FINAL

ENVIRONMENTAL PRE-FEASIBILITY SCOPING STUDY AND TERMS OF REFERENCE REPORT

CES

ENVIRONMENTAL AND SOCIAL ADVISORY SERVICES

PROPOSED MOZAMBIQUE SUBMARINE CABLE SYSTEM

Environmental Pre-Feasibility Scoping Study and Terms of Reference Report

Prepared for:

VODACOM Mozambique

Prepared by:

Coastal and Environmental Services (Pty) Ltd. t/a CES

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NON-TECHNICAL SUMMARY

Project description and location

Vodacom Mozambique (the 'Proponent') is proposing the development of the 37,000-kilometre (km) long 2Africa Submarine Fibre Optic Cable System (hereafter referred to as 2Africa) which will greatly enhance connectivity across Africa and the Middle East. 2Africa will be one of the world's largest subsea cable projects and will interconnect Europe, the Middle East, and 35 landings in 26 countries. 2Africa is being implemented by a consortium of companies, which for Mozambique includes Vodacom Mozambique ('Landing Provider'). Alcatel Submarine Networks (ASN) was contracted by the consortium to engineer, manufacture and install the submarine cable system.

The 2Africa Project will include two cable landing sites in Mozambique, one in Nacala and the second in Maputo. The Project will require installation and operation of two submarine branch cables of 17-50mm diameter through the Exclusive Economic Zone (EEZ) and territorial seas of Mozambique. The Project will also involve shore-end cable installation in the nearshore and beach environment, and construction of a beach manhole (BMH) at each landing site adjacent to the beach at Nacala and Maputo to connect the submarine component to the terrestrial cable components. A detailed description of the infrastructure associated with the 2Africa Project is provided in the body of this report.

Rationale for the development

The rationale for this development is based on the increase in internet users in Mozambique, which has grown from 30,000 users in 2000 to 6,523,613 at the end of 2019, and the subsequent lack of infrastructure required to meet this demand. The proposed 2Africa Project will deliver much needed internet capacity and reliability across large parts of Africa, supplement the fast-growing capacity demand in the Middle East, and underpin the further growth of 4G, 5G, and fixed broadband access for hundreds of millions of people.

By connecting Mozambique to this network, businesses and consumers will benefit from an enhanced capacity and more reliable network that supports fixed and mobile communications networks and internet services. Access to affordable, high speed and reliable connectivity will aid in promoting sustainable growth and development in Mozambique.

Environmental Permitting Process

Due to the nature, scale and location of the proposed project, the 2Africa Project is considered a Category A (Annexure II) project and is therefore subject to a regulated Environmental and Social Impact Assessment (ESIA) process. This Estudo de Pré-viabilidade Ambiental e Definiao de Ambito (EPDA), translated as an Environmental Pre-feasibility Scoping Study, is an ESIA requirement to be undertaken at the start of the decision-making process. The process also requires a mandatory stakeholder engagement process referred to as the Public Participation Process (PPP) where anyone with an interest in, or who may be affected by the proposal is provided an opportunity to become involved. A detailed description of the ESIA Process is included in Chapter 2 of this report.

Project Alternatives

Location alternatives: The applicant has identified the best route for the cable based on the underlying topography of the seabed, nearshore and beach characteristics. The route has been chosen to avoid highly sensitive features such as corals, shipwrecks and seagrass beds where feasible. Route refinements were made based on marine survey information to optimise the cable route and landing site. As such, no route alternative will be investigated.

The "No-Go" Alternative: According to the ESIA Regulations, the option of doing nothing, not proceeding with the proposed development (i.e. the No Go Option), must be assessed during the ESIA.

Design Alternative: The submarine cable system is a very specific, custom-built piece of infrastructure that is tailor made to follow the optimum routing to minimize environmental impact and maximize cable protection and reliability. Design alternatives are restricted to smaller technical components of the selected cable infrastructure.

Layout Alternative: As the project is at scoping level, the layout of the project is not fixed at this time. A proposed layout indicating the position of the cable route and BMH has been included based on desktop and field studies and industry standard; however, these may shift if the specialist studies find there to be highly sensitive features that need to be avoided. This will be further investigated during the ESIA.

Stakeholder and Community Engagement

The PPP involves consultation with the wider public. The process facilitates the dissemination of information about the project and identification of indirectly and directly affected I&APs. Disclosure of the EPDA and ESIA will comprise open public meetings in communities and the cities of Nacala and Maputo, and will be conducted in five distinct stages:

- Preparation of the list of stakeholders.
- Preliminary consultations with communities and some government institutions and non-governmental organizations.
- Submission of EPDA to the relevant institutions and made available for consultation before the public meetings.
- Preparation and delivery of invitation letters to relevant stakeholders.
- Realisation of public consultation meetings in the affected communities, Nacala and Maputo.

Preliminary Environmental and Social Risk Assessment

The following biophysical and social risks have been identified as a result of the proposed project (colour coding and descriptors are further explained in Chapter 7):

Issue	Significance Rating	Mitigation Potential	Risk
Disturbance of the seabed.	Low	Easily Achievable	MINOR-
Sediment suspension.	Moderate	Achievable	MINOR-
Noise.	Low	Easily Achievable	MINOR-
Reef Effect.	Low	Achievable	MINOR-
Entanglement of surface laid cables with fish and marine mammals.	Low	Achievable	MINOR-
Disturbance/ interruption of fishing activities.	Moderate	Achievable	MINOR-
Disturbance of Maritime Heritage sites.	Low	Easily Achievable	NEGLIGIBLE
Pollution of the Environment: Discharge of bilge water, sewage, food waste.	Moderate	Achievable	MINOR-
Pollution of the Environment: Accidental leaks and spills of vessel fuel.	Moderate	Achievable	MINOR-
Pollution of the Environment: Atmospheric emissions from vessel engines.	Moderate	Achievable	MINOR-
Socio-economic benefits: creation of minor job opportunities.	Low	Achievable	MINOR+
Socio-economic benefits: Access to high speed internet.	Low	Achievable	MAJOR+
Socio-economic benefits: Loss of residential land or machamba.	Low	Achievable	MINOR-
Disturbance and/or beach closure.	Low	Achievable	MINOR-

Article 10.1a of decree 54/2015 states that fatal flaws regarding the activity must be assessed. No fatal flaws were identified for this project and therefore none form part of this assessment. From an environmental and social perspective, it is clear that the project presents a very low risk to people and the environment, and hence the project should proceed to the ESIA phase.

Conclusions and Way Forward

An assessment of the potential risks for this project found that with the implementation of sound mitigation measures, especially at the design stage through careful route and BMH site selection, there are no major or even medium risks for this project. Sensitive features such as corals, shipwrecks and seagrass meadows have been avoided where feasible at the Nacala landing and where this is not feasible, technology that has been used to lower the impacts. Additional research will be necessary to determine the presence of corals and seagrass near the landings. Of the fourteen risks identified, eleven are minor negative, one is minor positive, one is Major Positive, and one is negligible. No fatal flaws were identified for this project and therefore none form part of this assessment

Way forward

This EPDA and ToR has described the potential risks associated with the project and has provided detailed ToR for specialist studies that will be required during the ESIA phase.

The report to be prepared for the ESIA will be divided into a number of volumes to cover the information as stipulated by Mozambican requirements. These volumes are summarised in Chapter 9 of this report.

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LIST OF ACRONYMS AND ABBREVIATIONS

AIA	Avaliação de Impacto Ambiental or Environmental Impact Assessment
ASN	Alcatel Submarine Networks
BMH	Beach Manhole
BU	Branching Unit
CES	Coastal and Environmental Services
CLS	Cable Landing Station
DINAB	Direcção Nacional do Ambiente or National Directorate of the Environment (within the Ministry of Land and Environment)
DUAT	Direito de Uso e Aproveitamento da Terra or Right to Use and Benefit from Land (a state-granted land right)
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment (Regulations)
EPDA	Estudo de Pré-viabilidade Ambiental e Definiao de Ambito or Environmental Pre-feasibility Scoping Study
ESIA	Environmental and Social Impact Assessment
GDP	Gross Domestic Product
I&AP	Interested and Affected Party
ICPC	International Cable Protection Committee
IFC	International Finance Corporation
INE	Instituto Nacional De Estatistica
IUCN	International Union for Conservation of Nature
MARPOL	International Convention for the Prevention of Pollution from Ships
MIMAIP	Ministério do Mar, Águas Interiores e Pescas or Ministry of the Sea, Inland Waters and Fisheries
MPA	Marine Protected Area
MTA	Ministério da Terra e Ambiente or Ministry of Land and Environment
NGO	Non-Government Organisation
NMS	National Maritime Space
OOS	Out of Service
PLGR	Pre-Lay Grapnel Run
PLIB	Post Lay Inspection and Burial
PPP	Public Participation Process
RC	Route Clearance
RPL	Route Position List
ROV	Remotely Operated Vehicle
TUPEM	Título de Utilização Privativa do Espaço Maritimo Nacional or Title for Private Use of the National Maritime Space
UNCLOS	United Nations Convention on the Law of the Sea
US$	United States Dollar (currency)

DEFINITIONS

Beach Manhole (BMH): A concrete vault located on or adjacent to the beach into which the cable is pulled from the beach landing. Inside the BMH the cable is connected to the terrestrial portion of the cable that will route to the cable landing station.

Cable Vessel: A specialized vessel designed for cable installation and/or maintenance and will be used to install the main trunk and cable branches that are in depths > 12 to 15 m, which are depths deep enough for safe access by the cable ship.

Direito de Uso e Aproveitamento da Terra (DUAT): The Right to Use and Benefit from Land - a state-granted land right.

Exclusive Economic Zone (EEZ): The EEZ is the zone adjacent to the country's territorial water and extending 200 nautical miles from the coastline. The sovereign state has special rights to the EEZ which includes exploration and use of marine resources. They are also responsible for the protection and preservation of the marine environment within this zone.

Grapnel: A small anchor with three or more flukes used for grappling or dragging the seabed.

Main Lay Vessel: Refer to cable vessel above.

Marine Protected Area (MPA): A clearly defined geographical space, recognized, dedicated, and managed through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.

Open Access Network: High-performance data networking. The fibre network is given to multiple service providers and wholesale services on one physical network infrastructure. This shared system enables service providers to reach their subscribers without the need to install a new fibre network themselves.

Repeater: Optical amplifiers that are installed along the length of the cable and are used to extend the reach of optical communications links by overcoming loss due to attenuation of the optical fibre.

Special Licence: In total and partial protection zones, the right of use and benefit of land cannot be acquired via an application for a DUAT, however special licences may be issued for the exercising of determined activities.

Submarine cable: An optical fibre submarine cable laid on the seabed and used to deliver high speed internet between land-based stations.

System Earth: An earth system for the submarine cable.

Título de Utilização Privativa do Espaço Maritimo Nacional (TUPEM): A title for Private Use of the National Maritime Space.

1 INTRODUCTION

1.1 PROJECT OVERVIEW

The 2Africa Submarine Cable System (hereafter referred to as 2Africa) is a proposed submarine fibre optic cable system that will greatly enhance connectivity across Africa and the Middle East. At over 37,000 kilometres (km) in length, 2Africa will be one of the world's largest subsea cable projects and will interconnect Europe, the Middle East, and 35 landings in 26 countries across Africa.

2Africa is being implemented by a consortium of companies, which for Mozambique includes Vodacom Mozambique ('Landing Provider'). Alcatel Submarine Networks (ASN) was contracted by the consortium to engineer, manufacture and install the submarine cable system.

1.2 ENVIRONMENTAL PERMITTING PROCESS

An environmental permitting process to obtain an environmental license is required for all public and private activities that can directly or indirectly influence the environment in Mozambique. The 2Africa project is therefore the subject of a regulated Environmental and Social Impact Assessment (ESIA) process. This Estudo de Pré-viabilidade Ambiental e Definiao de Ambito (EPDA), translated as an Environmental Pre-feasibility Scoping Study, is an ESIA requirement to be undertaken at the start of the decision-making process. The process also requires a mandatory stakeholder engagement process referred to as the Public Participation Process (PPP) where anyone with an interest in, or who may be affected by the proposal is provided an opportunity to become involved.

1.3 THE PROPONENT

The proponent for this project is Vodacom Mozambique, which is the 'Landing Provider' or Developer's representative for the Project within Mozambique. The Contact details for Vodacom Mozambique:

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1.4 THE CONSULTANTS

This document has been prepared by Coastal and Environmental Services Mozambique Lda (CES). CES is a company registered in Mozambique, with the Ministério da Terra e Ambiente (MTA) (Appendix 2) and has the requisite knowledge, experience and multidisciplinary specialists to conduct environmental impact assessments and prepare environmental management programs.

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1.5 EXPERTISE OF KEY TEAM MEMBERS

Dr A.M. (Ted) Avis – Project Leader / Reviewer

Ted Avis is a leading expert in the field of Environmental Impact Assessments, having project-managed numerous large-scale Environmental and Social Impact Assessment (ESIAs) to international standards (e.g. International Finance Corporation). Ted was principal consultant to Corridor Sands Limitada for the development of all environment aspects for the US$1billion Corridor Sands Project. Ted has also managed ESIA studies and related environmental assessments of similar scope in Kenya, Madagascar, Egypt, Malawi, Zambia and South Africa. He has also worked on large scale Strategic Environmental Assessments in South Africa and has been engaged by the International Finance Corporation (IFC) on a number of projects. Ted was instrumental in establishing the Environmental Science Department at Rhodes University whilst a Senior lecturer in Botany, based on his experience running honours modules in ESIA practice and environment. He is an Honorary Visiting Fellow in the Department of Environmental Sciences at Rhodes. He was one of the first certified Environmental Assessment Practitioners in South Africa, gaining certification in April 2004. He has delivered papers and published in the field of ESIA, Strategic Environmental Assessment and Integrated Coastal Zone Management and has been a principal of CES since its inception in 1990, and Managing Director since 1998. Ted holds a PhD in Botany, and was awarded a bronze medal by the South African Association of Botanists for the best PhD adjudicated in that year, entitled “Coastal Dune Ecology and Management in the Eastern Cape”.

Dr Chantel Bezuidenhout – Project Manager

Dr Chantel Bezuidenhout holds MSc and PhD degrees in Botany (estuarine ecology) and a BSc degree in Botany and Geography from Nelson Mandela Metropolitan University (South Africa). Dr Bezuidenhout has been an Environmental Consultant for approximately 10 years and as such has been focusing on environmental management and impact assessment. She is well versed in environmental legislation and has managed a number of environmental, social and health impact assessments and management plans for heavy mineral mining in South Africa and Madagascar. These projects have been completed to international standards (IFC and World Bank). In addition, Dr Bezuidenhout has also completed ESHIA’s for a number of open cast mines in Zambia and Mozambique. These projects were also completed to IFC Standards and have been granted environmental authorizations from their host countries. All the ESIAs that have been managed by Dr Bezuidenhout included community consultations and as such she has been involved in various forms of community engagements in the rural

African settings. Dr Bezuidenhout has also been extensively involved in the data collection and report wring for land and natural resource use assessments in both Madagascar and Mozambique. The data gathering component involves extensive community meetings as well as focus group meetings to establish land use (including agriculture) and natural resources use within the communities and wider regions. Dr Bezuidenhout has recently completed an extensive land survey as part of a RAP process for a heavy minerals mine in Mozambique and an in-kind land survey for a large infrastructure project in Tanzania, and as such is well-versed with the relevant process. She is a Principal Consultant and Branch Manager of the CES Port Elizabeth Office.

Ms Tarryn Martin –Report Writer

Tarryn holds a BSc (Botany and Zoology), a BSc (Hons) in African Vertebrate Biodiversity and an MSc with distinction in Botany from Rhodes University. Tarryn's Master's thesis examined the impact of fire on the recovery of C_3 and C_4 Panicoid and non-Panicoid grasses within the context of climate change for which she won the Junior Captain Scott-Medal (Plant Science) for producing the top MSc of 2010 from the South African Academy of Science and Art as well as an Award for Outstanding Academic Achievement in Range and Forage Science from the Grassland Society of Southern Africa. She conducts vegetation assessments including vegetation and sensitivity mapping to guide developments and thereby minimise their impacts on sensitive vegetation. Tarryn has conducted a number of vegetation and impact assessments in Mozambique (to IFC standards) which include the Lurio Forestry Project in Nampula, the Syrah Graphite Mine in Cabo del Gado and the Baobab Iron Ore Mine in Tete, Mozambique. Tarryn has also co-designed and implemented the Terrestrial Monitoring Program for Kenmare, MOMA, a heavy mineral mine in Mozambique. This monitoring program includes an assessment of forest health. She has also worked on the Lesotho Highlands Development Authority botanical baseline survey for phase 2 of the Lesotho Highlands Water Project.

Ms Lina Buque – Report Writer

Lina is a skilled and experienced public facilitator and socio-economic and environmental consultant with over 10 years of experience working in Mozambique. She has a Master of Environmental Science degree from the Universidade de São Paulo, Brazil. Her research area was in socio-environmental conservation and development, focusing on environmental education. Lina has experience in both environmental and social best practice performance monitoring and management. Her expertise includes project management, ESIA's, public engagement and social facilitation, environmental compliance monitoring and resettlement planning. As a senior environmental consultant with CES, she has worked on a number of ESIA processes for the mining, forestry and oil and gas sectors, facilitating stakeholder engagement and resettlement processes, socio-economic surveys and developing Resettlement Action Plans (as per the IFC guidelines). She has completed a practical training course in Land Acquisition, Resettlement and Social Sustainability that was presented by the World Bank. She has also gained notable experience in environmental and social performance monitoring management for the mining and oil and gas sectors to date.

Ms Nicole Wienand – Assistant Report Writer

Ms Nicole Wienand is an Environmental Consultant with two years' experience based in the Port Elizabeth branch. Nicole obtained her BSc Honours in Botany (Environmental Management) from Nelson Mandela Metropolitan University in December 2018. She also holds a BSc Degree in Environmental Management (Cum Laude) from the same university. Nicole's honours project focused on the composition of subtidal marine benthic communities on warm temperate reefs off the coast of Port Elizabeth and for her undergraduate project she investigated dune movement in Sardinia Bay. Nicole's key interests include marine ecology, botanical specialist assessments, Geographical Information Systems Mapping, the general ESIA process, Public Participation Process (PPP) and Ecological Impact Assessments. Since her appointment with CES in January 2019, Nicole has undertaken a number of Ecological Impact Assessments under the guidance of Dr Greer Hawley and Tarryn Martin.

2 ESIA PROCESS

2.1 THE ESIA PROCESS IN MOZAMBIQUE

The [1]ESIA process, regulated by the Mozambique Environmental Impact Assessment (EIA) Regulations (Decree No. 54/2015) and translated as the Avaliação de Impacto Ambiental (AIA) Regulations, is applicable to all public and private activities. The MTA, through the Direcção Nacional do Ambiente (DINAB) and translated as the National Directorate of the Environment, within the Ministry of Land and Environment, is the authority responsible for environmental assessment.

The Mozambican EIA Regulations (Article 4) define four project categories and these in turn define the level of environmental assessment required:

- The project being considered here is a **Category A (Annexure II) Project** and is subject to a **full ESIA** as defined by the regulations, due to the nature, scale and location of the proposed project.

The PPP guidelines are set out in the Ministerial Decree No. 130/2006 and are compulsory for all Category A Projects. Article 15 of the Regulations on the Process of Environmental Impact Assessment defines the PPP as an activity that involves public hearings and consultation. The PPP implies delivery of timely information regarding projects to all directly and indirectly interested and affected parties (I&APs), responding to public requests for explanations on the project and the formulation of suggestions.

Public participation provides an opportunity for stakeholders to learn more about the proposed project and provide their opinions. These need to be incorporated into the ESIA process and should be used to guide further phases of the assessment, and help mitigate potential conflict situations early on in the planning process.

