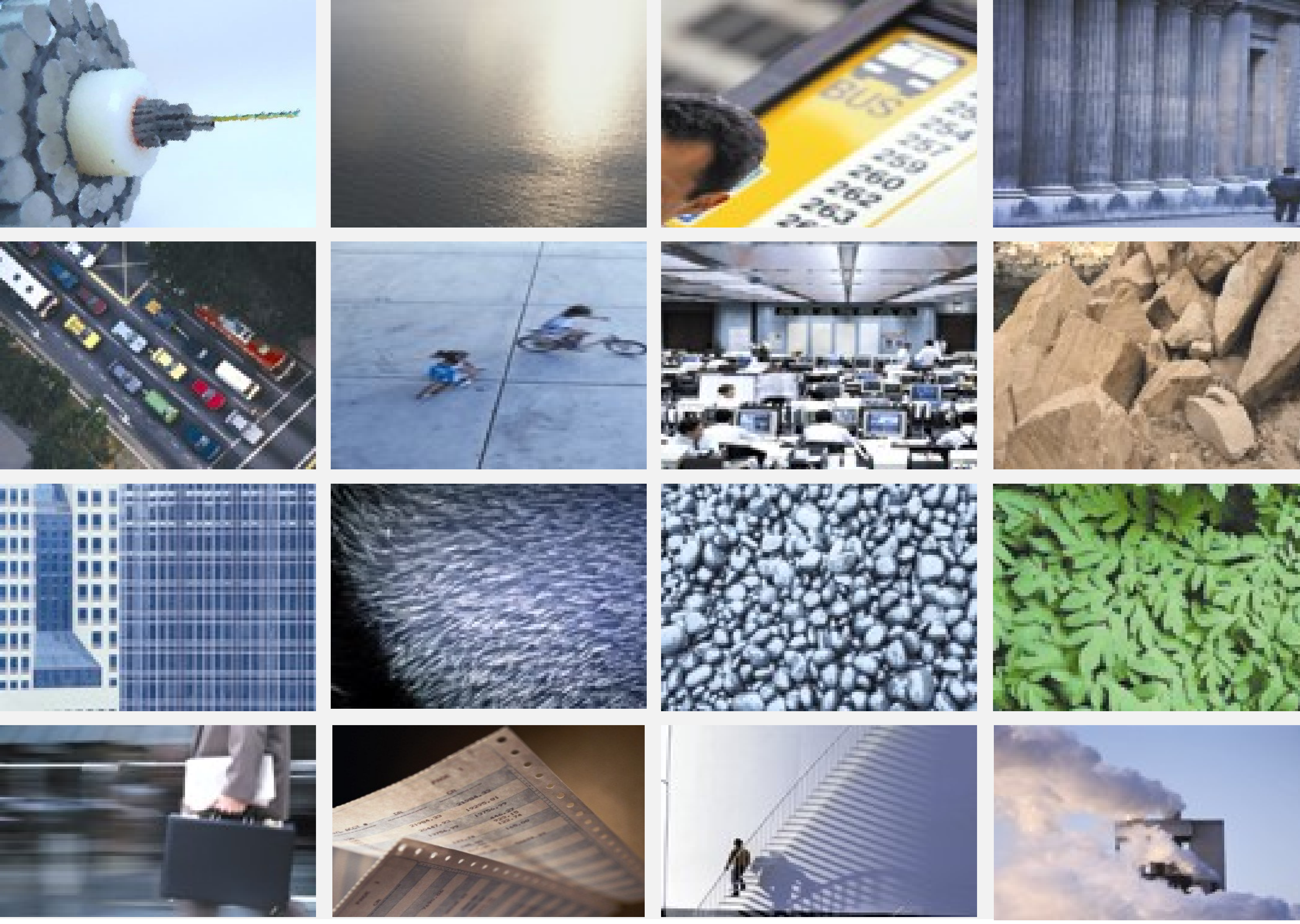

Environmental Impact Assessment process for the Installation and Operation of the METISS Subsea Cable System to be Landed in Amanzimtoti, South Africa

Final Scoping Report

11 March 2019

Project No.: 0482086

The business of sustainability

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Document details

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11 March 2019

Environmental Impact Assessment process for the Installation and Operation of the METISS Subsea Cable System to be Landed in Amanzimtoti, South Africa

Final Scoping Report

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EXECUTIVE SUMMARY

I. Purpose of this Document

This document provides a summary of the Final Scoping Report for the METISS Subsea Cable System Project, which includes a description of the proposed Project and the associated Scoping and EIA processes. It aims to help stakeholders understand the proposed Project, and provides guidance on how stakeholders can register and be involved in the Scoping and EIA process.

II. Project Background

The Project involves the installation and operation the Melting Pot Indianoceanic Submarine System (METISS) in South Africa. METISS is a proposed new subsea fibre optic cable system that will connect Mauritius to South Africa and provide high-speed connectivity of 24 terabytes per second to the global telecommunications network and low latency access to enhance business operations across multiple industries.

METISS is owned by a Consortium of companies comprising Canal+ Télécom, CEB FiberNet, EMTEL, Zeop, SRR (SFR) and TELMA. The Consortium was formed for the purposes of developing the system. The Consortium has contracted ASN and Elettra for the manufacture and installation of the subsea cable system. The Consortium has contracted Liquid Telecom to act as the Landing Party in South Africa responsible for operational aspects in South Africa.

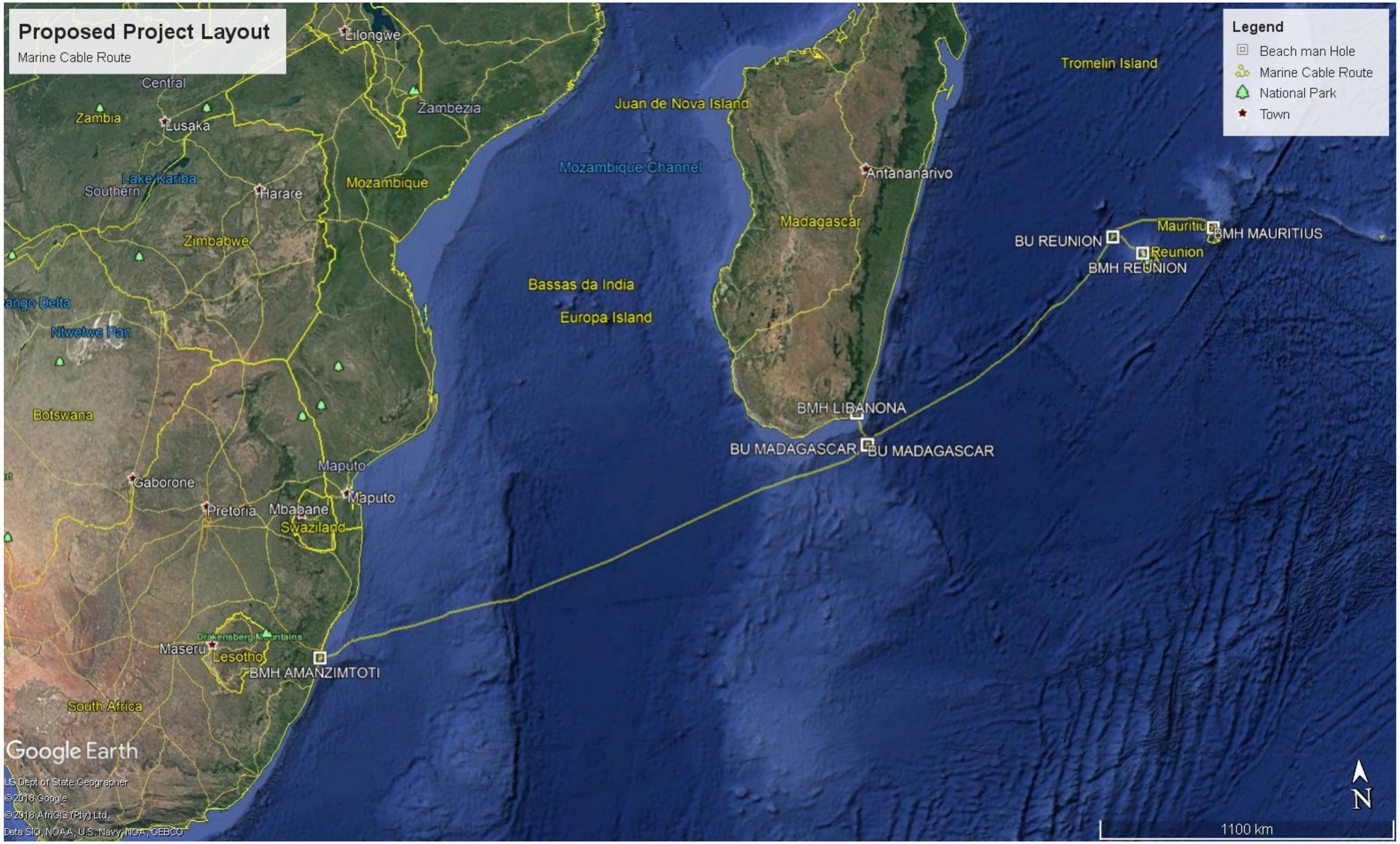
The METISS main cable (‘trunk’) will run more than 3,200 km from Mauritius to South Africa and spilt at Branching Units off the main trunk to landing sites in Reunion Island and Madagascar.

In South Africa specifically, the METISS subsea cable will run approximately 538 km (inclusive of Territorial Waters and Economic Exclusive Zone (EEZ)). The system includes a 14 mm to 35 mm diameter subsea cable that will enter the South African EEZ (approximately 370 km from the seashore) and continue through Territorial Waters (approximately 22 km from the seashore), to a landing site at Amanzimtoti Pipeline Beach in KwaZulu-Natal. The Project is provisionally scheduled to be installed in the first quarter of 2020 and is expected to be completed and operational by the end of the third quarter of 2020.

All planning, installation and maintenance are performed according to approved and certified International Organization for Standardization (IOS) quality systems. The planning of the route is performed in accordance with industry recognised standards and codes including the International Telecommunications Union (ITU) as well as the International Cable Protection Committee (ICPC).

Figure 1 illustrates the subsea cable route running from Mauritius, connecting to host countries (Reunion Island and Madagascar) and landing in Amanzimtoti, South Africa.

Figure 1 Proposed METISS Subsea Cable Layout



Source: ERM, 2018

III. Administrative Framework

The National Environmental Management Act (Act No.107 of 1998, as amended) (NEMA) is the South African framework legislation with respect to environmental protection and management. NEMA provides a framework for the integration of environmental issues into the planning, design, decision-making and implementation of plans and development proposals that are likely to have a negative effect on the environment.

Whilst Section 23 sets out the basic objectives and principles of the Integrated Environmental Management (IEM) procedure, *Section 24* sets out how these objectives and principles are to be accomplished. Regulations governing the environmental authorisation process have been promulgated in terms of NEMA and include the EIA Regulations (GNR R326 of 2017) and Listing Notices 1, 2 and 3 (GNR 324 of 2017; GNR 325 of 2017 and GNR 327 of 2017).

Numerous trigger activities have been identified for this Project in terms of Listing Notice 1, 2 and 3. In instances where more than one listing notice is triggered (as in this Project), Listing Notice 2 requirements will take precedent and the Project will be subject to a full Scoping and Environmental Impact Assessment process prior to commencement of the activity.

Based on the EIA Regulations it is understood that the competent authority for this Project will be the National Department of Environmental Affairs (DEA). As such, Liquid Telecom will be required to obtain a positive Environmental Authorisation from the National DEA prior to commencement of the proposed activities.

IV. Project Description

i. Project Location

The METISS subsea cable within South African waters is 538 km long (inclusive of Territorial Waters and Economic Exclusive Zone). The cable diameter varies between 14 mm and 35 mm. The cable will enter the South African Exclusive Economic Zone (370 km from the seashore), run through to the Territorial Waters (22.22 km from the seashore), and land onshore at Amanzimtoti Pipeline Beach in KwaZulu-Natal Province (Figure 1).

ii. Project Motivation

The METISS submarine cable system will provide additional telecommunications capacity to South African users as well as providing cross-connect opportunities from/ to other networks within South Africa and the region. The Project will provide high speed connectivity to the global network.

Businesses and consumers will benefit from enhanced capacity and reliability for telecommunications services that support fixed and mobile communications networks and internet services. Broadband traffic is growing rapidly due to the demand for new uses like cloud computing and video streaming. Furthermore, the demand for new connectivity reflects an end-user and business environment in which high speed connectivity is needed for sustainable growth and development.

V. Project Components

A summary of the subsea cable system components is provided below.

Figure 2 Summary of the Project Components

Subsea Fibre Optic Cable

The fibre optic cable comprises of the following: Inner optical fibres encased in polyethylene. Articulated pipe will be used as additional protection for the subsea cable from the Low Water Mark to the BMH.

Repeaters and Branching Units

Repeaters will be installed along the subsea cable to boost signal as the signal strength weakens along the route. At approximately every 100 km along the subsea cable there will be a built-in repeater unit deployed as part of the cable.

System Earth

The System Earth provides an earthen electrical ground for the subsea cable. It would consist of a beach earth plate installed in the saturated soil. The system earth would be located near the BMH and would be entirely subsurface and not visible.

Beach Manhole

The BMH will be a concrete utility vault where the marine portion of the cable is connected to the terrestrial portion of the cable. It will be situated in the car park of Pipeline Beach.

Terrestrial fibre optic cable

The terrestrial fibre optic cable is anchored on the inside wall of the BMH with a specifically built plate to join the cable armouring elements to the BMH. The cable splits inside the BMH after the anchoring point.

Cable Landing Station

The CLS is an existing building that functions as a control centre for the subsea cable system and where the system is connected to the domestic telecommunication network.

VI. Project Activities

The Project activities can be divided into four phases as follows:

- Pre-installation;
- Installation;
- Operations (including maintenance and repair); and
- Decommissioning.

VII. EIA Process

An EIA process is initiated by the Scoping Phase, as shown in Figure 3. During the Scoping phase, the Terms of Reference for the full EIA Report is formulated and requirements from the authorities clarified, and potential issues and concerns identified via consultation.

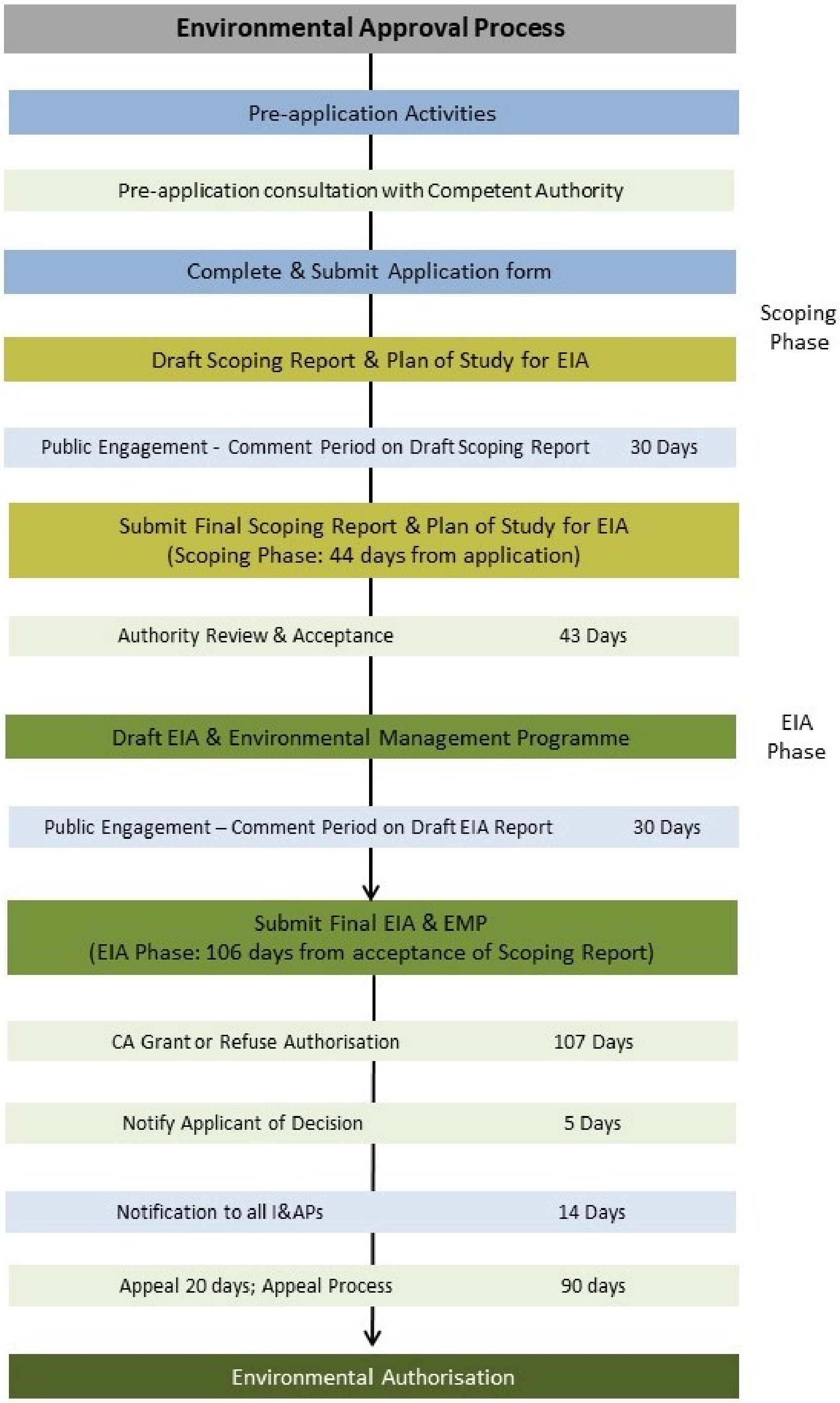
After completion of the Scoping phase, detailed specialist studies will be undertaken in order to address the key issues identified during the Scoping phase. Specialists are expected not only to provide baseline information in their particular field of expertise for the Project Area, but also to identify which project actions will result in significant impacts. Specialists will recommend ways in which adverse impacts could be mitigated to reduce their severity, and positive impacts enhanced.

The Draft Scoping Report and Draft EIA reports are submitted for public review, during which time ERM present the key findings to all I&APs.

All comments made by I&APs are captured in a Comments and Response Report Appendix C and in this report responses to all issues and concerns raised during the public review period are provided.

All recommendations cited in the EIA Report must be detailed in an Environmental Management Programme Report (EMPr), which defines the mitigation/ enhancement actions to be implemented. EMPr is recognised as important tool for the sound environmental management of projects.

Figure 3 Environmental Impact Assessment Process



Note: ([1]) Dark Blue (Application Activities), Yellow (Authority Activities), Olive green (Scoping Activities), Light Blue (Public Engagement), Green (EIA Activities), Dark Green (Authorisation)
Source: ERM, 2018

A key component of the EIA process is public participation. In South Africa public participation is required for an Environmental Authorisation process in terms of the EIA Regulations. Table 1 provides a breakdown of the public participation tasks undertaken, and still to be undertaken during the remainder of the process.

Table 1 Public Participation Tasks

Activity	Description and Purpose
Pre-Application	
Preparation of a preliminary stakeholder database	A preliminary database has been compiled of authorities (local and provincial), Non-Governmental Organisations, neighbouring landowners and other key stakeholders (Appendix B). This database of registered I&APs will be maintained and updated during the ongoing EIA process.
Post-Application	
Erection of Site Notices	Site notices have been placed at the following locations: • Near the proposed Beach Manhole location in Amanzimtoti Pipeline Beach; • Kingsburgh Library; and • Amanzimtoti Library.
Release of Draft Scoping Report for Public Comment	The Draft Scoping Report was disclosed for public comment. Notifications were sent to stakeholders identified as relevant and therefore included on the stakeholder database and the report was made available online and in the libraries detailed above. All comments received have been included in the Final Scoping Report.
Advertisement of the Project	The EIA process was advertised on 31 January 2019 in English in the local paper South Coast Sun and in isiZulu in the regional paper Isolezwe. Proof of Advertisements has been included in Appendix B of the Final Scoping Report.
Engagement Sessions	The option to request one-on-one discussions was presented to stakeholders in their notification material.
Development of the Comments and Response Report (CRR)	Comments received during the public participation process have been recorded into the CRR and the Final Scoping Report has been updated accordingly. The CRR has been included as Appendix C
Impact Assessment Phase	
Release of Draft EIA Report for Public Comment	The Draft EIA Report and EMPr will be made available for a 30 day comment period to stakeholders and the relevant authorities. A notification letter will be sent to all registered I&APs on the Project database. This letter will invite I&APs to comment on the Draft EIA Report. Newspaper adverts will be placed in local newspapers notifying stakeholders of the availability of the Draft EIA Report for review. All comments received will be included in the Final EIA Report.
Notification of Environmental Authorisation	I&APs will be notified of the Environmental Authorisation and the statutory appeal period. An advertisement will be placed to advertise the Environmental Authorisation.

VIII. Plan of Study for EIA Process

Following the Scoping Phase of the Project, the EIA team will:

- Update and finalise the technical Project description as further engineering details become available, working closely with Project engineers to confirm information such as the final cable routing and construction and operation plans;
- Conduct additional consultation and further refine the scope of the EIA process as necessary;
- Collect additional baseline data through desktop research and field studies in the Project Area of Influence to complete a comprehensive description of the environmental and social conditions;
- Undertake an impact assessment of the Project activities interactions with the key environmental and social resources and receptors;
- Develop mitigation and enhancement measures and outline an Environmental Management Programme including an approach for monitoring; and
- Report findings in a comprehensive Draft EIA Report.

A number of issues were identified during the Scoping Study. The following specialist studies have, therefore, been identified to address the key issues raised:

- Fisheries;
- Maritime Heritage;
- Marine and Coastal Ecology; and
- Terrestrial Ecology and Coastal Processes.

A provisional schedule for the EIA is provided in Table 2 below.

Table 2 Provisional EIA Schedule

Task	Timing
Stakeholder Comment Period on the Draft Scoping Report and Plan of Study for EIA Report	February 2019 – March 2019
Finalise the Scoping Report and Plan of Study and submit to DEA	March 2019
Acceptance of the Final Scoping Report received from DEA	April 2019
Specialist studies	November 2018 to March 2019
Prepare Draft EIA Report and EMPr	April 2019
Stakeholder Comment on Draft EIA Report and EMPr	April 2019 to May 2019
Finalise and submit Final EIA Report and EMPr to DEA	June 2019

IX. Impact Identification

A key part of the Scoping Phase is an initial assessment of the ways in which the Project may interact (positively and negatively) with environmental (including physical and biological receptors) and social resources or receptors. The impacts that are identified as potentially significant during the Scoping process provide focus for the studies undertaken during the Impact Assessment Phase. Each of the potentially significant impacts will be discussed and assessed in more detail in the Draft EIA Report.

Table 3 presents the potential impacts identified during Scoping as potentially significant and therefore to be assessed further in the Draft EIA Report.

Table 3 Potential Impacts from Planned Activities and Unplanned / Accidental Events

Receptor / Resource	Installation Phase[1]		Operational Phase	Maintain / Decommission
	Terrestrial Construction	Subsea Cable Pre-Installation and Installation Activities		
Dust	■			
Noise	■	■		
Waste Management Infrastructure	■			
Climate Change	■	■		■
Air Quality	■			
Road Traffic	■			■
Hazardous Waste Management				
Vibration	■	■		■
Heat				
Radiation				
Marine Water Quality	■	■		■
Seabed And Benthos		■		■
Heritage / Archaeology	■	■		
Terrestrial Environment	■			■
Marine And Coastal Environment		■		■
Fisheries		■	■	■
Tourism	■	■		
Shipping		■		■
Socio-Economic			■	
Risk of Accidents Resulting in Pollution or Hazard		■		■
Worker And Public Safety	■	■		■

[1] Onshore construction activities are included as part of the Installation Phase of the Project

CONTENTS

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Acronyms and Abbreviations

Name	Description
AoI	Area of Influence
BU	Branching Unit
CBD	Central Business District
CITES	Convention on International Trade in Endangered Species
CLS	Cable Landing Station
cm	Centimetre
CMS	Convention on Migratory Species
CRR	Comments and Responses Report
CV	Curriculum Vitae
DA	Double Armour
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	National Department of Environmental Affairs
EAP	Environmental Assessment Practitioner
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
ERM	Environmental Resources Management
GHG	Greenhouse Gas
GNR	Government Notice Regulations
HDD	Horizontal Directional Drilling
HDPE	High Density Polyethylene
I&AP	Interested and Affected Party
ICCAT	International Commission for the Conservation of Atlantic Tunas
ICT	Information and Communications Technology
IDP	Integrated Development Plan
IDZ	Industrial Development Zone
IOTC	Indian Ocean Tuna Commission
IUCN	International Union for the Conservation of Nature
Km	Kilometre
LW	Lightweight
LWP	Lightweight Protected
m	Meter
MPA	Marine Protected Areas
NEMA	National Environmental Management Act (Act No. 107 of 1998, as amended)
Nm	Nautical miles
PF	Power Feed
PLB	Post Lay Burial
PLGR	Pre-Lay Grapnel Run
RA	Rock Armour
ROV	Remotely Operated Vehicle
SA	Single Armour
SR	Scoping Report
UNFCCC	United Nations Framework Convention on Climate Change

1. INTRODUCTION

1.1 Project Overview

The *Project* involves the installation and operation of the *Melting Pot Indianoceanic Submarine System (METISS)* in South Africa. METISS is a proposed new subsea fibre optic cable system that will connect Mauritius to South Africa, and provide high-speed connectivity of 24 terabytes per second to the global telecommunications network, as well as low latency[2] access to enhance business operations across multiple industries.

METISS is owned by a Consortium of companies comprising Canal+ Télécom, CEB FiberNet, EMTEL, Zeop, SRR (SFR) and TELMA. The Consortium was formed for the purposes of developing the system, and has contracted ASN and Elettra for the manufacture and installation of the subsea cable system. The Consortium has contracted Liquid Telecom to act as the Landing Party in South Africa, responsible for all operational aspects in South Africa.

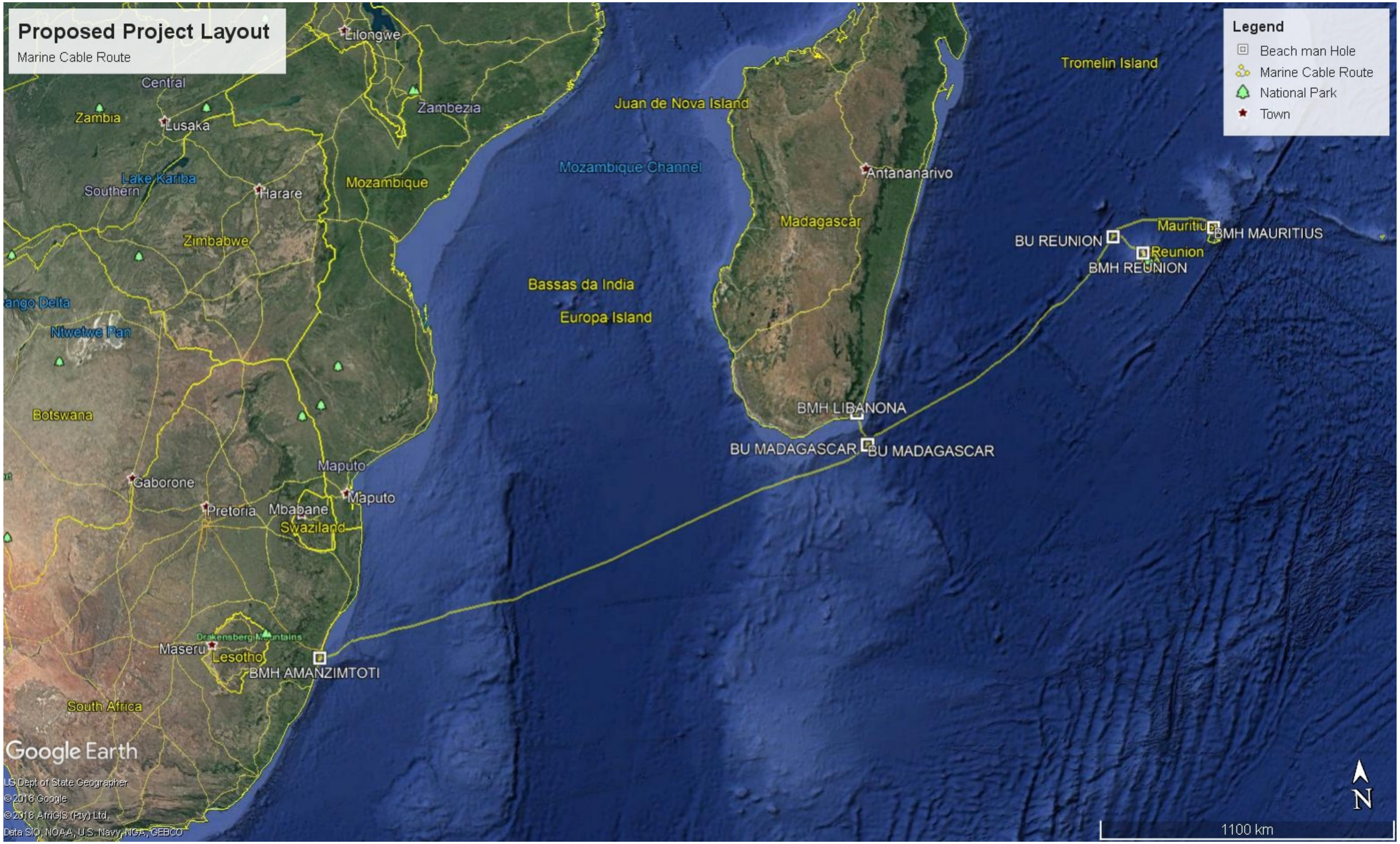
The METISS main cable ('trunk') will run more than 3,200 km from Mauritius to South Africa and spilt at Branching Units off the main trunk to landing sites in Reunion Island and Madagascar. Figure 1-1 shows the subsea cable route.

In South Africa specifically, the METISS subsea cable will run approximately 538 km (inclusive of Territorial Waters and Economic Exclusive Zone (EEZ)). The system includes a 14 mm to 35 mm diameter subsea cable that will enter the South African EEZ (approximately 370 km from the seashore) and continue through Territorial Waters (approximately 22 km from the seashore), to a landing site at Amanzimtoti Pipeline Beach in KwaZulu-Natal. The Project is provisionally scheduled to be installed in the first quarter of 2020 and is expected to be completed and operational by the end of the third quarter of 2020.

All planning, installation and maintenance are performed according to approved and certified International Organization for Standardization (IOS) quality systems. The planning of the route is performed in accordance with industry recognised standards and codes including the International Telecommunications Union (ITU) as well as the International Cable Protection Committee (ICPC).

[2] Low latency refers to a computer network that is optimized to process a very high volume of data with minimal delay (latency).

Figure 1-1 Proposed METISS Subsea Cable System Layout



1.2 Background

Historically international telecommunications traffic was carried by radio, satellite or analogue cable systems. With the introduction of fibre optic cables and the increased quality and capacity they provide, telecommunication companies have switched to this as a primary means of connectivity. Fibre optic subsea cables now carry up to 95 percent of international voice and data traffic (ICPC website).

Currently the SEACOM, EASSy and SAFE systems land on the East Coast of South Africa. The SEACOM and the EASSy systems serve countries along the Indian Ocean in East Africa and North Africa, whereas the SAFE system extends from South Africa to the Far East via Mauritius and Reunion. The SAFE system is close to the end of its design lifespan, furthermore its capacity is limited for current growth requirements, resulting in high costs and limited data transmission, particularly when maintenance activities are required. In addition, the IOX Subsea Cable System (currently under application) is another subsea cable system proposed to land on the East Coast of South Africa from India.

Thus the purpose of this Project is to provide high speed and low latency network access to enhance businesses in South Africa and across industries through direct connectivity to the Mauritius market.

1.3 Purpose of this Report

Environmental Resources Management (ERM) was appointed to conduct the Environmental Impact Assessment (EIA) for the Project in terms of the National Environmental Management Act (NEMA) (Act No. 107 of 1998, as amended) for Environmental Authorisation (EA). This Final Scoping Report has been compiled as part of the EIA process in accordance with the regulatory requirements stipulated in the EIA Government Notice Regulations (GNR 326 of 2017) promulgated in terms of Section 24(5) of NEMA.

The EIA involves three phases, namely:

- Scoping;
- Specialist Studies; and
- Impact Assessment.

This Final Scoping Report identifies the potentially significant environmental and social issues relating to the installation, operation and decommissioning of the proposed Project that should be addressed further in the Specialist Studies and Impact Assessment phases.

This report includes a description of the proposed Project, infrastructure and activities, alternatives considered, as well as the EIA methodology and a description of the stakeholder engagement process. The report also provides the plan of study for Impact Assessment, which defines the specialist studies and impact assessment work is to be undertaken.

Copies of the Draft Scoping Report were made available for public comment for a 30 day period (1 February 2019 to 4 March 2019. Public comments on the report have been addressed and included in a Comments and Responses Report that have been included in this Final Scoping Report (Appendix C. This report has been submitted to the National Department of Environmental Affairs (DEA) for review.

1.4 Applicable Legislation

Environmental legislation pertaining to the Project, and the permitting thereof, is contained in *Chapter 4* of this report. This legislation includes the following:

- National Environmental Management: Biodiversity Act 10 of 2004
- National Environmental Management: Protected Areas Act 57 of 2003
- National Environmental Management: Integrated Coastal Management Act 24 of 2008
- Telecommunications Act 103 of 1996
- Marine Traffic Act 2 of 1981
- Marine Living Resources Act 18 of 1998
- Maritime Zones Act 15 of 1994
- National Ports Act 12 of 2005
- National Heritage Resources Act 25 of 1999

The relevant legislation pertaining to the EA for subsea cable installation development is the National Environmental Management Act (NEMA) (No. 107 of 1998) as amended and the 2014 EIA Regulations (as amended). The relevance of this legislation is summarised below.

1.4.1 *National Environmental Management Act*

NEMA requires that activities be investigated that may have a potential impact on the environment, socio-economic conditions, and cultural heritage. The results of such investigation must be reported to the relevant authority. Procedures for the investigation and communication of the potential impact of activities are contained in Section 24(7) of NEMA.

Section 24(C) of NEMA defines the competent decision-making authority which is normally the provincial environmental department. However, in cases where a development's footprint transverses international boundaries, the National DEA becomes the competent authority.

1.4.2 *Environmental Impact Assessment Regulations*

The 2014 EIA Regulations (as amended) (Government Notice R.324, R.325 and R.327) identify the activities which may have a detrimental effect on the environment including:

Table 1.1 Applicable Listed Activities

	Trenching Option	Horizontal Directional Drilling Option
GN R 327	Activity 15, 17 and 19A	Activity 15
GN R 325	Activity 14	Activity 6 and 14
GN R 324	Activity 12	

Government Notice R326 sets out the procedures and documentation for Scoping and the EIA process that need to be complied with.

Please refer to *Section 4.2* for detailed description of all of the listed activities.

1.5 Project Proponent

The METISS Subsea Cable System is owned by a consortium of companies including Canal+ Télécom, CEB FiberNet, EMTEL, Zeop, SRR (SFR) and TELMA. The Consortium has contracted ASN and Elettra to manufacture and install the subsea cable system in South Africa. The Consortium has contracted Liquid Telecom to act as the Landing Party in South Africa. Liquid Telecom is the Project Proponent and Applicant for the purposes of the Environmental Authorisation. The contact details for the proponent are presented below:

Box 1.1 Applicant Contact Details

Liquid Telecom

Contact: Mervin Chetty

Telephone: +27 11 5851827

Email: Mervin.chetty@liquidtelecom.co.za

Postal Address: 41 Old Pretoria Main Road Halfway House Midrand 1685

1.6 Competent Authority

The Competent Authority (CA) in terms of the Environmental Impact Assessment (EIA) Regulations is the Department of Environmental Affairs (DEA). The contact details for the assigned case officer for the DEA are as follows:

Box 1.2 Component Authority Contact Details

Contact: Thando Booi

Telephone: +12 399 9387

Email: tbooi@environment.gov.za

1.7 EIA Consultant

The requirement for environmental consultants to act independently and objectively is an established principle in South African law. The 2014 EIA regulations (as amended) (GN R.326), specifically state:

"…an EAP (environmental assessment practitioner) (must have) no business, financial, personal or other interest in the activity, application or appeal in respect of which that EAP is appointed in terms of these Regulations other than fair remuneration for work performed in connection with that activity; or that there are no circumstances that may compromise the objectivity of that EAP in performing such work."

The role of the environmental consultants is to provide credible, objective and accessible information to government and other stakeholders, so that an informed decision can be made about whether a proposed development should proceed or not.

ERM is a privately owned company registered to conduct business in South Africa. ERM has no financial ties to, nor is ERM a subsidiary, legally or financially, of Liquid Telecoms, the Project owners, ASN, or Elettra. Remuneration for the services to ERM is not linked to an approval by the decision-making authority. Furthermore, ERM has no secondary interest in the development.

The ERM team selected for this Project possess the relevant expertise and experience to undertake this EIA Report. As such, ERM has signed the legally required declaration of independence to function as an objective Environmental Assessment Practitioner (EAP). The CVs and details of the

Independent Environmental Practitioner are presented in Appendix A. The contact details of the EAP for the application are presented in Box 1.3 below.

Box 1.3 EIA Consultant Contact Details

Environmental Resources Management Southern Africa (Pty) Ltd.

Contact: Vicky Stevens

Telephone: +27 21 681 5400 | F +27 21 686 0736

Email: metiss-subseacable-eia@erm.com

Postal Address: Postnet Suite 90, Private Bag X12, Tokai, 7966

The core EIA team members involved in this EIA process are listed in Table 1.1 below.

Table 1.2 The EIA Team

Name	Role	Qualifications, Experience
Philip Johnson	Partner in Charge	MSc (International Business), over 14 years of experience
Henry Camp	Technical Advisor	BA (Biology), 35 years' experience
Vicky Stevens	Environmental Assessment Practitioner and Project Manager	MSc (Physical Oceanography), over 10 years' experience
Reinett Mogotshi	Assistant Project Manager	BSc (Hons) Environmental Sciences, 4 years' experience
Stephanie Gopaul	EIA Process Specialist	MSc (Environmental Management), over 10 years' experience
Victoria Braham	Stakeholder Engagement Specialist	BSocSci (Hons), Environmental Analysis and Management, 4 years' experience
Amy Barclay	Technical Coordinator	MSc (Environmental and Wetland Sciences), 2 years' experience
Khosi Dlamini	Project Assistant	BSc (Hons), Environmental Sciences, 3 years' experience
Amishka Mothilal	Project Assistant	BSc, Environmental Sciences, 1 years' experience

1.8 Undertaking by EAP

Based on the preliminary Project description and outcomes of the Scoping Phase, no fatal flaws have been identified. ERM's opinion is the proposed Project should proceed to the EIA phase where the impacts and risks identified in the Scoping Report will be assessed in sufficient detail and significances determined.

ERM believes that the information provided in this Final Scoping Report is the most recent detail provided by the Proponent and specialists thus far.

1.9 Scoping Report Requirements

Table 1.3 illustrates the legislated content of for a Scoping Report and indicates where the information can be found in this report.

