

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY (ESIAS) OF PEACE SUBSEA CABLE PROJECT

REGULATORY FILE

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A light gray world map with two circular callouts. The first callout is over Europe and contains the text 'iXPERIENCE IN DEPTH'. The second callout is over North America and contains the text 'iXBLUE'. The map also features several small black dots representing global locations.

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GLOSSARY

AfDB: African Development Bank Group
BMH: Beach Manhole
CLS: Cable Laying Station
DTS: Desktop Study
ESIAS: Environmental and Social Impact Assessment Study
EEZ: Exclusive Economic Zone
EHSC: Environmental Health and Safety Coordinator
EIA: Environmental Impact Assessment
EMP: Environmental Management Plan
EPA: Environment Protection Act
FRAP: Full Resettlement Action Plan
ISS: Integrated Safeguards System
IUCN: International Union for Conservation of Nature
PLGR: Pre-Lay Grapnel
SCS: Seychelles Cable Systems Company Ltd
SEAS: Seychelles East African System
TW: Territorial Water
WD: Water Depth

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1. EXECUTIVE SUMMARY

1.1. INTRODUCTION

This document is an executive summary of the Environmental and Social Impact Assessment Study (ESIAS) for Submarine Cable System Ltd for PEACE fiber optic cable landing in Mahé, Seychelles.

IXBLUE is following the African Development Bank Group (AfDB) guideline, especially the “SAFEGUARDS AND SUSTAINABILITY - SERIES Volume 1: General Guidance on Implementation of Operational Safeguard 1, Issue 1, (December 2015)” which contain requirements and topics around the Environmental and Social Impact Assessment.

IXBLUE has taken care to respect all the key steps recommended by the AfDB, in order to not to omit any element essential to the examination of this regulatory file, namely:

- Scoping;
- Stakeholder identification;
- Project definition;
- Analysis of alternatives;
- Baseline definition;
- Impact assessment;
- Preparation of an Environmental and Social Management Plan (ESMP), including monitoring and reporting.

For the constitution of the ESIA report content, IXBLUE has relied on the plan suggested by environmental French Code in line with European guidelines: for reference, Articles R. 214-6 to R. 214-56 and L.214-1 and on, especially the Article R122-5 (Decree n°2019-190 03/14/2019 - art. 6).

1.2. OVERVIEW OF THE PROJECT

1.2.1. Alternatives and Project choice

Since the implementation of SEAS, the first optical cable to Seychelles, SCS knew that a second cable will be needed for obvious security of international connectivity reasons. “Doing nothing” is not an acceptable alternative for the Seychelles Government.

In the course of 2018, several alternative projects have been analyzed to connect Seychelles to the World Wide Web with a new submarine cable.

5 cable alternatives were identified:



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- PEACE, a Chinese private initiative, submarine cable system from Pakistan to Europe and a branch to Kenya, on which a Seychelles branch shall be hooked.
- MERCURY, an international consortium, led by Vodafone, change into SIMBA project
- DARE, a regional consortium, led by Djibouti Telecom.
- IOX, a private submarine cable initiative, led by Indian investors from Mauritius to South Africa and future extension to India and Kenya.
- Africa-1, an International consortium led by STC and Etisalat.

All these alternative projects have similar state-of-the-art technologies and the cable landing considerations in Mahé were exactly the same.

The criteria of choice were mainly price, availability date and telecommunications capability of the alternatives.

Decision was taken on September 2018 to select the PEACE project. PEACE was the better option in particular for onward connectivity to Europe included into the Project and for price consideration. DARE-1 project was not offering this direct connectivity and the other alternatives were not mature for implementation, and still are not a year later.

1.2.2. Project benefits

Currently, the Seychellois telecommunications operators heavily rely the submarine cable system (Seychelles East African System (SEAS)) running from Beau Vallon (Seychelles) to shore crossing and landing site in Dar es Salaam (Tanzania) to carry the bulk of their international traffic.

Seychelles Cable Systems Company Ltd (SCS) is considering to improve connectivity and reliance of submarine network by investing into a new cable: a branch from Seychelles to PEACE (Pakistan & East Africa Connecting Europe) main system. PEACE is a cable system linking Pakistan to Europe (Marseille) via Djibouti and Egypt, to Kenya (Mombasa) along the East coast of Africa.

The project fits into a larger framework aiming to develop the technology sector in Seychelles and connecting Africa to the rest of the world. The project will enhance internet access to a broader section of the population including youths and business.

The government of Seychelles, as well, wants to apply a plan which emphasizes development of the information, communication and telecommunication infrastructure.

For existing businesses, the project will provide faster and more reliable transmission for data and voice call. This can result in an enhancement of business performance as well as create opportunities for expansion. Lower entry costs will also facilitate the start-up of new businesses.

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The project will improve the quality and the reliability of the connectivity of Seychelles to the rest of the world.

Seychelles Cable System, SCS, the operating company, has its headquarters at Victoria and is the only Seychelles-based submarine cable company

In addition to the direct economic benefits of increased telecommunications access and reliability in Seychelles, many other indirect social and economic benefits would be associated with the proposed development. These include:

- Improved educational opportunities through better access to information and education resources;
- Development of a regional sense of community through greater equality of information sharing across geographical regions and across society group;
- Economic benefits from the enhanced opportunities for new and small enterprises that may have previously been excluded from technologies by high costs;
- Macroeconomic benefits of the potential expansion of technology-reliant industries, such as information technology services, software development businesses and finance and banking activities.

The analysis of alternatives is a component of the ESIA process. Its purpose is to improve project design, construction and operation decisions based on feasible project alternatives. Early consideration of alternatives during the design phase of a project can result in the avoidance/minimization of impacts without the need for expensive or time-consuming mitigation measures at a later stage.

Six landing sites alternative have been explored and are discussed in the table below.

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#	Landing Point	Benefits	Constraints
1	Perseverance North 4°36'7.33"S 55°27'54.15"E	Close to new CLS. Direct landing. Rock wall easy to dismount and re-install properly. Sea route away from ship traffic lines and anchoring zones. Duct already installed – Less land work	
2	Perseverance South 4° 36.508'S 55° 28.192'E	Easy direct landing	Military spot not directly accessible No sand beach but rocky bottom. No duct installed
3	Port Launay 4°39'15.33"S 55°23'58.10"E	Existing non-anchoring zone. Easy direct landing.	No ducts availables and very long land route across mountain. Crossing of private real estate (Ephelia) Marine Park
4	Anse Nord'est 4°34'4.63"S, 55°27'24.19"E	Reasonable land route along the coast	Very exposed to North-East swell Erosion in progress
5	Anse Macchabee 4°33'52.98"S, 55°26'50.05"E	Reasonable land route along the coast	Rocky bottom Exposed to North-east swell.
6	Beau Vallon	Existing cable (SEAS)	Lack of redundancy for international cables. Far from new CLS.

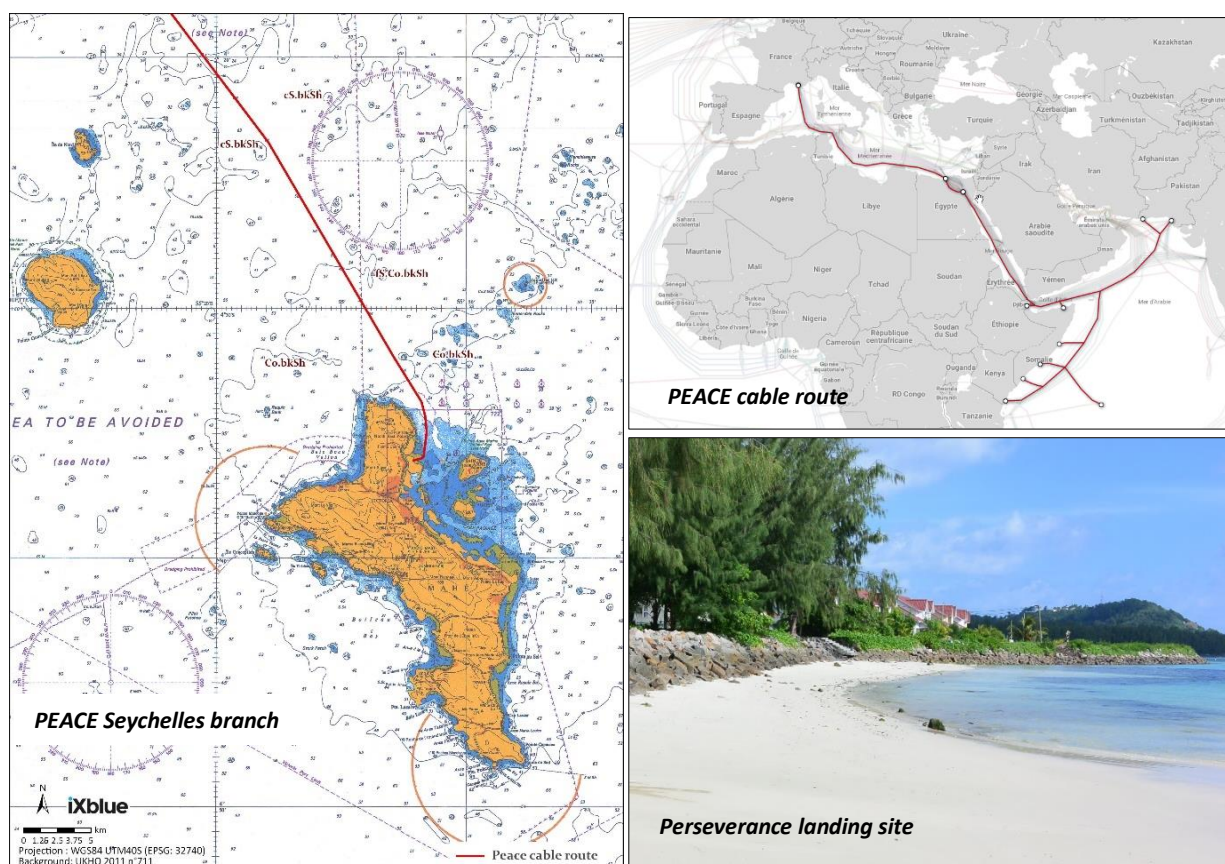
1.3. PROJECT DESCRIPTION AND THE MAJOR ENVIRONMENTAL AND SOCIAL OF THE PROJECT SITE AND INFLUENCE AREA

1.3.1. Project description

Cable route location

PEACE is a cable system linking Pakistan to Europe (Marseille) *via* Djibouti and Egypt, to Kenya (Mombasa) along the East coast of Africa. Seychelles branch is 900 km long from the BMF at Perseverance. The cable arrives from the north-west of the Seychelle bank and pass through the North of Silhouette Island as shown on the chart below. It will run about 57km in Territorial Water (TW) and 488km in the Economic Exclusive Zone (EEZ).