There are effectively six (6) main steps in the ESIA process (refer to Figure 2-1 below):

[1]Whilst the Mozambican legislation is labelled the “EIA Regulations”, this report refers to the mandatory process called for in the regulations as the ESIA process (encompassing socio-economic impact assessment as well as bio-physical impact assessment), they are the same document.

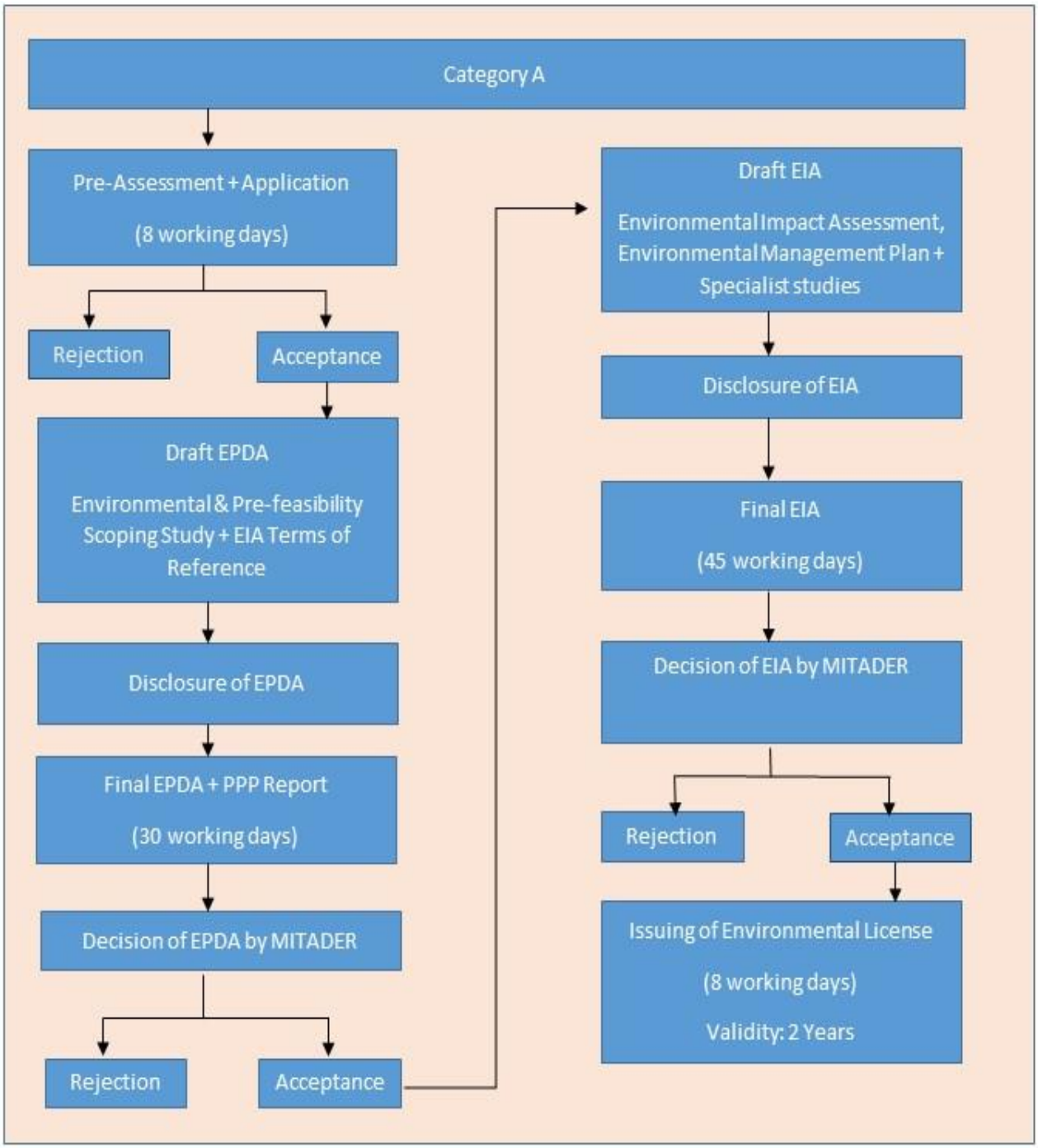

Figure 2-1: Summary of ESIA process to be followed for a Category A project.

Step 1: Pre-Evaluation (Application and Screening)

The first step in the ESIA process in Mozambique is environmental screening to define the extent and type of environmental assessment required for a given project. All activities must be screened against Annexure I, II, III and IV as defined in Article 4 of the Environmental Assessment Regulation in order to determine under which project Category ($A^{+,}$ A, B or C) the proposed activity is to be assessed. Factors that are considered during the screening include:

- Scale and type of project;
- Location and sensitivity of the site; and
- Nature and magnitude of potential impacts.

The ESIA Regulations requires the completion of a Preliminary Environmental Information form (titled "Environmental Information for the Pre-Assessment of Development Projects" and available as Annex VI of the ESIA Regulations) before the ESIA process may commence. This form requires the following information:

- Name of activity.
- Identity of applicant.
- Address and contact details of applicant.
- Location of proposed activity – Street; Town; Locality; District; Province.
- Type of area.
- Zoning information.
- Description of activity – Infrastructure; Associated Activities; Brief description of technology required for construction and operation; Type origin and quantity of labour; Type, origin and quantity of raw materials; Chemical Products to be used; Type, quantity and origin of water and electricity to be used; Other resources required; Land holding (legal status of physical area required); Alternative locations (reason for choosing the proposed location and identification of at least two alternative locations); Brief environmental description of the area and region; Supplementary information in the form of maps and diagrams.

The Preliminary Environmental Information form was submitted to MTA on the 9th of June 2021 and a categorisation letter was issued by the authorities on 16 July 2021. A copy of the categorisation letter is provided in Appendix 1.

Step 2: Environmental Pre-feasibility Scoping Study and Terms of Reference

An Environmental Pre-feasibility Scoping Study (EPDA) (this report) is obligatory for all Annexure I and II activities as defined by Article 10 of the Environmental Assessment Regulations. The key objectives of the phase as defined by the ESIA regulations are to:

- Determine any fatal flaws or environmental risks associated with the implementation of the activity.
- Determine the scope of the ESIA process and develop a Terms of Reference (ToR) for this phase should no fatal flaws be identified.

An EPDA report should be produced and should, at the minimum, include the following:

- A non-technical summary highlighting the key issues and conclusions
- Details of the proponent and ESIA study team.
- Spatial extent of the proposed activity in terms of both direct and indirect influences as well as the pre-development land use in this zone.
- A description of the activity and the different actions to be undertaken, with respect to possible alternatives at the planning, construction, exploration and decommissioning stages.
- Identification of important biophysical and socio-economic characteristics of the affected environment.
- Identification of any potential fatal flaw.
- Identification of potential environmental issues or impacts.
- Identification of aspects that need to be addressed in the ESIA study phase.

The ToR describes, in detail, the issues to be investigated by each specialist study during the next phase of the ESIA process (namely the Environmental Impact Report and Environmental Management Programme).

Step 3: Authority Review of the Environmental Pre-feasibility Scoping Study and Terms of Reference

The EPDA and ToR report will be presented in Portuguese to MTA for review. The authority may request additional information and should provide comment and recommendations in terms of the ESIA study within 30 days of receiving the final report.

Step 4: The Public Participation Process (EPDA and ESIA Phase)

The PPP involves consultation with the wider public. The process facilitates the dissemination of information about the project and identification of indirectly and directly affected I&APs. The proponent is required to undertake the PPP throughout the ESIA process. This includes providing sufficient advertising and allowing the opportunity for I&APs to participate in public meetings during both the EPDA and ESIA phases of the project. The PPP will be undertaken based on any directives given by the relevant authority, and the results of the process will be summarised in a final public participation report. A public meeting must be advertised at least 15 days in advance, to which all I&APs must be invited and the technical reports of the EPDA and ESIA must be made available for public comment.

Public meetings will be held for the disclosure of the draft EPDA and ESIA at the villages that will be directly affected by the project activities as well as at the District Administrator offices/Municipality offices in Nacala and Maputo.

Step 5: Environmental Impact Study and Environmental Management Programme (EMPr)

The ESIA process is the responsibility of the proponent and the ESIA team and will be undertaken in line with the ToR set out in the EPDA. The study will be summarised in an Environmental and Social Impact Assessment (ESIA). To address the issues raised during the EPDA process, the ESIA study will include specialist studies to provide a detailed and thorough examination of key environmental impacts. Once completed, these findings will be synthesized into the ESIA .

All specialist studies will include specific recommendations aimed at avoiding, or where this is not possible, reducing negative impacts and maximizing positive impacts during the construction, operation and decommissioning phases of the proposed development. These recommendations will be synthesized into an Environmental Management Programme (EMPr).

Step 6: Authority Review of the Environmental Impact Report and Environmental Management Programme

The Environmental Impact Report, Specialist Studies Volume and Environmental Management Programme will be presented to MTA for review. The review should be undertaken within 45 days of receiving the final reports. Upon completion of the review, MTA will provide a final Record of Decision. Based on Article 19 of the Environmental Assessment Regulations this may be one of the following:

- Positive record of decision
- Total rejection of the activity based on the outcomes of the reports and the final environmental impact statement
- Partial rejection of the activity based on the outcomes of the reports and the final environmental impact statement

In providing an environmental installation license, the relevant authority may seek to place conditions of approval that are legally binding on the proponent. Furthermore, the authority may request changes to the project scope or additional ESIA studies.

According to Article 20 of the Mozambique ESIA Regulations (Decree No. 54/2015) the licensing steps are as follows:

- Issuance of provisional environmental license - environmental license issued after the approval of the EPDA and the AIA;
- Issuance of the installation environmental license - License issued after the approval of the ESIA and the presentation of the resettlement plan (if applicable); and
- Issuance of the environmental operating license - license issued after verification/inspection of full compliance with the ESIA after construction and full implementation of the Resettlement Plan (if required).

2.2 Applicable Mozambican Legislation

A summary of the ESIA process for a Category A project is presented in Figure 2-1 above and a summary of legislation applicable to the proposed development is provided below in Table 2.1. It should be noted that the list provided below is not exhaustive, is not a legal register, and has been restricted to documents that have direct relevance to either the environment and/or communities.

Table 2.1: List of applicable legislation.

LEGISLATION	DATE OF ENACTMENT	APPLICABILITY TO THE PROJECT
NATIONAL LEGISLATION		
Constitution of the Republic of Mozambique	2004	Dictates the right to environment for each citizen in section 7.1: “All citizens shall have the right live in a balanced environment and shall have the duty to defend it”.

LEGISLATION	DATE OF ENACTMENT	APPLICABILITY TO THE PROJECT
INDUSTRIAL LICENSING AND LABOUR LAW		
General Investment Act	Law 3/1993 of June 24th	International businesses are required to abide by commercial laws of the operating country.
Investment Law Regulation	Decree 43/2009 of 21st August	The Investment Law promotes improvement in the implementation of investment projects in order to make them more attractive to investors by simplifying the process for approval of investments and reducing existing bureaucracies in this area.
Labour Act	Law no. 23/2007 of August 1st	International businesses are required to abide by labour regulation of the operating country.
ENVIRONMENTAL FRAMEWORK LAW, ESIA, INSPECTIONS AND AUDITS		
Environment Act	Law 20/1997 of October 1st (As amended by the Decree 42/2008)	The project will have an environmental impact, and as such will fall under the ambit of the Environmental Act. The Act is the foundation for legal requirements pertaining to the protection of the country's environment. Article 2 defines the legal basis for use and management of the environment and its component to achieve sustainable development in the country.
Environmental Impact Assessment (EIA) Regulations	Decree 54/2015 of December 31st	This outlines the process and rules to be followed when conducting an EIA (referred to as an ESIA process in this report) It describes the type of project categories based on the size and impacts of the project, the responsibility of the applicant, authorities and Environmental Assessment Practitioner, the PPP and the Environmental Licensing Process.
Addendum to the EIA Regulations no. 45/2004	Ministerial Diploma 198/2005 of September 28th	The environmental authorization required prior to commencements of this project will be regulated by the EIA legislation
General Directive for EIA	Ministerial Diploma 129/2006 of July 19th	
General Directive for the Public Participation Process in the ESIA process	Ministerial Diploma 130/2006 of July 19th	Public participation forms a crucial part of the ESIA process and is mandatory for category A+, A and B projects. At least two public consultation rounds must take place and a final PPP report that addresses all questions, concerns and comments raised by I&APs must be submitted with the ESIA report to the authorities.
Regulations for Environmental Inspections	Ministerial Decree 11/2006 of June 15th	The Regulation apply to both public and private activities influencing, directly or indirectly, environmental components. In particular, the regulation defines the types and contents of environmental audits, the related necessary competences and auditors' profiles. Moreover, it regulates environmental audit reports and defines sanctions and penalties for non-compliance.
Environmental Audit Process	Ministerial Decree 32/2003 of August 12th	

LEGISLATION	DATE OF ENACTMENT	APPLICABILITY TO THE PROJECT
		Auditing and monitoring form crucial parts of the ESIA process, and as such this act directly impacts upon the regulatory requirements to which the proponent must adhere
Extracts from the Penal Code	16 September 1886	These regulations define the consequences of environmental non-compliance and infringement on the proponent.
Norms of application of fines and other sanctions prescribed in the Environmental legislation	Ministerial Diploma 1/2006 of January 4th	
Law on Crimes against the Environment	Ministerial Diploma of 2006/7	
SOCIAL		
Protection of the Mozambican Cultural Heritage	Law No. 10/1988 of December 22nd	The purpose of this law is to protect the tangible and intangible assets of the Mozambican cultural heritage – e.g. monuments, buildings of historical, artistic and scientific sites and natural elements of scientific interest and particular aesthetic. This law extends to any cultural assets that may be discovered on Mozambican territory, in particular, in the soil, subsoil, inland bodies of water or the continental shelf and can include monuments, groups of buildings with historic, artistic, or scientific importance, places or locations (with sacred, archaeological, historic, aesthetic, ethnologic, or anthropologic interest), and natural elements (physical and biological formations of particular interest from an aesthetic or scientific point of view). No heritage resources (e.g. shipwrecks) have been identified within the project location. However, it is possible that Heritage Resources may be discovered / disturbed and impacted during the construction phase of the project (e.g. chance finds), and as such might fall under the ambit of these regulations. As such a chance find procedure will be developed and included in the EMPr as part of the ESIA process.
Archaeological Heritage	Decree 27/1994 of July 20th	No heritage resources (e.g. shipwrecks) have been identified within the project location. However, it is possible that Heritage Resources may be discovered / disturbed and impacted during the construction phase of the project (e.g. chance finds), and as such might fall under the ambit of these regulations. As such a chance find procedure will be developed and included in the EMPr as part of the ESIA process.
Regulation on the Protection of the Archaeological Heritage,	Decree 27/97 of July 20th.	
Regulation of Resettlement Process Resulting from Economic Activities	Decree 31/2012 of August 8th	These regulations formulate the procedures for any resettlement in Mozambique, and especially articulate the assistance required from Government during a resettlement process. These regulations are used during the ESIA process to inform all project affected communities of their rights with regard to economic displacement. The articles in this

LEGISLATION	DATE OF ENACTMENT	APPLICABILITY TO THE PROJECT
		regulation is used to structure most of the RAP procedures at community level if and when required. It is not anticipated that there will be any resettlement of people as a consequence of this project.
Land Act	Law19/97 of October 1st	The Land Act recognizes the right to land, known by the Portuguese acronym, DUAT (direito de uso e aproveitamento dos terras) and provides the legal framework for land ownership, as well as the control of land and natural resources in Mozambique. The process of determining land rights is also explained by this law. However, total and partial protection zones are part of the public domain, and as such no right of land-use or benefit can be obtained in these areas (Articles 7 and 9). Total protection zones include those areas specifically intended for conservation or preservation activities, whilst access to partial protection zones requires special licenses, which may be issued for specified activities. According to Article 7, Total Protection Zones are designated as areas destined for nature conservation and national defence and security activities. Partial Protection Zones include, among others: • Inland waters, territorial sea and the maritime exclusive economic zone (EEZ); • The continental shelf; • The strip of the seafront and around islands, bays and estuaries, measured from the line of maximum high tides up to 100 meters into the interior of the territory; • The strip of land up to 100 meters bordering the water sources; • The strip of land around dams and reservoirs up to 250 meters; and • A 2km strip along the land boundary. For public infrastructure, partial protection zones include, among others: Secondary and tertiary roads and the 15m bordering strip on each side of these; • Primary roads and the adjoining strip of 30m on each side of them; • Aerial, surface, underground and submarine installations and conductors for electricity, telecommunications, oil, gas and water, and the adjoining land strip of 50m on each side thereof; and • Airports and aerodromes and the surrounding 100m bordering land strip. The use and benefit of land in areas of total and partial protection requires the issuance of a special license for the exercise of certain activities. The approval of the oil and gas infrastructure implies the automatic creation of a 50m partial protection zone around the area occupied by such infrastructure.

LEGISLATION	DATE OF ENACTMENT	APPLICABILITY TO THE PROJECT
		As the proposed project falls within a partially protected area, the project does not require the application for a DUAT, but does require a Special License. An application in terms of this has been lodged with the relevant authorities.
Land Act Regulations	Decree 1/2003 of February 18th	As the proposed project falls within a partially protected area, the project does not require the application for a DUAT, but a Special License. An application in terms of this has been lodged with the relevant authorities.
Land Planning Act	Law 19/2007 of July 18th	The Land Planning Act (Law 19/2007 of July 18) creates a legal framework for land planning. The Act defines the mechanisms for preparation, approval, implementation, monitoring and supervision of land-use plans, as well as the responsibilities associated. This law applies to the entire national territory and, for purposes of planning, regulating relations between different levels of public administration, its relations with other public and private individuals, representatives of different economic, social and cultural interests, including local communities. The proposed project will potentially have to register the change in land-use.
Regulation of the Land Planning Act	Decree no. 23/2008	This Act sets out measures and regulatory procedures to ensure the occupation and rationale and sustainable use of natural resources, appreciation of the diverse potential of each region, the infrastructure, urban systems and promoting national cohesion and population safety.
WASTE, EFFLUENT AND EMISSION		
Regulation on Environmental Quality and Effluents Emissions	Decree 18/2004 of June 2nd (As amended by Decree 67/2010)	This regulation prohibits the emission of any pollutants and toxic substances into the atmosphere beyond legally established limits. However, emission standards are not defined for ships and maritime vessels. As such, the Project will comply with the provisions of Annex VI of the MARPOL Convention, adopted in September 1997. The rules in this annex establish limits for sulphur oxide and nitrogen oxide from ship exhaust systems, and prohibit deliberate emissions of substances that cause the depletion of the ozone layer.
Regulations for the management of solid municipal waste	Decree 94/2014 of December 31st	This decree establishes the rules for the management of solid municpal waste and is applicable to every individual as well as all private and public companies within the country that produce solid municipal waste. . Article 10 (Duty of Information) specifies that in the event of any solid waste spills, the Municipal Council must be informed within 24 hours of the incident occurring. Article 11 and 12 deals with the obligations of producers and operators of solid waste as well as the transportation of this waste.
BIODIVERSITY AND WILDLIFE, LAND		
Wildlife and Forestry Act	Law 10/1999 of July 7th	This Regulation applies to protection activities, storage, use, exploitation and production of forest and wildlife resources, and covers the marketing, transportation, storage and primary processing, trade or industrial applications of these resources.