Table 1.3 Legislated Content of the Scoping Report and Corresponding Sections in this Report

Legislated Content – Appendix 2 Section 2	Section in this Report
(1) (a) details of-	
(i) the EAP who prepared the report	Chapter 1
(ii) the expertise of the EAP, including a curriculum vitae	Chapter 1 & Appendix A
(b) the location of the activity (i) the 21 digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name; (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	Chapter 2 & Appendix D
(c) a plan which locates the proposed activity or activities applied for at an appropriate scale (including coordinates) (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken	Chapter 2 & Appendix D
(d) a description of the scope of the proposed activity, including-	
(i) all listed and specified activities triggered;	Section 4.2
(ii) a description of the activities to be undertaken, including associated structures and infrastructure	Chapter 2
(e) a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process	Chapter 4
(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 location;	Chapter 2
(g) a full description of the process followed to reach the proposed preferred activity, site and location of the development footprint within the site, including	
(i) details of all the alternatives considered;	Chapter 3
(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 5 & Appendix B.
(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;	Chapter 5.6.3 & Appendix C
(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Chapter 6
(v) the impacts and risks which have informed the identification of each alternative, including the nature, significance, consequence, extent, duration and probability of such identified 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 3
(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives	Chapter 8.4 & 8.5
(vii) positive and negative impacts that the proposed activity and alternatives 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 7
(viii) the possible mitigation measures that could be applied and level of residual risk	Chapter 7

Legislated Content – Appendix 2 Section 2	Section in this Report
(ix) the outcome of the site selection matrix	Chapter 3
(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such	Not Applicable
(xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity	Chapter 3
(h) a plan of study for undertaking the environmental impact assessment process to be undertaken, including-	Chapter 8
(i) a description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity	Chapter 3
(ii) a description of the aspects to be assessed as part of the environmental impact assessment process; (iii) aspects to be assessed by specialists;	Chapter 8 Chapter 8
(iv) a description of the proposed method of assessing the environmental aspects, including aspects to be assessed by specialists	Chapter 8
(v) a description of the proposed method of assessing duration and significance	Chapter 8
(vi) an indication of the stages at which the competent authority will be consulted;	Chapter 8
(vii) particulars of the public participation process that will be conducted during the environmental impact assessment process;	Chapter 8
(viii) a description of the tasks that will be undertaken as part of the environmental impact assessment process;	Chapter 8
(ix) identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored.	Chapter 7
(i) an undertaking under oath or affirmation by the EAP in relation to	
(i) the correctness of the information provided in the report	Chapter 1 & Appendix A
(ii) the inclusion of comments and inputs from stakeholders and interested and affected parties	Appendix C
(iii) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties	Appendix C
(j) an undertaking under oath or affirmation by the EAP in relation to the level of agreement between the EAP and interested and affected parties on the plan of study for undertaking the environmental impact assessment;	Chapter 1 & Appendix A
(k) where applicable, any specific information required by the competent authority; and	N/A
(l) any other matter required in terms of section 24(4)(a) and (b) of the Act	N/A

1.10 Report Structure

The remainder of this report is structured as follows:

- Chapter 1: Introduction
- Chapter 2: Project Description
- Chapter 3: Project Alternatives
- Chapter 4: Legislative Context
- Chapter 5: EIA Approach and Methodology
- Chapter 6: Environmental and Social Baseline
- Chapter 7: Identification of Impacts
- Chapter 8: Plan of Study for EIA

- Chapter 9: References

In addition, the report includes the following appendices:

- Appendix A: Undertaking by the EAP and the Project Team CVs
- Appendix B: Stakeholder Engagement Records
  - Appendix B1: Stakeholder Database
  - Appendix B2:Notification Letter
  - Appendix B3: Site Notices
  - Appendix B4: Newspaper Advertisements
  - Appendix B5: Request for Comments from Commenting Authorities
  - Appendix B6: Comments Received
- Appendix C: Comments and Response Report
- Appendix D: Project Locality Maps
- Appendix E: DEA Pre-Application Meeting Records

2. PROJECT DESCRIPTION

2.1 Overview

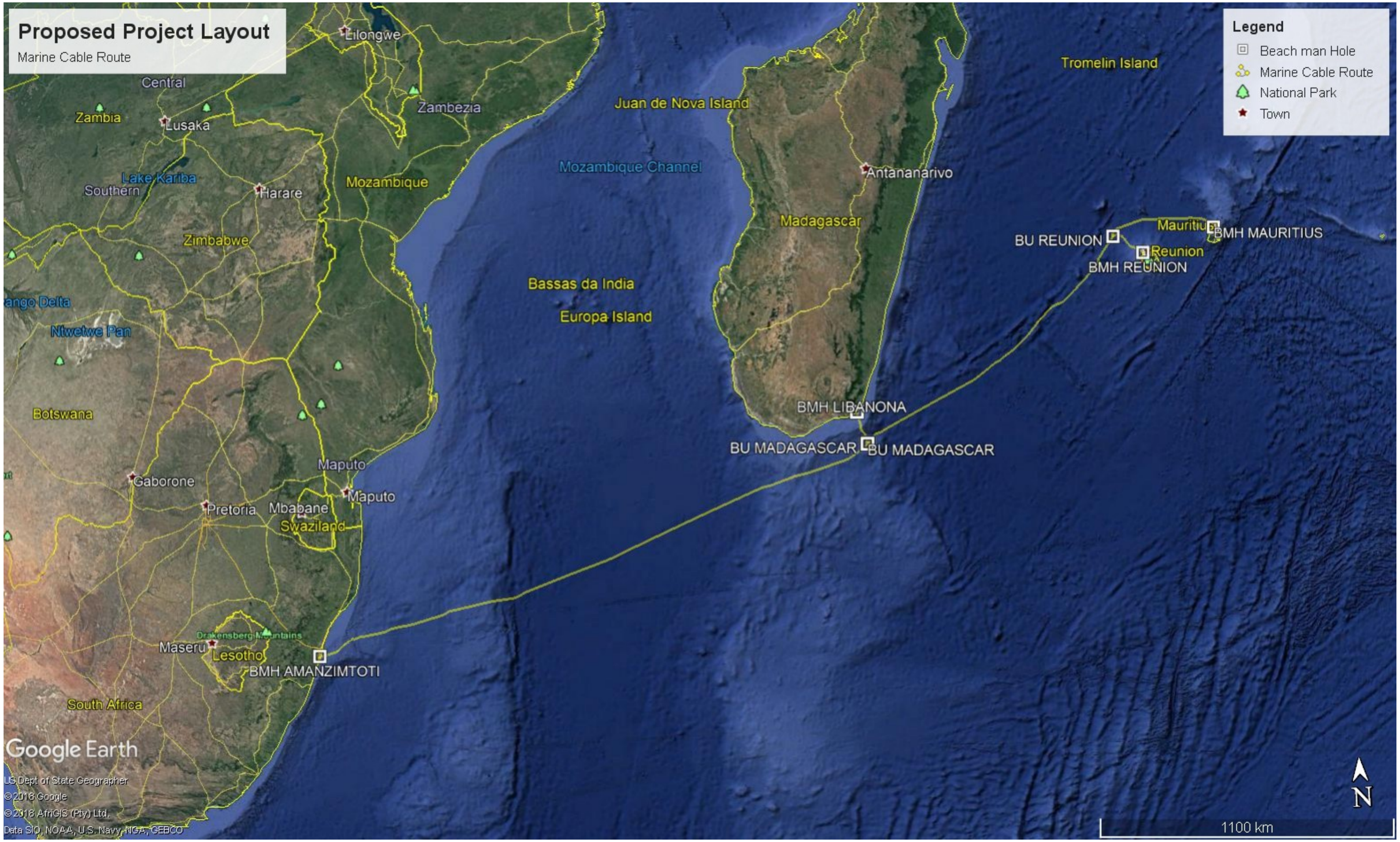
The METISS Subsea Cable System will span more than 3,200 km from Mauritius to South Africa and deliver a boost to bandwidth between the respective countries, providing a connection speed of 24 Terabytes Per Second (TBps). Figure 2-1 below illustrates the subsea cable route running from Mauritius, connecting to host countries (Reunion Island and Madagascar) and landing in Amanzimtoti in South Africa.

The Project involves the installation and operation of the system. The main system components include the following:

- Fibre-optic subsea cable;
- Repeaters and Branching Units (BU);
- Beach Manhole (BMH);
- System earth;
- Cable Landing Station (CLS) (in the case of the Project this will be an existing building);
- Terrestrial fibre optic cable (herein referred to as terrestrial cable).

The Project is described in further detail in the following sections.

Figure 2-1 Proposed METISS Subsea Cable System Layout



2.2 Purpose and Need

Broadband traffic is growing rapidly due to the demand for new uses like cloud computing and video streaming. Furthermore, the demand for new connectivity reflects an end-user and business environment in which high speed connectivity is needed for sustainable growth and development.

METISS will provide additional telecommunications capacity to South African users as well as providing cross-connect opportunities from/ to other networks within South Africa and the region. The Project will provide high speed connectivity to the global network.

Businesses and consumers will benefit from enhanced capacity and reliability for telecommunications services that support fixed and mobile communications networks and internet services.

Refer to Chapter 6 of this report for a description of the socio-economic baseline, which further describes the Project need.

2.3 Project Location

The METISS subsea cable within South African waters is 538 km long (inclusive of Territorial Waters and Economic Exclusive Zone). The subsea cable diameter varies between 14 mm and 35 mm. The subsea cable will enter the South African Exclusive Economic Zone (approximately 370 km from the seashore), run through to the Territorial Waters (approximately 22.22 km from the seashore), and land onshore at Amanzimtoti Pipeline Beach in KwaZulu-Natal Province (Figure 2-2).

2.3.1 *Subsea Cable Route Location*

The main trunk of the subsea cable is approximately 3,200 km in length and will run from Mauritius to South Africa. Branches of the subsea cable will split from Branching Units (BUs) on the main trunk to landing sites in the other landing countries located along the route. The other landing countries include Reunion Island and Madagascar.

The cable system is provisionally scheduled to be installed in the first quarter of 2020 and is expected to be completed by the end of the third quarter of 2020.

2.3.2 *Landing Site Location*

The landing site in South Africa is approximately 30° 2’27.03”S, 30° 53’58.40”E, at Amanzimtoti Pipeline Beach. Refer to Figure 2-2 for an illustration of the proposed position of the landing location in relation to the Beach Manhole (BMH).

Figure 2-2 Amanzimtoti Pipeline Beach from BMH looking towards the Landing Point

Source: Site visit Report, 2018 (DTS-REP-17_100)

Note: The blue line illustrates the proposed subsea cable route from the Beach Manhole towards the sea.

2.3.3 *Beach Manhole Location*

The subsea cable will terminate in a Beach Manhole that will be located at approximately 30° 2'24.87"S 30°53'55.84"E on a grassed island near a car park. Refer to Figure 2-3 or an illustration of the proposed positioning of the BMH.

Figure 2-3 Proposed Beach Manhole Location and Amanzimtoti Pipeline Beach

Source: Photographed by S. Gopaul (20/11/2018)

2.4 Cable System Components

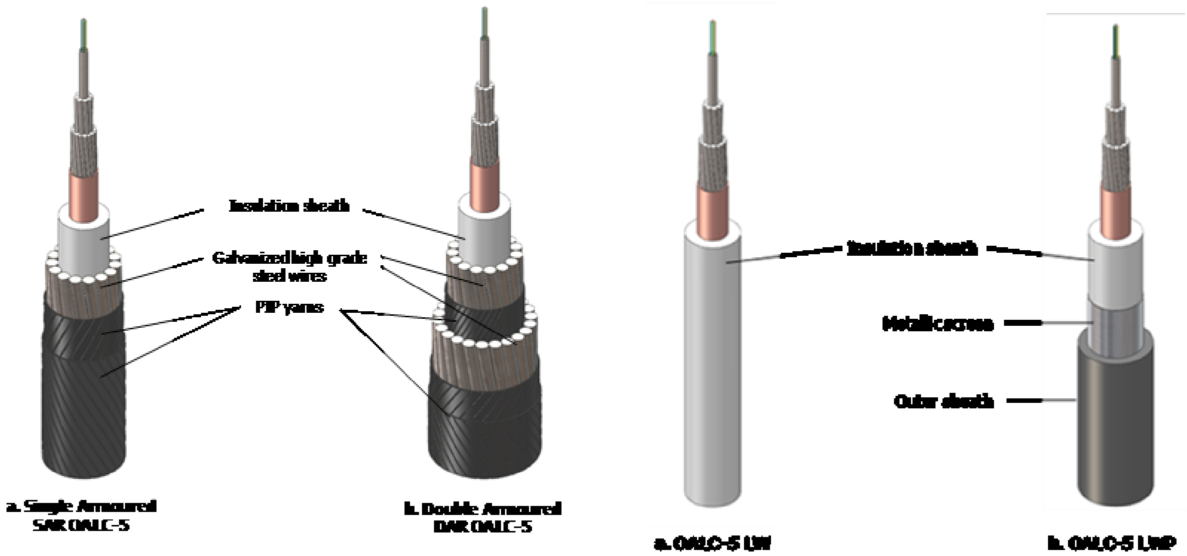
2.4.1 *Subsea Fibre Optic Cable*

The main part of the system is the subsea fibre optic cable which will consist of inner optical fibres encased in polyethylene for strength. The optical fibres are glass fibres that carry light along their length. They are widely used in telecommunication systems because they allow for transmission of data over long distances and at very high speeds. The exterior subsea cable diameter will range from 14 to 35 mm.

The main design function of the subsea cable is to protect the optical fibre transmission path over the entire service life of the system, including laying, burial, and recovery operations (refer to Figure 2-4 for an illustration of typical OALC-5 cable types). The proposed subsea cable types are Reinforced Double Armour (DAR), Reinforced Single Armour (SAR), Lightweight Protected (LWP) and Lightweight (LW). DAR and SAR cable types are normally used in shallow water (<1,500 m water depth) where subsea cable burial is planned and where the external risk to the subsea cable is considered higher. LWP and LW subsea cable types are normally used in deep water where the cable will be laid on the surface of the seabed and the external risk to the subsea cable is considered lower.

The subsea cable type to be used for METISS is the ASN OALC-5 subsea cable, a resilient cable type designed specifically for repeatered systems. A 'repeatered system' is a subsea cable system typically longer than 350 to 400 km. To prevent the optical signal deteriorating from the point of origin to the destination, the signal is boosted approximately every 70 km in a component call a 'repeater'. Power will be provided to the repeaters through electrical connection in the subsea cable. The current is fully shielded by the polyethylene coating.

Figure 2-4 Proposed ASN OALC-5 Cable Types



Source: ASN

2.4.2 *Repeaters and Branching Units*

Repeaters will be installed along the subsea cable to boost the signal as it loses strength along its length. At approximately every 100 km along the subsea cable there will be a built-in repeater unit (typically about 1.5 m long and 0.4 m diameter) deployed as part of the cable structure. There will be up to three such repeaters in South African Terrestrial Waters. The copper ring in the fibre optic cable structure conducts the required power from either shore end to operate the repeaters.

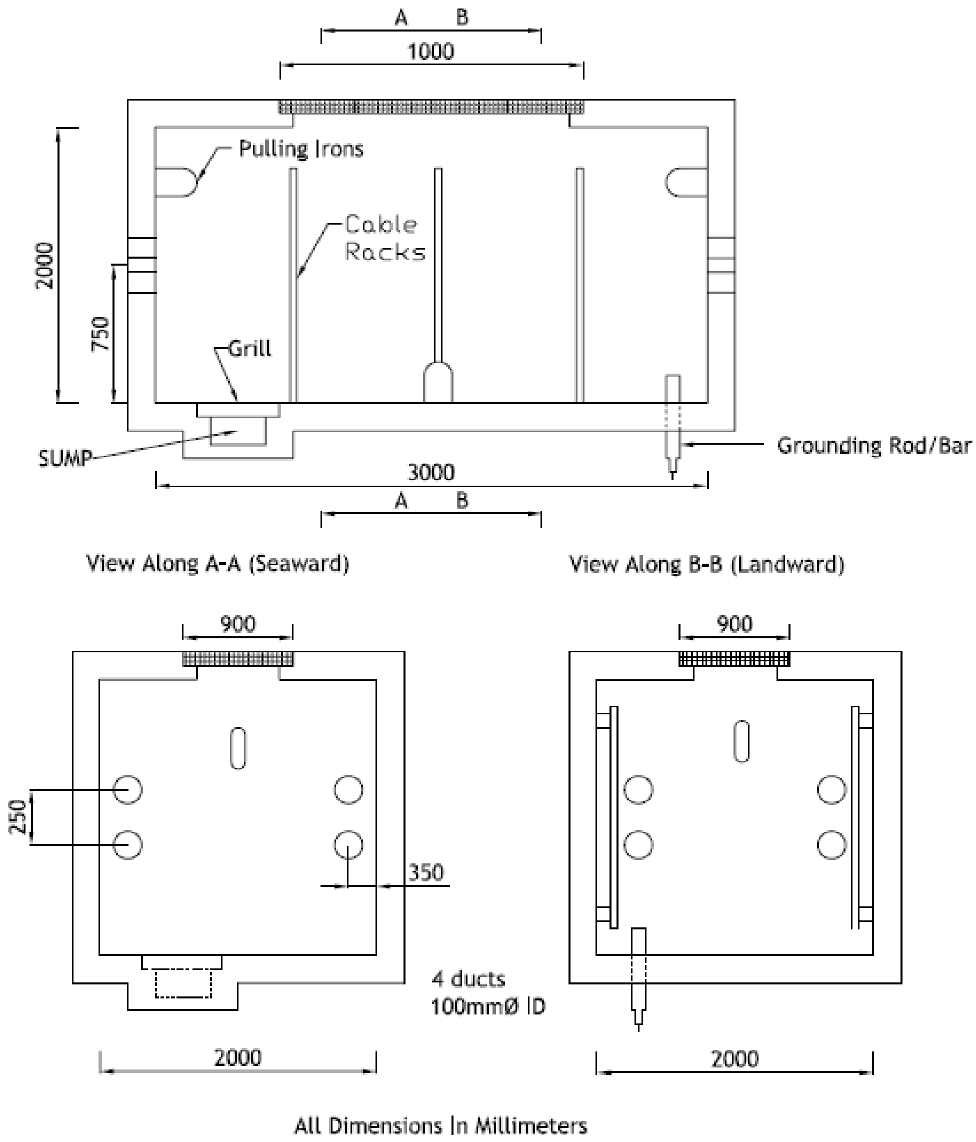
Branching Units will be installed on the subsea cable to provide connections to Reunion and Madagascar. The BUs splits the route of the cable fibres to drop capacity in countries other than those connected by the main trunk cable. There will be no BUs installed in South African waters.

2.4.3 *Beach Manhole Construction*

The BMH is a concrete utility vault where the marine portion of the subsea cable is connected to the terrestrial portion of the cable route. The BMH will be constructed in advance of the cable landing operations. The BMH will be situated at the shore line above the high-water mark and mostly buried with an access port at the ground surface. It will have a tamper-proof cover to prevent unauthorised entry and an approximate size of 4 m long x 2 m wide x 2 m high. It is expected that construction (by concrete casting) the BMH will take approximately 1 to 2 weeks.

Refer to Figure 2-5 for an illustration of the BMH design.

Figure 2-5 Typical Beach Manhole Layout



Source: ASN, 2018 INST.12613.doc

The type of manhole lid is currently being investigated because the air on the South African coast is corrosive to steel and iron, therefore alternatives, such as loaded polycarbonate, are being evaluated. The spacing between the ducts on the seaward wall will be 150 mm spacing both horizontally and vertically. This allows sufficient space to fit the armour wire anchor clamps which will be used to connect the cable to the BMH.

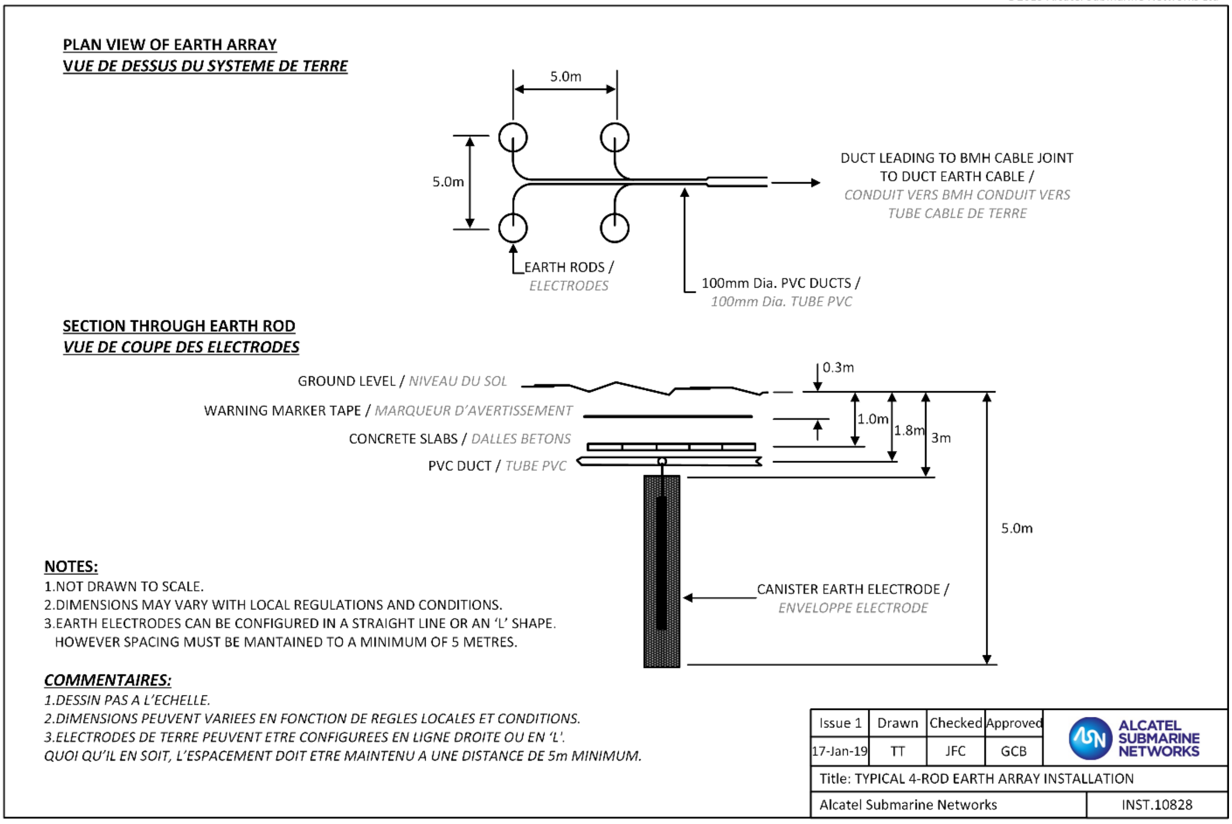
Two earth or ground rods will be placed in each corner of the seaward wall of the BMH to provide an earth for the power running through the cable. The position of the rods will be 100 mm from the end and side walls and protrude 125 mm from the floor. Depending on the length of pull from the beach, four anchor irons will be fixed to the terrestrial cable side of the BMH wall, one above each set of ducts and one below each set of ducts and one below the manhole shaft. The seaward wall will have the anchor irons above and below the set of four ducts.

2.4.4 *System Earth*

The System Earth (also called an Ocean Grounding Bed or Earth Array) is required to provide an earthen electrical ground for the subsea cable. It will consist of either a number of rods (rod-type array, Figure 2-6) or a metal plate (beach earth plate, Figure 2-7) installed in the saturated soil close to the water line. The system earth would be located near the BMH and would be entirely subsurface and not visible. Refer to Figure 2-8 for an example of possible beach earth plate location.

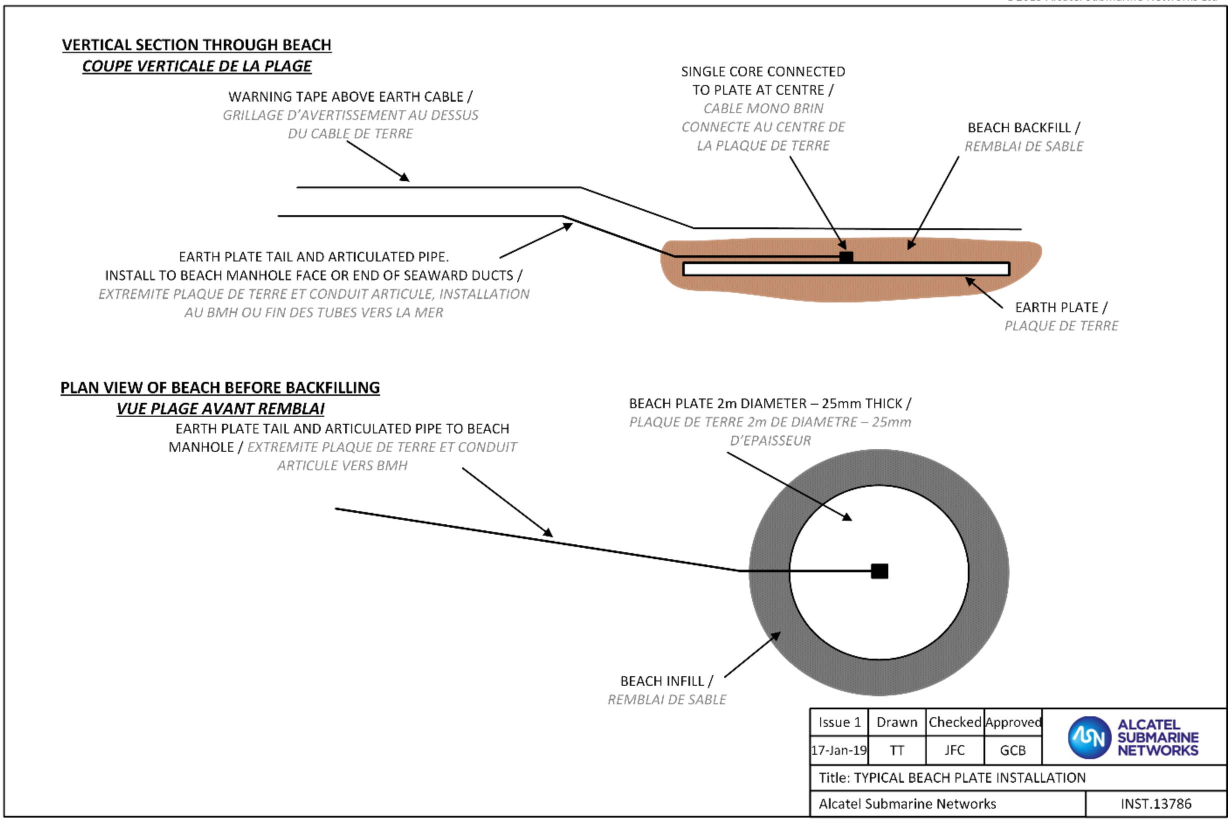
Due to difficulties in finding suitable separation from existing infrastructure near the BMH location and existing electricity lines, the beach earth plate option is the preferred option for the Project.

Figure 2-6 Typical Rod Type System Earth Array



Source: ASN, 2018

Figure 2-7 Schematic of Beach Plate Design



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Source: ASN, 2013

Figure 2-8 Possible Beach Plate Location

Source: ASN, 2018

2.4.5 *Terrestrial Fibre Optic Cable*

The terrestrial fibre optic cable (terrestrial cable) is anchored on the inside wall of the BMH with a built plate to join the cable armouring elements to the BMH. The connecting terrestrial cable will run from the BMH to the duct infrastructure on land and connect to the Cable Landing Station (CLS). The approximate length between BMH and CLS is maximum 5 km. The trench will be 450 mm wide where trenching is required. More detail on the installation design will be provided by the technical team and the impacts will be evaluated in the in the detailed EIA phase. To connect to existing terrestrial infrastructure, new ducts will be required from the BMH to where existing infrastructure exits. Where feasible the terrestrial cable will be buried and routed along existing roads and servitudes up to the point where it joins existing infrastructure (e.g., ducting).

Installation of the terrestrial cable is independent of the installation of the subsea cable, and in some cases the terrestrial cable installation is completed up to the BMH before the subsea cable landing.

2.4.6 *Cable Landing Station (existing building)*

The 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. Existing telecommunications facilities and buildings will be used to accommodate the METISS system. Power Feed Equipment will be installed in the CLS building to provide power to the repeaters along the subsea cable.

A combination of new ducts and existing infrastructure will connect the terrestrial cable to the CLS. The trench, ducting and manholes between the BMH and existing infrastructure will be installed as follows:

- A dedicated, sub-surface, trench located away from power lines and other potentially interfering infrastructure will be dug.
- 2x High Density Polyethylene (HDPE) ducts of approximately 110/95 mm diameter will be installed in the trench for the installation of the terrestrial cables.
- The connecting terrestrial cables are run through the ducting. Fibre optic and earth cables may be up to 5 km long.
- Manholes and other infrastructure are installed as required to install and maintain the terrestrial cable.

2.5 Project Activities

The Project phases include:

- Pre-installation and Installation;
- Operation; and
- Decommissioning.

2.5.1 *Pre-Installation*

2.5.1.1 *Subsea Cable Route Study*

A Subsea Cable Route Study was compiled in April 2018 (DTS-REP-17_100) with the following objectives:

- Provide local information on fishing, port developments, permitting, dredging, reclamation and other factors likely to affect the cable system;
- Propose a viable and secure cable route up to the BMH;
- Assess the risks (natural and manmade) along the proposed route;

- Present information that may impact on the survey/installation schedule;
- Present information that may affect system maintenance; and
- Detail the survey, installation and operational permits required for the system.

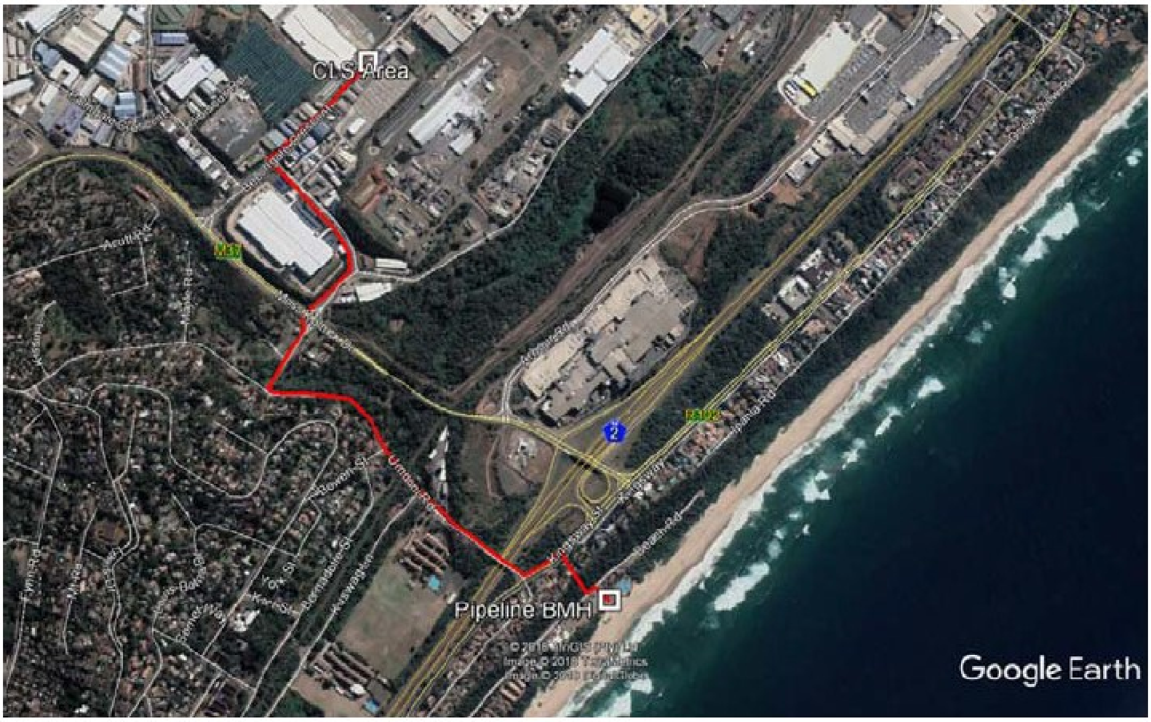
This study provides the information required to inform the survey, installation and lifespan of the METISS System in terms of the following aspects:

- Cable landing sites information;
- Geological and tectonic settings;
- Environmental factors;
- Offshore activities and anthropogenic factors; and
- Permitting.

2.5.1.2 *Terrestrial Cable Route Site Visit*

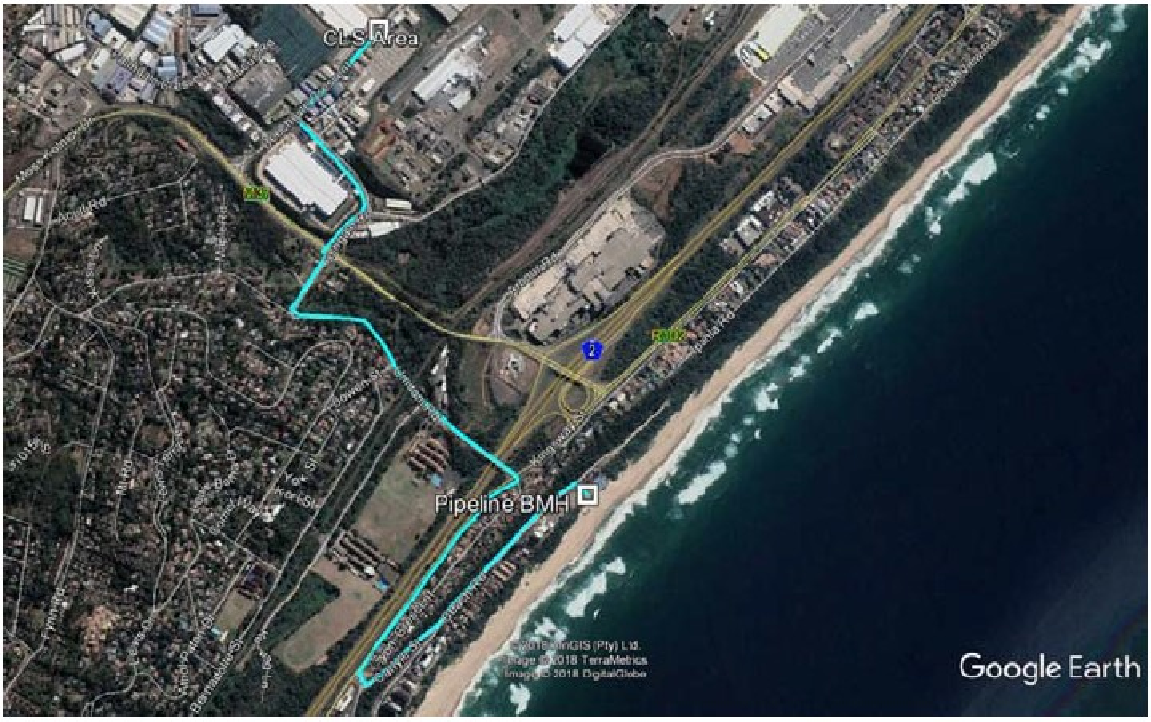
A preliminary study of the terrestrial cable route was conducted in November 2018. The study identified two route options from the BMH location to the CLS (Figure 2-9 and Figure 2-10). A final decision on the preferred route will depend on local council approval and will be confirmed during the Impact Assessment phase. Refer to Chapter 3 for a more detailed description of the proposed route alternatives.

Figure 2-9 Terrestrial Cable Route Option 1



Source: ASN, 2018

Figure 2-10 Terrestrial Cable Route Option 2



Source: ASN, 2018

2.5.1.3 *Marine Survey*

The exact position of the subsea cable is being confirmed on the basis of sophisticated, offshore and nearshore surveying of the seabed. This allows the subsea cable route design to avoid sensitive habitats and features on the seabed. The survey data provides the necessary information for detailed engineering, construction, installation and subsequent maintenance of the cable. Routing of the cable to avoid sensitive habitats serves as a built-in control measure.

The following survey techniques were used during the survey operations:

Geophysical Survey

- Multibeam Echosounder (MBES) to determine the contours of the seabed and define water depth;
- Sub-bottom profiling to identify the type of sediments and best route for burial of subsea cable; and
- Sidescan sonar to identify obstacles such as deep gullies, rocks, and corals.

Geotechnical Survey (in planned burial areas only)

- Cone Penetrometer Tests (CPTs) to determine the resistivity of the sediment for burial operations; and
- Core Sampling to identify the types of sediment to assist with burial assessment.

The survey has been completed and the data collected are being used to finalize the subsea cable route.

A survey was also conducted at the landing sites to determine preferred alignment of the subsea cable at the shore crossing and exact placement of the BMH and System Earth. The results of this landing site survey are under analysis.

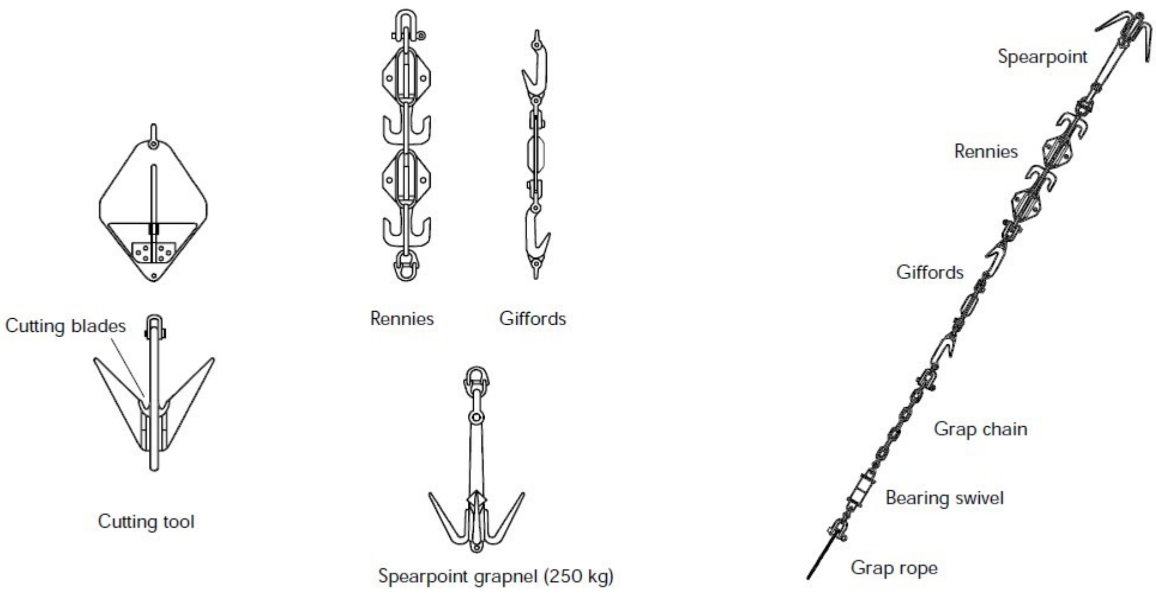
2.5.1.4 *Pre-Lay Grapnel Run (PLGR)*

Prior to installation, a clearance operation will be conducted to remove obstacles from the path of the final subsea cable route (as confirmed by the marine survey). Immediately in advance of installation, a Pre-Lay Grapnel Run (PLGR) will take place along the planned subsea cable route where burial is required as a final check of the seabed for items that might interfere with installation or otherwise damage the subsea cable or plough burial equipment. The PLGR is undertaken by the main cable laying vessel or another designated vessel. The operation involves the towing of one or an array of grapnels along the route where burial is required. The vessel proceeds at a rate to ensure that the grapnel maintains continuous contact with the seabed. The grapnel is usually a sliding prong type which can penetrate up to 40 centimetres (cm) into the seabed.

As the vessel moves along the route, the towing tension is monitored and the grapnel is recovered if the tension increased indicating that an obstruction has been hooked. As a matter of routine, the grapnel is recovered and inspected at minimum intervals of 15 km along the route.

Usually a single tow is made along the route but in areas where other marine activity or debris amounts are high, additional runs may be made. All debris recovered from the seabed will be stored on board and disposed of at an appropriate approved land facility once the vessel docks. Refer to Figure 2-11 for an illustration of typical PLGR grapnel gear.

Figure 2-11 PLGR Grapnel Gear



Source: ASN, 2018

2.5.2 *Installation Phase*

2.5.2.1 *Overview*

The subsea cable is provisionally scheduled to be landed and installed starting in the first quarter of 2020 and is expected to be complete by the end of the third quarter of 2020. Marine installation of the subsea cable in South African waters is expected to take approximately 30 days, including shore end operations ie, construction of the BMH for approximately 5 days.

A specialised cable laying vessel will place the cable on the seabed along the predetermined route. In deeper water (>1,000 m water depth) the cable will be installed on the surface of the seabed. In shallower waters (<1,000 m water depth) where there is greater risk of cable damage from fishing or shipping activities, the subsea cable will be buried to approximately 1 m below the seabed. The subsea cable laying process will require minor construction works within the marine environment, with the target burial depth offshore of approximately 1 m below the seabed in South African waters.

On land, some grass vegetation will be cleared for the Beach Manhole and the terrestrial cable route. The Terrestrial Ecology Study, which will be conducted during the Impact Assessment phase, will confirm if the vegetation that will be disturbed due to the installation of the terrestrial cable is considered to be indigenous, primary dune vegetation. Only small-scale construction works are required at the cable landing site to enable the cable to enter the Beach Manhole (BMH).

2.5.2.2 *Surface Lay and Burial Operations*

Subsea Cable Offshore

The METISS subsea cable enters the South African Exclusive Economic Zone, runs through Territorial Waters and lands at Amanzimtoti Pipeline Beach.

Offshore the cable will be installed using a combination of surface lay on the seabed and burial. The cable will be buried below the seabed in water depths less than 1,000 m to a target burial depth of 1 m to provide additional protection in areas where the subsea cable is perceived to be at higher risk to external threats. In water depths more than 1,000 m, where the risk of external threat is considered lower, the subsea cable will be installed on the surface of the seabed, with the subsea cable conforming to the contours of the seabed.

The installation vessel will be a purpose-built subsea cable vessel fully equipped with all the necessary equipment, tools and facilities to safely handle and install, joint, test, and power the submerged plant, including simultaneous lay and plough burial (Figure 2-12). The vessel will have sufficient power and dynamic positioning capability to carry out the installation in the expected weather and current conditions. Dedicated cable engineering software will be used to install the subsea cable along the planned route with high positional accuracy and control of the cable tension in combination with the ship's navigational systems.