The preferred landing site is located on Perseverance beach in the North East of Mahé less than 5 km from Victoria town center. It is an artificial beach resulting from natural evolution of the bay of reclaimed lands.



System overview and component

The optical fiber cable consists in a central optical fiber bundle surrounded by a frame of steel fibers surrounded by a polyethylene or fiberglass core for strength and fiber separation. The external diameter of the cable will vary between 17 and 20 mm for sections without protective armor to 50 mm diameter for armored cables.

Optical fiber cables carry signals that do not generate a magnetic field. Indeed, there is no service voltage and the cable will be buried at the ends.

Installation work

Prior to installation of the cable, a marine geophysical survey will be performed to investigate the safest route for the cable system. A detailed topographic survey will be performed to assess the conditions and feasibility of the landing. A limited seabed sampling program will also be conducted to supplement the side-scan sonar and subbottom profiler data in the areas where the cable will be buried.

For installation, a built ship will accurately place the cables on or under the seabed along the route determined by the pre-installation survey. Shallow water laying may be aided by scuba divers while deepwater laying is sometimes aided by remote operated vehicles.

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The cable laying work use different techniques depending on seabed type and environmental constraints:

- On shore, the cable will pass through the rock armor of Perseverance beach to join the BMH;
- From the beach to 15 m WD, the cable will be buried using jetting or anchored using an appropriate mean to preserve environment, especially coral reef and seagrass. The cable will be armored along about 400m, till 10 m WD;
- From 15m WD to north of Mahé, along about 13 km, the cable will be buried in a trench using a subsea plough;
- Offshore, the cable is just laid on the seabed.

Operations

Once in place and connected, the cable system requires no intervention. Cable repair and maintenance may be required in case of accidental damage.

Decommissioning

A full decommissioning plan will be developed near the end of the Project's expected 25-year lifetime. The plan will be based on best practices at the time and with consideration of environmental and safety issues.

1.3.2. Initial state of environment

1.3.2.1. Marine environment

Geology and geomorphology

Seychelles 115 granite and coral islands extend from between 4 and 10 degrees south of the equator and lie between 480km and 1,600km from the east coast of Africa in the western Indian Ocean.

The East coast of Mahé Island is dominated by a coral reef which make difficult humans' access and settlement. Perseverance is an artificial island located at 2 km north-east of Victoria and reclaimed to the sea in 2000s It is mainly made of marine aggregates such as sand materials forming a polder.

Bathymetry

The inner Seychelles islands (Mahé, Praslin, La Digue) locate on a large plateau named Seychelles bank, extended over 43 000 km² and between 20 and 70m water depth.

At Perseverance landing site, a reef rises to the sea surface at 150m from the coast. It has a major role for protection against wave and contributes to the beach development. The cable should avoid this reef by turning around with a gentle curve.



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Climata and meteorology

The climate of the Seychelles is classified into two types: northwest monsoons (NWM) from December to March, associated with north-westerly winds, and southeast monsoon (SEM), associated with trade winds from south-east, from May to October. The trade winds are the strongest and are statically greater than 10 knots from June to September.

Oceanography

The tide is semi-diurnal and characterized by two cycles by day with uneven range. The tidal regime is defined as mesotidal with an average range of 1.2m.

Swells are the main driving forces of the coastal system. They are generated by alternating south-eastern trade winds and north-eastern monsoon wind. Rarely, tropical cyclones that form in southeast of Seychelles generate heavy swells that affect the coast. During NWM, the the north-westerly wind generate wind waves, with short period, coming from the same direction. During to the SEM, the south-easterly winds dominate are responsible for the strong southeastern swell.

The landing site location appears well sheltered, especially from the prevailing south-eastern swells thanks to the Islands of Saint Anne and Cerf.

Coastal process and erosion

Recent study of Borrero and al. (2016) focus on the coastal processes and erosion of the north east cost of Mahé. The study clearly highlights the effect of the reef destruction as result of land reclamation and reef bleaching which have reduced the amount of sand being produced.

Coastal terrestrial habitats

No mangrove and mudflat are located in the landing point.

The intertidal communities are relatively narrow due to the low tidal range, the commonest animals found there being limpets, barnacles and rock crabs.

Marine biodiversity

Despite historical upheavals mainly related to the installation and growth of humans on this island, the exceptional marine biodiversity of Seychelles is at the heart of the concerns. Seagrass and coral reef are present in the vicinity of Perseverance but up to this day, no study of the state of preservation of marine ecosystems seems to have been done. The only cartography available seems obsolete and an update is recommended before installing the cable.

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Among all the marine species found in Seychelles and particularly those with high heritage value, only corals that are static can be more impacted by this project. There are no Marine National Park, Protected Marine and Terrestrial and RAMSAR site's at the proposed landfall on Perseverance Island, but the marine parc of Saint Anne is less than 3 km south east.

Climate change

In terms of coastal hazards and vulnerability in Seychelles, the two major effects of climate change are long-term sea-level rise and storm frequency.

1.3.2.2. Socio-economic and cultural environment

Population, habitat and infrastructure

The landing point is on the public beach of Perseverance outside residential area. The beach is dedicated to leisure activities for resident.

Dumping, dredging and reclamation

Several projects are planned near Perseverance: extension of Aurore island reclamation, sand stock pile, mega-yatch marina.

Submarine pipeline/cables

Two subsea cables are noticed on the marine charts and also on Navionics apps. These are Out of Service telegraphic cables since the 50's. PLGR will clear them if they are on PEACE route.

Tourism

Perseverance Island is not a touristic place. The landing beach is mainly use by resident.

Fishing

There is no trawling in the Seychelles bank area. Fishing activities mainly consist in angling, trap and net fishing from anchored boat.

Hydrocarbon exploitation

The proposed cable route crosses the PetroSeychelles exploration area.

It will nevertheless be imperative that the accurate track of the cable be communicated to PetroSeychelles so that future drilling activities in the area do not affect the cable.

Mining

Two marine aggregates mining area extend on the west coast of Mahé. The cable does not cross those areas.

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Military activities

At this time, no military activity has been identified in near Perseverance landing site. The operator in charge of the installation of the cable will have to preliminary inquire to be sure of a lack of activity during the works.

Charted obstructions and wrecks

No obstruction has been reported around the proposed landfall. If burial operations are envisaged, a survey is recommended on the final route to be sure that no obstruction or wreck are present along the cable route.

1.4. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

The cable will be installed in international waters as well as the territorial waters of Seychelles. The project, Category 1 in AfDB terminology, will interact with both the marine and terrestrial environments. The project will thus be subject to:

- Seychelles administrative and legal requirements:
 - Environment protection Act (EPA) Chapter 71 (Act 9 of 1994, Act 15 of 1998 and S.I 73 of 1994). The implementation of the project requires administrative clearance from the Ministry of Environment, Energy and Climate Change, in conformity with the provisions of the Act.
 - Seychelles national Strategy and Action Plan 2015-2020 (NBSAP).

According to the AfDB Policy Statement and Operational Safeguards report (2013), the definition of Project Category 1 is:

“Bank operations likely to cause significant environmental and social impacts – Category 1 projects are likely to induce significant and/or irreversible adverse environmental and/or social impacts, or to significantly affect environmental or social components that the Bank or the borrowing country considers sensitive. Some programme-based operations or other regional and sector programme loans that have significant adverse environmental or social risks and are deemed to be Category 1. In some cases, projects are included in Category 1 because of their potential cumulative impacts or the potential impacts of associated facilities. Any project requiring a Full Resettlement Action Plan (FRAP) under the provisions of the Bank’s policy on involuntary resettlement is also deemed to be Category 1. Category 1 programme-based operations or regional and sector loans require a SESA, and Category 1 investment projects require an ESIA, both leading to the preparation of an ESMP. For a project requiring a FRAP, the ESIA includes, and—if there are no other issues requiring assessment—may be limited to, the social assessment needed to prepare the FRAP.”

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The environmental Authority has prepared a **scoping form** intended for all actors who have been consulted for this project. Those forms have been completed by all stakeholders meet during the site visit in February 2019.

- International convention and standards:
 - The International Convention for the Protection of Submarine Cables (1884);
 - Geneva Convention on the High Seas (1958);
 - United Nations Convention on the Law of the Sea (UNCLOS).