LEGISLATION	DATE OF ENACTMENT	APPLICABILITY TO THE PROJECT
Protection, Conservation and Sustainable Use of Biodiversity Law and its Regulation	Law 16/2014 of 20th June (as amended by Law 5/2017),	This law establishes the basis of the principles and norms for the protection, conservation, restoration, and sustainable use of biological diversity within national territory, particularly inside conservation areas. Article 16 states that all activities that can result in changes (alterations) to land and vegetation cover, or that can disturb flora, fauna, and ecological processes up to the point of compromising their maintenance, are interdicted within national parks, except if required for scientific reasons or management needs. It should be noted that the protect does not fall within a protected area and as such no permit will be required from the National Administration for Conservation Areas (Administração Nacional das Áreas de Conservação, Maputo [ANAC]). Article 11 of the regulation states that cultural and natural monuments shall be protected. These include areas with one or more natural, aesthetic, geological, religious, historical, or culturally unique values that, because of their rarity, must be conserved. Natural monuments can include trees of ecological, aesthetic, historical, and cultural value. No artifacts and/or shipwrecks of cultural significance have been found on site to date. A chance find procedure will be developed as part of the EIA process and should any artifacts and/or shipwrecks be discovered during the construction phase of the project, the relevant permits will be appplied for
National Strategy and Action Plan for the Conservation of Biological Diversity for Mozambique	Formulated by MICOA (now MTA) and passed by the Council of Ministers in August 2003	Biodiversity and wildlife management will form part of the mitigation measures for the project
MARINE RESOURCES		
Sea Act	Law 4/1996 of January 4th	This law provides the framework for the regulation of activities that take place within the jurisdictional area of the Mozambican maritime zones which include the territorial sea (12 nautical miles), contiguous zone (24 nautical miles), economic exclusive zone (200 nautical miles), the continental shelf and the maritime public domain. This law is applicable to all vessels and other maritime objects including cables, installations and maritime infrastructures under the Mozambican jurisdiction.
Legal Regime for activities within the National Maritime Zone	Law No. 21/2017 of May 24th	This law establishes the mechanisms for the planning and management of the National Maritime Zone, providing norms and rules applicable to titles of private use of the maritime zone, building permits along the coastal areas, and on the outline of islands, bays, and estuaries, measured from the maximum tide-line up to 100 meters inland. A Título de Utilização Privativa do Espaço Maritimo Nacional or Title for Private Use of the National Maritime Space (TUPEM) in terms of this law needs to be obtained from the Ao Ministério do Mar,

LEGISLATION	DATE OF ENACTMENT	APPLICABILITY TO THE PROJECT
		Águas Interiores e Pescas-Direcção Nacional de Políticas Marítima e Pesqueira- to Ministry of the Sea, Inland Waters and Fisheries- National Directorate of Maritime and Fisheries Policies (MIMAIP) before the start of any project operation in the Maritime Zone. The TUPEM application was submitted to the relevant authorities on the 27th of May 2021 and has been incorporated in the pre-assessment form (and ESIA registration) submitted to MTA on the 9th of June 2021.
Regulation for the prevention of marine pollution	Decree 45/2006 of November 30th	The objective of this decree is to prevent pollution of the marine environment from illegal discharges made by ships, platforms or by land-based sources.
Fisheries Law	Decree 22/2013	This law outlines the legal requirements for all fishing activities by national and foreign vessels operating in waters under Mozambican jurisdiction. The aim of this law is to implement measures to protect, manage and sustain the natural marine resources. A marine impact assessment will be undertaken for the proposed development in order to determine if there are any current fishing activities along the proposed route for the subsea cable.

2.3 APPLICABLE INTERNATIONAL LEGISLATION

2.3.1 United Nations Convention on the Law of the Sea (1982) (UNCLOS).

Mozambique is a signatory to the United Nations Convention on the Law of the Sea (UNCLOS) which is an international law that establishes the rights and duties of all states. Under this law, Mozambique has the rights and jurisdiction to explore, exploit, conserve, and manage natural resources; establish artificial islands; installations, and structures; conduct marine scientific research; and protect and preserve the marine environment within the Economic Exclusive Zone (EEZ) and on the continental shelf, but other states enjoy the freedom to lay and maintain submarine cables within the continental shelf and EEZ (Carter et. al., 2009).

2.3.2 International Convention for the Prevention of Pollution from Ships (1973/1978) (MARPOL)

The International Convention for the Prevention of Pollution from Ships was developed to minimize the pollution of the oceans and seas by all harmful substance discharged from ships. The current convention is a combination of the 1973 Convention and 1978 Protocol.

The convention consists of six annexes related to the control and elimination of marine pollution.

- **Annex I**: Regulation for prevention of pollution by oil (October 1983).
- **Annex II**: Regulations for control of pollution by Noxious Liquid Substance in bulk (April 1987).

- **Annex III**: Regulation for prevention of pollution by harmful substance carried at sea in packaged form (July 1992).
- **Annex IV**: Regulation for prevention of pollution by sewage from ships (Sep 2003).
- **Annex V**: Regulation for prevention of pollution by garbage from ships (Dec 1998).
- **Annex VI**: Regulation for prevention of air pollution from ships (May 2005).

2.3.3 United Nations Framework Convention on Biological Diversity

One of the three main goals of this Convention is to conserve biodiversity. Article 8 of the Convention (In-Situ Conservation) includes a commitment of Parties to take appropriate steps to "*Prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species*".

2.3.4 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

CITIES has three appendices:

- Appendix I include all species threatened with extinction which are or may be affected by trade.
- Appendix II include:
  - All species which although not necessarily now threatened with extinction may become so unless trade in specimens of such species is subject to strict regulation in order to avoid utilization incompatible with their survival; and
  - Other species which must be subject to regulation in order that trade in specimens of certain species may be brought under effective control.
- Appendix III include all species which any Party identifies as being subject to regulation within its jurisdiction for the purpose of preventing or restricting exploitation, and as needing the co-operation of other Parties in the control of trade.

The Parties to CITIES will not allow trade in specimens of species included in Appendices I, II and III except in accordance with the provisions of the Convention.

2.3.5 United Nations Framework Convention on Climate Change (UNFCCC)

The UNFCCC is a framework convention which was adopted at the 1992 Rio Earth Summit. The stated purpose of the UNFCCC is to *"achieve…stabilisation of greenhouse gas concentrations in the atmosphere at concentrations at a level that would prevent dangerous anthropogenic interference with the climate system",* and to hereby prevent human-induced climate change by reducing the production of greenhouse gases defined as *"those gaseous constituents of the atmosphere both natural and anthropogenic, that absorb and re-emit infrared radiation".*

2.3.6 Kyoto Protocol

The Kyoto Protocol is a protocol to the UNFCCC which was initially adopted for use on 11 December 1997 in Kyoto, Japan, and which entered into force on 16 February 2005 (UNFCCC, 2009). The Kyoto Protocol is the chief instrument for tracking climate change. The major feature of the Protocol is that *"it sets binding targets for 37 industrialized countries and*

the European community for reducing greenhouse gas (GHG) emissions. These amount to an average of 5% against 1990 levels, over the five year period, 2008-2011" (UNFCCC, 2009). The major distinction between the Protocol and the Convention is that *"while the Convention encouraged industrialised countries to stabilize GHG emissions, the Protocol commits them to do so".*

2.3.7 The Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Dumping Convention), 1972

This Convention, which has been in force since 1975, is aimed at protecting the marine environment from pollution associated with human activities. Its objective is to promote the effective control of all sources of marine pollution and to take all practicable steps to prevent pollution of the sea by dumping of wastes and other matter.

Although the definition of "dumping" in the Convention explicitly excludes "disposal at sea of wastes or other matter incidental to, or derived from the normal operations of vessels…", Article XII obligates Parties to the Convention to "to promote, within the competent specialized agencies and other international bodies, measures to protect the marine environment against pollution caused by" amongst other things, hydrocarbons and other noxious or hazardous materials transported by vessels other than for the purposes of dumping and also "wastes generated in the course of operation of vessels".

IMO Guidelines for the Control and Management of Ships' Ballast Water to Minimise the Transfer of Harmful Aquatic Organisms and Pathogens (Resolution A.868 (20), 1997)

This resolution includes a comprehensive set of requirements aimed at minimising the threat of introduction of harmful aquatic organisms and pathogens via ballast water and is the basis for current measures aimed at addressing this threat.

2.3.8 African Convention on the Conservation of Nature and Natural Resources

The objectives of this Convention are:

- To enhance environmental protection;
- To foster the conservation and sustainable use of natural resources; and
- To harmonize and coordinate policies in these fields with a view to achieving ecologically rational, economically sound and socially acceptable development policies and programmes.

2.3.9 Cartagena Protocol on Bio-safety to the Convention on Biological Diversity

The Convention on Biological Diversity was finalized in Nairobi in May 1992 and opened for signature at the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro on 5 June 1992. It entered into force on 29 December 1993. The objective of this Protocol is to contribute to ensuring an adequate level of protection in the field of the safe transfer, handling and use of living modified organisms resulting from modern biotechnology that may have adverse effects on the conservation and sustainable use of biological diversity, also taking into account risks to human health, and specifically focusing on transboundary movements.

2.3.10 Convention on the Conservation of Migratory Species of Wild Animals

The Convention on Migratory Species (CMS) is an intergovernmental treaty, concluded under the aegis of the United Nations Environmental Programme (UNEP), concerned with the conservation of wildlife and habitats on a global scale and in particular terrestrial, aquatic and avian migratory species throughout their range.

2.3.11 Basel Convention

The main objectives of the Basel Convention are the reduction of the production of hazardous waste and the restriction of trans-boundary movement and disposal of such waste. It also aims to ensure that any trans-boundary movement and disposal of hazardous waste, when allowed, is strictly controlled and takes place in an environmentally sound and responsible way. Its scope of application covers a wide range of wastes defined as “hazardous wastes” based on their origin and/or composition and their characteristics (Article 1 and Annexes I, III, VIII and IX), as well as types of wastes defined as “other wastes” (household waste and incinerator ash; Article 1 and annex II).

2.3.12 Bamako Convention

The requirements of this Convention are similar to those of the Basel Convention.

3 PROJECT DESCRIPTION

3.1 INTRODUCTION AND PROJECT BACKGROUND

The 2Africa Submarine Cable System involves the installation of a submarine cable system that will greatly enhance connectivity across Africa and the Middle East. At 37,000 kilometres (km) in length, 2Africa will be one of the world's largest subsea cable projects and will interconnect Europe, the Middle East, and 35 landings in 26 countries, as outlined in Figure 3-1. The system is expected to be operational in 2023–2024.

2Africa is implemented by a consortium of companies, which for Mozambique includes Vodacom Mozambique ('Landing Provider'). Alcatel Submarine Networks (ASN) was contracted by the consortium to engineer, manufacture and install the submarine cable system called 2Africa.

3.2 RATIONALE FOR THIS DEVELOPMENT

Internet use in Mozambique has grown from 30,000 users in 2000 to 6,523,613 at the end of 2019. However, it is estimated that only 20.9 percent of the population in Mozambique currently has internet access (Internet World Stats, 2020).

The 2Africa project cable will deliver more than the total combined capacity of all submarine cables serving Africa today, with a design capacity of up to 180 terabits per second (Tbps) on key parts of the system. The system will deliver much needed internet capacity and reliability across large parts of Africa, supplement the fast-growing capacity demand in the Middle East, and underpin the further growth of 4G, 5G, and fixed broadband access for hundreds of millions of people.

By connecting Mozambique to this network, businesses and consumers will benefit from an enhanced capacity and more reliable network that supports fixed and mobile communications networks and internet services. Access to affordable, high speed and reliable connectivity will aid in promoting sustainable growth and development in Mozambique.

3.3 LOCATION OF THE PROPOSED SUBMARINE CABLE SYSTEM

The 2Africa Project will include two cable landing sites in Mozambique, one in Nacala and the second in Maputo. The Project will require installation and operation of two submarine branch cables through the EEZ and territorial seas of Mozambique (Figure 3-2). The Project will also involve shore-end cable installation in the nearshore and beach environment, and construction of a beach manhole (BMH) at each landing site adjacent to the beach at Nacala and Maputo to connect the submarine component to the terrestrial cable components.

Figure 3-1: 2Africa Overview*(Source: ASN 2020/).*

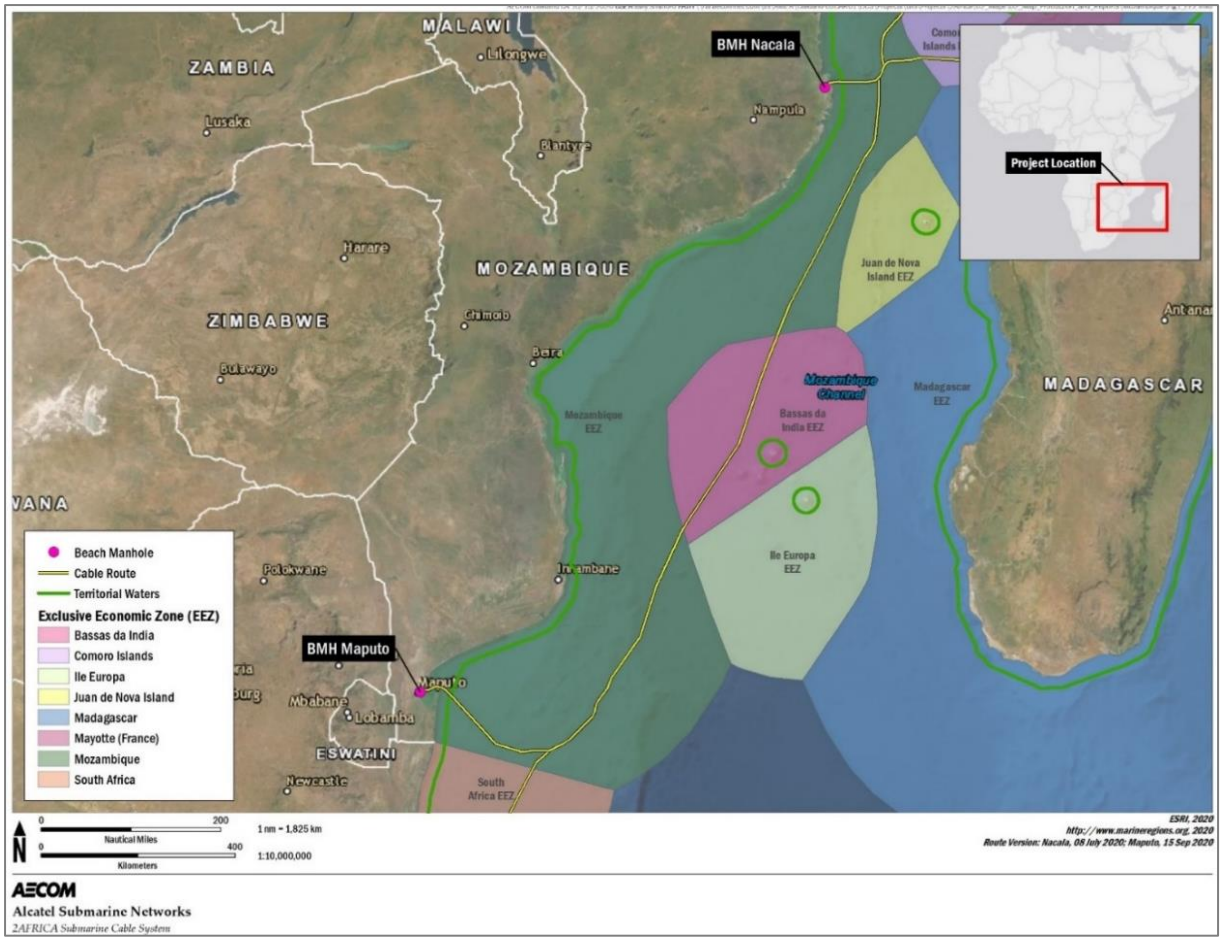

Figure 3-2: Map illustrating the cable route along the Mozambican coastline and landing positions at Maputo and Nacala.

3.4 INFRASTRUCTURE

A typical fibre optic cable network has a main trunk cable that is laid in the open ocean. This acts as the main cable from which cable 'branches' will be taken off to make landfall in countries along the route, thereby connecting the individual countries to the bigger system. The branch cables are 'landed' on the beach and then trenched in the shallow, nearshore environment, and on the beach. On or adjacent to the beach, a BMH is constructed to connect the marine portion of the cable. The terrestrial portion of the cable system is connected to the marine portion in the BMH, and a cable is then installed from the BMH to a Cable Landing Station (CLS), from where it is connected to various configurations of terrestrial fibre optic cable systems.

The current application includes activities and infrastructure associated with the marine portion of the cable, including the nearshore and beach installation and the BMH. Excluded from the current application are the connections from the BMH to the CLS and other terrestrial activities and infrastructure associated with the terrestrial fibre optic cable system.

The infrastructure associated with this application includes the submarine fibre optic cable (referred to as "submarine cable"), repeaters, BMH, articulated pipes and clamps and a System Earth (Figure 3-3). Each of these components is described in further detail below.

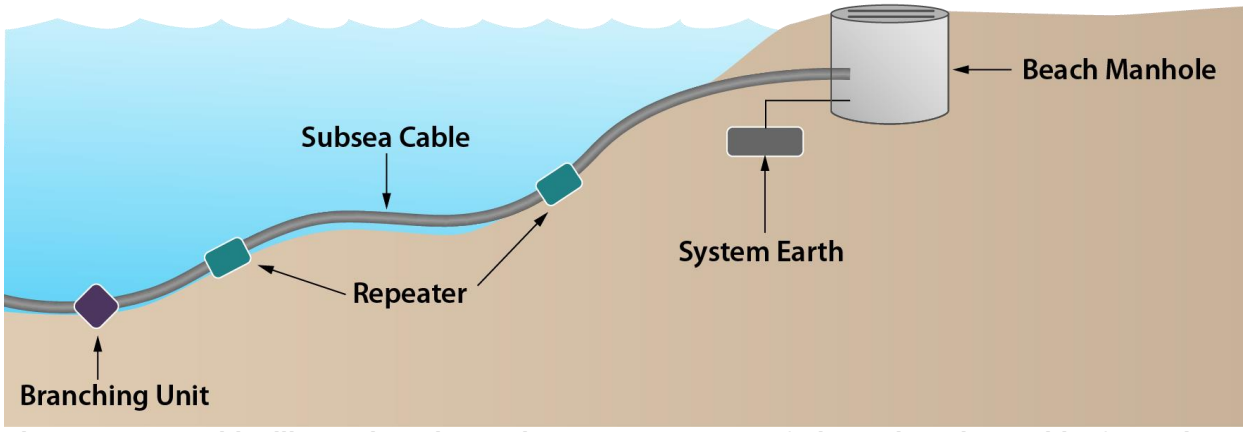

Figure 3-3: Graphic illustrating the various components of the submarine cable from the branching unit to the beach manhole.

3.4.1 Submarine Cable Technology

The proposed cable is an optical fibre submarine cable, designed with materials to minimize environmental impact. The cable design will accommodate optical fibres, which are housed in a jelly-filled stainless-steel tube, surrounded by two layers of steel wires that form a protective vault against pressure and external contact, and provide tensile strength (Figure 3-4).

This vault is then enclosed in a hermetically sealed conductor tube and insulated with a layer of polyethylene to form the basic deep-sea Light Weight (LW) cable. The outer low-density polyethylene coating provides high voltage electrical insulation, as well as abrasion protection.

The main design function of a cable is to protect the optical fibre transmission path over the entire service life of the system, including laying, burial, and repair operations.

A secondary function is that its metallic elements are used to feed an electric current to localised cable breaks and power repeaters.

For shallow water applications, external layers of steel armour wires are added to suit route conditions and installation methods, and to protect the cable from external forces such as seismic activity, ship's anchors and fishing activity.

Cable size will vary in width from 17 millimetres (mm) (lightweight cables used at a water depth of 1,000 to 8,000 metres [m]) to 50mm DAH (double armoured heavy) cable used at water depths of 0-100m, on the beach and rocky shores where burial cannot occur) (Figure 3-4).