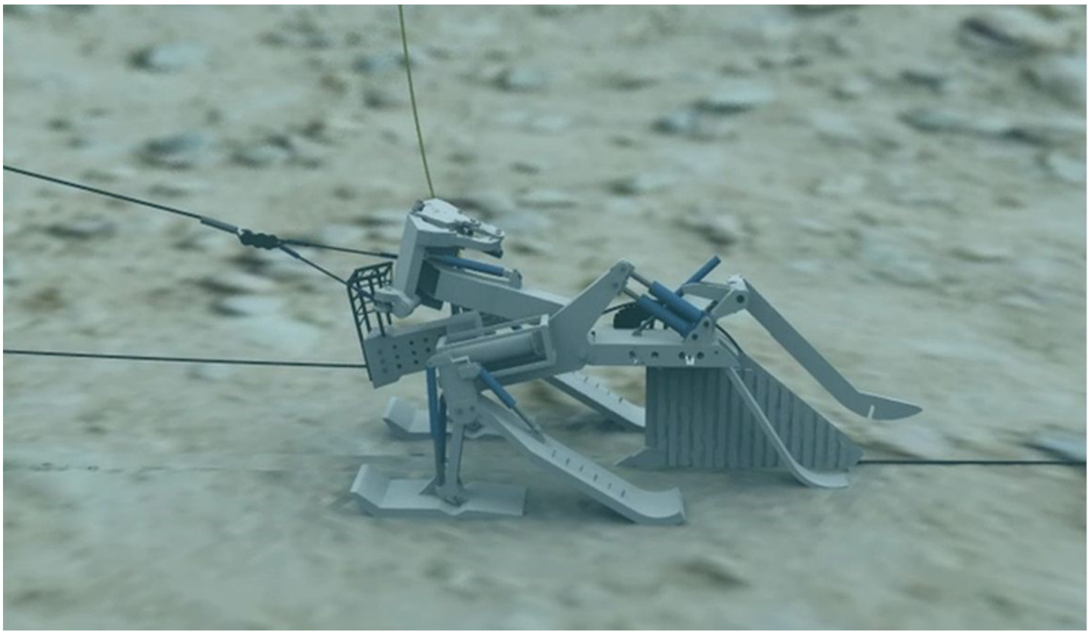
Where required, the burial technique used depends on the seabed conditions and other site-specific factors. In water depths deeper than approximately 20 m and up to 1,000 m (offshore), the subsea cable will be buried using a specialised cable burial plough which uses a blade to cut a trench through the seabed sediment. The plough used to bury the cable has dimensions of approximately 9 m x 5 m x 5 m (L x H x W) and a submerged weight of 13 tonnes (Figure 2-13). The plough is designed to backfill the cable burial trench during operation.

A jet trencher deployed from a remotely operated vehicle (ROV) (Figure 2-16) may also be used in some areas of burial. The proposed ROV has dimensions of approximately 5 m x 3 m x 2 m (L x H x W).

Figure 2-12 Elettra – Taurus2 SMD Plough System

Source: Elettra, 2018

Figure 2-13 Cable Burial Plough on Seabed



Source: ASN, 2018

Figure 2-14 Elettra – ROV Phoenix II

Source: Elettra, 2018

No pipeline or power subsea cable crossings have been identified in South African waters. However, one in-service fibre optic cable crossing has been identified and it is expected to be in an area where the cable is surface laid, at approximately 1,400 m water depth. For surface laid subsea cable crossings in deep water, no additional cable protection is required as the risk to the cable integrity is low.

All subsea cable owners will be notified of crossings, in line with International Cable Protection Committee (ICPC) guidelines and where possible, a favourable crossing angle of close to 90 degrees is targeted for crossings.

Crossing of existing subsea cables will be designed to be three times the water depth from the nearest repeater or powered equaliser on the existing subsea cable, wherever possible. Generally crossing angles of 60 degrees or greater are engineered unless seabed conditions and the position of other cables precludes it.

Subsea Cable in the Nearshore

The main subsea cable installation vessel cannot normally approach the beach in water depths less than 15 m due to the draft of the vessel. In some cases, the vessel may be able to approach the beach in shallower water, depending on the sea state on the day of the subsea cable landing. From the 15 m water depth contour to the landing point on the beach at Amanzimtoti, the subsea cable will be installed in what is termed ‘direct shore end operation’. A direct shore end is performed when the distance from the BMH to the 15 m water depth contour is less than 2,500 m. In this case, the shore end subsea cable is installed directly from the main subsea cable installation vessel and floated to the beach landing point using buoys and assisted by small boats and divers.

Figure 2-15 Example of Installation of the Subsea Cable in the Nearshore

Source: ASN, 2019

The shore end (beach) and low water mark sections of the subsea cable will be buried using the diver jet burial technique (Figure 2-16); which includes hand-held jets to bury the subsea cable in the seabed. The expected maximum width of the seabed fluidised by the jet burial is approximately 105 mm either side of the centre line of the proposed subsea cable route (ie, 210 mm width) and the subsea cable is buried to a target depth of 1 m. The seabed can be expected to naturally reinstate shortly after completion of the works.

Figure 2-16 Proposed Burial Jet

Source: ASN (2018)

Where burial cannot be achieved, additional protection on the subsea cable in the form of an articulated split-pipe may be used to maximise subsea cable protection, particularly in rocky areas, areas with extensive fishing activities, or areas where other activities that may pose a threat to the subsea cable.

Figure 2-17 Example of Articulated Pipe

Source: ASN, 2019

2.5.3 *Shore Crossing*

2.5.3.1 *Subsea Cable in from Nearshore to the BMH*

Two options for installation of the subsea cable from the shoreline to the BMH were considered:

- Option 1: Trenching only (preferred option); and
- Option 2: Combination of Horizontal Directional Drilling and Trenching.

Selection of the preferred option (ie, trenching only) was made based on results of the detailed route surveys. HDD should be avoided as it would disturb a significantly large area than trenching.

2.5.3.2 *Trenching Option (preferred)*

In this option, the installation of the beach section will entail digging of a trench to a depth of 1 m to 3 m below the ground level (or until bedrock is reached) using a backhoe digger and hand tools. The trench will be dug along the existing beach access pathway, down to the beach into the intertidal zone. This differs from that which uses a combination of trenching and Horizontal Directional Drilling as described below.

Trenching and backfilling will entail the excavation and deposition of approximately 5 cubic metres of material per linear metre of trench. The subsea cable will be placed in the trench and covered as shown in Figure 2-18, which is an illustration of a typical shore crossing installation. Excavated material will be reused to fill in the trench.

Articulated pipe will be used as additional protection for the subsea cable from the Low Water Mark (LWM) to the BMH. The articulated pipe has a maximum external diameter of 130 mm and will be buried on the beach to a target depth of 3 m or until bedrock. The subsea cable splits inside the BMH after the anchoring point.

Once the subsea cable is landed and pulled through to the BMH, cable testing will be performed to ensure the subsea cable system is working. The land cable team will join the cable to the terrestrial cable at the BMH, the transition between subsea cable and terrestrial cable.

Figure 2-18 Example of Subsea Cable Installation by Trenching

Source: ASN, 2019

2.5.3.3 *Horizontal Directional Drilling (HDD) and Trenching Option*

For the connection to the BMH via seaward ducts, the option for HDD would entail drilling from the BMH under the dunes and vegetation to the high water mark (HWM) on the beach. The construction activities will entail installation of a new 100 mm internal diameter duct from the BMH location. HDD may also be required for the system earth cable.

Prior to the construction work, geotechnical investigations including taking soil samples at the landing site may take place up to a month prior to HDD drilling. The purpose of the investigations is to survey the drill entry and exit points and the drill path. The geotechnical investigations will include topographic surface elevations, foreign lines, and obstructions. Coring analysis will be performed to check the composition of the soil and sand. The coring will inform the selection of the type of drill head to improve drilling progress and safety.

The rest of the shoreline crossing into the intertidal area would be completed using a trenching method.

A summary of the installation methods for all components of the subsea cable is provided below.

Table 2.1 Project Installation Methods

Conditions/ Environment	Installation Method
Water Depth > 1,000 m	• In water depths more than 1,000 m, where the risk of external threat is considered lower, the subsea cable (14 to 35 mm) will be installed on the surface of the seabed, with the subsea cable conforming to the contours of the seabed.
Water Depth 20 to 1,000 m	• The subsea cable (14 to 35 mm) will be buried below the seabed in water depths less than 1,000 m to a target burial depth of 1 m • The plough used to bury the cable has dimensions of approximately 9 m x 5 m x 5 m (L x H x W) and a submerged weight of 13 tonnes. The plough is designed to backfill the cable burial trench during operation.
Shore End (beach) and Low Water Mark Sections (< 20 m water depth)	• The shore end (beach) and low water mark sections of the subsea cable will be buried using the diver jet burial technique; which includes hand-held jets to bury the subsea cable in the seabed. The expected maximum width of the seabed fluidised by the jet burial is approximately 105 mm either side of the centre line of the proposed subsea cable route (ie, 210 mm width) and the subsea cable is buried to a target depth of 1 m. The seabed can be expected to naturally reinstate shortly after completion of the works. • Articulated pipe will be used as additional protection for the subsea cable from the LWM to the BMH. The articulated pipe has a maximum external diameter of 130 mm and will be buried on the beach to a target depth of 3 m or until bedrock.
Beach Manhole (BMH)	• Excavation of a pit on the shore line above the high-water mark, followed by construction of a concrete bunker (typically up to 4 m x 2 m x 2 m) with ducts seaward for the subsea cable entry.
System Earth	• Excavation of a pit adjacent to the BMH to a depth of approximately 5 m for burial of electrodes connected via an Earth Return Cable in the BMH.
Terrestrial Cable Route Installation Option 1 – Trenching Only	• The installation of the beach section by trench will entail digging of a trench (to a depth of 1 m to 3 m below the soil level, or until bedrock using a backhoe digger and hand tools) along the existing beach access pathway, down to the beach into the intertidal zone. • Trenching and backfilling will entail the excavation and deposition of approximately 5 cubic metres of material per metre of trench. It should be noted that all excavated material will be reused to fill in the trench.
Alternative Terrestrial Cable Installation Option 2 – Trenching and HDD	• The option for HDD would entail drilling from the BMH under the dunes and vegetation to the HWM on the beach. The construction activities will entail installation of a new 100 mm internal diameter duct from the BMH location. HDD may also be required for the system earth cable.
Terrestrial Cable Route Option 1	• Alternative 1 follows a 2.6 km route from the BMH, through existing vegetation before following the road servitude to the Cable Landing Station. The trench will be 450 mm wide where trenching is required. More detail will be provided in the EIA phase.
Terrestrial Cable Route Option 2	• Alternative 2 is a longer, 4.1 km route, as it follows the road servitude in order to limit disturbance of natural vegetation to the Cable Landing Station. The trench will be 450 mm wide where trenching is required. More detail will be provided in the EIA phase
Cable Landing Station	• Existing telecommunications facilities and buildings will be used to accommodate the METISS system.

The expected duration of the installation activities are noted below:

Table 2.2 Approximate Duration of Installation Activities

Activities	Duration
Subsea Cable Installation (including shore crossing)	30 days
Terrestrial Cable Route Installation	3.5 months
BMH and System Earth Construction	5 days

*All durations are approximate and assume favourable weather conditions.

2.5.4 *Operation of the System*

Following installation, the system is expected to be operational for at least 25 years.

Once installed and operational the system will not require routine maintenance. However, subsea cables can be damaged or broken by human activity (fishing trawler gear or ships dragging or dropping anchor) and/or natural events (seismic activity). If the subsea cable is damaged or needs repair, the damaged portion of the cable can be retrieved and repaired or replaced.

For inshore and subsea cable repairs, equipment and methods would be similar to those outlined above but not along the full alignment ie, of smaller scale, with the potential to use smaller equipment such as Remotely Operated Vehicles (ROVs) equipped with injector tool and divers with hand held tools.

The typical process for repair works for shore end and marine works is outlined below:

- Terminal Testing: Testing from cable station terminal, to determine fault location as precisely as possible using optical or electrical characteristics of the cable;
- Initial Inspection: Subsea cable route and seabed will be inspected using Side Scan Sonar, ROV or divers where appropriate to determine the precise fault location and nature if unknown. If the cable is buried, tracking equipment is used;
- Cut faulty subsea cable, buoy off, recover to vessel: If necessary to cut the cable at the fault area, either an ROV or grapnels will be used, or if feasible, divers. Divers use hand-jetting and ROV use a jetting technique to uncover buried cable. Grapnels penetrate the seabed without jetting to pick up, cut and recover the cable. The cable ends will be recovered to the vessel, using diver, ROV or gripper grapnels. While one subsea cable end is repaired on the vessel, the other end will be attached to a rope that is lowered to seabed and this rope will be attached to a buoy to mark its location;
- Cable Splice and Repair: Damaged subsea cable section will be cut out. First one end will be spliced to the spare repair cable section and electrical and optical testing conducted to ensure the integrity of the splice and cables. Then the second subsea cable end will be picked up and spliced back to the repair cable section. Upon completion, the cable integrity will be confirmed through end-to-end electrical and optical testing;
- Replacement of Repaired Subsea Cable: Once the subsea cable has been fully repaired and connected, it will be lowered onto the seabed, along the ‘as-laid’ subsea cable route. Once the repaired subsea cable is in the ‘as-laid’ cable route alignment, a diver or ROV will perform an inspection of the repair area, including determining the beginning and ending of unburied subsea cable; and
- Post-Lay Inspection and Burial (PLIB): Should burial at the repair area be necessary, it will be carried out to best endeavours or pre-determined target depth, using diver or ROV jetting up to 2 m. If burial is not possible, other means of protection may be considered such as articulated piping, URADUCT® or other means such as rock dumping. One final diver or ROV inspection will be carried out before repair works are completed.

In the Southern Africa region, there are dedicated repair ships on standby to respond to any emergency repairs.

2.5.5 *Decomissioning*

Decommissioning of the system would usually involve demolition and recovery and removal of terrestrial components. The marine portion of the subsea cable could be recovered and removed along certain segments if required, and abandonment in place along others. The METISS subsea cable system, will not however, be decommissioned. The subsea portion of the cable is likely be retired in place, as per current global industry practice. This is done in accordance with a Decommissioning Plan, details of which will be provided in the EIA Report. Details regarding the decommissioning of the terrestrial portion of the cable will also be included in the Decommissioning Plan.

3. CONSIDERATION OF ALTERNATIVES

The consideration of alternatives is a legal requirement stipulated in NEMA and associated EIA Regulations. Alternatives are defined in the EIA Regulations as:

"…*different means of meeting the general purpose and requirements of the activity, which may include alternatives to (a) the property on which or location where it is proposed to undertake the activity; (b) the type of activity to be undertaken; (c) the design or layout of the activity; (d) the technology to be used in the activity; and (e) the operational aspects of the activity*".

This Chapter provides a description of the various alternatives considered including the option of not implementing the proposed activity (ie, the no-go alternative) and justification for the selection of the preferred site, activity and technology alternative/s.

It should be noted that the nature and requirements of the proposed Project allow for a limited number of feasible and reasonable alternatives to be considered as described in the following.

3.1 Subsea Cable Route Alternatives

The determination of the subsea cable route is based on a Cable Route Study (CRS), including visits to potential landing sites, followed by a detailed offshore and nearshore marine survey. The final route survey informed the design of the Project, to avoid sensitive marine environmental and physical features (ie, seamounts, rocky outcropping).

The findings from the CRS will be included in the EIA Report during the Impact Assessment phase.

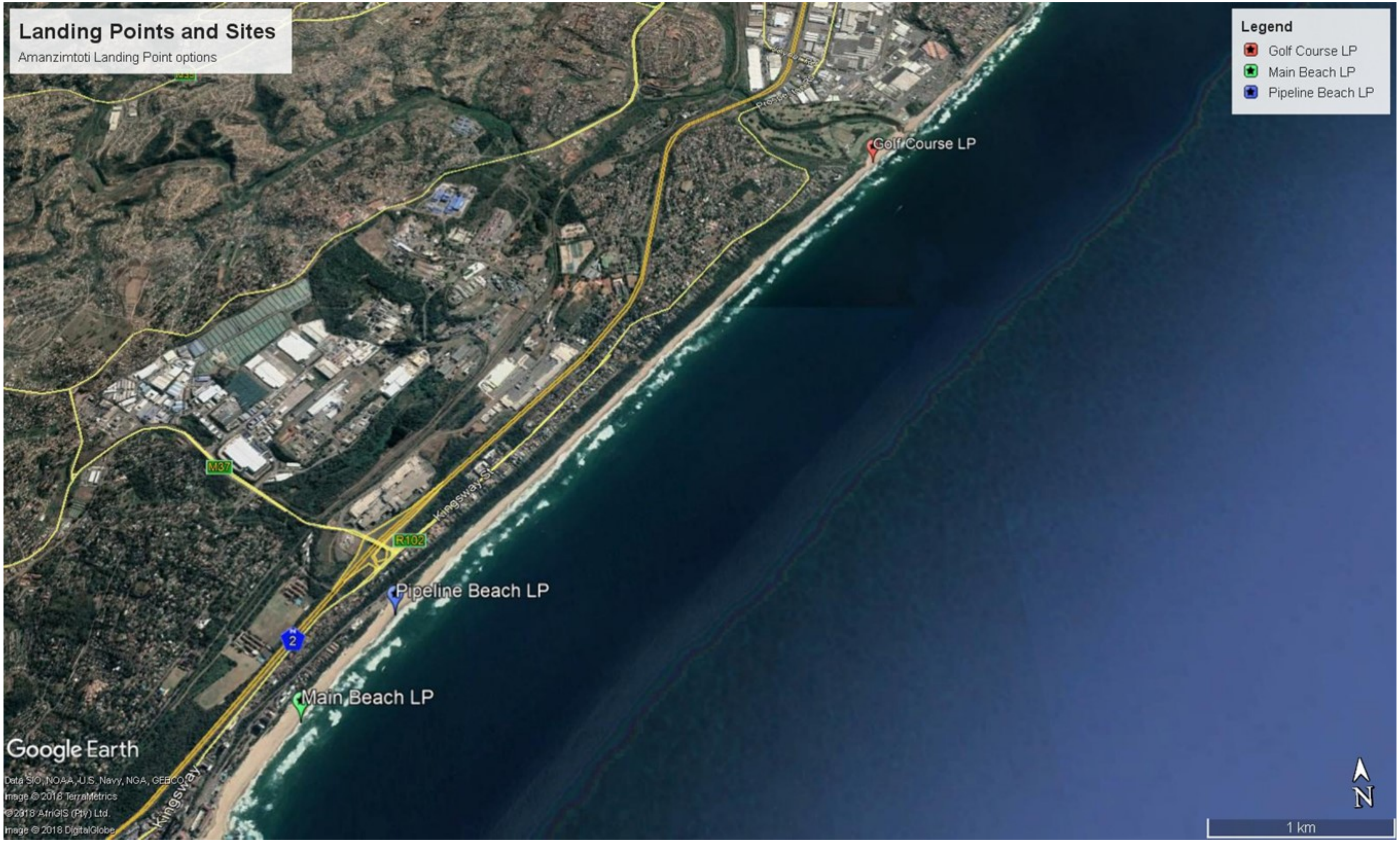
3.2 Landing Site Location Alternatives

There are number of criteria that determine the operational, environmental and financial feasibility of the selected landing site. The most important of these include the following:

- Minimising additional government permitting and approval processes and specialist studies.
- Proximity to existing services such as power, sewerage and water.
- Proximity to existing terrestrial telecommunications infrastructure for housing of equipment and provision of backhaul (ie, linkages to existing terrestrial networks).
- Proximity to offshore explosives dumping ground.
- Proximity to busy shipping areas to avoid locations where anchors may drag on the seabed.
- Proximity to sensitive or protected areas such as marine reserves, coastal dunes, or sensitive ecosystems.
- Proximity to sensitive fishing areas to avoid impacting fishing activities.
- Level of worker health and safety risk during installation and operation.

Based on the above-mentioned key criteria, the three location alternatives considered are illustrated in Figure 3-1 and described below.

Figure 3-1 Landing Site Location Alternatives



3.2.1 Description of Alternatives

3.2.1.1 *Alternative 1: Amanzimtoti Golf Course*

The Amanzimtoti golf course is situated in a secluded location adjacent to the historical Amanzimtoti Country Club. This site is located 1.3 km away from the nearest business area (Prospection), 1.6 km away from the nearest residential area (Athlone Park) and 20 km from the Durban Harbour. The site was not considered feasible due to the very powerful surf zone up to 220 m from the low water mark and exposed rocks which limits the installation of the subsea cable by divers at the shore end. In addition, due to the secluded location it may be a target for cable theft or Beach Manhole (BMH) vandalism during operation.

From the environmental sensitivity point of view the BMH location will be located near the vegetated dunes. These dunes are classified as irreplaceable Critical Biodiversity Area (CBA) by South African National Biodiversity Institute (SANBI).

3.2.1.2 *Alternative 2: Amanzimtoti Pipeline Beach (Preferred)*

Pipeline Beach is a popular swimming and surfing beach fringing the Pipeline Coastal Park. Pipeline Beach is approximately 2.8 km from the centre of Amanzimtoti and approximately 24 km away from the Durban Harbour. The site was considered feasible due its large, broad stretch of sandy beach for the BMH location and ease of access to the location, as the municipality owns the beach, car park and swimming pool nearby.

From the environmental sensitivity point of view the BMH will be located in a transformed area (tarred parking area), near an irreplaceable CBA.

3.2.1.3 *Alternative 3: Amanzimtoti Main Beach*

The Main Beach is a popular location for tourists and locals. This site is located approximately 2.8 km from the centre of Amanzimtoti and approximately 26 km away from the Durban Harbour. The site was considered feasible due to its accessibility to the beach; however the angle of the beach is less favourable than pipeline beach for installation. This site was not considered feasible due to the angle of the beach; its proximity to the popular shore fishing area Nyoni Rocks and high level of tourist activity.

From the environmental sensitivity point of view the BMH will be located in a disturbed area, near an irreplaceable CBA and near a sensitive dune system.

3.2.2 Comparison of Site Alternatives

A risk identification process was undertaken to identify the preferred landing location. A summarised version of this assessment is provided in Table 3.1 below.

Table 3.1 Comparison of Landing Site Location Alternatives

	Alternative 1: Amanzimtoti Golf Course	Alternative 2: Amanzimtoti Pipeline Beach	Alternative 3: Amanzimtoti Main Beach
Technical Considerations	• Existing access to site. • Owned by the Municipality.	• Existing access to site. • Owned by the Municipality.	• Existing access to site. • Angle of the beach is difficult for installation • Owned by the Municipality.
Environmental Considerations	• Irreplaceable Critical Biodiversity Area (CBA), BMH located near vegetated dunes • Strong surf conditions, exposed rock and steep beach profile • Estuary wetland	• Irreplaceable CBA, BMH located in a transformed area (tarred parking area) • Strong surf conditions • Proximity to shark nets (400 m offshore)	• Irreplaceable CBA, BMH location in a disturbed area • The BMH is located near a sensitive dune system
Socio-Economic Considerations	• Secluded location considered to be a risk for cable theft and infrastructure being tampered with.	• Potential crime area along the beach, posing a risk during construction.	• Potential crime area along the beach, posing a risk during construction. • High level of tourist activity • Close proximity to Nyoni Rocks fishing area.

Key Method[3]

	Definition
(green)	Low risk to project development.
(amber)	Medium risk to project development.
(red)	High risk to project development.

3.2.3 *Site Visit*

On the 20 November 2018, representatives from ERM, ASN, Liquid Telecoms and Canal+ conducted a site visit of the Amanzimtoti Pipeline Beach landing site. The purpose of the site visit was to understand the site setting and identify potential issues and concerns to assist in the selection of a preferred alternative for the location of the landing site, BMH and system earth.

Liquid Telecom is considering using the following methods and locations for installing the subsea cable from the BMH to the landing site:

- Horizontal Directional Drilling (HDD) to avoid clearing any coastal dune vegetation.
- Trenching the existing walkway (servitude) from the car park to the landing; subject to considering a utilities map of the car park/ walkway area.

There are two location options being considered for the system earth location, ie, near the beach landing or in the car park area. The selection of the preferred alternative depends on the distance required between the system earth and cable routing and also on the existing facilities within the car park. A 25 m separation distance is required between the system earth and existing/ planned utilities, infrastructure, services (including planned works on the sewage outlet pipes and services to the shower etc.).

[3] Basic assessment for comparison of Project alternatives in relation to each other.

3.2.4 *Selection of the Preferred Landing Site Location Alternative*

When assessed against the technical, environmental and social considerations (Table 3.1) and when compared to the other landing site alternatives, the Amanzimtoti Pipeline Beach meets all criteria required and has an acceptable level of risk to development and is, therefore, the preferred option for cable landing. All the alternative landings were reviewed and analysed during the Cable Route Study which is the first stage of the survey operations; this included visits to each site. Other location alternatives were not assessed in any further detail since they were considered not viable.

3.3 Terrestrial Cable Route Alternatives

3.3.1 *Description of Alternatives*

Two terrestrial cable routes have been considered, based on the preferred landing site, and are described below. The eThekwini Metropolitan Municipality, department of roads, will determine the route for the terrestrial cable based on existing municipal infrastructure. This decision is pending. The preferred alternative for the terrestrial route will presented during the EIA Phase of the Project.

3.3.1.1 *Alternative 1: Terrestrial Cable Route 1*

Alternative 1 follows a direct route from the BMH, through existing vegetation (Figure 3-2.), before following the road servitude to the Cable Landing Station. Route Alternative 1 is presented in Figure 2-9.

3.3.1.2 *Alternative 2: Terrestrial Cable Route 2*

Route alternative 2 is a longer route, as it follows the road servitude in order to limit disturbance of natural vegetation (Figure 3-3) to the Cable Landing Station. Route Alternative 2 is presented in Figure 2-10.

Based on the municipality’s decision, the preferred terrestrial cable route will be presented in the Draft EIA Report.

Figure 3-2 Terrestrial Cable Route 1

Source: Liquid Telecom, 2018

Figure 3-3 Terrestrial Cable Route 2

Source: Liquid Telecom, 2018

3.4 Activity Alternatives

3.4.1 *Description of Alternatives*

In principle, land-based fibre optic cables are an alternative to the proposed subsea cable system. Such a land-based cable would be routed, generally, along coastal areas where telecommunications usage is concentrated. The cable would need to be installed underground and would require extensive trenching and the establishment of appropriate servitudes. Land-based fibre optic cables do not allow for new international transmission connections to be made.

Comparative analysis of the alternative methods of enhancing telecommunication network was undertaken for the Project, based on the needs and desirability of the Project. Three key criteria were defined for the comparative analysis and are as follows:

- Installation costs for the fibre optic cable;
- Environmental sensitivities along the subsea and terrestrial cable route; and
- The suitable environment for connecting South Africa to the rest of the world.

Table 3.2 Comparison of Activity Alternatives

	Optic Cable Types	
Assessment criteria	**Land-based fibre optic cable**	**Subsea fibre optic cable system**
Technical Considerations	Absence of the terrestrial environment that would facilitate fibre connection. Disruption to public access and tourist activity during the installation phase.	Greater reliability that allows for connection with the rest of the world. Minimal disruption to public access and tourist activity during the installation phase.
Installation Costs	High installation costs (based on terrain, sensitive areas, access constraints, etc.).	High installation costs (based on sensitive areas, access constraints, seabed features, depths, etc.).
Environmental Considerations	Encounter environmentally sensitive areas such as surface water bodies, conservation areas and sensitive ecosystem.	Marine sensitive areas identified during the Cable Route Study and survey operations will be avoided where possible.

Key Method

	Definition
(green)	Low risk to project development.
(red)	High risk to project development.

3.4.2 *Comparison of Alternatives*

When assessed against the three criteria, the land-based fibre optic cables are likely to encounter environmentally sensitive features such as surface water bodies (ie, rivers, streams, and wetlands), conservation areas, and sensitive ecosystems. The installation costs are also higher for terrestrial systems due to the increased complexity associated with the installation and maintenance activities.

For this Project, a terrestrial cable burial system would not be feasible due to South Africa and the intended countries for connection being separated by oceans.

A subsea cable system with its perceived relatively lower impact and greater reliability allows for connection with the rest of the world, therefore, offers the best option to achieve the Project's objectives of improving telecommunication services. These factors make the subsea cable system the preferred activity alternative for the Project.

As a result, this is the only activity alternative being taken forward to the Impact Assessment Phase.

3.5 Technology Alternatives

3.5.1 *System Earth*

The System Earth (also called an Ocean Ground Bed or earth array) is required to provide an earthen electrical ground for the subsea cable. It would consist of either a number of rods (rod-type array) installed in the car park area or a metal plate (sea earth plate) installed in the saturated soil close to the water line. Rods are unlikely to be used due to existing infrastructure and power lines present in the car park. A sea earth plate system will be used.

3.5.2 *Subsea Cable Installation at the Shore Crossing*

In terms of installation technology alternatives, two options for installation of the subsea cable at the shoreline are under consideration:

- Option 1: Trenching (preferred)
- Option 2: Horizontal Directional Drilling (HDD)

3.5.2.1 *Alternative 1: Trenching*

This method of installation of subsea cable entails digging a trench in the ground to install cables underground. When the installation of the cable is completed, the trench is backfilled with the excavated material, and disturbed ground is returned to its original state, insofar as possible.

The landing of the subsea cable would entail the digging of a trench down the beach into the intertidal zone. Once on the beach, a trench is excavated in the sand to a depth of 1 to 3 m using a backhoe digger. The subsea cable is placed in the trench and covered.

3.5.2.2 *Alternative 2: Horizontal Directional Drilling*

HDD is a trenchless, boring method for installing underground cables, pipes and conduits in a shallow curve along a prescribed bore path with the use of a surface-launched rig/machine, which minimises the disruption of the surrounding area. The cost of HDD is determined by the diameter and length of the product to be installed as well as the ground conditions and site risks.

The development of the landing of a subsea cable would entail drilling from a starting point, at the BMH, under the dunes to a point near the high water mark on the beach. The rest of the shoreline crossing into the intertidal area would be completed using a trenching method.

3.5.3 *Impacts Associated with the Technology Options Identified*

The technology alternatives considered are discussed below. Two technology alternatives for installation are considered for this Project, Option 1 being trenching and Option 2 HDD.

The impacts of both alternatives have been identified in Table 3.3 and preliminarily assessed in this Scoping Report. In addition, the preliminary rating of significance pre- and post-mitigation are included in *Table 3.3* below.

A shortened version of ERM's EIA methodology was used to establish the significance of these impacts. Refer to *Section 8.4* for more a more detailed description of the methodology.

Table 3.3 Comparison of Installation Method Alternatives

Installation Method	Description	Advantages/ Disadvantages	Key Impacts	Rating	Mitigation
Alternative 1: Trenching	The landing of the subsea cable at the shoreline would entail the digging of a trench down the beach into the intertidal zone. Once on the beach, a trench is excavated in the sand to a target depth of 3 m, or until bedrock, using a backhoe digger. The cable is placed in the trench and covered to return the ground to its original state where possible.	*Advantages* • The trenching method allows for schedule flexibility, thus optimising the cable positioning. • Cable trenching allows the cable to be well protected from external threats such as vessels and anchors • Lower installation costs *Disadvantages* • Generally slower and would result in disturbance of vegetation in the coastal area during installation. However, due to the use of the existing access path this impact would be limited.	Potentially significant impacts related to the trenching method and based on the issues and concerns identified during the Scoping process include: • Dust generation during trenching operation and transportation of materials for construction • Increase in turbidity caused by disturbance to the sediment by the tools used for burial and maintenance activities • Disturbance of heritage and archaeological sites as a result of physical penetration of the surface • Disturbance of sensitive habitats during trenching operations • Direct disturbance of coastal species from trenching • Deposition of displaced sediment on marine and coastal organisms	Likely, localised impacts would occur during installation of the subsea cable system. This impact is likely to be of **Moderate** to **Minor** significance (given the sensitivity of the marine environment) without mitigation and **Minor** to **Negligible** significance with mitigation. Further specialist work would be required in order to provide a quantification of this.	Standard mitigation measures are available to reduce the impacts of the trenching method during installation. Some of the impacts on sensitive coastal areas can be avoided by using the existing access path. Additional mitigations may be required to reduce the impacts of trenching on sensitive habitats. Specialist inputs will be required to confirm the mitigation measures and the ratings

Installation Method	Description	Advantages/ Disadvantages	Key Impacts	Rating	Mitigation
Alternative 2: HDD	• The installation of the subsea telecommunication cable at the shoreline would entail drilling from a starting point at the BMH to a location on the beach near the high water mark. • If this option is selected, the construction phase will require a few months. Construction activities will commence from a prepared earthen platform. The exact location will be determined by a site survey. A hole will be drilled from the drill pad to the beach and the cable will be pulled back through the hole to the land location.	*Advantages* • An environmentally friendly method that results in physical footprint impacts limited to the entry and exit locations. • Allows the cable to be well protected from external threats such as vessels and anchors. *Disadvantages* • Installation costs for the cable are significantly higher compared to trenching. • Requires special care to avoid the release of drilling fluid to the environment. • Location of entry and exit point may be in undisturbed area	Potentially significant impacts related to the HDD method and based on the issues and concerns identified during the Scoping process include: • Pollution from the unplanned discharge of drilling fluids or drilled rock cuttings into the sea • Disturbance of heritage and archaeological sites as a result of physical penetration of the surface • Indirect disturbance, displacement and exclusion of sensitive fauna as a result of noise and vibration • Dust generation during trenching operation and transportation of materials for construction. • Noise associated with drilling activity • Disturbance of sensitive habitats during trenching operations.	Likely, localised impacts would occur during installation of the subsea cable system. This impact is likely to be of **Moderate** to **Minor** significance (given the sensitivity of the marine environment) without mitigation and **Minor** to **Negligible** significance with mitigation. Further specialist work would be required in order to provide a quantification of this.	Standard mitigation measures are available to reduce the impacts of the HDD method during installation. Specialist inputs will be required to confirm the mitigation measures and the post-mitigation ratings

3.5.4 *Comparison of Alternatives*

When assessed against the technical, environmental and economic considerations, and when compared to the HDD alternative, trenching meets all criteria required and has an acceptable level of risk to development if the existing walkway (servitude) to the beach is used and is, therefore, the preferred option. It is expected that sufficient beach burial depth will be achieved at the preferred site using the trenching method and, using the existing walkway, there are not expected to be any obstacles encountered along the trenched route. Trenching on the beach is a relatively straightforward operation and will fit in well with the installation timing of the project, lowering the risk for delay.

The HDD option has been considered but is a more complex, and in this instance will have a bigger environmental impact, and will be less cost effective than the trenching option. The reason for the bigger environmental impact will be the location of entry and exit point may be in undisturbed area, whereas the trenching would be along an existing access path.

Both options were reviewed and analysed during the site visit and trenching is expected to be achievable across the shoreline. Other shore crossing alternatives were not assessed in any further detail since they were considered not viable.

3.6 No-Go Alternative

Under the no-go alternative, the proposed Project would not be executed. Assuming that no other subsea cable system was installed, in this scenario, the region would continue to be constrained by the lack of telecommunications capacity, especially in the area of international data transfer. This could hinder economic growth and cause South Africa to become increasingly more isolated from the global community, as sophisticated data transfer mechanisms are employed elsewhere that South Africa would not be able to access.

Should the no-go alternative be selected, METISS would not be able to facilitate an improved communication capacity and internet service to South Africa.

4. LEGISLATIVE CONTEXT

4.1 Introduction

This section provides an overview of legislation, guidelines and information documents that have informed the scope and content of this report and the approach to the EIA process.

4.2 Environmental Authorisation Process

The Environmental Authorisation process in South Africa is governed by the NEMA Act, as amended, and the NEMA EIA Regulations of 2014, as amended in 2017. The relevance of this legislation is summarised below.

4.2.1 *NEMA Environmental Authorisation*

Chapter 5 of NEMA outlines the general objectives and implementation of Integrated Environmental Management. This provides a framework for the integration of environmental issues into the planning, design, decision-making and implementation of plans and projects that are likely to have a detrimental effect on the environment. Whilst *Section 23* sets out the basic objectives and principles of the Integrated Environmental Management (IEM) procedure, *Section 24* sets out how these objectives and principles are to be accomplished.

Regulations governing the environmental authorisation process have been promulgated in terms of NEMA and include the following:

- EIA Regulations;
- EIA Regulations Listing Notice 1 (GNR 327 of 2017);
- EIA Regulations Listing Notice 2 (GNR 325 of 2017); and
- EIA Regulations Listing Notice 3 (GNR 324 of 2017).

Activities that trigger Listing Notice 1 and 3 require a Basic Assessment (BA) process to be undertaken, whereas activities identified in terms of Listing Notice 2 will require a full Scoping and Environmental Impact Assessment (S&EIA) process. The EIA Regulations set out the general procedure to follow when conducting either a BA or S&EIA process.

Numerous trigger activities have been identified for this Project in terms of all the NEMA listing notices. In instances where all the listing notices are triggered (as in this Project), Listing Notice 2 requirements take precedent and the Project will be subject to a full S&EIA process prior to commencement of any of the associated activities.

Section 24(C) of the Act defines the competent decision-making authority, which is normally the provincial level environmental department. However, in cases where a development transverses territorial boundaries (such as the Project), the national DEA is the competent authority'.

Table 4.1 lists the potential permitting requirements for the Environmental Impact Assessment Regulations Listing Notice 1, 2, and 3 as amended in 2017 from NEMA for the Project.

Table 4.1 Project EIA Regulations Triggers

Permit	Listed Activity	Project Trigger
Basic Assessment Listing Notice 1 (GNR R327 of 2017)	15) The development of structures in the coastal public property where the development footprint is bigger than 50 square metres	The development of the landing of a subsea cable south of the Amanzimtoti Pipeline Beach entails digging of a trench across the beach and into the intertidal zone. The subsea cable length in the territorial sea is approximately 33 km and the anticipated diameter is a maximum of 35 mm.
Basic Assessment Listing Notice 1 (GNR R327 of 2017)	17) The development- i.in the sea; e. in respect of infrastructure with a development footprint of 50 square metres or more.	The development of the landing of a subsea cable south of the Amanzimtoti Pipeline Beach entails digging of a trench down the beach into the intertidal zone. In South Africa, the cable will be buried in water depths less than 1,000 m to a target burial depth of 1.0 m below the seabed to provide additional protection in areas where the cable is perceived to be at higher risk to external threats.
Basic Assessment Listing Notice 1 (GNR R327 of 2017)	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-(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.	The Project will entail the excavation and deposition of more than 5 cubic metres of material within 100 metres of the high water mark of the sea when trenching for, and backfilling of, the subsea cable trench takes place, and as such, this listed activity will only be triggered should the shore crossing be undertaken using only trenching (Option 1 as described in the Project Description).
Full Scoping and EIA Listing Notice 2 of 2017 (GNR 325 of 2017)	6) The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent.	Should Horizontal Directional Drilling be utilised for the shore crossing (Option 2 as described in the Project Description, which is not currently envisaged as not necessary and having higher local impact), then depending on the drilling techniques used, the Project may require a Coastal Water Discharge Permit, thus triggering this activity.

Permit	Listed Activity	Project Trigger
Full Scoping and EIR Listing Notice 2 (GNR 325 of 2017)	14) The development and related operation of- (iii) any other structure or infrastructure on, below or along the sea bed.	The proposed Project involves the installation of the subsea cable below and/or along the seabed. • In water depths greater than 1,000 m, the cable is laid directly on the seabed. • In waters depths less than 1,000 m, the cable is buried below the seabed. The subsea cable enters the South African Exclusive Economic Zone and runs through Territorial Waters onto the Landing Site in Amanzimtoti Pipeline Beach.
Basic Assessment Listing Notice 3 (GNR 324 of 2017)	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, v. Critical Biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or bioregional plans. vi. Within the littoral active zone or 100 metres inland from the high water mark of the sea, whichever distance is the greater, excluding where such removal will occur behind the development setback line on erven in urban areas; and vii. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.	The proposed development may require the removal of indigenous, primary dune vegetation from the Landing Site to the Beach Manhole and for the new section of the terrestrial cable route. The anticipated footprint of vegetation clearance from the Landing Site to the Cable Landing Station will be confirmed in the EIA Phase by a specialist. However based on the disturbed nature of the selected cable route it is possible that this activity will not be triggered.

4.3 Other Applicable Legislation, Polices and/or Guidelines

4.3.1 *National Legislation*

National environmental legislation relevant to the Project (in addition to those presented in preceding sections) is listed below.

