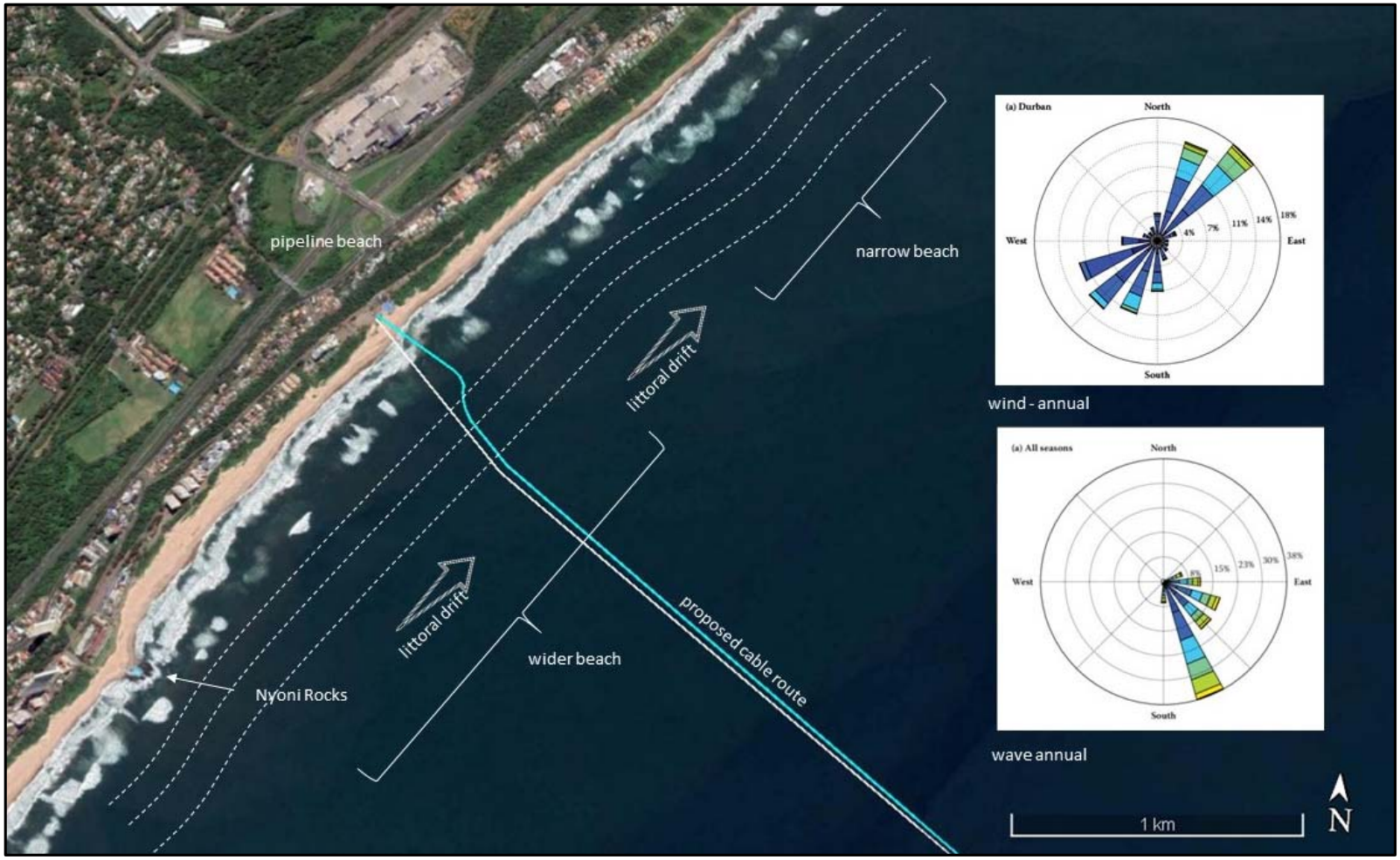


Figure 36 Aerial photograph showing features and coastal dynamics at site of cable landing, Pipeline Beach, Amanzimtoti (Source: SDP, 2021)

6.2.7 Vegetation on site

ENVASS (2021) (Appendix B) identified three broad habitat units (HU) within the study area, viz: Coastal thicket, Degraded land and the Seashore zone.

The coastal thicket (Plate 20) comprises tall/medium height subtropical coastal forest with a thicket canopy. The dominant woody species include *Drypetes natalensis, Brachylaena discolor*, *Albizia adianthifolia, Englerophytum natalense* with *Strelitzia nicolai* dominating the fringes of the areas of dense canopy. The shrub and herb undergrowth consisted of *Sideroxylon inerme, Dovyyalis longispina* and *Psydrax obovata subsp. obovata*. *Dracaena aletriformis* were identified within the ecotone of the habitat unit along with *Trema orientalis* within the road reserve, presumably planted there for aesthetic appeal. Encroachment by alien invasive plants, including *Ricinus communis*, *Melia azedarach, Rubus cuneifolius, Lantana camara* and *Bidens Pilosa*, is also evident.

Two protected tree species, namely *Mimusops caffra* and *Sideroxylon inerme* were observed during site visits in the coastal thicket of the study area but not within the actual project footprint.

Much of the study area is degraded land, which is highly altered in comparison to the reference vegetation. It is dominated by hardened surface such as pavement, concrete and tar with urban lawns and sparse woody species providing little diversity. Some indigenous species have been planted.

The affected area of the Seashore Zone is associated with the reference vegetation type Subtropical Seashore Vegetation. The BMH sites are however situated within a completely transformed area (tar and grass). The vegetated dune in front of the proposed BMH sites is dominated by the dune pioneer species, *Scaevola plumereii,* while the beach itself obviously has no plant life (Plate 21).

6.2.8 Freshwater resources and wetlands

The terrestrial portion of the cable falls within the Mgeni Sub-Water Management Areas (WMA) of the larger Mvoti to Umzimkulu WMA.

As confirmed by ENVASS (2021) (Appendix B), one (1) natural wetland classified as a Unchannelled Valley Bottom wetland is situated within 500 m of the proposed development (Figure 37). It is, however, situated approximately 250 m northwest of the proposed development, separated by the National Route 2 (N2) highway and a sports field, and not deemed at-risk. No National Freshwater Ecosystem Priority Areas (NFEPA) rivers were identified within the study area and the region was not classified as any type of FEPA.




Plate 20 **Photos showing grassed verges and coastal thicket along the terrestrial cable alignment between the Beach Manhole and Cable Landing Station at Amanzimtoti (Source: ENVASS, 2021)**


Plate 21 ***Scaevola plumereii*** **(left) is the dominant dune plant in front of the proposed BMH site (which can be seen in the background of the photo on the right)**

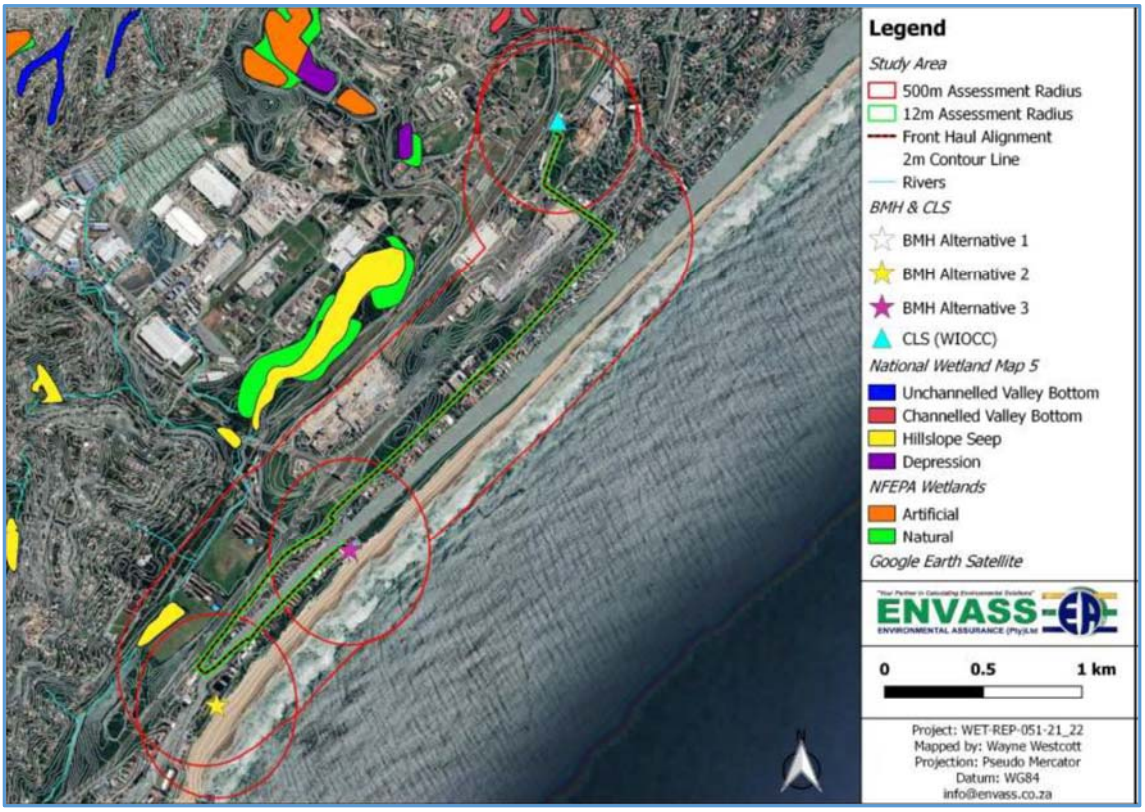


Figure 37 Illustration of the NFEPA wetlands and National Wetland Map 5 within and around the proposed development study area (Source: ENVASS, 2021)

6.2.9 Fauna and avifauna

Although the proposed terrestrial portion of the 2AFRICA/GERA (East) Cable System (Amanzimtoti landing) will be located in transformed areas, the adjacent coastal dune vegetation and thicket in the DMOSS areas provide habitat for various faunal species. Based on a review of the Quarter Degree Square 3030BB, the ecological specialist study (ENVASS, 2021) indicates that 224 species of moths and butterflies, 6 mammal species, 17 amphibian and 21 reptile species have been recorded in this area. Five species potentially occurring in the area are considered to be Species of Conservation Concern (Table 12).

Table 12 Herpetofauna Species of Conservation Concern and likelihood of occurrence within the study area (Source: ENVASS, 2021)

#	Common Name	Scientific Name	Status	Likelihood of occurrence
1	KZN Dwarf Chameleon	*Bradypodion melanocephalum*	NT	Likely
2	Spotted Shovel-nosed Frog	*Hemisus guttatus*	NT	Likely
3	Pickersgill's Reed Frog	*Hyperolius pickersgilli*	EN	Likely
4	Kloof Frog	*Natalobatrachus bonebergi*	EN	Unlikely
5	Durban Dwarf Burrowing Skink	*Scelotes inornatus*	CR	Likely

KEY: CR- Critically Endangered, EN- Endangered, NT- Near Threatened (IUCN, 2019).

According to the South African Bird Atlas Project 2 (SABAP2), there are approximately three hundred and eleven (311) bird species that have been sighted within QDS 3030BB. Of these, only four (4) are SCC (Table 13). None of the potential SCC were observed within the study area during the once-off field survey.

Table 13 Avifauna SCC and likelihood of occurrence within the study area (ADU, 2020)

LIKE#	Common Name	Scientific Name	Status	Likelihood of occurrence
1	Sooty Falcon	*Falco concolor*	VU	Moderately Likely
2	Lanner Falcon	*Falco biarmicus*	VU	Moderately Likely
3	Martial Eagle	*Polemaetus bellicosus*	EN	Unlikely
4	African Crowned Eagle	*Stephanoaetus coronatus*	NT	Likely

KEY: EN- Endangered, NT- Near Threatened, VU

6.3 Climate

6.3.1 Prevailing climate and weather

As reported in ACER (2021), Durban has a warm subtropical climate with warm wet summers and mild, dryer winters. Average air temperatures for Amanzimtoti recorded in the past 10 years range between a minimum of 14ºC and maximum of 26ºC. Rain falls throughout the year (approximately 975 mm average annual rainfall) with peak rainfall occurring during the summer months. Prevailing winds along the coast are north easterly and south westerly. The windier part of the year is from August to January. Over the year, average wind speeds range between 10 to 15 km per hour. In August, gusts in the Durban area measure a maximum average speed of 25 km per hour.

6.3.2 Climate change

eThekwini's IDP recognises the need to plan and adapt, in a multi-disciplinary way, to the challenges of climate change, which include extreme weather events. The shoreline is vulnerable to extreme weather events and to sea level rise. The National Oceanographic and Atmospheric Administration identifies a sea level rise rate of 1.94mm/year for Durban, a slightly higher rate of increase than that reported by South African authors (SDP, 2021).

6.4 Topography and geology

eThekwini is generally very hilly. The sandy beach at the Amanzimtoti landing site is 80-100 m wide, sloping up to an altitude of approximately 12 m above sea level (asl) at the beach carpark. The area immediately behind the beach has been levelled for beachfront development and access roads. The coastal sand dunes behind this development rise steeply to an altitude of about 50 m asl just east of the N2 National Road. The topography undulates inland (https://en-za.topographic-map.com/maps/77od/KwaZulu-Natal/).

The proposed landfall site for the 2Africa/GERA undersea cable lies on the Umkwelani Formation (Uloa Subgroup, Maputaland Group) coastal sands and calcarenite of Quaternary age (formerly the Bluff and Berea Formations). Sands within the beach profile can be classed as fine to coarse materials.

6.5 Socio-economic overview of the receiving environment

The eThekwini Metropolitan Municipality is large, stretching from Tongaat in the north to Umkomaas in the south and Cato Ridge to the west. It is demarcated into 5 planning regions, with the suburb of Amanzimtoti located in Ward 97 of the South region.

6.5.1 Development planning context

There are several national, provincial and local policies and plans relevant to the study area, which have been discussed in detail in the Scoping Report (ACER, 2021), in as far as they relate to the development of telecommunications infrastructure in the country.

Notably, in South Africa, the Presidential Infrastructure Coordinating Commission (PICC) launched the national SIP 15: Expanding Access to Communication Technology. This is led by the Department of Communications and supported by the Department of Public Enterprises and Department of Science and Technology. SIP 15 aims to ensure universal service and access to reliable, affordable and secure broadband services by all South Africans, prioritising rural and under-serviced areas and stimulating economic growth. This project, although not registered with the South African Government as a SIP project, will support SIP 15.

eThekwini's IDP (eThekwini Municipality IDP, 2020/2021 Review) and Spatial Development Framework (eThekwini Municipality SDF, 2019) both align with the goal of "improving access to telecommunications technologies to unlock investment and stimulate both the regional and national economy". The proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) will support this goal.

6.5.2 Economy and employment (eThekwini)

With an estimated population size of 3.8 million (ACER, 2019), eThekwini contributes significantly towards the South African economy, ranking as the second largest economic centre in South Africa. The eThekwini region accounts for 7% of domestic GDP and just over 60% of KZN's productivity eThekwini has a fairly diversified economy, including manufacturing, logistics, tourism and finance. The COVID-19 pandemic has had the effect of rendering downward adjustments to major indicators such as trade, employment, GDP and foreign direct investment by all spheres of government and the world at large. In the light of global economic recovery from the worst effects of the pandemic, the South African economy is expected to rebound in 2021 by approximately 3.%, following a 7.2% contraction in 2020. However, the outlook remains highly uncertain and the economic effects of the pandemic are far reaching. (http://www.durban.gov.za/Resource_Centre/reports/Documents/MediumTermRevenueAndExpenditureFramework2021_22.pdf).

6.5.3 Key institutions and role-players and affected property

The eThekwini Municipality administers all municipal services, with Parks, Leisure and Cemeteries (Beach management) being the main contact for management of the beaches. The EPCPD is the primary role player with respect to conservation issues in the Metro. EKZNW manages MPAs on the KZN coast. Other relevant authorities (local, provincial and national) and key role players are detailed in Chapter 4.

eThekwini Municipality will have jurisdiction over most of the land affected by the project (public beaches and servitudes along roads). However, other parties have servitudes which need to be taken into account, including AECI. Properties belonging to the Passenger Rail Agency of South Africa (PRASA) and the South African National Roads Agency SOC Ltd (SANRAL) will also potentially be affected by the terrestrial portion of the cable. Property details are provided in Appendix C.

6.5.4 Land use and infrastructure at Amanzimtoti

Amanzimtoti is an urban area and is well developed with services and infrastructure. Road access via national, provincial and municipal roads is good. The land uses in the study area include public beaches, recreational and tourism facilities, restaurants, beach holiday accommodation, schools, residential, retail/commercial, railway property and industrial areas.

6.5.5 Population demographics (Amanzimtoti)

Amanzimtoti has an urban population of 13,813 people (4390 households) with an average household size of 2.7 people. The population of Amanzimtoti is predominantly White (67.3%) with 22.1% Black African, 8.2 % Indian/Asian and 1.9 % Coloured. Durban City in contrast has 51.1 % of the population classified as Black African, 24. 0 % Indian/Asian, 15.3 % White and 8.6 % Coloured. In terms of age structure, the majority of the population fall between the ages of 25 and 64 years (http://www.statssa.gov.za/?page_id=4286&id=10469).

Annual household incomes in Amanzimtoti range from no income (10.4 %) to over R2 million (1.2 %) with about 20 % of households earning less than R3200 per month. (http://www.statssa.gov.za/?page_id=4286&id=10469). Generally, unemployment in eThekwini is high, and creation of jobs for previously disadvantaged local people is a key focus of local government.

Residents of Amanzimtoti have good access to education, although only 43.4 % have a matric qualification. Most people (98.4 %) live in formal dwellings. Household access to piped water, sanitation and electricity is good, with 90 % or more households having motor cars, televisions, stoves and refrigerators (http://www.statssa.gov.za/?page_id=4286&id=10469).

6.5.6 Beach and nearshore based tourism and activities at Amanzimtoti

Amanzimtoti is a popular tourist destination, with the beaches (Sapphire Coast) being a major drawcard. The landing site alternatives are situated at public beaches which are well used and busy especially during peak season (November to April). The beaches are used for general recreational activities and for shore fishing. There are various facilities such as public pools, water slides, etc at the beachfront. During the winter sardine run (June/July), the beaches see a huge flurry of fishing and spectating activities. Activities nearshore include swimming, wave-surfing, windsurfing, kitesurfing, fishing (on and offshore), ski-boating, scuba diving and spearfishing. Shark nets are provided, as well as lifeguards at designated swimming areas on weekends and during other peak times.

6.5.7 Beach infrastructure

The municipality provides various public facilities at the beach including paved carparks, signage, braai facilities, showers and toilets. Access paths from the carpark to the beach are provided, some of which can also be used for (authorised) vehicle access. Wooden bollards and sand traps are in place to stabilise the foredunes and promote dune vegetation growth. A lifesavers' hut/platform is stationed on the beach in front of the Aquatic Centre next to Amanzimtoti Pipeline Beach.

There are shark nets in place, operated and maintained by the Natal Sharks Board.

Protection of the infrastructure described above, will need to be considered during cable installation.

6.5.8 Crime and security

South Africa has a high crime rate due, *inter alia*, to high levels of inequality, poverty and unemployment, and a culture of general lawlessness and corruption. Amanzimtoti is not exempt from this and, as such, individuals need to be alert to the risks and take sensible precautions wherever they go. Crime prevention and law enforcement are the domain of the South African Police Services. Private security firms play a prominent role in protection of people and property, for those that can afford to pay for this service. Should construction plant or materials need to be left on site, 24-hour security will be required.

6.6 Cultural Heritage

The marine portion of the cable route to the BMH is under the jurisdiction of SAHRA. SAHRA is the relevant heritage authority for all heritage resources located below the high-water mark of the sea up to a distance of 24 Nm seaward whilst the terrestrial portion of the cable route inland of the BMH falls under the jurisdiction of Amafa. South Africa's record of maritime and underwater cultural heritage resources is based on a mix of information derived from historical documents and other secondary sources, and from very limited primary sources such as geophysical data and other field-based observations and site recordings (ACO Associates, 2021) (Appendix B).

6.6.1 Underwater cultural heritage: submerged prehistoric archaeological resources

According to the heritage specialist report (Appendix B), 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 in which sea level has generally been lower than it is today. Periods of low sea level would have added a large coastal plain to the South African land mass, where parts of the continental shelf were exposed as dry land (Figure 38). 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.

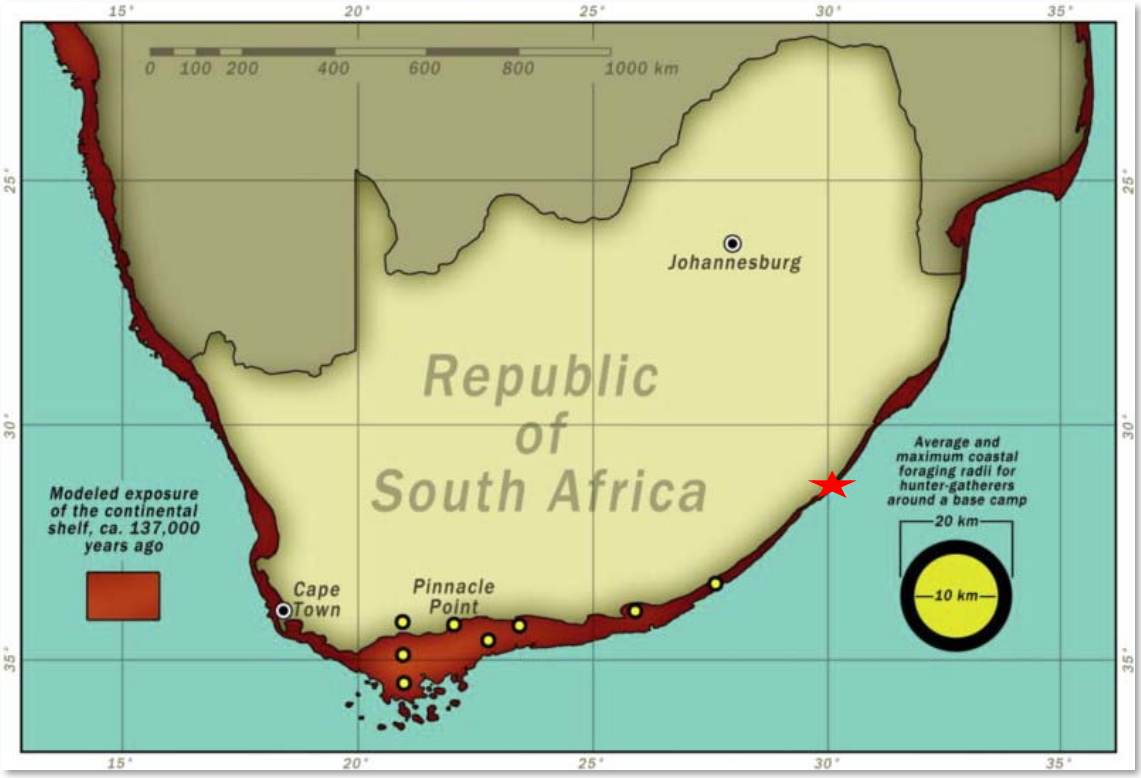


Figure 38 Possible extent of the South African continental shelf during the Marine Isotope Stage 6 (~190,000 years ago). The approximate location of Amanzimtoti is marked by the red star (Source: cited in ACO Associates, 2021)

The exposed continental shelf was quickly populated by terrestrial flora and fauna, and also by our human ancestors who were dependant on these resources. 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”.

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.