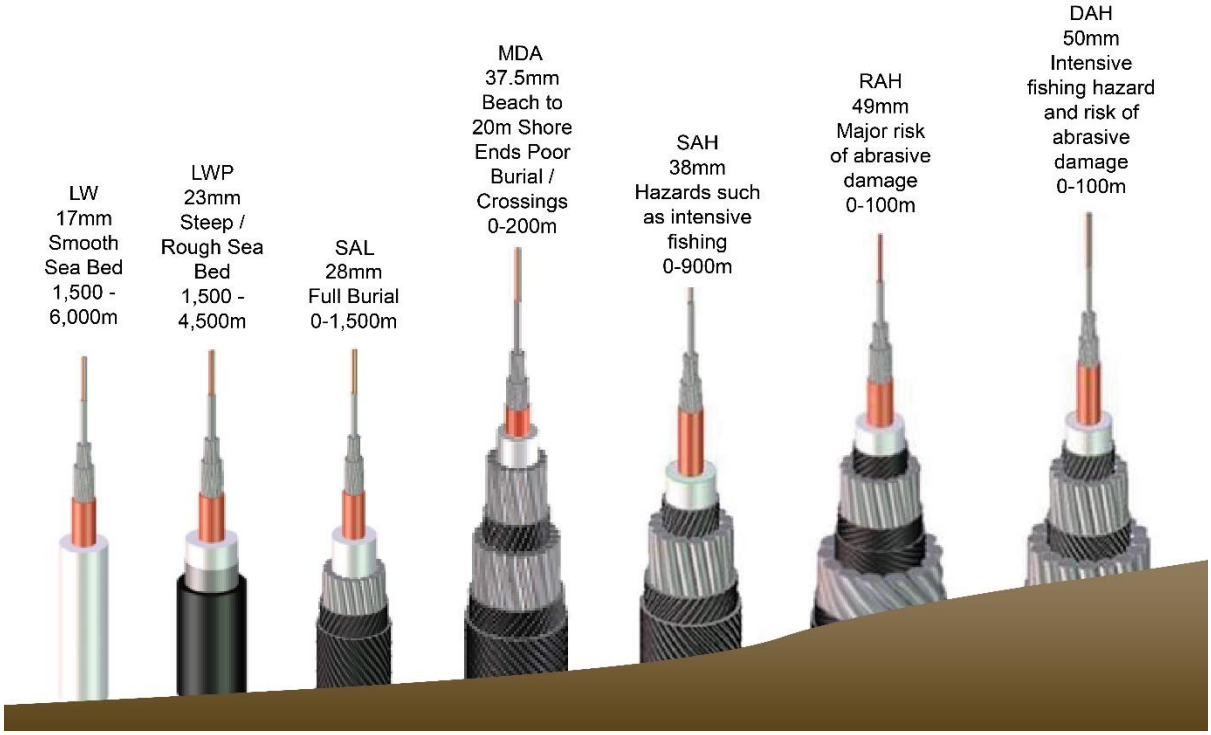

Figure 3-4: Image illustrating the inside of submarine cable ***(Source: ASN 2020).***

3.4.2 Repeaters

Repeaters are used to boost (amplify) the signal along the length of the cable and are used to extend the reach of optical communication links by overcoming loss due to attenuation of the optical fibre. Repeaters will be installed at specific distances along the route making up the cable system.

- The diameter of the rigid sea-case (white tube section in Plate 3-1**Error! Reference source not found.**) is approximately 270 mm.
- The length of the sea-case section of the repeater is approximately 980mm.
- The total length of repeater is approximately 3900 mm to 4240 mm depending on cable coupling.
- The spacing between repeaters is approximately 80km, varying with route plan.

The cable system also contains reconfigurable optical add-drop multiplexers (ROADMs) that are used to manage the wavelengths of light in the systems. These have a similar footprint to the repeater.

Plate 3-1: Cable repeaters ***(Source: ASN 2020).***

3.4.3 Beach Manhole

The BMH is a concrete vault located on or adjacent to the beach into which the cable is pulled from the beach landing. Inside the BMH the cable is connected to the terrestrial portion of the cable that will route to the CLS.

The BMH is normally located within 200m from the waterline with a straight line of sight to the landing point and to the sea. The BMH is approximately 2.4 m wide and 3.4 m long (8.16m^2) but final dimensions are still to be determined based on local conditions at each landing site. The BMH will be approximately 2 m in height but will be installed entirely underground. Excavation of a trench big enough for the BMH will be required and only the 1m cover plates will be visible once backfill of the trench is complete.

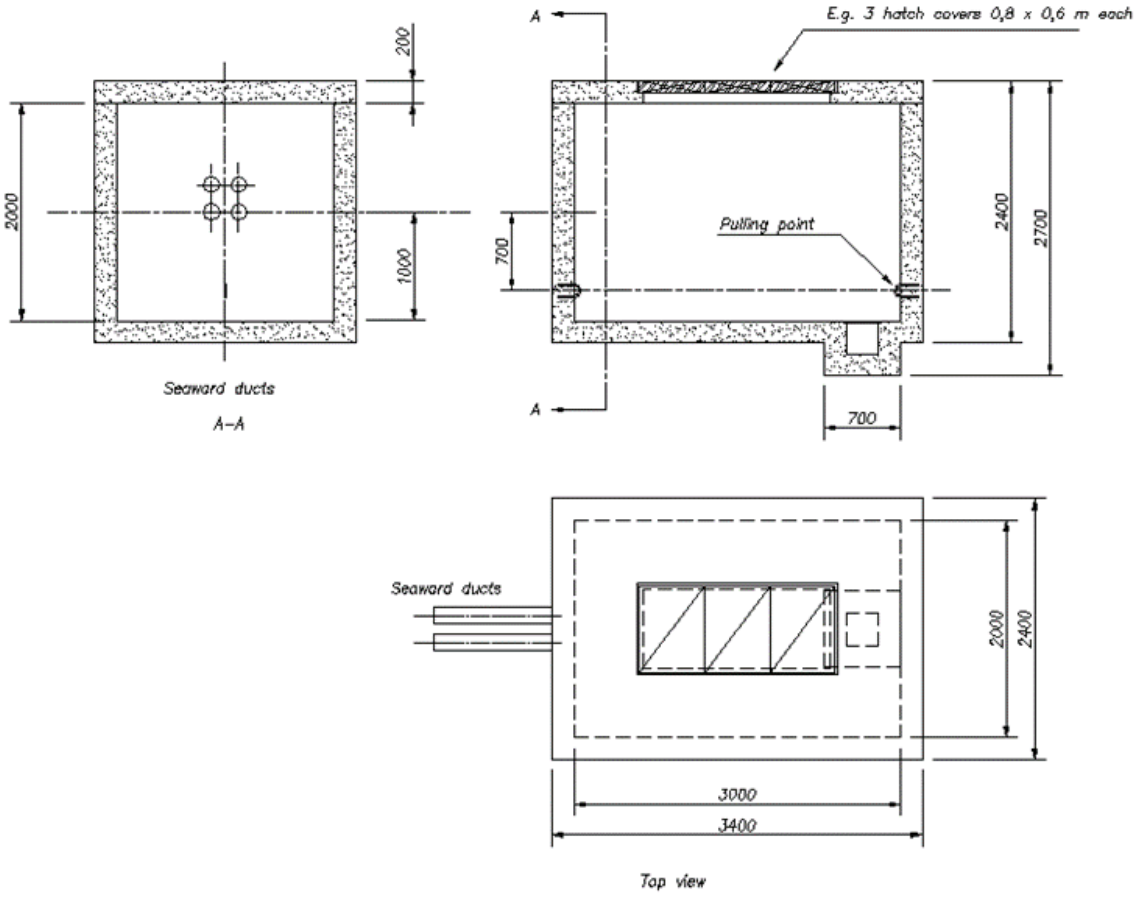

Figure 3-5: Typical BMH Construction design

There will be a BMH at each of the landing sites:

1. The Nacala site is located at approximately 14° 27.4411'S; 40° 40.8032'E and is on the north western-most beach of Fernão Veloso Bay (Figure 3-6). The exact location will be confirmed during the course of the ESIA process.
2. The Maputo site is located at approximately 25° 56.817'S, 32° 37.096'E near Avenida da Marginal on the north western portion of Maputo Bay (Figure 3-7). The exact location will be confirmed during the course of the ESIA process.

Figure 3-6: Location of the nearshore cable route and BMH in relation to Fernao Velosa Bay.

Figure 3-7: Location of the nearshore cable route and BMH in relation to Maputo Bay.

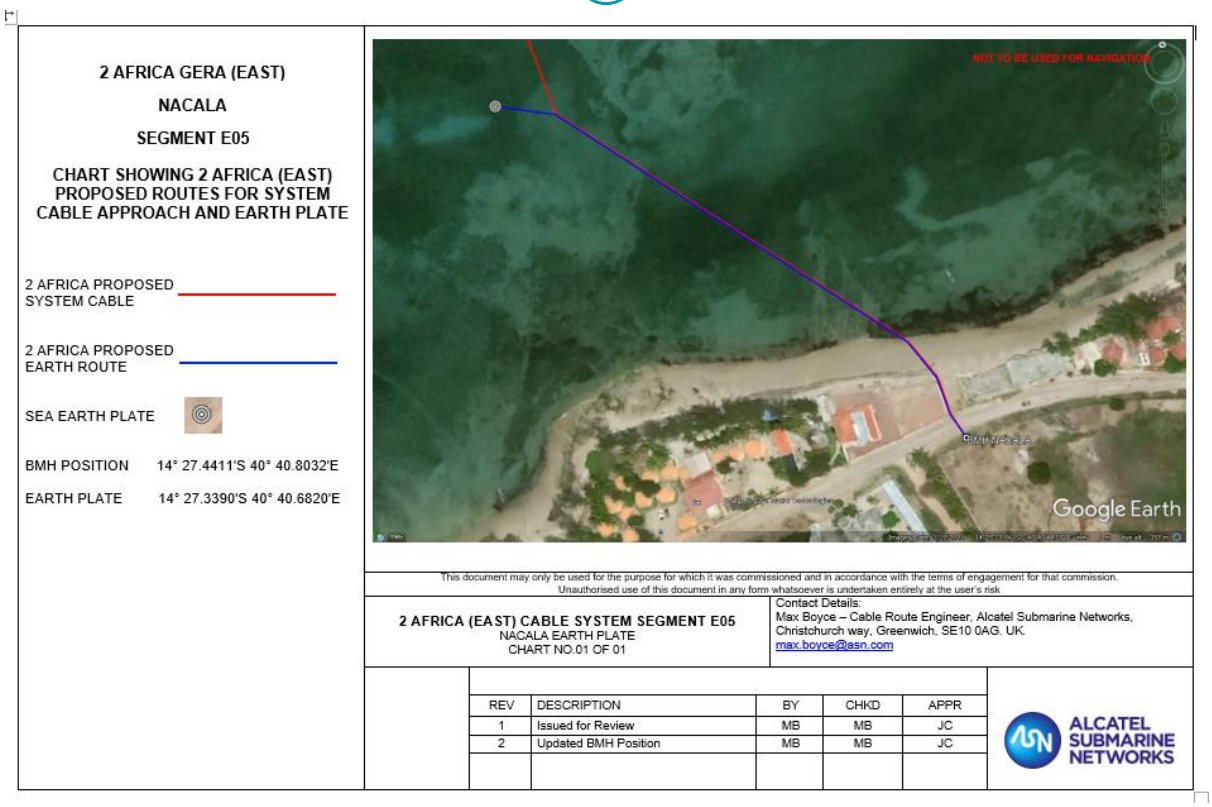

Figure 3-8: Location of the BMH and beach earth plate at the Nacala Landing.

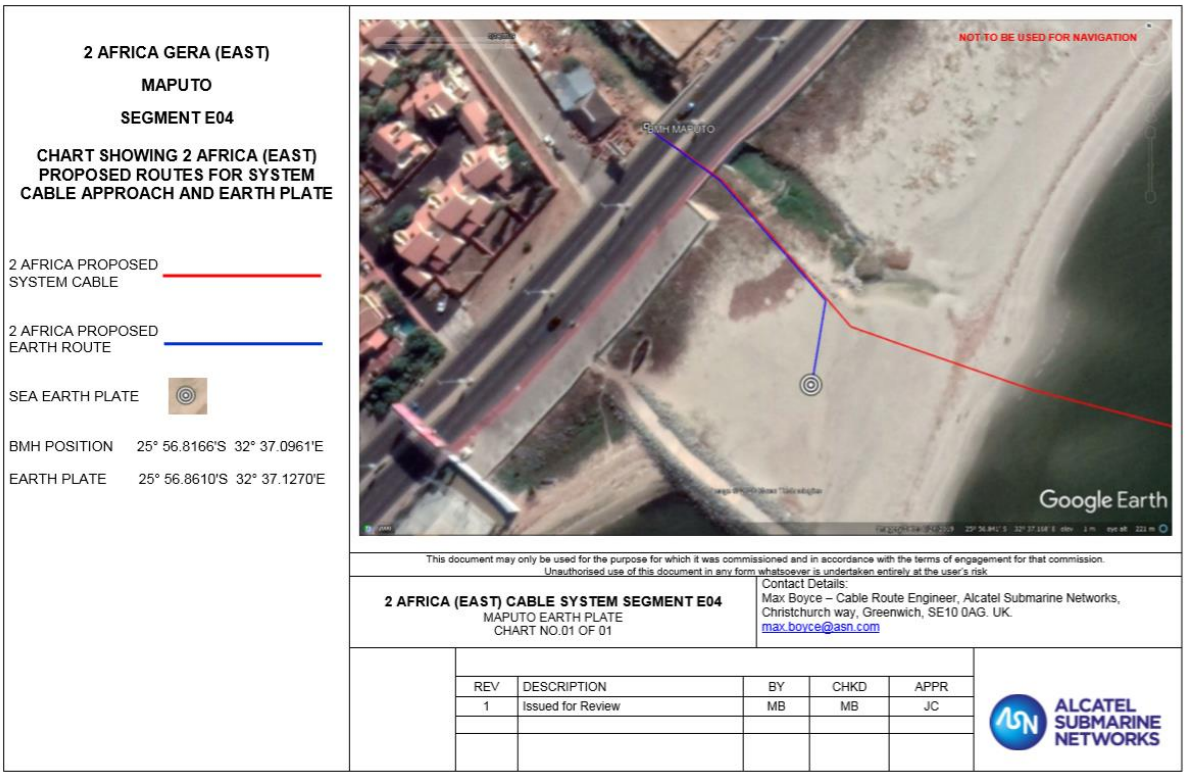

Figure 3-9: Location of the BMH and earth plate at the Maputo Landing.

3.4.4 Articulated Pipes

Articulated pipes (Figure 3-10) may be installed on the cable from the BMH towards the sea and typically up to the Low Water Mark (LWM). Where cable stability and additional protection may be required, articulated pipes may be fitted over the cable e.g. in the surf zone to avoid cable abrasion, if burial is not possible.

Articulated pipes are normally applied by divers, so the maximum deployment water depth is ruled by the local high energy wave system. Thus, articulated pipes are normally used down to a maximum of 10 m water depth.

In some situations, articulated pipes may be pre-installed onboard the cable vessel during the cable landing operation e.g. in areas with strong surf or high energy waves that will not allow post installation by divers. This pre-installation of articulated pipes onboard the main lay vessel can be in part (critical surf area only) or in full.

Figure 3-10: Articulated pipe.

3.4.5 Articulated Pipe Clamps

Articulated pipe may need to be secured with clamps. If necessary and to prevent further lateral movement of the articulated pipe in high energy surf zones. If needed saddle clamps will be installed by divers at suitable intervals along the articulated pipe to provide stability (Plate 3-2 and

Plate 3-3). Saddle clamps for articulated pipe are normally made from the same material as the articulated pipes themselves.

Clamps will only be considered for articulated pipe on hard ground in high energy surf zones where there is a significant risk of cable movement. At most cable landings, the cable route is

perpendicular to the dominant wave front, thus limiting the sideways drag component and therefore the need for clamps.

Normally stainless-steel studs are rod drilled into healthy rock surface and secured and anchored by special resin which will cure quickly. The length of rods required is determined by rock hardness and quality, and may vary from 0.2 – 1.5 m.

Plate 3-2: Example of saddle clamp installation (Two rod anchor).

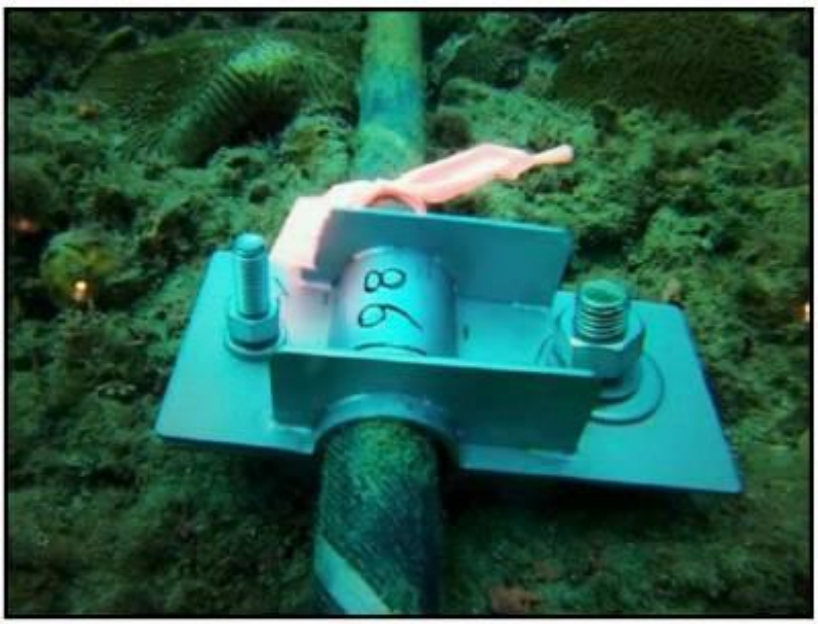

Plate 3-3: Example of cable clamp installation (One rod anchor).

3.4.6 System Earth

Submarine cables require an energy source to operate repeaters along the cable route, and therefore also need to be safely earthed. Earthing is achieved by installing a beach or sea earth plate and/or array of earth rods (collectively known as a system earth).

The system earth plate will be installed at a minimum distance of 25 m from the submarine cable and any other steel objects. The system earth plate is a 25 mm thick steel plate 2m in diameter and has a weight around 800kg including earth cable connection. The system earth plate must be installed in permanent saturated soil often close to and below the water line. The system earth will be buried and will not be visible on completion of installation.

3.5 PROJECT PHASES

3.5.1 Cable Route Engineering and Planning Phase

Identifying the most optimal route for the cable is known as 'cable route engineering.' This is developed during the route planning process and includes an engineering desktop study and a cable route study. The desktop study includes a detailed review of all factors affecting the routing of the cable, including physical, environmental, socioeconomic and regulatory aspects. This will form the basis for the marine survey activities—the detailed seafloor mapping to determine the final submarine cable route.

The cable route survey includes shallow and deep-water surveys of the route. Bathymetric and other data are collected and analysed to determine the optimum route for cable installation. Seabed samples are taken as required to help the classification of seabed sediments. Cone penetrometer tests are performed in areas of soft sediment where cable burial by ploughing is desired for cable protection.

During the planning phase of the cable system, the cable route survey and route selection exercises are optimised to choose a route that minimises impact on the seabed as much as reasonably practicable during the installation phase. During the cable route survey, modifications are made to find the optimum route.

Due to the technology that is used to perform the burial installation, it is beneficial for the route to follow areas of seabed where there is sufficient sediment. The sediment should ideally be of a nature that is good for both ploughing and providing adequate protection to the installed cable from external threats.

This typically means that areas of rough topography (rocks and boulders) and undulating bathymetry (sand waves and pockmarks) are avoided, if possible. By selecting ground that provides good conditions for the burial operation, the impact on the seabed is kept to a minimum because the amount of force required to penetrate the seabed is minimised.

Cable route engineers then engineer the cable type to suit the selected route. This means that the cable type will vary with cable depth, seabed type and cable burial location.

The cable route survey was conducted by Fugro Germany Marine GMBH (Fugro) at both sites between 9 October 2020 through 21 November 2020. Additional information about the findings of the survey are included in subsequent sections.