- Constitution of the Republic of South Africa (Act No. 108 of 1996);
- National Environmental Management: Biodiversity Act (Act No. 10 of 2004);
- National Environmental Management: Protected Areas Act (Act No. 57 of 2003);
- National Environmental Management: Integrated Coastal Management Act (Act No. 24 of 2008);
- Telecommunications Act (Act No. 103 of 1996);
- Marine Traffic Act (Act No. 2 of 1981);
- Marine Living Resources Act (Act No.18 of 1998);
- Maritime Zones Act (Act No.15 of 1994);
- National Ports Act (Act No.12 of 2005);
- National Heritage Resources Act (Act No. 25 of 1999); and
- White Paper for Sustainable Coastal Development in South Africa (2000).

Applicable provisions from these laws and regulations will be incorporated into the design and implementation of the Project.

4.3.2 *National Guidelines*

National Guidelines relevant to the Project is listed below.

- DEA Integrated Environmental Management Guidelines (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); and
- DEA South African Water Quality Guidelines for Coastal Marine Waters (2012).

4.4 Integrated Environmental Management

Due to nature of the Project and consideration of the potential to use HDD, other environmental legislation will be applicable. In order to meet the various legislative requirements, a single, integrated EIA process will be run, which will also meet the requirements in terms of the following:

- National Environmental Management: Integrated Coastal Management Act (No. 24 of 2008).
- National Heritage Resources Act (No. 25 of 1999).

5. EIA APPROACH AND METHODOLOGY

5.1 Introduction

EIA is a systematic process that identifies and evaluates the potential impacts a proposed Project may have on the physical, biological, chemical, and social environment and develops mitigation measures that will be incorporated in order to avoid, minimise or offset these impacts.

As described in Chapter 4, the process in South Africa is regulated by the EIA Regulations. As stipulated, the EIA process includes a Scoping phase as well as an Impact Assessment phase, and is illustrated in Figure 5-1.

The EIA process that is being undertaken for this Project is aligned with the requirements of the EIA Regulations as further described in this Section.

5.2 EIA Approach

A pre-application meeting is held with the competent authorities in order to introduce the Project.

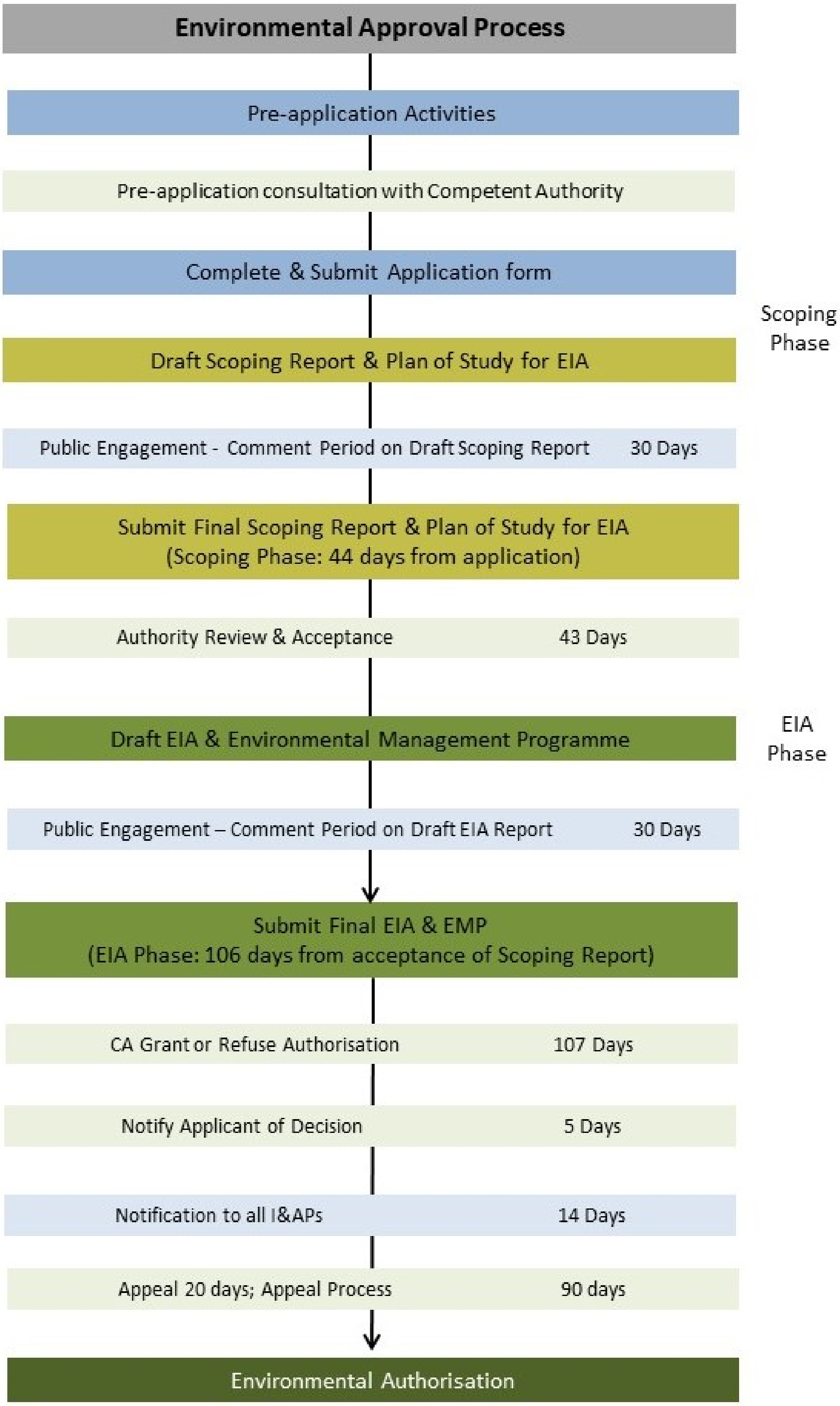
The EIA process is then initiated through the submission of the environmental application form, which also marks the start of the Scoping phase, as shown in Figure 5-1. During scoping the Plan of Study for the full EIA process is formulated, and requirements from the authorities clarified and any potential issues and concerns identified via a public consultation process.

After completion of the scoping, detailed specialist studies is undertaken in order to address issues identified during scoping. Specialists are expected not only to provide baseline information in their particular field of expertise for the study area, but also to identify Project actions will result in significant impacts. Specialists also suggest ways in which these negative impacts could be mitigated, to reduce their severity.

Draft reports (during both the Scoping and Impact Assessment phases) are submitted for public review. The key findings of the work undertaken to date is disclosed to Interested and Affected Parties (I&APs) during the review of the Draft Scoping Report, as well as the Draft EIA Report. All comments made by I&APs are captured in a Comments and Response Report (CRR), and in this report responses to all issues and concerns raised during the public review period are provided.

All recommendations cited in the EIA Report are detailed in an Environmental Management Programme (EMPr), which defines the mitigation actions to be implemented.

Figure 5-1 Environmental Impact Assessment Process



Note: ([1]) Dark Blue (Application Activities), Yellow (Authority Activities), Olive green (Scoping Activities), Light Blue (Public Engagement), Green (EIA Activities), Dark Green (Authorisation)
Source: ERM, 2018

5.3 Scoping Phase

A principal objective of scoping is to identify the key environmental, social and health issues and those Project activities with the potential to contribute to, or cause, impacts to the environmental and social receptors.

During scoping key issues are identified (often together with input from stakeholders) and understood to a level which allows the definition of the Plan of Study for the Impact Assessment phase.

Issues that are not relevant are scoped out. This enables the resources for the EIA process to be focused on collecting required information and identifying significant impacts while carrying out specialist studies and stakeholder engagement activities in an effective and efficient manner.

Specifically, the objectives of scoping are to:

- Define the Project Area of Influence;
- Understand the legislative context and establish a description of baseline conditions;
- Identify Project alternatives and preferred options for the proposed development;
- Identify stakeholders and plan or initiate communication with these stakeholders so as to gather issues of concern;
- Identify potential significant impacts; and
- Develop the Plan of Study for the Impact Assessment which sets out the proposed approach to the EIA process, potential impacts to be evaluated and methodology to be used.

The following steps have been undertaken as part of the scoping and are further described below:

- Desktop review;
- Site visit;
- Pre-application meeting with the Department of Environmental Affairs (DEA);
- Public participation (see further detail in *Section 5.7);*
- Preparation of the Draft Scoping Report (this report);
- Submission of EIA application and release of Draft Scoping Report for comment; and
- Submission of Final Scoping Report to DEA for consideration.

5.3.1 *Desktop Review*

An initial review of available information was conducted. The desktop review included the following tasks:

- Initial review of relevant legislative and guidance documents;
- Identification and review of secondary data;
- Development of an outline description of the planned Project activities; and
- Development of a plan for stakeholder engagement.

5.3.2 *Site Visit*

A site visit to the proposed Project site was undertaken by ERM consultants on 20 November 2018. The purpose of the site visit was to understand the site setting and assist in the identification of potential issues and concerns. Findings from the site visit are included in *Section 3.1.3*.

5.3.3 *Pre-application Meeting*

A pre-application meeting was held with the DEA on 27 November 2018. The purpose of the meeting was to provide an overview of the Project and to confirm the EIA process to be followed. The meeting minutes are included in Appendix E of this Scoping Report.

5.3.4 *Public Participation*

Details of the public participation process for scoping are provided in Section 5.7.

5.3.5 *EIA Application and Draft Scoping Report*

The completed EIA application form was submitted to the Competent Authority together with the Draft Scoping Report on 31 January 2019. In terms of the EIA Regulations, the Final Scoping Report is to be submitted to the competent authority within 43 days from the date of submission of the Application Form.

5.3.6 *Draft Scoping Report*

This Draft Scoping Report was compiled in accordance with the regulatory requirements stipulated in EIA Regulations, (including a Plan of Study).

The Draft Scoping Report was made available to stakeholders through a public website, selected libraries and electronic copies provided on request for a period of 30 days, during 1 February to 4 March 2019.

5.3.7 *Final Scoping Report*

After the 30 day public comment period ended, the comments on the Draft Scoping Report were compiled into a CRR and included in the Final Scoping Report along with any other updates or changes necessitated by the comments. The CRR has been distributed to I&APs, via email on 13 March 2019.

The Final Scoping Report has been submitted to the DEA for consideration on 14 March 2019. Registered I&APs have been notified of this submission.

5.4 Specialist Studies

A number of specialist studies have been identified through the scoping process to address key issues of concern. The findings of these studies will be incorporated into the EIA Report. Further information related to the approach to the specialist studies and the impact assessment is contained in the Plan of Study for EIA Report in *Chapter 8*.

5.5 Impact Assessment

The final phase of the EIA process is the Impact Assessment Phase, which is described in detail in the Plan of Study for EIA Report (Chapter 8).

The assessment of impacts proceeds through an iterative process considering three key elements:

- Prediction of the significance of impacts that are the consequence of the proposed development on the natural and social environment.

- Development of mitigation measures to avoid, reduce or offset impacts.
- Assessment of residual significant impacts after the application of mitigation measures.

The Draft EIA Report and EMPr will be made available to I&APs for a 30 day period. Registered and identified I&APs will be notified of the release of the Draft EIA Report and where the report can be reviewed.

Comments received on the Draft EIA Report and EMPr will be assimilated and the EIA Project team will provide appropriate responses to all comments. A CRR will be appended to the Final EIA Report, which will be submitted to DEA for decision-making.

In addition, all registered I&APs will be notified when an Environmental Authorisation has been issued by DEA. A 90 day (maximum time should an appeal be submitted) appeal period will follow the issuing of the Environmental Authorisation.

5.6 EIA Schedule

The schedule for the EIA process is presented in Table 5.1. Chapter 8 presents a more detailed Plan of Study.

Table 5.1 EIA Schedule

Task	Timing
Stakeholder Comment Period on the Draft Scoping Report and Plan of Study for EIA Report	January 2019 to February 2019
Finalise the Scoping Report and Plan of Study and submit to DEA	March 2019
Acceptance of the Final Scoping Report received from DEA	April 2019
Specialist studies	November 2018 to March 2019
Prepare Draft EIA Report and EMPr	April 2019
Stakeholder Comment on Draft EIA Report and EMPr	April 2019 to May 2019
Finalise and submit Final EIA Report and EMPr to DEA	June 2019

5.7 Public Participation during Scoping

5.7.1 *Objectives*

Public participation) is an inclusive and culturally appropriate process which involves sharing information and knowledge, seeking to understand the concerns of others and building relationships based on collaboration. It allows stakeholders to understand the risks, impacts and opportunities of the Project in order to achieve positive outcomes.

The public participation process is designed to provide information to and receive feedback from I&AP for use throughout the EIA process, thus providing organisations and individuals with an opportunity to raise concerns and make comments and suggestions regarding the proposed Project. By being part of the assessment process, stakeholders have the opportunity to influence the Project layout and design, input into mitigation measures and technical solutions as well as the Plan of Study for the EIA Report.

The main objectives of public participation are:

- To ensure that adequate and timely information is provided to those potentially affected by the Project;

- To provide these groups with sufficient opportunity to voice their opinions and concerns; and
- To ensure that comments are received in a timely manner so that they can be taken into account in Project decisions.

5.7.2 *Legislative Requirements*

Public participation with regards to EIA in South Africa is determined by the principles of NEMA and elaborated upon in the guidelines in terms of the EIA Regulations, which states that the public participation process means: “a process by which potential interested and affected parties are given opportunity t*o comment on, or raise issues.”*

Public participation is required for an environmental authorisation process in terms of the EIA Regulations.

5.7.3 *Public Participation Activities*

Table 5.2 details the planned public participation tasks to be undertaken.

Table 5.2 Public Participation Activities

Activity	Description and Purpose
Pre-Application	
Preparation of a preliminary stakeholder database	A preliminary database has been compiled of authorities (local and provincial), Non-Governmental Organisations, neighbouring landowners and other key stakeholders (Appendix B). This database of registered I&APs will be maintained and updated during the ongoing EIA process.
Post-Application	
Erection of Site Notices	Site notices have been placed at the following locations: • Near the proposed Beach Manhole location in Amanzimtoti Pipeline Beach; • Amanzimtoti Library; and • Kingsburgh Library.
Disclosure of Draft Scoping Report for Public Comment	The Draft Scoping Report was been disclosed for a 30- day public comment period. Notifications have been sent to registered stakeholders included on the stakeholder database and the report has been made available online and in the libraries detailed above. All comments received are included in the Final Scoping Report.
Advertisement of the Project	The Project and the opportunity to comment has been advertised in the local paper and regional paper. Proof of Advertisement has been included in the Final Scoping Report.
Engagement Sessions	Direct engagement with select I&APs will be scheduled upon request during the commenting period.
Development of the CRR	Comments received during the public participation process will be recorded into the CRR and the Draft Scoping Report will be updated accordingly, and submitted to DEA as the Final Scoping Report for consideration. The CRR is provided as Appendix C.
Impact Assessment Phase	
Disclosure of Draft EIA Report for Public Comment	The Draft EIA Report will be made available for a 30 day comment period to stakeholders and the relevant authorities. A notification letter will be sent to all registered I&APs on the Project database. This letter will invite I&APs to comment on the Draft EIA Report. Newspaper adverts will be placed in local newspapers notifying stakeholders of the availability of the Draft EIA Report for review. All comments received will be included in the Final EIA Report.

Activity	Description and Purpose
Notification of Environmental Authorisation	I&APs will be notified of the Environmental Authorisation (EA) and the statutory appeal period. An advertisement will be placed to advertise the Environmental Authorisation.

6. ENVIRONMENTAL AND SOCIAL BASELINE CONDITIONS

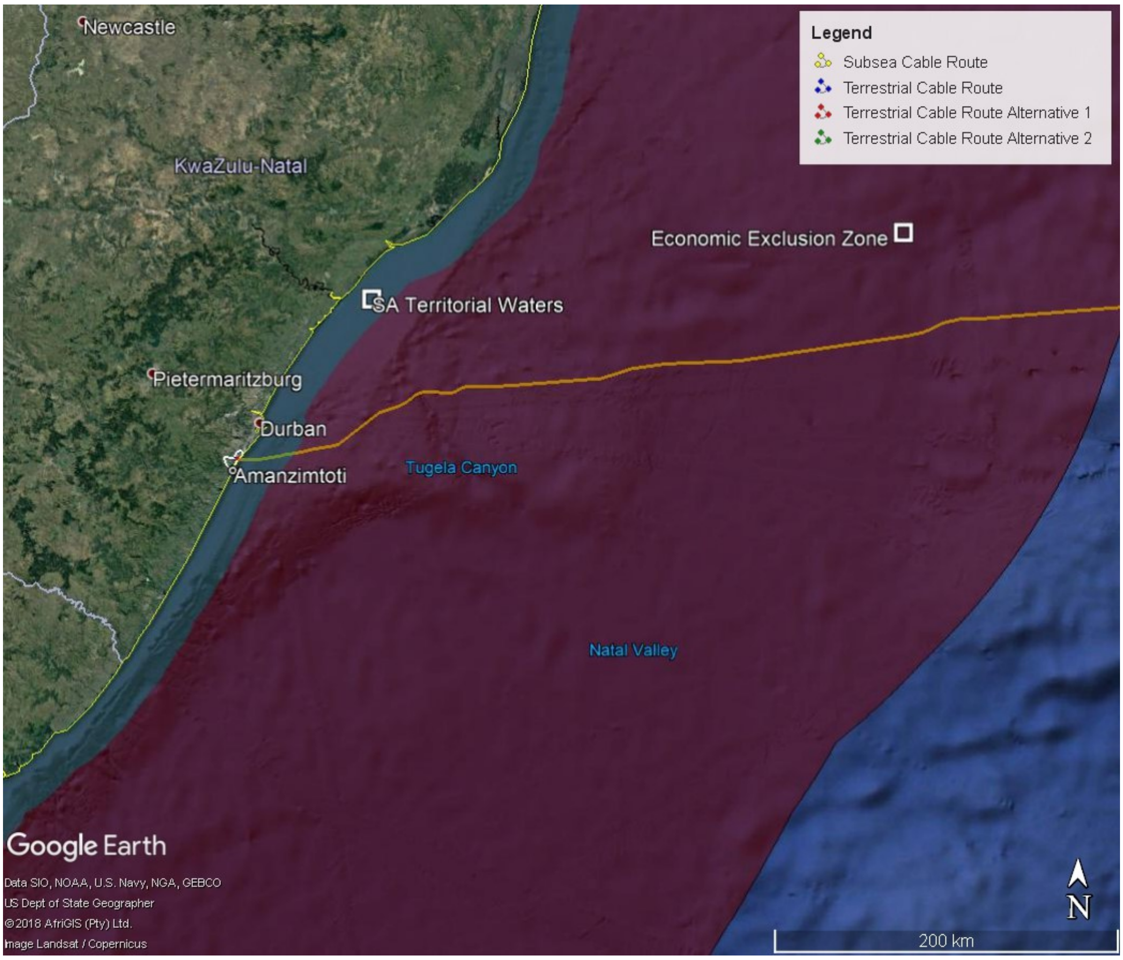
6.1 Project Area

The Project Area comprises the spatial area in which there will be a direct or indirect impact on biophysical and socio-economic resources or receptors. The Project Area can be divided into the Direct Area of Influence (AoI) and Indirect AoI. The Direct AoI is defined as the area directly affected by Project activities. The scale of the Direct AoI will be dependent on the source and cause of the impacts and will not be consistent for every environmental or social aspect ie, the Direct AoI for air quality impacts could differ from the Direct AoI for the consideration of social impacts. In deciding upon the Project AoI, the larger affected area between the environmental aspects is selected.

The Direct AoI is the spatial extent of the Project footprint as well as the area within which there is a Project impact which in the case of this Project encompasses (Figure 6-1):

- Subsea cable footprint in the Republic of South African EEZ and Territorial Waters; and
- The coastal area along the beach at the landing site and the footprint of the terrestrial cable route.

Figure 6-1 Project Direct Area of Influence



The **Indirect** AoI encompasses areas impacted by secondary effects, cumulative effects, and induced effects. The Direct and Indirect AoI for the Project will be further refined and defined during the EIA process.

6.2 Biophysical Baseline Environment

The purpose of this section is to describe the physical and biological baseline conditions of the environment within the Project Area. This information forms the basis for the identification of potential impacts on the natural environment. Most impacts will be on a local scale in the immediate vicinity of the subsea cable system route, but it is, nevertheless, important to appreciate the regional context for the Project from a biophysical perspective.

6.2.1 *Climate Change*

6.2.1.1 *Greenhouse Gases (GHG)*

Concern over increasing amounts of greenhouse gases in the atmosphere and the potential to influence global climate change has produced a number of initiatives, the Paris Agreement, 2015; and the Kyoto Protocol, 2002, both ratified under the United Nations Framework Convention on Climate Change (UNFCCC). The objective of the UNFCCC is to achieve stabilisation of the concentrations of greenhouse gases in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. The South African Government ratified the UNFCCC in August 1997.

Climate change constitutes a key concern in South Africa. Mean annual temperatures have increased by at least 1.5 times the observed global average of 0.65 °C over the past five decades and extreme rainfall events have increased in frequency (WIREs Clim Change, 2014). The South African economy is highly dependent on fossil fuels and the country can be judged to be a significant emitter due to the relatively high values that can be derived for emissions intensity and emissions per capita (DEAT, 2004).

Water resources can be impacted by climate change effects leading to changes in hydrological resources resulting in water stress and scarcity and therefore impact to ecosystem services.

For the Project, there will be emissions of greenhouse gases related to the burning of fossil fuels by the Project vessels and construction vehicles and machinery.

6.2.2 *Air Quality*

The air quality (PM_{10} index) in Amanzimtoti is Moderate to Low[4]. Amanzimtoti is likely to experience north-easterly, and south-easterly winds associated with elevated dust levels throughout the year.

There is potential for dust generation during the trenching operation and transportation of materials for installation of the cable.

6.3 Terrestrial Environment

6.3.1 *Climatic Conditions*

The regional climate is generally characterised by relatively high temperatures and evenly distributed rainfall throughout the year. It is typical of humid subtropical climates. This region experiences wet summers with some convectional thunderstorm activity (Weatherbase, 2018[5]).

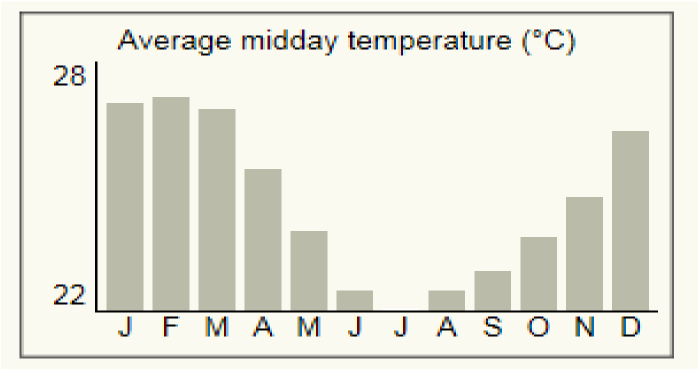
Amanzimtoti receives approximately 783 mm of rain per year.

[4] https://www.numbeo.com/pollution/in/Durban

[5] https://www.weatherbase.com/weather/weatherall.php3?s=88586&cityname=Durbanpercent2C+KwaZulu-Natalpercent2C+South+Africa&units=

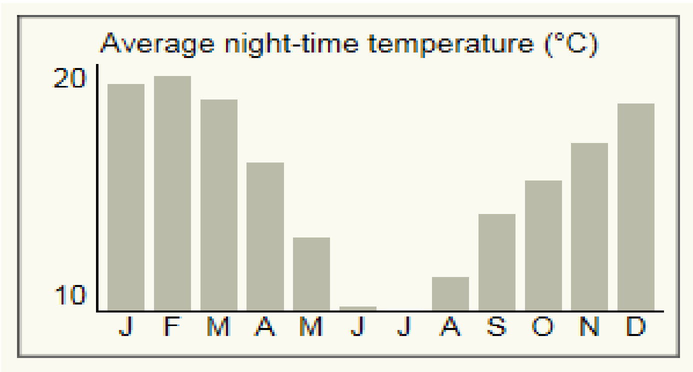
Rainfall occurs year round (as is the anticipated climate in the Indian Ocean Coastal belt), with the peak during Southern Hemisphere summer months. The lowest rainfall is received in June and the highest in January with 16 mm and 109 mm of rainfall respectively. The average temperatures during the day range between 22.1 ˚C in July to 27.2 ˚C in February (Figure 6-2). The coldest month is July with an average night temperature of 9.5 ˚C (Figure 6-3) (saexplorer, 2018[6]). The winters in this region are mild with negligible frost (DEA, 2013).

Figure 6-2 Average Midday temperature (˚C) for Amanzimtoti



Source: saexplorer, 2018[7]

Figure 6-3 Average Night-time temperature (˚C) for Amanzimtoti



Source: saexplorer, 2018[8]

6.3.2 *Terrestrial Biodiversity*

According to the State of Biodiversity Report (2016/ 2017), South Africa is the third most biodiverse country worldwide. The country is comprised of nine biomes namely: Fynbos Biome; Succulent Karoo Biome; Desert Biome; Nama-Karoo Biome; Grassland Biome; Savanna Biome; Albany Thicket Biome; Indian Ocean Coastal Belt Biome, and Forests Biome (Mucina & Rutherford, 2006).

Three of South Africa's nine terrestrial biomes are found around Amanzimtoti. These include the Savanna, Forest and the Indian Ocean Coastal Belt Biomes.

[6] http://www.saexplorer.co.za/south-africa/climate/amanzimtoti_climate.asp

[7] http://www.saexplorer.co.za/south-africa/climate/amanzimtoti_climate.asp

[8] http://www.saexplorer.co.za/south-africa/climate/amanzimtoti_climate.asp

Further to this, the landing site also encompasses eleven nationally recognised vegetation types namely[9]:

- Eastern Valley Bushveld;
- KwaZulu-Natal Coastal Belt;
- KwaZulu-Natal Hinterland Thornveld;
- KwaZulu-Natal Sandstone Sourveld;
- Ngongoni Veld;
- Scarp Forest;
- Northern Coastal Forest;
- Subotropical Dune Thicket;
- Sub-tropical Seashore Vegetation;
- Swamp Forest; and
- Mangroves.

The vegetation found within the Direct AoI in Amanzimtoti where the subsea cable is proposed to be landed is characteristic of the Indian Ocean Coastal Belt Biome.

The Indian Ocean Coastal Belt Biome contains coastal dunes and coastal grassy plains. It occurs in both the Eastern Cape and KwaZulu-Natal Provinces at elevations from sea level to 600 m above sea level (masl) (DEA, 2013).

The biomes long strip from the KwaZulu-Natal to the Eastern Cape Province has a width of approximately 35 km in the north, and it narrows irregularly towards the south to a width of about 20 km in parts of Pondoland and less than 10 km in several parts of the Wild Coast (DEA, 2013).

6.4 Topography

The beaches in KwaZulu-Natal Province are typically narrow and shallow. They normally have bedrock occurring less than 3 m below the sand surface. The KwaZulu-Natal Province coastline can be divided into two zones separated by the Thukela River. The zone south of the Thukela River is generally characterised by rocky topography, and it becomes sandier in the northern parts. The sandy beaches found towards the north correlates to the decreased wave energy as one travels further north (Cooper & Smith, 2014). According to the eThekwini Spatial Development Framework (2018/ 2019), the eThekwini Municipal Area is characterised by coastal plains as well as steep and dissected topography.

With regards to the proposed Project Area, the Beach Manhole (BMH) is located at the Pipeline Beach in Amanzimtoti, South of Durban. According to the diving survey conducted by GeoTeam in 2018, the location was preferred due to its calm and sandy nature. The topography of the landing site is typical of that of the KwaZulu-Natal Province beach areas.

6.5 Marine Environment

The descriptions of the physical and biological environments focus primarily on the area between Port Shepstone and Richard's Bay on the KwaZulu-Natal Province coast.

[9] State of Biodiversity Report (2016/2017)

The summaries presented below are based on information provided in desk based research and input from the relevant specialists, as well as more recent scientific studies undertaken in the general area.

6.5.1 *Water Masses and Circulation*

The oceanography of this coast is almost totally dominated by the warm Agulhas Current that flows southwards along the shelf edge (Schumann, 1998) (Figure 6-4). The Agulhas 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 (Lutjeharms, 2006). It flows southwards at a rapid rate following the shelf edge along the East Coast, before retroflecting between 16° and 20° E (Shannon, 1985). It is a well-defined and intense jet some 100 km wide and 2,300 m deep (Schumann, 1998; Bryden *et al*, 2005). Current speeds of 2.5 m/s or more have been recorded (Pearce *et al*, 1978).

Where it meets the northern part of the Thukela Bank near Cape St Lucia, the inertia of the Agulhas Current carries it into deep water. This generates instability in the current (Gill & Schumann, 1979) resulting in meanders and eddies (Pearce *et al*, 1978; Guastella & Roberts, 2016; Roberts *et al*, 2016). Three eddy types have been identified in the Agulhas Current (Gründlingh, 1992):

- Type I meanders that comprise smaller shear/frontal features to a depth of at least 50 m, which dissipate over a period of days.
- Type II meanders comprising the large clockwise loops generated within the Natal Bight. Of these the extremely transient Natal Pulse occurs when meanders move the southward flow offshore, enabling sluggish and occasional northward flow to develop close inshore (Schumann, 1988; Roberts *et al*, 2016). The larger Natal Gyre is a clockwise circulation cell that extends from Durban to Richard's Bay, resulting in northward flow inshore (Pearce, 1977a, 1977b). The Natal Gyre, however, is temporally and spatially variable (CSIR, 1998; Roerts *et al*, 2016), being affected by a number of Type I disturbances (Gründlingh, 1992).
- More recently, Guastella & Roberts (2016) identified that the Durban Eddy, a meso-scale, lee-trapped cold-core feature, which develops in the south between Durban and Sezela causing strong north-eastward flow inshore, is present off Durban approximately 55 percent of the time, with an average lifespan of 8.6 days, and inter-eddy periods of 4 to 8 days. Combined with the southerly flow on the outer shelf, the effect is the development of a semi-permanent cyclonic circulation ('swirl') over the entire southern bight.
- Type III meanders, which are the larger meanders that originate north of St Lucia.

South of Durban, the continental shelf again narrows and the Agulhas Current re-attaches itself as a relatively stable trajectory to the coast, until off Port Edward it is so close inshore that the inshore edge (signified by a temperature front) is rarely discernible (Pearce, 1977a). At Port St Johns, however, there exists a semi-permanent eddy, which results in a northward-flowing coastal current and the movement of cooler water up the continental slope onto the centre of the very narrow shelf (Roberts et al, 2010).

Further south, when the Agulhas Current reaches the wider Agulhas Bank, where the continental slopes are weaker, it starts to exhibit meanders, shear edge eddies and plumes of warm surface waters at the shelf edge, before retroflecting eastwards as the Agulhas Return Current to follow the Subtropical Convergence (Lutjeharms, 2006) (Figure 6-4).

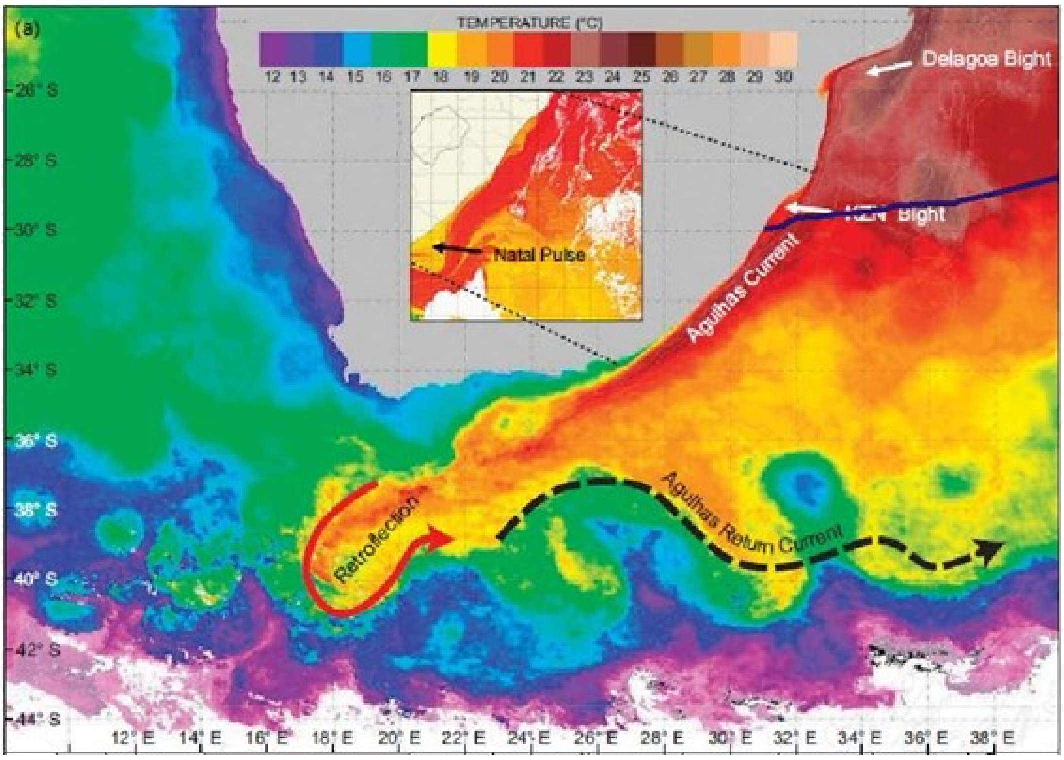
In common with other western boundary currents, a northward (equatorward) undercurrent - termed the Agulhas Undercurrent - is found on the continental slope of the East Coast at depths of between 800 m and 3,000 m (Beal & Bryden, 1997).

As the Agulhas Current originates in the equatorial region of the western Indian Ocean its waters are typically blue and clear, with low nutrient levels and a low frequency of chlorophyll fronts. On the Thukela Bank, however, nutrient concentrations are characterised by short-term temporal variations, but are higher than in areas where the continental shelf is narrower (Carter & d'Aubrey, 1988). This is attributed in part, to the topographically induced upwelling that occurs in the area as a result of the bathymetric arrangement of the Natal Bight (Gill & Schumann, 1979; Schumann 1986; Lutjeharms et al, 1989).

Recently, however, Roberts & Nieuwenhuys (2016) identified that upwelling in the northern Kwa-Zulu Natal (KZN) Bight is common, and that almost all major and minor cold-water intrusions coincided with upwelling-favourable north-easterly winds that simultaneously force a south-westerly coastal current. Major upwelling events last for 5 to 10 days, whereas shorter duration events persist for 1 to 2 days. Wind-driven upwelling also occurs in the inner bight between Richards Bay and Port Durnford. Furthermore, the canyons of northern bight may also play a role in enhancing upwelling. Upwelling has also been reported in the southern bight 'swirl'. The cold nutrient-rich upwelled waters are a source of bottom water for the entire Natal Bight (Lutjeharms et al, 2000a, b). However, from all other perspectives, the Bight may be considered a semi-enclosed system (Lutjeharms & Roberts, 1988) as the strong Agulhas Current at the shelf edge forms a barrier to exchanges of water and biota with the open ocean.

The surface waters are a mix of Tropical Surface Water (originating in the South Equatorial Current) and Subtropical Surface Water (originating from the mid-latitude Indian Ocean). Surface waters are warmer than 20 °C and have a lower salinity than the Equatorial Indian Ocean, South Indian Ocean and Central water masses found below. Surface water characteristics, however, vary due to insolation and mixing (Schumann, 1998). Seasonal variation in temperatures is limited to the upper 50 m of the water column (Gründlingh, 1987), increasing offshore towards the core waters of the Agulhas Current where temperatures may exceed 25 °C in summer (21 °C in winter) (Schumann, 1998). Further offshore of the core waters temperatures again decrease.

Figure 6-4 Predominance of the Agulhas Current in the Oceanography of the Subsea Cable Route (blue line)



Source: Pisces 2018, adapted from Roberts et al, 2010.

6.5.1.1 *Winds and Swells*

The main wind axis off the KwaZulu-Natal Province coast is parallel to the coastline, with north-north-easterly and south-south-westerly winds predominating for most of the year (Schumann & Martin, 1991) and with average wind speeds around 2.5 m/s (Schumann, 1998) (Figure 6-5).

In the sea areas off Durban, the majority of swells are from the south and south-southwest, with the largest attaining >7 m. During the Southern Hemisphere summer and autumn seasons, some swells also arrive from the east (Figure 6-6).

The less regular weather patterns affecting the East Coast (eg, 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 (Hunter, 1988; Schumann, 1998). The large waves (>20 m high) that are at times encountered within the Agulhas Current (Heydorn & Tinley, 1980), arise from the meeting of the south-westerly swells and the southerly flowing Agulhas Current, and may be a navigation hazard at times.

6.5.1.2 *Nutrients*

Nutrient inputs on the Thukela Banks are thought to originate from a combination of an upwelling cell off Richards Bay, the Thukela River, and a cyclonic lee eddy off Durban. The marine nutrients are derived from a topographically-induced upwelling cell just south of Richards Bay (Gill & Schumann, 1979; Schumann, 1988; Lutjeharms *et al*, 1989). The cold nutrient-rich upwelled waters are a source of bottom water for the entire Natal Bight (Lutjeharms *et al*, 2000a b).

The region is generally oligotrophic, with nutrients (silicates, phosphates and nitrates) occurring in very low concentrations in the upper mixed layer, increased below the pycnocline (Muir *et al*, 2016).

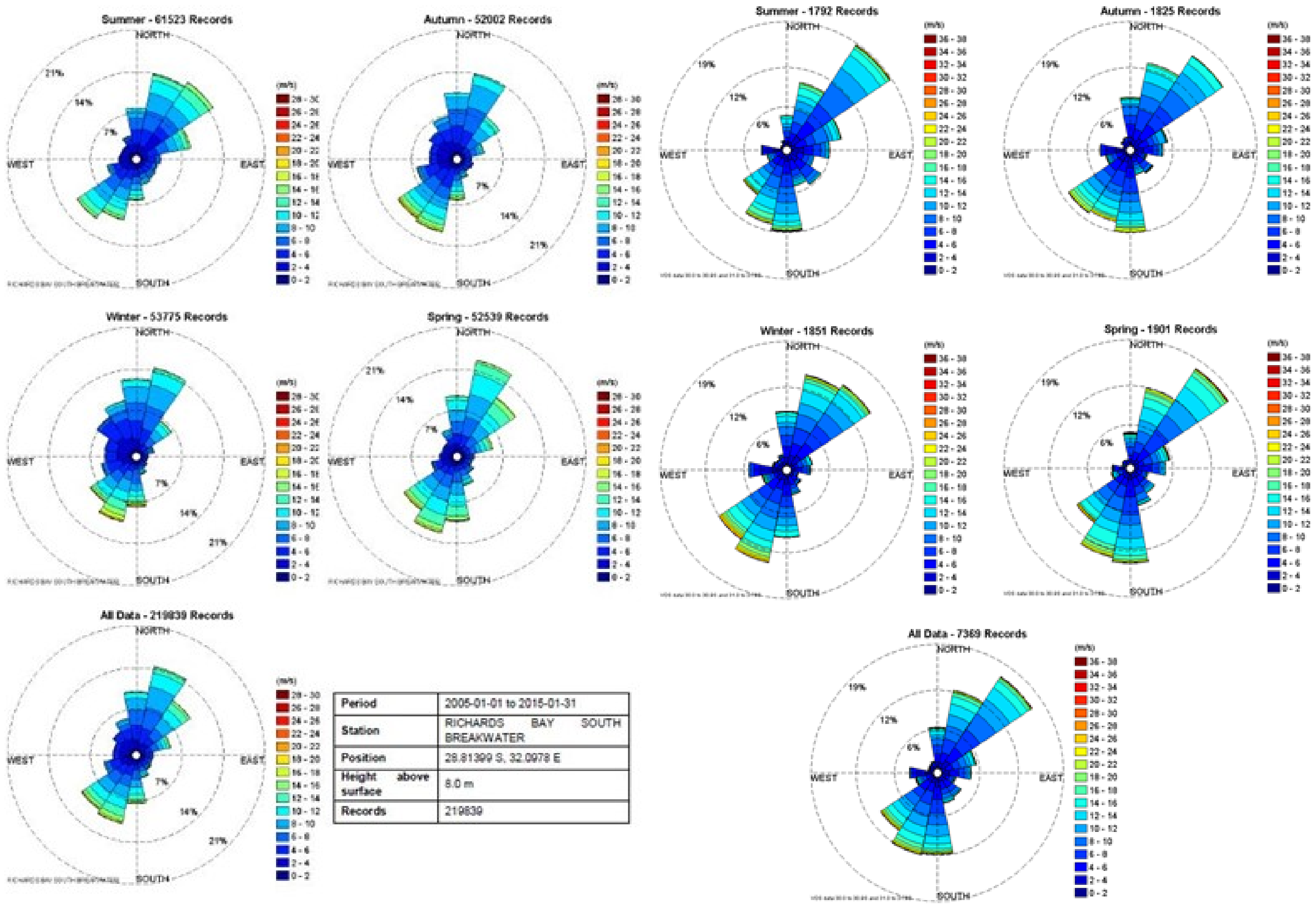
Nutrient levels show temporal and spatial variability, with elevated levels typically occurring near the Thukela River mouth (Barlow *et al*, 2015; de Lecea *et al*, 2015; van der Molen *et al*, 2016).