The African Development Bank Group (AfDB) gives high priority to the provision of high quality technical guidance to its Regional Member Countries (RMCs) to strengthen capacity for sustainable development and to foster ownership of the Integrated Safeguards System (ISS).

The new Integrated Environmental and Social Impact Assessment (IESIA) guidance materials are the third component of the ISS and are intended to provide necessary knowledge to Bank's RMCs when undertaking environmental impact assessments for Bank financed projects/programs. They can be also be used by the Bank's Operational staff in reviewing and clearing these studies and in project supervision.

A Public consultation will occur in October 2019 and the ESMP shall be updated, if need be.

1.5. ENUMERATION OF THE MAJOR AND MODERATE IMPACTS

Positive impacts

A number of positive benefits are predicted to be associated with the proposed development. Many of the positive aspects of the project relate to macro and micro-economic opportunities and benefits resulting from increased Information and communication technology connectivity, but many other secondary benefits including, social, employment and educational impacts will also be realized.

Negative impacts and mitigations

The potentials impacts from the project are limited in scope and are mainly associated with the pre-installation and installation phases. Potential impacts during operations and decommissioning are negligible.

This study indicates that there will be no impacts or negligible impacts on the following resources:

- Physical environment: soils and geology, oceanography characteristics;
- Air quality;
- Protected areas;

- Landscape and visual receptors;
- Noise and vibration receptors;
- Traffic;
- Social and cultural structure;
- Culture heritage.

Detailed impact assessment was carried out for three potential impact areas

- Habitats, fauna and flora;
- Water quality;
- Human activities (recreational, fisheries), health and safety.

The potential negative or unexpected impacts from the global cable installation techniques are classified as follow:

- 0 : No impact;
- 1 : minimal impact, no need for specific mitigation ;
- 2: low to medium impact, need basic mitigation ;
- 3 medium to high, need specific mitigation measures and careful monitoring program to ensure no adverse effects.

Potential impact without mitigation			Project stage															
Area of impact	Description	Degree of impact	Onshore				Shallow water				Offshore							
			Construction (BMH)	Cable Installation	Operation / Maintenance	Decommissioning	Marine Route Survey (excl. Vessels)	Route clearance (excl. Vessels)	Submarine cable installation	Vessels (All operation)	Operation/repair	Decommissioning	Marine Route Survey (excl. Vessels)	Route clearance (excl. Vessels)	Submarine cable installation	Vessels (All operation)	Operation/repair	Decommissioning
Environment																		
Geology and soils		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrology		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Meteorology	Winds, rainfall	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oceanography	Swell, current...	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ecology	Terrestrial	Temporary, reversible, direct	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Coral reef	Temporary, reversible, indirect	0	0	0	0	0	1	1	1	1	0	0	1	1	1	1	0

Potential impact without mitigation			Project stage															
Area of impact	Description	Degree of impact	Onshore				Shallow water				Offshore							
			Construction (BMH)	Cable Installation	Operation / Maintenance	Decommissioning	Marine Route Survey (excl. Vessels)	Route clearance (excl. Vessels)	Submarine cable installation	Vessels (All operation)	Operation/repair	Decommissioning	Marine Route Survey (excl. Vessels)	Route clearance (excl. Vessels)	Submarine cable installation	Vessels (All operation)	Operation/repair	Decommissioning
Environment																		
	Seagrass bed	Temporary, reversible, indirect	0	0	0	0	0	1	1	1	1	0	0	1	1	1	1	0
	Marine fauna/flora	Temporary, reversible, direct	0	0	0	0	0	1	1	1	1	0	0	1	1	1	1	0
	Marine habitats	Temporary, reversible, direct	0	0	0	0	0	1	1	1	1	0	0	1	1	1	1	0
Protected area/Ramsar		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Water quality	Sediment disturbance causing turbidity discharges	Temporary, reversible, indirect	0	0	0	0	0	1	2	1	1	0	0	1	2	1	1	0
	Discharges	Temporary, reversible, indirect	1	1	0	0	0	1	2	1	1	0	0	1	2	1	1	0
	Accidents which cause spills	Temporary, reversible, indirect	0	0	0	0	0	1	2	1	1	0	0	1	2	1	1	0
Waste	Generation of wastes	Temporary, reversible, indirect	1	1	1	0	0	1	1	1	0	0	0	1	1	1	0	0
Air quality (Local)	Dust	Temporary, reversible, indirect	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Gazeous emissions	Temporary, reversible, direct	1	1	1	0	0	1	1	1	1	0	0	1	1	1	1	0
Air quality (Local)	Odour	Temporary, reversible, direct	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Heat/radiation		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Social																		
Traffic	Impacts on traffic in area	Temporary, reversible, direct	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	0
		Temporary, reversible, direct	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0

Potential impact without mitigation			Project stage															
Area of impact	Description	Degree of impact	Onshore				Shallow water				Offshore							
			Construction (BMH)	Cable Installation	Operation / Maintenance	Decommissioning	Marine Route Survey (excl. Vessels)	Route clearance (excl. Vessels)	Submarine cable installation	Vessels (All operation)	Operation/repair	Decommissioning	Marine Route Survey (excl. Vessels)	Route clearance (excl. Vessels)	Submarine cable installation	Vessels (All operation)	Operation/repair	Decommissioning
Environment																		
	creation of new building, landscape	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cultural and heritage	Impacts to sites of cultural or archeological interest	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Impacts on fisheries activities	Temporary, reversible, indirect	0	0	0	0	1	1	2	2	1	0	1	1	2	2	1	0
	On tourism - diving sites, recreational activities	Temporary, reversible, indirect	1	1	1	0	1	1	2	2	1	0	1	1	2	2	1	0
Human activities	Impact on shipping and anchorage	Temporary, reversible, indirect	0	0	0	0	1	1	2	2	1	0	1	1	2	2	1	0
	Impact on mining activities	Temporary, reversible, indirect	0	0	0	0	1	1	1	1	1	0	1	1	1	1	1	0
	Impact on dredging/submarine cable/hydrocarbon activities	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Impact on employment	Positive																

1.6. SITE VISIT AND STAKEHOLDERS SCOPING SURVEY

A site visit was conducted from the 3rd to the 8th of February 2019 to identify each potential landing points for PEACE branch to Mahé Island and meet the stakeholders. This scoping survey allowed to recommend Perseverance landing site with the approval of all stakeholders and with favorable environmental and social context. This site also complies with cable work feasibility.

All stakeholders agree Perseverance landing site as testified by scoping forms collected and presented in appendice.

It was concluded that the project will have no negative impact on the fishery industry, will not affect PetroSeychelles operations, and will not embarrass anybody during the installation. At this day, there are no structures where landing point will be, no dredging activities forecasted and no cultural activities organized in this area

Ile Perseverance seems the ideal place for a cable landing because the district is equipped with the right trenching which is already there to facilitate the works needed. Moreover, Perseverance Island is not a natural beach and those are usually more frequented by various animal species such as nesting turtles. The cable route avoids areas with environmental issues (the patch of corals and sea grass on the NE part of the island).

The stakeholders consulted made various recommendations on the improvement of the knowledge of the study area (topography, unclassified remote sensing exercise, GIS sections of the Department of Environment or Habitat and Land Use can be of assistance with satellite imagery, bathymetry actualisation) and information and coordination during the launch of the work in particular to work in a safe environment (special attention not to hinder good navigation).

The Seychelles Ports Authority recommends that the cables and dredging restrictions are kept clear of the Port Victoria anchorage and also that future development such as the yacht marina and other potential development should be taken into consideration

The Marine Conservation Society Seychelles recommends that a floating siltation barrier will need to be installed around the site prior to work commencing with appropriate facility to remove suspended silt from the trapped water during trenching and pipe laying activities. Due to the location and very fine sediments found in this area, effective siltation barriers should be deployed around the working site with appropriate facility to remove suspended silt from the trapped water during trenching and pipe laying activities. Blasting should not be allowed in this area due to its proximity to the Marine National Park and potential damage to fish and other marine life.

Stakeholders		Date	Subject of interest	Responses/Request
Organisation	Name of stakeholders & post title/s			
Seychelles Fishing Authority	Calvin GERRY – Deputy CEO	04/02/2019	<ul style="list-style-type: none"> - Fisheries Issues (coastal, offshore etc.) - Fisheries Policy Issues 	In general the proposed site will not have significant negative impact on the fishery industry
Seychelles Coast Guard Perseverance	Major David ARRISOL – Technical officer	06/02/2019	<ul style="list-style-type: none"> - Oceanography Issues - Military Activities - Navigation Issues - Underwater Pipelines 	We at the SCG explained to iXblue that the boundary around our base is completely surrounded by coral reef. We also ensure them that the SCG do not have any hazardous matter or equipment positioned in the sea around it base. We also advise that that if they want to carry out any diving or other activities in the area around our base they have to inform us and permission will be granted accordingly. We also advise them to get a better detail topography of the area at the MLUH. After the meeting ended they went with Lt S King and Mr Denis Naidoo to take a few photograph of the area outside the SCG base and they left.
PetroSeychelles	Patrick SAMSON – Exploration Manager	06/02/2019	<ul style="list-style-type: none"> - Oil & Hydrocarbon Activities - Underwater Pipelines - Mineral Activities? - Entry point of the fibre Optic Cable on Ile Perseverance Island 	PetroSeychelles is of the view that this entry point will not affect its operations. PetroSeychelles requested however that a shape file of the final coordinates of the cable be made available for its GIS database.
Seychelles Islands Foundation	Frauke FLEISCHER-DOGLEY - GEO	07/02/2019	<ul style="list-style-type: none"> - Environmental organization 	We recommend that an unclassified remote sensing exercise is being undertaken and suggest that the GIS sections of the Department of Environment or Habitat and Land Use can be of assistance with satellite imagery. SIF also provided contact details of Dr Rowat for further follow up to the consultant iXblue.