3.5.2 Installation Phase Activities

Activities that will be undertaken during the installation of the submarine cable are outlined in Table 3.1 below. More detailed description of system infrastructure is provided in sections below.

Table 3.1: List of activities associated with each project phase.

Activity	Description
Installation	
1. Cable Lay Vessel operation in EEZ and territorial seas	The cable vessel, also referred to as the 'Main Lay' vessel, is a specialized vessel designed for cable installation and/or maintenance and will be used to install the main trunk and cable branches that are at depths > 12 to 15 m, which are depths deep enough for safe access by the cable vessel. When reaching the coast during cable landing activities, the cable vessel will take up position between the 12 to 15 m depth contour, at a safe distance from the coastline and reefs, and with consideration for currents and swell. Smaller guide/diver boats will be used within shallower waters to tow the cable from the cable vessel to the shore. This shallower section of installation is called the 'Shore-end lay'. It is estimated that, excluding delays due to weather conditions, the installation of the Nacala cable branch in the territorial seas and EEZ will take approximately two to three weeks. For the Maputo cable branch (excluding weather delays), it is estimated that the cable installation through the territorial seas and EEZ will take approximately six (6) weeks. The installation of the main trunk between the Maputo and Nacala branches will take two (2) weeks.
2. Other vessel usage (guard vessels, small diving boats, small support boats, barges etc.)	Other smaller size boats will be used during the shore-end cable landing activities, operating in shallower waters (up to 12 to 15 m deep). These vessels will be used to pull the cable from the cable lay vessel to land, as well as to house installation equipment, to provide support for diving operations and to secure a safety zone around the cable landing operations to keep other water users out of the project area for the duration of the installation (typically 1 day).
3. Laying cables across other existing cables	When existing fibre optic cables fall along or close to the proposed cable route, the installation method will depend on the depth of the seabed and if the section of new cable will be buried or not: • **>1,000 m**: in deep waters cables are laid on the surface of the sea floor. New cables are typically laid over existing (third party) cables and no further installation action is needed. • **< 1,000 m and non-burial areas**: installation is the same as for >1,000 m above. • **< 1,000 m and planned burial areas**: ploughing will only be used up to within 250 m to 500 m on either side of the existing cable, leaving a 500 to 1,000 m zone across the existing cable where other methods of installation are needed. In this area, the cable will be first laid on the surface of the seabed, and then followed with a burial method called Post Lay Inspection and Burial (PLIB).

Activity	Description
	• All crossings will follow the (International Cable Protection Committee) ICPC recommendations by crossing as perpendicularly as possible. Notification of third-party cable owners will be done by the applicant.
4. Laying cables across other existing infrastructure	Currently no known additional infrastructure has been identified that will need to be crossed, but this is under investigation. This section will be updated if comments from stakeholders highlight existing infrastructure within 500 m on either side of the proposed cable route.
5. Route clearance	Route clearance (RC) is a process of clearing the route of out-of-service (OOS) cables that are identified during the desk-top assessment and route survey. This is usually done in areas where burial of the cable is planned across an old (no longer operating) cable. This process requires the use of a Deep Trenching Grapnel, which will be dragged on the seabed to snag the existing cable. The vessel will remove a suitable section of this old cable to ensure safe ploughing. The cable ends of any cut out-of-service cables will be laid onto the seabed and weighted, in accordance with ICPC recommendations. This is typically done by the cable vessel, but sometimes an additional vessel may be used.
6. Pre-lay grapnel run	Pre-lay Grapnel Run (PLGR) applies to areas in which burial is planned, in other words along the route at depths < 1,000 m deep and across sediments suitable for burial. This will therefore be undertaken in the nearshore areas below the high-water mark. A PLGR will not be done in areas with existing services or infrastructure, nor over rocky/hard surfaces. The aim of the PLGR is to remove all debris on the seabed surface (e.g. old fishing net, rope/wire, anchor chain) that may obstruct the ploughing process, since seabed debris can damage the cable and burial equipment. PLGR operations are performed ahead of the burial installation, and are performed by a vessel specifically fitted with winches and grapnels, or by the cable lay vessel itself. The vessel will move along the route towing one, or an array of grapnels along the seabed. Typically, the route is run once, except in areas of high fishing or marine activity, where additional runs might be made. The grapnel penetrates 0.5 to 1.0 m into soft sediment. The PLGR vessel will operate as close to shore as possible. Divers may be used to remove debris near shore or adjust the cable route if debris cannot be removed. Any debris recovered during these operations will be discharged ashore on completion of the operations and disposed of in accordance with local regulations. The PLGR operation will be to industry standards employing towed grapnels; the type of grapnel being determined by the nature of the seabed. The PLGR run for the Maputo branch is estimated to be over a distance of 200 km but only approximately 1.3 km for the Nacala branch.
7. Main trunk cable installation	The main trunk of the cable is laid in a north-south direction, at a distance of approximately 100 to 475 km from the coast of Mozambique.

Activity	Description
	The main trunk is located in water 1,600 m to 3,630 m deep. For depths of **>1,000 m** cable is laid on the surface of the seabed and burial is not used as there is a lower risk of external threat to the cable, and there is lower water movement and less cable abrasion on the seafloor. If there are areas shallower than 1,000 m then burial options would be considered. A Marine Survey assessed the seafloor to determine the bathymetry of the seafloor and to plan surface cable laying that will avoid obstacles such as trenches, sea mounts, steep slopes and rough/hard surfaces.
8. Branch cable and ***deep***-water installation (>1,000 m)	This is the installation (laying) of the branch cable from the trunk in deeper waters, towards the cable landing location on the beach. In water depths >1,000 m, the cables will be surface laid.
9. Branch cable and ***shallow***-water installation (<1,000 m)	This is the installation (laying) of the branch cable to the cable landing location on the beach. In water depths <1,000 m, burial using a plough is the typical installation method. In shallow waters 20 to 1,000 m deep the cable is usually buried to protect it from threats such as anchoring, trawl fishing and other maritime activities, as well as from currents and wave action. Survivability (and reducing the need for repair) of the cable is one of the key drivers for choosing burial in shallow waters. The cables will be buried where seabed conditions allow. A sea plough is deployed from the cable lay vessel and is towed on the sea floor. The cable is fed through the plough into a narrow furrow at the bottom of a share blade, which places the cable into the seafloor substrate. The target burial depths for 2Africa in Mozambique is 2.0 m where seabed sediments and slopes allow. The final depth of the cable will be determined by the hardness/softness of the sediment on the seafloor. The width of the trench is 0.2 m wide, but the plough may leave a 4 m strip footprint. The length of time that this footprint might remain visible depends on the substrate and local seabed hydrodynamics and sedimentation. In water <20 m water deep, installation is achieved using smaller vessels to tow the cable from the cable lay vessel to shore, and divers and other burial equipment is used to bury/secure the cable. Exceptions to this typical burial method in <1,000 m deep water are where hard surfaces/ rocky areas are encountered, or were services or existing cables are crossed. In this instance, Shallow Water Surface Lay is used.
10. Shore-end Lay/ Landing	The shore-end landing is the section of cable in shallow waters that are too shallow for the cable vessel to operate. There are two types of shore-end methods which are influenced by the slope of the seafloor. A steeper slope will reach 12 to 15 m depth at a shorter distance from the shoreline than a more gradual slope, where the 12 to 15m depth will be further away. The two different shore-end methods are as follows: Direct shore-end landing – proposed for Nacala:

Activity	Description
	• Direct shore-end landing is used where the distance to the landing site is < 2500 - 3000 m from the shallowest area that the cable lay vessel can safely operate. This is called the shallowest draft point and is at a depth of around 15 m. This type of landing will be applicable to the Nacala landing. • The cable vessel will take up position at the 12 to 15 m depth, using dynamic positioning (DP) mode to maintain position and no anchoring will be used. DP mode is when the ship does not drop anchor but is kept in position using computer software that controls the ships engines to keep it on a designed GPS location. • Positioning will also consider proximity of coastline, reefs and other potential risks. • The cable (with floats attached) is floated directly form the cable ship and pulled to the beach with the help of work boats, divers and beach equipment (e.g. excavators) as described in point 11 below (Landfall Operations) (refer to Plate 3-4). • Inshore burial is performed as per Point 12 below (Burial Options). • Beach burial is performed as per Point 13 below (Beach Burial). Pre-laid shore end landing (PLSE) – proposed for Maputo: • This option is used when the distance to the landing site from the shallow draft point (i.e. 15m depth) is more than 2,500 to 3,000 m. This option is proposed at the Maputo Landing Site, where the nearshore area has a very gentle gradient and the shallow draft point is 40 km from the low water mark. Therefore, the shore end will be installed by another vessel, a barge that can operate in shallower water. • The PLSE will be installed either by the cable segment being surface laid and then post-lay burial (PLB) operations are performed or will be laid and buried simultaneously with a jetting plough. • The barge will travel along the route propelled by thrusters, assisted by a support vessel. The barge pilot will follow the route as defined on the survey navigational screen. • The cable will cross Xefina Island, which will be done by trenching through the sand bar for approximately 50 m. This will be done by either digging a trench with excavators for the cable only and using jetting nozzles and pumps attached to the barge to cut a channel to allow the barge to get as close to the sand bar as possible on either side of the crossing, OR using the jetting nozzles to jet a trench for the barge to cross Xefina Island (at high tide) while installing the cable. • On reaching the shallow point near the shoreline, the cable is floated directly from the barge and pulled to the beach with the help of work boats, divers and beach equipment (e.g. excavators) as described in Point 11 below (Landfall Operations). • The final section of cable in the intertidal zone is performed in the same way as for direct shore-end lay and is described in Point 12 below. • Beach burial is performed in the same way as for direct shore-end lay and is described in Point 13 below.
11. Landfall Operations	The process of landing the cable at the beach landing site, for both direct and pre-laid shore-end methods, is illustrated in Plate 3-4 and summarised as follows: Pre-lay preparations:

Activity	Description
	• Prior to laying the cable, local fishing communities will be notified of the intended operations so that they can remove any fishing gear from the cable route, preventing any inadvertent damage to fishing gear. • All necessary equipment will be mobilised to the site the day before the planned landing. This will include two excavators. One excavator will be positioned near the landing point to anchor a quadrant on the beach and the other excavator will be prepared with necessary rigging and pulling rope to pull the cable through the quadrant – usually at 90 degrees to the cable lay. • A full dive swim will be completed the day before the landing so debris can be removed or be avoided before sinking the cable. • In areas with significant local inshore vessel traffic, additional small guard vessels/work boats may be considered to avoid any possible damage to the floating cable during landing operation. Beach pull: • A messenger line will be pulled to the beach using a smaller work boat. • The excavators on the beach will facilitate the pulling of the cable to shore. • The pulling excavator will pull the cable a few hundred metres from the quadrant, and then go back to the quadrant and perform additional pulls until the required amount of cable (slack) is on the beach • Security guards may be used in some areas to restrict public access and to look after equipment at landing site during night-time • As the cable is being pulled from the vessel, crew will attach floats to the cable every 3 to 5 m. Positioning, testing, burial and cable protection: • Once anchored on the beach the cable route in the nearshore will be re-positioned on the surface by small boats at the required route/position • Divers will cut the floats away from the cable and guide the cable to the seafloor and perform a full swim to confirm the cable is positioned according to the planned routing, and to avoid sensitive receptors (such as coral reefs, infrastructure, etc.). Floats will be returned to the vessel. • Cable testing will be performed. After being tested to be working, inshore burial activities will begin inshore, and on the beach, as described in points 12 and 13 respectively. • Should cable protection or stabilization measures be required, these will be done during the inshore burial activities described in point 12. • After the cable is placed on the seabed, the cable end, currently on the beach, will be installed in the BMH. The Beach Manhole will need to be constructed prior to arrival of the cable. Either premixed concrete or precast walls will be delivered. This is likely to happen three weeks before to allow concrete to cure. Once the beach burial is finished, the beach will be reinstated to its former state. It typically takes a few days to bring the cable to shore and secure it to the BMH.
12. Inshore Operations	A dive team and small workboats will support the cable landing operation, cable sinking and securing of the cable on the seabed from the shore to

Activity	Description
	around the 15 to 20 m water depth mark. This may also include post burial activities, as required. All work will be done during daylight hours and will be subject to the tide, wind, current and wave conditions. A typical dive team includes two small local work boats, one diving supervisor and a diving team of three to six divers.
13. Beach Burial	The beach burial extends from the BMH or end of seaward ducts to the waterline on the day of installation. The submarine cable will be buried to a target depth of 2 m below surface or to hard ground, whichever comes first. The cable may be protected by articulated pipe. This may also include installation and burial of the sea earth plate and earth cable. All digging will start the day before the planned cable landing. Normally excavators will be used for this activity, and the beach is often restored within a few days of completing the burial . To dig a trench of 2 m deep the trench needs to be approximately 6 m wide, depending on the sediment properties.
14. Post Lay Inspection	Cable laying and burial may be followed by a post-lay inspection to ensure that the cable is placed correctly on or into the seabed. In shallow waters, the inspection may be carried out by divers, using various equipment including burial jets. In deep waters, a Remotely Operated Vehicle (ROV) that is equipped with video and digital cameras will be used. The images obtained are viewed on the surface control vessel in real time.

Plate 3-4: Landfall operations showing the cable ship paying out cable with floats attached, being installed with assistance from small boats and divers.

3.5.3 Operational Phase Activities

During the cable laying processes described above, GPS data will be collected to record the exact location of installation, referred to as the 'as-laid' position. This information is then distributed, in standard-format cable record, to relevant parties such as cable maintenance ships, government agencies, and other data users. These records will be maintained throughout the system's life and after the system is retired.

Once installed, the submarine cables do not require routine maintenance or inspection. The system can be monitored remotely for faults.

The cables may not require any repairs during their operational lifetime. They are however installed in a way that enables repairs to be carried out if necessary. Cable repair involves locating the cable section that has shown a fault and using a grapnel to bring the cable up to the vessel for repair and returning it again afterwards. There may be requirements for re-burying the cable.

As-laid data can be used to locate the cables on the seabed if a cable repair is needed.

3.5.4 Decommissioning Phase Activities

There is no definitive position on decommissioning of telecommunication submarine cables. Carter *et. al.*, 2009, points out that the removal of submarine telecommunication cables should be evaluated on a case-by-case basis, as the procedures for withdrawal and some local conditions (soil type, crossing with other cables, etc.) can often have a greater environmental impact than the procedures related to the installation itself. In some cases, cables that have a depleted business life may serve research and teaching purposes, which in other words is an extension of their “useful life”, but now under the responsibility of another owner / manager.

The system typically has a system life span of about 25 years, however the cable system can operate long after this period, and its deactivation can only be performed by the shutdown of the electrical / electronic system and disabling the transmission of information. There are no plans to withdraw the cable from the seafloor, coastal and / or area of the beach.

3.6 PROJECT INPUTS AND OUTPUTS

3.6.1 Water Supply

Water will only be used for staff drinking water which will be between 8 to 20 people per week. It is possible water may be required for mixing concrete for the building of the two BMH (one at Maputo and one at Nacala) but it is expected that premixed concrete will be brought to site to cast the manhole in-situ. Water usage will therefore be minimal.

3.6.2 Energy Requirements

During the construction phase, power usage will be minimal. Power will be obtained from generators. The total annual demand for electricity from the local grid will be 0 kWh.

During operation, the cables will be powered from the CLS and will not need a separate source of power.

3.6.3 Employment Opportunities

During the installation phase it is estimated that up to 120 workers will be employed at the peak of the construction phase, which is estimated to take approximately three months.

Given the nature of the installation, only skilled and semi-skilled labour will be required. A breakdown of the number of skilled and semi-skilled labour has been provided in Table 3.2.

The nationality of the workers will be dependent on the contracting firm appointed to undertake the work. Mozambique workforce is preferred as it is more economical, however where suitably qualified and experienced skilled labour cannot be found in Mozambique, foreign skilled labour will need to be sourced, particularly during the construction phase.

During the operational phase it is estimated that approximately six workers will be employed at the Maputo site and a further six at the Nacala site.

A breakdown of the staffing is provided in Table 3.2:

Table 3.2: A breakdown of staffing requirements for the Installation and Operational Phases.

Type	Installation Phase	Operational Phase (Maputo)	Operational Phase (Nacala)
Skilled	Approximately up to 80 to 100 skilled workers for the vessel crew and dive teams	Approximately three skilled workers as technicians/ remote hands staff	Approximately three skilled workers as technicians/remote hands staff
Semi-Skilled	Approximately up to 20 semi-skilled workers for the support staff on the vessel and beach	Approximately three Semi-skilled workers for maintenance crew	Approximately three Semi-skilled workers for maintenance crew
Unskilled	0	0	0
Total	120	6	6

3.7 Project Alternatives

3.7.1 Fundamental Alternatives

Fundamental alternatives are developments that are totally different from the proposed project and usually involve a different type of development on the proposed site, or a different location for the proposed development.

A different location: The applicant has identified the best route for the cable based on the underlying topography of the seabed, nearshore and beach characteristics. The route has been chosen to avoid highly sensitive features such as corals, shipwrecks and seagrass beds where feasible. Route refinements were made based on marine survey information to optimise the cable route and landing site. As such, no route alternative will be investigated.

The "No-Go" Alternative: According to the ESIA Regulations, the option of doing nothing, not proceeding with the proposed development (i.e. the No Go Option), must be assessed during the ESIA.

3.7.2 Incremental Alternatives

Incremental alternatives are modifications or variations to the design of a project that provide different options to reduce or minimise environmental impacts and maximise benefits. There are several incremental alternatives that can be considered, including the design or layout of the activity, technology to be used in the activity, and the operational aspects of the activity.

Design: The submarine cable system is a very specific, custom-built piece of infrastructure that is tailor made to follow the optimum routing to minimize environmental impact and maximize cable protection and reliability. Design alternatives are restricted to smaller technical components of the selected cable infrastructure.

Layout: As the project is at scoping level, the layout of the project is not fixed at this time. A proposed layout indicating the position of the cable route and BMH has been included based on desktop and field studies and industry standard; however, these may shift if the specialist studies find there to be highly sensitive features that need to be avoided. This will be further investigated during the ESIA.

4 DESCRIPTIONS OF THE BIOPHYSICAL ENVIRONMENT

Mozambique is located along the eastern coast of southern Africa between 10º27' and 26º52'' South and 30º12' and 40º51' East. It covers a surface area of 799 380 km^2 and is bordered by South Africa, Swaziland, Zimbabwe, Zambia, Malawi and Tanzania (Ribeiro and Chauque; 2010).

4.1 CLIMATE

4.1.1 Nacala

Nacala is located on the eastern coast of the African continent between the latitudes of 14^0 and 15^{0}S, and experiences a tropical climate characterised by a high summer rainfall and dry winter (Climate-data.org, 2020). The Inter-tropical Convergence Zone sits over Nampula Province and influences much of the climate (Pereira *et. al.,* 2014). Annual average rainfall is 843mm per year, with the majority of the rain falling between the months of December and March. However, in recent decades, a notable decline in precipitation has been observed in East Africa and studies are underway to understand the cause of this (Souverijns *et. al.*, 2016).

Temperature throughout the season varies very little, with highs of 26^{0}C in January and February and lows of 23^0 in July (Climate-data.org, 2020). The average annual temperature is approximately 24.9^{0}C.

4.1.2 Maputo

Maputo is located south of Nacala between the latitudes of 25^0 and 26^{0}S and like Nacala experiences a tropical climate characterised by a high summer rainfall and dry winter (Climate-data.org, 2020). Annual average rainfall is 781 mm per annum with the majority of the rain falling in January. The southern coast of Mozambique is influenced by a subtropical anti-cyclonic zone dominated by the southeast trade winds.

Temperature throughout the season varies very little, with average temperatures ranging between 26^{0}C in January and February and 18^0 in June and July (Climate-data.org, 2020). The average annual temperature is approximately 22.7^{0}C.