The cyclonic eddy incorporates enrichment, retention and concentration mechanisms, and together with the upwelling and elevated phytoplankton production in the north of the Bight (Lutjeharms *et al*, 2000b), creates the necessary conditions for enhanced survivorship of early larvae and juveniles of pelagic spawners (Beckley & van Ballegooyen, 1992; Hutchings *et al*, 2003).

River discharge also has profound effect on physical, chemical and biological processes in coastal waters, and in KZN the effect of catchment-derived nutrient supply onto the Thukela Banks is thought to be pronounced given that nutrient supply from upwelling events is limited (Lamberth *et al*, 2009; Scharler *et al*, 2016). The importance of localised fluvial processes (under normal flow, reduced flow and flood events) in driving marine food webs has recently received much research attention (DWAF, 2004; Lamberth *et al,* 2009; Turpie & Lamberth, 2010). Nutrient inputs into the coastal environment through river runoff is predicted to stimulate phytoplankton and zooplankton production, and ultimately the larval, juvenile and adult fish that depend on them as a food source. Proposed impoundments on the Thukela River may thus have cascade effects on ecosystem functioning of the Thukela Banks, with far-reaching consequences for the sustainability of local fisheries.

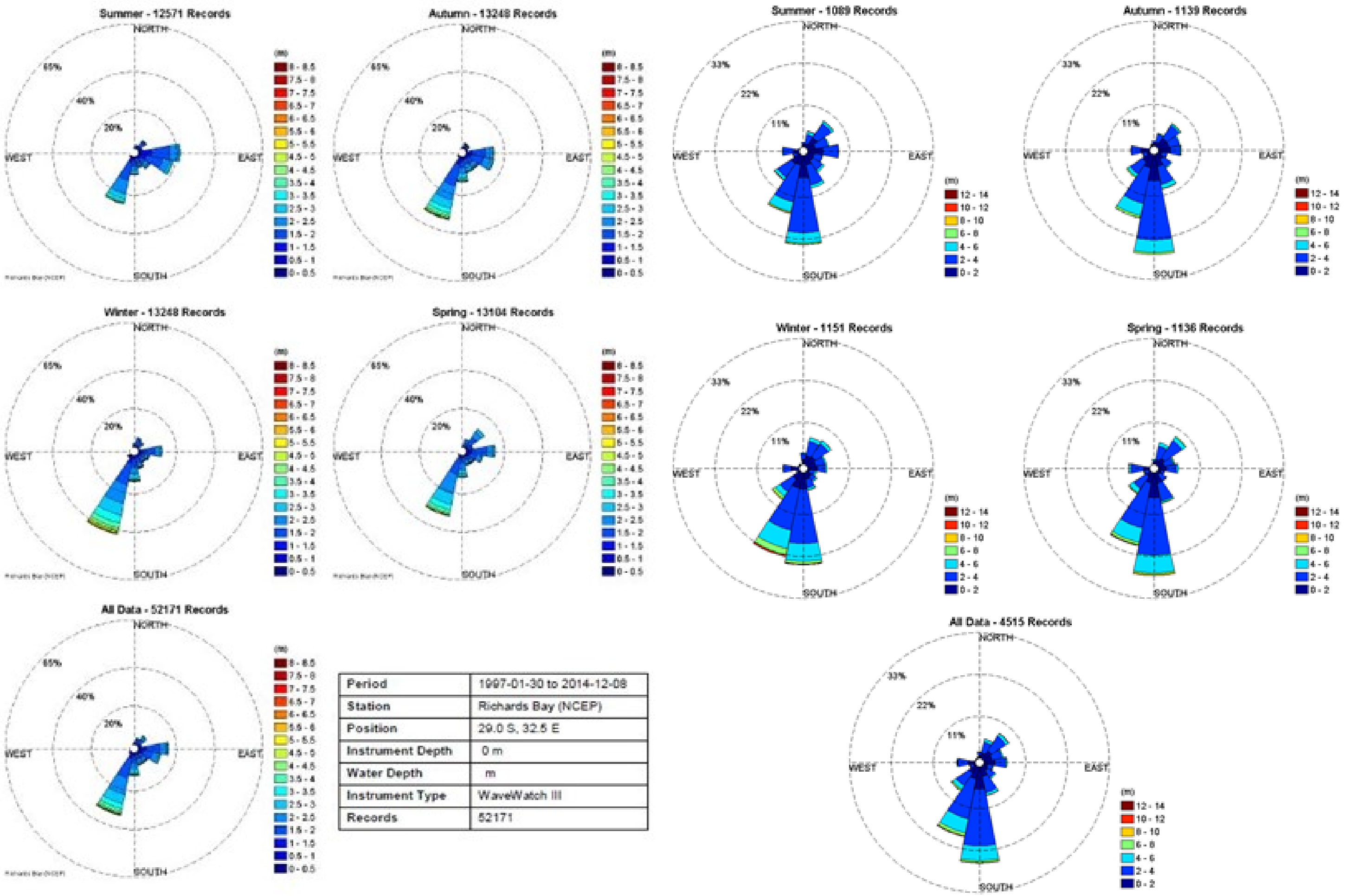
The turbid, nutrient-rich conditions are also important for the life-history phases (breeding, nursery and feeding) of many demersal and pelagic species. The area harbours the only commercial shallow-water prawn trawl fishery in the country and is thus of considerable socio-economic importance to KwaZulu-Natal Province.

Figure 6-5 VOS Wind Speed vs Wind Direction for Richards Bay Breakwater (28.8°S and 32.1° E) (left) and Port Shepstone (30.0° to 30.9° S and 31.0° to 31.9° E) (1960-02-15 to 2012-04-13; 7,369 records) (right)



Source: CSIR 2018, in Pisces, 2018

Figure 6-6 VOS Wave Height (Hmo) vs Wave Direction for a Deepwater Location Offshore of Richards Bay (29.0°S and 32.5° E) (left) and for Port Shepstone (30.0° to 30.9° S and 31.0° to 31.9° E) (1960-02-15 to 2012-04-13; 4,515 records) (right)



Period	1997-01-30 to 2014-12-08
Station	Richards Bay (NCEP)
Position	29.0 S, 32.5 E
Instrument Depth	0 m
Water Depth	m
Instrument Type	WaveWatch III
Records	52171

Source: CSIR 2018, in Pisces, 2018

6.5.2 *Bathymetry and Seabed Sediments*

The orientation of the coastline along the East Coast is relatively uniform, and north-northeast trending. A significant topographical feature is the Natal Bight, a coastal indentation between Cape Vidal and Durban, which is sheltered from the main force of the southward flowing Agulhas Current. The majority of the East Coast region has a narrow continental shelf and a steep continental slope. A prominent feature on the continental shelf is the Thukela Bank located along the KwaZulu-Natal coast 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 (Lutjeharms *et al*, 1989), and the continental slope is more gentle (Martin & Flemming, 1988). To the south, the continental margin descends into the Natal Valley, while to the north-eastwards it develops into the Central Terrace (Figure 6-7).

The Thukela Bank is interrupted by two canyons; the large and prominent Thukela Canyon and the smaller Goodlad Canyon (also referred to as 29°25' S). A further canyon, referred to as the 'Durban Canyon' (SANBI GIS database) is located east of Durban, with an additional five canyon heads reported between the 50 m and 300 m contour to the south of the Bank between Port Shepstone and Port Edward where the continental shelf narrows and the continental margin descends into the Natal Valley (Harris *et al*, 2012). The Thukela Canyon is an example of a large submarine canyon restricted to the mid-lower continental slope. Unlike those off the Greater St Lucia Wetland Park (GSLWP) further north, this canyon lacks connection to the upper continental slope and shelf. The canyon head is located at approximately 600 m depth with the thalweg[10] ending in the Natal Valley at approximately 2,800 m (Wiles *et al*, 2013). Sporadic high relief basement outcrops occur in the canyon head, with terraces developing along the western canyon wall beyond depths of approximately 1,500 m. With increasing distance from the continental shelf, and increasing depth, the canyon increases in width and relief. Information on the Goodlad Canyon is sparse. It is reported to start as a small 20 m deep valley (Martin & Flemming, 1988) deepening to 250 m while becoming a 50 km wide, shallow valley at a depth of 1,400 m. It emerges from the Thukela Bank at 2,320 m (Goodlad, 1986). The gradient of the canyon walls are less steep than those of the Thukela Canyon and limited tributaries occur (Young, 2009). No information specific to the canyon off Durban or the southern canyons could be sourced.

These Canyons therefore differs significantly in morphology from those in northern KwaZulu-Natal, where coelacanths have been reported. Firstly, the canyon heads lack the amphitheatre-shaped head morphology. Secondly, they are located at far greater depth than the Sodwana canyons and lack connectivity to the shelf, and finally, they show no significant tributary branches (Wiles *et al*, 2013). Although terraces are present and may provide shelter in the form of caves and overhangs, they occur at depths (>1,500 m) well beyond those at which coelacanths have been recorded to date.

The Thukela Bank is the major sedimentary deposition centre of the KZN continental shelf, being characterised by fluvial deposits of Thukela River and Mgeni River origin. Sediment dispersal in the Bight is controlled by the complex interaction of shelf morphology, the Agulhas Current, wave regime, wind-driven circulation, sediment supply and the presence of the semi-permanent gyre. The seabed is thus sedimentary in nature but varies in the degree to which it is consolidated (CBD, 2013; see also Green & MacKay, 2016). North of Durban, the shelf region is dominated by terrigenous sand (0.063 – 2 mm), with patches of gravel (>2 mm) occurring throughout the area. Areas on the mid-shelf contain sediments comprising up to 60 percentage terrigenous mud. Two large mud depo-centres are found off the Thukela River mouth, while a smaller one is located off St Lucia. These mud depo-centres are a rare environment along the east coast of South Africa, comprising only about 10 percentage of the shelf area (Demetriades & Forbes, 1993). The muds and their associated elevated organic contents provide habitat to a unique fauna dominated by benthic and deposit feeders that favour muddy sediments and turbid waters.

[10] A thalweg is the line of lowest elevation within a valley or watercourse.

Despite being primarily a soft-sediment habitat, low profile beachrock outcrops (Fennessy, 1994a, 1994b; Lamberth *et al*, 2009) occur just offshore of the 50 m contour off Durban and around the 200 m contour off Richard's Bay.

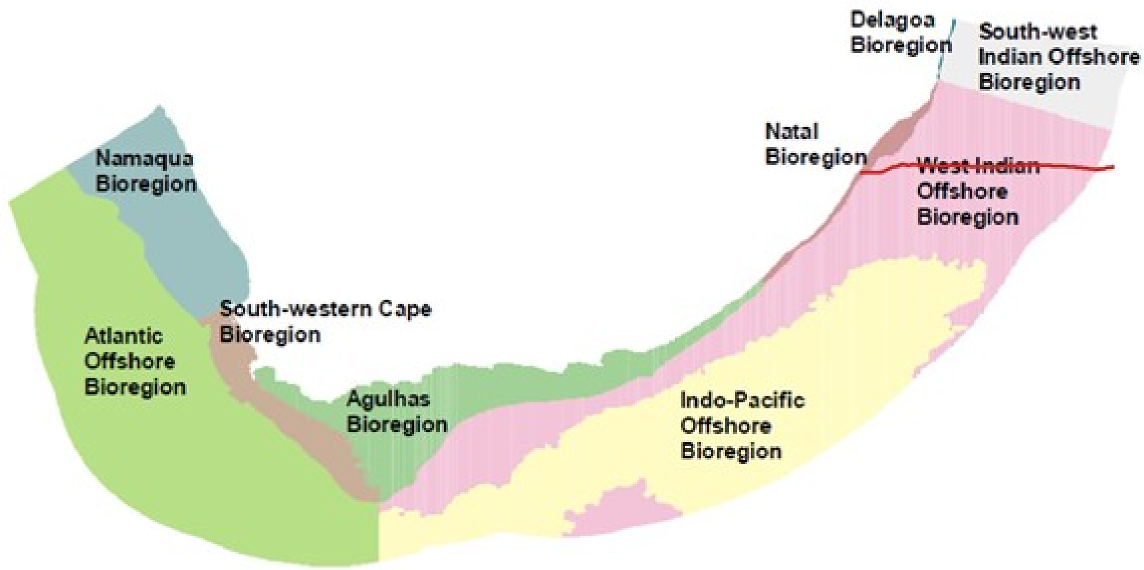
South of Durban, sand dominates both the inshore and offshore surficial sediments, although a substantial gravel component is present on the middle and outer shelf to as far as Port St Johns, occurring as coarse lag deposits in areas of erosion or non-deposition. Traces of mud are present on most areas of the shelf, although significant mud depo-centres are absent. The Agulhas Current and/or waves affect the sediment bedform patterns on the KwaZulu-Natal Province continental shelf. North and south of the Thukela Bank, the Agulhas Current generates active dune fields at the shelf edge (Flemming & Hay, 1988). In contrast, sediments on the shelf area of the Thukela Bank to a depth of 100 m are affected mostly by wave action (CSIR, 1998; Green & MacKay, 2016). South of the Ilovo River the inner shelf comprises sand sheets, while sand ribbons and streamers occur on the mid-shelf comprises, with gravel pavements dominating the outer shelf.

The outer shelf is dominated by gravels of shell-fragment and algal-nodule origin (Heydorn *et al*, 1978). Outer shelf sediments are influenced solely by the strong Agulhas Current, forming large-scale subaqueous dunes with a southwesterly transport direction. Subaqueous dunes in the inner and mid shelf are prone to current reversals (Uken & Mkize, 2012).

6.5.3 *Biological Environment*

Biogeographically, the subsea cable route falls into the Natal and West Indian Offshore bioregion (Figure 6-7) (Lombard *et al*, 2004). The inshore area comprises the Thukela Banks, whereas the offshore areas comprise deepwater benthic habitats and the water body. Due to limited opportunities for sampling, information on the pelagic and demersal communities of the shelf edge, continental slope, and upper and lower bathyal are very poorly known. Consequently, much of the information on the baseline environment provided below relates to the inshore (<50 m) and continental shelf (<200 m) regions, which fall within the Natal Bioregion (Figure 6-7).

Figure 6-7 South Africa Inshore and Offshore Bioregions in Relation to the Subsea Cable Route (red line)



Source: Pisces 2018, adapted from Lombard et al, 2004

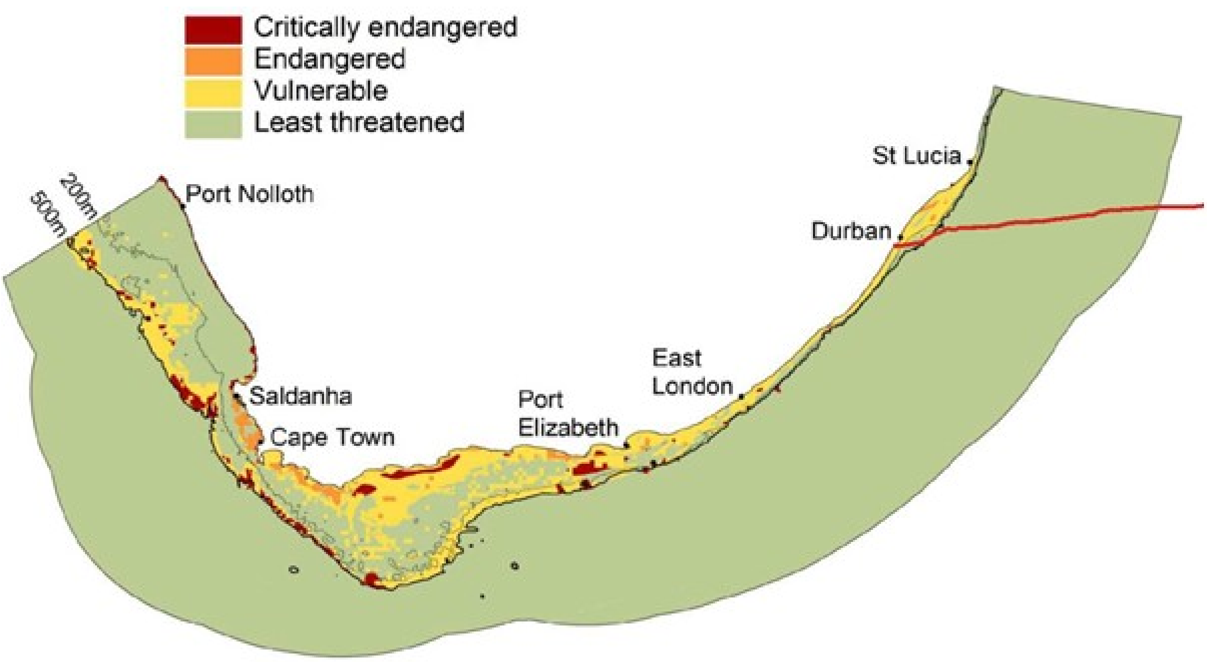
The benthic communities within these habitats are generally ubiquitous throughout the southern African East Coast region, being particular only to substratum type and/ or depth zone. They consist of many hundreds of species, often displaying considerable temporal and spatial variability. The biological communities 'typical' of each of these habitats are described briefly below, focusing both on dominant, commercially important and conspicuous species, as well as potentially threatened or sensitive species, which may be affected by the proposed Project.

6.5.3.1 *Benthic Communities*

The proposed subsea cable route crosses a number of benthic habitats (Figure 6-8 and Figure 6-9). 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. These biozones lie within the 'minimal protected category' (1 to 5 percentage) and a number of the benthic habitats on the Thukela Bank and continental shelf off the East Coast are defined as 'Vulnerable' or 'Endangered' as existing Marine Protected Areas (MPAs) are insufficient for conserving marine habitats and their associated biodiversity (Lombard *et al*, 2004; Sink *et al*, 2012).

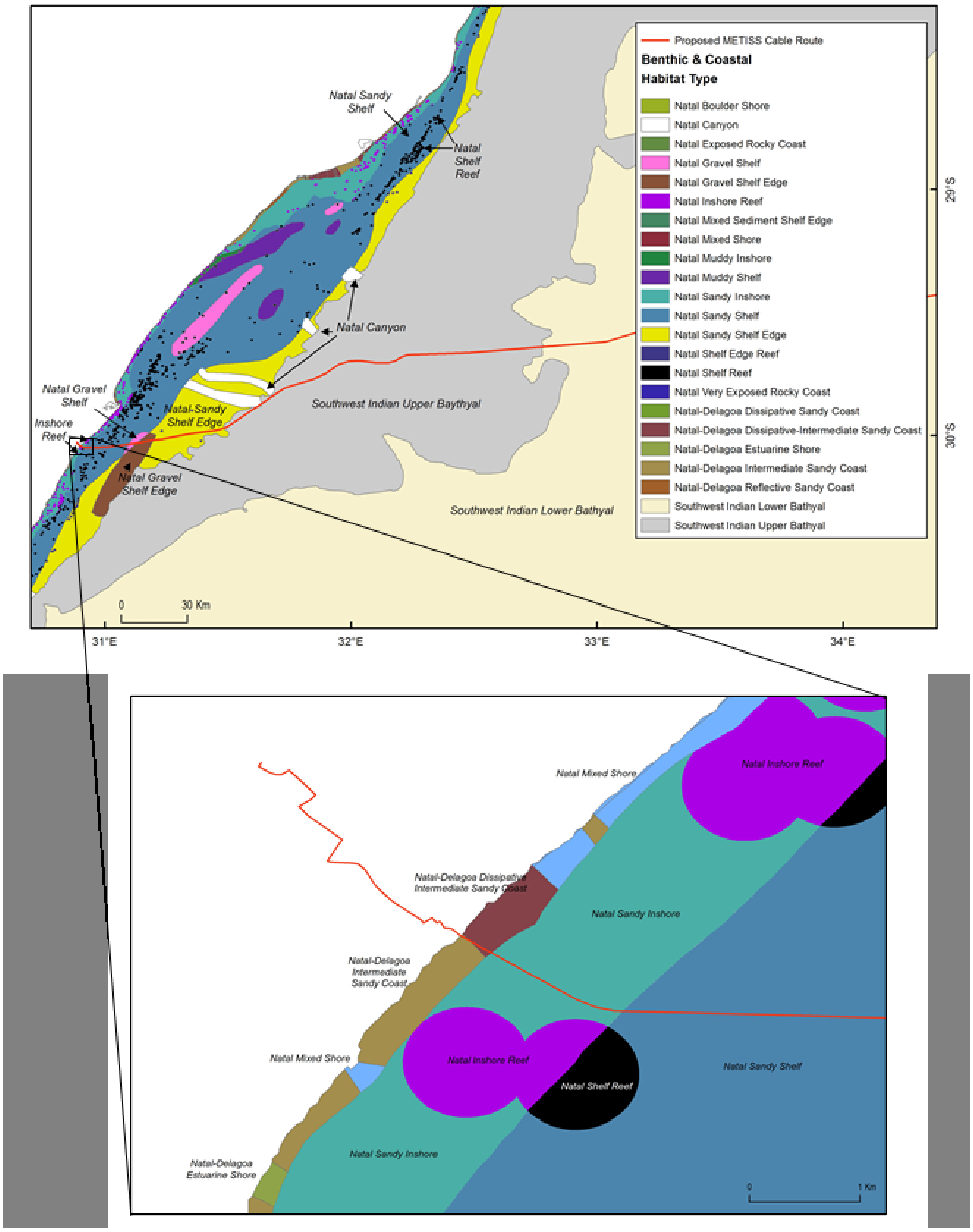
Impacts of multiple development and the lack of biodiversity protection has resulted in some of the coastal habitat types along the east coast being assigned a threat status of 'Critically Endangered' and 'Vulnerable' (Lombard *et al*, 2004; Sink *et al*, 2012) (Table 6.1). Using the SANBI benthic and coastal habitat type GIS database (Figure 6-9), the threat status of the benthic habitats within the broader Project Area, and those potentially affected by the proposed subsea cable route, were identified (Table 6.1). Assuming trenching is implemented for the subsea cable's shore crossing, five benthic habitats rated as 'Vulnerable' are affected by the proposed subsea cable routing, namely Natal Canyon, Natal Sandy Inshore, Natal Sandy Shelf, and Natal Shelf Reef Natal-Delagoa Intermediate Sandy Coast. All other habitats in the Project Area are considered 'Least Threatened'.

Figure 6-8 Ecosystem Threat Status for Coastal and Offshore Benthic Habitat Types on the South African East Coast in Relation to the Subsea Cable Route (red line)



Source: Pisces 2018, adapted from Sink et al, 2012.

Figure 6-9 Benthic and Coastal Habitat Types on the Continental Shelf of the Subsea Cable Route (red line).



Source: Pisces, 2018 (adapted from Sink et al. 2012).

Note: The habitats affected by the proposed subsea cable routing are identified in Table 6.1. The proposed subsea cable route is indicated by red line. Insert provides details of the inshore habitat types on the continental shelf.

Table 6.1 Ecosystem Threat Status for Marine and Coastal Habitat Types in the Broader Project Area

Habitat Type	Threat Status
Natal Boulder Shore	Critically Endangered
Natal Canyon	Vulnerable
Natal Estuarine Shore	Least Threatened
Natal Exposed Rocky Coast	Least Threatened
Natal Gravel Shelf	Least Threatened
Natal Gravel Shelf Edge	Least Threatened
Natal Inshore Gravel	Least Threatened
Natal Inshore Reef	Endangered
Natal Mixed Sediment Shelf	Least Threatened
Natal Mixed Sediment Shelf Edge	Least Threatened
Natal Mixed Shore	Vulnerable
Natal Muddy Inshore	Endangered
Natal Muddy Shelf	Endangered
Natal Muddy Shelf Edge	Least Threatened
Natal Sandy Inshore	Vulnerable
Natal Sandy Shelf	Vulnerable
Natal Sandy Shelf Edge	Least Threatened
Natal Shelf Edge Reef	Least Threatened
Natal Shelf Reef	Vulnerable
Natal Very Exposed Rocky Coast	Least Threatened
Natal-Delagoa Dissipative Sandy Coast	Least Threatened
Natal-Delagoa Dissipative-Intermediate Sandy Coast	Least Threatened
Natal-Delagoa Intermediate Sandy Coast	Vulnerable
Natal-Delagoa Reflective Sandy Coast	Vulnerable
Southwest Indian Upper Bathyal	Least Threatened
Southwest Indian Lower Bathyal	Least Threatened

Source: Pisces, 2018 (adapted from Sink et al, 2012).

Note: Assuming trenching is implemented for the subsea cable's shore crossing, those habitats potentially affected by the subsea cable route are shaded.

6.5.3.2 *Phytoplankton and Ichthyoplankton*

The nutrient-poor characteristics of the Agulhas Current water are reflected in comparatively low primary productivity in KZN inshore areas, with chlorophyll concentrations ranging between 0.03 and 3.88 µg/l (Carter & Schleyer, 1988; Coetzee *et al*, 2010). Further offshore, the pelagic environment is characterised by very low productivity, with the low variability in water-column temperature resulting in very low frequency of chlorophyll fronts. Phytoplankton, zooplankton and ichthyoplankton abundances are thus expected to be extremely low. In contrast, on the Thukela Bank, short-term increases in productivity are associated with localised upwelling (Oliff, 1973; Muir *et al*, 2016; Barlow *et al*, 2015), with phytoplankton being confined to the upper 100 m of the water column (Muir *et al*, 2016).

The distribution of phytoplankton and photosynthesis in the bight are, however, driven by temperature and irradiance, rather than nutrients (Barlow *et al*, 2013; Lamont & Barlow 2015).

Continental shelf waters support greater and more variable concentrations of zooplankton biomass (Figure 6-10) than offshore waters (Beckley & Van Ballegooyen, 1992), with species composition varying seasonally (Carter & Schleyer, 1988).

Copepods represent the dominant species group in shelf waters (Carter & Schleyer, 1988), although chaetognaths are also abundant (Schleyer, 1985). Zooplankton productivity appears associated with nutrient peaks from both the Durban Eddy as well as upwelling off Richards Bay (Pretorius *et al*, 2016), but dependence on nutrients derived from organic matter of marine origin (de Lecea *et al*, 2015) as well as terrestrial origin (de Lecea *et al*, 2013, 2016) has been demonstrated.

Figure 6-10 Phytoplankton and Zooplankton associated with Upwelling Cells on the Thukela Bank

Source: Pisces, 2018, in hymagazine.com (left), and in mysciencebox.org (right)

Pilchard (*Sardinops sagax*) eggs occur in inshore waters (< 50 m) along the Eastern Cape and the southern KwaZulu-Natal coast with the onset of the 'sardine run' between May and July (Anders, 1975; Connell, 1996). The sardine and other clupeid eggs persist in inshore waters throughout winter – spring, before disappearing in early summer as the shoals break up and move northwards and further offshore (Connell, 2010). Recent evidence suggests that the inshore areas of the KZN coast may also function as a nursery area for these small pelagic species during the winter months (Connell, 2010; Coetzee *et al*, 2010) as freshwater flows from the large rivers serve as cues for spawning and the recruitment of juveniles (Lamberth *et al*, 2009). Anchovy (*Engraulis encrasicolus*) eggs were reported in the water column during December as far north as St Lucia (Anders, 1975).

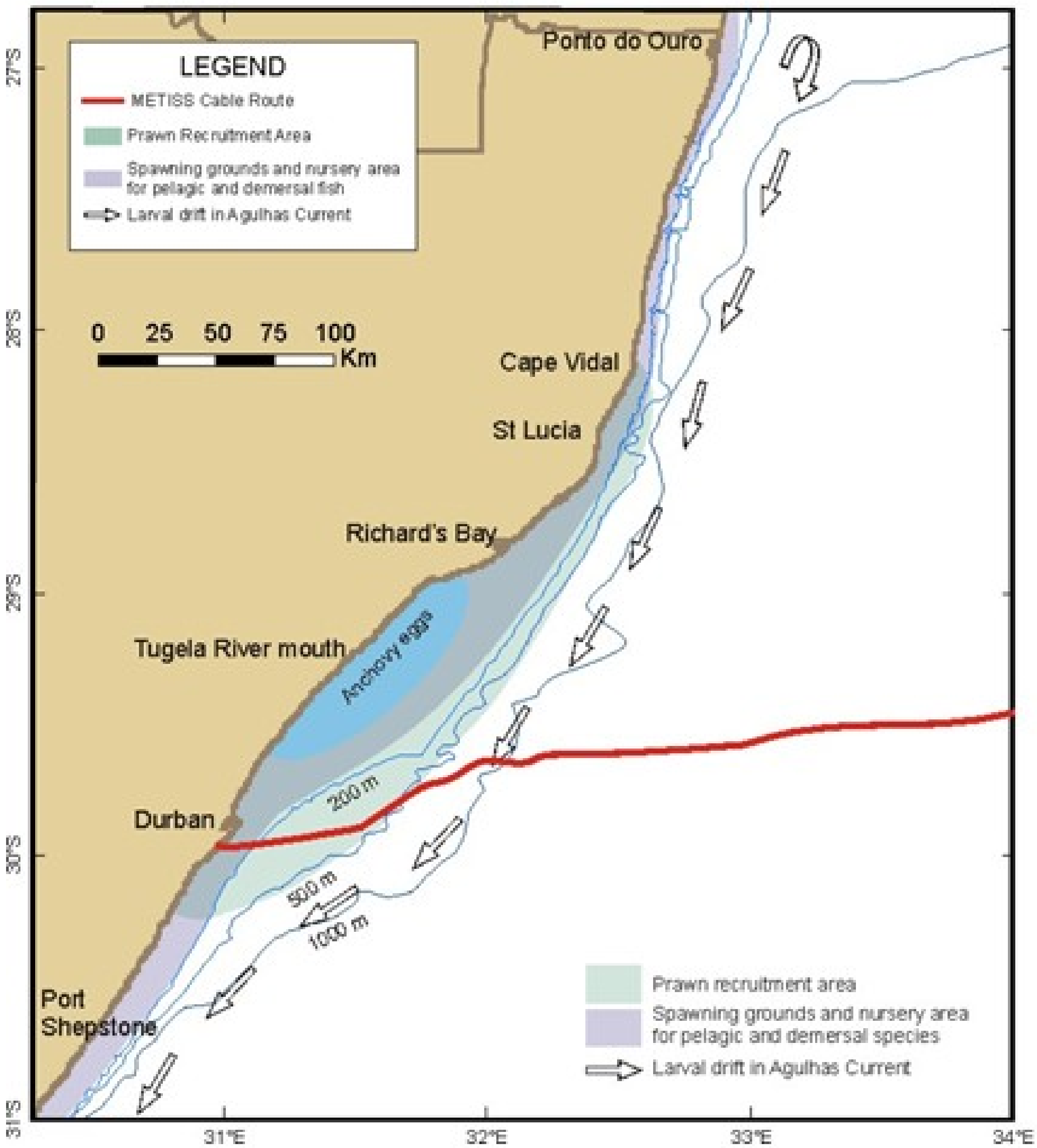
Numerous other fish species (eg, squaretail kob and various sciaenids (snapper, sin croaker, beareded croaker)) use the Thukela Banks as a nursery area due to suitable food sources and protection from predators in the turbid water (Fennesy, 1994a). For example, juvenile squaretail kob and snapper kob are seasonally abundant as a bycatch in the shallow-water prawn fishery from January to March, before moving from their feeding areas on the trawling grounds to low reef areas where their diet changes to include more teleosts (Fennessey, 1994a). The Thukela Banks also serve as a nursery area for the endangered scalloped hammerhead shark, slinger and black mussel cracker (CBD 2013), and five species of dasyatid rays (Fennessy, 1994b). The Thukela Banks serve as a spawning area for (amongst others) bull shark, sand tiger shark, black mussel cracker and king mackerel, as a spawning and migration route for sardine ('sardine run') (Haupt, 2011; Harris *et al*, 2011; Sink *et al*, 2011; Ezemvelo KZN Wildlife, 2012; CBD, 2013).

Numerous linefish species (eg, dusky kob *Argyrosomus japonica, elf Pomatomus saltatrix*, seventy-four *Polysteganus undulosus*, steenbras Petrus rupestrus, black musselcracker Cymatoceps nasutus, white musselcracker *Sparodon durbanensis*, *silverbream Rhabdosargus holubi* and *strepie Sarpa salpa leervis Lichia amia*, *geelbek Atractoscion aequidens* and *garrick Lichia amia*) undertake spawning migrations along the inshore areas of the coast into KwaZulu-Natal waters during the winter months (Van der Elst, 1976, 1981; Griffiths, 1988; Garret, 1988).

Many of the species listed have been identified as either 'threatened' or listed as priority species for conservation due to over-exploitation (Sink & Lawrence, 2008).

Following spawning during spring and summer (November to April), the eggs and larvae of these linefish species are subsequently dispersed southwards by the Agulhas Current (Connell, 2010) (Figure 6-11), with juveniles occurring on the inshore Agulhas Bank (Van der Elst, 1976, 1981; Garret, 1988). Ichthyoplankton likewise is confined primarily to inshore waters (<200 m), with larval concentrations varying between 0.005 and 4.576 larvae/m^3. Concentrations, however, decrease rapidly with distance offshore (Beckley & Van Ballegooyen, 1992). The subsea cable route traverses the major linefish spawning and migration routes, and ichthyoplankton abundance is likely to show strong spatial and temporal variability.

Figure 6-11 Major Fish Spawning, Nursery and Recruitment Areas along the KwaZulu-Natal Coast in Relation to the Subsea Cable Route (red line)



Source: Pisces, 2018

6.5.3.3 *Subtidal Reefs*

The subtidal shallow reefs of the East Coast range from rich, coral-encrusted sandstone reefs in the north to the more temperate rocky reefs further south (Figure 6-12). The subsea cable route passes through an area of high deep reef density. The Maputaland Coral Reef system, which extends from Kosi Bay to Leven Point (27 °55 ’40” S, 32° 35’ 40” E) and constitute the southernmost coral-dominated reefs of Africa (UNEP-WCMC, 2011) lie well to the north of the subsea cable route.

South of the iSimangaliso Wetland Park (St Lucia) reef habitat is provided by rock outcrops, although both hard and soft corals still occur. Known reefs inshore of the 200 m depth contour on the Thukela Bank were mapped by Turpie & Lamberth (2010) and Harris *et al*, (2012).

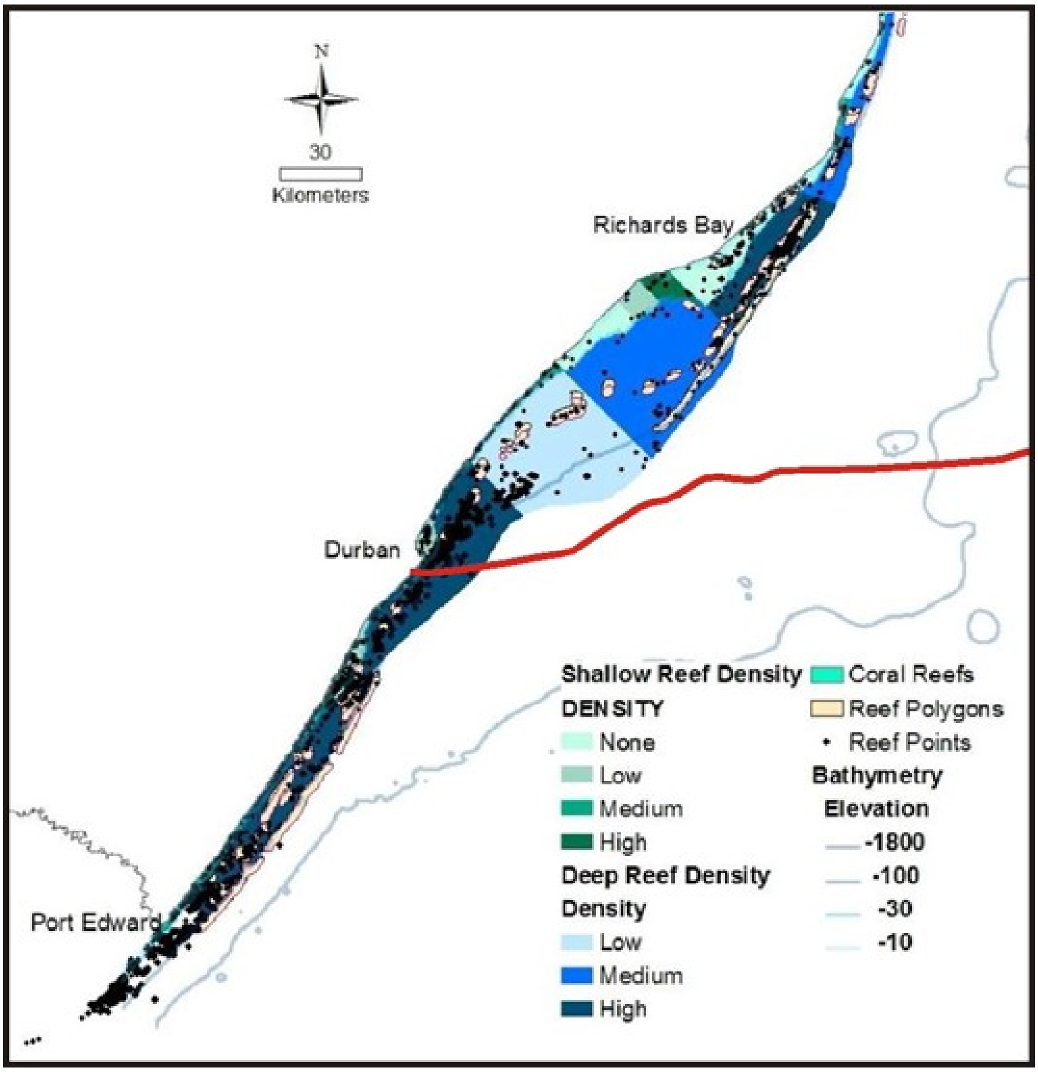
Both reef types (ie, coral and rock outcrops) are characterised by diverse invertebrate and ichthyofaunal biota of Indo-Pacific origin (Figure 6-13, left). The invertebrate benthic communities associated with hard substrata boast a high diversity of hard and soft corals, sponges, tunicates and bivalve molluscs.

Mobile benthic organisms associated with the reefs include a wide variety of echinoderms (urchins, starfish and sea cucumbers), gastropod molluscs and crustaceans. The coral reef habitat also provides shelter and a food source for the highly diverse Indo-Pacific reef fish community.

Both the coral-dominated reefs off Sodwana Bay and the sandstone reefs off Durban and the KZN South Coast are popular amongst divers for their wealth of invertebrate and fish diversity.

In recent years there has also been increasing interest in deep-water corals and sponges because of their likely sensitivity to disturbance and their long generation times. These benthic filter-feeders generally occur at depths exceeding 150 m. Some coral species form reefs while others are smaller and remain solitary. Corals and sponges add structural complexity to otherwise uniform seabed habitats thereby creating areas of high biological diversity (Breeze *et al*, 1997; MacIssac *et al*, 2001). Their frameworks offer refugia for a great variety of invertebrates and fish (including commercially important species) within, or in association with, the living and dead frameworks. The canyons and feeder valleys on the shelf edge host a diversity of sponges, black corals, gorgonians, alcyonarian soft corals and stylasterine lace corals, which support a diverse epifauna including basket- and brittlestars, winged oysters and other molluscs (Sink *et al*, 2006). These invertebrates establish themselves below the thermocline where there is a continuous and regular supply of concentrated particulate organic matter, caused by the flow of a relatively strong current. The occurrence of such potentially vulnerable marine ecosystems in the Direct AoI is unknown.

Figure 6-12 Reefs in KwaZulu-Natal Inshore of Approximately 200 m Depth in Relation to the Subsea Cable Route (red line)



Source: Pisces, 2018, adapted from Harris et al, 2012

Figure 6-13 Reefs in KwaZulu-Natal are Characterized by Diverse Fish Fauna

Source: Pisces, 2018

Note: the reefs in KwaZulu-Natal are characterized by highly diverse invertebrate benthic communities and their associated fish fauna (Left, photo: www.sa-venues.com). The annual 'sardine run' attracts a large number of pelagic predator, which follow the shoals along the coast (Right, photo: www.sea-air-land.com).

6.5.3.4 *Marine Mammals*

Two species likely to be encountered along the subsea cable route are singled out for further discussion, namely the great white shark *Carcharodon carcharias* (Figure 6-14, left) and the whale shark *Rhincodon typus* (Figure 6-14, 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 are listed in Appendix II (species in which trade must be controlled in order to avoid utilization incompatible with their survival) of CITES (Convention on International Trade in Endangered Species) and Appendix I and/or II of the Bonn Convention for the Conservation of Migratory Species (CMS). The great white shark and whale shark are both also listed as 'vulnerable' in the List of Marine Threatened or Protected Species (TOPS) as part of the National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA).