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 paleao-landscape features and sediments which have archaeological potential. 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 also suggest the presence of palaeo-rivers on the now submerged continental shelf where, archaeological sites and material can be expected to be associated with these river valleys. These paleaeochannels channels are filled by fluvial sediment and are overlain by Holocene sediments deposited when sea-level regained levels near to those of present day. Where fluvial deposits within the paleaeochannels have survived subsequent marine transgression, these have the potential to preserve paleoenvironmental information.

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 paleochannels. Although this unconsolidated surface sediment is likely to have some archaeological potential, it is likely to be low.

6.6.2 Palaeontological features and fossil material (onshore and offshore)

The onshore or landfall site for the fibre cable is in the Umkwelane Formation aeolianites. Fossils typical of this formation are marine molluscs, shark teeth and foraminifera (microscopic marine organisms). Occasionally trace fossils such as worm burrows or rhizoliths are preserved in the Umkwelane Formation. 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.

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

6.6.3 Maritime archaeological resources

South Africa has a rich and diverse underwater cultural heritage. Strategically located on the historical trade route between Europe and the East, South Africa's rugged and dangerous coastline has witnessed more than its fair share of shipwrecks and maritime dramas in the last 500 years. 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 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 coast.

Until the 1820s the KZN coastline was avoided whenever possible by European sailors because of its lack of safe anchorages. However, during the 19th century Port Natal (later renamed Durban in 1835) was established as the principal harbour on the KZN coast, with other small harbours established at Scottburgh, Umkomaas, Port Shepstone and Richards Bay. Historical shipwrecks along the KZN coastline tend to be concentrated at the 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, as well as the remains of nearly a dozen whalers and other vessels that were scuttled during the 20th century to the east and south-east of Durban.

According to the heritage specialist report (Appendix B), there are no known or recorded wrecks within 1 km of the route alignment of the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) in the contiguous zone and territorial waters. 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 7 km north and south of the cable

alignment, respectively (Figure 39). 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.

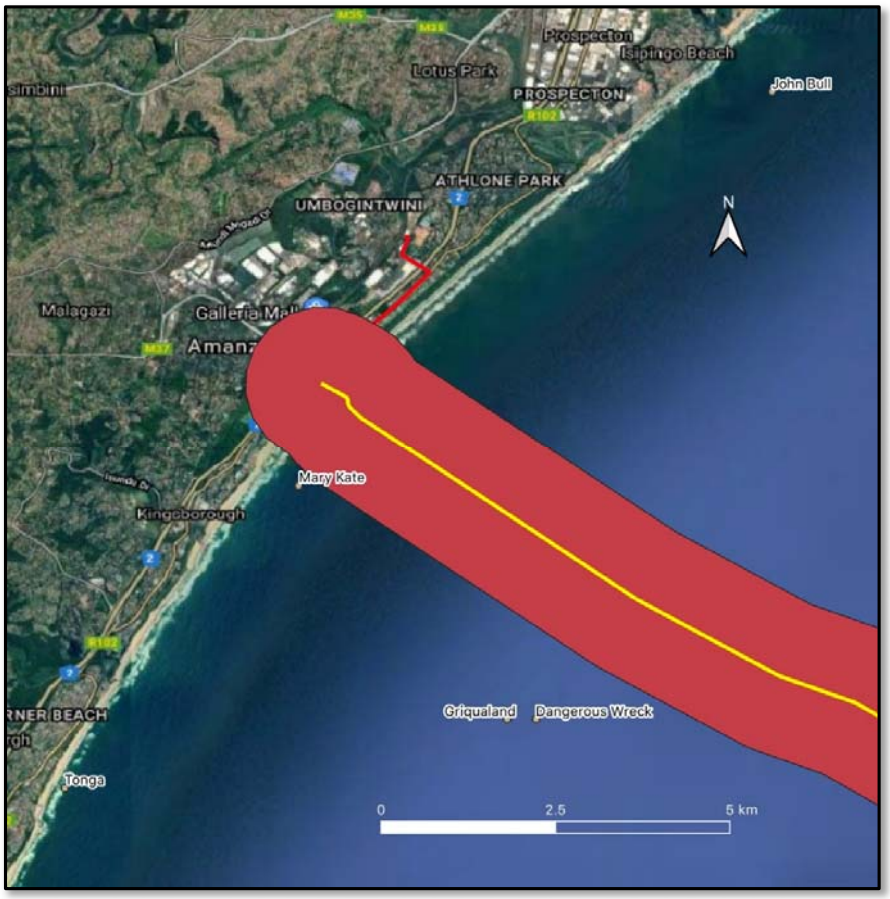


Figure 39 Known and recorded wrecks in immediate vicinity of the Amanzimtoti branch cable (yellow line). A 1 km buffer either side of the cable is shown in red (Source:ACO Associates, 2021)

According to comments received from SAHRA, there are no recorded historic wrecks in the immediate vicinity of the proposed cable route. However, there are a number of wrecks further out in deeper waters which were causalities of German U-boats during the Second World War. The locations of these wrecks are approximate positions but as they are considered war graves their possible presence and cultural heritage significance should be highlighted during any heritage assessments.

6.6.4 Archaeology of the terrestrial cable route

Studies suggest a long hominin presence in the general eThekwini 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. These early agro-pastoralists seem to have moved into a landscape inhabited by Later Stone Age hunter-gatherers. Various distinct styles of pottery provide evidence of these early inhabitants. Iron Age middens have been found on the dunes south of the Amanzimtoti river mouth. Refer to the HIA (Appendix B) for further detail.

The sub-surface sediments along the terrestrial route of the cable between the BMH and CLS at Amanzimtoti have 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 public monuments and 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.

7 ENVIRONMENTAL ASSESSMENT PROCESS AND METHODOLOGY

7.1 Scoping

Scoping was undertaken between February 2020 and April 2021. The primary product of Scoping was the FSR. An important part of the FSR was the Plan of Study for Impact Assessment, which provided information on which specialist studies would be undertaken, what would be investigated within each specialist study, how the investigations would be conducted, how potential impacts would be assessed, and impact significance determined, public participation activities, and applicable time lines.

7.2 Impact Assessment

The aim of the Impact Assessment was to investigate the environmental issues and concerns that were identified during Scoping. The technical and public participation processes continued to interact at important stages to ensure that both processes built towards a comprehensive investigation of the issues identified. The main activities during this phase were to:

- Undertake focused scientific studies to assess the issues of concern.
- Maintain ongoing communication and participation with stakeholders.
- Integrate the findings into an EIA Report, inclusive of mitigation measures to ameliorate the effects of negative impacts and optimise positive ones.
- Prepare an EMPr.

7.2.1 Technical process

To provide scientifically sound information in regard to the various issues raised, a number of specialist studies were commissioned. Where applicable, specialists were encouraged to interact and share information to inform the assessment of potential impacts. To address the key issues, each specialist was tasked with assessing the possible impact from their angle of expertise. An integrated approach was adopted to consider direct, secondary and cumulative impacts wherever applicable.

Importantly, technical information on certain project components and activities were fed into this EIA process from other project team members who did not necessarily form part of the EIA specialist study group. In addition, the EAP took into consideration information from other existing documentation, for example, spatial planning documents. Thereafter, the findings (along with relevant input from the public participation process described in Chapter 8) were integrated by the EAP to provide a comprehensive understanding of the issues and associated potential impacts.

An important component of the FEIAR is the associated EMPr. The EMPr (Appendix F) outlines the mitigation and monitoring measures for avoiding or minimising negative impacts and optimising benefits during project implementation. In this regard, the EMPr provides a critical link between mitigation measures described in the FEIAR and their actual implementation.

7.3 Specialist studies and terms of reference

The specialist studies were undertaken by professionals regarded as experts in their specific disciplines. Arising from Scoping and the distillation of issues and associated potential impacts, the need for the following specialist studies was identified:

- ❑ Terrestrial Ecology (Vegetation/ Freshwater water resources/ Fauna) Specialist Assessment.
- ❑ Fisheries Specialist Assessment.
- ❑ Marine Ecology Specialist Assessment.
- ❑ Marine (shallow water) Benthic Specialist Assessment.
- ❑ Beach and Coastal Dune Dynamics Assessment.
- ❑ Heritage Specialist Assessment.

Note that at the beginning of Scoping, the application of the Department's Screening Tool recommended several specialist studies, some of which were not undertaken as part of the Impact Assessment. A motivation for excluding these studies is provided in the table below (as previously indicated in the Draft and Final Scoping Reports).

Specialist Studies recommended	Included	Excluded	Motivation/reasons
Aquatic Biodiversity Impact Assessment.	X		
Marine Impact Assessment.	X		
Defence Assessment.		x	A specialist study on Defence is not required. While there is a Naval Base at the Durban Harbour and the Air Force Base at the site of the old Durban International Airport, these facilities are located further than 10 km way and will not be impacted by the operation of the undersea fibre-optic cable. All relevant shipping and navigation entities will be notified when the laying of the cable takes place, so that they are aware of the activities and schedule of the cable laying ship which will be in the area for a limited period. The terrestrial portion of the cable will be buried and will not impact on known defence installations.
Geotechnical Assessment		x	A marine survey report which investigates in detail the characteristics of the seabed, will be undertaken by specialists in order to identify geotechnical characteristics, features and obstacles on the seabed. There is no need for an additional geotechnical report for the marine part of the route. The construction of a BMH at the edge of the beach carpark will be in loose unconsolidated dune sands. The burial of the cable on land will be adjacent to existing roads. No deep excavation of foundations is required for the terrestrial portion of the route and therefore, no geotechnical assessment is required, provided the cable servitude on land avoids the toe of the dune behind beach road.

Terms of reference for the different specialist studies are contained in Appendix B. Specialists were requested to apply the "Protocols"[30] , where relevant. The results of the specialist studies were used by the EAP when undertaking the integrated assessment. The outcomes of integration and assessment have been documented in this FEIAR, which will be submitted to DFFE for decision making.

30 Procedures for the Assessment and Minimum Criteria for Reporting on identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, which were promulgated in Government Notice No. 320 of 20 March 2020 (i.e. "the Protocols"), and in Government Notice No. 1150 of 30 October 2020 (i.e. protocols for terrestrial plant and animal species).

7.4 Integration, impact description and assessment conventions

Taking into account the specialist findings and information from other sources, the EAP assessed all identified impacts (positive and negative), using the following assessment conventions to determine their significance:

- **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 as a result of the activity. These types of impacts include the potential impacts that do not manifest immediately when the activity is undertaken, or which occur at a different place as a result 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 a period of time and can include both direct and indirect impacts.

- **Nature** – the evaluation of the nature of the impact. 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 or not the intensity (magnitude/size/frequency) of the impact would be negligible, low, medium or high:
  - Negligible (inconsequential or no impact).
  - Low (small alteration of systems, patterns or processes).
  - Medium (noticeable alteration of systems, patterns or processes).
  - High (severe alteration of 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** – the degree to which the impact can be reversed/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**[31] – 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.

[31] This excludes positive impacts on the environment. In these cases, the level of significance should be denoted as Low**, Moderate** or High**.

- **Confidence** – the degree of confidence in predictions based on available information and specialist knowledge:
  - Low.
  - Medium.
  - High.

8 PUBLIC PARTICIPATION PROCESS

The public participation process was designed to comply with the requirements of the 2014 EIA Regulations (as amended) and was approved by the Chief Directorate: Integrated Environmental Authorisations (Directorate: National Infrastructure Development: National Infrastructure Projects) on 30 July 2020.

Important elements are:

- The manner in which I&APs were notified of the application for environmental authorisation. This includes on-site notice boards, giving written notice to landowners, letters, Background Information Documents (BID) and advertisements in the media (Section 41).
- Opening and maintaining a register containing the names and addresses of I&APs. These include all persons who have submitted comments, attended meetings, and are organs of State who have jurisdiction in the assessment process, and all those who have requested that they be placed on the register as registered I&APs (Section 42).
- Registered I&APs are entitled to comment, in writing, on all written submissions made to the competent authority by the applicant or the EAP managing the application, and to bring to the attention of the competent authority any issues, which that party believes may be of significance when the application is considered for authorisation (Section 43).
- The comments of registered I&APs and responses thereto must be recorded and included with the reports submitted to the competent authority (Section 44).

Public participation in an EIA process aims to provide sufficient and accessible information to I&APs, in an objective manner, to assist them to:

- During the Scoping Phase.
  - Identify issues of concern and provide suggestions for enhanced benefits and alternatives.
  - Contribute local knowledge and experience.
  - Verify that their issues have been considered.

- During the Impact Assessment.
  - Verify that their issues have been considered either by the EIA Specialist Studies, or elsewhere.
  - Comment on the findings of the DEIAR, including the measures that have been proposed to enhance positive impacts and reduce or avoid negative ones.

All relevant public participation documentation is provided in Appendix D and Appendix E.

Due to the Covid-19 National State of Disaster and Lockdown in the country, the DFFE requires Environmental Assessment Practitioners to undertake public participation in ways that respect social distancing and other measures to contain the spread of the Corona virus. The public participation process was compiled to comply with the “Directions regarding measures to address, prevent and combat the spread of COVID-19 relating to National Environmental Management Permits and Licenses” in Government Notice (GN) No. 650 dated 5 June 2020.

8.1 Notification of the application

Stakeholders were informed of WIOCC's intention to apply for environmental authorisation via a Background Information Document, media advertisements and on-site notice board. The application is also posted on ACER's website for stakeholder review.

8.2 Identification and registration of Interested and Affected Parties

Key stakeholders and other I&APs were identified, and their contact details incorporated into a project database. They included representatives of a variety of sectors, as shown in Table 14. A copy of the stakeholder database is provided in Appendix D.

Table 14 Sectors of society represented by I&APs on the direct mailing list

Government (National, Provincial and Local)
Parastatals including Ports/Maritime and Defence (Navy)
Utility/service providers
Offshore Oil and Gas Rights Holders
Conservation Authorities, Conservation/Environmental Groups, Marine Research
Business
Tourism
Fisheries
Local Residents Associations
Sea based sports and recreation - e.g. angling, sailing, ski-boating

While consultation has taken place with representatives of different sectors of society, special efforts have been made to obtain the contributions of all people who may be directly affected by the proposed project. These efforts will be on-going for the duration of the EIA.

8.3 Project announcement

The opportunity for I&APs to participate in the Scoping and Impact Assessment process[32] was announced as follows:

- Advertisements in local and provincial newspapers viz the Natal Mercury (English), South Coast Sun (English) and Isolezwe (Zulu) during the period 2- 4 September 2020).
- A letter, inclusive of a Background Information Document, was compiled and emailed to I&APs on the database (2 September 2020).
- Electronic copies of the notification letter and BID were sent to relevant Government departments and commenting authorities.
- All I&APs who registered following the project announcement, were sent the letter and BID.
- Telephonic engagement with I&APs was undertaken as and when required.
- Direct correspondence and/or meetings with the local Ward Councillor, relevant eThekwini officials and government authorities.
- Community forums were notified of the EIA process.
- Onsite notices (English and Zulu) were placed at the proposed landing site, notifying I&APs of the proposed development and EIA process.
- Public documents were made available to the public on ACER's website (https://acerafrica.co.za/)

[32] All relevant project documents were loaded onto ACER's website at the applicable time and were available for public review.

8.4 Obtaining and dealing with comments from I&APs

Opportunities provided to I&APs to contribute comments included:

- Completing and returning Registration and Comment Sheets.
- Providing comments telephonically or by email.

Responses in writing or by telephone were provided directly to I&APs where relevant, and/or in the Comments and Responses Report circulated with the FSR and DEIAR (see below).

8.5 Comments and Responses Report and summary of issues raised

Issues and concerns raised by I&APs, and responses thereto, have been captured in a Comments and Responses Report provided in Appendix E. To date, the comments received from I&APs and relevant authorities relate to the following topics:

- General I&AP registration, requests for information, etc.
- Affected Oil and Gas Exploration Blocks (marine).
- Crossing of Transnet Pipeline Servitudes (on land).
- Potential impact on indigenous forest.
- Coastal Navigation Safety.
- Protection of Water Resources.
- Comments from DEDTEA in regard to the application for a Sea Shore lease Permit.
- Maritime/underwater heritage.
- Environmental Health.
- Crossings of electrical and telecommunications cables on land.
- Traffic impacts.
- Slope stability in regard to trenching.
- Comments from DFFE on requirements for specialist studies, Plan of Study for Scoping, Public Participation, Cumulative Impacts, EMPR and other process Issues regarding Scoping and EIA.
- Concerns associated with the AECI Property Services Marine Outfall Pipeline and benthic sampling programme.
- Comments from SAHRA regarding cultural heritage impacts and process requirements.
- Co-ordinated comments from eThekwini Metropolitan Municipality Line Departments.
- Comments and recommendations from DFFE (Oceans and Coasts) relating to the protection of the coastal environment and access to the coastal public property, in line with the ICMA.

8.6 Draft and Final Scoping Report

The purpose of the Draft Scoping Report (DSR) and FSR was to enable I&APs and authorities to verify that their contributions had been captured, understood and correctly interpreted. The issues identified by I&APs and by the environmental technical specialists were used to define the terms of reference for the specialist studies for this impact assessment.

The availability of the Draft Scoping Report for public comment was advertised as follows:

- All registered Interested and Affected Parties were notified in writing on 19 March 2021 of the availability of the Draft Scoping Report for their review and comment.

- The Draft Scoping Report was made available on ACER's website and at the Amanzimtoti Public Library on the 12 March 2021, for the reviewing period (19 March 2021 – 22 April 2021).
- Notification letters were emailed to all registered I&APs on the 19 March 2021 and notices were placed at strategic points near Pipeline Beach, notifying the public of the availability of the Draft Scoping Report for review and comment.
- The Draft Scoping Report was uploaded to ACER's website where members of the public can download the report for review and comment.
- Opportunity was provided for telephonic engagement with I&APs who do not have access to the internet, in order to:
  - Disseminate information regarding the proposed project.
  - Provide an opportunity for I&APs to interact with project team members.
  - Discuss the studies to be undertaken during the EIA.
  - Supply more information regarding the EIA process.
  - Answer questions regarding the project and the EIA process.
  - Receive input regarding the public participation process and the proposed development.
  - Provide I&APs not previously registered on the project database with an opportunity to be formally registered and, thereafter, be informed of progress for the remainder of the project.
- ACER also held virtual meetings to discuss issues raised by key stakeholders such as AECI and EKZNW.

Comments submitted during this period were taken into account when compiling the FSR. They were included in the Final CRR which was submitted to DFFE with the FSR on 30 April 2021. I&APs were notified of the submission and an electronic copy of the FSR was uploaded to the ACER website for review and comment by I&APs.

DFFE approved the FSR on 09 June 2021, allowing the Impact Assessment to follow in accordance with the Plan of Study.

8.7 Draft Environmental Impact Assessment Report and Environmental Management Programme

The DEIAR and accompanying draft EMPr were made available for public and authority review at appropriate and accessible local public venues and by placing documentation on ACER's website. Following the 30-day public review period, the DEIAR and EMPr were amended according to comments received, and then finalised along with the Final CRR. This FEIAR has been submitted to DFFE for decision making and has also been made available to I&APs for review and comment (should comments be received these will be forwarded on to DFFE for consideration).

8.8 Notification of I&APs of DFFE 's decision making

Once DFFE has issued (or refused) an environmental authorisation on the proposed project, registered I&APs will be notified via post or email of the decision, including details on the appeal procedure.

9 SUMMARY OF SPECIALIST STUDY FINDINGS

The specialist studies produced by each specialist are listed in Table 15 and contained in Appendix B, as referenced. Note that the reports on Avifauna and Marine Mammals were commissioned as additional overview reports for the use of all of the 2AFRICA landings in South Africa, in response to comments raised by DFFE-OC. They are therefore additional to the Plan of Study for Impact Assessment as outlined in the FSR for the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing).

The approach, findings and conclusions of the specialist reports, as they apply to the selected alternatives that are assessed in this EIA, are summarised below. Note that the environmental baseline referenced from specialist reports, where applicable, has been included in Chapter 6 of this report.

Table 15 Specialist studies and specialists

	Specialist Study	Specialist	Organisation
1	Compliance Statement for Terrestrial and Freshwater Ecosystems (Appendix B1)	Mr Wayne Westcott	Environmental Assurance (Pty) Ltd
2	Commercial Fisheries Specialist Study (Appendix B2)	Mr David Japp and Ms Sarah Wilkinson	Capricorn Marine Environmental (Pty) Ltd (CapMarine)
3	Coastal Impact Assessment (beach and dunes) (Appendix B3)	Mr Simon Bundy	SDP Ecological & Environmental Services
4	Marine Ecology Assessment (Appendix B4)	Dr Andrea Pulfrich	Pisces Environmental Services (Pty) Ltd
5	Marine benthic shallow water impact assessment (Appendix B5)	Dr Russell Chalmers and Dr Shirley Parker-Nance	Aquatic Ecosystem Services
6	Heritage Impact Assessment (Appendix B6)	Mr John Gribble and Ms Gail Euston-Brown	ACO Associates cc
7	Submarine Telecommunications Cables Environmental Impact Assessment. Generic Avifaunal Impact Assessment (Appendix B7)	Mr Jon Smallie	WildSkies Ecological Services (Pty) Ltd
8	A review of the potential effects of submarine telecommunications cables on marine mammals in Southern Africa (Appendix B8)	Mr Simon Elwen	Sea Search Research and Conservation

9.1 Ecological impact assessment (vegetation, wetlands/watercourses & fauna)

9.1.1 Introduction

The report (Appendix B1) deals with impacts of the proposed 2AFRICA/GERA (East) Cable System (Amanzimtoti landing) on terrestrial and freshwater ecosystems and associated fauna. The study also undertook the necessary investigations to inform ACER of the Water Use License Application requirements associated with the project.

9.1.2 Approach

The scope of work was guided by the Species Protocol Guidelines (DEA, 2020) applicable to the aquatic and terrestrial biodiversity themes, and GN no. 509 under the National Water Act, which included the following:

- Desktop study and literature review of available datasets and information.
- A once-off field survey of the study area to identify and delineate all watercourse and Habitat Units and associated floral species within the study area.
- Identify and mark locations of Species of Conservation Concern (SCC) and Threatened and/or Protected Species (TOPS).
- Determine the Present Ecological State (PES), Ecological Importance and Sensitivity (EIS), Ecosystem Service value and buffer zones of all at-risk watercourses (if any).
- Undertake a DWS Risk Assessment Matrix for Section 21(c) and (i) water uses in accordance with General Notice (GN) no. 509 (DWS, 2016).
- Determine the Site Ecological Importance of the HUs within the study area.
- Conduct an impact assessment of the proposed development on the terrestrial environment and provide mitigation and/or rehabilitation measures to remediate perceived impacts.
- Provide a reasoned opinion as to whether the proposed development may continue.

9.1.3 Findings

As indicated in Section 6.2.7, three habitat types were described in the study area. In terms of terrestrial biodiversity, the Coastal Thicket and Seashore Zone HUs were determined to be of High Site Ecological Importance (SEI). In contrast, the Degraded Land HU, being dominated by hardened surfaces and degraded land with little to no indigenous vegetation present, was determined to be of Very Low SEI. The proposed development will predominantly be constructed within the Degraded Land HU. The indigenous sections of D'MOSS and CBA: Irreplaceable units which formed part of the Coastal Thicket and Seashore Zone HUs were determined to be fulfilling their function as open space and providing refuge to faunal species in the peri-urban environment, as well as in meeting provincial and national conservation target requirements. No fauna or flora Species of Conservation Concern were identified within the study area, however two (2) protected species were recorded, namely: *Mimusops caffra* and *Sideroxylon inerme* within the Coastal Thicket and Seashore Zone HU. These species were not situated directly within the proposed development footprint.