4.2 PROTECTED AREAS

Mozambique falls within the Eastern Africa Marine Ecoregion which is recognised as having a significantly high marine biodiversity of global importance (WWF, International Corals Initiative). According to the Marine Protected Area atlas, there are sixteen Marine Protected Areas (MPAs) in Mozambique and four Marine Managed Areas. IUCN defines MPAs as *"A clearly defined geographical space, recognized, dedicated, and managed through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values".* The Centre for Biological Diversity defines an MPA as "*Any defined area within or adjacent to the marine environment, together with its overlying water and associated flora, fauna, historical and cultural features, which has been reserved*

by legislation or other effective means, including custom, with the effect that its marine and/or coastal biodiversity enjoys a higher level of protection than its surroundings"

4.2.1 Nacala

Baixo Pinda Forest Reserve (the closest MPA to the Nacala portion of the proposed project) is located 8 km north of the landing site, and Matibane Forest Reserve is located 28 km south of the landing site (Figure 4-1) (iBAT, 2020). The project will not transverse any MPAs or terrestrial protected areas.

4.2.2 Maputo

iSimangaliso Marine Protected Area (the closest MPA to the Maputo portion of the proposed project) is located approximately 105 km south of the landing site, and Ponta do Oura Partial Marine Reserve is located 37 km southeast of the landing site, and 10 km south of the submarine cable route (Figure 4-2) (iBAT, 2020). The Mozambique Special Reserve is adjacent to the Ponta do Oura Partial Marine Reserve and located within a terrestrial area.

The submarine cable and associated infrastructure will not transverse any marine or terrestrial protected areas.

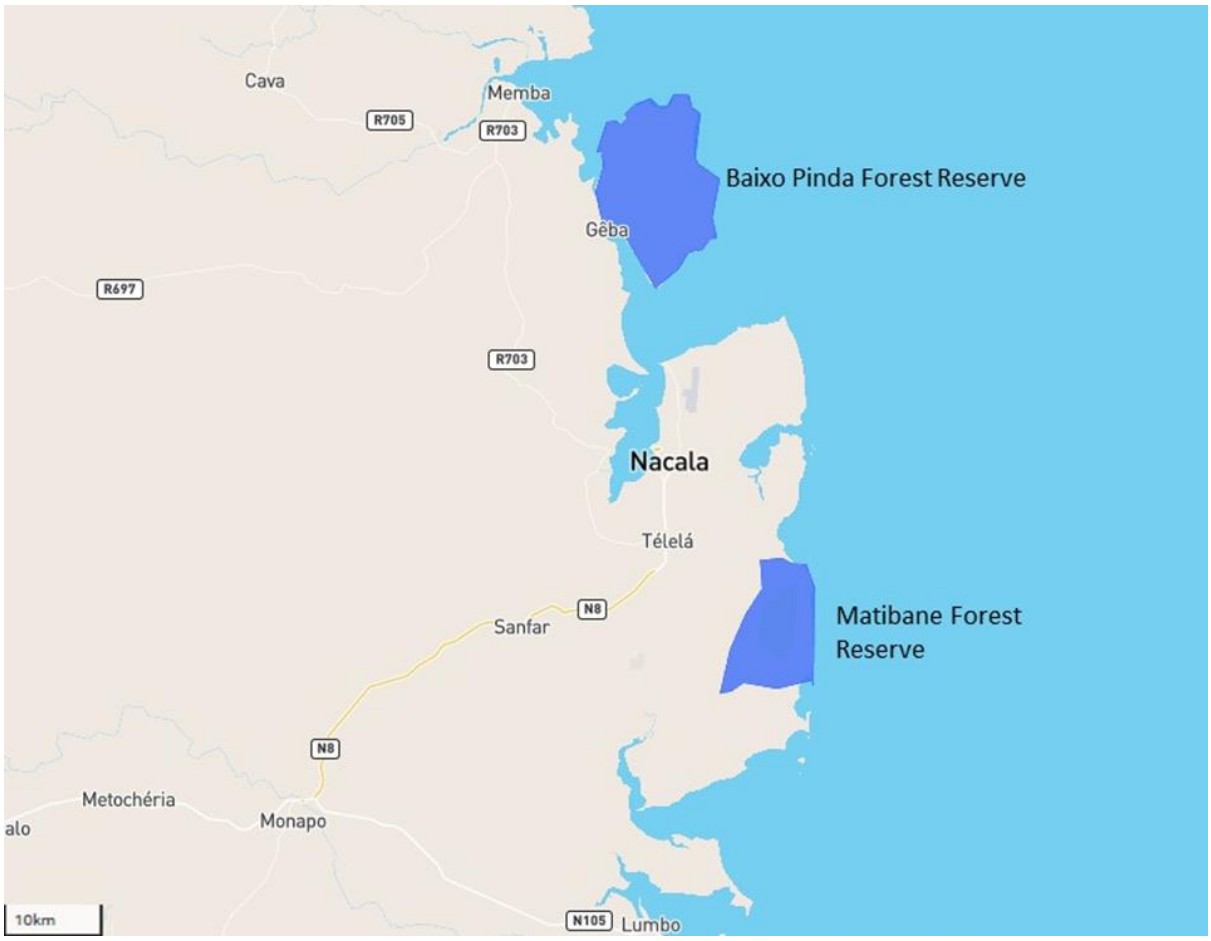

Figure 4-1: Location of the two protected areas in relation to Nacala (Source: iBAT).

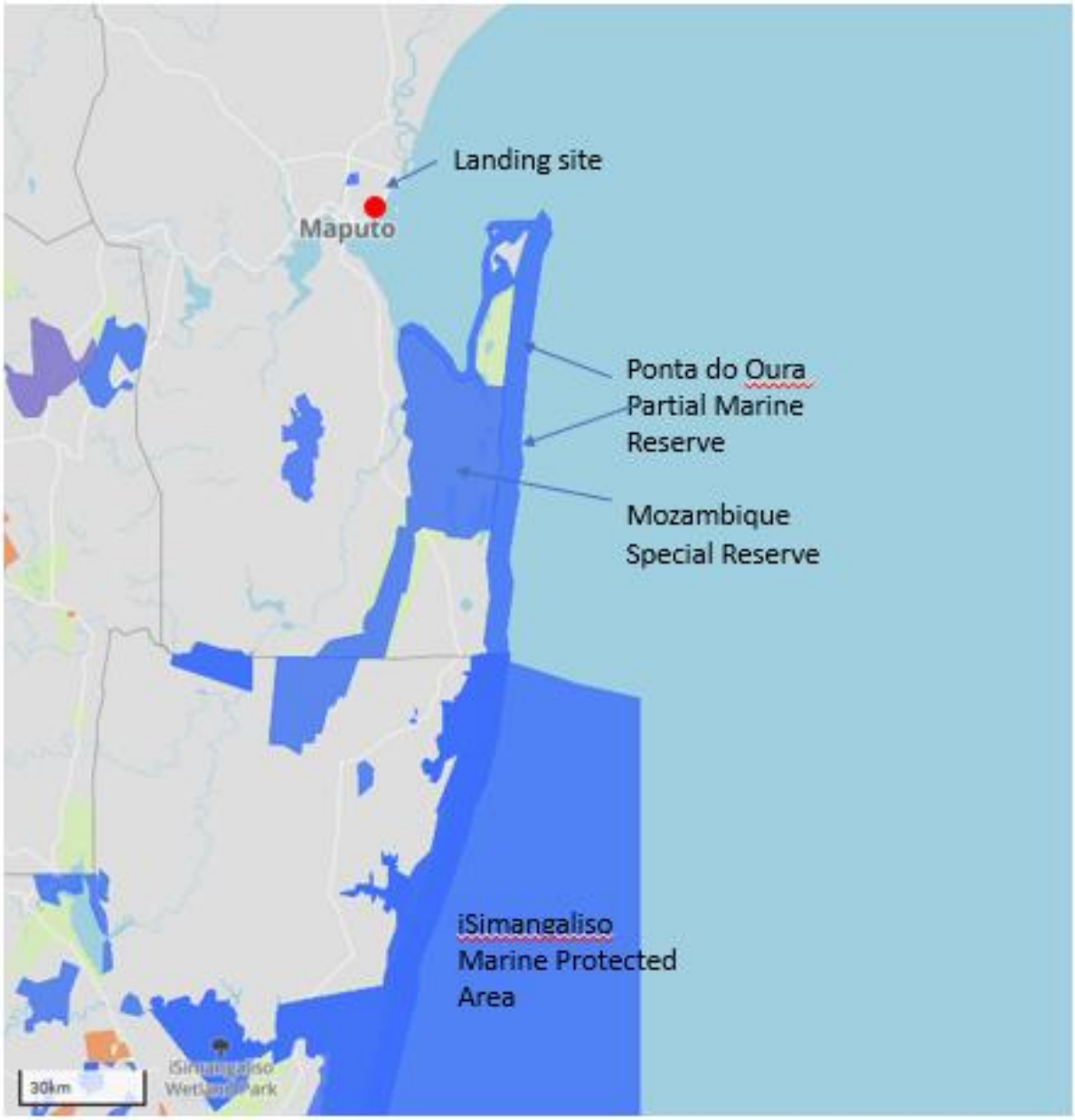

Figure 4-2: Location of the protected areas in relation to Maputo. ***(Source: iBAT).***

4.3 MARINE ECOREGIONS

4.3.1 Nacala

The marine environment off the coast of Nacala falls within the Nacala-Mossuril Marine Ecoregion. This area has been identified as an important area for conservation but is not considered to be of global significance (EAME, 2004). Very little literature is available on this eco-region.

4.3.2 Maputo

The Maputo Bay-Machangula Complex ecoregion occurs to the south of Maputo and includes the southern portion of Maputo Bay. This region is important for the following reasons (EAME, 2004):

- Feeding area for turtles, dugongs and migratory birds;
- Nesting area for loggerhead and leatherback turtles;
- Numerous endemic fish and plant species are present;
- Presence of unique tube worm reefs; and
- Deep rocky formations are dominated by sessile colonial cnidarians (type of soft coral).

4.4 Marine Environment

The Mozambican coastline is home to a high biodiversity of marine organisms (Pereira *et. al.,* 2014). This is a consequence of the range of available habitats and ecosystems present along the coastline. It is estimated that the coastline supports:

- 900 species of reef-associated fish;
- 122 species of sharks and rays (20% of which are listed as Threatened Species);
- 30 species of pipefish and 2 species of seahorse;
- 400 mollusk species;
- 27 species of marine mammals;
- 5 species of marine turtles;
- 270 species of hard and soft corals;
- 14 species of seagrasses; and
- 9 species of mangroves.

Mozambique has divided the main coastal and offshore region into three broad ecozones which are described below (Figure 4-3). For the purpose of this report, these ecozones are defined as broad management units with similar marine and coastal features.

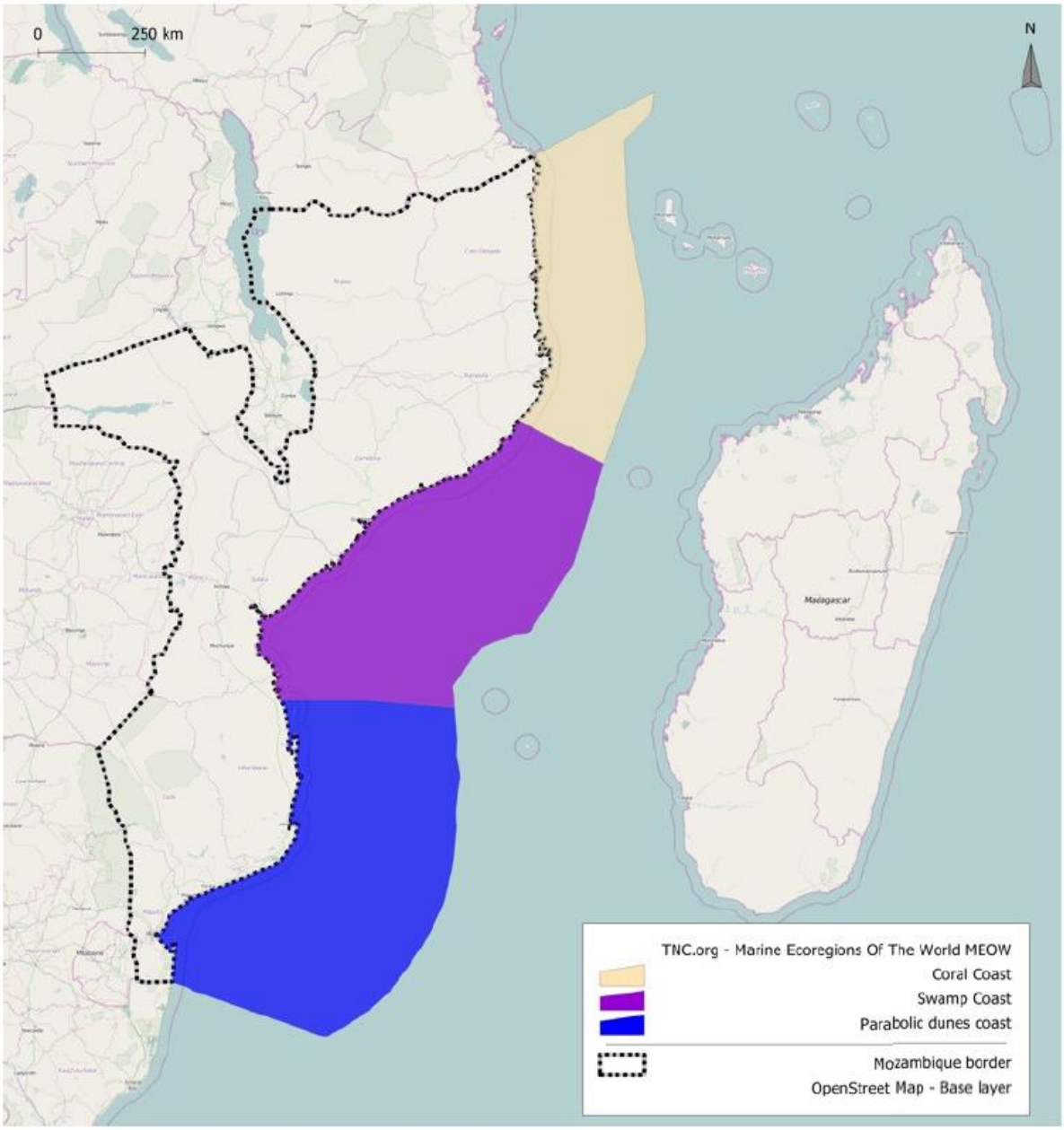

Figure 4-3: Broad Coastal Ecoregions found along the coast of Mozambique (Source: Pereira *et. al.* 2014).

4.4.1 Coral Coast Ecozone

The coast off Nacala, where the Nacala branch cable will make landfall, occurs within the broadly defined Coral Coast Ecozone, which stretches from the Rovuma River to Pebane. It includes the Quirimbas Archipelago north of Pemba and the Primeiras and Segundas National Park south of Angoche.

The reefs in this area are considered to be one of the most diverse ecosystems in the world, and in 2012 were recognised as the second most biodiverse area for coral species in the Indo-Pacific (Obura, 2012 in Pereira *et. al.*, 2014). In Nacala, 220 species of hard corals have been identified, and it is estimated that the number could be as high as 297 species (Obura, 2012 in Pereira *et. al., 2014*). During the cable route survey in Nacala, the inshore survey started at the beach and proceeded seaward. It utilized side scan sonar and underwater photography

and identified the presence of coral near the shoreline (Fugro 2020). Where feasible, the cable will be routed around hard surfaces, including coral reefs, to limit the impacts on sensitive marine life.

4.4.2 Swamp Coast Ecozone

The Swamp Coast Ecozone, through which the main trunk will pass predominantly in the EEZ, occurs in Central Mozambique between Angoche and the Bazaruto Archipelago. In this area the continental shelf is wide, reaching in excess of 140km near Beira. However, high water turbidity limits the formation of coral reefs along this section of the coast. It is unlikely that the cable route will impact on corals or seagrass meadows in this ecoregion.

4.4.3 Parabolic Dune Coast Ecozone

The Parabolic Dune Coast Ecoregion through which the Maputo branch cable will pass and make landfall near the city of Maputo, stretches from the Bazaruto Archipelago to the south at Ponto do Ouro. Characteristic features of this region along the coast are large and steep (up to 120 m high), vegetated parabolic dunes with salt lakes and salt lagoons. In instances where lagoons are open to the ocean, large estuaries that typically support seagrass meadows occur. Although the ecoregion if described as the Parabolic Dune Coast and much of the coast is characterized by the presence of sand dunes, the site where the submarine cable will make landfall and where the BMH is located does not currently have any sand dunes present as these have been transformed by infrastructure such as the road and adjacent houses.

In the marine environment, this ecozone is characterized by the presence of sandstone reef formations that are scattered along the southern coastline of Mozambique and are typically colonized by soft corals rather than hard, reef building, corals. However, hard corals are also present within this ecozone, for example there are hard corals recorded at Inhaca Island and Baixo Denae in Maputo Bay, but they are not as extensive as the hard corals found within the Coral Coast Ecoregion. In Maputo the cable route survey began at approximately 0.5 km offshore and proceeded seaward. Coral presence was not observed; however, the 0.5km nearshore area could not be surveyed by the boat as the water depth was less than 0.5m and therefore coral presence closer to shore was not confirmed (Fugro 2020).

4.5 SEAGRASS MEADOWS

Seagrass ecosystems are associated with the Mozambican coastline and it has been recorded that eight of the twelve Western Indian Ocean seagrass species occur here (Pereira *et. al.*, 2014). These meadows are ecologically important as they function as nursery grounds for juvenile reef fish, and are important habitat for dugongs, marine turtles and commercially valuable marine species such as nudibranchs (sea cucumbers).

Seagrass distribution ranges include sandy bays, mudflats, lagoons and estuaries. They are highly valuable systems from both a biodiversity perspective as well as a commercial perspective. Not only do seagrass meadows provide important niche habitats for various species during their life cycle, they are also important foraging grounds for various species, and provide local people who forage for various fish and invertebrates, with a source of high protein food and a cash income (Scarlet, 2005 in Pereira *et. al.,* 2014).

From Google Earth satellite imagery it appears that there are seagrass meadows that the submarine cable will pass through at the Nacala site. The cable route survey confirmed the presence of seagrass near the landing site.

As noted in Section 4.4.3, the marine survey for the Maputo landing did not cover the route within approximately 0.5 km of shore, and therefore presence or absence of seagrass was not confirmed within this area (Fugro 2020). Seagrasses may be present within the area based on information in the literature. Figure 4-4 from Bandeira and Paula (2014) provides a map showing the known distribution of seagrass meadows in Maputo Bay.