Figure 6-14 Great White Shark (left) and Whale Shark (right)

Source: www.flmnh.ufl.edu in Pisces, 2018

Note: The great white shark Carcharodon carcharias (left) and the whale shark *Rhincodon typus* (right)

The great white shark is a significant apex predator along the South African south and east coasts, and was legislatively protected in South Africa in 1991 in response to global declines in abundance. Long-term catch-per-unit-effort data from protective gillnets in KwaZulu-Natal, however, suggest a 1.6 percent annual increase in capture rate of this species following protection, although high interannual variation in these data lessen the robustness of the trend (Dudley & Simpfendorfer, 2006).

White sharks migrate along the entire South African coast, typically being present at seal colonies during the winter months, but moving nearshore during summer (Johnson et al, 2009). Recent research at Mossel Bay into the residency patterns of white sharks revealed that male sharks display low site fidelity, often rapidly moving in an out of the area. Females in contrast, display high site fidelity and may remain resident in the area for up to two months (Koch & Johnson, 2006). Great white sharks are, however, capable of transoceanic migrations (Pardini et al, 2001; Bonfil et al, 2005; Koch & Johnson, 2006), with recent electronic tag data suggesting links between widely separated populations in South Africa and Australia and possible natal homing behaviour in the species. Although during transoceanic migrations they appear to spend most of the time just below the sea surface, frequent deep dives to a much as 980 m are made whilst en route. Long-distance return migrations along the South African coast are also frequently undertaken (Figure 6-15), particularly by immature individuals (Bonfil et al, 2005). These coastal migrations, which are thought to represent feeding-related events, potentially traverse the proposed subsea cable route.

Figure 6-15 Long-distance Return Migrations of Two Tracked Great White Sharks along the South African Coast in relation to the Subsea Cable Route (red line).

Source: Adapted from Bonfil et al, 2005 in Pisces, 2018

Note: The black trace shows a migration from 24 May – 2 November 2003; the white trace shows a migration from 31 May – 1 October 2004.

Whale sharks are regarded as a broad ranging species typically occurring in offshore epipelagic areas with sea surface temperatures of 18 to 32 °C (Eckert & Stewart, 2001). Adult whale sharks reach an average size of 9.7 m and 9 tonnes, making them the largest non-cetacean animal in the world.

They are slow-moving filter-feeders and therefore particularly vulnerable to ship strikes (Rowat, 2007). Although primarily solitary animals, seasonal feeding aggregations occur at several coastal sites all over the world, those closest to the Project Area being off Sodwana Bay in the Greater St. Lucia Wetland Park, Tofo Reef near Inhambane in Mozambique, Nosy Be off the northwest coast of Madagascar, and the Tanzanian islands of Mafia, Pemba, and Zanzibar (Cliff *et al*, 2007). Off the KZN coast, whale shark abundance in nearshore waters increases in late October-early November, with most animals moving in a northwards direction, possibly en route to the aggregation area around Ponta Tofo in Mozambique, where numbers peak between November and May.

Satellite tagging of whale sharks has revealed that individuals may travel distances of tens of 1,000s of kms (Eckert & Stewart, 2001; Rowat & Gore 2007; Brunnschweiler *et al*, 2009). Recently the movements of a whale shark tagged in southern coastal Mozambique were monitored crossing the Mozambique Channel, passing the southern tip of Madagascar and into the Madagascar Basin.

Although the fish spend most time in the upper 25 m of the water column while on the continental shelf, once in deep water, the occurrence of dives into mesopelagic and bathypelagic zones increased, with dives to a depth of 1,286 m being recorded. These dives were thought to represent search behaviour for feeding opportunities on deep-water zooplakton (Brunnschweiler *et al*, 2009).

While there is a possibility of whale sharks migrating across and along the Direct AoI, the likelihood of an encounter is relatively low.

6.5.3.5 *Fish*

Pilchards (*Sardinops sagax*) are a small pelagic shoaling species typically found in shelf water between 14 °C and 20 °C. Spawning occurs on the Agulhas Bank during spring and summer (November to April). During the winter months of June to August, the penetration of northerly-flowing cooler water along the Eastern Cape coast and up to southern KZN effectively expands the suitable habitat available for this species, resulting in a 'leakage' of large shoals northwards along the coast in what has traditionally been known as the 'sardine run'. Other pelagic shoaling species 'running' with the sardines but often occupying different depths in the water column include anchovy *Engraulis encrasicolus*, West Coast round herring *Etrumeus whiteheadi*, East Coast round herring *Etrumeus teres* and chub mackerel *Scomber japonicus* (Coetzee *et al*, 2010). 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 6-13, right), Cape Gannets and various other large pelagic predators (www.sardinerun.co.za; O'Donoghue *et al*, 2010a, 2010b, 2010c). Recent studies have indicated that the annual 'sardine run' constitutes a migration to localised upwelling centres inshore of the Agulhas Current (East London and Cape St Lucia) that provide a favourable temperate spawning environment for these small pelagic fish species during and subsequent to their annual migration along the East Coast (Beckley & Hewitson, 1994; Coetzee *et al*, 2010). The sardine run occurs along the continental shelf and therefore crosses the inshore sections of the proposed subsea cable route.

Catch rates of several important species in the recreational shoreline fishery of KZN have been shown to be associated with the timing of the 'sardine run' (Fennessey *et al*, 2010). Other pelagic species that migrate along the KZN south coast include elf/shad (*Pomatomus saltatrix*), geelbek (*Atractoscion aequidens*), yellowtail (*Seriola lalandi*), kob (*Argyrosomus sp*.), seventy-four (*Cymatoceps nasutus*), strepie/karanteen (*Sarpa salpa*), Cape stumpnose (*Rhabdosargus holubi*), red steenbras (*Petrus rupestrus*), poenskop (*Cymatoceps nasutus*) and mackerel (*Scomber japonicus*), which are all regular spawners within KZN waters (Van der Elst, 1988; Hutchings *et al*, 2003).

Both the Thukela Bank, as well as the many estuaries along the KZN coastline, serve as important nursery areas for many of these species. From an ecological perspective, the Thukela Banks are thought by some to function as an estuary, as freshwater flows from the large rivers are likely to provide cues for spawning and the recruitment of juveniles that use the bank as a nursery area (Lamberth *et al*, 2009).

A wide variety of demersal fishes and megabenthic invertebrates have been recorded in experimental trawls off Richards Bay (CSIR, 2009) and between the Mlalazi River and Durban (Fennessy, 2016). Long-term datasets shows wide spatio-temporal variability in the diversity and abundance of trawl catches over the years (CSIR, 2009). Similar variability has been reported from other regions of the world, and it appears to be an inherent feature of demersal fish and megabenthic invertebrate communities from near-shore soft-sediment habitats (Otway *et al*, 1996). Similarly, a high diversity of pelagic Teleosts (bony fish) and Chondrichthyans (cartilaginous fish) is associated with the numerous inshore reefs and shelf waters and can be expected to occur along the inshore sections of the subsea cable route. Many of the fishes are endemic to the Southern African coastline and form an important component of the commercial and recreational linefisheries of KZN (Table 6.2).

Fennessy (2016) reports on demersal fish communities across the KZN Bight to depths of 575 m. Species composition was structured mainly by depth (with diversity increasing with depth), substratum type (which in turn influences invertebrate macrofaunal community structure) and proximity to the Thukela River. The Thukela River itself was particularly influential species composition on the adjacent Thukela Bank that harbours a unique community. The fish communities were dominated by the Sparidae (five species), Triglidae (four species), Acropomatidae (three species), Macrouridae (eight species). Information on other neritic and demersal fish and megabenthic invertebrates beyond 600 m depth is lacking.

Table 6.2 Some of the More Important Linefish Species Landed by Commercial and Recreational Boat Fishers along the East Coast

Common Name	Species Name
bony fish	*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 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*

Common Name	Species Name
Skates	*Rajiformes*
Stingray	*Dasyatidae*

Source: adapted from CCA & CMS 2001

6.5.3.6 *Marine 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*) (Figure 6-16, left), hawksbill (*Eretmochelys imbricata)* and loggerhead (*Caretta caretta)* (Figure 6-16, right). Green turtles are non-breeding residents often found feeding on inshore reefs. They nest mainly along the coast of Mozambique and on both Europa and Tromelin Islands (Lauret-Stepler et al, 2007). Hawksbills also occur on inshore reefs but nest along the coastlines of Madagascar and the Seychelles (Mortimer, 1984). Olive ridleys are infrequent visitors to South African waters and nest throughout the central and northern regions of Mozambique (Pereira et al, 2008). Leatherback turtles inhabit the deeper waters of the Atlantic Ocean and are considered a pelagic species. They travel the ocean currents in search of their prey (primarily jellyfish) and may dive to over 600 m and remain submerged for up to 54 minutes (Hays et al, 2004; Lambardi et al, 2008). They come into coastal bays and estuaries to mate, and lay their eggs on the adjacent beaches. Loggerheads tend to keep more inshore, hunting around reefs, bays and rocky estuaries along the African East Coast, where they feed on a variety of benthic fauna including crabs, shrimp, sponges, and fish. The Thukela Bank serves as an important feeding area for this vulnerable species. In the open sea their diet includes jellyfish, flying fish, and squid (www.oceansafrica.com/turtles.htm).

Figure 6-16Leatherback (left) and Loggerhead Turtles (right) Occur along the East Coast of South Africa

Source: Ketos Ecology 2009; www.aquaworld-crete.com

Loggerheads and leatherbacks nest along the sandy beaches of the northeast coast of KZN, South Africa, as well as southern Mozambique during summer months. These loggerhead and leatherback nesting populations are the southern-most in the world (Nel *et al*, 2013). Even though these populations are smaller (in nesting numbers) than most other populations, they are genetically unique (Dutton *et al*, 1999; Shamblin *et al*, 2014) and thus globally important populations in terms of conservation of these species.

Loggerhead and leatherback females come ashore to nest from mid-October to mid-January each year. They crawl up the beach and deposit an average of approximately 100 (loggerheads) or approximately 80 (leatherback) eggs in a nest excavated with their hind flippers. The eggs incubate for two months and hatchlings emerge from their nests from mid-January to mid-March.

The mean hatching success for loggerheads (73 percent) and leatherbacks (76 percent) on the South African nesting beaches (de Wet, 2013) is higher than reported at other nesting sites globally. Nevertheless, eggs and emerging hatchlings are nutritious prey items for numerous shoreline predators, resulting in the mean emergence success and hatchling success being slightly lower than the hatching success. However, emergence and hatchling success for both species is similarly higher in South Africa than reported at other nesting beaches as mortality is largely limited to natural sources due to strong conservation presence on the nesting beach, which has reduced incidents of egg poaching and female harvesting to a minimum (Nel, 2010). The production of both loggerhead and leatherback hatchlings is thus remarkably high in South Africa, making the nesting beaches in northern KZN some of the most productive (relative to nesting numbers) in the world.

Those hatchlings that successfully escape predation on their route to the sea, enter the surf and are carried approximately 10 km offshore by coastal rip currents to the Agulhas Current (Hughes, 1974b). As hatchlings are not powerful swimmers they drift southwards in the current. Hatchlings and juveniles may therefore be encountered along the inshore sections of the subsea cable route, but abundances are expected to be low. During their first year at sea, the post-hatchlings feed on planktonic prey items (Hughes, 1974a), with their activities largely remaining unknown (Hughes, 1974a). After approximately 10 years, juvenile loggerheads return to coastal areas to feed on crustaceans, fish and molluscs and subsequently remain in these neritic habitats (Hughes 1974b). In contrast, leatherbacks remain in pelagic waters until they become sexually mature and return to coastal regions to breed. Loggerheads reach sexual maturity at about 36 years of age whereas leatherbacks reach maturity sooner, at approximately 15 years (Tucek *et al*, 2018). It has been estimated that only 1 to 5 hatchlings survive to adulthood (Hughes, 1974b; de Wet, 2013).

Sea turtles are highly migratory and travel extensively throughout their entire life cycle. Adult turtles migrate thousands of kilometres between foraging and breeding grounds, returning to their natal beaches (Hughes, 1996; Papi *et al*, 2000; Schroeder *et al*. 2003) by using geomagnetic (Lohmann *et al*, 2007) and olfactory cues (Grassman *et al*, 1984), hearing (Wyneken & Witherington 2001) as well as vision (Witherington 1992) to find their way back to the beach. The Maputaland loggerheads appear to use the higher sulphide concentrations along that particular stretch of coast as a chemical cue for nesting (Brazier 2012). Post-nesting females and hatchlings use natural ambient light to orientate towards the ocean (Bartol & Musick, 2002). Artificial light, however, acts as deterrents for nesting females (Witherington, 1992; Salmon, 2003; Brazier, 2012) and brightly lit beaches thus have reduced female emergences. In contrast, hatchlings are attracted to light even if the source is inland and may consequently suffer higher mortality rates due to desiccation and increased predation (Witherington & Bjorndal, 1991; Salmon, 2003).

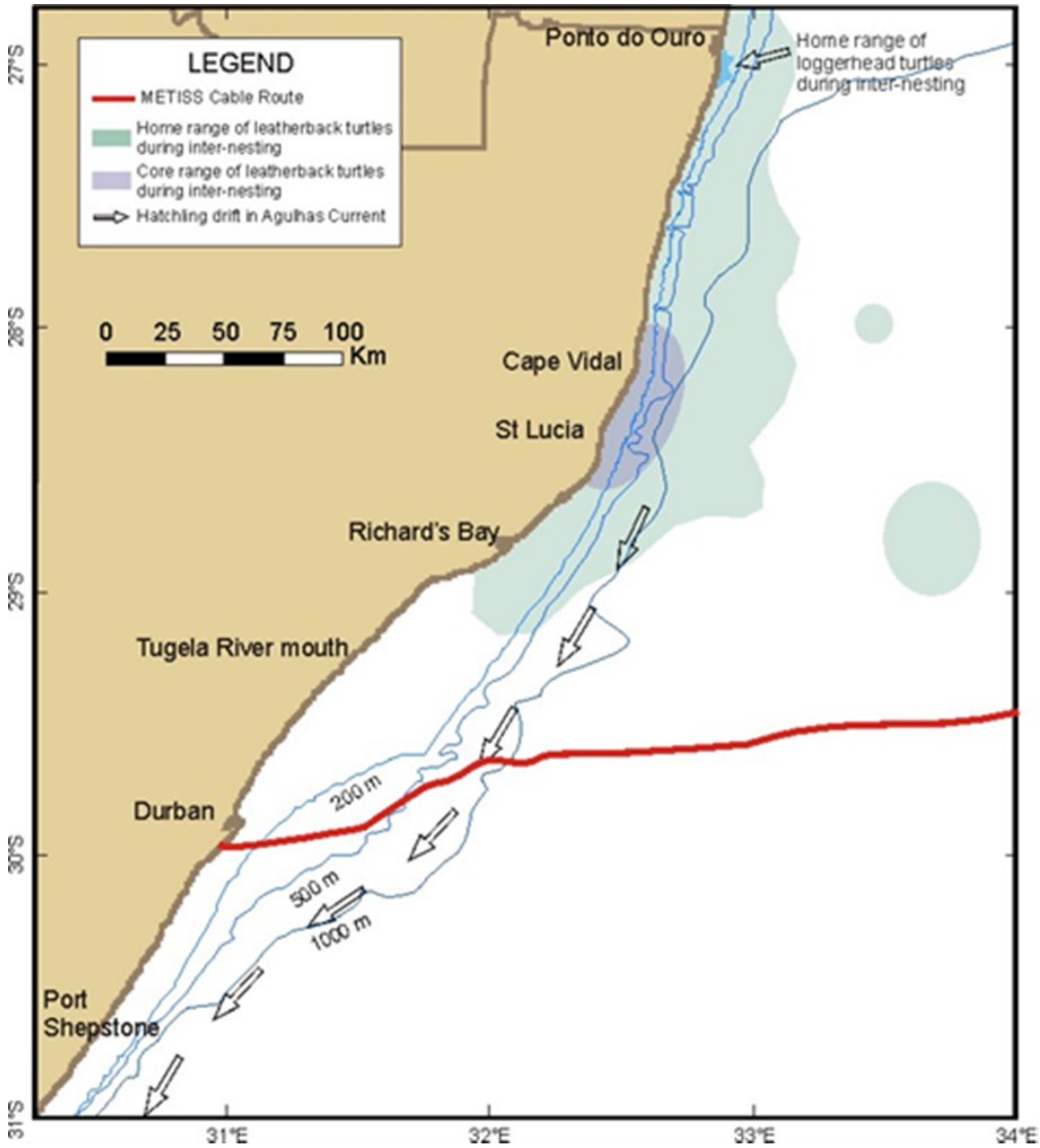
Satellite tracking of female loggerhead and leatherback turtles during inter-nesting periods revealed that loggerheads remained close to the shore (within the boundaries of the iSimangaliso Wetland Park) between nesting events (Figure 6-17), whereas leatherbacks travelled greater distances (more than 300 km) and beyond the borders of the MPA. Consequently, a southward extension of the MPA was proposed in order to include a greater portion of the core range of inter-nesting leatherbacks and provide better protection.

The offshore extension of the iSimangaliso Wetland Park MPA was one of the network of MPAs approved by Cabinet on 24 October 2018. The inshore sections of the subsea cable route lie well south of the inter-nesting migrations for leatherbacks.

Female turtles do not nest every year due to the high energetic costs of reproduction (Wallace & Jones, 2008). During this remigration interval they travel thousands of kilometres (particularly leatherbacks) with ocean currents in search of foraging grounds (Luschi *et al*, 2003a; Luschi *et al*, 2003b). Turtles marked with titanium flipper tags have revealed that South African loggerheads and leatherbacks have a remigration interval of 2 to 3 years, migrating to foraging grounds throughout the South Western Indian Ocean (SWIO) as well as in the eastern Atlantic Ocean.

They follow different post-nesting migration routes (Hughes *et al*, 1998; Luschi *et al*, 2006), with loggerheads preferring to stay inshore whilst travelling northwards to foraging grounds along the southern Mozambican coastline or crossing the Mozambique Channel to forage in the waters off Madagascar (Figure 6-15). In contrast, leatherbacks move south with the Agulhas Current to deeper water in high-sea regions to forage (Hughes *et al*, 1998; Luschi *et al*, 2003b; Luschi *et al*, 2006), with some individuals following the Benguela Current along the west coast of South Africa, as far north as central Angola (Figure 6-17, de Wet (2013)). Both species are thus likely to be encountered along the Project Area.

Figure 6-17 Home and Core Ranges of Loggerheads and Leatherbacks during Inter-Nesting Relative to the Subsea Cable Route (red line)



Source: Oceans and Coast, unpublished data in Pisces, 2018

6.6 Protected and Conservation Areas

6.6.1 *Marine and Protected Areas*

KwaZulu-Natal has four Marine Protected Areas (MPA), although none occur along the subsea cable route (Figure 6-18).

6.6.1.1 *iSimangaliso Extension MPA*

The Maputaland and St Lucia MPAs form a continuous protected area stretching 150 km from the Mozambique border southwards to Cape Vidal, and three nautical miles (5.56 km) out to sea. Together with the southward extension of the St Lucia MPA, they are components of the offshore iSimangaliso MPA, as part of the iSimangaliso Wetland Park. The MPA protects a large number of turtle nesting sites; the migration of whales, dolphins and whale-sharks offshore; coelacanths in the submarine canyons; and a considerable number of waterfowl associated with the iSimangaliso Wetland Park, including large breeding colonies of pelicans, storks, herons and terns.

6.6.1.2 *uThukela Banks MPA*

This recently approved coastal and offshore MPA is located between the Mlalazi and Seteni estuary. The purpose of this MPA is to protect coastal habitats including sandy beaches, rocky shores and estuaries as well as offshore habitats including the soft sediment and reef systems, submarine canyons, the shelf edge and slope ecosystems (Government Gazette 39646, 2016).

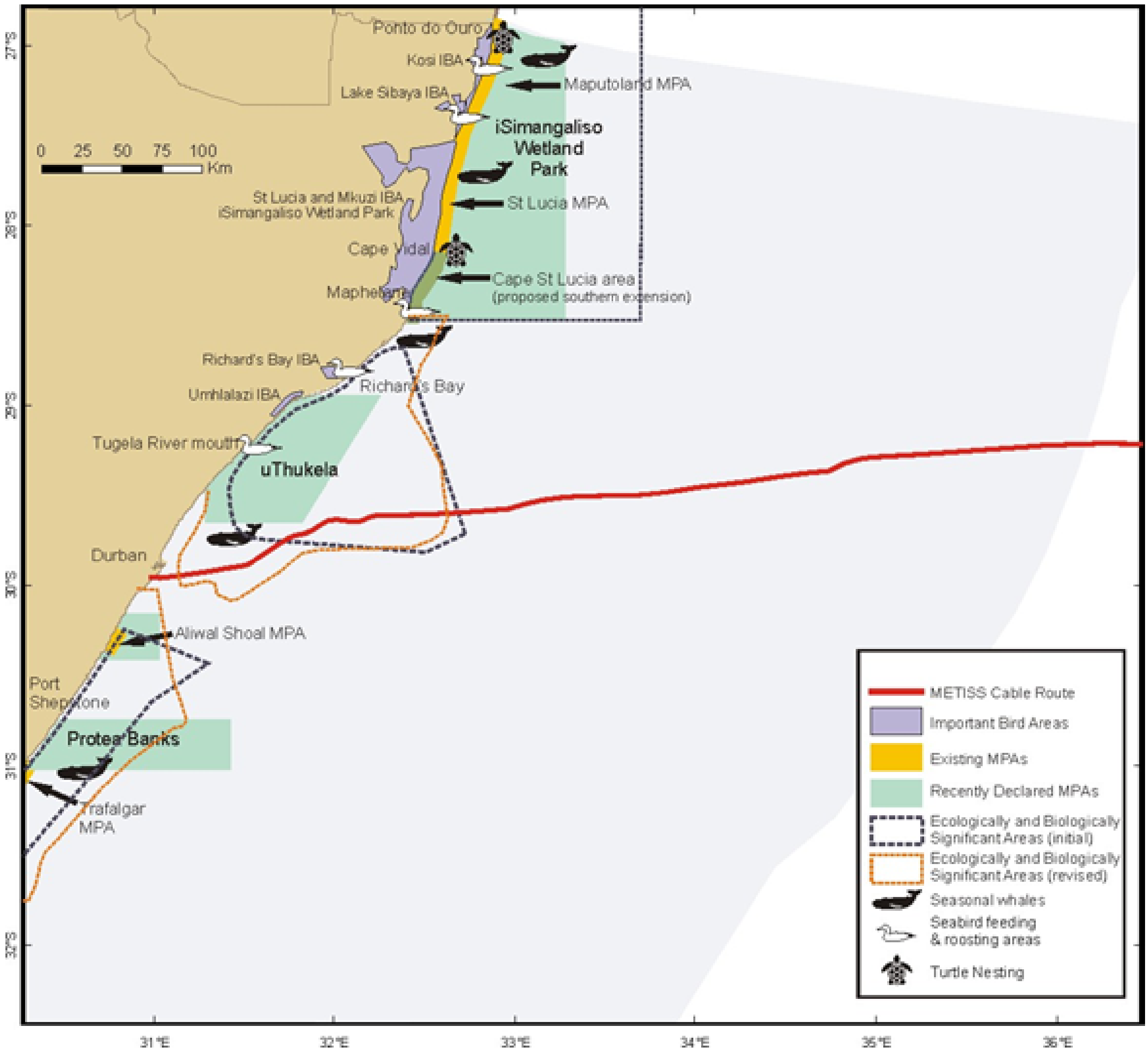
6.6.1.3 *Aliwal Shoal MPA*

The Aliwal Shoal MPA is situated on the south coast between Umkomaas and Ocean View. The purpose of this MPA is to specifically protect and conserve the Aliwal Shoal and the fish stocks associated with it; to promote and regulate eco-tourism activities and scientific research in a way that does not adversely affect the marine environment and the biodiversity of the Aliwal Shoal Marine Protected Area and to prescribe penalties for contraventions (Government Gazette 26433, 2004).

6.6.1.4 *Protea Banks MPA*

The Protea Banks Marine Protected Area is an offshore Area in the 20 m to 3,000 m depth range with the southern portion lying adjacent to the existing Trafalgar Marine Protected Area. The purpose of this MPA is to conserve and protect submarine canyons, deep reefs, cold water coral reefs and other habitats of the shelf edge and slope (Government Gazette 39646, 2016).

Figure 6-18Marine Protected Area (MPAs) within the Exclusive Economic Zone (grey shading) off the KZN Coast in Relation to the Subsea Cable Route (red line)



Source: Pisces, 2018

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 in KZN, Algoa Bay, Plettenberg Bay, Knysna, the Cape Whale Coast (Hermanus area) and False Bay in the Western Cape. Of these, the Aliwal Shoal Hope Spot is located to the south of the subsea cable route.

6.6.2 *World Heritage Site*

The iSimangaliso Wetland Park is recognised as a wetland of international importance under the Ramsar Convention and has been designated a World Heritage Site in terms of the World Heritage Convention Act (No. 49 of 1999). The iSimangaliso Wetland Park covers an area on 324 441 ha, including 230 km of coastline from Kosi Bay (bordering Mozambique) to south of Maphelane and three nautical miles out to sea. The Park is governed by the National Environmental Management Protected Areas Act (No. 57 of 2003).

In terms of Section 48(1) no person may conduct commercial prospecting or mining activities within a World Heritage Site. In addition, Section 50(5) states that no development is permitted in a World Heritage Site without prior written approval from the management authority, namely iSimangaliso Wetland Park Authority. The proposed subsea cable route lies well to the south of the World Heritage Site.

6.6.3 *Ecologically and Biologically Significant Area (EBSAs)*

Following application of the Conservation on Biological Diversity's (CBD) Ecologically or Biologically Significant Marine Areas (EBSA) criteria[11], a number of areas around the South African coast were identified as potentially requiring enhanced conservation and management.

These were presented at the CBD regional workshop for the description of marine EBSAs in the Southern Indian Ocean (July/August 2012) (CBD, 2013).

Three EBSAs have been proposed and inscribed for the East Coast under the Convention of Biological Diversity (CBD) (CBD, 2013), namely Protea Banks and the Sardine Route, the Natal Bight and the Delagoa Shelf Edge. In meeting the EBSA criteria various endemic and rare chondrychthian and teleost species were listed for the Natal Bight and Thukela Bank, and IUCN listed species and threatened habitat types identified. The Protea Banks area includes submarine canyons, an area of steep shelf edge and a unique deep-reef system, all of which may support fragile habitat-forming cold-water coral species. This area also includes a major component of the migration path for several species undertaking the 'sardine run'. The Delagoa Shelf Edge, Canyons and Slope is a transboundary EBSA that includes the iSimangaliso Wetland Park, a Ramsar and World Heritage Site in South Africa, and Ponta do Ouro Partial Marine Reserve in Mozambique. This EBSA supports a variety of fish, sharks, turtles, whales and other marine mammals by including their migratory routes, nursery areas, spawning/breeding areas, and foraging areas, and notably provides nesting habitat for Loggerhead and Leatherback turtles. Many of the species in the EBSA are threatened, such as: coelacanths, seventy-four seabream, marine mammals, turtles, and sharks. Potential VMEs include numerous submarine canyons, paleo-shorelines, deep reefs, and hard shelf edge, with reef-building cold-water corals also recovered at depths of more than 900 m.

Although focussed primarily on the conservation of benthic biodiversity and threatened benthic habitats, the EBSA also considers the pelagic habitat. The pelagic habitat of the Natal Bight is characterized by cool productive water advected onto the shelf in this sheer-zone through Agulhas Current-driven upwelling cells. In the Protea Banks EBSA, the dynamic pelagic environment and the sardine run also contribute to the high diversity in the pelagic ecosystems.

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[11] In 2008, the Conference of the Parties to the Convention on Biological Diversity (COP 9) adopted the following scientific criteria for identifying ecologically or biologically significant marine areas in need of protection in open-ocean waters and deep-sea habitats (further details available at http://www. cbd.int/marine/doc/azores-brochure-en.pdf):

1. Uniqueness or Rarity
2. Special importance for life history stages of species
3. Importance for threatened, endangered or declining species and/or habitats
4. Vulnerability, Fragility, Sensitivity, or Slow recovery
5. Biological Productivity
6. Biological Diversity
7. Naturalness

In 2010, COP 10 noted that the application of the EBSA criteria was a scientific and technical exercise, and that areas found to meet the criteria may require enhanced conservation and management measures, and that this could be achieved through means such as marine protected areas and impact assessments. It was emphasised that the identification of EBSAs and the selection of conservation and management measures was a matter for States and competent intergovernmental organisations, in accordance with international law, including the UN Convention on the Law of the Sea.

Following new research conducted in the area since the original description of these EBSAs, the boundaries, names, descriptions and criteria ranks have recently been updated. No specific management actions have as yet been formulated for these EBSAs, although the uniqueness of the areas contributed to the development of the recently approved offshore MPAs. The proposed subsea cable route traverses the Thukela Bank EBSA.

6.6.4 *Terrestrial Critical Biodiversity Areas*

The BMH location will be located near vegetated dunes, which are classified as irreplaceable Critical Biodiversity Area (CBA) by SANBI. It must however be noted that the potentially affected area is at present completely transformed from its natural state due to past development and disturbance. The implications to the CBA will be examined further during the terrestrial specialist study, and will be described during the Impact Assessment phase.

6.7 Socio –Economic Baseline Description

The purpose of this section is to describe the socio-economic environment within which the proposed Project is located. Potential impacts are mostly local and regional with a potential influence on the town of Amanzimtoti, and upon the fisheries sector. The socio-economic context is, consequently, described on a regional and local level.

6.7.1 *Administrative Institutions*

6.7.1.1 *Government Institutions*

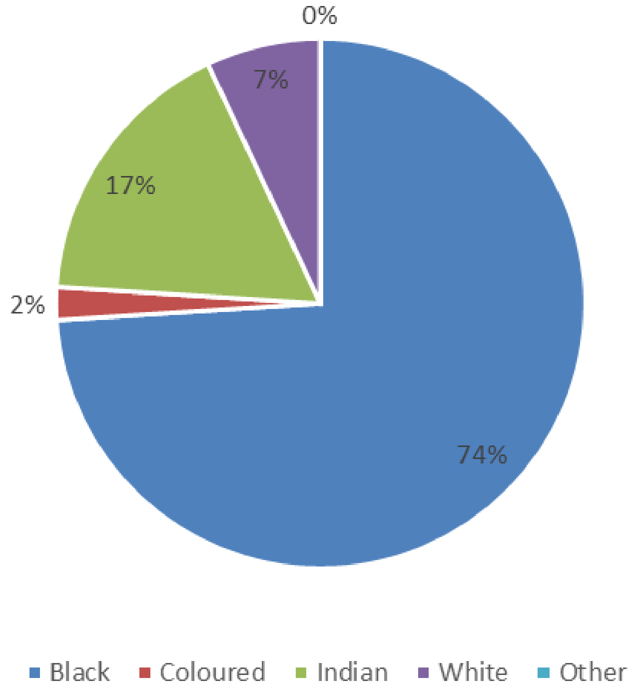
EThekwini Metropolitan Municipality is a Category A Municipality which sits on the east coast of South Africa in the KwaZulu-Natal province. It covers an area of approximately 2,555 km2 (this following the incorporation of some of the Vulamehlo Local Municipality Wards), and hosts around 3.7 million citizens (eThekwini Municipality IDP, 2017/2018; eThekwini Municipality SDF, 2018/2019). It stretches all the way from Tongaat in the north to Umkomaas in the South. It further extends from the coastline in the east to Cato Ridge in the west. The Municipality is bordered by three district municipalities namely; iLembe in the north, UGu in the South and uMgungundlovu in the west (eThekwini Municipality SDF, 2018/2019).

6.7.2 *Demographics*

The current estimated population within the eThekwini Municipality is 3.7 million citizens. A population forecast for the eThekwini Municipality conducted by Statistics South Africa revealed that by the year 2020, the population would have grown by 175,000 to 3.8 million citizens taking into consideration the fertility rate, life expectancy, mortality rates, HIV/AIDS and migration (eThekwini Municipality SDF, 2018/2019).

Figure 6-19 below illustrates the population composition within the eThekwini Municipality:

Figure 6-19 Population Composition within the eThekwini Metropolitan Municipality



Source: eThekwini Municipality SDF, 2018/2019

The black population makes up the majority of the eThekwini Municipality (74 percent), followed by the Indian population (17 percent). The coloured population only makes up two percent and the other population groups are negligible in composition.

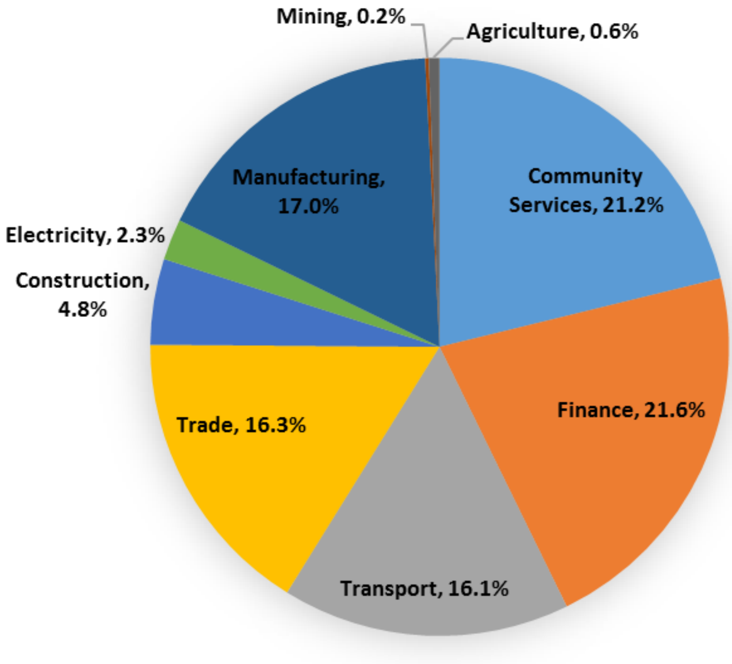
6.7.3 *Employment*

An extremely large number of the eThekwini Municipality population are not economically active (873,583). This places pressure on household heads with low income levels. Approximately 992,560 citizens are employed and 430,319 are unemployed. The unemployment rate has improved over the years, decreasing from 15.5 percent in 2013 to 15 percent in 2015 (eThekwini Municipality SDF 218/2019). Compared to the other Metropolitan Municipality nationally, eThekwini has had the best performance with regards to unemployment rates. This is mostly due to the increase in the "not economically active" category (eThekwini Municipality IDP, 2017/2018).

6.7.4 *Economy and Livelihoods*

The eThekwini Municipality contributes significantly towards the South African economy, and it ranks as the second largest economic centre in South Africa. The eThekwini region contributed towards 10 percent of the National Gross Domestic Product (GDP). The major contributing sectors towards eThekwini's GDP include Finance (21.6 percent), Community Services (21.2 percent) and Manufacturing (17 percent) (eThekwini Municipality IDP, 2017/2018).

Figure 6-20 Sectoral Composition in the eThekwini Municipality



Source: eThekwini Municipality IDP, 2017/2018

6.7.5 *Social Services and Infrastructure*

6.7.5.1 *Education*

2.5 percent of the eThekwini Municipality population has no form of schooling, 5.1 percent have completed primary education and 21 percent have completed Grade 12. Approximately 1.2 percent of the population is unspecified.

Lack of sufficient school-based education could result in functional illiteracy and lower frequency of marketable skills to engage in business ventures (eThekwini Municipality SDF, 2018/2019).

Table 6.3 Education Profile

Level of Education	Percentage (percent)
No Schooling	2.5
Some Primary Education	35
Primary Education Completed	5.1
Some Secondary Education	31.3
Grade 12 Complete	21.4
Higher Education	3.4
Education NA	1.2

Source: eThekwini Municipality SDF, 2018/2019

6.7.5.2 *Health*

HIV/AIDS infections have shown a persistent increase across the different ethnic groups (Table 6.4).

Table 6.4 Present and Projected HIV/AIDS Infections in the eThekwini Municipality

Population Group	2005	2010	2015	2020	2025
Asian	4.9 percent	6.4 percent	6.9 percent	7.2 percent	7.4 percent
Black	35.6 percent	32.8 percent	29.4 percent	28.3 percent	28.1 percent
Coloured	10.7 percent	12.3 percent	12.5 percent	12.7 percent	13.0 percent
White	3.5 percent	4.5 percent	4.9 percent	5.1 percent	5.3 percent

Source: eThekwini Municipality IDP, 2017/2018

Approximately two thirds of all HIV/ADS infected people contract tuberculosis (TB). In 2009, the Municipality registered 43,739 new and retreatment cases of TB (both HIV positive and HIV negative) which ultimately ranked eThekwini Municipality as one of the leading districts in TB cases (eThekwini Municipality IDP, 2017/2018)

6.7.5.3 *Water and Sanitation*

Due to the high unemployment rate in the eThekwini Municipality, many citizens are unable to pay for basic services. Over and above this challenge, there is limited funding available to the Municipality to provide these services. The table below describes the existing backlog of basic services in the Municipality and the timeframe in which the Government has committed to address them, based on the funding available (eThekwini Municipality IDP, 2017/2018).

Table 6.5 Basic Services Backlog in the eThekwini municipality

Basic Service	Existing Backlog (consumer units) as at December 2016	Delivery ranges per Annum	Timeframe to Address based on Current Funding Levels
Water	54,721	2,000 – 2,500	22 – 27 years
Sanitation	153,275	8,000 – 10,000	15 – 19 years
Electricity	241,976	8,000 – 13,000	19 – 30 years
Refuse Removal	0	1,500 – 2,000	0 years
Roads	1,081.03 Km	10 - 15	72 – 108 years

Source: (eThekwini Municipality IDP, 2017/2018)

6.7.6 *Dumping Waste*

The most common method of waste disposal in the eThekwini Municipal Area is in managed landfill sites. Every year, the four main landfill sites in the Municipality receive over one million tons of waste. Various initiatives have been undertaken by the Municipality to reduce the waste that ends up in landfills has been promoted, including the separation of waste at the source (eThekwini Municipality SDF, 2018/2019).

6.7.7 *Mineral and Petroleum and Exploration Rights and Activities*

Exploration Rights to specified Oil and Gas License Areas within the subsea cable route have been granted to the following companies' activities:

- ExxonMobil;
- Sasol and Eni; and
- Silver Wave Energy.

The License Areas overlap with the subsea cable route.

6.7.8 *Tourism*

Tourism contributed 5.9 percent towards eThekwini Municipality's GDP in 2015. This was a slight decrease from the previous year which was 6.6 percent. A decreasing trend has been noted of the number of trips by purpose made over the past seven years to eThekwini Municipality. Approximately 79 percent of the Municipality's visitors were domestic, and the other 21 percent were international visitors in the year 2015 (eThekwini Municipality IDP, 2017/2018).

6.7.9 *Marine Traffic*

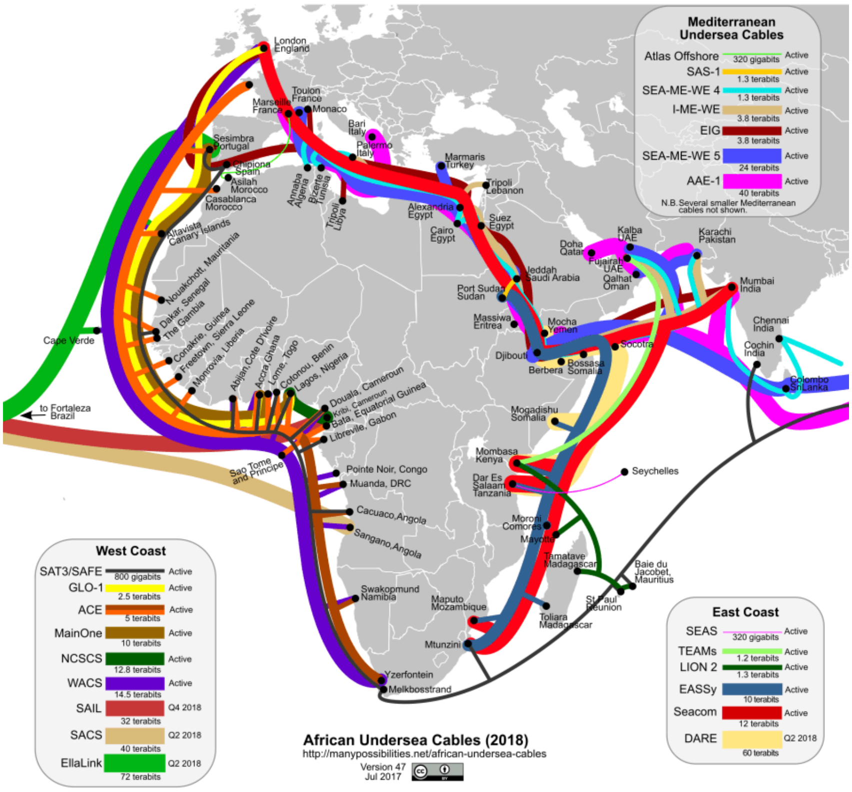
South Africa's major export destinations are as follows: the USA (8.2 percent, China (8.1 percent), Germany (7.6 percent), Japan (4.8 percent and Botswana (4.8 percent). The items generally being exported include precious metals and stones, chemical products, vehicles and transport equipment and mineral products (eThekwini Municipality IDP, 2017/2018).