Stakeholders		Date	Subject of interest	Responses/Request
Organisation	Name of stakeholders & post title/s			
Public Utilities Corporation	Steve MUSSARD – Managing Director (Water and Sewage)	11/02/2019	<ul style="list-style-type: none"> - Ducts - Other Cable Systems (underwater electricity cables) - Underwater Pipelines? 	PUC has a proposed sewage treatment plant (STP) on the northern tip of Ile Aurore. As part of the STP, a sea outfall will be built to discharge the treated effluent into the sea. The outfall will be laid along the sea-bed and will have an approximate length of 1.0 km.
Ministry of Local Government (Ile Perseverance 2 DA)	Lucas PHARISIANNE – District Administrator	12/02/2019	<ul style="list-style-type: none"> - Environmental Matters - Environment Policies - Environmental Legislations & Processes - Reserves / Conservation Areas - Oceanography? - Mineral activities? - Sensitive Areas - Potential Landing Stations 	<p>With the coming of the second fiber optic cable, the country will benefit from fast internet access.</p> <p>This will facilitate the government offices, the business community, students and other people who uses internet in their daily life and operations.</p> <p>As discussed, Ile Perseverance is the ideal place other than Beau Vallon for this cable to land and the district is equipped with the right trenching which is already there to facilitate the works needed. It will not embarrass anybody as said the work will be carried out only for three days.</p> <p>Some people have been told about the cable and work to be carried out, they have no objection and are looking forward to it, as they will benefit in one way or another whilst using internet. It will be more reliable in case of an accident with the first one and internet will be cheaper.</p> <p>As DA, I give my blessing to this project.</p>
Seychelles Maritime Safety Administration	Richard ERRESTA - Director	13/02/2019	<ul style="list-style-type: none"> - Navigation Issues - Wrecks - Commercial Navigation 	No adverse comments as long as the cable does not pose any direct dangers to navigation.

Stakeholders		Date	Subject of interest	Responses/Request
Organisation	Name of stakeholders & post title/s			
			<ul style="list-style-type: none"> - Recreational Navigation - Underwater Pipelines 	
Seychelles Ports Authority	Daina RENAUD – Social Impact Officer	14/02/2019	<ul style="list-style-type: none"> - Harbour Issues - Anchoring Zones - Oceanography Issues - Navigation Issues - Commercial Navigation 	<p>The SPA has no objection to the location of the site as long as DICT/Consultants gets the necessary clearance from other stakeholders such as MHILT, SFA, SMSA, Coast Guard, etc.</p> <p>SPA recommends that the cables and dredging restrictions are kept clear of the Port Victoria anchorage and also that future development such as the yacht marina and other potential development should be taken into consideration (check with SIB).</p>
Department of Government	Kevin MOUMOM – Senior Conservation Officer	14/02/2019	<ul style="list-style-type: none"> - Environmental Matters - Environment Policies - Environmental Legislations & Processes - Reserves / Conservation Areas - Oceanography? - Mineral activities? - Sensitive Areas - Potential Landing Stations 	<p>Following scoping meeting for the landing area of the fiber optic cable the biodiversity conservation division have made the following observations and concerns herewith;</p> <ul style="list-style-type: none"> - The selected area at the Ile perseverance seems to be a good option for landing of the cable as it is not a natural beach and those are usually more frequented by various animal species such as nesting turtles. - The patch of corals and sea grass on the NE part of the island is not within the proposed route of the fiber optic cable so it poses no threat of destruction. <p>Are there new habitats in the area, growing coral over the past ten years after the Perseverance Island development? Consultation of the IEA report from the WEP division of the Ile Perseverance development may shed some light on the various studies conducted in</p>

Stakeholders		Date	Subject of interest	Responses/Request
Organisation	Name of stakeholders & post title/s			
				the area prior but knowledge of the site right now will put us in a better position for decision making and setting of conditions.
Ministry of Habitat Infrastructure and Land Transport	Michel LAPORTE – Director Design	18/02/2019	<ul style="list-style-type: none"> - Dredging Issues - Land Policy - Land-based GIS information - Structures (All) - Planning Permission Issues 	<p>Eastern Perseverance so far best possible location. No structures where landing point will be. No dredging activities forecasted. Possible reclamation north of Perseverance but well away from the cable route. Possible offshore extraction again well away from the cable route. Request for bathymetry survey: to be made available by Mr Patrick Lablache.</p> <p>Request for Cross-sectional drawings for rock armoring: to be made available by Mr Michel Laporte.</p> <p>Request for future reclamation: to made available by Mr Patrick Lablache.</p> <p>Cable will be buried under seabed for a least 18km off Mamelles Island.</p>
Ministry of Habitat, Infrastructure and Land Transport	Francis COEUR DE LION – Director GIS	20/02/2019	<ul style="list-style-type: none"> - Dredging Issues - Land Policy - Land-based GIS information - Structures (All) - Planning Permission Issues 	In a GIS point of view, the Center for GIS does not find any issues regarding the laying and landing of the Fiber Optic Cable, which can negatively impact the environment. The Center therefore has no adverse comments regarding this matter.
Department of Local Government (Ile Perseverance 1 DA)	Andre GABRIEL - District Administrator	22/02/2019	<ul style="list-style-type: none"> - Local Community Issues - Recreational Activities - Local Cultural Issues 	- Pathway of cable from Pakistan/France to Seychelles plus mitigation measures at ocean floor and landing point at Perseverance Beach

Stakeholders		Date	Subject of interest	Responses/Request
Organisation	Name of stakeholders & post title/s			
				<p>- Risk of anchorage – mitigation measures taken by Port Authority to established no anchorage corridor which will be highlights or Marine ch</p> <p>Risk to picnickers, cable will be laid 2m from bedrock of the beach at Perseverance</p>
Marine Conservation Society Seychelles	David ROWAT – Chairman	26/02/2019	<ul style="list-style-type: none"> - Environmental Matters - Environment Policies - Environmental Legislations & Processes - Reserves / Conservation Areas - Oceanography? - Mineral activities? - Sensitive Areas - Potential Landing Stations 	<p>Location site: This site is on the reclaimed land and will require removal of rock armoring and the breaching of the anti-siltation barrier. As a consequence a floating siltation barrier will need to be installed around the site prior to work commencing with appropriate facility to remove suspended silt from the trapped water during trenching and pipe laying activities. The anti-siltation membrane will need to be repaired after pipe laying to prevent excessive leach out of fine sediment.</p> <p>Near shore trenching: The basin where the pipe is likely to come ashore appears to be a basin cut by the previous dredging to reclaim the now adjacent land; as such this may be a hard limestone bed with a layer of fine sediment which leaches out from the reclaimed land. If so, this will require cutting of the trench with a cutter suction head or similar. Blasting should not be allowed in this area due to its proximity to the Marine National Park and potential damage to fish and other marine life. Again, due to the location and very fine sediments found in this area, effective siltation barriers should be deployed around the working site with appropriate facility to remove suspended silt from the</p>

Stakeholders		Date	Subject of interest	Responses/Request
Organisation	Name of stakeholders & post title/s			
				trapped water during trenching and pipe laying activities. Impact to the marine environment: Due to this location being on a man-made island there is little of ecological value on the rock armoring or the adjacent sea floor which has been dredged clean in the previous land reclamation process. The major risks to adjacent marine life and the St. Anne's Marine National Park is that of increase siltation both during the works and afterwards if remedial anti-siltation steps are not taken.
Department of Culture	Julienne BARRA - Not specified	Not specified	<ul style="list-style-type: none"> - Environmental Matters - Environment Policies - Environmental Legislations & Processes - Reserves / Conservation Areas - Oceanography? - Mineral activities? - Sensitive Areas - Potential Landing Stations 	<p>The Department of Culture has no objection in regards to the installation of a new Submarine Fiber Optic Cable in the northern part of Mahe for the following reasons:</p> <p>There is no cultural activities organized in this area, activities are organized on the playing field or near the church.</p> <p>There are no cultural sites or artefacts that are known to the Department in this area.</p> <p>However there is a need to inform the District Administrator about the upcoming development so that they will be able to inform the community of Perseverance.</p>

	Environmental and Social Impact Assessment Study (ESIAS) of PEACE subsea cable project Regulatory file - BIO	SCS Ltd
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1.7. ENVIRONMENT AND SOCIAL MANAGEMENT PLAN (ESMP)

Globally, project activities are expected to have no effect on the environmental or social environment. This is mainly a result of the benign nature of the Project and the associated activities as well as the result of the integration of preventative measures into the project design.

The environmental assessment does indicate some potential for limited environmental and social impacts to habitats and flora; fauna; water quality; and human health and safety.

The most notable impact is on the coral reef and seagrass areas due to the local and momentary increase in turbidity during the burial of the cable.

The potential is reduced through the implementation of standard mitigation measures and industry best practices, none of which are excessive in cost.

Given the low potential for negative impacts and the high potential for significant positive benefits (both direct and indirect), the Project would be deemed to have a high level of environmental and social acceptability.

An Environmental Management Plan is proposed accordingly.

This Environmental Management Plan shall be sent to the contractor for due execution by themselves and their subcontractors.

The estimated cost for the implementation of the ESMP amounts to 917 K€.