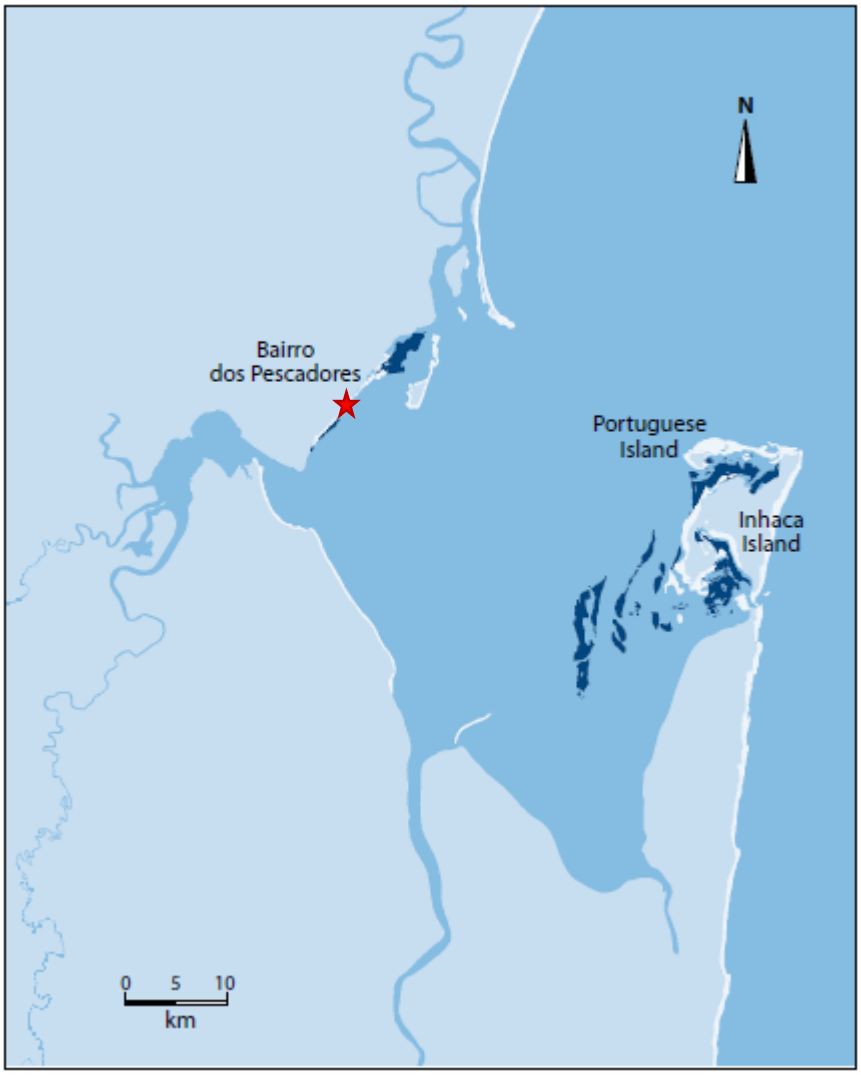

Figure 4-4: Map showing seagrass cover in Maputo Bay (dark blue areas) (Source: Bandeira and Paula, 2014). Red star indicates landing site.

4.6 MANGROVES

In Mozambique, mangrove forests cover an estimated 396,080 ha and occur mostly in sheltered areas of the coastline, such as along bays, estuaries, swamps and deltas (Barbosa *et al*., 2001). The deltas and estuaries of larger rivers in Central Mozambique boast the highest concentrations of mangrove forests. However, over 1,821 ha of these mangrove forests are lost per year, mainly due to uncontrolled clearing for domestic resource use, uncontrolled coastal migration and industrial development within the coastal zone (Barbosa *et al*., 2001).

Globally, Mozambique has been estimated to support 2.3% of the global mangrove forest area and has been ranked 13th in the world in terms of mangrove coverage (Pereira *et. al.,* 2014). Of the 15 species of mangrove found along the African continent, nine occur in Mozambique (Barbosa *et al*., 2001; Pereira *et. al.,* 2014).

Important mangrove areas in the north of Mozambique include the Quirimbas Archipelago, Pemba Bay and the coastline of Nampula Province. Although there are some mangroves along the northern and western margin of Fernao-Velosa-Bay, a desktop assessment using satellite imagery on Google Earth, indicates that the project will not traverse or impact on any mangroves.

As with the Nacala site, although there are mangroves in Maputo Bay, a desktop assessment using satellite imagery on Google Earth, indicates that the project will not traverse or impact on any mangroves.

4.7 Terrestrial Vegetation

4.7.1 Nacala

Although it is expected to find coastal woodland and thicket along the coastline of Fernao-Velosa-Bay, the site of the BMH is characterised by the presence of machambas (farmland) and urban development (Figure 4-5). The project will therefore not have an impact on intact, indigenous, terrestrial vegetation.

4.7.2 Maputo

At the Maputo site, the cable will cross approximately 10 m of vegetated sand dunes. This area has already been impacted by the building of Avenue da Marginal, and the vegetation present is therefore no longer pristine (Figure 4-6). The impact of the project on this vegetation is therefore likely to be of low to negligible significance.

4.8 Current (Pre-Development) Land-Use

4.8.1 Nacala

The Nacala site is located on the northwestern-most beach of Fernão Veloso Bay. As such the current land-use in this area is public beach used for recreation and subsistence fishing activities. The shoreline is used for small-scale commercial fishing activities. Adjacent land-uses to the public beach is predominantly residential in nature.

4.8.2 Maputo

The Maputo site is located near Avenida da Marginal on the north western portion of Maputo Bay. As such the land-use is urban development and the beach environment appears to be used for fishing and other natural resource use.

Figure 4-5: Satellite imagery showing the landcover present at the Nacala BMH.

Figure 4-6: Satellite imagery showing the landcover present at the Maputo BMH.

5 DESCRIPTION OF THE SOCIO-ECONOMIC ENVIRONMENT

5.1 LOCAL ADMINISTRATION

Mozambique's local government comprises both formal and traditional authorities. District Administrators fall below the provincial level government and are responsible for overseeing a number of Chiefs of Administrative Posts (Synergia, 2016). Administrative posts are divided into localities, and each of these are headed by a Chefe de Localidade (a chief responsible for overseeing the locality and who reports to the Administrative Chief). Community leaders fall below the Chefe de Localidade and include both traditional leaders, selected based on traditional rules, and elected leaders. Figure 5-1 Illustrates the local government administrative structure.

In Mozambique land is normally held by the Government, although the Government recognises the role of customary tenure. The land is therefore still largely regulated and controlled by local chiefs and elders.

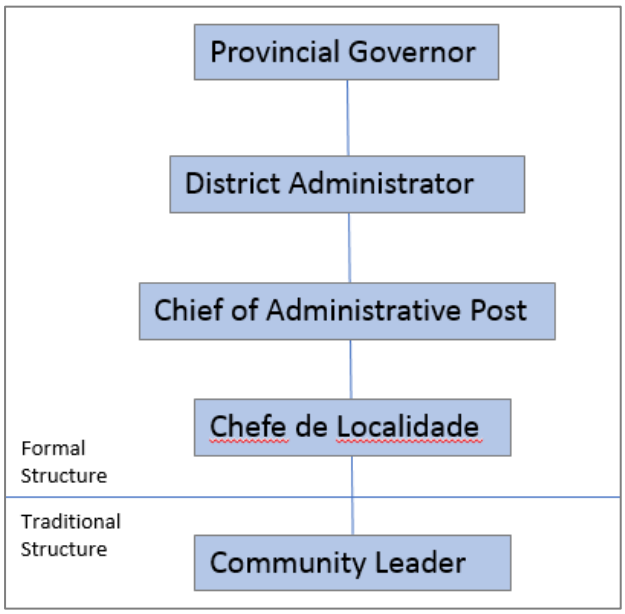

Figure 5-1: Local government structure.

5.2 DEMOGRAPHICS

5.2.1 Nacala

Nampula province is the most heavily populated province in Mozambique, with a population of approximately 5,251,293 (20.6% of the total population in Mozambique) according to the 2017 census undertaken by Instituto Nacional De Estatistica (INE). This figure rose from 4,084,656 in 1997 which indicates a population growth of around 2.8% per year (Club of Mozambique, 2019; INE, 2020).

The Nacala trunk and landfall site falls within Nacala City, which covers approximately 319 km^2 and, according to the 2017 census, has a population size of approximately 287, 536 inhabitants (www.citypopulation.de; 2020). The population density is 901.2 inhabitants/km^2 with a population growth of 3.4% per year (INE, 2020).

The city's population is characterised by a very young population. According to the 2017 census, 45.8% of the population is under the age of 15, and 51.5% of the population are within working-age of between 15 and 64 (INE, 2020).

In terms of gender, there are more females (51.6%) than males (48.4%) living in the city (INE, 2020). Based on CES's experience in the area, most households are male-headed.

5.2.2 Maputo

Maputo Province was recorded to have a population of 1,908,078 in the 2017 census. This figure rose from 1,205,709 in 2007 which indicates a population growth of approximately 4% per year for the Province (Club of Mozambique, 2019; INE, 2020).

The Maputo trunk and landfall site falls within Maputo City, which covers approximately 347.7 km^2 and, according to the 2017 census, has a population size of approximately 1,080,277 inhabitants (www.citypopulation.de; 2020). The population density is 3230 inhabitants/km^2 with a population growth of only 0.08% per year for Maputo City (INE, 2020).

The city's population is characterised by a middle-aged population. According to the 2017 census, 64.8% of the population are within working age between the ages of 15 and 64, and 31.6% of the population are between 0 and 15 (INE, 2020).

In terms of gender, there are more females (51.7%) than males (48.3%) living in the city (INE, 2020).

5.3 HOUSEHOLD LIVELIHOODS, INCOME AND EXPENDITURE

Agriculture, fishing and forestry in Mozambique contributed 24.04% to the gross domestic product (GDP) in 2019 (Statista, 2020). It is therefore considered an important contributor towards the country's economy, especially since subsistence agriculture employs the majority of the country's workforce, particularly in rural areas.

Nacala falls within the North-Central Coastal Fishing Zone (FEWS, 2014) where the main source of livelihood is characterised by fishing primarily for species such as crayfish, tuna, mackerel, sardines, anchovies, lobster and squid. Agriculture is used to supplement this activity, and common crops grown in these areas include cassava, maize, beans and vegetables that can grow on the sandy soils that typically have a low fertility.

Maputo City falls within the Southern Coastal Fishing, Cassava and Maize Zone which stretches along the coastal area of the Gaza and Maputo coastline (FEWS, 2014). The primary sources of livelihood strategies in this region include agriculture, livestock, fishing and labour employment. This area is highly populated and the cities of Maputo and Xai-Xai have a significant influence on the local economy, with livelihood strategies in these cities relying less on agriculture, livestock and fishing. A large proportion of inhabitants living in Maputo are

formally employed, with Maputo City contributing 20% to Mozambique's Gross Domestic Product. The most significant sectors contributing towards this include the trade, transport, communications and manufacturing sectors (Urban Resilience Hub, 2020).

5.4 Cultural Properties

Given that the only terrestrial portion of the project is the BMH, which is located along the coast, it is unlikely that the project will affect family graveyards, cemeteries or sacred sites. However, in the unlikely event that during the site visit for the ESIA it is determined that cultural property such as that described above will be impacted by the BMH and associated infrastructure, the proponent will work with the local community and appropriate authorities to avoid impacting such sites, or conduct a specialist study to determine potential impacts or sensitivity.

5.5 Marine Heritage Sites

A literature search and discussion with the Ministry of Culture and Tourism indicates that although there are a number of shipwrecks off the Mozambican coastline, the location of many of these remain unknown. The marine route survey that was undertaken by Fugro in 2021 covered the inshore areas (starting from the beach seaward in Nacala and starting approximately 0.5 km offshore in Maputo), shallow water areas and the deep-water route alignment from the Maputo BMH to the Branching Unit (BU) MPT, and from the Nacala BMH to the BU MNC. Side-scan sonar was used to identify hard rock surfaces, boulders, shipwrecks, and debris along the surveyed route. Based on the results of the survey using this technology, no shipwrecks were identified on the proposed route at either landing.

6 STAKEHOLDER AND COMMUNITY ENGAGEMENT PROCESS

6.1 INTRODUCTION

The Public Participation Process (PPP) involves consultation with the wider public. The process facilitates the dissemination of information about the project and identification of indirectly and directly affected I&APs.

The PPP will be outlined in detail in the PPP Report which provides accounts of all the meetings held during the EPDA phase of the ESIA. It is then expanded after the EIR public disclosure meetings have taken place to report on the entire PPP. The final PPP document with all the relevant minutes of the meetings and attendance registers is submitted to MTA, together with the other full ESIA reports. The PPP Report for the EPDA Phase has been prepared for the Project and will be submitted to MTA concurrently with this report. The PPP Report documents the stakeholder outreach conducted to date for the Project.

In accordance with the Mozambican ESIA Regulation (Decree no. 45/2004 of 29 September and Decree no. 42/2008 of 4 November, which amends some articles of Decree no. 45/2004), the proposed project has been classified by MTA as a Category A Project, which includes the implementation of a PPP.

The PPP is crucial for any Category A project. It is vital that all I&APs are not only aware of the project and its possible negative implications, but also understand the project and its potential benefits to their communities and surrounding environment. Failure to ensure this could cause disputes and disagreements between communities, the developer and government authorities and lead to the disruption of established social structures.

As part of this process, public consultation meetings are organized where all I&APs are invited and thus have an opportunity to express and record their concerns, expectations and comments relating to the proposed project and environmental authorization process.

6.2 NATIONAL LEGISLATION

Both the Constitution and Environment Law establish the rights of citizens to have information about, and to participate in, decision-making about activities that may affect the environment. Stakeholder engagement is a legal requirement for Category A projects and MTA have prepared a Directive for the Stakeholder Engagement process published as Ministerial Diploma 130/2006 of 19 July.

The need for Stakeholder Engagement is further reinforced by the new Regulations on Resettlement Process resulting from Economic Activities (Decree 31/2012, of 8 August). Article 13 of this Regulation points out the need to ensure Public Participation throughout the entire process of development and implementation of Resettlement Action Plans for projects.

The PPP phase of the ESIA is expected to:

- identify the stakeholders;
- disseminate information to stakeholders;
- manage a dialogue with the proponent of the activity;
- assimilate and take into account public comments received; and
- provide feedback in response to the outcomes of the dialogue and inputs so as to demonstrate how these have been taken into account in the design of the activity.

6.3 Stakeholder Engagement Activities

The PPP involves meetings with local communities and local authorities as well as meetings in Nacala and Maputo to account for provincial stakeholders, in order to introduce the project and disclose the EPDA, as well as the ESIA.

6.4 Public Participation Process

The main objective of the public consultation meetings is to disclose the main findings of the preliminary assessment, present the potential impacts and risks identified during the Pre-Feasibility Study and explain the EIA process and what specialist studies will be undertaken.

Disclosure of the EPDA and ESIA will comprise open public meetings in communities and the cities of Nacala and Maputo, and will be conducted in five distinct stages:

- Preparation of the list of stakeholders.
- Preliminary consultations with communities and some government institutions and non-governmental organizations.
- Submission of EPDA to the relevant institutions and made available for consultation before the public meetings.
- Preparation and delivery of invitation letters to relevant stakeholders.
- Realisation of public consultation meetings in the affected communities, Nacala and Maputo.

Public consultation meetings were scheduled for the 5th, 6th and 7th of October 2021 in Maputo, Nampula and Nacala respectively for the Project. The meetings to be conducted in Nampula and Nacala were rescheduled to the 25th and 26th of November 2021, respectively. Prior to all of the public meetings, a draft of this EPDA document was made available on a public website and hard copies were distributed at key locations for the public to view. The details of the public meetings were advertised in newspapers and on local radio stations.

Full details of the stakeholder engagement are documented in the PPP Report, submitted with this EPDA report.

7 PRELIMINARY ENVIRONMENTAL AND SOCIAL RISK ASSESSMENT

7.1 RISK ASSESSMENT METHODOLOGY

To guide the development of the ToR for specialist studies and the ESIA, a structured risk assessment approach was applied. This EPDA was used to identify environmental and social (E & S) issues, and a preliminary assessment of the significance of the issues was undertaken. Risk was then assessed by combining significance with the potential difficulty to mitigate issues, with "degree of difficulty to mitigate" interpreted in terms of effectiveness, practicality and cost effectiveness. Thereafter a risk matrix was applied to arrive at a final risk rating.

This methodology is described more fully below. It is important to note that the risk assessment, which is done at a high level, differs from the impact assessment which will be used by the specialists during the ESIA phase. The **environmental significance** scale evaluates the importance of a particular impact. This evaluation needs to be undertaken in the relevant context, as an impact can either be ecological or social, or both. The evaluation of the significance of an impact relies heavily on the values of the person making the judgement. For this reason, impacts of especially a social nature need to reflect the values of the affected society. A four-point impact significance scale was applied (Table 7.1).

Table 7.1: Environmental significance rating scale

Significance	Description
Very High	These impacts would constitute a major and usually permanent change to the (natural and/or social) environment, and usually result in severe/very severe effects, or beneficial/very beneficial effects.
High	These impacts will usually result in long term effects on the social and/or natural environment. Impacts rated as high will need to be considered by the project decision makers as constituting an important and usually long-term change to the (natural and/or social) environment. These would have to be viewed in a serious light.
Moderate	These impacts will usually result in medium to long term effects on the social and/or natural environment. Impacts rated as moderate will need to be considered by the project decision makers as constituting a fairly important and usually medium-term change to the (natural and/or social) environment. These impacts are real but not substantial.
Low	These impacts will usually result in medium to short term effects on the social and/or natural environment. Impacts rated as low are generally fairly unimportant and usually constitute a short-term change to the (natural and/or social) environment. These impacts are not substantial and are likely to have little real effect.

The **degree of difficulty of mitigating** the various impacts ranges from very difficult to easily achievable. The four categories used are listed and explained in Table 7.2 below. The practical

feasibility of the measures, financial feasibility of the measures and their potential effectiveness was taken into consideration in deciding on the appropriate degree of difficulty.

Table 7.2: Degree of mitigation difficulty rating scale

Difficulty	Description
Very difficult	The impact could be mitigated but it would be very difficult to ensure effectiveness and/or to technically/financially achieve
Difficult	The impact could be mitigated but there will be some difficulty in ensuring effectiveness and/or implementation
Achievable	The impact can be effectively mitigated without much difficulty or cost
Easily achievable	The impact can be easily and effectively mitigated

The **risk matrix** determines the overall level of risk associated with an impact by comparing the significance of the impact with its difficulty of mitigation is shown in Table 7.3 below.

Table 7.3: Risk matrix derived from the pairing of the significance of the impact and the difficulty of mitigation

Mitigation Potential	Impact Significance			
	Low	Moderate	High	Very High
Very difficult	Medium Risk	Major Risk	Extreme Risk	Extreme Risk
Difficult	Minor Risk	Medium Risk	Major Risk	Extreme Risk
Achievable	Minor Risk	Minor Risk	Medium Risk	Major Risk
Easily achievable	Minor Risk	Minor Risk	Minor Risk	Medium Risk

Impacts that are of high to very high significance and difficult to very difficult to mitigate are considered to be ‘extreme’ environmental or social risks to the project. Those impacts that are less significant and easier to mitigate are rated as ‘major’ to ‘medium’ to ‘minor’ i.e. generally impacts of low to moderate significance for which mitigation is achievable to easily achievable. Impacts may potentially be of very high significance, but if the mitigation is easily achievable, they are rated as ‘medium’ risks, as per Table 7.3. The implications of the risk categories are explained in Table 7.4.

Table 7.4: Risk categories

Risk	Description

Extreme	Significant mitigatory actions would be required to reduce these risks. In some cases, it may not be possible to reduce these extreme risks meaning they are likely to prevent the option from being used (raised as red flags in this assessment).
Major	These risks are of a serious nature, and without effective mitigation measures would be major hindrances to the project. These would need to be monitored and managed, and in combination Major risks may necessitate the use of a different option to achieve the projects objectives.
Medium	These risks are of a less serious nature but still important, and need to be reduced to As Low As Reasonably Possible (ALARP) for the benefit of the environment or social network affected. In isolation these risks are generally insufficient to prevent the project from proceeding.
Minor	These risks are generally acceptable to the project and environment, and mitigation is desirable but not essential. Best industry practice, however, should be followed and the risks mitigated to prevent a cumulative effect of such impacts.

7.2 Risk Assessment

Refer to Table 7.5 below for an assessment of biological and social risks associated with the subsea cable project. Fourteen risks were identified for the project. In all instances, mitigation measures and route selection have ensured that the project will have the least social and environmental impact possible, and as such eleven risks are classified as minor negative risks, two are minor positive benefits, and one (the impact on marine heritage resources) is likely to be of negligible significance.

Article 10.1a of decree 54/2015 states that fatal flaws regarding the activity must be assessed. No fatal flaws were identified for this project and therefore none form part of this assessment. From an environmental and social perspective, it is clear that the project presents a very low risk to people and the environment, and hence the project should proceed to the ESIA phase.

Table 7.5: Summary of bio-physical and socio-economic risks in the project area.