The potential encroachment of the project footprint into the High SEI Coastal Thicket HU and disturbance of TOPS identified therein, followed by the encroachment of Alien and Invasive Plant Species (AIPS) and disturbance of the Seashore Zone HU, were considered the most significant potential impacts in the pre-mitigation state. These impacts can be remediated to a Low significance level in the post-mitigation state, provided the recommended mitigation and rehabilitation measures are strictly implemented.

In terms of aquatic biodiversity, it was determined that no wetland or riverine systems were at risk of being impacted on by the proposed development. The nature of the proposed development and the proximity of the activities to the delineated watercourses resulted in all aspects being calculated to be of Low significance in the post-mitigation state within the DWS Risk Assessment Matrix. As one wetland lies within 500 m of the proposed project, a General Authorisation (GA) applies. (However, it is considered to warrant an exclusion, subject to confirmation from DHSWS.)

In terms of fauna, the coastal thicket habitat was confirmed to provide good refuge for faunal species, specifically reptiles, invertebrates and smaller mammal species. However, as this habitat will not be directly impacted, the potential impact of the project on fauna (including avifauna) is of low significance.

Mitigation measures from this specialist report, including monitoring requirements, have been carried across to Section 10.2 of this report and incorporated into the EMPr (Appendix F), as relevant.

9.1.4 Conclusion

The specialist concludes that the proposed BMH Alternative 3 and the preferred fronthaul alignment proceed, provided that the mitigation measures and recommendations are strictly implemented and subsequently monitored. It will be vital for the High sensitivity Coastal Thicket HU to be avoided as far as reasonably possible. HDD is the recommended means of connecting the marine cable to the terrestrial BMH, primarily due to the cumulative impacts recorded within the study area and the sensitivity of the Seashore HU, as well as it being situated within DMOSS and CBA: Irreplaceable conservation planning units.

9.2 Fisheries assessment

9.2.1 Introduction

The report (Appendix B2) provides an assessment of the potential impacts of the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) on the commercial fishing industry.

9.2.2 Approach

The applicable legislation specifying safety and exclusion zones around submarine cables and cable laying vessels was outlined. An overview of South African fisheries was provided and thereafter a detailed description of those sectors whose fishing grounds coincide with the proposed cable routing. For each of these fishing sectors, the report identified (where the information was available):

- Target species.
- Wholesale economic value of the sector and nominal catch
- The vessels, gear, methods and timing involved in the fishing activity and the way in which this may impact or be impacted by the proposed cable.
- The location and extent of the fished areas in relation to the proposed cable.
- An estimation of the fishing effort affected by the exclusion zones applied during installation and operation of the cable, in relation to the overall effort recorded by the sector.
- Possible mitigation.

Taking the above into account, the report identified and assessed the potential impacts of each stage of the cable installation (survey, installation and operation) on affected fishing sectors.

9.2.3 Findings

9.2.3.1 Exclusion zones

Under the Convention on the International Regulations for Preventing Collisions at Sea (COLREGS, 1972, Part A, Rule 10), a vessel that is engaged in cable laying is defined as a "vessel restricted in its ability to manoeuvre" which requires that power-driven and sailing vessels give way to a vessel restricted in her ability to manoeuvre. Furthermore, under the Marine Traffic Act, 1981 (No. 2 of 1981), a vessel used for the purpose of cable laying falls under the definition of an "offshore installation" and as such it is protected by a 500 m safety zone. It is an offence for an unauthorised vessel to enter the safety zone. In practice a 1,500 m (maximum) exclusion zone will be requested around the cable laying vessel during cable installation.

Once installed, a subsea cable is protected by a 500 m exclusion zone on either side of the cable, and it is an offence for any anchoring or trawling within this zone.

9.2.3.2 Commercial fisheries which intersect with the marine cable alignment

As described in detail under the description of the receiving environment (Section 6.1.4), fishing activity for the following fishing sectors overlaps or potentially overlaps to varying extents with the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) marine cable alignment:

- Large Pelagic Longline.
- Traditional Line fish.
- Crustacean Trawl.
- Net fish.
- Oyster.
- Exploratory Redeye Jig.
- Small Scale Fisheries.
- Recreational Fisheries.

Of the above sectors, those most likely to be affected are the large pelagic longline, traditional line fish, crustacean trawl and small scale fisheries.

9.2.3.3 Potential impacts of the project on fisheries

The causes of potential impacts of the project on the fishing industry were identified as:

- Noise emissions generated during geophysical survey activities which may harm or temporarily displace fish.
- Temporary exclusion from fishing ground during geophysical survey and cable-laying operations.
- Long-term exclusion of anchoring and trawling around the cable during operation.

NOISE EMISSIONS DURING THE GEOPHYSICAL SURVEY

The presence and operation of the survey vessel will introduce a range of underwater noises into the surrounding water column that may potentially contribute to and/or exceed ambient noise levels in the area.

Elevated noise levels could impact marine fauna by:

- Causing direct physical injury to hearing or other organs, including permanent or temporary threshold shifts in hearing.
- Masking or interfering with other biologically important sounds (e.g. communication, echolocation, signals and sounds produced by predators or prey).
- Causing disturbance to the receptor, resulting in behavioural changes or displacement from important feeding or breeding areas.

Findings of Pisces (2021) indicate that the noise generated by the acoustic equipment utilised during geophysical surveys would not coincide with the hearing range of most fish and crustaceans. However, following a precautionary approach, the current assessment makes an allowance for possible effects on catch rates to the line fishery, which includes the commercial line fish and small-scale sectors as well as recreational sectors. Based on the rapid attenuation of high-frequency sound in the ocean, the spatial extent of the impact of noise on catch rates is expected to be localised. Additionally, due to the short-term duration and the low intensity of noise generated by the acoustic equipment utilized during geophysical surveys, the specialist report considers the significance of the impact to be very low. The impact is highly reversible, as any disturbance of behaviour that may occur as a result of survey noise would be temporary. No mitigation measures are possible or considered necessary for the generation of noise by the geophysical survey methods proposed.

TEMPORARY EXCLUSION FROM FISHING GROUND DURING GEOPHYSICAL SURVEY AND CABLE-LAYING OPERATIONS DUE TO TEMPORARY SAFETY ZONE AROUND VESSELS

By law, vessels engaged in surveying as well as vessels engaged in laying of subsea cables will need to adhere to a 500 m safety zone (which can increase to a maximum distance of 1,500m - the distance depends on the depth of cable laying at any particular time). All unauthorised vessels would be excluded from entering the safety zone.

The implementation of the safe operational zone will effectively exclude fishing vessels from portions of their fishing grounds when the vessels are on site. The temporary exclusion of fisheries from the safety zone will effectively reduce fishing grounds, which in turn could potentially result in a loss of catch and/or displacement of fishing effort (direct negative impact). Sectors that could be affected include the KZN crustacean trawl sector, large pelagic longline sector, traditional line fish and small-scale sectors which have historically operated across the proposed Amanzimtoti landing route and are all currently active to a greater or lesser degree.

The impact on the large pelagic longline, traditional line fish and small-scale fisheries is considered to be short-term (limited to the duration of the survey and cable laying operations) with the extent being localised. The intensity of the impact on each sector will be based on the proportion of fishing effort and catch within the affected area, relative to total effort and catch reported by each sector. The intensity of the impact is assessed to be low. While there is little scope for mitigation, the assessment indicates that the overall impact of temporary exclusion is of very low significance for the KZN crustacean trawl, large pelagic longline, traditional line fish and small-scale fisheries.

EXCLUSION FROM FISHING GROUND DUE TO PERMANENT EXCLUSION ZONE AROUND CABLE

Once installed, a subsea cable is protected by a 500 m exclusion zone on either side of the cable, and it is an offence to anchor or trawl within this zone. This may result in a loss in catch where fishing grounds of demersal trawl fisheries coincide with this route.

The only demersal trawl fishery active in KZN is the commercial crustacean trawl sector which operates on the Thukela Bank, situated East of the proposed cable routing at Amanzimtoti. The proposed cable route alignment coincides with the westerly extent of grounds fished by the deep-water prawn trawl fishery. A 500 m exclusion zone would cover approximately 2 km^2 of trawl fishing ground over the depth range 260 – 270 m. Once an exclusion zone is in place, skippers would raise their ground gear off the seabed as they transit the exclusion zone in order to avoid potential contact with the cable. This would result in a loss of fishing time within the area.

Over the period 2010 to 2019, a total of four trawls crossed the proposed cable route. This is equivalent to 0.03% of the total number of trawls conducted by the sector over this period. The intensity of the impact on the sector is considered to be low, and the overall significance of the impact is assessed to be low.

Mitigation measures from this specialist report have been carried across to Section 10.4 of this report and incorporated into the EMPr (Appendix F), as relevant.

9.2.4 Conclusion

The report concludes with a summary table listing a significance of very low or low, for each of the identified project impacts on affected fisheries, before and after the implementation of mitigation measures (Table 16).

Table 16 Summary of the impacts on fisheries of each of the identified project activities

Ref:	Potential Impact Source	Project Phase	Impact Significance	
			Pre-Mitigation Impact	Residual Impact
1	Noise effects on catch rates during geophysical survey (multi-beam echo sounder, side-scan sonar, sub-bottom profiler)	Pre-Installation	Very Low	Very Low
2	Temporary safety zone around geophysical survey vessel	Pre-Installation	Very Low	Very Low
3	Temporary safety zone around cable-laying vessel	Installation	Very Low	Very Low
4	Permanent exclusion zone around cable	Operation Demobilisation	Low	Low

9.3 Beach and coastal dune dynamics

9.3.1 Introduction

The report (Appendix B3) provides an assessment of the potential impacts of the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) on the beach and dune cordon, within and adjacent to the proposed landing point.

9.3.2 Approach

The investigation utilised desk-top assessments and field reconnaissance to investigate various selected parameters and to identify biophysical factors associated with the area that may be considered drivers that determine the status and ecological function of the beach and dune cordon. In addition, the investigation considers the ecological impacts that may arise within the dune system from the establishment of the cable, the most appropriate routing for the cable, as well as mitigation and management measures that may be employed during and post the installation phase.

9.3.3 Findings

The beach and dune environment of interest falls within a loosely defined coastal cell with a generally wide, offshore bar. The major sediment source associated with this beach has been considered to be the littoral sediment transport system, augmented by low level inputs from proximal river systems, including the Little Amanzimtoti and Amanzimtoti Rivers and, under some situations, the Umbogintwini River. Sediment supply from the extensive, but now stabilised dune forms at Amanzimtoti has historically supported inshore components of the sand sharing system. However, the impact of dune stabilisation and loss of this sediment resource has been represented by significant erosion events at points along the Amanzimtoti shoreline. Under such a scenario, DEDTEA's "Coastal Vulnerability Data base" indicates that the beach and dune cordon are considered "moderate vulnerability" areas. Although predicted sea level rise for Durban anticipates potential impacts on structures lying proximal to the beach, where undercutting of the beach form may occur, these anticipated impacts should generally be limited due to the moderately wide beach at Amanzimtoti.

A number of smaller ephemeral[33] or hummock dunes across the beach provide evidence of significant sediment movement and the presence of the dune pioneer species, *Scaevola plumereii*, is testimony to the surplus sediment being transferred onto the beach, where this cover dependent species prevails. Moving landward, the stable primary dune transitions from a scrub habitat to an elevated dune forest form, dominated by larger woody species including *Mimusops caffra, Ficus burtt davyii* and the shrub, *Chrysanthemoides monilifera*. This vegetation is particularly important in stabilizing the elevated dunes along this portion of coastline, as well as retarding landward movement of sediments. The vegetation ameliorates the primarily, beach-parallel winds, which give rise to aeolian streaming and the transfer of sand along the shore. At Pipeline Beach, pedestrian traffic and the presence of built structures have compromised the stabilising influence of vegetation, giving rise to significant engulfment of portions of dune and the landward movement of sediments. Evidently there have been attempts to stabilize the dune form in the past by planting both indigenous and exotic vegetation (*Yucca* sp.), however, for the most part these initiatives have been unsuccessful.

It is suggested that the proposed cable landing point is in a highly altered state. In addition, the beach can be considered to be dissipative in nature and therefore inflated, with a fine to medium sand, which would facilitate the excavation, cable laying and reinstatement of sand across the beach and the back of beach. It follows from the above that the establishment of a submarine telecommunications cable at Pipeline Beach will have little impact on the eco-morphology of the sand sharing system at this point and the coastline in general.

Management/mitigation measures recommended by the specialist have been carried across to Section 10.5 of this report and incorporated into the EMPr (Appendix F), as relevant.

[33] Ephemeral dunes can be classified as unconsolidated landforms deposited on the beach backshore.

9.3.4 Conclusion

It is contended that the landing of a submarine telecommunications cable and the establishment of related anchor mechanisms along the shoreline and beach-dune interface at Pipeline Beach will, if implemented with the conditions and recommendations presented in this report, give rise to negligible ecological repercussions in the subject area.

9.4 Marine ecology assessment

9.4.1 Introduction

The report (Appendix B4) was compiled as a desktop study and provides an assessment of the potential impacts of the proposed 2AFRICA/GERA (East) Cable System (Amanzimtoti landing) on the marine environment. The study focused on benthic habitats and biota but also took into account impacts on marine fauna in the water column, as well as seabirds and shorebirds.

9.4.2 Approach

The specialist adopted a 'desktop' approach. The landing site at Amanzimtoti is characterized by a stretch of intermediate sandy beach, no different from other similar beaches in the Natal Delagoa Bioregion, and which have been adequately described in the scientific literature. A detailed site investigation was thus not deemed necessary and no new data have been collected.

Although no protocols and formal screening tools have been developed for the marine environment as part of GNR No 320, of 20 March 2020, the approach to the study by default includes a site sensitivity verification, comprising a desktop analysis using satellite imagery of the coastal zone, as well as marine spatial information contained in the National Biodiversity Assessment: Marine Component (Sink *et al.,* 2019).

The study provides a description of the natural baseline environment in the marine study area based on a review and collation of existing information and data from the scientific literature, and various internal reports. The information for the identification of potential impacts was drawn from various scientific publications, and information sourced from the Internet. The report identified and assessed the potential impacts of each stage of the cable installation (survey, installation and operation) on benthic habitat, marine fauna and water and sediments. All identified marine impacts were summarised, categorised and ranked in impact assessment tables, which have been translated into the impact assessment tables in Chapter 10 of this FEIAR, as applicable.

9.4.3 Findings

9.4.3.1 Sensitive areas encountered along the marine cable route alignment

The route of the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) passes through a number of ecologically sensitive areas, with differing levels of protection, including:

- Threatened ecosystems (Near threatened and Endangered), ranging from poorly protected to not protected).

- The Protea Banks and Sardine Route EBSA.
- CBA1, CBA2 and ESA areas in terms of the National Coastal and Marine Spatial Biodiversity Plan (2020). However, the overlap of the cable route with these areas is minimal.

No MPAs are crossed by the proposed cable landing.

9.4.3.2 Disturbance of the coastal zone[34]

Installation of the subsea cable through the surf-zone and across the beach would require the subsea cable to be buried to sufficient depth to ensure it is not exposed during seasonal variation of the beach levels. Excavated material would be disposed of onto the beach and into the surf-zone down-current of the construction site. Subtidal trenching would result in the mobilisation and redistribution of sediments in tidal currents and the littoral drift. This would result in localised increased suspended sediment concentrations in the water column. Where burial cannot be achieved and additional cable protection is required, an articulated split-pipe may be used to maximise cable security. The trenching and cable burial process would result in disturbance of high shore, intertidal and shallow subtidal sandy beach habitats and their associated macrobenthic communities through displacement, injury or crushing. Mobile organisms such as fish and marine mammals, on the other hand, would be capable of avoiding the construction area. Any shorebirds feeding and/or roosting in the area would also be disturbed and displaced for the duration of construction activities. On a high-energy coastline the recovery of the physical characteristics of intertidal and shallow subtidal unconsolidated sediments to their pre-disturbance state following trenching and cable burial will occur within a few tidal cycles under heavy swell conditions and will typically result in subsequent rapid recovery of the invertebrate epifaunal and infaunal communities to their previous state. If, following the disturbance, the surface sediment is similar to the original surface material, and if the final long-term beach profile has similar contours to the original profile, the addition or removal of layers of sand does not have enduring adverse effects on the sandy beach benthos.

9.4.3.3 Disturbance of nearshore benthic habitats

Trenching of the subsea cable in the littoral zone beyond 10-15 m depth would result in the mobilisation and redistribution of sediments in tidal currents and the littoral drift. This would result in localised increased suspended sediment concentrations in the water column. Where burial cannot be achieved and additional cable protection is required, an articulated split-pipe may be used to maximise cable security. Within the wave-base (0 – 50 m), the subsea cable and/or articulated split-pipes may be held in place with saddle clamps at specific locations. This would require drilling into the bedrock to secure the clamps. The subsea cable burial and/or securing process would result in disturbance of subtidal unconsolidated sediments and their associated macrobenthic communities through displacement, injury or crushing. Although recovery is site specific and dependent on different modes of cable burial and varied sediment environments, studies have shown that on the inner and middle shelf, recovery of benthic communities following cable burial by plough typically occurs within 1-2 years and conclude that the physical presence of the cable and the disturbance caused by its burial had little effect on the benthic communities along the cable route.

[34] The coastal zone is defined as the coastal strip from 500 m inland of the high water mark to the 30 m depth contour (Cited in Pisces, 2021).

9.4.3.4 Disturbance of offshore habitats

The grapnel used during the PLGR, and the subsea cable plough and/or tracked jet-trenching/burial ROV implemented during subsea cable laying would result in the disturbance and turnover of unconsolidated sediments along a swath of seabed. The plough blade disturbs a swath of seabed ≤1 m wide but potentially extending to a depth of 3 m. Jetting techniques create a trench typically ≤1 m wide, however sediment disturbance is extensive and redeposition can spread to hundreds of metres from the trench, with plumes of the suspended mud fractions potentially extending to 2 km from the cable route, thereby creating a larger impact footprint.

As the cable is typically only 17 mm to 50 mm in diameter, the disturbance associated with laying it on top of the sediment or consolidated substrate is limited to the footprint of the cable itself and any protective encasing material. Impacts associated with placing the cable directly onto the seabed include crushing, damaging or displacement of organisms. Unless cables traverse habitats supporting vulnerable slow-growing species (e.g. glass sponges, deep-water corals), the loss of substratum would be temporary as the cable itself would provide an alternative substratum for colonising benthic communities or provide shelter for mobile invertebrates. Once the cable has been laid, the affected seabed areas around the cable would with time[35] be recolonised by benthic macrofauna, with the encrusting epifauna resembling that inhabiting natural reefs in the area. Recovery time will vary depending on the type of benthic community, and is usually much slower in deeper areas, sometimes taking more than 10 years to fully recover. The impacts associated with cable burial are, however, a once-off disturbance, with affected communities able to recover naturally following the cable installation. Where the subsea cable is exposed, colonisation of the cable would commence within a few weeks. Studies from elsewhere have determined that benthic macro- and mega-fauna within 0–100 m of trenched and surface-laid cables showed negligible changes in abundance and distribution following cable installation.

9.4.3.5 Increase in noise

During installation of the subsea cable shore-crossing, noise and vibrations from excavation machinery may have an impact on surf-zone biota, marine mammals and shore birds in the area. The noise generated will, however, be localised and of short duration and mobile animals will be able to move out of the noise affected area.

Further offshore, underwater noise generated during subsea cable installation could affect a wide range of fauna; from benthic invertebrates and demersal species residing on the seabed along the subsea cable route, to those invertebrates and vertebrates occurring throughout the water column and in the pelagic habitat near the surface. Due to their hearing frequency ranges, the taxa most vulnerable to noise disturbance are turtles, pelagic seabirds, large migratory pelagic fish, and both migratory and resident cetaceans.

The cumulative impact of increased background anthropogenic noise levels in the marine environment is an ongoing and widespread issue of concern. The sound level generated by the subsea cable laying vessel and subsea apparatus would fall within the hearing range of most fish and marine mammals and would be audible for considerable ranges (in the order of tens of kms) before attenuating to below threshold levels. However, the noise is not considered to be of sufficient amplitude to cause direct physical injury or mortality to marine life, even at close

[35] The time taken will vary depending on the benthic community and can take many years. Recovery rates are usually slower in deep water than in shallower areas.

range. The underwater noise may, however, induce localised behavioural changes or masking of biologically relevant sounds in some marine fauna. As much of the cable route is aligned with the main offshore shipping lanes that pass around southern Africa, the vessel noise component of the ambient noise environment is expected to be significant along the cable route. The noise generated by the cable laying vessel would be no different from that of other vessel traffic throughout the oceans, and from the point of vessel operations no specific mitigation (e.g. avoidance of marine mammal migration periods) is therefore deemed necessary when the vessel is in high seas waters.

9.4.3.6 Increased turbidity

The disturbance and turnover of sediments during the pre-lay grapnel run and during trenching will result in increased suspended sediments in the water column and physical smothering of biota by the re-depositing sediments. The effects of elevated levels of particulate inorganic matter and depositions of sediment have been well studied, and are known to have marked, but relatively predictable effects in determining the composition and ecology of intertidal and subtidal benthic communities. Increased suspended sediments in the surf-zone and nearshore can potentially affect light penetration and thus phytoplankton productivity and algal growth, whereas further offshore it can load the water with inorganic suspended particles, which may affect the feeding and absorption efficiency of filter-feeders. The increased occurrence of turbidity plumes near the surface can also affect the feeding success of visual predators. However, due to the rapid dilution and widespread dispersion of settling particles, any adverse effects in the water column would be ephemeral and highly localised. Any biological effects on nectonic and planktonic communities would be negligible. Turbid water is a natural occurrence along the Southern African coast, resulting from aeolian and riverine inputs, resuspension of seabed sediments in the wave-influenced nearshore areas and seasonal phytoplankton production in the upwelling zones.

Rapid deposition of material from the water column and direct deposition of excavated sands on adjacent areas of seabed may result in the physical smothering of resident biota by the depositing sediments.

9.4.3.7 Physical presence of subsea cable

Although the cable is typically only 17 mm – 50 mm in diameter, its presence and that of any protective steel sleeves or concrete mattresses effectively reduces the area of seabed available for colonisation by macrobenthic infauna in seabed sediments. The subsea cable itself and any protective covering, however, would serve as an alternative substratum for colonising benthic communities or provide shelter for mobile invertebrates and demersal fish (artificial reef effect). Assuming that the hydrographical conditions around the subsea cable and repeaters would not be significantly different to those on the seabed, a similar community to that typically found on hard substrata in the area can be expected to develop over time. The presence of subsea infrastructure (namely cable and repeaters) can therefore alter the community structure in an area, and effectively increase the availability of hard substrate for colonisation by sessile benthic organisms, thereby locally altering and increasing biodiversity and biomass, potentially also attracting mobile macro- and megafauna who utilize the biofouling community as a food source. Where cable protections are of a different structure than the surrounding natural reef (e.g. concrete mattresses vs. boulders), different species assemblages and reef effects may result. Although no direct mitigation measures are possible, the negative impact of the subsea cable presence on marine biota is considered to be of low significance.

Designated cable protection zones with suitable habitats may in fact help to maintain and improve biodiversity and species abundance, and therefore act as *de facto* marine reserves or sanctuaries, although this concept has yet to be proven.