Code	Potential environmental impact	Mitigation/Enhancement measures	Monitoring/ implementation	Time frame	Deadline for the completion of measure	Estimated cost	Monitoring verification method	Implementation responsibility
I1	Physical environment	Not specific mitigation required	NA	NA	NA	NA	NA	NA
I2	Terrestrial	<ul style="list-style-type: none"> - Limiting dearing and restoring areas of disturbance - Controls to prevent incursion into adjacent areas - All soil that is disturbed during trench digging will be restored to approximate original depths as the trenches are backfilled (sandy beach, rock armor with a new geotextile and the backshore) - Realize the work on the beach during a period of low tourism 	<ul style="list-style-type: none"> - Hazardous materials management plan - Erosion control and restoration plan - Construction site management plan 	Pre-installation and installation	Duct to BMH is planned in Q2 2020	Estimated €400K for construction	<ul style="list-style-type: none"> - Contractors monthly reporting - Weekly check of beach restoration for one month followed by check one per month for six-month international audit program 	Civil work company under SCS monitoring and control
I3	Marine fauna/flora, Habitats	<ul style="list-style-type: none"> - Marine vessels will be required to adhere to IMO regulations on bilge and ballast water discharge in order to avoid tensional introduction of non-native species to the marine environment - Areas of habitat that are temporarily disturbed during installation activities will be rehabilitated ASAP after the cable has been installed - The project will ensure that measures are adopted to avoid incursion into areas adjacent to the work site, especially the coral areas, or any secondary affects from pollution, sedimentation, or accident spills - The project will also require that marine vessels have a similarity comprehensive plan for storage and handling of hazardous materials as well as a plan for containment and cleanup of accidental spills into the marine environment - Contractors will implement a suitable system for spotting marine mammals and turtle whist pre-installation and installation vessels are at sea. Should these species be observed in the vicinity of the work area. The vessels will execute measures to avoid collision or 	<ul style="list-style-type: none"> - Construction site management plan - Hazardous Materials Management Plan - Marine Logistics Plan - Waste Management Plan - Marine Fauna Protection Procedure; - Daily fauna observation report - Lighting Plan - Notification procedure - Environmental training and awareness raising for contractor personnel - Erosion control and restoration plan 	Pre-installation and installation	Cable laying is planned to be completed by February 2021	Laying operations including environmental monitoring are estimated at €500K	<ul style="list-style-type: none"> - Daily self-check and verification by contractors - Monthly reports on performance by contractors to company - Weekly review of grievances recorded - Internal audit program (company) - Lighting plan to approved by EHSC - Weekly check of beach restoration for one month followed by check one per month for six-month internal audit program 	Laying is of the responsibility of the Contactor, HMN with Global Marine partner. SCS Project Manager is supervising the actions

Code	Potential environmental impact	Mitigation/Enhancement measures	Monitoring/ implementation	Time frame	Deadline for the completion of measure	Estimated cost	Monitoring verification method	Implementation responsibility
		<p>disturbance. Vessel operators will maintain a distance of 100m or greater and will travel 10 knots or less when safety permits until animals are more than 500m away. Abrupt changes in direction will be avoided</p> <ul style="list-style-type: none"> - Vessel crews must report sightings of any injured or dead marine mammals and sea turtles immediately, regardless of whether the injury or death is caused by a project vessel. The report should include the date and location (latitude/longitude) of the animal/strike, the name of the vessel involved, and the species identification or a description of the animal. The report should be made to a designated ecology organization - Security lighting will be aimed on the area it is required at an adequate level of illumination only to avoid impacts on sensitive l4fauna. Spillage of illumination outside the direct work area will b15e avoided - Col6nsider the installation of an anti-MES barrier during the burrowing phase of the cable to limit the impact of resuspension of sediment on the corals and seagrass - Advised jetting work period in austral winter (southeastern trade wind) to promote the discharge of the turbidity plume out of the lagoon 						
I4	Protected area/Ramsar	No specific mitigation required	NA	NA	NA	NA	NA	NA
I5	Water quality	<ul style="list-style-type: none"> - Marine vessels will be required to comply fully with the requirements of the MARPOL Protocol (1978) at all times - Marine vessel anchors will not be dragged along the seabed and they will be retrieved vertically to avoid unnecessary sediment disturbance 	<ul style="list-style-type: none"> - Marine logistic plan - Journey Management plan - Spill prevention control containment and emergency response plan 	Pre-installation and installation	Marine route survey is planned in Q1 2020 Cable laying is planned in Q1 2021	€2000	<ul style="list-style-type: none"> - Daily self-check and verification by contractors - Monthly reports on performance by contractors to company 	Global Marine (HMN) under SCS supervision

Code	Potential environmental impact	Mitigation/Enhancement measures	Monitoring/ implementation	Time frame	Deadline for the completion of measure	Estimated cost	Monitoring verification method	Implementation responsibility
		- The maximum speed of the cable laying will not exceed 5knots per hour so that the amount of seabed sediment disturbed and dispersed during the cable laying process can be kept to a minimum	- Hazardous materials management plan				- Internal audit program	
16	Waste	- Waste management is required to avoid the risk of harm to the environment and human health	Waste management plan	Pre-installation and installation	During survey & Lay	€2000	Daily self-checks and verification by contractors (...)	EGS & Global Marine (HMN) under SCS supervision
17	Air quality (local)	<ul style="list-style-type: none"> - The Project should require that construction contractors operate only well-maintained engines - Should considerable dust generation occur during construction, causing plumes of dust in the vicinity of the works and behind construction vehicles, a routine wetting program of all unpaved surfaces including roads and construction areas will be undertaken to ensure sufficient moisture content is maintained to suppress dust generation - Construction traffic speed control measures will be enforced on unpaved roads (reduced dust generation levels are often consistent with reduced traffic speeds) - Operation in line with the requirements specified under MARPOL 73/79 Annex VI 	<ul style="list-style-type: none"> - Dust management measures - Vehicle maintenance records - Placement of traffic signs indicating the speed limit along the route used by construction vehicles - Construction Site Management Plan 	Pre-installation and installation	During survey & Lay	€2000	<ul style="list-style-type: none"> - Internal audit Program - Daily self-checks and verification by contractors - Monthly reports on performance by contractors to company - Weekly review of grievances recorded 	EGS & Global Marine (HMN) under SCS supervision
18	Heat/radiation	Not specific mitigation require	NA	NA	NA	NA	NA	NA

Code	Potential social impact	Mitigation/Enhancement measures	Monitoring/ implementation	Time frame	Deadline for the completion of measure	Estimated cost	Monitoring verification method	Implementation responsibility
19	Maritime Traffic	<ul style="list-style-type: none"> - Make contact with the other vessel to avoid collision or damage - Vessels will increase watch when navigating in areas that are known to be used by fishermen and other vessels 	Construction site management plan	Pre-installation and installation	Cable laying is planned to be completed by February 2021	€4000	<ul style="list-style-type: none"> - Internal audit Program - Daily self-checks and verification by contractors 	Laying is of the responsibility of the Contactor, HMN with Global Marine partner.

Code	Potential social impact	Mitigation/Enhancement measures	Monitoring/ implementation	Time frame	Deadline for the completion of measure	Estimated cost	Monitoring verification method	Implementation responsibility
								SCS Project Manager is supervising the actions
I10	Noise	<ul style="list-style-type: none"> - Use equipment and vehicles in good working order, well maintained - The Project will require contractors to use equipment and vehicles that are in good working order, well maintained, and that have all noise suppression equipment (mufflers, noise baffles) intact and in working order 	<ul style="list-style-type: none"> - Best driving practices - Vehicle maintenance records - Journey management plan - Placement of traffic control signs indicating traffic rules and enforcement of fines and a penalty system for non-compliances 	Pre-installation and installation	Duct to BMH is planned in Q2 2020	€2000	<ul style="list-style-type: none"> - Internal audit program - Daily self-checks and verification by contractors - Monthly reports on performance by contractors to company - Weekly review of grievances recorded 	Civil work company under SCS monitoring and control
I11	Visual Pollution	Efforts will be made to minimize visual impacts: land disturbed by cable laying will be contoured to its original form as part of overall reinstatement	NA	Pre-installation and installation	Duct to BMH is planned in Q2 2020	€2000	Internal audit program	Civil work company under SCS monitoring and control
I12	Cultural and heritage	Not specific mitigation required	NA	Pre-installation and installation	NA	NA	Internal audit program	NA
I13	Human activities (fisheries activities. On tourism - diving sites, creational activities...)	<ul style="list-style-type: none"> - Contractors will be required to wear suitable Personal Protective Equipment including hard hats, high-visibility vests, safety boots and gloves and life vests as appropriate in accordance with the EHS plan - All construction and cable repair workers will be sufficiently trained in the safe methods of working with fiber optic cables to avoid injury associated with laser lights and fibers - All open trenches and excavated areas will be backfilled as soon as possible after the construction has been completed. Access to open trenches and excavated areas will be secured to prevent pedestrians or vehicles from falling in 	<ul style="list-style-type: none"> - Environmental, Health and Safety Plan - Health and Safety training and training records - Health and safety incident register - Marine Logistics Plan - Regular health and safety meetings with all parties in attendance and official minutes taken 	Pre-installation and installation	Cable laying is planned to be completed by February 2021	€5000	<ul style="list-style-type: none"> - Daily checks and verification by contractor - Monthly reports on performance between contractors to company - Internal audit program 	Laying is of the responsibility of the Contactor, HMN with Global Marine partner. SCS Project Manager is supervising the actions

Code	Potential social impact	Mitigation/Enhancement measures	Monitoring/ implementation	Time frame	Deadline for the completion of measure	Estimated cost	Monitoring verification method	Implementation responsibility
		<ul style="list-style-type: none"> - Vessels will increase watch when navigating in areas that are known to be used by fishermen and other vessels. If other vessels are observed within the near vicinity, the project vessel will stop moving, make contact with the other vessel if possible, and wait until it has been confirmed that the course of both vessels will not result in collision or damage to equipment - While a ship is laying cable its maneuverability is restricted, as such it will display the day signals and lights of a hampered vessel to avoid collision with other vessels at sea - Trenches and excavated areas will be backfilled ASAP Require to wear suitable personnel protective equipment - Require day signals and lights of a hampered vessel to avoid collision with other vessels at sea - Fishing representatives to be informed of cable laying schedule and exclusion zones - Community stakeholders to be informed of cable laying schedule and exclusion zones - Local fishermen and other sea users will be informed about the presence of the cable vessel and location of the cables. 						