A large number of vessels navigate along the East Coast on their way around the southern African subcontinent. The majority of this boat 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. The Project Area may overlap with the routes taken by tankers and bulk carriers.

6.7.10 *Subsea cables*

There are a number of other submarine telecommunications cable systems in South African waters (Figure 6-21). The SAExpress, SAFE, EASSy and Seacom subsea cables land at Mtunzini, located approximately 100 km north of Durban.

Figure 6-21 Subsea Cables in Africa



Source: Song, 2018

6.7.11 *Fisheries*

6.7.11.1 *Description of Commercial Fishing Sectors and Fisheries Research Surveys*

South Africa has a coastline that spans two ecosystems over a distance of 3,623 km, extending from the Orange River in the west on the border with Namibia, to Ponta do Ouro in the east on the Mozambique border. The western coastal shelf has highly productive commercial fisheries similar to other upwelling ecosystems around the world, while the East Coast is considerably less productive but has high species diversity, including both endemic and Indo-Pacific species. South Africa's fisheries are regulated and monitored by the Department of Agriculture, Forestry and Fisheries (DAFF). All fisheries in South Africa, as well as the processing, sale in and trade of almost all marine resources, are regulated under the Marine Living Resources Act, 1998 (No. 18 of 1998) (MLRA).

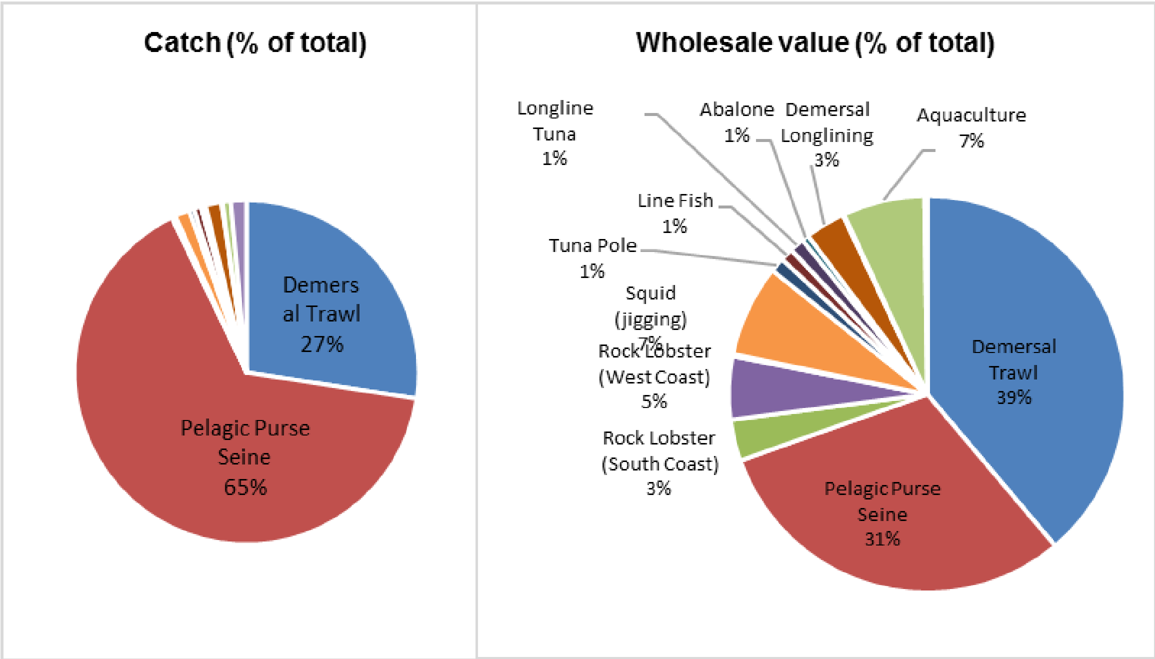
Approximately 14 different commercial fisheries sectors currently operate within South African waters.

Figure 6-22 indicates the proportional volume and value of catch landed by each of these sectors (2016).

Primary fisheries in terms of economic value and overall tonnage of landings 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 whitheadii*).

Highly migratory tuna and tuna-like species are caught on the high seas and seasonally within the South African waters by the pelagic long-line and pole fisheries. Targeted species include albacore (*Thunnus alalunga*), bigeye tuna (*T. obesus*), yellowfin tuna (*T. albacares*) and swordfish (*Xiphias gladius*). The traditional line fishery targets a large assemblage of species close to shore including snoek (*Thyrsites atun*), Cape bream (*Pachymetopon blochii*), geelbek (*Atractoscion aequidens*), kob (*Argyrosomus japonicus*), yellowtail (*Seriola lalandi*) and other reef fish. Crustacean fisheries comprise a trap and hoop net fishery targeting West Coast rock lobster (*Jasus lalandii*), a line trap fishery targeting the South Coast rock lobster (*Palinurus gilchristi*) and a trawl fishery based solely on the East Coast targeting penaeid prawns, langoustines (*Metanephrops andamanicus* and *Nephropsis stewarti*), deep-water rock lobster (*Palinurus delagoae*) and red crab (Chaceon macphersoni). Other fisheries include a mid-water trawl fishery targeting horse mackerel (*Trachurus trachurus capensis*) predominantly on the Agulhas Bank, South Coast and a hand-jig fishery targeting chokka squid (*Loligo vulgaris reynaudii*) exclusively on the South Coast. In addition to commercial sectors, recreational fishing occurs along the coastline comprising shore angling and small, open boats generally less than 10 m in length. The commercial and recreational fisheries are reported to catch over 250 marine species, although fewer than five percent of these are actively targeted by commercial fisheries, which comprise 90 percent of the landed catch.

Figure 6-22 Percentage of Landings by Weight (left) and Wholesale Value (right) of each Commercial Fishery Sector as a Contribution to the Total Landings and Value for all Commercial Fisheries Sectors Combined (2016)



Source: CapMarine 2018, modified from DAFF.

Most commercial fish landings must take place at designated fishing harbours. For the larger industrial vessels targeting hake, only the major ports of Saldanha Bay, Cape Town, Mossel Bay and Port Elizabeth are used.

On the West Coast, St. Helena Bay and Saldanha Bay are the main landing sites for the small pelagic fleets. These ports also have significant infrastructure for the processing of anchovy into fishmeal as well as canning of sardine. Smaller fishing harbours on the West/ South-West Coast include Port Nolloth, Hondeklip and Laaiplek, Hout Bay and Gansbaai harbours.

On the East Coast, Durban and Richards Bay are deployment ports for the crustacean trawl and large pelagic longline sectors. There are more than 230 small-scale fishing communities on the South African coastline, ranging in size from small villages to towns (DAFF, 2016).

6.7.11.2 *Large Pelagic Long Line*

Highly migratory tuna and tuna-like species are caught on the high seas, and seasonally within the South African Exclusive Economic Zone (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*). Tuna, tuna-like species and billfishes are migratory stocks and are therefore managed as a “shared resource” amongst various countries under the jurisdiction of the International Commission for the Conservation of Atlantic Tunas (ICCAT) and the Indian Ocean Tuna Commission (IOTC). In the 1970s to mid-1990s the fishery was exclusively operated by Asian fleets (up to 130 vessels) under bilateral agreements with South Africa. From the early 1990s these vessels were banned from South African waters and South Africa went through a period of low fishing activity as fishing rights issues were resolved. Thereafter a domestic fishery developed and 50 fishing rights were allocated to South Africans only. These rights holders now include a small fleet of local longliners although the fishery is still undertaken primarily with Japanese vessels fishing in joint ventures with South African companies.

There are currently 30 commercial large pelagic fishing rights issued and 21 vessels active in the fishery. During the period 2000 to 2014, the sector landed an average catch of 4 527 tons and set 3.55 million hooks per year.

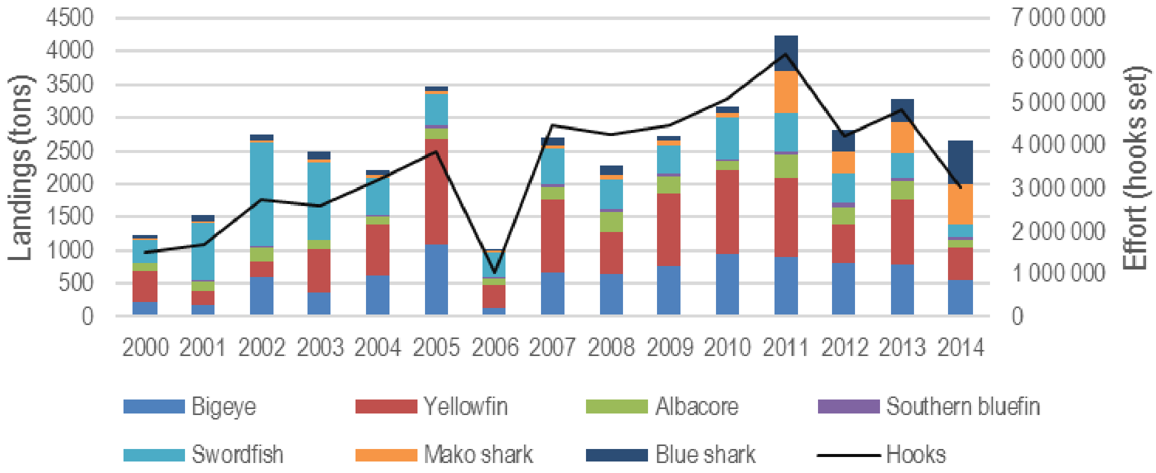
Catch by species and number of active vessels for each year from 2005 to 2014 are given in Table 6.6. Total catch and effort figures reported by the fishery for the years 2000 to 2014 are shown in Figure 6-23.

The fishery operates year-round with a relative increase in effort during winter and spring. Catch per unit effort (CPUE) variations are driven both by the spatial and temporal distribution of the target species. Variability in environmental factors such as oceanic thermal structure and dissolved oxygen can lead to behavioural changes in the target species, which may in turn influence CPUE (Punsly & Nakano, 1992).

Table 6.6 Total Catch (t) and Number of Active Domestic and Foreign-Flagged Vessels Targeting Large Pelagic Species for the period 2005 to 2014 (Source: DAFF, 2016)

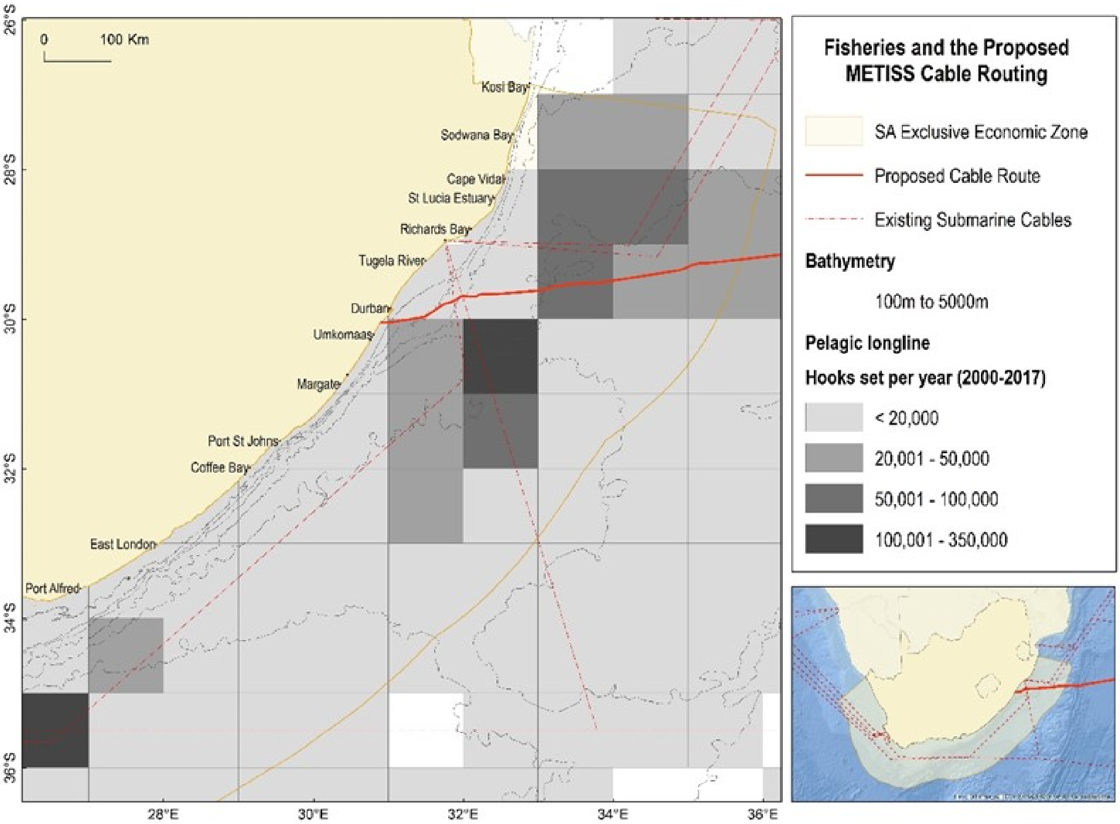
Year	Bigeye tuna	Yellowfin tuna	Albacore	Southern bluefin tuna	Swordfish	Shortfin mako shark	Blue shark	Number of active vessels	
								Domestic	Foreign-flagged
2005	1,077.2	1,603.0	188.6	27.1	408.1	700.1	224.6	13	12
2006	137.6	337.3	122.9	9.5	323.1	457.1	120.7	19	0
2007	676.7	1,086.0	220.2	48.2	445.2	594.3	258.5	22	12
2008	640.3	630.3	340.0	43.4	397.5	471.0	282.9	15	13
2009	765.0	1,096.0	309.1	30.0	377.5	511.3	285.9	19	9
2010	940.1	1,262.4	164.6	34.2	527.7	590.5	311.6	19	9
2011	906.8	1,181.7	338.7	48.6	584.4	645.2	541.6	16	15
2012	822.0	606.7	244.6	78.8	445.3	313.8	332.6	16	11
2013	881.8	1,090.7	291.1	50.9	471.0	481.5	349.0	15	9
2014	543.8	485.8	113.8	31.2	223.1	609.6	573.4	16	4

Figure 6-23 Inter-Annual Variation of Catch Landed and Effort Expended by the Large Pelagic Longline Sector over the Period 2000 to 2014



The fishery operates extensively within the South African EEZ, primarily along the continental shelf break and further offshore. As indicated in Figure 6-24, the proposed subsea cable route coincides with the spatial distribution of pelagic longline fishing effort.

Figure 6-24 Spatial Distribution of National Fishing Effort Expended by the Longline Sector Targeting Large Pelagic Species in Relation to the Subsea Cable Route



Source: CapMarine 2018.

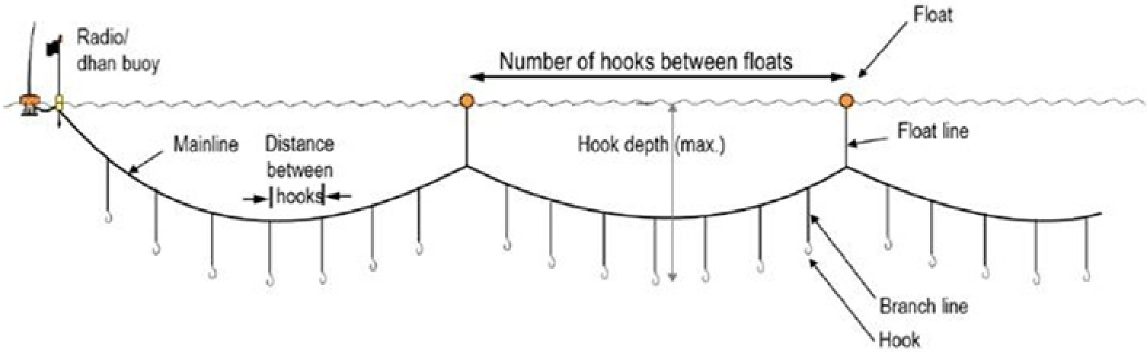
Tuna are targeted at thermocline fronts, predominantly along and offshore of the shelf break. Vessels set a drifting monofilament mainline of up to 100 km length which is suspended from surface buoys and marked at each end. Between radio buoys the mainline is kept near the surface or at a certain depth by means of ridged hard-plastic buoys, (connected via a "buoy-lines" of approximately 20 m to 30 m). The buoys are spaced approximately 500 m apart along the length of the mainline. Up to 3,500 hooks are attached to the mainline on branch lines, (droppers), which are clipped to the mainline at intervals of 20 m to 30 m between the ridged buoys. The main line can consist of twisted tarred rope (6 mm to 8 mm diameter), nylon monofilament (5 mm to 7.5 mm diameter) or braided monofilament (approximately 6 mm in diameter). A line may be left drifting for up to 18 hours before retrieval 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.

Refer to Figure 6-25 for a photograph of a typical surface longline vessel, Figure 6-26 for typical gear configuration and Figure 6-27 for gear components used by the fishery.

Figure 6-25 Photograph of a Typical Large Scale Tuna Longline Vessel

Source: CapMarine 2017.

Figure 6-26 Typical Configuration of Surface Longline Gear Targeting Tuna, Swordfish and Shark Species



Source: IOTC Ross Observer Manual, 2015.

Figure 6-27 Photographs Showing Marker Buoys (left), Radio Buoys (centre) and Monofilament Branch Lines (right)

Source: CapMarine 2015.

6.7.11.3 *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).

Table 6.7 lists the catch of important linefish species for the years 2002 to 2016.

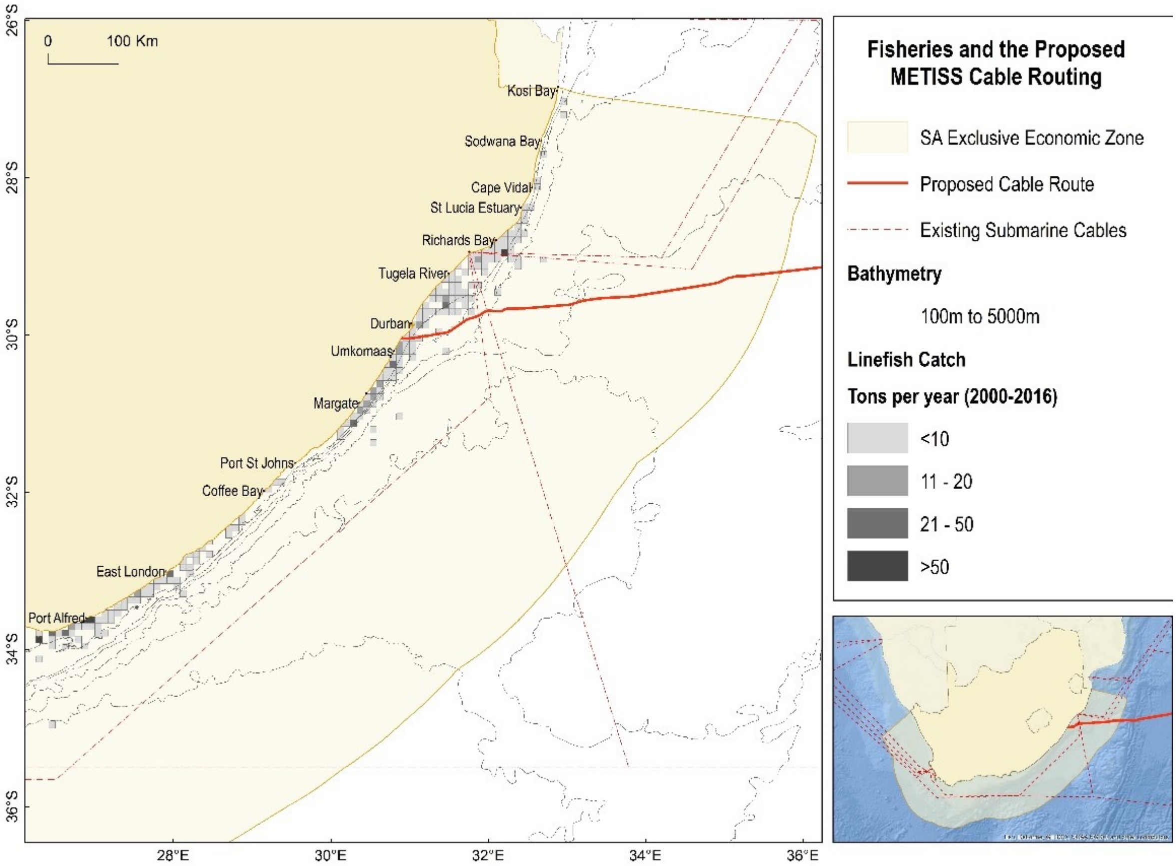
Table 6.7 Annual catch of linefish species (t) from 2002 to 2016 (DAFF, 2018)

	Snoek	Yellowtail	Kob	Carpenter	Slinger	Hottentot Seabream	Geelbek	Santer	Total catch
2002	3,837	242	392	231	101	79	315	48	
2003	4,532	329	272	177	88	106	513	48	
2004	7,278	883	360	228	184	254	672	87	
2005	4,787	739	324	184	169	168	580	84	
2006	3,529	310	400	159	192	87	419	79	
2007	2,765	478	421	265	157	128	448	84	11,841
2008	5,223	313	358	226	194	120	403	82	
2009	6,322	330	442	282	186	184	495	66	14,109
2010	6,360	171	419	263	180	144	408	69	13,688
2011	6,205	204	312	363	214	216	286	62	12,530
2012	6,809	382	221	300	240	160	337	82	11,855
2013	6,690	712	157	481	200	173	263	84	9,142
2014	3,863	986	144	522	201	192	212	74	6,849
2015	2,045	594	121	519	175	142	238	68	4,421
2016	1,643	474	133	690	211	209	246	65	4,289

The traditional line fishery is a boat-based activity and has since December 2000 consisted of 3,450 crew operating from about 450 commercial vessels. The number of rights holders in 2017 is 425 with 2,550 allowable crew (rights are valid until 31 December 2020). The 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. To distinguish between line fishing and longlining, line fishers are restricted to a maximum of 10 hooks per line. Target species include resident reef-fish, coastal migrants and nomadic species.

Annual catches prior to the reduction of the commercial effort were estimated at 16,000 tons for the traditional commercial line fishery. Almost all of the traditional line fish catch is consumed locally. The fishery is widespread along the country's shoreline from Port Nolloth on the West Coast to Cape Vidal on the East Coast (Figure 6-28).

Figure 6-28 Spatial Distribution of Fishing Effort Expended by the Traditional Linefish Sector in Relation to the Subsea Cable Route



Source: CapMarine 2018.

Effort is managed geographically with the spatial effort of the fishery divided into three zones. Zone A extends from Port Nolloth to Cape Infanta, Zone B extends from Cape Infanta to Port St Johns and Zone C covers the KwaZulu-Natal region. *Table 6.8* lists the annual Total Allowable Effort (TAE) and activated effort per linefish management zone from 2006 to 2012.

Table 6.8 Annual Total Allowable Effort (TAE) and Activated Effort per Linefish Management Zone from 2006 to 2012 (DAFF, 2016)

Total TAE boats (fishers). Upper limit: 455 boats or 3450 crew			Zone A: Port Nolloth to Cape Infanta		Zone B: Cape Infanta to Port St Johns		Zone C: KwaZulu-Natal (Sikombe River to Ponto da Ouro)	
Allocation	455 (3,182)		301 (2,136)		103 (692)		51 (354)	
Year	Allocated	Activated	Allocated	Activated	Allocated	Activated	Allocated	Activated
2006	455	385	301	258	103	78	51	49
2007	455	353	301	231	103	85	51	37
2008	455	372	301	239	103	82	51	51
2009	455	344	300	222	104	78	51	44
2010	455	335	298	210	105	82	51	43
2011	455	328	298	207	105	75	51	46
2012	455	296	298	192	105	62	51	42

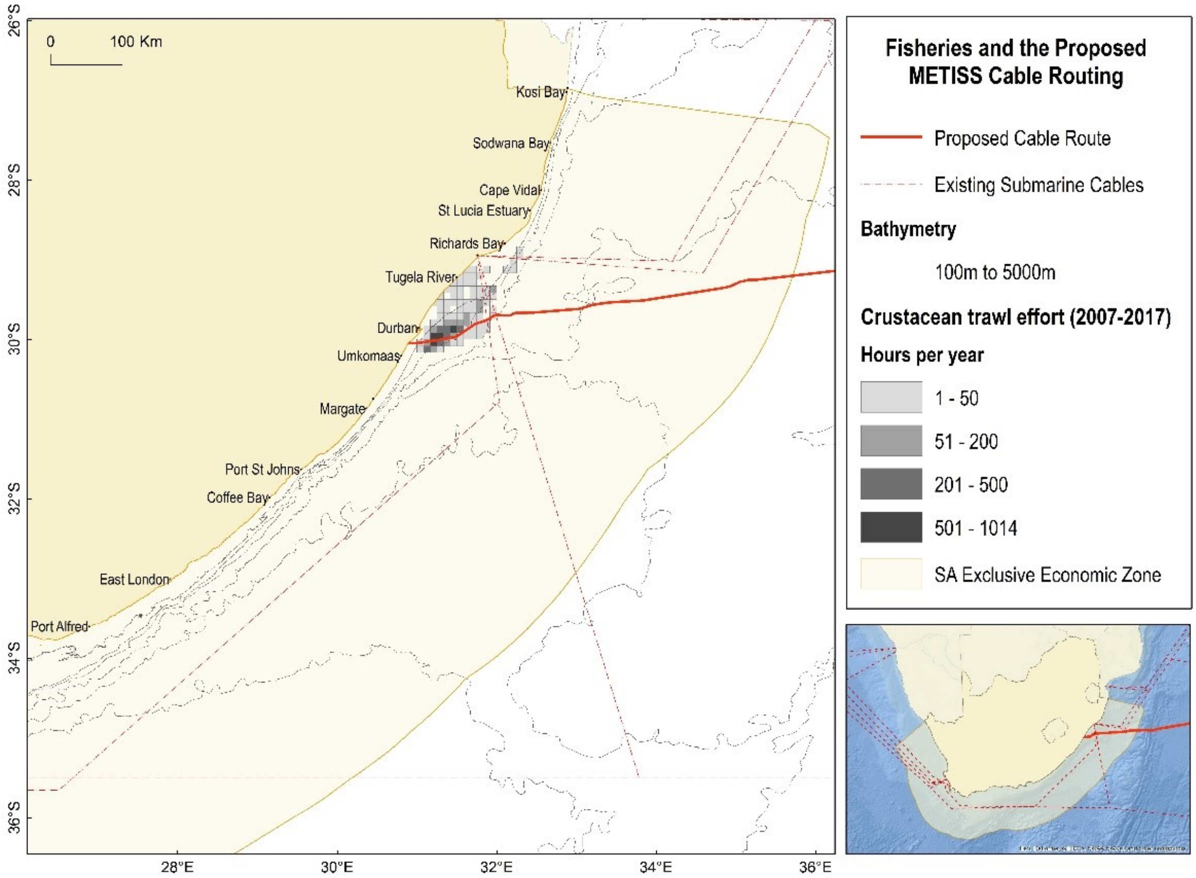
Most of the catch (up to 95 percent) is landed by the Cape commercial fishery, which operates on the continental shelf from the Namibian border on the West Coast to the Kei River in the Eastern Cape. Fishing vessels of between 4.5 m and 11 m in length generally range up to a maximum offshore distance of about 70 km, although fishing at this outer limit is sporadic. The spatial distribution of line-fishing effort coincides with inshore areas the proposed cable routing.

6.7.11.4 *Crustacean Trawl*

South Africa's crustacean trawl fishery operates exclusively within the province of KwaZulu-Natal (KZN). Also referred to as the KwaZulu-Natal prawn trawl sector, the fishery comprises two components; a shallow-water (5 to 40 m) fishery on the Thukela Bank and at St Lucia in an area of roughly 500 km^2, and a deep-water fishery (100 to 600 km) between Cape Vidal in the north and Amanzimtoti in the south. Figure 6-29 shows the location of fishing grounds which coincides with the proposed subsea cable route.

In combination, the shallow- and deep-water fisheries operate over an area of approximately 1,700 km^2 along the edge of the continental shelf. The inshore and offshore sectors differ not only according to the fishing grounds in which they operate but also according to their targeted species and gear types.

Figure 6-29 Spatial Distribution of Fishing Effort Expended by the Crustacean Trawl Sector in Relation to the Subsea Cable Route



Source: CapMarine 2018

The inshore fishery is based on white prawns (*Fennereopenaeus indicus*), tiger prawns (*Penaeus monodon*) and brown prawns (*Metapenaeus monoceros*) which occur on the shallow water mud banks along the north east coast of KZN.

There are few areas within the habitat distribution of penaeid prawns that are suitable for trawling due to the steep slope of the continental shelf on the East Coast. The shelf widens between Durban and Richards Bay to form the Tugela Bank – a muddy/sandy area relatively sheltered from the fast-flowing Agulhas current. The inshore fishery operates on the Tugela Bank in water depths of up to 50 m and within 10 nautical miles of the shore. There is a seasonal closure of the Tugela Bank grounds in order to minimize high bycatch levels, therefore trawlers operate only within these inshore grounds during the period March to August. During Southern Hemisphere summer month's activity shifts northwards towards St Lucia, where the fishery targets bamboo prawns (*Penaeus japonicus*) in addition to the previously-mentioned species. The prawn species on which the inshore fishery is based are fast-growing and are dependent on estuarine environments during the early phase of their life cycle. As juveniles they recruit onto the mud banks where they mature and reproduce. The catch composition within the fishery typically comprises 20 percent prawn species, while approximately 10 percent of the remainder of the catch is also retained for its commercial value and includes crab, octopus, squid, cuttlefish and linefish. The remainder of the catch is discarded.

The deep-water fishery operates between water depths of 100 m and 600 m 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 (*Haliporoides triarthus*) and red prawns, langoustines (M*etanephrops 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.

The fishery is managed using a Total Applied Effort (TAE) strategy, which limits the number of vessels permitted to fish on the inshore and offshore grounds. Currently there are five vessels operating within the inshore grounds and two vessels restricted to working in the offshore grounds. The fleet comprises steel-hulled vessels ranging in length from 25 to 40 m and up to a Gross Registered Tonnage (GRT) of 280 tons. All are equipped with GPS, echosounders, radar and VHF/SSB radio. Most vessels are single otter trawlers, deploying nets from the stern or side at a speed of two to three knots. Trawl net sizes range from 25 m to 72 m footrope length, with a minimum mesh size of 60 mm. The duration of a typical trawl is four hours. Trip lengths range from three to four weeks and vessels may carry a crew of up to 20.

Figure 6-30 Photograph of a Typical Crustacean Trawl Vessel

Source: Oceanographic Research Institute

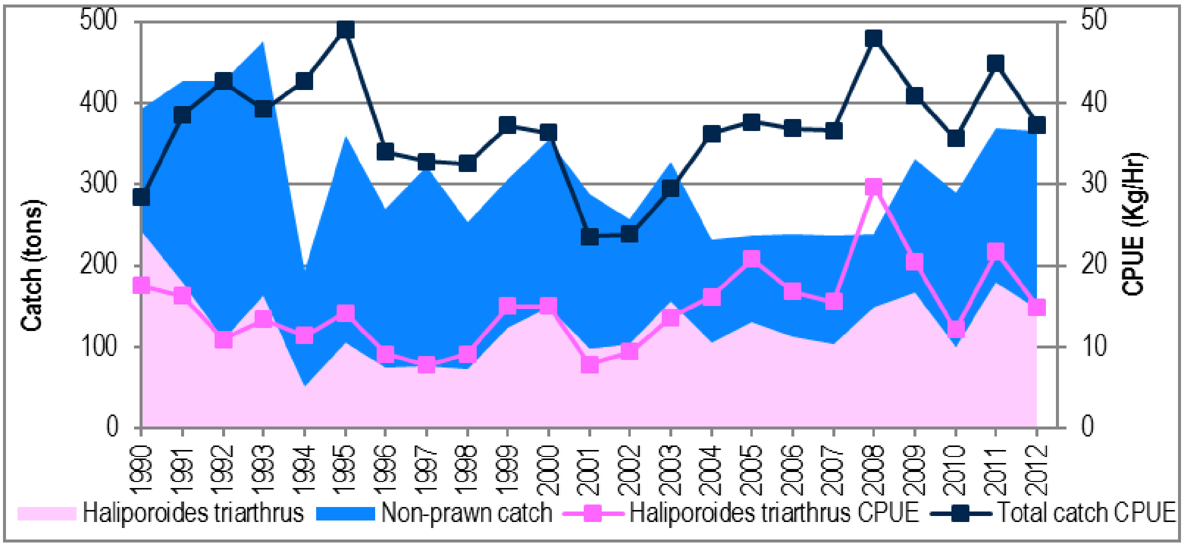
Table 6.9 below lists the catch by species group of the prawn trawl fishery from 2000 to 2016. Annual and monthly catch and effort for the deep-water sector over the period 1990 to 2012 is shown in Figure 6-31 and Figure 6-32, respectively.

Table 6.9 Annual Total Annual catch of the KZN prawn trawl fishery (t)

		Total catch (t)						
		Inshore fishery	Offshore fishery				Both fisheries	
Year	TAE (no. of permits)	Shallow-water (all prawns)	Deep-water (all prawns)	Langoustine	Red crab	Rock lobster	Landed by-catch	Total catch
2000		107	142	76	53	10	34	422
2001		63	103	80	54	8	4	313
2002		93	102	56	28	9	10	298
2003		29	162	60	40	5	91	387
2004		40	116	42	24	4	82	308
2005		33	140	42	31	4	88	339
2006		21.3	123	49	31	4.7	47	276
2007	7	17.6	79.2	53.2	24.1	5.3	46.9	226.3
2008	7	9.2	104.6	31.4	17.0	4.7	34.9	201.8
2009	7	7.7	196.7	59.8	20.9	9.7	53.4	267.8
2010	7	7.3	172	51.2	23.2	22	69.4	345.1
2011	7	9.6	150.1	79.2	19.7	22.7	63.2	344.5
2012	7	7.6	153.4	81.6	21.6	18.5	71.4	354.1
2013	7	1.7	103.3	61.5	12.0	8.1	34.4	221.0
2014	7	0.3	149.6	56.2	11.5	4.9	25.2	247.7
2015		0	118.0	72.8	55.9	6.3	48.1	301.1
2016		0	115.0	32.5	42.5	4.3		

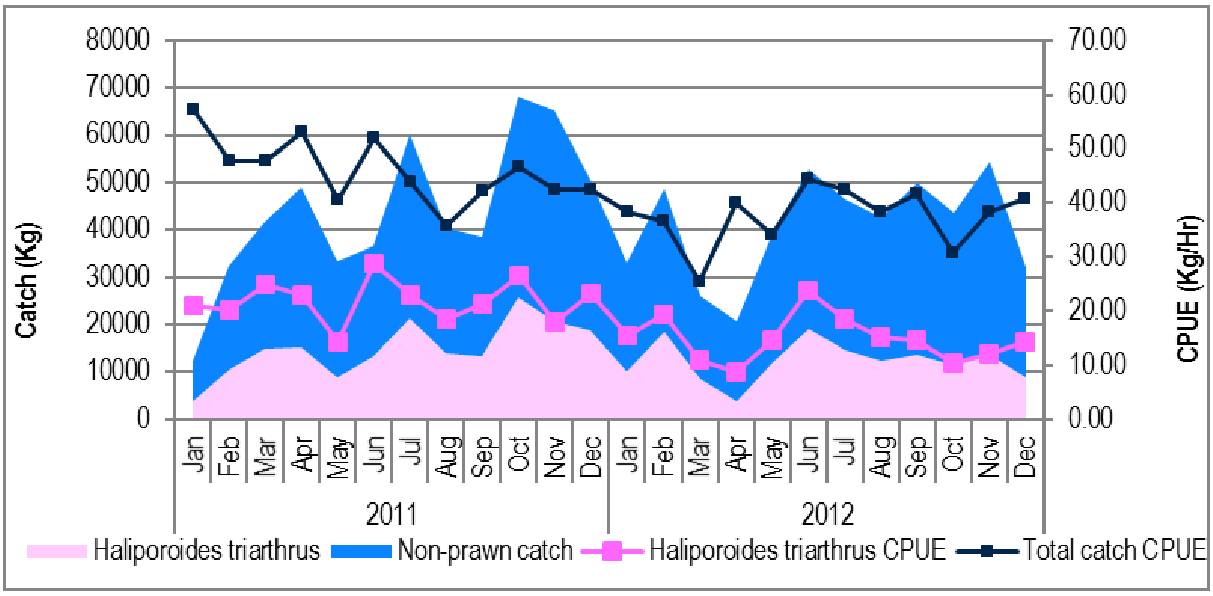
Source: DAFF, 2016

Figure 6-31 Annual Catch and Effort for the Deep-Water Trawl Fishery (1990 to 2012)



Source: Capmarine, 2018

Figure 6-32 Monthly Catch and Effort for the Deep-Water Trawl Fishery (1990 to 2012)



Source: Capmarine, 2018

6.7.12 *Cultural Heritage and Archaeology*

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 2,500 vessels are recorded as having been wrecked, sunk, abandoned or scuttled in South African waters since the early 1500s.

This list is not complete and does not include the as yet unproven potential for shipwrecks and other sites that relate to pre-European, Indian Ocean maritime exploration, trade and interactions along the South African east coast. It is thus anticipated that further research in local and foreign archives, together with physical surveys to locate the remains of historical shipwrecks would produce a final tally of more than 3,000 wrecks in South African waters.

More than 1,900 of the wrecks currently recorded in South African waters are older than 60 years and are thus protected by the National Heritage Resource Act (NHRA) as archaeological resources.

This section considers those maritime and underwater cultural heritage resources in the vicinity of the proposed subsea cable route which are located below the high water mark, namely submerged prehistoric resources and historical shipwrecks.

6.7.12.1 *Submerged Prehistory of the Amanzimtoti Area*

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

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

Rugged and linear aeolianite shoals like the Protea Banks and Aliwal Shoal form prominent features on the KZN shelf and Cawthra *et al,* (2012) also recently identified aeolianite deposits off of The Bluff in Durban.

These aeolianite deposits form a succession of shore-parallel reef systems extending to depths in excess of 100 m below mean sea level. They are linked to global Quaternary sea level fluctuations and are thought to represent Late Pleistocene palaeocoastlines. They formed as coastal dunes associated with barrier beaches and are interpreted as submerged coastal dune cordons (Martin and Flemming, 1988; Bosman *et al*, 2005; Cawthra *et al,* 2012). Martin and Flemming (1988) suggest that they were formed during the last glacial, between 120,000 and 30,000 years ago. An Infrared Stimulated Luminescence age of 60 ka obtained by Cawthra *et al,* (2012) supports this dune building during the Marine Isotope Stage 4, last glacial period. Coastal dunes are a known focus of pre-colonial human activity, and sites are often found in dune slacks which provide shelter from the prevailing wind. It is possible, therefore, that there will be archaeological sites and material associated with the aeolianite deposits off the KZN coast, although such material has not yet been identified.

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

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

6.7.12.2 *Shipwrecks*

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

The South African coast is rugged and the long fetch and deep offshore waters mean that the force and size of seas around the South African coast are considerable, a situation exacerbated by prevailing seasonal winds.

The geographical position of the South African coast on the historical route to the East and the physical conditions mariners could expect to encounter in these waters have, in the last five centuries, been responsible for the large number of maritime casualties which today form the bulk of South Africa's maritime and underwater cultural heritage (Gribble, 2002).