9.4.3.8 Potential impacts associated with emissions from the cable (e.g. heat, electromagnetic fields, leachate)

HEAT DISSIPATION

While high and medium voltage seabed power transmission cables can emit heat, the amperage associated with telecommunication cables (for powering the repeaters) is very low, and any associated heat emissions are understood to be negligible. Although the potential consequences of this thermal radiation on benthic organisms has not yet been investigated in situ, the narrow footprint of the cables and the expected low temperature differences suggest that impacts are likely to be negligible.

SOUND EMISSIONS

Under normal operations, fibre optics cables do not emit any audible sound. During the laying of the cable, it does vibrate as a result of regular vortex shedding as it descends through the water column during installation and repair. At ~10 Hz, this is a low frequency phenomenon and well below the hearing frequencies of marine fauna. Once the cable comes to rest on the seabed the sound ceases. In areas of high wave or current action on the continental shelf, cables can be exposed and undermined. Where undermining is significant, the suspended cable can vibrate or strum under the water motions. This sound would likewise be of low frequency and would not be of sufficient amplitude to cause auditory or non-auditory trauma in marine animals. The sound is expected to attenuate rapidly to below ambient levels.

ELECTRIC AND ELECTROMAGNETIC FIELDS

Fibreoptics cables carry a constant direct current of 1 - 1.6 Amperes to power the underwater repeaters. There is no external electric field associated with the power on the inner conductor as the polyethylene insulation ensures that the electric field remains only within the cable insulation. The direct current in the inner conductor does, however, set up a stationary magnetic field in the form of concentric rings emanating from the cable. The magnetizing force produced by this field diminishes with increasing radius from the cable such that at a distance of 1 m from the cable, the electromagnetic field would be in the order of 0.32 micro Tesla. This is two orders of magnitude lower than the typical magnetic flux densities of the earth, which range from 30 microTesla at the equator to 60 microTesla at the magnetic poles. Animals with the capacity to detect and use constant geomagnetic fields are thus likely to only detect the signal within close proximity to the source (within centimetres).

The marine environment is by no means devoid of electric and magnetic fields. Organisms use internal electric potentials and signals for a wide variety of biological functions (e.g. orientation or prey detection), and in some cases can perceive very small electric and magnetic fields. Perturbations from external electric and magnetic fields on such physiological systems need not necessarily have detrimental biological effects, as the magnitude of the effect will depend on the field intensities and exposure times to them, their frequency content, modulation, etc. A wide variety of taxa are sensitive to electromagnetic fields. Elasmobranchs and chimaerids are the taxa most likely to detect the electrical fields produced by fibre-optic cables because their electroreceptive organs are sensitive to stimuli in the very low frequency range from 0.125 Hz to 8.0 Hz.

The injection of a low frequency electrical signal from the land station is known as 'electroding' or 'toning' and is undertaken to aid in cable location in the event of a fault or when a safe distance needs to be kept from a cable during other marine work. Toning has been used for many years on submarine cables throughout the world, and no adverse effects on marine life have been reported.

LEACHING OF CONTAMINANTS

Modern deep-water fibre-optic cables are composed of hair-like glass fibres, a copper power conductor and steel wire strength members, all of which are sheathed in high-density polyethylene. Where extra protection is required, as for areas of rocky seabed or strong wave and current action, additional steel wire armour is added. No anti-fouling agents are used. The cable-grade polyethylene used for the sheath is essentially inert in seawater. Oxidation, hydrolysis, and mineralization processes for polyethylene are extremely slow, with the total conversion to carbon dioxide and water estimated to take centuries. The effects of ultraviolet light, the main cause of degradation in most plastics, are minimized using light-stabilized materials, burial of the cable into the seabed and the natural reduction in light penetration through the photic zone. Where the cable is located on the energetic continental shelf and mechanical abrasion of the cable's plastic sheathing by fine-grained particles is possible, the cable is either armoured or buried.

A study investigating potential leachates of copper, iron and zinc from the conductors and galvanized steel armour, identified that only zinc passed into the seawater, yielding concentrations of less than 6 mg/l for intact cables and less than 11 mg/l for cut cables with exposed wire armour ends[6]. The amount of leaching declined after ~10 days. Although this is above the recommended BCLME water quality guideline value of 5 µg/l (CSIR, 2006), dilution of leachates by the surrounding water would be rapid and any negative effects on marine organisms are likely to be highly localised. Although zinc is an essential food element and occurs as Zn^{II} in dissolved form, it is listed amongst the 129 priority pollutants by the US Environmental Protection Agency as it can have lethal and sub-lethal effects at concentrations as low as 170 µg/l, particularly on the egg and larval stages of marine invertebrates.

9.4.3.9 Pollution and accidental spills

Trenching during installation of the shore-crossing of the subsea cable will involve excavation and construction activities. Vessels will also be used in the nearshore for cable laying and floating and hauling the cable to shore which may be a potential source of pollution. There would thus be potential for or accidental spillage or leakage of fuel, chemicals or lubricants, litter, inappropriate disposal of human wastes and general degradation of ecosystem health on the shoreline. Any release of liquid hydrocarbons has the potential for direct, indirect and cumulative effects on the marine environment through contamination of the water and/or sediments. These effects include physical oiling and toxicity impacts to marine fauna and flora, localised mortality of plankton, pelagic eggs and fish larvae, and habitat loss or contamination. Many of the compounds in petroleum products have been known to smother organisms, lower fertility and cause disease in aquatic organisms. Hydrocarbons are incorporated into sediments through attachment to fine-grained particles, sinking and deposition in low turbulence areas. Due to differential uptake and elimination rates, filter-feeders, particularly mussels, can bioaccumulate organic (hydrocarbons) contaminants.

During construction, litter can enter the marine environment. Marine litter is a cosmopolitan problem, with significant implications for the environment and human activity all over the world. Marine litter travels over long distances with ocean currents and winds. It originates from many sources and has a wide spectrum of environmental, economic, safety, health and cultural impacts. It is not only unsightly, but can cause serious harm to marine organisms, such as turtles, birds, fish and marine mammals.

As much of the cable would be installed in the offshore marine environment, the strong operational lighting used to illuminate the survey and cable vessels may disturb and disorientate pelagic seabirds feeding in the area. Operational lights may also result in physiological and behavioural effects of fish and cephalopods as these may be drawn to the lights at night where they may be more easily preyed upon by other fish and seabirds. The response of marine organisms to artificial lights can vary depending on a number of factors such as the species, life stage and the intensity of the light. Considering the extensive distributions and low numbers of pelagic seabirds likely to be encountered in the offshore environment, the likelihood of collisions would be low.

9.4.3.10 Remobilisation of contaminants

AECI Property Services receive wastewater form various points within the Umbogintwini Industrial Complex. The wastewater is treated at the onsite effluent treatment plant and, on average, 3,000 m^3 is discharged daily through a 1.5-km long marine outfall pipeline into the nearshore marine environment at a depth of approximately 26 m. The effluent, which is largely of organic content, is routinely monitored to ensure compliance with permit conditions. Parameters are monitored daily (NH_3, COD, pH, TSS, conductivity), weekly (Cu, Pb, Cr, Hg, Flourides, SOG, As, Sulphides) and monthly (Zn, Se, Cd, Mn, Cn).

Effluent from the Venator titanium dioxide processing plant was discharged into the coastal waters off Amanzimtoti for decades, with discharges ceasing in 2016. The 1.8-km pipeline lies parallel to the APS pipeline with the outfall at a depth of ~32 m. It was an ‘acid-iron’ effluent characterised by a low pH and the presence of a suite of metals (Pulfrich, 2015). Elevated concentrations of heavy metals (zinc, lead, manganese, vanadium, copper, chromium and iron) are present in the surficial sediments adjacent to the outfall relative to sediment from the wider area. Although the heavy metals are persistent, under current conditions they do not appear to be bioavailable and, therefore, do not exert a detectable ecological impact on the benthic fauna. Information on the depth of the contamination is, however, lacking.

Metal complexes within sediments remain insoluble as long as the sediment remains anoxic, with contribution of the pore-water phase being regarded as minimal. As dispersion of trace metals in the water column occurs predominantly through the particulate phase, disturbance of sediments during trenching and pipeline burial may promote the shift of metals from the particulate to the dissolved state. As the contaminant ‘hotspots’ identified to the north/northeast of the Venator outfall overlap with the proposed cable routing, remobilisation of contaminants may occur during trenching and pipeline burial.

Although many heavy metals are needed in trace amounts, they become toxic to plants and animals at high concentrations. Metal bio-availability and eco-toxicology is complex and depends on the partitioning of metals between dissolved and particulate phases and the speciation of the dissolved phase into bound or free forms. Although the dissolved forms are regarded as the most bio-available, many of these are not readily utilisable by aquatic organisms. Consequently, those forms that are ultimately bio-available and potentially toxic to marine organisms usually constitute only a fraction of the total concentration. However, some

suspension feeders can respond to metal sources in both the particulate and dissolved phases. Trace metal uptake by organisms may occur through direct absorption from solution, by uptake of suspended matter and/or via their food source. Toxic effects on organisms may be exerted over the short term (acute toxicity, or through bioaccumulation.

Impacts from remobilisation of contaminants would be temporary, persisting only during the disturbance of the sediments and diluting rapidly. The significance of the impact is assessed as low.

9.4.3.11 Collisions with and entanglement by marine fauna (including seabirds)

Vessel traffic can affect large cartilaginous fish species, turtles and marine mammals by direct collisions or propeller injuries. The potential effects of vessel presence on turtles and cetaceans include behavioural disturbance, physiological injury or mortality. Most lethal and serious injuries are caused by larger vessels and most vessel strikes occur on the continental shelf and when vessels are moving with speeds in excess of 10 knots. Given the slow speed of the vessels during surveying, the pre-lay grapnel run and the cable installation, ship strikes with marine mammals and turtles are unlikely, and should the impact occur, it would be very infrequent.

Entanglement of whales with old telegraph cables occurred during the telegraph era (1850s to 1950s) at sites where cables had been repaired on the edge of the continental shelf or on the adjacent continental slope in water depths down to 1,135 m. With improved design, laying and maintenance techniques, since development of the coaxial submarine cables in the 1950s and into the fibre-optic era in the early 1980s, no further entanglements with marine mammals have been recorded. Furthermore, as the cable would be buried along much of its length on the continental shelf, entanglements are highly unlikely.

9.4.3.12 Cumulative impacts

The primary impacts associated with the installation of subsea cables in the Natal and Southwest Indian Deep Ocean Ecoregions, relate to physical disturbance of the seabed. Other currently active submarine cable systems landing on the East Coast of South Africa are the EASSy, SAFE and Seacom subsea cables landing at Mtunzini, to the north of the project area. The main trunk of the 2AFRICA/GERA (East) cable routing will largely follow that of the existing SAFE cable. The proposed cable route of the Amanzimtoti branch, where possible, avoids sensitive reef areas and environments such as MPAs. Consequently impacts will mostly affect communities in unconsolidated habitats, which are less sensitive to disturbance and recover more quickly than those inhabiting hard grounds.

The Amanzimtoti branch of the 2AFRICA/GERA (East) cable system will come ashore at Pipeline Beach, which is by no means pristine and has been heavily impacted by numerous coastal developments, several pipelines as well as the existing METISS subsea cable and the T3 cable which is proposed also to land at Pipeline Beach (www.acerafrica.co.za). Therefore, cumulative impacts in this area and on the benthic sampling area around the outfall pipelines are likely.

Further offshore on the shelf and beyond the shelf break, the greatest possibility of cumulative impacts is where the proposed 2AFRICA/GERA (East) cable route meets those of other existing subsea cables. These cumulative impacts are, however, assessed to be of low to very low significance as in reality the total cumulative impacted area at any one time would be minimal, due to the natural recovery of benthic communities of unconsolidated habitats over the medium term.

9.4.3.13 Marine impact assessment summary

Potential impacts of the project on the marine environment include:

- Physiological injury or behavioural disturbance of marine fauna caused by noise.
- Potential injury to marine mammals and turtles through vessel strikes.
- Disturbance of sediments and associated fauna.
- Elimination of biota in the cable's structural footprint
- Physical presence of the cable providing an alternative substratum for colonising benthic communities or resulting in faunal attraction to fish and mobile invertebrates.
- Temporary loss of benthic habitat and associated sessile communities in the coastal zone.
- Possible temporary impacts on adjacent habitat health due to turbidity.
- Temporary disturbance of marine biota.
- Possible impacts to marine water quality and sediments through hydrocarbon pollution or contamination by other waste.
- Potential impacts associated with emissions from the cable (e.g. heat, electromagnetic fields, leachate).
- Pollution of the beach and sea due to accidental spills and litter.
- Remobilisation of contaminants near the Venator Pipeline.
- Collisions with and entanglement by marine fauna.
- Cumulative impacts.

A summary of the specialist's assessment of impacts is provided below. Relevant mitigation measures have been carried across to Section 10.3 of this report and incorporated into the EMPr (Appendix F), as relevant.

- Any behavioural or physiological impacts on marine fauna (including avifauna) due to noise from the geophysical survey and cable installation onshore and offshore would be short term, localised, of low intensity and fully reversible. Mitigation potential is very low. **The impact of increased noise on marine fauna during the cable survey and cable installation is considered of VERY LOW significance both without and with mitigation.**
- Disturbance and destruction of sandy beach biota during trench excavation and subsea cable installation would be temporary, once-off and highly localised. The impacts on benthic communities as a result of cable installation through the littoral zone would be of medium intensity. Impacts would be short-term as communities within the wave-influenced zone are adapted to frequent natural disturbances and recover relatively rapidly. If HDD is used, an undersea tunnel will be created and surface sediments will be negligibly impacted. **The potential impacts of the cable's shoreline crossing on benthic organisms is deemed to be of LOW significance without mitigation.**
- The impacts of trenching and increased suspended sediments on benthic communities in nearshore benthic habitats within and beyond the surf-zone would be of medium intensity. Impacts would be once-off and highly localised. Impacts would be expected to endure over the short-term only as communities within the wave-influenced zone are

adapted to frequent natural disturbances and recover relatively rapidly. Although the subsea cable route passes through nearshore benthic habitats identified as 'Near Threatened' (Natal Delagoa Intermediate Sandy Shore and Southern KZN Shelf Edge Mosaic ecosystem types) and 'Endangered' (Southern KZN Inner Shelf Mosaic and Southern KZN Mid Shelf Mosaic), the loss of resources would be low and impacts would be fully reversible. Using the total available areas provided for the various marine ecosystem types (Sink *et al.,* 2019), and assuming a worst-case disturbance footprint of 5 m wide, the proportion of Natal Delagoa Intermediate Sandy Shore habitat affected by the subsea cable installation was calculated at 0.0003% and that for and Southern KZN Shelf Edge Mosaic habitat at 0.002% of the total 52.12 km^2 and 669.56 km^2 available for these 'Near Threatened' habitats, respectively. For the 'Endangered' Southern KZN Inner Shelf Mosaic and Southern KZN Mid Shelf Mosaic the proportion of habitat affected by the subsea cable installation was calculated at 0.002% and 0.004% of the 258.87 km^2 and 989.63 km^2 available habitat, respectively. This disturbance of benthic habitats can be considered negligible in relation to the available habitat areas. This disturbance of benthic habitats can be considered negligible in relation to the available habitat areas. **The potential impacts of cable installation on benthic organisms in the nearshore environments is consequently deemed to be of LOW significance without mitigation.**

- The potential direct impacts of crushing and sediment disturbance on benthic organisms in offshore habitats would be of medium intensity and once off (unless cable repair is necessary). Benthic impacts will be highly localised along the length of the subsea cable route. Impacts would be limited to the medium-term only as recolonisation of disturbed sediments from adjacent areas would occur within a year, but full recovery to functional similarity can take longer (medium- to long-term). The change in habitat from unconsolidated sediments to the hard substratum of the cable itself would, however, be permanent. **The potential impacts on benthic organisms of cable installation across the continental shelf and abyss is deemed to be of LOW significance without mitigation.**
- Elevated suspended sediment concentrations due to trenching and burial activities associated with the subsea cable installation is deemed of low intensity and would extend locally around the subsea cable route and down-current of the shore-crossing, with impacts persisting only temporarily. Within the wave-base at least, marine biota are typically adapted to periods of elevated turbidity and as suspended sediment concentrations would remain at sub-lethal levels, the loss of resources would be low and impacts would be fully reversible. Mitigation potential is very low. **The impact of increased turbidity on marine biota is therefore assessed to be of VERY LOW significance without mitigation.**
- The physical presence of subsea infrastructure (namely cable and repeaters) can alter the community structure in an area, and effectively increase the availability of hard substrate for colonisation by sessile benthic organisms, thereby locally altering and increasing biodiversity and biomass, potentially also attracting mobile macro- and megafauna who utilize the biofouling community as a food source. Designated cable protection zones with suitable habitats may in fact help to maintain and improve biodiversity and species abundance, and therefore act as *de facto* marine reserves or sanctuaries, although this concept has yet to be proven. The impacts on marine biodiversity through the physical presence of the subsea cable would be of medium intensity and highly localised along the cable itself. As the subsea cable would likely be left in place on the seabed beyond decommissioning of the project, its impacts would thus be permanent. No direct mitigation measures, other than the no-project alternative, are possible. There is no feasible potential for mitigation. **The potential impacts on marine biota due to the physical presence of the cable is deemed to be of LOW significance without mitigation.**

- Based on available information in the literature, the impacts on marine fauna through the generation of heat, sound, EMFs and leachates by the submarine cable would be of negligible intensity and highly localised along the cable itself. As the subsea cable would be in operation for up to 25 years, the impacts would persist over the long-term. No direct mitigation measures, other than the no-project alternative, are possible. **The potential impacts on marine biota, caused by heat dissipation, sound emissions, electric fields, electromagnetic fields and/or leaching of contaminants directly from the cable, are deemed to be of VERY LOW significance without mitigation.**
- Potential hydrocarbon spills and pollution in the intertidal and shallow subtidal zone during installation of the subsea cable are deemed of medium intensity within the immediate vicinity of the construction site, with impacts persisting over the short- to medium-term. Impacts of pollution and accidental spills would be direct, indirect, and cumulative. As the coastal habitats at the shore crossing (Northern Coastal Forest and Subtropical Seashore Vegetation) have been categorised as Critically Endangered and Least Threatened, respectively, the loss of resources could potentially be medium, with impacts being only partially reversible in the worst-case scenario. Mitigation potential is high. **Pollution and accidental spills on the shoreline during the construction phase is improbable and the impact is therefore assessed to be of LOW significance.**
- Metal bio-availability and eco-toxicology is complex and depends on the partitioning of metals between dissolved and particulate phases and the speciation of the dissolved phase into bound or free forms. Although many heavy metals are needed in trace amounts, they become toxic to plants and animals at high concentrations. Remobilisation of contaminants from sediments near the Venator pipeline, due to trenching and burial activities associated with the subsea cable installation, could potentially be of medium intensity, but would remain limited only to the area to the north east of the pipelines known to host contaminated sediments, with impacts persisting only temporarily during disturbance of the sediments and before diluting rapidly. Depending on the degree of contamination of the sediments and the dilution factor of those contaminants that become bio-available once released from the sediments, concentrations would likely remain at sub-lethal levels and acute toxicity effects are likely to be negligible. The loss of resources would be low and impacts would be fully reversible. **The remobilisation of contaminants and potential poisoning of marine organisms is assessed to be of LOW significance without mitigation.**
- Given the slow speed of the vessels during surveying, the pre-lay grapnel run and the cable installation, ship strikes with marine mammals and turtles are unlikely, and should the impact occur, it would be very infrequent. Entanglement with the marine cable is improbable. The likelihood of collision by seabirds as a result of operational lights is low. However, in the event of a collision or entanglement, the impact is deemed of low intensity and would be site specific to the vessel/cable location. Injury through collision and/or entanglement would persist over the short term and considering the slow vessel speed would likely remain at sub-lethal levels. Mitigation potential is medium. **Although this direct impact could result in a medium loss of resources, collision with or entanglement of marine fauna is assessed to be of LOW significance without mitigation.**
- The proposed cable route, where possible, avoids sensitive reef areas and environments such as MPAs. Consequently, impacts will mostly affect communities in unconsolidated habitats, which are less sensitive to disturbance and recover more quickly than those inhabiting hard grounds. cumulative impacts are therefore less likely. The greatest possibility of cumulative impacts is where the proposed 2AFRICA/GERA (East) route meets those of other existing subsea cables. Pollution and cumulative impacts closer to shore where there are a number of pipelines and current/future cable landings at Pipeline Beach, are possible. **These cumulative impacts are, however, assessed to be of LOW to VERY LOW significance.**

9.4.4 Conclusion

Installation of the cable will potentially result in localised disturbance of the upper beach and intertidal and shallow subtidal sandy habitats, as well as unconsolidated seabed beyond the surf-zone and across the shelf. Most potentially negative impacts were rated as being of low significance, with only pollution and accidental spills during construction rated as medium significance. As recovery of marine communities over the short- to medium-term can be expected, residual impacts were all considered minor.

The specialist report concludes that, if all environmental guidelines and appropriate management and monitoring recommendations advanced in the report are implemented, there is no reason why the proposed installation of the proposed 2AFRICA/GERA (East) Cable System (Amanzimtoti landing) should not proceed.

9.5 Marine benthic shallow water impact assessment

9.5.1 Introduction

The report (Appendix B5) provides an assessment of the potential impacts of the proposed 2AFRICA/GERA (East) Cable System (Amanzimtoti landing) on the marine benthic communities in the shallow (<30 m) subtidal environment near the cable landing point at Pipeline Beach.

9.5.2 Approach

This specialist study undertook a desktop review of available scientific and grey literature on marine benthic comunities along the KZN shallow coastal subtidal environment which was supported through the collection of primary visual field data within the cable servitude and wider study area to obtain information on the substrate composition, and macrobenthic community structure in water depths <30m. The objective of the field assessment was to characterise macrobenthic community compositon along the inshore (depths 0-30 m) cable aligment to identify Threatened or Protected Species, rare or sensitive speices, or Convention on International Trade in Endagered Species listed species. The study involved a quantitative assessment and a rapid habitat assessment.

9.5.3 Findings

The main habitats along the shallow water cable route are reef, sub-cropping rock and sand substrates. The study area was dominated by unconsolidated sediments. Along the surveyed cable route, 57% consists of coarse sediments, 41% sub-cropping reef and less than 1% is outcropping reef.

The inshore reef complex consisting of a band of flat low to medium profile reef in the nearshore (assigned to two different biotopes) which structurally consists of plateaus, ledges, overhangs and medium profile outcrops. This provides various surfaces to be colonized by a variety of small biota and sparsely distributed larger invertebrates. A third biotope type was identified which has a larger sand component and the hard substrate is generally covered extensively with a considerable layer of sand (sub cropping reef). The occurrence of biota is patch like and these areas are generally found in deeper waters further offshore.

The inshore reef system supported abundant life with no bare rock recorded although sand patches, narrow gullies and areas with a thin sand veneer were present. Species of note, although low in abundance, include the purple and white thorny soft coral *Dendronephthya* sp and white/cream *Leptophyton benayahui* found in the shallower sections. No prominent hard coral colonies were recorded. A few individuals of *Antipathes* and *Cirrhipathes* (Black corals) were observed in the panoramic images but none were present in the sample quadrats (quantitative analysis). The abundance of these species was found to be very low. These taxa are not listed or classified on the IUCN Red List, however, *Antipatharia* are listed in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora which list species not necessarily threatened with extinction but highlights the need for strict regulation. Although high biodiversity is suggested by the comprehensive list of species known to occur off the KZN coast, the small inshore reef ridge at the study site presented relatively few of these species, especially large specimens, and if so at low densities.