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1.8. CONCLUSION

The environmental and social assessment study for the installation of a new fiber optic telecommunications cable network from Seychelles to Pakistan & East Africa Connecting Europe (PEACE) main system suggest that project activities are expected to have no effect on the environmental or social environment.

The study does indicate some potential for limited environmental and social impacts to habitats and flora; fauna; water quality; and human health and safety. The most notable impact is on the coral reef and seagrass areas due to the local and momentary increase in turbidity during the burial of the cable. However as indicated by the Department of Government, the cable route avoids areas with environmental issues (the patch of corals and seagrass on the NE part of the island).

The stakeholder's opinion recommends Perseverance landing site with favourable environmental and social context.

Given the low potential for negative impacts and the high potential for significant positive benefits (both direct and indirect), the Project would be deemed to have a high level of environmental and social acceptability.

The Environmental Management Plan proposed is an instrument that details the measures to be taken during the implementation and operation of the project to eliminate or offset adverse environmental and social effects, or to reduce them to acceptable levels; and the actions needed to implement these measures. This plan shall be sent to the contractor for due execution by themselves and their subcontractors.

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2. INTRODUCTION

iXblue has been commissioned by the SCS Ltd to provide an **Environmental and Social Impact Assessment Study (ESIAS)** of the optimum submarine routing for the fiber optic cable system.

The Cable System Project is a new fiber optic telecommunications cable network from Seychelles to Pakistan & East Africa Connecting Europe (PEACE) main system. PEACE is a cable system linking Pakistan to Europe (Marseille) via Djibouti and Egypt, to Kenya (Mombasa) along the East coast of Africa.

Specifically, this report provides information on project activities; anticipated impact of the project activities; measures to deploy in order to mitigate identified adverse impacts; and institutional arrangement to facilitate implementation and monitoring of the environmental management plan in order to obtain authorization for a unique landing site. It will be written to respect the requirement of the Seychelles Authorities in order to efficiently support the permitting process.

This project takes in account the fact that vast areas of Mahe are designated as national parks introduced to protect and safeguard the exceptional ecological heritage for which Seychelles is famous all over the world. Seychelles is known as a geomorphological curiosity which has been systematically investigated (Baker 1963) and documented. As a granitic island it is regarded as a micro continent dated as pre-Cambrian which has a unique biotope still not thoroughly researched.

IXBLUE is following the African Development Bank Group (AfDB) guideline, especially the "SAFEGUARDS AND SUSTAINABILITY - SERIES Volume 1: General Guidance on Implementation of Operational Safeguard 1, Issue 1, (December 2015)" which contain requirements and topics around the Environmental and Social Impact Assessment.

IXBLUE has taken care to respect all the key steps recommended by the AfDB, in order to not to omit any element essential to the examination of this regulatory file, namely:

- Scoping;
- Stakeholder identification;
- Project definition;
- Analysis of alternatives;
- Baseline definition;
- Impact assessment;
- Preparation of an Environmental and Social Management Plan (ESMP), including monitoring and reporting.

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For the constitution of the ESIA report content, IXBLUE has relied on the plan suggested by environmental French Code in line with European guidelines: for reference, Articles R. 214-6 to R. 214-56 and L.214-1 and on, especially the Article R122-5 (Decree n°2019-190 03/14/2019 - art. 6).

3. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

3.1. THE ENVIRONMENT PROTECTION ACT

The impact of the cable landing on marine environment is recognized in laws of Seychelles, especially in the Seychelles Environmental Protection Act (EPA) chapter 71 (Act 9 of 1994, Act 15 of 1998 and S.I 73 of 1994).

This act permits to provide for the protection, improvement and reservation of the environment, to set objectives and guiding principles aimed at protecting the environment and human health for the promotion of environmental principles so as to facilitate the implementation of international commitments including the prevention, control and abatement of environmental pollution in Seychelles and for matters connected therewith or incidental thereto.

The first EPA was promulgated in 1991. Part IV of this Act, which sets out formal procedures for Environmental Impact Assessment (EIA), only came into force in 1995. This Act was consolidated to 30 June 2012.

EPA Part IV (Environmental Impact Assessment) concerns the requirements for, and contents of, an Environmental Impact Assessment and the administrative procedures that will be followed in processing EIA license applications.

EIA is a study which determines the environmental consequences of a proposed development. Expected results on the natural environment, human health will be evaluated in the study. The EIA is a sound decision making tool and helps in achieving sustainable development in the country. Various alternatives are analyzed through which the proposed development can be realized and identifies the best combination.

Section 15 of Part IV of the EPA provides guidelines on the contents of an EIA report, and is summarized below:

- The location, size and scope of the project or activity and description of the original state of the environment prior to implementation of the project or activity;
- The principle, concept and the purpose of the project or the activity;
- The technical aspects relating to the project or the activity;
- The direct or indirect effects that the activity is likely to have on the population, flora and fauna, soil, air, water, landscape, and other physical assets including historical, artistic and archeological;
- Any actions or measures which may avoid, prevent, change, mitigate or remedy the likely effects of the activity or the project on the environment;
- The inevitable adverse effects that the project or the activity is likely to have on the environment if it is implemented in the manner proposed by the proponent;

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- The irreversible and irretrievable impact on the commitments of resources which will be involved by the project or the activity;
- The actions or measures proposed for compensating physically or financially for any resulting loss or damage to the environment;
- A study of the feasible alternatives considered, including a summary of all the expected impacts;
- An environmental monitoring program;
- Such other information as may be necessary to a proper review of the potential environmental impact of the project or the activity.

Responsibility for the enforcement of the EPA is dispersed across a number of **different ministries**, which has the potential of being very effective in resolving the many institutional and enforcement issues that arise.

The implementation of the project requires administrative clearance from the Ministry of Environment, Energy and Climate change, in conformity with the provisions of the Act. The Ministry is mandated to monitor and follow-up on the implementation measures highlighted in the impact study reports.

The environmental Authority has prepared a **scoping form** intended for all actors who have been consulted for this project. All of these sheets are attached. Those forms have been completed by all stakeholders meet during the site visit in February 2019

3.2. OTHER REGULATORY REQUIREMENTS

The Seychelles National Biodiversity Strategy and Action Plan 2015-2020 (NBSAP) has been prepared through alliterative process of stakeholder consultation and approval. The NBSAP addresses Seychelles' obligation under Article 6a of the Convention on Biological Diversity (CBD) and replaces the previous version produced in 1997.

A Public consultation will occur in October 2019 and the ESMP shall be updated, if need be.

3.3. INTERNATIONAL TREATIES AND CONVENTIONS

Recognizing the value to humanity of international communications, cables are protected by international treaties:

- The International Convention for the Protection of Submarine Cables (1884);
- Geneva Convention on the High Seas (1958);
- United Nations Convention on the Law of the Sea (UNCLOS) (1982, Figure 1).

The International Convention for the Protection of Submarine Cables establishes that the breaking or injury of a submarine cable, done willfully or through culpable negligence, and resulting in the total or partial interruption or embarrassment of telegraphic communications, shall be a punishable offence, but the punishment inflicted shall be no bar to a civil action for damages.

The Geneva Convention on the High Seas establishes the High Seas as being open to all nations; no State may validly purport to subject any part of them to its sovereignty. Freedom of the High Seas is exercised under the conditions laid down by the Articles of the Convention and by the other rules of international law. It comprises, inter alia, both for coastal and non-coastal States:

- Freedom of navigation;
- Freedom of fishing;
- Freedom to lay submarine cables and pipelines;
- Freedom to fly over the high seas.

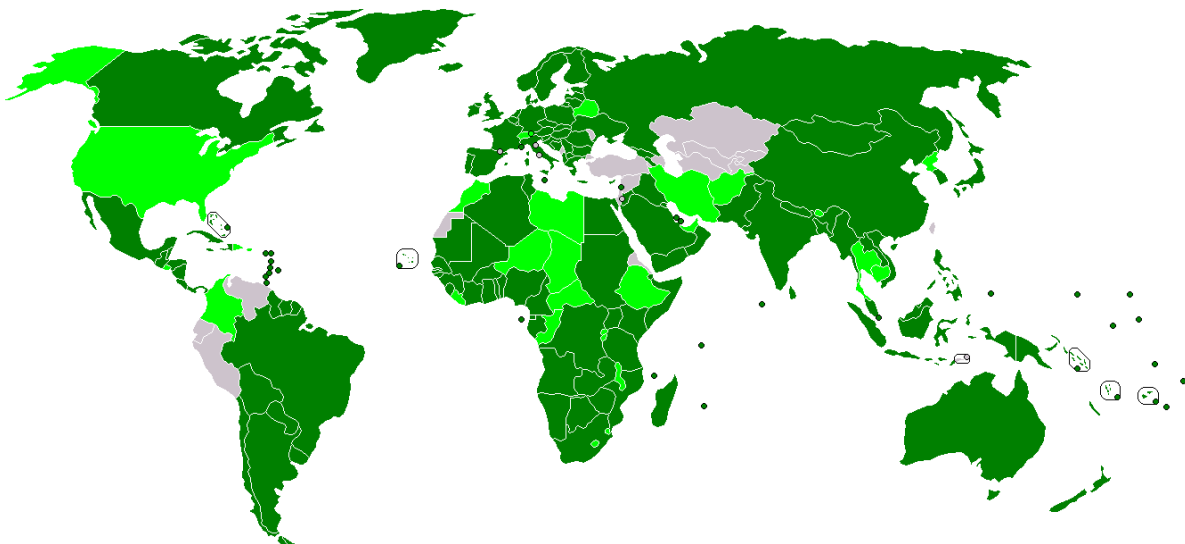


Figure 1: Signature and ratification of UNCLOS (Green ratified, green light signed, grey but not yet ratified, did not sign) (Source Wikipedia, 2010).