Issue	Significance Rating	Comment	Mitigation Potential	Mitigation Challenges	Risk
Waste and Pollution					
Disturbance of the seabed	Low	The laying of the cable could result in the disturbance of the seabed which is of significance when crossing sensitive features such as seagrass meadows and coral reefs. However, it must be noted that the footprint of the cable is relatively small (the cable typically ranges from 1.7cm to 5 cm in diameter, therefore a footprint of 17m^2 over each 1 km length. Articulated pipe with a diameter of up to 10 cm may be used in small sections. The impact associated with the laying of the cable is therefore restricted to a relatively small surface area and is of short duration. However, the impact can be of higher significance when the cable crosses sensitive features such as corals and seagrass meadows.	Easily Achievable	The marine survey undertaken for Nacala indicates the presence of coral reef and seagrass (Fugro 2020). To reduce the impact on these sensitive features, the cable can be surface laid, aligned by divers to avoid features (as much as possible) and pegged to stay in position, resulting in a minor risk. The marine survey undertaken for Maputo indicates no coral or seagrass was observed along the cable route; however, the survey did not cover the area closest to shore (Fugro 2020). Maputo Bay is a known area for seagrass (Bandeira and Paula, 2014). Further evaluation is needed during the ESIA Phase.	MINOR-
Sediment suspension	Moderate	Disruption of marine life and intertidal vegetation due to increased turbidity and a reduction in water quality during installation can occur. A decrease in water transparency and increase in suspended solids can have the following impacts on marine life: • Limit light required for photosynthesis for marine plants • Reduce the feeding ability of fish that spot their prey visually • Negatively affect invertebrate species that rely on filter-feeding • Damage gills of young fish larvae. This impact will be of moderate significance, but is of short duration and over a small area.	Achievable	Cable ploughing equipment cuts a wedge into the soft ocean floor into which the cable falls, and the displaced sediment falls back into place as the plough moves past. Jetting aims at fluidising the soft substrate below the cable to allow the cable to sink into the substrate, with the substrate falling on top of the cable. No open trenching is proposed, thus no piles of sediment are left alongside an underwater trench for backfilling at a later stage, and no second event of substrate handling/disturbance occurs (as would happen when trenches are backfilled). Cable ploughing and jetting however still produces a minor plume (suspension of bottom sediments) into the water column. It should be noted however that the installation activity is very short term (in the magnitude of	MINOR-

Issue	Significance Rating	Comment	Mitigation Potential	Mitigation Challenges	Risk
				a few days or less) is temporary, localized to the cable route and immediately surrounding area. The spatial extent would likely be limited due to the short time period that material stays in the water column, coupled with rapid dilution in an open ocean setting. The potential impact of any sediment suspension and deposition will however depend on the sensitives of the biota in the vicinity of the cable installation and the local marine environmental conditions (such as currents and wave action).	
Noise	Low	Excessive noise in the ocean can result in avoidance behaviour of marine fauna by masking of biologically significant marine sounds and faunal calls, and possible disruption of feeding and breeding behaviour of certain species. However, underwater noise linked to the installation of submarine cables is associated with vessel movement and low compared to other activities such as noise from sonar or explosions (Taorimina et. al., 2018). Additionally, such effects are usually restricted to a limited area and are limited in time.	Difficult to achieve	Noise-reducing propeller design options in addition to what the vessels are currently equipped with are not practically or financially feasible given the low impact significance. Consideration should be given to the selection of onboard machinery along with appropriate vibration control measures, proper location of equipment in the hull, and optimization of foundation structures that may contribute to reducing underwater radiated and onboard noise affecting passengers and crew.	MINOR-
Reef Effect	Low	Unburied submarine cables can create artificial reefs resulting in what is known as the “reef effect” (Langhamer, 2012 in Taorimina et. al., 2018). In soft sediments, unburied cables can have a stronger reef effect than buried cables located in naturally hard substratum. The reef effect can be considered a positive affect as these areas typically have a higher biodiversity. However, in some instances it may result in a negative effect as these structures may act as corridors that facilitate the introduction of non-indigenous sessile species. However, to date, there is	Easily Achievable	If the submarine cable is buried in areas of soft sediment, then this impact will be negligible. If it is not buried, the cable is likely to self-bury in any event due to its weight and thus is also considered negligible. Should the cable cross rocky areas, the small diameter of the cable is unlikely to result in a reef effect and as a consequence the issue is considered to be minor.	MINOR-

Issue	Significance Rating	Comment	Mitigation Potential	Mitigation Challenges	Risk
		no proof that they have acted as corridors that facilitate the introduction of non-indigenous species.			
Entanglement of surface laid cables with fish and marine mammals	Low	Pre-1950 there was evidence of entanglement of marina mammals and fish with telegraphic cables, particularly around the continental shelf. However, with the marked technological advances in cable design, surveying and laying methods this has been virtually eliminated. Cables on the continental shelf and upper continental slope are typically buried and cables are laid under tension without slack (Carter et. al. 2009), as slack can result in entanglements.	Easily Achievable	The advances in technology have resulted in this impact being of low probability and thus low significance.	MINOR-
Disturbance/ interruption of fishing activities	Moderate	The installation of the cable will require the presence of a ship as well as machinery operating on the vessel and seabed. The presence of the ship and machinery may interfere directly with fisheries (commercial and artisanal) activities as it may be in the way of these vessels. The noise generated by the activities may also indirectly affect fisheries as it chases away marine fauna. However, as mentioned previously, such effects are usually restricted to a limited area and are very limited in time. The impacts are therefore likely to be of low significance.	Easily Achievable	It is recommended that the contractors laying the cable notify the commercial and artisanal fisherman of their presence and the duration that they will be in the area.	MINOR-
Disturbance of Maritime Heritage sites	Low	Disturbance of the seabed could result in the loss of maritime heritage sites such as shipwrecks as well as prehistoric archaeological sites.	Easily Achievable	A marine survey using side-scan sonar and multibeam echosounder data recorded from 3 m to 1,000 m water depth indicated that no wrecks were found along the proposed routes. As such there will be no impact on maritime heritage resources.	Negligible
Pollution of the Environment	Moderate	Discharge of bilge water, sewage and food waste from the cable vessel could result in pollution of the marine environment, which would affect the marine fauna and humans reliant on the sea for their livelihoods.	Easily Achievable	All vessel wastes will be managed in accordance with the requirements set out within the International Convention for the prevention of pollution from ships (MARPOL), specifically Annex I covering Prevention of pollution by oil and oily water, Annex IV	MINOR-

Issue	Significance Rating	Comment	Mitigation Potential	Mitigation Challenges	Risk
				covering prevention of pollution by sewage, and Annex V which sets out Regulations for the Prevention of pollution by garbage.	
	Moderate	Accidental leaks and spills of vessel fuel could impact on the marine fauna, flora and humans reliant on the sea for their livelihoods.	Easily Achievable	The vessel will comply with MARPOL Annex I - Prevention of Pollution by Oil, and will have a contingency plan for marine oil pollution in the form of Shipboard Oil Pollution Emergency Plan (SOPEP). All vessels will have chemical handling procedures for oils and fuels in place and Health, Safety and Environmental monitoring procedures with weather and personnel limits will be implemented during cable installation.	MINOR-
	Moderate	Atmospheric emissions from vessel engines could affect the air quality, which would have health impacts on the workers on the vessels and other nearby users, particularly when working near the shore.	Achievable	All vessels involved in installation activities will comply with MARPOL 73/78 Annex VI on air pollution and with the NOx Technical code (2008) Guidelines for Implementation, 2017 edition (IMO, 2017). Vessel activity in the project areas is temporary. The impacts are therefore likely to be of low significance.	MINOR-
Socio-economic benefits	Low	The installation of the cable and construction of the BMH will result in the creation of minor job opportunities for local Mozambican residents. This will be a small positive benefit of the project.	Achievable	Where feasible, Mozambican nationals must be given preference especially when unskilled and semi-skilled labour is required.	MINOR+
		Loss of residential land or machamba potentially used by a member of the community.	Achievable	The construction of the BMH will require the allocation of the rights of the land to the applicant. If this is located on land with rights already assigned to another party or person, then consultation around reallocation of such right will be required. However, given that the footprint is only 8.16 m^2, the associated	MINOR-

Issue	Significance Rating	Comment	Mitigation Potential	Mitigation Challenges	Risk
				impact of reallocation of the land will be of minor significance.	
	High	Access to high speed internet.	Achievable	The installation of the project will enable high speed, affordable access to the residents of Mozambique. This will aid in the development of business and investment on the country.	MAJOR+
Disturbance and/or beach closure	Low	The beach may be temporarily closed during the construction of the BMH, the Earth System and the cable landing and burial at the beach and intertidal zone. In addition to this there may be increased traffic due to the presence of construction vehicles. These activities could affect the livelihood strategies of community members reliant on the beach to access food sources and other natural resources as they will be unable to harvest from these areas while the beach is closed. This impact will be of short-term duration.	Achievable	Any required temporary closures of the beach shall be minimised in duration. Impacts will be minimised during peak usage of the beach by local communities (e.g., weekends and public holidays), where possible, by only keeping a small portion of access to the beach closed (i.e., not the entire beach). Regular local radio and newspaper announcements and communications with the Ports Authority and harbour master will be done to limit the inconvenience of the beach closure. Onshore/intertidal activities will occur during day light hours only. No additional lighting will be required. Such effects are usually restricted to a limited area and are limited in time. The impacts are therefore expected to be of minor significance.	MINOR-

8 TERMS OF REFERENCE FOR SPECIALIST STUDIES

Due to the fact that all negative risks associated with the project are minor, only one specialist study is required to provide adequate data to confirm a minor risk assessment. This section, however, also provides motivation for the exclusion of additional specialist studies such as the following:

- Marine Heritage Survey;
- Social Impact Assessment; and
- Terrestrial Ecological Assessment.

8.1 STUDIES REQUIRED AS PART OF THE PROJECT:

8.1.1 Coral reefs and seagrass meadows study

Based on the results of the Inshore, Shallow Water and Deep Water Surveys undertaken by the Project for the Nacala and Maputo segments (Fugro 2020), a specialist study to determine the impact of the proposed project on coral reefs and seagrass meadows is recommended for the both landing sites in the nearshore area. The specialist study proposed will provide additional information related to the ecological significance of the resources. Additionally, based on feedback during stakeholder engagement, a further review of commercial fisheries is also recommended. The Terms of reference for this study are outlined below.

- Provide a description of the marine environment along the cable route in Mozambican Territorial Seas and the EEZ.
- Identify possible sensitive features along the cable route between Nacala and Maputo. Sensitive features could include (but are not limited to) hard coral reefs, soft coral reefs, deep water corals, and seagrass beds and meadows.
- Identify any species of conservation importance, including Red Data/CITES species potentially affected by the proposed project.
- Assess the potential environmental impacts of the project, specifically on any known sensitive features, and provide recommendations toward route or location choices as well as practical mitigation measures.
- Assess the cumulative marine ecology impacts in terms of the current and proposed activities in the area.
- Provide a high-level description (at a desktop level) of the fisheries sector in Nacala and Maputo in terms of the preferred fishing waters, typical methods used, and species fished.
- Assess the impacts of laying and operating the cable on the commercial and subsistence fisheries sector and provide practical mitigation measures.

8.2 MOTIVATION FOR STUDIES NOT CONSIDERED REQUIRED FOR THE PROPOSED PROJECT:

8.2.1 Marine heritage survey

The cable route survey undertaken by Fugro in 2021 covered the inshore areas, shallow water areas and the deep water route alignment from the Maputo BMH to the Branching Unit (BU) MPT, and from the Nacala BMH to the BU MNC. Sidescan sonar was used to identify hard rock surfaces, boulders, shipwrecks and debris along the surveyed route. Based on the results of the survey using this technology, no shipwrecks were identified and as such a marine heritage survey is not required.

8.2.2 Social impact assessment

The location of the BMH has been selected to avoid impacts on any houses and it is unlikely that there will be an impact on any machambas (agricultural fields) given its location adjacent to the beach and its small footprint of approximately 8.16m^2. As such, a separate social impact assessment is not required. The impacts on the social environment will be addressed directly in the ESIA report.

8.2.3 Terrestrial Ecological Assessment

Since the BMHs are located within urban areas on land that has already been transformed and because of its small footprint, the structure is unlikely to have an impact on the terrestrial ecology (fauna and flora). As such an ecological assessment will not be undertaken but rather the impacts will be addressed directly in the ESIA report as with the social environment.

9 CONCLUSIONS AND WAY FORWARD

9.1 CONCLUSIONS

An assessment of the potential risks for this project found that with the implementation of sound mitigation measures, especially at the design stage through careful route and BMH site selection, there are no major or even medium risks for this project. Sensitive features such as observed corals and seagrass meadows have been avoided where feasible for the Nacala landing during the Planning Phase, and where this is not feasible, burial methods have been adjusted to lower the impacts on sensitive resources. However there is not enough information in the cable route study to confirm the ecological significance, therefore, further evaluation will be conducted for both landings.. Of the fourteen risks identified, eleven are minor negative, one is minor positive, one is Major Positive, and one is negligible (Table 9.1).

Table 9.1: A summary of the biophysical risks associated with the project

Issue	Significance Rating	Mitigation Potential	Anticipated Risk
Disturbance of the seabed	Low	Easily Achievable	MINOR-
Sediment suspension	Moderate	Achievable	MINOR-
Noise	Low	Easily Achievable	MINOR-
Reef Effect	Low	Achievable	MINOR-
Entanglement of surface laid cables with fish and marine mammals	Low	Achievable	MINOR-
Disturbance/ interruption of fishing activities	Moderate	Achievable	MINOR-
Disturbance of Maritime Heritage sites	Low	Easily Achievable	Negligible
Pollution of the Environment: Discharge of bilge water, sewage, food waste	Moderate	Achievable	MINOR-
Pollution of the Environment: Accidental leaks and spills of vessel fuel	Moderate	Achievable	MINOR-
Pollution of the Environment: Atmospheric emissions from vessel engines	Moderate	Achievable	MINOR-
Socio-economic benefits: creation of minor job opportunities	Low	Achievable	MINOR+
Socio-economic benefits: Access to high speed internet.	Low	Achievable	MAJOR+
Socio-economic benefits: Loss of residential land or machamba	Low	Achievable	MINOR-
Disturbance and/or beach closure	Low	Achievable	MINOR-

9.2 WAY FORWARD

This EPDA and ToR has described the potential risks associated with the project and has provided detailed ToR for specialist studies that will be required during the ESIA phase. These studies will most likely be carried out in mid-2021.

The report to be prepared for the ESIA will be divided into a number of volumes to cover the information as stipulated by Mozambican requirements. The volumes will be as follows:

- Volume 1: Scoping Report (This Volume)
- Volume 2: Specialist Studies
  This volume will include Study 1: Coral Reefs and Seagrass Meadows / Marine Specialist Study as described in Chapter 8 as well as any additional technical reports that may be prepared for the project.
- Volume 3: Environmental and Social Impact Report (ESIA)
  This volume is likely to include the following (but please note that the Table of Contents presented below is indicative and may change):

  1 INTRODUCTION
  2 ESIA PROCESS
  3 LEGAL FRAMEWORK
  4 PROJECT DESCRIPTION
  5 DESCRIPTION OF THE BIOPHYSICAL ENVIRONMENT
  6 DESCRIPTION OF THE SOCIO-ECONOMIC ENVIRONMENT
  7 DESCRIPTION OF THE LANDUSE PRACTICES
  8 ASSESSMENT OF BIOPHYSICAL IMPACTS
  9 ASSESSMENT OF SOCIO-ECONOMIC IMPACTS
  10 NATIONAL AND REGIONAL SOCIAL AND ENVIRONMENTAL PROJECT BENEFITS
  12 RECOMMENDATIONS
  13 CONCLUSIONS
- Volume 4 : Public Participation Report
  Public consultation concludes with the preparation of a public consultation report, which will be submitted as part of the ESIA.
- Volume 5: Social and Environmental Management Programmes
  All recommendations cited in the ESIA report (resulting from the ESIA process) will be described in the Environmental Management Programme (EMP), which will provide details on the Environmental and Social Management Plans (ESMPs) that will be required to be implemented during the construction and operation phases of the project.
- Non-technical Summary document: This document will provide a short summary of the ESIA.

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APPENDIX 1 – CATEGORISATION LETTER

REPÚBLICA DE MOÇAMBIQUE
MINISTÉRIO DA TERRA E AMBIENTE
DIRECCÃO NACIONAL DO AMBIENTE

À:

Vodacom Moçambique
Att: Exmo Senhor Jerry Mobbs

Maputo

N/Refª Nº /MTA/ 1129 /DINAB/GDN/252/21 Data: 16-07-2021

Assunto: Submissão do Requerimento para a Instrução de Processo de Avaliação de Impacto Ambiental de Projecto Sistema de Cabos Submarinos, da Vodacom Moçambique

Exmo Senhor

A DINAB recebeu no dia 11 de Junho de 2021, o Relatório de Pré-avaliação Ambiental do Projecto de Sistema de Cabos Submarinos, cujo proponente é a empresa a Vodacom Moçambique.

Trata-se de um projecto de instalação de Sistemas de Cabos Submarinos no contorno do continente africano designado por Projecto 2Africa, com uma extensão de 37.000 Km.

O Projecto irá requerer a instalação e operação de dois cabos submarinos através da Zona Económica Exclusiva (ZEE) e águas territoriais de Moçambique. O Projecto também envolverá a instalação de cabo de extremidade costeira no ambiente costeiro e de praia, e a construção de um Poço de inspecção de Praia (BP) em cada local de pouso ou adjacente à praia de Nacala e Maputo para conectar o componente submarino aos componentes do cabo terrestre.

Neste contexto, a DINAB serve-se da presente para informar à V.Excia que, a actividade de desenvolvimento em epígrafe, foi classificada como sendo de **categoria "A",** de acordo com a alínea n), numero 2.1 do Anexo II, do Regulamento sobre o Processo de Avaliação do Impacto Ambiental, aprovado pelo Decreto nº 54/2015, de 31 de Dezembro, portanto, sujeita a realização do Estudo do Impacto Ambiental (EIA) nos termos do Artigo 11 do mesmo Regulamento. Recomenda-se que se trate de DUAT e Licenças Especiais,

Rua da Resistência, 1746/47, Celular: +258 823113668, Maputo, Email: mta@mta.gov.mz

caso seja necessário, de cada Município (Nacala e Maputo) para a construção de Poço de inspecção de Praia e a realização de consultas públicas nos municípios de Nacala e Maputo. Os EIA's deverão ser realizados por consultores licenciados pelo MTA.

Informa-se ainda que a anteceder os EIA's, deverão ser submetidos à nossa instituição 24 cópias dos Estudos de Pré-Viabilidade Ambiental e Definição de Âmbito (EPDA) e os respectivos Termos de Referência (TdR) para os projectos, em formato de papel A4, sendo 6 para a SPA Nampula, 6 para a SPA Maputo e 12 para a DINAB e 1 cópia em formato electrónico.

Com os melhores cumprimentos.

A Directora Nacional

Guilhermina Amurane
(Técnica Superior N1)

Rua da Resistência, 1746/47, Celular: +258 823113668, Maputo, Email: mta@mta.gov.mz

APPENDIX 2 – CES MTA CERTIFICATE

República de Moçambique

MINISTÉRIO DA TERRA, AMBIENTE E DESENVOLVIMENTO RURAL

CERTIFICADO DE CONSULTOR AMBIENTAL

Nº. 08 / 2019

O Ministério da Terra, Ambiente e Desenvolvimento Rural (MITADER), ao abrigo do Regulamento sobre o Processo de Avaliação do Impacto Ambiental, aprovado pelo Decreto nº 54/2015, de 31 de Dezembro, certifica-se que o (a) sr (a) *Coastal & Environmental Services Mozambique Limitada* está devidamente credenciado (a) a exercer funções de Consultor Ambiental em Moçambique.

Maputo, aos 11 / 02 /20 19

Validade até 11 / 02 /20 22

O Ministro

CERTIFICADO DE CONSULTOR