The report provides detailed information on anticipated impacts, both quantitative and qualitative, focusing on the benthic communities along the cable alignment at 0-30 m water depths, as outlined in the sections below. Mitigation measures for these impacts, as provided from this specialist report, have been carried across to Section 10.3 of this report and incorporated into the EMPr (Appendix F), as relevant.

9.5.3.1 Physical disturbance and damage to marine benthic biota (0-30 m depth) (installation)

Due to the presence of sub-cropping rock and shallow overlaying sediments the greatest part of the cable will buried by divers (56%) which will cover the section from the intertidal to the 20m isobath. The use of the cable laying ship and plough burial will only commence in waters deeper than 20m which will account for 44% of the shallow water (<30 m) cable route. No effort will be made for burial over the short section of outcropping reef and the cable will be surface laid, secured on either side by burial in the soft sediments as well as pinning if required and deemed necessary.

Damage to the hard substrata marine macro-benthic communities will be limited due to the small amount of reef which occurs along the cable route, and the narrow linear zone of impact. All species encountered on hard substrata within the project servitude occur within the region and no unique or endangered species were observed. Should any benthic reef macro fauna or flora be damaged during installation it will be able to recover to pre-impact health within a reasonable time. The cable and armouring will also likely be overgrown by these fauna as has been demonstrated elsewhere.

In areas where sand occurs over sub-cropping rock cable burial will be undertaken by divers using a purpose-built sledge which is towed along the seafloor by a surface support vessel. The sledge is guided by divers with water being pumped from the surface vessel creating a high volume flow which is used to create a trench and bury the cable to a pre-determined depth. Diver burial will be attempted along 874m (56%) of the cable route from the intertidal to approximately 20 m water depth. The success of this burial will depend on the depth of the sediments over the sub-cropping rock at the time of the operation.

Observations from the field surveys showed that benthic biota was observed attached to the hard substrates in these areas and indicates very shallow sub-cropping rock. It is unlikely that burial will be effective in these areas. Cable laying and attempted cable burial may result in some damage to the biota in these habitats which are scattered along the cable route. No species in these habitats are of key concern and occur widely in the region.

No infaunal burrows were observed along the cable route in fine or coarse sand areas suggesting the absence of larger burrowing macrofauna, however, this does not preclude the presence of smaller interstitial species. Such species are however likely to be widely distributed in the sandy areas and the extent of direct damage resulting from plough burial on such organisms will be minimal. The PLGR will also create disturbance on the sandy areas up to depths of 80 cm, however, these sandy areas are widely distributed throughout the region and recovery of damaged areas will likely occur rapidly.

9.5.3.2 Increased turbidity and sedimentation/smothering in the nearshore (installation)

PLGR, use of the plough and diver operated cable burial water jetting activities will lead to elevated suspension of particulate materials during the installation phase. This may lead to two impacts on the marine benthic biota, firstly increased turbidity affecting light penetration and therefore the ability of algae to photosynthesize, and secondly, smothering of biota due to the deposition of the suspended particles. However, due to the sediment type on site, the potential for dispersion is limited and sediment will settle out of the water column quickly. This means that the extent of the impact will be highly localised and of short duration. This nearshore coastal area in the study site is subject to strong currents which will also aid in rapid dispersal and dilution of suspended particles. Biota occurring in these habitats are adapted to these conditions. Hard substrata was limited within the study area and no algal beds were observed. Impacts of increased turbidity due to the short duration and limited extent will likely be negligible.

Smothering of benthic biota by sediments may impact on feeding of suspension feeders, potentially influencing benthic community structure on reef or hard substrata more significantly than unconsolidated substrata, as soft sediment biota are generally mobile or able to withstand short periods of inundation. Areas of rock outcropping within the cable route were extremely limited, being restricted to a span of less than 20m wide. The narrow reef does, however, run perpendicularly to the cable alignment and areas further away may also impacted to some degree as sediments are transported and dispersed by currents. The inshore coastal waters are typically highly dynamic and experiences strong currents and wave action, particularly during large storms which lead to large scale sediment movement. It is therefore probable that the inshore benthic communities are able to withstand temporary inundation as they occur in a naturally dynamic environment where sediment movement is common.

9.5.3.3 Resuspension of existing contaminants

Two effluent discharge pipelines as described in Section 6.1.8 and Section 6.1.9, and the sediments nearby, have elevated concentrations of zinc, lead, manganese, vanadium, copper, chromium and iron in the sediments adjacent to the outfall when compared to the sediment from the wider area (i.e. away from the outfall). Metals bind to the sediment particles and are not bioavailable to the marine biota when in this state. However, disturbance of the sediments during cable installation may lead to the oxidation of the sediments, which could, in turn, lead to metals becoming more soluble and, therefore, more bioavailable to surrounding marine biota. This may create a potentially toxic environment for marine biota.

The solubility of metals depends on a range of factors, including rates of re-adsorption, the concentration and composition of organic material and the oxidative environment. The mechanisms through which the metal species are re-adsorbed are complex and driven by multiple factors.

Three alternatives for cable burial in the nearshore area are proposed, based on the way the plough is operated, and the depth to which the cable will be buried. These alternatives are only relevant where plough burial will take place which will commence at approximately 20m water depth, cable burial in waters shallower than this will be facilitated by divers. Areas that are less than 20m deep (0-770m distance from shore) are also less likely to contain contaminated sediments as the Tioxide outfall discharged at a water depth of 32m (1,500m distance from shore). Plough burial with the aid of a water jet may result in an increased plume of suspended sediments in the water column compared to mechanical ploughing alone. In the absence of water jetting at the plough/sediment interface, the level of disturbance and resuspension of sediments is greatly reduced. This therefore has the advantage of minimising the potential release of contaminants currently contained within the sediments.

While a detailed assessment of contaminants and toxicity was well beyond the scope of this specialist study, a synthesis of available information from a marine monitoring programme by Physalia in 2019 was provided to enable an assessment of the impact. According to previous monitoring, five metals (chromium, manganese, lead, vanadium, and zinc) were present in the sediments at levels above the expected natural background concentrations. However, none of these metals occurred at levels above the Australian and New Zealand Environment and Conservation Council (ANZECC) lower guideline value (Threshold Effects Level-(TEL)), or the South African Screening Guideline values, whilst chromium slightly exceeded the National Oceanic and Atmospheric Administration (NOAA) TEL it was below the NOAA Probable Effects Level (PEL).

The coastal zone in the project area is highly dynamic with prevalence of strong currents which will aid in dispersal and dilution of any suspended sediments which may occur as a result of cable burying activities. The only feasible mitigation measure for this impact is to ensure that the disturbance to sediments is kept to a minimum. The use of water jetting at the sediment plough interface should therefore be avoided, especially in areas of known high contaminations. Furthermore, disturbance during diver burial should be minimised as far as possible

9.5.3.4 Accidental spills (installation)

The findings regarding accidental spills corroborate those of the Marine Ecology Assessment as summarised in section 9.4.3 above.

9.5.3.5 Presence of hard permanent structure in the nearshore (operation)

The installation of the cable will result in the presence of a hard permanent structure. This impact is only relevant in areas where cable burial is not undertaken. For the Amanzimtoti Pipeline Beach Landing Site only a very small section of cable is unlikely to be buried. The cable in this habitat will be colonised and overgrown by naturally occurring marine benthic species in time.

9.5.3.6 Introduction of electric fields, electromagnetic fields, sound and heat (operation)

The findings regarding cable emissions corroborate those of the Marine Ecology Assessment as summarised in section 9.4.3 above.

9.5.3.7 Cable maintenance and repair

Due to the highly dynamic nature of the coastal zone, the possibility exists of a cable break due to ongoing abrasion, or a major storm event. However, this is highly unlikely as only a short section of cable will be surface laid and it will also be protected in articulated split pipe. It is therefore highly unlikely that cable damage will occur in the nearshore during the project period. Should a break occur in the nearshore it is probable that the cable from the BMH to a safe workable depth will be replaced in its entirety. The impacts of this will be as for the construction phase.

9.5.3.8 Cumulative impacts

The KZN south coast is subject to considerable residential and industrial development, and several sources of pollution from inland sources are ultimately discharged into the nearshore marine environment. Water and sediment quality are both likely to have been impacted by inland wastewater and the marine outfalls which discharge into the nearshore. The cumulative effect of these existing impacts has not been quantified and is difficult to predict. However, the proposed cable will have no likely impacts on the nearshore marine environment during the operational phase since once installed, the cable is benign with no meaningful chemical discharges.

Whilst the construction phase may add to the cumulative effects on the local environment, the operational phase of the project will have little to no contribution to the cumulative impacts within surrounding areas.

9.5.4 Conclusion

The report concludes that the nearshore (<30 m) marine substrate composition was dominated by soft sands, and both reef (outcropping rock) and sub cropping reef habitats were limited. No unique or range restricted species were identified and all species or taxa observed occur within the region. The project activity is linear in nature (but will not create a barrier) limiting the extent of impacts on surrounding habitats. The impacts are mainly limited to the construction phase and are short term in duration. All construction impacts were rated as LOW significance post-mitigation. Care must be taken to limit disturbance to the seabed and resuspension of contaminants as far as possible using appropriate industry acceptable, installation methods, including mechanical plough use (i.e. NO jetting). All operational impacts are considered to be of LOW significance and there will be no long-term impacts on macrobenthic communities. The contribution of the overall project to the cumulative impacts is considered LOW. For this reason, no follow on or long-term monitoring is required.

Based on the findings of the visual assessment of shallow water macrobenthic communities it is feasible to authorise the cable landing, installation and operation through the proposed route at Amanzimtoti Pipeline Beach provided suitable mitigation is in place during cable installation through the contaminated areas.

9.6 Heritage assessment

9.6.1 Introduction

The HIA report (Appendix B6) provides an assessment of the potential impacts of the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) on heritage resources.

The 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 SAHRA. The terrestrial element of the cable route lies between the BMH and the CLS and falls under the jurisdiction of Amafa.

9.6.2 Approach

The HIA 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 mitigation. 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 following aspects are addressed:

- Potential maritime archaeological sites, and submerged pre-colonial sites along the marine route of the cable system.
- Potential archaeological and other heritage sites along the terrestrial route of the cable system.
- A desk-top palaeontologist assessment of the potential for impacts to palaeontological features (both on land and in the seabed) arising from the cable system.
- 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 the HIA report along with an assessment of the sensitivity and significance of any heritage resources, an evaluation of the potential impacts of the project on these resources and recommendations for measures to mitigate any negative impacts.

9.6.3 Findings

Of the heritage resource types protected by the NHRA, the installation and operation of the proposed 2AFRICA/GERA (East) Cable System (Amanzimtoti landing) 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.
- Public monuments and memorials.

These have been described in Section 6.6 of this EIA report and in more detail in the specialist report.

9.6.3.1 Submerged prehistoric archaeological material

The report finds that where submerged prehistoric archaeological 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. The nature of the proposed seabed intervention, namely the burial of the cable in the seabed within the area covered by this assessment suggests that indirect impacts, which manifest themselves after and/or downstream of the activity are also unlikely.

No mitigation is 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.

9.6.3.2 Paleontological features and fossil material (marine and terrestrial)

The sediments, both onshore and offshore, that may be affected by the proposed cable route are relatively young. The Umkwelane Formation aeolianites which underlie the terrestrial portion of the cable route have a low potential to preserve significant fossils.

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, while further offshore the reworked delta-fan sands of the Tugela Cone are unlikely to contain any *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 potentially fossiliferous sediments below the seabed are expected to be negligible. Where burial is required with the seabed plough method, it is not possible to perform palaeontological mitigation, as seabed materials are not brought up to the vessel for inspection and sampling. However, direct palaeontological impacts from burial are considered to be negligible, due to the limited subsurface seabed disturbance entailed in burying the cable by seabed plough.

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.

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.

No mitigation is proposed. However, recommendations for chance finds are made, which have been listed in Section 10.6 of this report and incorporated into the EMPr (Appendix F), as relevant.

9.6.3.3 Maritime archaeological resources

Two wrecks, the *Mary Kate (1976)* and *Griqualand (1970)* 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 Landfall and Inshore and Shallow Water geophysical surveys undertaken by Fugro (2021), 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 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.

The specialist recommendations for mitigation of impacts on maritime heritage resources are listed in Section 10.6 of this report and incorporated into the EMPr (Appendix F), as relevant.

9.6.3.4 Terrestrial archaeology

The small footprint of the cable trench, the likelihood that any archaeological material 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 in the vicinity of the cable system are very unlikely.

Measures for mitigation of chance finds of terrestrial archaeological resources are listed in Section 10.6 of this report and incorporated into the EMPr (Appendix F), as relevant.

9.6.4 Conclusion

The HIA concludes that, provided the recommended mitigation measures are implemented, the installation of the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) 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 the HIA.

9.7 Avifauna assessment

9.7.1 Introduction

This report (Appendix B7) is a generic, desktop assessment of the potential impacts of the construction and operation of marine fibre optic cable systems on avifauna in South Africa, prepared by WildSkies (2021). This assessment was commissioned following comments raised by DFFE – O&C with regards to possible impacts on offshore avifauna. The findings can be applied to all submarine fibre-optic cable landings on the West, South and East coasts of South Africa.

9.7.2 Approach

The investigation utilised desk-top assessments and a review of available literature to investigate and identify factors associated with the installation and operation of subsea cables and their potential impacts on seabirds associated with South Africa's EEZ and coastline. In addition, the investigation identified mitigation and management measures that may be employed during and post installation.

9.7.3 Findings

South African waters boast a rich diversity of seabirds and shorebirds, many of which occur in the area affected by the proposed 2AFRICA/GERA (East) Submarine Cable System. The 2018 'State of South Africa's Birds' (Taylor & Peacock, 2018) states that "seabirds have declined faster than any other group of birds and now account for a third of all threatened species". Reasons for the poor conservation status of seabirds include slow reproductive rates; dependence on islands for breeding (and consequent vulnerability to disturbance and introduced predators); direct mortality through interaction with fishery activities; and competition between seabirds and fisheries.

Three main impacts of subsea cable installations on birds were identified, along with general mitigation measures, as described below.

- **Offshore habitat destruction** during installation of the marine cable is an indirect impact most likely to affect seabird prey base and is likely to be of low significance given the limited development footprint and short construction period. The onshore and near-shore components of the cable system have a very small footprint and are generally located on sandy beaches (to facilitate cable burial) and not the more ecologically sensitive rocky shorelines. Although work within this zone is normally completed within a week, the site should be carefully managed to ensure that no unnecessary impacts occur. Particularly sensitive bird areas should be avoided when planning cable landing sites and include avoiding MPAs, IBAs, sensitive onshore areas and any islands.
- **Disturbance effects** will be limited, if breeding sites are not impacted on, as cable installation moves relatively quickly (up to 20 kilometres of cable laid per day). As described above, the onshore and near-shore activities will be extremely limited spatially and temporally, and any impacts on shore birds should be minor and short lived. Disturbance will therefore be a localised and temporary effect. Breeding areas for sea and shorebirds should be avoided, to minimise impacts.
- Since no food will be available to sea birds during cable installation or during the pre-lay grapnel run, **possible incidental mortality of seabirds striking the cable laying vessel** will be of low significance. Birds may approach the vessel to investigate but will not spend extended periods close to the ship or congregate in large numbers (since no

food is available). Further, since no feeding behaviour will be induced, birds will not be distracted (which is thought to contribute to their collision and entanglement at fishing vessels) whilst in flight close to the ship. Lighting on board project vessels should be kept to a minimum in order to reduce the risk of attracting and disorientating seabirds.

Mitigation measures from this specialist report have been carried across to Section 10.3 of this report and incorporated into the EMPr (Appendix F), as relevant. Refer also to the recommendations above.

9.7.4 Conclusion

In general, the significance of anticipated impacts of submarine telecommunications cables projects on seabirds and shorebirds is low, provided the cable avoids particularly sensitive bird areas such as MPAs, IBAs, sensitive onshore areas and any islands.

9.8 Marine mammal assessment

9.8.1 Introduction

This report is a generic, desktop assessment of the potential impacts of the construction and operation of marine fibre optic cable systems on marine mammals in Southern African waters, prepared by Sea Search (2021) (Appendix B8). This assessment was commissioned following comments raised by DFFE-O&C with regard to possible impacts of marine telecommunications cable projects on marine mammals. These findings can be applied to all of the 2AFRICA landings on the West and East coasts of South Africa.

9.8.2 Approach

The investigation utilised desk-top assessments and a review of available literature to investigate and identify factors associated with the installation and operation of telecommunications cable systems around South Africa which could potentially impact on marine mammals. In addition, the investigation identified mitigation and management measures that may be employed during and post installation.

9.8.3 Findings

Submarine telecommunications cables have been laid across the ocean floor since the mid-1800s, with over a million kilometres of cable now deployed worldwide. Given that the laying of the cable is relatively brief in comparison to other human activities floor such as mining and trawling and the fact that the footprint of the cable is narrow (up to 8 m for the actual cable but a few km for initial acoustic/benthic surveys), the impacts of benthic destruction and modification is not thought to impact marine mammals in any measurable way. The main impacts of the cable laying process which might affect marine mammals have been identified as follows:

- Avoidance of noise and masking of vocalisations by general ship noises and depth sounders.
- Potential startle responses of marine mammals to multi-beam echosounders, which could lead to mass stranding events.

- Entanglement of cetaceans in the cable is possible during deployment or once laid but has not been recorded in over 30 years. This is thought to be a result of modern materials and cable laying methods (including shallow water burial) and thus, entanglement is not regarded as a threat.

Given that most marine mammals occur in South Africa's water throughout the year, the timing of installation is not considered to be of great importance, however based on the data available, the months of June – October tend to be more important to vulnerable species such as Fin Whales, Blue Whales and Sei whales.

Mitigation options for these activities are limited but include ensuring use of well-maintained ships and equipment to minimize noise production from engines; switching off non-essential sonar systems, cautious use of multi-beam echosounders and avoidance of peak whale seasons.

It is recommended that the vessel skipper appoints a suitably trained crew member with relevant experience in marine mammal identification as a Marine Mammal / Protected Species Observer (MMO/PSO), to ensure no mammals are within the potential impact zone of sonars, cables or noise pollution.

10 ENVIRONMENTAL ISSUES AND POTENTIAL IMPACTS

The key issues identified during Scoping and carried through to the Impact Assessment are formulated as seven key questions[36]:

- What are the potential social and socio-economic impacts associated with the construction and operation of the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing)?
- What impacts will the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) have on terrestrial and freshwater aquatic habitat and biodiversity (vegetation, wetlands/rivers and fauna)?
- What impacts will the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) have on the marine environment (including sensitive benthic ecosystems and areas of conservation value)?
- What impacts will the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) have on commercial and recreational fisheries?
- What impacts will the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) have on the beach and coastal dunes?
- What impacts will the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) have on terrestrial and marine cultural heritage resources, including paleontological features?
- What cumulative impacts will result from the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing)?

Potentially significant impacts associated with each of the above issues are discussed and assessed in the sections below. Where relevant, significance ratings have been assigned to impacts, according to the assessment conventions (Section 7.4), and presented in Impact Assessment tables (Table 17 to Table 23). The tables assess the significance of expected impacts before mitigation, as well as after application of the recommended mitigation measures (in Chapter 10 and in the EMPr), as applicable.

Note that mitigation measures may be repeated, where they apply to multiple phases of the project.

10.1 What are the potential social and socio-economic impacts associated with the construction and operation of the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing)?

During the construction/installation phase, social and socio-economic impacts (both positive and negative) are of medium and low significance after management/mitigation. During operation, they are also of medium and low significance after management/mitigation (Table 17).

10.1.1 Boost to economic development (nationally and internationally)

The proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) will provide additional and affordable international bandwidth which will support the country's economic development initiatives locally and abroad.

[36] Note that some changes have been made to the questions as originally framed in the FSR, however they continue to address all key issues identified in the FSR.

While expanding access to communication technology will be done primarily through broadband infrastructure roll-out, this requires a national backbone connected to the rest of the world. In this case, the proposed project supports SIP 15 via its international connectivity, capacity and speed.

10.1.2 Improved/increased opportunities for education and job creation (during operation)

In improving and facilitating communications and economic development in South Africa, the project is anticipated to contribute positively towards education and job creation in the country, thus assisting to improve livelihoods.

10.1.3 Increased employment opportunities and opportunities for local business and SMMEs (during installation)

Since the landing of the marine cable onto shore is a specialised activity, and limited land based infrastructure will need to be constructed, few temporary jobs will be available during the installation phase. Local businesses and accommodation facilities may benefit from the project team temporarily staying in the area.

10.1.4 Impacts on Oil and Gas exploration concession areas

The proposed Amanzimtoti branch line passes through an offshore O&G lease area under ENI as the operator of block 236ER on behalf of their partner Sasol. Following initial engagements between ASN and ENI a letter of no objection has been issued by ENI for installation of the 2AFRICA/GERA (East) Cable System.

O&G interests and future associated drilling activities do however pose a risk to the development of the proposed 2AFRICA/GERA (East) Cable System, and it is recommended that ASN, WIOCC and ENI engage each other if, and when, future associated mining activities occur.

10.1.5 Impacts on existing marine telecommunications cables and submarine pipelines

The main trunk cable of the 2AFRICA/GERA (East) will cross other submarine cables circumnavigating the South African coast, and the branch line to Amanzimtoti will cross the METISS cable. WIOCC will abide by the guidelines and standards of the ICPC, which are in place to ensure safety of existing marine telecommunications systems (this would apply to both installation and decommissioning). Therefore, it is not anticipated that the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) will negatively impact on existing marine telecommunications cables.

The proposed cable route crosses no pipelines at sea.

10.1.6 Damage/disruption to property and services

Land-based services and infrastructure such as telecommunications cables, electricity cables, water pipelines, stormwater or sewage infrastructure, pavements, signage and lighting could potentially be damaged or otherwise disrupted by trenching between the BMH and CLS. However, identification of existing wayleaves and services will be undertaken by WIOCC and their appointed service providers in consultation with eThekwini as part of the engineering design for the land cable installation, so that damage can be avoided. On land, the cable servitude will avoid impacting on AECI's effluent pipelines.

Trenching between the BMH and CLS may cause limited temporary damage to municipal roads, verges and driveways. However, the site will be reinstated and made good after installation.

The Beach Office and KZN Sharks Board will be notified prior to the cable landing so that shark nets and any other potentially affected beach infrastructure (e.g. lifeguards platforms) can be temporarily moved and/or appropriately managed.

10.1.7 General disruption, safety risks and nuisance impacts to the local community and beach users

Construction of the BMH and trenching , as well as the shore end landing, will result in minor disruption and nuisance impacts to surrounding infrastructure, residents, and beach goers. These impacts may include increased noise and dust, temporary disruption of traffic and access, increased health, safety and security risks, and negative visual impacts.

Trenching along the roads will cause minor disruption but the areas will be cordoned off with hazard tape, and road safety and traffic management measures will be implemented where required. Any disruption of access will be temporary, and the trenches will be reinstated and revegetated as soon as construction is complete.

Installation activities on the beach will be confined to a limited area and will be of short duration. Areas which may pose a safety risk to the public will be cordoned off. Public access to the non-affected sections of the beach carpark and beach will be maintained during the construction/installation period and thus recreational beach activities will not be unduly restricted. All trenching on the beach will be reinstated directly after cable installation. Due to the relatively limited scale and short duration of the construction works, these general safety and nuisance impacts are anticipated to be of low significance, with mitigation.