The EEZ and territorial waters are defined by UNCLOS and within which specific rules apply. Article 79 of UNCLOS, in particular, concerns the installation of submarine cable and pipelines on the continental shelf and specifies:

- All States are entitled to lay submarine cables and pipelines on the continental shelf, in accordance with the provisions of this article.
- Subject to its right to take reasonable measures for the exploration of the continental shelf, the exploitation of its natural resources and the prevention, reduction and control of pollution from pipelines, the coastal State may not impede the laying or maintenance of such cables or pipelines.

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- The delineation of the course for the laying of such pipelines on the continental shelf is subject to the consent of the coastal State.
- Nothing in this Part affects the right of the coastal State to establish conditions for cables or pipelines entering its territory or territorial sea, or its jurisdiction over cables and pipelines constructed or used in connection with the exploration of its continental shelf or exploitation of its resources or the operations of artificial islands, installations and structures under its jurisdiction.
- When laying submarine cables or pipelines, States shall have due regard to cables or pipelines already in position. In particular, possibilities of repairing existing cables or pipelines shall not be prejudiced.

Permitting of the cable will be undertaken by the navy's Hydrographic department. Full details of the survey route, vessel and equipment, master and crew are required for the permit application.

A number of provisions and guidance outlined in the MARPOL Convention are relevant to marine activities, including general requirements over the control of waste oil, engine oil discharges and grey and black waste water discharges. In addition, a number of the Annexes of the Convention relevant such as Annex V (Prevention of Pollution by Garbage from ships) and Annex VI (Prevention of Air Pollution from ships).

3.4. AfDB SAFEGUARD POLICIES AND PROCEDURES (ISS)

The African Development Bank Group (AfDB) gives high priority to the provision of high quality technical guidance to its Regional Member Countries (RMCs) to strengthen capacity for sustainable development and to foster ownership of the Integrated Safeguards System (ISS).

The new Integrated Environmental and Social Impact Assessment (IESIA) guidance materials are the third component of the ISS and are intended to provide necessary knowledge to Bank's RMCs when undertaking environmental impact assessments for Bank financed projects/programs. They can be also be used by the Bank's Operational staff in reviewing and clearing these studies and in project supervision.

According to the AfDB Policy Statement and Operational Safeguards report (2013), the definition of Project Category 1 is:

"Bank operations likely to cause significant environmental and social impacts – Category 1 projects are likely to induce significant and/or irreversible adverse environmental and/or social impacts, or to significantly affect environmental or social components that the Bank or the borrowing country considers sensitive. Some programme-based operations or other regional and sector programme loans that have significant adverse environmental or social

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risks and are deemed to be Category 1. In some cases, projects are included in Category 1 because of their potential cumulative impacts or the potential impacts of associated facilities. Any project requiring a Full Resettlement Action Plan (FRAP) under the provisions of the Bank's policy on involuntary resettlement is also deemed to be Category 1. Category 1 programme-based operations or regional and sector loans require a SESA, and Category 1 investment projects require an ESIA, both leading to the preparation of an ESMP. For a project requiring a FRAP, the ESIA includes, and—if there are no other issues requiring assessment—may be limited to, the social assessment needed to prepare the FRAP.”

4. PROJECT JUSTIFICATION

4.1. ALTERNATIVES AND PROJECT CHOICE

Since the implementation of SEAS, the first optical cable to Seychelles, SCS knew that a second cable will be needed for obvious security of international connectivity reasons. “Doing nothing” is not an acceptable alternative for the Seychelles Government.

In the course of 2018, several alternative projects have been analyzed to connect Seychelles to the World Wide Web with a new submarine cable.

5 cable alternatives were identified:

- PEACE, a Chinese private initiative, submarine cable system from Pakistan to Europe and a branch to Kenya, on which a Seychelles branch shall be hooked.
- MERCURY, an international consortium, led by Vodafone, change into SIMBA project
- DARE, a regional consortium, led by Djibouti Telecom.
- IOX, a private submarine cable initiative, led by Indian investors from Mauritius to South Africa and future extension to India and Kenya.
- Africa-1, an International consortium led by STC and Etisalat.

All these alternative projects have similar state-of-the-art technologies and the cable landing considerations in Mahé were exactly the same.

The criteria of choice were mainly price, availability date and telecommunications capability of the alternatives.

Decision was taken on September 2018 to select the PEACE project. PEACE was the better option in particular for onward connectivity to Europe included into the Project and for price consideration. DARE-1 project was not offering this direct connectivity and the other alternatives were not mature for implementation, and still are not a year later.

4.2. PROJECT BENEFITS

Currently, the Seychellois telecommunications operators heavily rely the submarine cable system (Seychelles East African System (SEAS)) running from Beau Vallon (Seychelles) to shore crossing and landing site in Dar es Salaam (Tanzania) to carry the bulk of their international traffic.

Seychelles Cable Systems Company Ltd (SCS) is considering to improve connectivity and reliance of submarine network by investing into a new cable: a branch from Seychelles to PEACE (Pakistan & East Africa Connecting Europe) main system. PEACE is a cable system

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linking Pakistan to Europe (Marseille) *via* Djibouti and Egypt, to Kenya (Mombasa) along the East coast of Africa.

The project fits into a larger framework aiming to develop the technology sector in Seychelles and connecting Africa to the rest of the world. The project will enhance internet access to a broader section of the population including youths and business.

The government of Seychelles, as well, wants to apply a plan which emphasizes development of the information, communication and telecommunication infrastructure.

For existing businesses, the project will provide faster and more reliable transmission for data and voice call. This can result in an enhancement of business performance as well as create opportunities for expansion. Lower entry costs will also facilitate the start-up of new businesses.

The project will improve the quality and the reliability of the connectivity of Seychelles to the rest of the world.

Seychelles Cable System, SCS, the operating company, has its headquarters at Victoria and is the only Seychelles-based submarine cable company

In addition to the direct economic benefits of increased telecommunications access and reliability in Seychelles, many other indirect social and economic benefits would be associated with the proposed development. These include:

- Improved educational opportunities through better access to information and education resources;
- Development of a regional sense of community through greater equality of information sharing across geographical regions and across society group;
- Economic benefits from the enhanced opportunities for new and small enterprises that may have previously been excluded from technologies by high costs;
- Macroeconomic benefits of the potential expansion of technology-reliant industries, such as information technology services, software development businesses and finance and banking activities.

5. SITE VISIT AND STAKEHOLDER SCOPING SURVEY

A site visit was conducted from the 3rd to the 8th of February 2019 to identify each potential landing points for PEACE branch to Mahé Island. This visit was based around observation of the landing points, exchanges with the institutions and the local stakeholders, the collection of all the necessary information making it possible to recommend the landing site the most judicious with regard to the technical constraints and environmental issues. The alternatives are developed in §9.

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Meetings with stakeholders allowed to discuss and gather their opinion about the following points:

- Project description and impact;
- Landing site alternatives constraints and benefits;
- Existing data about environmental and social context.

The schedule of the visits and the scoping forms results are presented in the following table.

All stakeholders agree Perseverance landing site as testified by scoping forms collected and presented in appendice.

It was concluded that the project will have no negative impact on the fishery industry, will not affect PetroSeychelles operations, and will not embarrass anybody during the installation. At this day, there are no structures where landing point will be, no dredging activities forecasted and no cultural activities organized in this area

Ile Perseverance seems the ideal place for a cable landing because the district is equipped with the right trenching which is already there to facilitate the works needed. Moreover, Perseverance Island is not a natural beach and those are usually more frequented by various animal species such as nesting turtles. The cable route avoids areas with environmental issues (the patch of corals and seagrass on the NE part of the island).

The stakeholders consulted made various recommendations on the improvement of the knowledge of the study area (topography, unclassified remote sensing exercise, GIS sections of the Department of Environment or Habitat and Land Use can be of assistance with satellite imagery, bathymetry actualisation) and information and coordination during the launch of the work in particular to work in a safe environment (special attention not to hinder good navigation).

The Seychelles Ports Authority recommends that the cables and dredging restrictions are kept clear of the Port Victoria anchorage and also that future development such as the yacht marina and other potential development should be taken into consideration

The Marine Conservation Society Seychelles recommends that a floating siltation barrier will need to be installed around the site prior to work commencing with appropriate facility to remove suspended silt from the trapped water during trenching and pipe laying activities. Due to the location and very fine sediments found in this area, effective siltation barriers should be deployed around the working site with appropriate facility to remove suspended silt from the trapped water during trenching and pipe laying activities. Blasting should not be allowed in this area due to its proximity to the Marine National Park and potential damage to fish and other marine life.