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

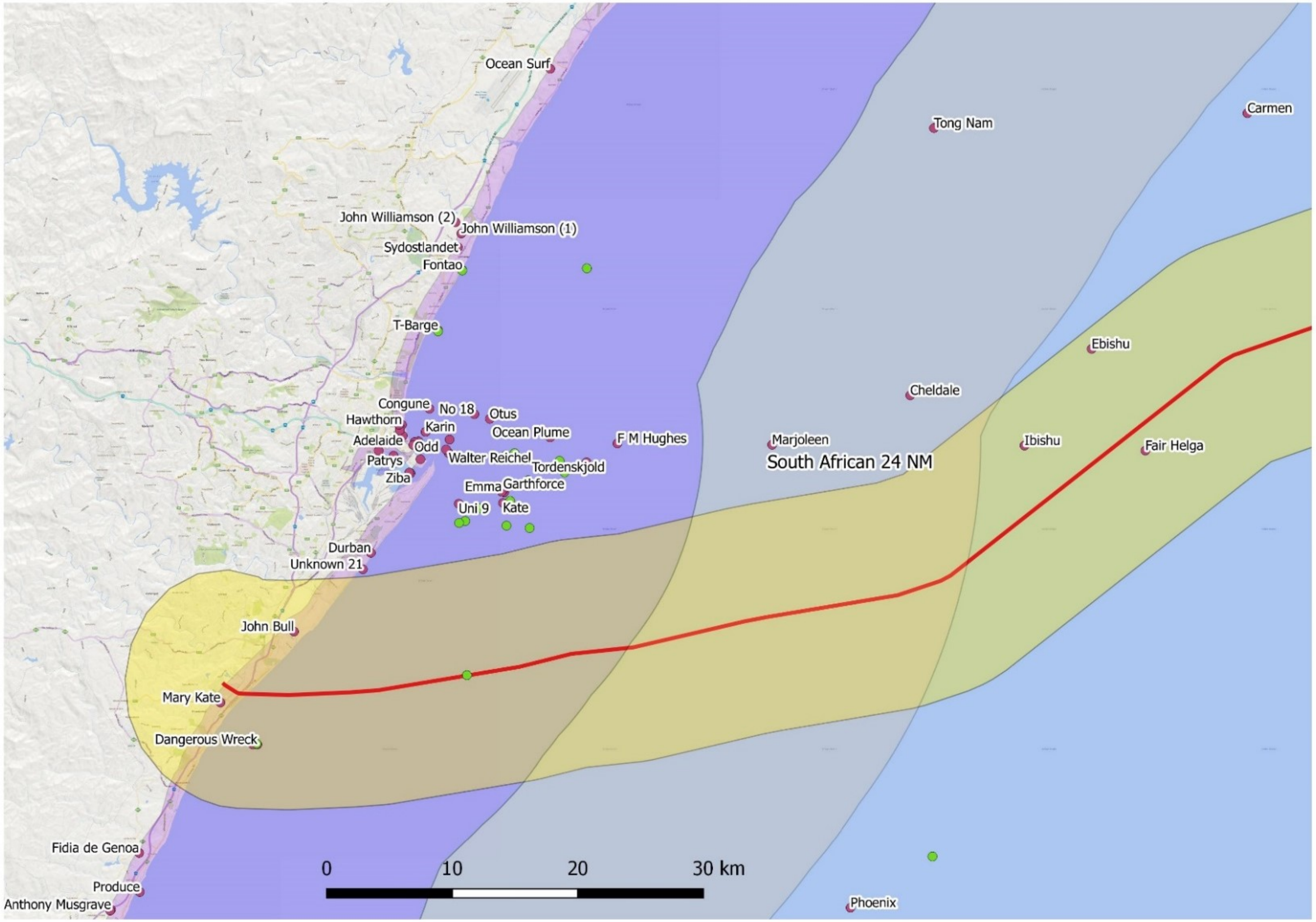
The more than 2,500 historical shipwrecks that make up the bulk of South Africa's underwater cultural heritage are a thus huge, cosmopolitan, repository of information about mainly global maritime trade during the last five centuries and potentially much further back into the past. These sites contain a wealth of cultural material associated with that trade and clues to the political, economic, social and cultural changes that accompanied this trade and which contributed to the creation of the modern world.

There are at least 170 recorded wrecks in the immediate vicinity of Durban. In addition, the remains of nearly a dozen whalers and other vessels that were scuttled during the 20th century are charted by the SANHO to the east and south-east of Durban (Figure 6-33). These positions for these charted wrecks are relatively accurate, but those available for most of the historical shipwrecks are less so.

Figure 6-33 below illustrates the 20 km study area where the subsea cable will be running (yellow polygon). The green points indicate unnamed SANHO charted wrecks. The green point on the subsea cable route is the SANHO "Position Approximate" of one of the wrecks described in the text above. It must be noted that the number of wrecks shown around Durban is not a true reflection of the total number known.

Sidescan Sonar Data will be used to identify any wrecks within the vicinity of the proposed cable prior to installation. The subsea cable route will be designed to avoid any known or identified wrecks.

Figure 6-33 Known and Recorded Wrecks in the Subsea Cable Route Maritime Archaeological Study Area within 24 Nautical Miles of the Coastline



Source: ACO Associates CC, 2018

7. IDENTIFICATION OF IMPACTS

7.1 Overview

The preliminary identification and consideration of the ways in which the Project may interact (both positively and negatively) with environmental and socio-economic resources or receptors forms a key part of the Scoping phase of the EIA Process. The impacts that are identified as potentially significant during the screening and scoping provide the focus for the studies during the Impact Assessment. Each of the identified potentially significant impacts will be discussed and assessed in more detail in the EIA Report.

This section describes the potential environmental and social impacts that may result from the Project as identified through the scoping process.

The following sources of information have been used in the identification of potential impacts:

- Site visit
- Preliminary understanding of the baseline environmental and social conditions;
- Review of available information about the environmental effects of subsea cable systems in other areas;
- Specialist inputs including fisheries and marine ecology; and
- Discussions with local experts, authorities and members of the Project team.

It should be noted that many of the impacts associated with the subsea component of the cable will be common to subsea cable systems all over the world. The identification of these impacts is based on experience, international research, and understanding of the interaction between subsea cables and the marine environment.

As indicated in the preceding section which describes the pre-installation activities, the design and proposed layout of the subsea cable system has taken into account areas of potential sensitivity (such as deep water trenches, protected areas, and busy harbours). Such areas are generally not suitable for subsea cable burial in any case as the cable may be exposed to the risk of damage and/or breakage. In addition, the preferred choice of landing site avoids sand dunes and other sensitive coastal habitats, relying on existing servitudes and infrastructure to reduce further disturbance to the natural environment.

The Project, therefore, includes considerable embedded mitigation. It is, nevertheless, important to systematically identify and analyse the potential negative and positive environmental effects of the Project to ensure that adverse impacts are avoid or minimised, and adequately balanced by the benefits of the Project.

The potential impacts on environmental and social resources arising from the proposed development include both permanent and temporary direct and indirect impacts within distinct marine and terrestrial contexts. Potential impacts are identified and evaluated within the Project stages. These stages are identified as follows:

- *Installation:* installation of the subsea cable offshore, the shore crossing, construction of the Beach Manhole (BMH) and terrestrial cable.
- *Operation:* operation of the subsea cable system and associated infrastructure.
- *Maintenance and/or Decommissioning:* maintenance relates to the infrequent requirement to repair subsea cable system damage. Decommissioning (or recovery) relates to final recovery of the subsea cable system (if applicable).

Table 7.1 provides an overview of likely aspects arising from each of the key Project activities and considers their likely interaction with socioeconomic and environmental resources and receptors.

It should be noted that the impacts, particularly in the marine environment, will be mainly associated with the installation activities.

Table 7.1 Project Aspects and Potential Interactions with Resources and Receptors

Receptor / Resource	Installation Phase[12]		Operational Phase	Maintain / Decommission
	Terrestrial Construction	Subsea Cable Pre-Installation and Installation Activities		
Dust				
Noise				
Waste Management Infrastructure				
Climate Change				
Air Quality				
Road Traffic				
Hazardous Waste Management				
Vibration				
Heat				
Radiation				
Marine Water Quality				
Seabed And Benthos				
Heritage / Archaeology				
Terrestrial Environment				
Marine And Coastal Environment				
Fisheries				
Tourism				
Shipping				
Socio-Economic				
Risk of Accidents Resulting in Pollution or Hazard				
Worker And Public Safety				

7.2 Screening of Impacts

The following section describes potentially significant impacts based on the issues and concerns identified during the Scoping process. It is likely that many of these impacts can be adequately addressed through the implementation of appropriate mitigation and management measures, however, some require further specialist investigation as indicated.

The preceding Section 7.1 highlights a number of potentially significant impacts associated with the Project.

[12] Onshore construction activities are included as part of the Installation Phase of the Project

One of the purposes of Scoping is to offer a preliminary, qualitative assessment of potential environmental and social impacts associated with the Project, thereby ensuring that those impacts that are potentially significant are assessed in the EIA Phase.

Impacts to the following resources and receptors have been identified as potentially significant.

- Dust;
- Noise;
- Air Quality and Climate Change;
- Road Traffic;
- Waste Management Infrastructure;
- Seabed characteristics;
- Water quality;
- Heritage and archaeology;
- Terrestrial ecology;
- Coastal processes;
- Marine and coastal ecology;
- Fisheries;
- Tourism;
- Shipping;
- Socio-economic
- Health and safety; and
- Accidental spills.

Of these impacts dust, noise, road traffic, waste production, shipping and health and safety are temporary impacts associated with the installation phase. Given the relatively small scale of construction/ installation activities, these impacts are regarded as not significant and should be adequately controlled through the implementation of standard environmental management measures that will be included in the EMPr.

Potential impact on climate change; seabed characteristics, seawater quality; marine and coastal ecology; fisheries; terrestrial ecology; coastal processes; heritage and archaeology; tourism and socio-economic aspects of the subsea cable system where identified as requiring detailed impact assessment. These impacts will, therefore, be subject to further investigation and are described below. Marine and coastal ecology; fisheries; terrestrial ecology and coastal processes; heritage and archaeology aspects require specialist studies during the Impact Assessment phase and will be subject to a formal significance assessment.

7.2.1 *Climate Change*

There are climate change implications from the burning of fossil fuels by the Project vessels and construction vehicles and machinery. The significance of this impact will be assessed further in the Impact Assessment.

7.2.2 *Seabed Biophysical Characteristics*

The pre-lay grapnel run, subsea cable installation and any cable repairs have the potential to affect the ocean floor environment.

The impact of these activities would depend on the seabed conditions in the vicinity of the subsea cable. This impact is common to subsea cables throughout the world and the effects are reasonably well understood.

Further information in this regard and a general assessment of significance will be provided in the EIA Report. Specific requirements for installation will be identified in the EMPr developed during the Impact Assessment phase.

7.2.3 *Seawater Quality*

During subsea cable laying, repair and recovery there may be an increase in turbidity caused by disturbance to the sediment by the tools used for burial and maintenance activities.

Pollution from the vessel as a result of an unintentional discharge or oil spill may also have a localised effect on marine water quality. This may, in turn, impact marine life (including static species and species especially sensitive to changes in water quality).

This impact is common to subsea cables throughout the world and the effects are reasonably well understood. Further information in this regard and a general assessment of significance will be provided in the EIA Report. Specific mitigation measures will be identified in the EMPr developed during the Impact Assessment phase.

7.2.4 *Marine and Coastal Ecology*

The potential effects on marine and coastal ecology from subsea cable installation may include:

- Direct physical damage to marine species from grappling, ploughing, subsea cable movement, anchoring and seabed disturbance by vessels;
- Direct disturbance of coastal species from trenching;
- Deposition of displaced sediment on marine and coastal organisms; and
- Indirect disturbance, displacement and exclusion of sensitive fauna as a result of noise and vibration.

In addition to disturbance of ecological conditions on the seabed, there is limited potential for interaction between the vessels and marine mammals and turtles, including potential injury due to a collision.

The above potential impacts are common to subsea cables throughout the world and are reasonably well understood.

Further information in this regard and a general assessment of significance will be provided in the EIA Report. Specific mitigation measures will be identified in the EMPr developed during the Impact Assessment phase.

7.2.5 *Fisheries*

There is a potential impact on fisheries as a result of fishing and subsea cable vessel activity, as well as fixed and towed equipment, nets and lines deployed by fishermen during installation. Submerged nets and lines can become entangled with towed equipment and subsea cables, leading to equipment loss or damage, and lost time for both parties.

In shallower waters (< 1,000 m water depth), the subsea cable will be buried to a target burial depth of 1 m to provide additional protection in areas where the cable is perceived to be at higher risk to external threats.

This is a common risk with subsea cables and further information in this regard and a general assessment of significance will be provided in the EIA Report. Specific mitigation measures will be identified in the EMPr developed during the Impact Assessment phase.

There is a legal requirement in terms of the Marine Traffic Act No. 2 of 1981 for an exclusion zone of one nautical mile (approximately 1.85 km) on either side of subsea cables that would be applicable to the Project during operations. Whether this exclusion zone is formally declared and enforced through any other agreements or contracts is at the discretion of the parties involved.

7.2.6 *Terrestrial Ecology*

The choice of the preferred landing site and the route of the terrestrial cable from the BMH to the cable station site specifically minimises the clearance of sensitive vegetation. The BMH will be placed within an existing parking lot, however the cable route does pass through a section of KZN Coastal Lowlands (forest) vegetation, before connecting to the existing infrastructure.

A specialist study focussed on terrestrial flora and fauna will be undertaken during the Impact Assessment phase in order to assess impacts further.

7.2.7 *Coastal Processes*

The digging of the shore crossing trench may result in a minor, temporary disturbance to coastal processes such as longshore sediment transport.

Trench digging may also temporarily introduce additional sediment into the coastal system and cause an increase in the number of suspended sediments (ie, turbidity) which, in turn, may impact marine flora and fauna (as described above). The subsea cable itself may become exposed due to sediment transfer or beach erosion (in severe storms). The cable is planned to be buried on the beach to target 2 m, or until bedrock, to reduce this risk. This is a common risk with subsea cables and further information in this regard and a general assessment of significance will be provided in the EIA Report. Specific mitigation measures will be identified in the EMPr developed during the Impact Assessment phase.

7.2.8 *Heritage/Archaeology*

The risks to heritage sites are a result of physical penetration of the surface during excavation on land or by trench ploughing and burial of the subsea cable offshore.

The landing site is not known to have any significant areas of archaeological interest at this stage. Specific procedures that must be followed if there are chance finds during the installation activities will be identified as part of the EMPr.

Offshore impacts on heritage relate to the presence of shipwrecks and associated objects on the seabed. The presence of wrecks is normally identified during the initial desktop study and confirmed during the marine survey. The route of the subsea cable will always be adjusted to avoid wrecks. For this Project, the subsea cable has some wrecks near the cable route and this will need to be confirmed by a specialist study during the Impact Assessment phase.

7.2.9 *Tourism*

Amanzimtoti is a popular holiday destination. There are likely to be temporary implications to the local tourism industry by the Project vessels, vehicles and machinery during the installation of the cable. The significance of this impact will be assessed further during Impact Assessment phase due to stakeholder concerns.

7.2.10 *Socio – Economics*

The main positive impact of the Project will be experienced during the operational phase. Improved data transmission is likely to benefit a broad range of individuals, communities and businesses throughout South Africa. More vulnerable and needy groupings, such as schools, entrepreneurs and small businesses, may be able to make use of a previously unaffordable resource to improve knowledge, skills, networking, and economic development. The distribution and enhancement of these benefits are facilitated by the ‘open access’ nature of the subsea cable system which allows any licensed telecommunications company to make direct use of the subsea cable. These direct and indirect social benefits associated with the Project are very difficult to quantify and assess but it is, nevertheless, important that these be considered alongside the negative impacts that will be presented and assessed in the assessment process. Further comment in this regard will be included in the EIA Report.

7.2.11 *Accidental Spills*

Accidental spills may occur due to the operation of construction machinery during the installation of the terrestrial portion of the cable. Measures to reduce the likelihood of spills, as well as the occurrence of these spills will be described in the EMPr.

7.3 Cumulative Impacts

There is limited potential for cumulative impacts associated with the Project given the uniqueness of this type of development and its relatively environmentally benign nature beyond the installation phase.

A cumulative impact associated specifically with the preferred site affects the fishing industry that would be impacted by the potential for an additional exclusion zone. This could be inconvenient for the fishermen and may have negative commercial consequences.

From a purely environmental perspective, an additional exclusion zone does contribute to protection of marine resources, although the relatively narrow corridor to which the exclusion would apply would not make this positive impact particularly significant. The impact on the fishing industry needs to be weighed against the risks associated with the concentration of subsea cables at a single gateway (ie, lack of redundancy in the event of cable damage).

8. PLAN OF STUDY FOR EIA

8.1 Introduction

The purpose of the Impact Assessment phase of the EIA process is:

- To address issues that have been raised during scoping;
- Describe and assess alternatives to the proposed activity in a comparative manner;
- Identify, describe and assess identified significant impacts; and
- Formulate mitigation measures.

An outcome of screening and scoping is the Plan of Study for EIA Report. This Chapter provides the proposed Plan of Study for the Impact Assessment and is structured as follows:

- Overview of the Impact Assessment phase;
- Planned specialist studies;
- Impact Assessment methodology;
- Proposed structure of the EIA Report; and
- Provisional schedule for the EIA process.

8.2 Overview of Impact Assessment Phase

Once the public comment period for the Draft Scoping Report has concluded, and the public comments have been addressed, the Final Scoping Report will be submitted to the Department of Environmental Affairs (DEA) for consideration. This represents the end of the Scoping phase of the EIA process. The subsequent Impact Assessment phase is described in more detail below.

8.2.1 *Impact Assessment*

Following scoping, the EIA team will:

- Update and finalise the technical Project description as design s refined, working closely with Project's technical team to confirm information such as the final facility layout, subsea and terrestrial cable routing and construction and operation plans;
- Conduct additional stakeholder engagement and further refine the scope of the EIA Report as necessary;
- Collect additional baseline data through desktop research and field studies in the Project Area to complete the comprehensive description of the environmental and social conditions;
- Undertake an impact assessment of the Project activities interactions with the environmental and social resources and receptors;
- Develop mitigation and enhancement measures and organise the information into an Environmental Management Programme (EMPr) including an approach for monitoring; and
- Report findings in a comprehensive EIA Report.

8.2.2 *Public Participation Activities*

During the Impact Assessment Phase, the following stakeholder engagement activities will be undertaken:

- The Draft EIA Report will be disclosed for a 30 day comment period to stakeholders and the relevant authorities.

- A notification letter will be sent to registered I&APs on the Project database to solicit to comment on the Draft EIA Report.
- The Final EIA Report will then be compiled and submitted to the DEA for decision-making. All comments made during the commenting period will be added to the existing Comments and Responses Report, and attached to the Final EIA Report as an Appendix.
- I&APs will be notified of the Environmental Authorisation and the statutory appeal period.

8.2.3 *Authority Interaction*

Authority consultation is integrated into the public consultation process, with additional one-on-one meetings held with the lead authorities where necessary. The competent authority (national DEA) as well as other lead authorities have, and will be consulted at various stages during the EIA process, for example during the commenting period of the Scoping stage as well as the Impact Assessment Stage.

8.3 Specialist Studies

A number of issues have been identified through scoping and the following specialist studies have been identified to address the key issues raised:

- Fisheries;
- Maritime Heritage;
- Marine and Coastal Ecology; and
- Terrestrial Ecology.

The appointed specialists will gather data relevant to identifying and assessing environmental impacts that might occur as a result of the proposed Project (Table 8.1). They will assist the Project team in assessing potential impacts according to a predefined assessment methodology. Specialists will also suggest ways in which negative impacts could be avoided or reduced and how positive benefits could be enhanced.

The results of the specialist studies will be integrated into the EIA Report during the Impact Assessment phase.

Table 8.1 Terms of Reference for Specialist Studies

Study	Scope	Terms of Reference
Maritime Heritage and Archaeology	Determine the archaeological and paleontological impacts associated with the construction and installation Phase of the Project.	• Details of the person who prepared the report, and the expertise of that person to carry out the specialist study or specialised process • A declaration that the person is independent. • An introduction that presents a brief background to the study and an appreciation of the requirements stated in the specific terms of reference for the study. • A short literature review to produce a heritage baseline description • Contribution from a maritime heritage specialist to identify potential locations of maritime archaeology offshore of Amanzimtoti. • Details of the approach to the study where activities performed and methods used are presented. • A description of the findings and potential implications of such findings on the impact of the proposed Project. • Suggested mitigation measures and monitoring recommendations. • A description of any assumptions made and any uncertainties or gaps in knowledge

Study	Scope	Terms of Reference
Marine Ecology	Determine the marine and coastal ecological impacts associated with the construction and installation Phase of the Project.	• Details of the person who prepared the report, and the expertise of that person to carry out the specialist study or specialised process • A declaration that the person is independent. • An introduction that presents a brief background to the study and an appreciation of the requirements stated in the specific terms of reference for the study. • A short literature review of existing secondary data • A baseline description of the marine and coastal environment within the vicinity of the proposed Project (in territorial waters of South Africa) • Details of the approach to the study where activities performed and methods used are presented. • A description of the findings and potential implications of such findings on the impact of the proposed Project. • Suggested mitigation measures and monitoring recommendations. • A description of any assumptions made and any uncertainties or gaps in knowledge
Fisheries	Determine the impacts on fisheries associated with the construction and installation Phase of the Project.	• Details of the person who prepared the report, and the expertise of that person to carry out the specialist study or specialised process • A declaration that the person is independent. • An introduction that presents a brief background to the study and an appreciation of the requirements stated in the specific terms of reference for the study. • A short literature review of existing fisheries spatial and temporal catch and effort data • A baseline description of the current commercial fisheries operating within the vicinity of the proposed Project (in territorial waters of South Africa) • Details of the approach to the study where activities performed and methods used are presented. • The specific identified sensitivity of commercial fishing sector related to the proposed Project. • A map superimposing the proposed subsea cable routing within South African territorial waters, as well as within the EEZ (with appropriate buffers), on the spatial distribution of catch and effort expended by each fishing sector. • A description of the findings and potential implications of such findings on the impact of the proposed Project. • Suggested mitigation measures and monitoring recommendations. • A description of any assumptions made and any uncertainties or gaps in knowledge.

Study	Scope	Terms of Reference
Terrestrial Ecology and Coastal Processes	Determine the impacts on terrestrial ecology associated with the construction and installation Phase of the Project.	• Details of the person who prepared the report, and the expertise of that person to carry out the specialist study or specialised process • A declaration that the person is independent. • An introduction that presents a brief background to the study and an appreciation of the requirements stated in the specific terms of reference for the study. • A baseline description of the current terrestrial ecology of the proposed terrestrial cable route and an alternative route, based on a site visit. • Summary of legal requirements related to terrestrial ecology in the context of the proposed Project. • Details of the approach to the study where activities performed and methods used are presented. • The specific identified sensitivity of terrestrial ecology related to the proposed Project. • Relevant vegetation and sensitivity maps. • A description of the findings and potential implications of such findings on the impact of the proposed Project. • Suggested mitigation measures and monitoring recommendations. • A description of any assumptions made and any uncertainties or gaps in knowledge.

8.4 Impact Assessment Methodology

An EIA process methodology should minimise subjectivity as far as possible and accurately assess the Project impacts. In order to achieve this ERM has followed the methodology defined below.

8.4.1 *Impact identification and Characterisation*

An 'impact' is any change to a resource or receptor caused by the presence of a Project component or by a Project-related activity. Impacts can be negative or positive.

Impacts are described in terms of their characteristics, including the impact's type and the impact's spatial and temporal features (namely extent, duration, scale and frequency). Terms used in this EIA process are described in Table 8.2.

Table 8.2 Impact Characteristics

Characteristic	Definition	Terms
Type	A descriptor indicating the relationship of the impact to the Project (in terms of cause and effect).	**Direct** - Impacts that result from a direct interaction between a planned Project activity and the receiving environment/receptors (ie, between occupation of a site and the pre-existing habitats or between an effluent discharge and receiving water quality). **Indirect** - Impacts that result from other activities that are encouraged to happen as a consequence of the Project. Sometimes referred to as secondary effects. **Induced** - Impacts that result from other activities (which are not part of the Project) that happen as a consequence of the Project. **Cumulative** - Impacts that act together with other impacts (including those from concurrent or planned future third party activities) to affect the same resources and/or receptors as the Project.
Duration	The time period over which a resource / receptor is affected.	**Temporary** - (period of less than 3 years -negligible/ pre-construction/ other). **Short term** - (period of less than 5 years ie, production ramp up period). **Long term** -impacts that will continue for the life of the Project, but ceases when the Project stops operating. **Permanent** - (a period that exceeds the life of plant – ie, irreversible.).
Extent	The reach of the impact (ie, physical distance an impact will extend to)	**On-site** - impacts that are limited to the Project site. **Local** - impacts that are limited to the Project site and adjacent properties. **Regional** - impacts that are experienced at a regional scale. **National** - impacts that are experienced at a national scale. **Trans-boundary/International** - impacts that are experienced outside of South Africa.
Scale	Quantitative measure of the impact ie, the size of the area damaged or impacted, the fraction of a resource that is lost or affected, etc.).	Quantitative measures as applicable for the feature or resources affects. No fixed designations as it is intended to be a numerical value.
Frequency	Measure of the constancy or periodicity of the impact.	No fixed designations; intended to be a numerical value or a qualitative description.

8.4.2 *Determining Impact Magnitude*

Once impacts are characterised they are assigned a ‘magnitude’. Magnitude is typically a function of some combination (depending on the resource/receptor in question) of the following impact characteristics:

- Duration
- Extent
- Scale
- Frequency

Magnitude (from Negligible to Large) is a continuum. Evaluation along the continuum requires professional judgement and experience. Each impact is evaluated on a case-by-case basis and the rationale for each determination is noted. Magnitude designations for negative effects are: Negligible, Small, Medium and Large.

The magnitude designations themselves are universally consistent, but the definition for the designations varies by issue. In the case of a positive impact, no magnitude designation has been assigned as it is considered sufficient for the purpose of the impact assessment to indicate that the Project is expected to result in a Positive impact.

Some impacts will result in changes to the environment that may be immeasurable, undetectable or within the range of normal natural variation. Such changes are regarded as having no impact, and characterised as having a Negligible Magnitude.

8.4.2.1 *Determining Magnitude for Biophysical Impacts*

For biophysical impacts, the semi-quantitative definitions for the spatial and temporal dimension of the magnitude of impacts used in this assessment are provided below.

Large Magnitude Impact affects an entire area, system (physical), aspect, population or species (biological) and at sufficient magnitude to cause a significant measureable numerical increase in measured concentrations or levels (to be compared with legislated or international limits and standards specific to the receptors) (physical) or a decline in abundance and/ or change in distribution beyond which natural recruitment (reproduction, immigration from unaffected areas) would not return that population or species, or any population or species dependent upon it, to its former level within several generations (physical and biological). A High Magnitude impact may also adversely affect the integrity of a site, habitat or ecosystem.

Medium Magnitude Impact affects a portion of an area, system, aspect (physical), population or species (biological) and at sufficient magnitude to cause a measurable numerical increase in measured concentrations or levels (to be compared with legislated or international limits and standards specific to the receptors) (physical) and may bring about a change in abundance and/or distribution over one or more plant/ animal generations, but does not threaten the integrity of that population or any population dependent on it (physical and biological). A moderate magnitude impact may also affect the ecological functioning of a site, habitat or ecosystem but without adversely affecting its overall integrity. The area affected may be local or regional.

Small Magnitude Impact affects a specific area, system, aspect (physical), group of localised individuals within a population (biological) and at sufficient magnitude to result in a small increase in measured concentrations or levels (to be compared with legislated or international limits and standards specific to the receptors) (physical) over a short time period (one plant/ animal generation or less, but does not affect other trophic levels or the population itself), and localised area.

Negligible Magnitude Impact is one where the area of the impact to the resource/receptor (including people) is immeasurable, undetectable or within the range of normal from natural background variations.

8.4.2.2 *Determining Magnitude for Socio – Economic Impacts*

For socio-economic impacts, the magnitude considers the perspective of those affected by taking into account the likely perceived importance of the impact, the ability of people to manage and adapt to change and the extent to which a human receptor gains or loses access to, or control over socio-economic resources resulting in a positive or negative effect on their well-being. The quantitative elements are included into the assessment through the designation and consideration of scale and extent of the impact.

8.4.3 *Determining Receptor Sensitivity*

In addition to characterising the magnitude of impact, the other principal step necessary to assign significance for a given impact is to define the sensitivity of the receptor. There are a range of factors to be taken into account when defining the sensitivity of the receptor, which may be physical, biological, cultural or human. Where the receptor is physical (for example, a water body) its current quality, sensitivity to change, and importance (on a local, national and international scale) are considered.

Where the receptor is biological or cultural (ie, a coral reef or a ship wreck), its importance (local, regional, national or international) and sensitivity to the specific type of impact are considered. Where the receptor is human, the vulnerability of the individual, community or wider societal group is considered. As in the case of magnitude, the sensitivity designations themselves are universally consistent, but the definitions for these designations will vary on a resource/receptor basis. The universal sensitivity of receptor is Low, Medium and High.

For ecological impacts, sensitivity is assigned as Low, Medium or High based on the conservation importance of habitats and species. For the sensitivity of individual species, Table 8.3 presents the criteria for deciding on the value or sensitivity of individual species.

For socio-economic impacts, the degree of sensitivity of a receptor is defined as the level of resilience (or capacity to cope) with sudden social and economic changes. Table 8.3 and Table 8.4 present the criteria for deciding on the value or sensitivity of biological and socioeconomic receptors.

Table 8.3 Biological and Species Value / Sensitivity Criteria

Value / Sensitivity	Low	Medium	High
Criteria	Not protected or listed as common / abundant; or not critical to other ecosystem functions ie, key prey species to other species).	Not protected or listed but may be a species common globally but rare in South Africa with little resilience to ecosystem changes, important to ecosystem functions, or one under threat or population decline.	Specifically protected under South African legislation and/or international conventions e.g. CITIES Listed as rare, threatened or endangered e.g. IUCN

Note: The above criteria are applied with a degree of caution. Seasonal variations and species lifecycle stage will be taken into account when considering species sensitivity. For example, a population might be deemed as more sensitive during the breeding/spawning and nursery periods. This table uses listing of species (ie, IUCN) or protection as an indication of the level of threat that this species experiences within the broader ecosystem (global, regional, local). This is used to provide a judgement of the importance of affecting this species in the context of Project-level changes.

Table 8.4 Socio-Economic Sensitivity Criteria

Sensitivity	Low	Medium	High
Criteria	Those affected are able to adapt with relative ease and maintain pre-impact status.	Able to adapt with some difficulty and maintain pre-impact status but only with a degree of support.	Those affected will not be able to adapt to changes and continue to maintain-pre impact status.

8.4.4 *Assessing Significance*

Once magnitude of impact and sensitivity of a receptor have been characterised, the significance can be determined for each impact. The impact significance rating will be determined, using the matrix provided in Table 8.5*.*

Table 8.5 Impact Significance

	Sensitivity/ Vulnerability/ Importance of Resource/ Receptor		
Magnitude of Impact	**Low**	**Medium**	**High**
Negligible	Negligible	Negligible	Negligible
Small	Negligible	Minor	Moderate
Medium	Minor	Moderate	Major
Large	Moderate	Major	Major

The matrix applies universally to all resources/receptors, and all impacts to these resources/receptors, as the resource/receptor-specific considerations are factored into the assignment of magnitude and sensitivity/vulnerability/ importance designations that enter into the matrix. *Box 8.1* provides a context for what the various impact significance ratings signify.

Box 8.1 Context of Impact Significances

An impact of **Negligible** significance is one where a resource/receptor (including people) will essentially not be affected in any way by a particular activity or the predicted effect is deemed to be 'imperceptible' or is indistinguishable from natural background variations.

An impact of **Minor** significance is one where a resource/receptor will experience a noticeable effect, but the impact magnitude is sufficiently small and/or the resource/receptor is of low sensitivity/ vulnerability/ importance. In either case, the magnitude should be well within applicable standards.

An impact of **Moderate** significance has an impact magnitude that is within applicable standards, but falls somewhere in the range from a threshold below which the impact is minor, up to a level that might be just short of breaching a legal limit. Clearly, to design an activity so that its effects only just avoid breaking a law and/or cause a major impact is not best practice. The emphasis for moderate impacts is therefore on demonstrating that the impact has been reduced to a level that is as low as reasonably practicable (ALARP). This does not necessarily mean that impacts of moderate significance have to be reduced to minor, but that moderate impacts are being managed effectively and efficiently.

An impact of **Major** significance is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource/receptors. An aim of IA is to get to a position where the Project does not have any major residual impacts, certainly not ones that would endure into the long-term or extend over a large area. However, for some aspects there may be major residual impacts after all practicable mitigation options have been exhausted (ie, ALARP has been applied). An example might be the visual impact of a facility. It is then the function of regulators and stakeholders to weigh such negative factors against the positive ones, such as employment, in coming to a decision on the Project.

8.4.5 *Mitigation Potential and Residual Impacts*

A key objective of an EIA process is to identify and define socially, environmentally and technically acceptable and cost effective measures to manage and mitigate potential impacts. Mitigation measures are developed to avoid, reduce, remedy or compensate for potential negative impacts, and to enhance potential environmental and social benefits. Mitigation measures for this EIA will be provided in detail within the EMPr.

The approach taken to defining mitigation measures is based on a typical hierarchy of decisions and measures, as described in *Box 8.2*.

The priority is to first apply mitigation measures to the source of the impact (i.e., to avoid or reduce the magnitude of the impact from the associated Project activity), and then to address the resultant effect to the resource/receptor via abatement or compensatory measures or offsets (i.e., to reduce the significance of the effect once all reasonably practicable mitigations have been applied to reduce the impact magnitude).

Once mitigation measures are declared, the next step in the impact assessment process is to assign residual impact significance.

This is essentially a repeat of the impact assessment steps discussed above, considering the assumed implementation of the additional declared mitigation measures. The approach taken to defining mitigation measures is based on a typical hierarchy of decisions and measures, as described in Box 8.2.

Box 8.2 Mitigation Hierarchy

Avoid at Source; Reduce at Source:
Avoiding or reducing at source through the design of the Project (eg avoiding by siting or re-routing activity away from sensitive areas or reducing by restricting the working area or changing the time of the activity).

Abate/Minimize on Site:
Add something to the design to abate the impact (eg pollution control equipment).

Abate/Minimize at Receptor:
If an impact cannot be abated on-site then control measures can be implemented off-site (eg traffic measures).

Repair or Remedy:
Some impacts involve unavoidable damage to a resource (eg material storage areas) and these impacts require repair, restoration and reinstatement measures.

Compensate in Kind; Compensate through Other Means:
Where other mitigation approaches are not possible or fully effective, then compensation for loss, damage and disturbance might be appropriate (eg financial compensation for degrading agricultural land and impacting crop yields).

8.4.6 *Cumulative Impact Assessment*

A cumulative impact is one that arises from a result of an impact from the Project interacting with an impact from another activity to create an additional impact. How the impacts and effects are assessed is strongly influenced by the status of the other activities (ie, already in existence, approved or proposed) and how much data is available to characterise the magnitude of their impacts.

The approach to assessing cumulative impacts is to screen potential interactions with other projects on the basis of:

- Projects that are already in existence and are operating;
- Projects that are approved but not as yet built or operating; and
- Projects that are a realistic proposition but are not yet built.

8.5 Assessing Significance of Risks for Accidental Events

The methodology used to assess the significance of the risks associated with accidental events differs from the impact assessment methodology set out in *Section 8.4* of this Report.

Risk significance for accidental events is based on a combination of the likelihood (or frequency) of incident occurrence and the consequences of the incident should it occur. The assessment of likelihood and consequence of the event also includes the existing control and mitigation measures for this project.

The assessment of likelihood takes a qualitative approach based on professional judgement, experience from similar projects and interaction with the technical team. The assessment of consequence is based on specialists' input and their professional experience gained from similar projects. Definitions used in the assessment for likelihood and consequence are set out in Box 8.3.

Box 8.3 Risk Significance Criteria for Accidental Events

Likelihood

Likelihood describes the probability of an event or incident actually occurring or taking place. It is considered in terms of the following variables:

- **Low:** the event or incident is reported in the telecommunication industry, but rarely occurs;
- **Medium:** the event or incident does occur but is not common; and/or
- **High:** the event or incident is likely to occur several times during the project's lifetime.

Consequence

The potential consequence of an impact occurring is a combination of those factors that determine the magnitude of the unplanned impact (in terms of the extent, duration and intensity of the impact). Consequence in accidental events is similar to significance (magnitude x sensitivity) of planned events and is classified as either a:

- **Minor consequence:** impacts of Low intensity to receptors/resources across a local extent that can readily recover in the short term with little or no recovery/remediation measures required;
- **Moderate consequence:** impacts of Low to Medium intensity across a local to regional extent, to receptors/resources that can recover in the short term to medium term with the intervention of recovery/remediation measures; or
- **Major consequence:** exceeds acceptable limits and standards, is of Medium to High intensity affecting receptors/resources across a regional to international extent that will recover in the long term only with the implementation of significant/remediation measures.

Once a rating is determined for likelihood and consequence, the risk matrix in Table 8.5 is used to determine the risk significance for accidental events. The prediction takes into account the mitigation and/or risk control measures that are already an integral part of the project design, and the management plans to be implemented by the project.

Table 8.6 Accidental Events Risk Significance

		Risk Significance Rating		
	Likelihood	**Low**	**Medium**	**High**
Consequence	**Minor**	Minor	Minor	Moderate
	Moderate	Minor	Moderate	Major
	Major	Moderate	Major	Major

It is not possible to completely eliminate the risk of accidental events occurring. However, the mitigation strategy to minimise the risk of the occurrence of accidental events is outlined in Box 8.4.

Box 8.4 Mitigation Strategy for Accidental Events

Control: aims to prevent or reduce the risk of an incident happening or reduce the magnitude of the potential consequence to As Low as Reasonably Possible (ALARP) through:

• Reducing the likelihood of the event ie, preventative maintenance measures, emergency response procedures and training);
• Reducing the consequence; and
• A combination of both of these.

Recovery/remediation: includes contingency plans and response
• Emergency Response Plans

8.6 Proposed Structure of the EIA Report

An outline of the proposed contents[13] of the EIA Report is Table 8.7 below.

Table 8.7 Proposed EIA Report Structure

Chapter		Explanatory Note
Acronyms, Abbreviations and Definition of Terms		This section defines concepts used in used in the EIA Report
Executive Summary		Summary of the entire EIA Report.
1	Introduction	This *Chapter* will outline the development and structure of the EIA Report including the background, terms of reference and declaration.
2	Project Description	This *Chapter* will provide a concise description of the project and its geographical and temporal context. It will include a site description, an overview of the facility Project design and details of project inputs and outputs.
3	Administrative Framework	This *Chapter* will outline the policy, legal and institutional framework within which the EIA process has been conducted.
4	Baseline Condition	This *Chapter* will summarise the available baseline data on the environmental and social resources and receptors within the Facility Project Study Area. It will be based on both primary and secondary data sources and will consider changes in the baseline condition without the development in place.
5	Public Participation Process	This *Chapter* will present the results of consultation undertaken as part of the EIA process, plus plans for future consultation. It will identify key project stakeholders and present their feedback on the Project.
6	Impact Assessment Methodology	This *Chapter* will summarise the methodology used to assess the impacts of the Project on the biophysical, terrestrial and socio-economic environment.
7	Impact Assessment	This *Chapter* will summarise the predicted positive and negative impacts of the Project, outline general and specific mitigation measures to reduce, remove or avoid negative impacts to environmental and social receptors as well as measuring for monitoring these impacts. Any residual impacts (post mitigation) will be outlined. Cumulative impacts will be assessed as appropriate.
8	Environmental Management Programme (EMPr)	The EMPr will draw together the possible mitigation measures; group them logically into components with common themes; define the specific actions required and timetable for implementation; identify training needs, institutional roles and responsibilities for implementation; and estimate the costs of the measures.

[13] In line with EIA Best Practice

Chapter		Explanatory Note
9	Conclusion	This *Chapter* will summarise conclusions that are made based on the assessment as well as outline any further recommendations.
Bibliography & References		All references made in the report and documents drawn upon during the course of the assessment
Appendices		These will include technical appendices with details of specific technical surveys, the bibliography and list of acronyms.

8.7 EIA Schedule

A provisional schedule for the EIA process is provided in *Table 8.8* below.

Table 8.8 Provisional EIA Schedule

Task	Timing
Final Scoping Report Submission	March 2019
Authority Review of Scoping Report	March to May 2019
Acceptance of the Final Scoping Report	May 2019
Specialist studies	November 2018 to March 2019
Disclosure of the Draft EIA Report and EMPr	May 2019
Submission of Final EIA Report	July 2019
Environmental Authorisation	October 2019

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APPENDIX A UNDERTAKING BY THE EAP AND THE PROJECT TEAM CVS

APPENDIX B STAKEHOLDER ENGAGMENT

APPENDIX C COMMENTS AND RESPONSE REPORT

APPENDIX D PROJECT LOCALITY MAPS

APPENDIX E DEA PRE-APPLICATION MEETING RECORDS

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