Swimmers, surfers, divers and recreational fishers will be required to stay at least 500 m away from the cable laying activities in the sea and surf zone. Provided cable landing does not coincide with the sardine run when it goes past Amanzimtoti, this impact is considered negligible as the landing will be of short duration and there are other nearby marine areas available for such activities.

During operation/maintenance of the cable, the impacts on beach infrastructure and beach and sea users will be negligible, as maintenance activities will be very infrequent and more likely to be required offshore.

Should decommissioning of the cable involve removal of the cable from the beach, similar (but less intense) impacts to cable installation, are anticipated. With suitable mitigation/management, these impacts will be of low significance.

10.1.8 Maritime safety and diver safety

Safety of ships and personnel at sea, and safety of the environment from ships and shipping activities, is obviously of prime importance. It is, however, regulated and managed at many levels via existing legislation and management systems. Notification to mariners is sent out which notifies ships in the area of cable operations and a 500 m safety zone from the ship must be adhered to. Provided notifications are properly undertaken and mariners comply with the necessary regulations, increased safety risks at sea are not anticipated to be a significant negative impact of the project.

During the sardine run, sharks will be present in the area and will pose a risk to divers assisting with cable landing. Cable landing must be scheduled to avoid the sardine run (June/July).

10.1.9 Mitigation measures

10.1.9.1 During planning and design

- ❑ WIOCC to implement the guidelines and standards of the ICPC for marine cable crossings.
- ❑ WIOCC to engage directly with offshore concession holders and to draw up a Co-operation Agreement (if required) which outlines the rights, obligations and roles and responsibilities of both parties in terms of the installation and operation of subsea infrastructure.
- ❑ To eliminate interactions with future Oil and Gas activities on cable system infrastructure and operations, the landing partner must undertake the following:
  - o Conclude Co-operation Agreements between the cable landing partner and the various offshore concession holders (if required) to ensure that the activities of both parties can co-exist without limiting each other's commercial operations.
  - o Map the marine cable system route and formally Register the cable routing as a real right against the Deed and against the Oil and Gas Rights at the Mineral and Petroleum Titles Registration Office.
- ❑ Cable landing should preferably be timed to occur outside of peak holiday seasons (December, January and April).
- ❑ Cable landing must be timed to avoid the Sardine Run (June/July) where possible.
- ❑ All land-based services and infrastructure (surface and buried) and associated wayleaves that may be affected by the terrestrial portion of the cable, must be identified and communicated to relevant parties so they can be appropriately avoided/ managed to prevent damage and disruption.

10.1.9.2 During installation (on land)

- ❑ Beach users should be forewarned of cable laying activities and schedules through on-site signage and other communication via the Amanzimtoti beach office, as relevant.
- ❑ The Beach Office and KZN Sharks Board must be notified prior to the cable landing so that shark nets and any other potentially affected beach infrastructure (e.g. lifeguards' platforms) can be temporarily moved and/or appropriately managed.
- ❑ Where possible, make use of local labour/SMMEs and use local goods and services.
- ❑ Cordon off work areas that pose a risk to the public and ensure that alternative access to the beach is provided.
- ❑ Construction vehicles must obey regulated speed limits, lights will be switched on at all times and no large vehicles will use the roads at dawn, dusk, at night or in heavy mist conditions to reduce the risk of accidents with other vehicles and pedestrians.

- ❑ Practice good housekeeping to limit negative visual impacts and leave the site clean and free of waste of any kind.
- ❑ Appropriate training of construction personnel must be undertaken so that they are aware of the restrictions, mitigation measures and the use of spill and containment kits.
- ❑ Any beach infrastructure that may be disturbed by the construction of facilities on land and by the installation of the cable, must be protected, or replaced at the cost of the applicant, should they get damaged due to implementation of the proposed project activities or negligence by the applicant.

10.1.9.3 During installation (marine)

- ❑ Number and size of vessels to be provided to SAMSA.

Table17 Assessment of potential socio-economic and social impacts resulting from the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing)

Description and Nature of Impact	**Mitigation**	**Nature** (Positive, Negative, Neutral)	**Spatial Extent** (Site Specific, Local, Regional, National/ International)	**Duration** (Short-term, Medium-term, Long-term, Permanent)	**Intensity** (Negligible, Low, Medium, High)	**Frequency** (Once off, Intermittent, Periodic, Continuous)	**Irreplace-able loss of resources** (Low, Moderate, High)	**Revers-ibility of impacts** (Non-reversible, Low, Moderate, High)	**Probability** (Improbable, Probable, Highly Probable, Definite)	**Significance** (Low, Medium, High)	**Confidence** (Low, Medium, High)
Boost to economic development (operation)	Unmitigated	Positive	National/ Inter-national	Long-term	Low	Continuous	Low	Medium	Highly Probable	Medium	High
	Mitigated	Positive	National/ Inter-national	Long-term	Low	Continuous	Low	Medium	Highly Probable	Medium	High
Improved educational and job opportunities (operation)	Unmitigated	Positive	National/ Inter-national	Long-term	Low	Continuous	Low	Low	Highly Probable	Low	High
	Mitigated	Positive	National/ Inter-national	Long-term	Medium	Continuous	Low	Low	Low	Medium	High
Increased employment and business opportunities (installation)	Unmitigated	Positive	Regional	Short-term	Negligible	Once-off	Low	N/A	Probable	Low	High
	Mitigated	Positive	Regional	Short-term	Low	Once-off	Low	N/a	Probable	Low	High
Impacts on O&G concession areas (operation)	Unmitigated	Negative	Local	Permanent	Medium	Once-off	Low	Low	Probable	Medium	Medium
	Mitigated	Negative	Local	Permanent	Low	Once-off	Low	Moderate	Probable	Low	Medium

Description and Nature of Impact	**Mitigation**	**Nature** (Positive, Negative, Neutral)	**Spatial Extent** (Site Specific, Local, Regional, National/ International)	**Duration** (Short-term, Medium-term, Long-term, Permanent)	**Intensity** (Negligible, Low, Medium, High)	**Frequency** (Once off, Intermittent, Periodic, Continuous)	**Irreplace-able loss of resources** (Low, Moderate, High)	**Revers-ibility of impacts** (Non-reversible, Low, Moderate, High)	**Probability** (Improbable, Probable, Highly Probable, Definite)	**Significance** (Low, Medium, High)	**Confidence** (Low, Medium, High)
Impacts on existing tele-communications cables and pipelines (installation)	Unmitigated	Negative	Site-specific	Short-term to permanent	Medium	Once-off	Low	Medium	Probable	Medium	Medium
	Mitigated	Negative	Site-specific	Short-term to permanent	Negligible	Once-off	Low	High	Improbable	Low	Medium
Damage/ disruption to property and services	Unmitigated	Negative	Local	Short-term	Medium	Once-off	Low	High	Probable	Medium	High
	Mitigated	Negative	Local	Short-term	Low	Once-off	Low	High	Improbable	Low	High
General disruption and nuisance impacts (installation	Unmitigated	Negative	Local	Short-term	Low	Once-off	N/A	High	Highly Probable	Low	High
	Mitigated	Negative	Local	Short-term	Negligible	Once-off	N/A	High	Highly Probable	Low	High
Maritime safety risks (including divers)	Unmitigated	Negative	Site-specific	Short-term	Medium	Once-off	N/A	N/A	Probable	Medium	Medium
	Mitigated	Negative	Site-specific	Short-term	Low	Once-off	N/A	N/A	Improbable	Low	Medium

10.2 What impacts will the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) have on terrestrial and freshwater aquatic habitat and biodiversity (vegetation, wetlands/rivers and fauna)?

10.2.1 Loss of, or disturbance to terrestrial vegetation, freshwater ecosystems and non-marine fauna

The proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) will have very little direct effect on vegetation as it is situated primarily on degraded/transformed land. Disturbance to the limited vegetation on the coastal dune seawards of the BMH will be prevented by using HDD methods. Construction of the BMH is in a tarred and grassed carpark. Trenching for the terrestrial section of the cable between the BMH and CLS will be confined primarily to transformed areas and the road reserve. The project may indirectly impact adjacent coastal thicket vegetation (considered as high sensitivity) by increasing the risk of colonisation and spread of alien invasive plant species into this habitat. Although two protected tree species occur within the study area, they are not within the project footprint. While there are wetlands within 500 m of the proposed land based infrastructure, they are not at risk of being impacted by the project. Consequently, the project will have no significant impact on natural habitat for terrestrial fauna.

The spillage and escape of bentonite from the drilling hole during HDD is possible. Although inert and nontoxic, bentonite has the consistency of mud which, if spilt, can smother surrounding plant life and organisms within the terrestrial environment. Through careful planning, and if a suitably qualified drilling contractor is appointed, the risks of bentonite spillage is considered to be of low significance.

Given the above, the significance of the impacts of the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) on terrestrial and freshwater aquatic habitat and biodiversity (including fauna) is considered low, after mitigation (Table 18).

10.2.2 Mitigation measures

10.2.2.1 During construction

- A suitably qualified drilling contractor must be used for the HDD and measures implemented to avoid the spillage of bentonite into the surrounding dune vegetation.
- The pegged-out route of the preferred fronthaul alignment should avoid all areas of the Coastal Thicket HU, of which large portions fall within D'MOSS and CBA: Irreplaceable units. The Degraded Land HU should be the preferred construction area.
- If the final pegged out route encroaches into area of D'MOSS and CBA: Irreplaceable planning units, written permission to do so must be obtained from EPCPD. An offset for species disturbed, as described below, is proposed if this will occur.
    - If any indigenous woody tree species within this unit are cut down to provide space for constructure, an offset ratio of 1:3 must be implemented for every species felled.
    - Three (3) specimens of the species felled must be planted within an area zoned as open space in the study area. The positioning of the species is to be discussed with EPCPD and EKZNW.

- No threatened or protected species should be disturbed, cut or felled. If this is completely unavoidable, the relevant permits must be obtained from the relevant competent authority prior to construction. The same offset ratio as described above is recommended if the protected species are to be felled. It is unlikely that translocation of the mature woody species will be possible.
- The construction footprint should be confined to the preferred fronthaul alignment trench and the preferred BMH Alternative 3. Sediment netting should be erected around each construction area to avoid unnecessary disturbance of the surrounding terrestrial environment.
- In areas which will not be hardened surface, the soil profile in the excavations should be removed in sequence and backfilled with subsoil first and topsoil thereafter (in inverted sequence to removal).
- Environmental toolbox talks, which includes illustrations of the sensitive environments to be avoided within the study, should be provided to all construction personnel. No indiscriminate movement of construction vehicles or personnel should occur in these areas.
- Waste skips should be provided for within the site camp. All construction personnel are to be instructed to make us of these to avoid pollution of the surrounding environment.
- The earthen trench should ideally be excavated by hand. If construction vehicles will be required (e.g. tractor loader backhoe - TLB) then drip trays should be placed underneath the vehicle to avoid pollution of the soil profile and terrestrial environment.
- The site camp should be demarcated and cordoned off with board or sediment netting and should be situated within an existing disturbance footprint preferably underlain by a hardened surface (e.g. Pipeline Beach parking lot).
- The areas of disturbance which contain natural groundcover should be backfilled, tilled and revegetated with a mixture of indigenous grass species to improve soil cohesion and reinstate groundcover. Species recommended for planting include: *Oplismenus hirtellus, Asystasia gangetica* and *Cynodon dactylon.*
- A qualified and competent Environmental Control Officer (ECO) should be appointed to oversee all environmental aspects during the construction phase.
- Construction activities must only take place during the day hours permitted under the eThekwini Municipality bylaws. No construction activity is to take place at night to avoid unnecessary noise and light pollution typically caused by construction vehicles.
- No construction vehicles or personnel are to traverse within the Coastal Thicket HU.
- No collection of faunal species from the study area is to be permitted.
- In line with the National Environmental Management: Biodiversity Act (Act no. 10 of 2004) (NEMBA), all AIPS listed under the amended Alien and Invasive Species Lists (DEFF: GN1003, 2020) must either be removed or controlled on land under the management of the proponent.
- Should IAPS be found, this needs to either be removed physically or reported to the ECO to contract a professional to remove more hardy species. The site ECO should be responsible for the monitoring of AIPS propagation with the study area.
- Following construction of the proposed development, indigenous vegetation must be planted in disturbed areas to reduce the risk of AIPS encroachment.
- The protected species identified and marked within this study should be avoided as far as possible. Should the need arise to cut, trim or fell a protected species the relevant permits from the provincial or national competent authorities must be obtained.
- Although no species of conservation concern were identified within the study area, all plant species to be disturbed during construction should be identified by the ECO in consultation with a botanist (if necessary) to confirm their conservation status.
- A pre-construction walkthrough of the pegged out proposed development footprint should be conducted by a suitably qualified botanist with experience in the region.

- All SCC and/or TOPS identified within the footprint must be marked and Ordinary TOPS permits obtained where disturbance of these species will occur. If deemed feasible, the SCC and TOPS to be disturbed should be translocated to suitable habitat outside of the disturbance footprint.
- No plant species must be removed or cut unless certain they are not SCC, or TOPS.
- Plant species that are SCC or TOPS must be reported to an ECO as soon as they are identified.
- Possibly translocate plant species that are of economic or cultural value to the local community.
- Vegetation clearing may only take place within the development footprint. Where possible, limited clearing must take place within the high sensitivity HUs.

10.2.3 Monitoring requirements

The monitoring of the receiving environment will be essential for the maintenance and/or improvement of the aquatic and terrestrial environments within the study area. The mitigative recommendations stated herein must be incorporated into the project-specific EMPr and compliance with the requirements/recommendations must be audited by a suitability qualified independent environmental scientist (can be the site ECO). The key to a successful EMPr is appropriate monitoring and review to ensure effective functioning of the EMPr and to identify and implement corrective measures in a timely manner. Monitoring for non-compliance must be undertaken on a daily basis during the construction phase by the contractors under the guidance of the Project Manager / ECO / Engineer. An appropriately timed audit report should be compiled by the independent ECO. Paramount to the reporting of non-conformance and incidents is that appropriate corrective and preventative action plans are developed and adhered to. Photographic records of all incidents and non-conformances must be retained. This is to ensure that the key impacts on the receiving aquatic and terrestrial habitats are adequately managed and mitigated against and that the rehabilitation of any disturbed areas within any system is successful.

A monitoring and maintenance programme must be in place not only to ensure compliance with the EMPr throughout the lifespan of the proposed development with specific reference to the construction phase, but also to monitor any environmental issues and impacts during the vegetation establishment phase of rehabilitation. Compliance against the EMPr must be monitored during the construction/operational phase monthly by an ECO. The period and frequency of monitoring required post-construction must be determined by a suitably qualified botanist and approved by the ECO.

Once the initial revegetation takes place during the rehabilitation phase, a suitably qualified professional must conduct weekly site visits to remove AIPS (in accordance with the latest revised NEM:BA requirements) and address any revegetation concerns until revegetation is considered successful (i.e. >80% indigenous cover). A generally accepted monitoring period of revegetated areas after this initial period is monitoring every 3 months for the first 12 months and every 6 months thereafter until the vegetation has successfully been established. If the revegetated areas have inadequate surface coverage (less than 30% within 9 months after re-vegetation) the disturbed areas should be prepared and re-vegetated again.

The cost-effective qualitative monitoring of the rehabilitation area may be time based through the use of periodic photographs taken from permanent photo viewpoints. These points are required to be established during site inception. The timeline created between the pre- and post-rehabilitation photos will provide an invaluable visual representation of the progress that is conveyed in a straightforward manner.

The photographer should be an environmental scientist (may be the site ECO), therefore allowing an expert assessment of the site adding to the qualitative information gathered from the photographs.

The below mentioned criteria must be adhered to, ensuring the quality of the information collected. This is to ensure that the key impacts on the aquatic and terrestrial habitats are adequately managed and mitigated against and that rehabilitation of any disturbed areas within the study area is successful.

- Establishment of the photo points must be completed during site inception/establishment. This will allow for pre-rehabilitation imagery spanning more than a once off photograph.
- Photo point locations should be easily relocated and accessible and must not be obscured by future vegetation growth.
- The level of detail captured must be appropriate to the area that has undergone rehabilitation.
- Photo record forms must be developed and used for every photo taken. The information required will be project name, location, unique identity number, directional point (e.g. North, South), date, time, photographers name and additional comments.
- Qualitative ecological information that must be visually interpreted and recorded at the same time as taking the photograph include:
    - Extent of the site vegetation groundcover.
    - General level of plant growth.
    - Evidence of anthropogenic presence (e.g. external disturbances).
    - Extent of AIPS propagation and success/failure of any previous control efforts; and
    - Evidence of erosion and close monitoring of post-construction erosion-control measures that may be required if erosion is observed.

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Table 18 Assessment of the potential impacts of the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) on terrestrial vegetation, wetlands and fauna

Description and Nature of Impact	**Mitigation**	**Nature** (Positive, Negative, Neutral)	**Spatial Extent** (Site Specific, Local, Regional, National/ International)	**Duration** (Short-term, Medium-term, Long-term, Permanent)	**Intensity** (Negligible, Low, Medium, High)	**Frequency** (Once off, Intermittent, Periodic, Continuous)	**Irreplace-able loss of resources** (Low, Moderate, High)	**Revers-ibility of impacts** (Non-reversible, Low, Moderate, High)	**Probability** (Improbable, Probable, Highly Probable, Definite)	**Significance** (Low, Medium, High)	**Confidence** (Low, Medium, High)
Loss/ disturbance of terrestrial vegetation	Unmitigated	Negative	Site-specific	Short-term	Low	Once-off	Low	High	Probable	Low	High
	Mitigated	Negative	Site-specific	Short-term	Negligible	Once-off	Low	High	Probable	Low	High
Loss/ disturbance of wetlands/ freshwater habitat	N/A (no impact)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Potential pollution of the terrestrial environment through bentonite spills	Unmitigated	Negative	Site-specific	Short-term	Medium	Once-off	Low	High	Probable	Medium	Medium
	Mitigated	Negative	Site-specific	Short-term	Low	Once-off	Low	High	Improbable	Low	High
Impacts on non-marine fauna	Unmitigated	Negative	Site-specific	Short-term	Negligible	Once-off	Low	High	Improbable	Low	High
	Mitigated	Negative	Site-specific	Short-term	Negligible	Once-off	Low	High	Improbable	Low	High

10.3 What impacts will the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) have on the marine environment (including sensitive benthic ecosystems and areas of conservation value)?

The proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) will have impacts along its routing, on various marine ecosystems and biota associated with the seabed and the water body around it. The potential negative impacts of the project on marine flora and fauna on shore, nearshore and offshore, are all of low significance before and after mitigation (noting the potential for mitigation is limited), with the exception of accidental pollution, which would be of medium significance before mitigation and low significance after mitigation.

The proposed cable burial through contaminated sediments near the AECI outfall pipeline has the potential to mobilise toxic sediments. Of the three burial options investigated it is recommended that no water jets are used on the cable plough during cable burial. The use of water jects has the potential to release and resuspend contaminated sediments from below the seafloor into the water column, thus, increasing the impacts associated with the release of contaminated sediments.

In this area mechanical cable burial is recommended which involves the ploughshare cutting through the sediment with no water jets aiding to provide lubrication through the sediment. If this is undertaken the only sediments which will be resuspended occur on the surface of the sea floor where the plough skid and ploughshare have the potential to disturb surface sediments. Given that cable burial through these contaminated sediments is expected to be completed within 1.5 hours and the fact that the ploughshare does not lift or expose deeper sediments it is the EAPs opinion that this impact on benthic ecosystems is highly localised, of short duration and with the mitigation measures proposed can be considered to be of low significance (Table 19).

10.3.1 Disturbance to shorebirds and seabirds

Only 3 bird species breed regularly on the East Coast and Pipeline Beach, being a popular beach in an urban area, is unlikely to provide suitable breeding habitat for shorebirds. Any shorebirds frequenting the area will temporarily move away from construction disturbance. Given the fast recovery of the sandy beach following excavation and laying of the cable (see the section below), the project is not expected to have any significant impact on the sandy beach biota which provide food sources for shorebirds. Therefore, impacts on shorebirds are anticipated to be of low significance.

Seabirds may approach the cable laying vessel to investigate but will not spend extended periods close to the ship or congregate in large numbers (since no food is available). Further, since no feeding behaviour will be induced, birds will not be distracted (which is thought to contribute to their collision and entanglement at fishing vessels) whilst in flight close to the ship. Lighting on board project vessels could, however, potentially attract and disorient seabirds. The possible incidental mortality of seabirds striking the cable laying vessel is anticipated to be of low significance.

10.3.2 Loss of, or disturbance to, sandy beach biota in the coastal zone

As detailed and assessed in the specialist findings (Section 9.4.3), disturbance and destruction of sandy beach biota will result during trench excavation and subsea cable installation across the surf zone and beach, but recovery will be rapid and the impact is considered to be of low significance.

10.3.3 Loss of, or disturbance to marine flora and fauna

10.3.3.1 Benthic organisms in sandy beach, littoral zone, nearshore and offshore habitats

Benthic organisms on the seashore, littoral zone and the seabed may be injured, crushed, smothered and affected by turbidity plumes, as a result of pre-installation and installation activities along the route alignment of the marine cable. This disturbance will also occur on a narrow section of outcropping reef near Pipeline Beach. As indicated in the marine specialist studies, both the reef and soft benthic habitats are located in a naturally dynamic environment which are subject to rough sea conditions, strong currents and large-scale sand movement. As such they are resilient to short-term impacts and will recover over time. The habitats which will be affected through this activity are widely distributed and thus the impact of the project on benthic organisms is deemed to be of low significance, without mitigation.

10.3.3.2 Disturbance/injury of marine fauna due to noise

Physiological injury or behavioural disturbance of marine fauna can be caused by noise. However, as detailed in the specialist findings (Section 9.4.3), the nature of the noise resulting from the cable survey, cable installation and maintenance activities, as well as from the cable itself during operation, will result in impacts that are considered to be of very low significance, both without and with mitigation.

10.3.3.3 Effect of increased turbidity on marine biota

Pre-installation and installation activities along the route alignment of the marine cable will result in a localised and temporary increase in sediment concentration near the seabed and in the water column. Increased turbidity in the water can affect marine biota in various ways. As detailed in the specialist findings (Section 9.4.3), turbid water is a natural occurrence on this coastline and the biota are adapted accordingly. The impact of increased turbidity on marine biota (deep and shallow waters), as a result of the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) is considered to be of low significance. Mitigation potential is low.

10.3.3.4 Artificial reef effect due to presence of the cable

During operation, the physical presence of the cable on the seabed may have an “artificial reef” effect. As described in the specialist findings (Section 9.4.3 and Section 9.5.3), where not buried, the cable will provide a substrate for colonisation by sessile benthic organisms, thereby potentially locally altering the composition of the benthic biota community. For the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing), most of the cable will be buried. Only a small section is unlikely to be buried. Introduction of the hard cable structure to areas of sub-cropping rock is not seen as a major issue as these areas comprise a mix or hard and soft substrata in the natural state, and the new hard substrate will be colonised and

overgrown by naturally occurring marine benthic species in time. The impacts on marine biodiversity through the physical presence of the subsea cable would be of medium intensity and highly localised along the cable itself. Although no direct mitigation measures are possible, the negative impact of the subsea cable presence on marine biota is considered to be of low significance. It is possible that the cable protection zones with suitable habitats may in fact act as marine sanctuaries, and as a result, have a positive effect on marine biodiversity and species abundance.

10.3.3.5 Pollution

Pollution by hydrocarbons and other litter is possible during the preinstallation and installation phases of the project and can have a variety of negative impacts on the health of marine organisms. Pollution is preventable, however, by good housekeeping and environmental management during preinstallation and installation. Potential pollution from the spillage and escape of bentonite from the drilling hole could lead to smothering of surrounding plant life and organisms within the marine environment . However, if a suitably qualified drilling contractor is appointed, and with careful planning and management, the risks of bentonite spillage are considered to be of low significance. Once the cable is in place, there is no further risk of pollution other than if repairs to the cable are required. With mitigation, the effect of pollution on marine biota, as a result of cable installation, is anticipated to be of low significance.

10.3.3.6 Potential impact on marine organisms due to remobilisation of contaminants near the marine outfall

At this point, despite limited knowledge of the actual toxins involved, and their bioavailability to biota, it is believed that the significance of the impact will not be high due to the following:

- The distance of the cable alignment through these contaminated sediments is relatively short (approximately 619 m).
- The marine plough unlike farming ploughs which turn over soil simply cuts through the sediment and then allows the sediment to fall back on itself. As such no deeper lying sediments are brought to the surface or exposed to the water column.
- Cable burial through the contaminated sediments is expected to be completed within 1.5 hours.
- Given the slow speeds of the plough very limited amounts of surface sediments will be disturbed and placed into suspension. This together with the prevailing water current will rapidly dilute any toxins released during cable burial into the large surrounding water body, resulting in very low concentrations.
- It can be considered a once off impact, thus, toxins will be only available to the uptake of biota (if bio-available) for a very short time period.

Depending on the degree of contamination of the sediments and the dilution factor of those contaminants that become bio-available once released from the sediments, concentrations would likely remain at sub-lethal levels and acute toxicity effects are likely to be negligible. The loss of resources would be low and impacts would be fully reversible. The impact is, therefore, assessed to be of low significance, with mitigation.

10.3.3.7 Collisions with and entanglement by marine fauna

As indicated in the findings of the marine specialist reports, the likelihood of large marine mammals colliding with the survey or cable laying vessels or becoming entangled with the cable is low.

10.3.3.8 Effects of cable" emissions" on marine biota

As already discussed in this report, heat dissipation, electric fields and electromagnetic fields emanating from the cable are of such low magnitude that their potential impacts on marine life are considered negligible.

10.3.3.9 Long term protection due to exclusion zone

The long-term impacts of the marine telecommunications cable on the benthic environment (both fauna and flora) are expected to be positive due to the implementation of the legislated buffer zone, which protects this environment from disturbance due to bottom trawling activities, mineral exploration and the anchoring of vessels.

10.3.4 Impact on marine protected areas and threatened marine ecosystems

The branch cable to Amanzimtoti traverses offshore habitats of varying conservation status, ranging from Near Threatened to Endangered. It does not traverse any MPAs but does skirt the Protea Banks and Sardine Route EBSA. There is minimal overlap with areas defined in the recent National Coastal & Marine Spatial Biodiversity Plan (Version 1) as CBA1, CBA2 and ESA. No Important Bird Areas are affected.

Despite traversing certain sensitive areas, as indicated in the specialist findings and in the sub-sections above, the identified impacts of cable installation and operation on the coastal zone, the marine benthic habitats and associated biota, fish, marine mammals, seabirds, and shorebirds are all considered to be of low significance. The protection provided either side of the cable after installation, is considered to be positive. Accordingly, the significance of the impact of the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) on marine areas of conservation significance will be low.

10.3.5 Impact on the marine environment due to cable operation and maintenance

The impacts of maintenance will be similar to the impacts incurred during construction. The probability of maintenance being required is improbable and the frequency is intermittent. Impacts resulting from maintenance are assessed as low significance.

10.3.6 Mitigation measures

10.3.6.1 Timing

- ❑ Where possible, schedule construction associated with the cable shore crossing to avoid peak whale migration (June to November) periods.
- ❑ Schedule construction associated with the cable shore crossing to avoid the Sardine Run along the KZN coast (usually around June/July).

10.3.6.2 Mitigation with respect to potentially contaminated sediments near the outfall pipelines

- Minimise disturbance of sediments as far as practically possible.
- Limit any cable burial to periods of good sea conditions with minimal longshore currents (as far as practically possible).
- Use mechanical plough only in the nearshore area, no water jetting to be used during plough burial.
- Avoid pre-lay grapnel runs in the contaminant 'hotspot' areas where possible.
- Monitor the plumes during cable burial to ascertain the spatial extent with the aim to limit the plume to less than 1km of the cable alignment (approximate distribution of existing contamination based on available data).
- Cease burial during periods of strong current, rough sea conditions or development of a large visible plume.

10.3.6.3 General

- Align routing of cable as closely as possible to the routes of existing or de-commissioned cables, thereby avoiding the impact of as yet undisturbed ecosystem types.
- Plan routing of proposed cable to as far as practicably possible avoid sensitive benthic habitats in the deep water, coastal and nearshore zone.
- Ensure that constant monitoring for the presence of marine mammals and turtles is maintained by a ship's staff member designated as a Marine Mammal Observer. The observation post must keep a record of sightings, recording date, time, coordinates and approximate distance. This is particularly important should cable installation across the continental shelf be scheduled during the whale migration period (beginning of June to end of November).
- Should a cetacean become entangled in towed gear, contact the South African Whale Disentanglement Network formed under the auspices of DFFE to provide specialist assistance in releasing entangled animals.
- Vessels to be seaworthy.
- Vessels are to exchange ballast appropriately before coming into port or the coast.
- During operations, vessels are to comply with all local and international regulations including pollution prevention regulations.
- Publicise the 2Africa servitude once declared.

10.3.6.4 During geophysical surveys

Although surveying of the cable alignment has been completed, should any further survey work be required along the cable alignment, the following mitigation measures must be implemented by the survey vessel:

- Onboard MMOs should conduct visual scans for the presence of cetaceans around the survey vessel prior to the initiation of any acoustic impulses.
- Pre-survey scans should be limited to 15 minutes prior to the start of survey equipment.
- "Soft starts" should be carried out for any equipment of source levels greater than 210 dB re 1 µPa at 1 m over a period of 20 minutes to give adequate time for marine mammals to leave the area.
- Terminate the survey if any marine mammals show affected behavior within 500 m of the survey vessel or equipment until the mammal has vacated the area.

- Avoid planning geophysical surveys during the movement of migratory cetaceans (particularly baleen whales) from their southern feeding grounds into low latitude waters (beginning of June to end of November) and ensure that migration paths are not blocked by sonar operations. As no seasonal patterns of abundance are known for odontocetes occupying the proposed exploration area, a precautionary approach to avoiding impacts throughout the year is recommended.
- Ensure that passive acoustic monitoring (PAM) is incorporated into any surveying taking place at night or between June and November.
- A dedicated MMO and PAM operator should be appointed to ensure compliance with mitigation measures during seismic geophysical surveying. The MMO can be either an independent MMO or a suitably trained crew member.

10.3.6.5 During cable installation (offshore)

- If cable installation across the continental shelf is scheduled during the whale migration period (beginning of June to end of November), consideration will be required from the cable-laying vessel to appoint a suitably trained crew member as a dedicated MMO with experience in seabird, turtle and marine mammal identification and observation techniques, to carry out daylight observations of the subsea cable route and record incidence of marine mammals, and their responses to vessel activities. Data collected should include position, distance from the vessel, swimming speed and direction, and obvious changes in behavior (e.g. startle responses or changes in surfacing/diving frequencies, breathing patterns). Both the identification and the behavior of the animals must be recorded accurately.
- Should a cetacean become entangled in towed gear, contact the South African Whale Disentanglement Network to provide specialist assistance in releasing entangled animals.
- The lighting on the cable laying vessels should be reduced to a minimum compatible with safe operations whenever and wherever possible. Light sources should, if possible and consistent with safe working practices, be positioned in places where emissions to the surrounding environment can be minimised.

10.3.6.6 During cable installation (nearshore)

- Follow the cable route plan as accurately as possible during landing of the cable at the Beach Manhole to prevent lateral drag across the seafloor.
- Divers to limit the working area to as narrow a corridor as possible during burial, attachment of articulated split pipe and pinning of the cable if considered necessary to avoid cable movement.
- If cable requires re-alignment over the hard substrata by divers, the cable should be lifted to minimise damage to macro-benthic biota (gorgonians etc.).
- Bury cable in areas of soft sediment where feasible.
- Undertake the work on a calm sea day.
- Ensure cable protection in the nearshore by burial or armoured casing (where considered necessary based on substrate and currents) .

10.3.6.7 During construction phase of the proposed cable shore-crossing

- ❑ Obtain a vehicle access permit from DFFE -OC prior driving in the coastal zone.
- ❑ While shore bird breeding is not anticipated to be an issue, due to the transformed nature of the dunes at the landing site, the ECO must check the affected area on the shoreline for nests of birds, prior to installation. If found, nests must be cordoned off and avoided as far as possible.
- ❑ Restrict disturbance of the intertidal and subtidal areas to the smallest area possible. Once the shore crossing is finalised and the associated construction site is determined, the area located outside of the site should be clearly demarcated and regarded as a 'no-go' area.
- ❑ All construction activities in the coastal zone must be managed according to a strictly enforced EMPr.
- ❑ Ensure that contracted construction personnel are aware of, and adhere to, the requirements of the EMPr.
- ❑ Keep heavy vehicle traffic associated with construction in the coastal zone to a minimum.
- ❑ Restrict vehicles to clearly demarcated access routes and construction areas only. These should be selected under guidance of the local municipality.
- ❑ Maintain vehicles and equipment to ensure that no oils, diesel, fuel or hydraulic fluids are spilled.
- ❑ For equipment maintained in the field, oils and lubricants must be contained and correctly disposed of off-site.
- ❑ Good housekeeping must form an integral part of any construction operations on the beach from start-up.
- ❑ Ensure regular collection and removal of refuse and litter from intertidal areas.
- ❑ There is to be no vehicle maintenance or refueling on the beach.
- ❑ Ensure that all accidental diesel and hydrocarbon spills are cleaned up accordingly.
- ❑ No mixing of concrete in the intertidal zone.
- ❑ Regularly clean up concrete spilled during construction.
- ❑ No dumping of construction materials, excess concrete or mortar in the intertidal and subtidal zones or on the seabed.
- ❑ After completion of construction activities remove all artificial constructions or created shore modifications from above and within the intertidal zone.
- ❑ No accumulations of excavated intertidal sediments should be left above the high-water mark, and any substantial sediment accumulations below the high-water mark should be levelled.

Table 19 Assessment of the potential impacts of the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) on the marine environment (including sensitive benthic ecosystems and areas of conservation value)

Description and Nature of Impact	**Mitigation**	**Nature** (Positive, Negative, Neutral)	**Spatial Extent** (Site Specific, Local, Regional, National/ International)	**Duration** (Short-term, Medium-term, Long-term, Permanent)	**Intensity** (Negligible, Low, Medium, High)	**Frequency** (Once off, Intermittent, Periodic, Continuous)	**Irreplace-able loss of resources** (Low, Moderate, High)	**Revers-ibility of impacts** (Non-reversible, Low, Moderate, High)	**Probability** (Improbable, Probable, Highly Probable, Definite)	**Significance** (Low, Medium, High)	**Confidence** (Low, Medium, High)
Disturbance of avifauna (seabirds and shorebirds)	Unmitigated	Negative	Site specific	Short-term	Low	Once-off	Low	High	Probable	Low	High
	Mitigated	Negative	Site specific	Short-term	Low	Once-off	Low	High	Probable	Low	High
Loss/ disturbance of sandy beach biota in coastal zone	Unmitigated	Negative	Local	Short-term	Medium	Once-off	Low	High	Definite	Medium	High
	Mitigated	Negative	Local	Short-term	Medium	Once-off	Low	High	Definite	Low	High
Loss/ disturbance of marine benthic organisms	Unmitigated	Negative	Site-specific	Short to medium-term	Medium	Once-off	Low	High	Definite	Low	High
	Mitigated	Negative	Site-specific	Short to medium-term	Medium	Once-off	Low	High	Definite	Low	High
Disturbance/ injury of marine fauna due to noise	Unmitigated	Negative	Local	Short-term	Low	Once-off	Low	High	Improbable	Low	Medium
	Mitigated	Negative	Local	Short-term	Low	Once-off	Low	High	Improbable	Low	Medium

Description and Nature of Impact	**Mitigation**	**Nature** (Positive, Negative, Neutral)	**Spatial Extent** (Site Specific, Local, Regional, National/ International)	**Duration** (Short-term, Medium-term, Long-term, Permanent)	**Intensity** (Negligible, Low, Medium, High)	**Frequency** (Once off, Intermittent, Periodic, Continuous)	**Irreplace-able loss of resources** (Low, Moderate, High)	**Revers-ibility of impacts** (Non-reversible, Low, Moderate, High)	**Probability** (Improbable, Probable, Highly Probable, Definite)	**Significance** (Low, Medium, High)	**Confidence** (Low, Medium, High)
Impact of increased turbidity on marine biota	Unmitigated	Negative	Local	Short-term	Low	Once-off	Low	High	Probable	Low	High
	Mitigated	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Artificial reef effect on marine biota	Unmitigated	Neutral	Site-specific	Long-term to permanent	Medium	Once-off	Low	Moderate	Definite	Low	High
	Mitigated	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pollution effects on marine biota	Unmitigated	Negative	Site-specific	Short to medium term	Medium	Intermittent	Low	Moderate	Probable	Medium	High
	Mitigated	Negative	Site-specific	Short -term	Low	Once-off	Low	High	Improbable	Low	High
Remobilisation of contaminants	Unmitigated	Negative	Site-specific	Short -term	Medium	Once-off	Low	High	Probable	Medium	Medium
	Mitigated	Negative	Site-specific	Short -term	Low	Once-off	Low	High	Probable	Low	Medium
Injury of large marine fauna and seabirds due to collision or entanglement	Unmitigated	Negative	Site-specific	Short -term	Low	Once-off	Medium	Moderate	Improbable	Low	High
	Mitigated	Negative	Site-specific	Short -term	Low	Once-off	Low	High	Improbable	Low	High

Description and Nature of Impact	**Mitigation**	**Nature** (Positive, Negative, Neutral)	**Spatial Extent** (Site Specific, Local, Regional, National/ International)	**Duration** (Short-term, Medium-term, Long-term, Permanent)	**Intensity** (Negligible, Low, Medium, High)	**Frequency** (Once off, Intermittent, Periodic, Continuous)	**Irreplace-able loss of resources** (Low, Moderate, High)	**Revers-ibility of impacts** (Non-reversible, Low, Moderate, High)	**Probability** (Improbable, Probable, Highly Probable, Definite)	**Significance** (Low, Medium, High)	**Confidence** (Low, Medium, High)
Effect of cable "emissions" on marine biota	Unmitigated	Negative	Site-specific	Long-term	Negligible	Intermittent to continuous	Low	High	Improbable	Low	High
	Mitigated	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Impact on marine areas of conservation value	Unmitigated	Negative	Site-specific	Medium to long-term	Low	Once-off	Low	Low	Definite	Low	High
	Mitigated	Negative	Site-specific	Medium to long-term	Low	Once-off	Low	High	Definite	Low	High
Long term protection of marine flora and fauna due to exclusion zone	Unmitigated	Positive	Local	Long-term	High	Continuous	N/A	N/A	Highly Probable	Low-Medium	Medium
	Mitigated	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Impacts during cable maintenance	Unmitigated	Negative	Site-specific	Short term	Negligible	Intermittent	Low	High	Improbable	Low	High
	Mitigated	Negative	Site-specific	Short term	Negligible	Intermittent	Low	High	Improbable	Low	High

10.4 What impacts will the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) have on commercial and recreational fisheries?

The proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) will potentially impact the large pelagic longline, traditional linefish, crustacean trawl and small scale sectors.

The potential for mitigation of identified impacts of the project on fisheries (other than the no-go option) is not possible. However, the identified potential negative impacts on the above-mentioned fishing sectors are assessed as being of low significance. (Refer to Table 20).

10.4.1 Potential reduction in catch rates during geophysical survey as a result of noise

The elevated noise produced during the geophysical survey does not coincide with the hearing range of fish and crustaceans. As described in Section 9.2.3, due to the short-term duration and low intensity of the noise, the impact on catch rates for all fishing sectors is considered to be of low significance. No mitigation measures are possible.

10.4.2 Temporary exclusion from fishing ground during cable-laying operations (up to 1,500 m from the vessel)

The temporary exclusion of fisheries from the safety zone will effectively reduce fishing grounds, which in turn could potentially result in a loss of catch and/or displacement of fishing effort for the large pelagic longline, traditional linefish, crustacean trawl and small-scale fisheries sectors. However, the impact will be short term, localised and for all sectors overall, is of low intensity and low significance.

10.4.3 Long-term exclusion of anchoring and trawling around the cable (500 m on either side of the cable)

The long term 500 m exclusion zone on either side of the cable may affect the western limit of crustacean trawl grounds as will require skippers to lift gear off the seabed when moving over the cable, to prevent risk of damage to both the cable and their own fishing gear. This reduces fishing time. However, the trawling effort over this area in the past ten years has been shown to be extremely low. The overall significance of the impact is assessed as low.

There is low potential for mitigation of the above impacts.

10.4.4 Mitigation measures

10.4.4.1 Prior to installation

- Timing: the affected fisheries operate year-round, therefore the timing of the survey to avoid certain periods of peak fishing activity is not considered to be advantageous to any of the sectors.
- The fishing industry and key stakeholders must be notified prior to the commencement of cable installation. These include DFFE, the SA Fishing Industry Association, the South African Navy Hydrographic Office (SAN Hydrographer), SAMSA and Ports Authorities.

10.4.4.2 During installation

- Request, in writing, the SAN Hydrographer to broadcast a navigational warning via Navigational Telex (NAVTEX).
- For the duration of the installation phase of the operation, a navigational warning should be broadcast to all vessels via Navigational Telex.
- Once installed, the cable route must be accurately charted with the SAN Hydrographer.
- Manage the lighting on the survey vessel to ensure that it is sufficiently illuminated to be visible to fishing vessels and compatible with safe operations.
- Implement a grievance mechanism in case of disruption to fishing or navigation.

10.4.4.3 Post installation

- The cable servitude must be charted by the SAN Hydrographer.
- Publicise the 2AFRICA servitude once declared.

Table 20 Assessment of potential impacts of the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) on commercial and recreational fisheries

Description and Nature of Impact	**Mitigation**	**Nature** (Positive, Negative, Neutral)	**Spatial Extent** (Site Specific, Local, Regional, National/ International)	**Duration** (Short-term, Medium-term, Long-term, Permanent)	**Intensity** (Negligible, Low, Medium, High)	**Frequency** (Once off, Intermittent, Periodic, Continuous)	**Irreplace-able loss of resources** (Low, Moderate, High)	**Revers-ibility of impacts** (Non-reversible, Low, Moderate, High)	**Probability** (Improbable, Probable, Highly Probable, Definite)	**Significance** (Low, Medium, High)	**Confidence** (Low, Medium, High)
Reduction in catch rates due to noise emissions during geophysical survey	Unmitigated	Negative	Local	Short-term	Low	Once-off	Low	High	Probable	Low	High
	Mitigated	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Temporary exclusion of fisheries from within 1,500 m of the cable laying vessel	Unmitigated	Negative	Local	Short-term	Low	Once-off	Low	High	Probable	Low	Medium
	Mitigated	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Long term exclusion of anchoring and trawling around cable (500 m either side of the cable)	Unmitigated	Negative	Local	Long-term	Medium	Continuous	Low	High	Definite	Low	High
	Mitigated	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

10.5 What impact will the construction and operation of the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) have on the beach and coastal dunes?

The potential impacts of the proposed cable landing on the three eco-morphological drivers of coastal systems, namely wind and wave, sediment transport dynamics and the prevailing biotic or vegetated dune form, are anticipated to be of low significance, both before and after mitigation (Table 21).

10.5.1 Alteration of drivers of coastal process, (e.g. wind and wave)

The cable will align approximately shore perpendicular and lie at a target depth of 2m below the surface, effectively having no impact on localised wind and wave regime. Some minor disruption of inter-tidal and supra-tidal wave regime may arise during laying of the cable. The once-off impact will be of negligible intensity, short duration and highly reversible and thus the significance of the impact is low, before and after mitigation.

10.5.2 Interruption of sediment transport regime

Some minor perturbation is expected during construction during excavation of the dune, beach and intertidal zone. Sediment mobilisation at the point of excavation through dune/stabilised dune may arise, exacerbating present trends towards engulfment. Following cable burial and establishment, the sediment transport regime should rapidly reach a state of equilibrium. The once-off impact is anticipated to be of negligible intensity, short duration and highly reversible and, thus, the significance of the impact is low, before and after mitigation.

10.5.3 Alteration of habitat/eco-morphology

HDD will avoid impacts on the dune vegetation and dune structure. Excavation through the beach will be followed by reinstatement of materials and natural aeolian winnowing will sculpt the excavated area. The impact will be of negligible intensity and the significance is low, after mitigation.

10.5.4 Mitigation measures

- The cable should be buried within the beach to a depth approximating ≥~1m below the deflated beach state. Where possible, and within the inter tidal and supra tidal environment, consider laying the cable at or around the depth of the shelly layer or “transitional point” within the beach sediments that is marked by increased deposition of shell and related debris, or a change in grain size.
- Although the use of HDD is proposed to avoid disturbance of vegetation, where disturbance of the vegetated dune does arise, the affected area should be raked back to an angle of repose ~ 27°, stabilised using a geofabric and suitably planted with appropriate vegetation (ideally the same dune species that are currently present on the dune cordon).
- No Tracked Mobile Machines (e.g. tracked bulldozer/TLB) or Trackless Mobile Vehicles may be permitted to disturb the vegetated portion of the dune cordon.
- Excavation of the preferred BMH Alternative 3 must remain within the existing disturbed carpark footprint.

- ❒ Sediment netting should be erected around the construction footprint of the preferred BMH Alternative 3 to avoid movement of soils into adjacent areas by coastal aeolian processes.

Table 21 Assessment of potential impacts of the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) on the beach and coastal dunes

Description and Nature of Impact	**Mitigation**	**Nature** (Positive, Negative, Neutral)	**Spatial Extent** (Site Specific, Local, Regional, National/ International)	**Duration** (Short-term, Medium-term, Long-term, Permanent)	**Intensity** (Negligible, Low, Medium, High)	**Frequency** (Once off, Intermittent, Periodic, Continuous)	**Irreplace-able loss of resources** (Low, Moderate, High)	**Revers-ibility of impacts** (Non-reversible, Low, Moderate, High)	**Probability** (Improbable, Probable, Highly Probable, Definite)	**Significance** (Low, Medium, High)	**Confidence** (Low, Medium, High)
Alteration of drivers of coastal process, (e.g. wind and wave)	Unmitigated	Negative	Local	Short-term	Negligible	Once-off	Low	High	Improbable	Low	High
	Mitigated	Negative	Local	Short-term	Negligible	Once-off	Low	High	Improbable	Low	High
Interruption of sediment transport regime	Unmitigated	Negative	Local	Short-term	Low	Once-off	Low	High	Improbable	Low	High
	Mitigated	Negative	Local	Short-term	Low	Once-off	Low	High	Improbable	Low	High
Alteration of habitat/eco-morphology	Unmitigated	Negative	Local	Short-term	Negligible	Once-off	Low	High	Improbable	Low	High
	Mitigated	Negative	Local	Short-term	Negligible	Once-off	Low	High	Improbable	Low	High

10.6 What effects will the construction of the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) have on cultural and heritage resources, including any paleontological resources?

The significance of potential impacts on heritage resources, should they occur, are assessed as medium (where there is no possible mitigation) and low (where mitigation is possible). Refer to Table 22.

10.6.1 Disturbance or destruction of submerged pre-historic archaeological resources

As discussed in the heritage specialist findings (Section 9.6.3) the potential for direct impacts on submerged prehistoric archaeological material in the study area is unlikely. Due to the irreplaceability of the resource and non-reversibility of the impact, the significance of the impact, should it occur, is assessed as medium.

10.6.2 Disturbance or destruction of palaeontological resources and fossil material

As discussed in the heritage specialist findings (Section 9.6.3), due to the nature of the sediments in the study area, the potential for impacts on fossils and palaeontological material is negligible. Due to the irreplaceability of the resource and non-reversibility of the impact, the significance of the impact, should it occur, is assessed as medium.

10.6.3 Disturbance or destruction of maritime archaeological resources

As discussed in the heritage specialist findings (Section 9.6.3), there are wrecks that may be present within 2 km of the cable alignment. However, as they are younger than 60 years old, they are not subject to the NHRA. The potential for direct impacts on maritime archaeological sites or material in the study area is negligible. With mitigation, the significance of the impact is assessed as low.

10.6.4 Disturbance or destruction of terrestrial archaeological resources

As discussed in the heritage specialist findings (Section 9.6.3), the potential for impacting pre-colonial or historical archaeological sites or material is highly unlikely along the alignment of the terrestrial cable route. With mitigation, the significance of the impact is assessed as low.

10.6.5 Mitigation measures

- In respect of potential submerged prehistoric archaeology, 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. If fossils are found once trenching has commenced, then they should be rescued and a palaeontologist called to assess and collect a representative sample.

- Along the inshore waters and beach crossing, an alert for the occurrence of palaeontological material be included in the EMPr, specifically 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. If possible, the project archaeologist should be consulted before data are collected to ensure that the survey specifications and data outputs are suitable for archaeological review.
  - 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.
  - The *Griqualand* is classified as a dangerous wreck and should be avoided.

- 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.

Table 22 Assessment of potential impacts of the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) on cultural and heritage resources, including any paleontological resources

Description and Nature of Impact	**Mitigation**	**Nature** (Positive, Negative, Neutral)	**Spatial Extent** (Site Specific, Local, Regional, National/ International)	**Duration** (Short-term, Medium-term, Long-term, Permanent)	**Intensity** (Negligible, Low, Medium, High)	**Frequency** (Once off, Intermittent, Periodic, Continuous)	**Irreplace-able loss of resources** (Low, Moderate, High)	**Revers-ibility of impacts** (Non-reversible, Low, Moderate, High)	**Probability** (Improbable, Probable, Highly Probable, Definite)	**Significance** (Low, Medium, High)	**Confidence** (Low, Medium, High)
Disturbance or destruction of submerged pre-historic archaeological resources	Unmitigated	Negative	Site-specific	Short-term	Low	Once-off	High	Non-reversible	Improbable	Medium	Low
	Mitigated	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Disturbance or destruction of palaeontological resources	Unmitigated	Negative	Site-specific	Short-term	Low	Once-off	High	Non-reversible	Improbable	Medium	Low
	Mitigated	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Disturbance or destruction of maritime archaeological resources	Unmitigated	Negative	Site-specific	Short-term	Low	Once-off	High	Non-reversible	Improbable	Medium	Low
	Mitigated	Negative	Site-specific	Short-term	Low	Once-off	High	Non-reversible	Improbable	Low	Low
Disturbance or destruction of terrestrial archaeological resources	Unmitigated	Negative	Site-specific	Short-term	Low	Once-off	High	Non-reversible	Improbable	Medium	Low
	Mitigated	Negative	Site-specific	Short-term	Low	Once-off	High	Non-reversible	Improbable	Low	Low

10.7 What cumulative impacts will result from the construction of the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing)

A cumulative impact is an incremental impact upon the environment that results from the impact of a proposed action when added to past, existing, and reasonably foreseeable future actions which can be both positive and negative in nature.

The proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) is a linear project (approximately 194 km in length), traversing various marine and terrestrial ecosystems and resulting also in indirect social/socio-economic impacts potentially throughout South Africa. As such, it is difficult to quantify the impacts. A qualitative assessment of cumulative impacts has been undertaken and considers the impacts of proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) together with impacts from the existing cables and planned fibre-optic marine cables off the coast of South Africa.

Both positive and negative cumulative impacts are anticipated. Overall, the significance of negative cumulative impacts is assessed to be low (Table 23).

10.7.1 Cumulative social and socio-economic impacts

The positive socio-economic impacts associated with the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) will cumulatively add to the positive impacts of other fibre optic cable landings in South Africa, through additional bandwidth and internet connectivity availability to the country. This has the potential to unlock investment and advance socio-economic development and education.

There are several existing cables circumnavigating South Africa and the installation of the 2AFRICA/GERA (East) Submarine Cable System will increase the incidence of cable crossings and thus increase the risk of damage to existing cables. However, with implementation of ICPC guidelines and standards, the contribution of the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) to cumulative risks is considered to be of low significance.

The increasing number of cables crossing O&G Concession areas will cumulatively exclude increased areas of the seabed from potential future mining. Given the relatively small surface area taken up by the cables in contrast to the large areas of the exploration blocks, the contribution of the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) to this cumulative impact, is considered to be of low significance. However, it must be noted that conflicts of interest are likely to increase with the accumulation of cables crossing O&G rights areas, unless co-operation agreements are concluded between the cable landing partner and the offshore concession holders, to ensure that the activities of both parties can co-exist without limiting each other's commercial operations.

The construction of a BMH and trenching inland to the CLS at Umbogintwini, on the back of the recent installation of the METISS cable, extends the period of general disruption, nuisance and safety risks at Pipeline beach carpark and along the affected suburban roads. However, given the relatively brief installation period and small footprint on land, and provided it is properly managed, the cumulative disruption/ nuisance impact is not considered significant.

10.7.2 Cumulative impacts on terrestrial ecosystems

The project potentially adds to the risk of the spread of alien invasive plants into adjacent coastal thicket. This, however, can be prevented through good site management during construction and rehabilitation. By using HDD methods, cumulative impacts on dune vegetation can be avoided. Given that the directly affected site is completely transformed by urban development and there are no affected wetlands/freshwater habitat, the contribution of the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) to cumulative negative impacts on terrestrial ecosystems is considered to be low.

10.7.3 Cumulative impacts on marine ecosystems

As discussed in the marine ecology specialist report (Appendix B4), the cumulative impact of increased background anthropogenic noise levels in the marine environment is an ongoing and widespread issue of concern. However, given that disturbance and injury to marine biota due to construction noise or noise generated by the vessel and cable plough is of low magnitude within the immediate vicinity of the construction site/subsea cable route, with impacts persisting over the short-term only, the contribution of the project to cumulative noise impacts in the marine environment is considered to be of low significance.

While the cable itself will remain in place over the long term, most of the negative impacts of the cable installation and operation on benthic organisms and other marine biota (as shown in Table 19) are once-off, and short term. With the exception of possible pollution events, all these impacts are of low significance before mitigation. In this light, the contribution of this project towards cumulative (negative) impacts on marine ecosystems crossed by the cable on the East Coast, is considered low.

10.7.4 Cumulative impacts on the fishing industry

A cumulative impact associated with the installation of an increasing number of subsea fibre-optic cables around the South African coastline, is the cumulative loss of fishing grounds to the demersal trawling and demersal long lining industry, due to the exclusion zones. The currently active submarine cable systems landing on the KZN coastline of South Africa include the EASSy, SAFE and Seacom subsea cables landing at Mtunzini and the METISS cable which was landed at Amanzimtoti beach on 03 November 2020.

The installation of the METISS cable resulted in an exclusion zone that coincided with the crustacean trawl grounds. According to Capmarine, 2021 (see Appendix B of this report), the fishery conducted 5.2% of its total effort within this affected area (over the fishing period 2007 to 2017). The 2AFRICA/GERA (East) cable landing in Amanzimtoti is expected to result in an additional exclusion area of 2 km^2 of fishing ground within which the sector conducts less than 0.03% of its total effort. Based on low level of fishing activity in the area affected by the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing), the cumulative impact potential is considered to remain at low overall significance.

10.7.5 Cumulative impacts on the beach and coastal dunes at Pipeline Beach

Given the current state of transformation of the beach and dunes at the landing site, any additional disturbance as a result of the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) is considered to be a cumulative impact of low significance.

10.7.6 Cumulative impacts on heritage (marine)

Based on the improbability of impacting any submerged or terrestrial heritage resources, the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) is not anticipated to contribute in any significant way to negative cumulative impacts. However, it is considered that the accumulated information that subsea cable surveys add to the existing knowledge base of maritime archaeological resources, is a positive impact for South African heritage.

10.7.7 Cumulative impacts associated with climate change

On a global scale, the cumulative provision of improved and affordable bandwidth between countries can potentially have a positive impact with respect to climate change. The International Cable Protection Committee (ICPC) represents 97% of the world's subsea telecom cables (https://www.iscpc.org/). A report prepared by the environmental advisor of the ICPC, Dr Mike Claire entitled: "Submarine Cable Protection and the Environment: A Bi-Annual Update" (30 September 2020) addresses the role of submarine cables in a post-Covid world, where submarine telecommunications cables are an enabler for changing people's behaviour away from hydrocarbons and climate impacting sources. Lessons learned from the lockdown will inform how businesses operate in future— leading to an increase in virtual, online meetings compared to those requiring long haul flights, and increased home-working— all of which will help in lowering greenhouse gas emissions. The ICPC estimates that internet traffic increased between 25% and 50% between November 2019 and the early stages of lockdown in April 2020, and this will likely continue as we adapt to the "new-normal" virtual world. Communications revenue for the quarter ending July 2020 saw a 355% increase compared to the previous year. This is just one indication of the increased video conferencing occurring as a result of widespread remote work, remote education, and remote personal video communication.

The cumulative impact of cables with respect to the production of greenhouse gases is not considered significant. A life cycle analysis study suggests that over a typical operational lifetime of 25 years (manufacture-to-decommissioning)[37] the main sources of carbon emissions from cables are due to a) power consumption at the terminal station (chiefly related to air conditioning and powering of the terminal equipment); and b) vessel transits for cable maintenance (ACER, 2021).

[37] Donavan, 2009. "Twenty thousand leagues under the sea: A life cycle assessment of fibre optic submarine cable systems".

Table 23 Assessment of potential cumulative impacts of the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing)

Description and Nature of Impact	**Mitigation**	**Nature** (Positive, Negative, Neutral)	**Spatial Extent** (Site Specific, Local, Regional, National/ International)	**Duration** (Short-term, Medium-term, Long-term, Permanent)	**Intensity** (Negligible, Low, Medium, High)	**Frequency** (Once off, Intermittent, Periodic, Continuous)	**Irreplace-able loss of resources** (Low, Moderate, High)	**Revers-ibility of impacts** (Non-reversible, Low, Moderate, High)	**Probability** (Improbable, Probable, Highly Probable, Definite)	**Significance** (Low, Medium, High)	**Confidence** (Low, Medium, High)
Cumulative social and socio-economic impacts (positive)	Unmitigated	Positive	National/ Inter-national	Long-term	Low	Continuous	Low	Low	Highly Probable	Medium	Medium
	Mitigated	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cumulative social and socio-economic impacts (negative)	Unmitigated	Negative	Site specific to local	Short-term to permanent	Medium to low	Once-off	Low	Moderate to High	Probable	Medium to Low	Medium
	Mitigated	Negative	Site specific to local	Short-term to permanent	Low to Negligible	Once-off	Low	Moderate to High	Probable	Low	Medium
Cumulative ecological impacts (terrestrial environment)	Unmitigated	Negative	Site specific to local	Short-to long term	Low	Once-off	Low	High	Probable	Low	High
	Mitigated	Negative	Site specific to local	Short-to long term	Negligible	Once-off	Low	High	Improbable	Low	High
Cumulative ecological impacts (marine environment)	Unmitigated	Negative	Site specific to international	Short-to long term	Low	-	-	-	Probable	Low	Medium
	Mitigated	Negative	Site specific to international	Short-to long term	Low	-	-	-	Probable	Low	Medium

Description and Nature of Impact	**Mitigation**	**Nature** (Positive, Negative, Neutral)	**Spatial Extent** (Site Specific, Local, Regional, National/ International)	**Duration** (Short-term, Medium-term, Long-term, Permanent)	**Intensity** (Negligible, Low, Medium, High)	**Frequency** (Once off, Intermittent, Periodic, Continuous)	**Irreplace-able loss of resources** (Low, Moderate, High)	**Revers-ibility of impacts** (Non-reversible, Low, Moderate, High)	**Probability** (Improbable, Probable, Highly Probable, Definite)	**Significance** (Low, Medium, High)	**Confidence** (Low, Medium, High)
Long term protection of marine biota within cable exclusion zones (cumulative)	Unmitigated	Positive	Regional	Long-term	Low	Continuous	N/A	High	Highly Probable	Low	Medium
	Mitigated	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cumulative impacts on demersal fishing	Unmitigated	Negative	Site specific	Long-term	Low	Continuous	Low	Moderate	Probable	Low	Medium
	Mitigated	Negative	Site specific	Long-term	Low	Continuous	Low	Moderate	Probable	Low	Medium
Cumulative impacts on beach and coastal dunes	Unmitigated	Negative	Site-specific	Short-term	Low	-	Low	High	Probable	Low	Medium
	Mitigated	Negative	Site-specific	Short-term	Low	-	Low	High	Probable	Low	Medium
Cumulative impacts on heritage (marine)	Unmitigated	Negative	Site-specific	Short to medium-term	Medium	-	High	Non-reversable	Improbable	Low	Low
	Mitigated	Negative	Site-specific	Short to medium-term	Medium	-	High	Non-reversable	Improbable	Low	Low

11 ENVIRONMENTAL IMPACT STATEMENT

Taking the key issues and the assessment of associated potential impacts into account, a summary of the environmental impacts of the proposed activity, and their significance (after mitigation, where applicable) is provided below.

Social and socio-economic impacts
Overall, the project is expected to contribute positively to the goal of improving livelihoods for South Africans through the education and economic opportunities opened up as a result of access to improved telecommunications networks. While expanding access to communication technology will be done primarily through broadband infrastructure roll-out, this requires a national telecoms backbone connected to the rest of the world. In this case, the proposed 2AFRICA/GERA (East) Cable System supports SIP 15 via is international connectivity, capacity and speed. The significance of this positive impact is assessed as medium.

Operation of the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) will render a very limited area of the seabed unavailable to concession holder(s) in the Oil and Gas sector. To eliminate interactions with future Oil and Gas activities on cable system infrastructure and operations, the landing partner must undertake the following[38]:

- ❑ Obtain No Objection/Consent Letters from existing Oil & Gas Rights Holders as required by the MPRDA.[39].
- ❑ Conclude Co-operation Agreements (if required) between the cable landing partner and the various offshore concession holders to ensure that the activities of both parties can co-exist without limiting each other's commercial operations.
- ❑ Map the marine cable system route and formally register the cable routing as a real right against the Deed and against the Oil and Gas Rights at the Mineral and Petroleum Titles Registration Office.

The cable *in situ* is not expected to have any impact on beach and sea users, and during installation, due to the brief installation period, disruption to beach and sea based recreation will be minimal. Other minor, short term disruption and nuisance impacts may arise during construction activities on the beach and inland. However, provided these negative social and socio-economic impacts are suitably managed, they will be of low significance.

Impacts on terrestrial ecosystems, vegetation and fauna
The implementation of the project on land affects an area which is transformed by urban development. CBAs in the area are outside of the construction footprint, as are areas of natural habitat (coastal thicket). However, it will be important to ensure that adjacent coastal thicket, regarded as high sensitivity, is not encroached upon by the project. No wetlands or freshwater habitat will be negatively affected. Consequently, there will be negligible impact on terrestrial (non-marine) fauna.

[38] In terms of Section 53 of the Mineral and Petroleum Resources Development Act (Act 28 of 2002), any person who intends to use the surface of any land in a manner which may be contrary to the objectives of the MPRDA or is likely to impede such objectives, must obtain consent from the rights holder and apply to the Minister for approval in the prescribed manner. Proof is required that no prospecting or mining right holders have objected to the proposed development based on its incompatibility with their interests.

[39] The marine cable (Amanzimtoti branch line) crosses an offshore O&G lease area under SP/ENI who have been consulted and have issued ASN with a letter of no objection in terms of the proposed installation of the 2AFRICA/GERA (East) Cable System.

Impacts on marine ecosystems, flora, fauna and avifauna

The branch cable to Amanzimtoti traverses offshore habitats of varying conservation status, ranging from Near Threatened to Endangered. It does not traverse any MPAs but does skirt the Protea Banks and Sardine Route EBSA. There is minimal overlap with areas defined in the recent National Coastal & Marine Spatial Biodiversity Plan (Version 1) as CBA1, CBA2 and ESA. No Important Bird Areas are affected. The potential negative impacts of the project on marine flora and fauna (small and large) on shore, nearshore and offshore, are all of low significance (after applying mitigation where feasible). Similarly, the impacts on seabirds and shorebirds will be of low significance.

While the exact nature of toxins (chromium, manganese, lead, vanadium, zinc and mercury) believed locked into sediments in the nearshore area in the vicinity of the marine outfall pipelines is not known (below a depth of 30 cm below the seabed), it is expected that the possible release thereof (subsurface toxins) during cable burial will be followed by rapid dilution and the possible uptake by marine organisms will be once off and temporary. The affected cable section is very limited (619 m in length) and burial of the cable through this section of the alignment is anticipated to be completed within 1.5 hours. It is recommended cable burial (as planned to a depth of 2 m) is conducted but only using mechanical ploughing. This means that the water jet system which is used to lubricate the ploughshare would not be turned on, thus, limiting the potential for contaminated sediment to become suspended in the water column.

The cable, once in place, will afford a section of the seabed long term protection due to the exclusion of anchoring and trawling 500 m either side of the cable, which is considered a positive impact of low significance.

Impacts on fisheries

The cable alignment intersects with areas used by various fishing sectors, which may potentially be negatively affected by the project. A potential decline in catch rates due to temporary noise disturbance is assessed as being of low significance. The potential effect on fishing activities and decline in catch rates due to the temporary exclusion zones (to a maximum of 1,500 m) around cable laying vessels is assessed as being of low significance. The long term effect on operational activities due to the 500 m exclusion zone either side of the cable will negatively impact the outer western edge of the area (2 km^2) which has seen very limited trawling activity in the past decade by the crustacean trawl sector. Any future trawling in this area will require operators to lift gear when crossing the exclusion zone. Overall, the significance of the impact on fisheries is assessed as low. The potential for mitigation of identified impacts is very low.

Impacts on the beach and coastal dunes

The project will have little impact on the beach and coastal dunes. The significance of potential negative impacts on drivers of coastal processes, sediment transport and habitat/eco-morphology of the beach and dunes will be low, both before and after mitigation.

Impacts on cultural heritage

The likelihood of the project impacting on submerged pre-historic archaeological resources, palaeontological or fossil material is negligible. As the impacts would be non-reversable if they should occur, and the potential for mitigation is low, the significance of impacts on these cultural heritage resources is assessed as medium. While there are two recorded shipwrecks within 2 km of the cable alignment, the likelihood of these being negatively impacted is low and furthermore, they are relatively modern and not protected by the NHRA. The *Griqualand* is, however, classified as a dangerous wreck and has been avoided by the proposed cable alignment. The potential for direct impacts on terrestrial archaeological sites or material as a result of the installation of the terrestrial cable is negligible. With mitigation, the significance of the impact on cultural heritage resources is low.

Cumulative impacts

Cable landings at Amanzimtoti currently include the METISS cable, with proposed landings by 2AFRICA (this project) and the T3 cable (EIA in progress). In general, the positive and negative impacts resulting from the proposed 2AFRICA/GERA (East) Submarine Cable System, along with those of other existing or future cables around the coast of South Africa, will have cumulative effects on the social and biophysical environment. Conflicts of interest may increase over time between the subsea fibre optic cable developers and the trawling industry, as increasing areas become excluded due to cables crossing trawling grounds. Similarly, conflicts of interest may increasingly arise between the subsea fibre optic cable developers and the O&G industry, particularly as offshore exploration activities ramp up and drilling plans materialise. For this project, direct and early engagement has taken place between role-players, to ameliorate cumulative impacts. Further cables into the area could impact on the benthic sampling program being conducted by APS around the marine outfalls, and will need to take this into account when planning final routing. As the cable installation is once-off and of short duration, with a relatively quick recovery of the disturbed benthic habitat, no negative cumulative impacts on marine ecology are anticipated. Activities on land are occurring in an area that is already transformed and thus the project is not considered to contribute significantly to cumulative impacts on land.

The No Development Alternative

The No-Development Alternative would avoid potential negative impacts on the natural environment and competing seabed users. However, it would preclude the positive impacts which improved telecommunications would have on the country's socio-economic environment and would fail to support the country's development goals. It is anticipated that, with required mitigation of negative impacts, the advantages of the project will outweigh the disadvantages. For this reason, the No-Development Alternative is not preferred.

12 CONCLUDING STATEMENT RECOMMENDATION OF THE EAP

Based on the findings of the specialists and the assessment of key issues and associated impacts undertaken in this report, it is the professional opinion of the EAP that there are no fatal flaws associated with the proposed project and that the negative impacts resulting from the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing) can be mitigated to acceptable levels. Therefore, the project should be granted environmental authorisation by DFFE, conditional on compliance with the mitigation measures as recommended in this report and contained within the EMPr. When crossing the contaminated sediments adjacent to the AECI outfall pipeline it is recommended that cable burial (as planned to a depth of 2 m) is conducted but only using mechanical ploughing.

The project components to be authorised are the installation and operation of the marine cable, along the alignment as proposed, with the shore landing at Pipeline Beach to link up to a new BMH at the carpark area (preferred Alternative 3) and on to the CLS building via new underground ducting. The location and alignment of the proposed infrastructure is indicated in the table below and in relevant Figures in this report.

GPS Co-ordinates (approximate) of the proposed infrastructure for the proposed 2AFRICA/GERA (East) Submarine Cable System (Amanzimtoti landing)		
Location	**Latitude (S)**	**Longitude (E)**
Start of marine branch cable (at trunkline)	31° 00.500'	32° 15.788'
Mid-point of marine branch cable	30° 44.032'	31° 20.948'
End of Branch Cable	30° 02.409’	30° 53.933’
Approximate length of marine branch cable	188 km	
Width of the offshore cable corridor to be authorised	500 m (250 m each side of cable)	
Width of the beach crossing corridor to be authorised	100 m (50 m each side of cable)	
Sea Earth Plate at Amanzimtoti Pipeline Beach	30° 02.408’	30° 54.004’
BMH (Alternative 3 - Preferred)	30° 02.409’	30° 53.933’
CLS	30° 01.229’	30° 54.591’
Mid-point of trench line for ducting from BMH to CLS	30° 02.184’	30° 54.022'
Approximate length of trench line for ducting to CLS	5.0 km	
Width of the land cable corridor to be authorised	10 m (5 m each side of cable)	

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APPENDIX A: EAP *CURRICULUM VITAE*

APPENDIX B: SPECIALIST REPORTS, *CURRICULUM VITAE* AND DECLARATIONS

APPENDIX C: PROPERTY DETAILS

APPENDIX D: PUBLIC PARTICIPATION DOCUMENTATION

APPENDIX E: COMMENTS AND RESPONSES REPORTS

APPENDIX F: ENVIRONMENTAL MANAGEMENT PROGRAMME

APPENDIX G: SUPPORTING MAPS