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Company	Meeting date	Participant
Department of Information, Communication and Telecommunication (DICT)	04/02/2019	Benjamin CHOPPY (Principal secretary, DICT) Paul Pierre (DICT)
Ministry of Environment, Energy and Climate Change	04/02/2019	Marie-Alise Rosette (Env department – Environmental assessment and permits), Nanette Laure (Director General, Env. Department, Waste Enforcement and permits), Kevin Mounon (Environment dept, Biodiversity conservation), Gilberte Gendron (Seychelles National parks authority)
Seychelles Fishing Authority	05/02/2019	Calvin Gerry, Deputy chief Executive Officer
Seychelles Maritime Safety Administration	05/02/2019	Captain Joachim Valmont, Richard Ernesta, Captain Marc Hoareau
Seychelles Port Authority	05/02/2019	Dr. Egbert Moustache, Diana Renaud, David Bianchi, Franky Laporte, Allen Chetty
Seychelles Coast Guards	06/02/2019	LT Samuel King, Civ. Denis Naidu, Maj. David Arrisol
Ministry of Habitat, Infrastructure and Land Transport (MHILT) and Planning Authority.	06/02/2019	Patrick Lablache (MHILT), Alvin Alcindor (MHILT), Joseph Francois (Planning Authority), Michel Laporte (MHILT)
Petroseychelles	06/02/2019	Jean-Luc Mondon (Senior Geologist, Petroseychelles), Patrick Samson (Exploration manager, Petroseychelles)
Airtel, Intelvision, CWS	07/02/2019	David Bedier (CWS), Nelson Mosil (Intelvision), Gerard Joubert (Airtel), Erwin Chetty (Airtel), Frederick Asrans (Intelvision), Reza Jard (Intelvision)
Department of Youth and Sport and Department of Culture	07/02/2019	Fabian Palmyre (Principal secretary, Department of Youth and Sports) Julienne Barra (Department of culture)
Marine Conservation Society	07/02/2016	Dr. David Rowart
Seychelles Islands Foundation (SIF)	07/02/2016	CEO Frauke FLEISHER-DOGLEY
Climate Change Division of Ministry of Environment Energy and Climate Change	08/02/2019	Selvan Pilla, Director Justin Prosper, Data manager
Department of Local Government	08/02/2019	Jim Moncherry (Local Government), Mike Morel (Local Government), Emmanuel Toussaint (Local Government) Pharisianne Lucas (DA – Perseverance, Local government), Andre Gabriel (DA Perseverance, Local government), Betty-May Sofa (Local government, Principal policy analyst)
Public Utilities Corporation	08/02/2019	Philippe Morin
Seychelles Islands Foundation (SIF)	07/02/2016	CEO Frauke FLEISHER-DOGLEY

Stakeholders		Date	Subject of interest	Responses/Request
Organisation	Name of stakeholders & post title/s			
Seychelles Fishing Authority	Calvin GERRY – Deputy CEO	04/02/2019	<ul style="list-style-type: none"> - Fisheries Issues (coastal, offshore etc.) - Fisheries Policy Issues 	In general the proposed site will not have significant negative impact on the fishery industry
Seychelles Coast Guard Perseverance	Major David ARRISOL – Technical officer	06/02/2019	<ul style="list-style-type: none"> - Oceanography Issues - Military Activities - Navigation Issues - Underwater Pipelines 	We at the SCG explained to iXblue that the boundary around our base is completely surrounded by coral reef. We also ensure them that the SCG do not have any hazardous matter or equipment positioned in the sea around it base. We also advise that that if they want to carry out any diving or other activities in the area around our base they have to inform us and permission will be granted accordingly. We also advise them to get a better detail topography of the area at the MLUH. After the meeting ended they went with Lt S King and Mr Denis Naidoo to take a few photograph of the area outside the SCG base and they left.
PetroSeychelles	Patrick SAMSON – Exploration Manager	06/02/2019	<ul style="list-style-type: none"> - Oil & Hydrocarbon Activities - Underwater Pipelines - Mineral Activities? - Entry point of the fibre Optic Cable on Ile Perseverance Island 	PetroSeychelles is of the view that this entry point will not affect its operations. PetroSeychelles requested however that a shape file of the final coordinates of the cable be made available for its GIS database.
Seychelles Islands Foundation	Frauke FLEISCHER-DOGLEY - GEO	07/02/2019	<ul style="list-style-type: none"> - Environmental organization 	We recommend that an unclassified remote sensing exercise is being undertaken and suggest that the GIS sections of the Department of Environment or Habitat and Land Use can be of assistance with satellite imagery. SIF also provided contact details of Dr Rowat for further follow up to the consultant iXblue.

Stakeholders		Date	Subject of interest	Responses/Request
Organisation	Name of stakeholders & post title/s			
Public Utilities Corporation	Steve MUSSARD – Managing Director (Water and Sewage)	11/02/2019	<ul style="list-style-type: none"> - Ducts - Other Cable Systems (underwater electricity cables) - Underwater Pipelines? 	PUC has a proposed sewage treatment plant (STP) on the northern tip of Ile Aurore. As part of the STP, a sea outfall will be built to discharge the treated effluent into the sea. The outfall will be laid along the sea-bed and will have an approximate length of 1.0 km.
Ministry of Local Government (Ile Perseverance 2 DA)	Lucas PHARISIANNE – District Administrator	12/02/2019	<ul style="list-style-type: none"> - Environmental Matters - Environment Policies - Environmental Legislations & Processes - Reserves / Conservation Areas - Oceanography? - Mineral activities? - Sensitive Areas - Potential Landing Stations 	<p>With the coming of the second fiber optic cable, the country will benefit from fast internet access.</p> <p>This will facilitate the government offices, the business community, students and other people who uses internet in their daily life and operations.</p> <p>As discussed, Ile Perseverance is the ideal place other than Beau Vallon for this cable to land and the district is equipped with the right trenching which is already there to facilitate the works needed. It will not embarrass anybody as said the work will be carried out only for three days.</p> <p>Some people have been told about the cable and work to be carried out, they have no objection and are looking forward to it, as they will benefit in one way or another whilst using internet. It will be more reliable in case of an accident with the first one and internet will be cheaper.</p> <p>As DA, I give my blessing to this project.</p>
Seychelles Maritime Safety Administration	Richard ERRESTA – Director	13/02/2019	<ul style="list-style-type: none"> - Navigation Issues - Wrecks - Commercial Navigation 	No adverse comments as long as the cable does not pose any direct dangers to navigation.

Stakeholders		Date	Subject of interest	Responses/Request
Organisation	Name of stakeholders & post title/s			
			<ul style="list-style-type: none"> - Recreational Navigation - Underwater Pipelines 	
Seychelles Ports Authority	Daina RENAUD – Social Impact Officer	14/02/2019	<ul style="list-style-type: none"> - Harbour Issues - Anchoring Zones - Oceanography Issues - Navigation Issues - Commercial Navigation 	<p>The SPA has no objection to the location of the site as long as DICT/Consultants gets the necessary clearance from other stakeholders such as MHILT, SFA, SMSA, Coast Guard, etc.</p> <p>SPA recommends that the cables and dredging restrictions are kept clear of the Port Victoria anchorage and also that future development such as the yacht marina and other potential development should be taken into consideration (check with SIB).</p>
Department of Government	Kevin MOUMOM – Senior Conservation Officer	14/02/2019	<ul style="list-style-type: none"> - Environmental Matters - Environment Policies - Environmental Legislations & Processes - Reserves / Conservation Areas - Oceanography? - Mineral activities? - Sensitive Areas - Potential Landing Stations 	<p>Following scoping meeting for the landing area of the fiber optic cable the biodiversity conservation division have made the following observations and concerns herewith;</p> <ul style="list-style-type: none"> - The selected area at the Ile perseverance seems to be a good option for landing of the cable as it is not a natural beach and those are usually more frequented by various animal species such as nesting turtles. - The patch of corals and sea grass on the NE part of the island is not within the proposed route of the fiber optic cable so it poses no threat of destruction. <p>Are there new habitats in the area, growing coral over the past ten years after the Perseverance Island development? Consultation of the IEA report from the WEP division of the Ile Perseverance development may shed some light on the various studies conducted in</p>

Stakeholders		Date	Subject of interest	Responses/Request
Organisation	Name of stakeholders & post title/s			
				the area prior but knowledge of the site right now will put us in a better position for decision making and setting of conditions.
Ministry of Habitat Infrastructure and Land Transport	Michel LAPORTE – Director Design	18/02/2019	<ul style="list-style-type: none"> - Dredging Issues - Land Policy - Land-based GIS information - Structures (All) - Planning Permission Issues 	<p>Eastern Perseverance so far best possible location. No structures where landing point will be. No dredging activities forecasted. Possible reclamation north of Perseverance but well away from the cable route. Possible offshore extraction again well away from the cable route. Request for bathymetry survey: to be made available by Mr Patrick Lablache.</p> <p>Request for Cross-sectional drawings for rock armoring: to be made available by Mr Michel Laporte.</p> <p>Request for future reclamation: to made available by Mr Patrick Lablache.</p> <p>Cable will be buried under seabed for a least 18km off Mamelles Island.</p>
Ministry of Habitat, Infrastructure and Land Transport	Francis COEUR DE LION – Director GIS	20/02/2019	<ul style="list-style-type: none"> - Dredging Issues - Land Policy - Land-based GIS information - Structures (All) - Planning Permission Issues 	In a GIS point of view, the Center for GIS does not find any issues regarding the laying and landing of the Fiber Optic Cable, which can negatively impact the environment. The Center therefore has no adverse comments regarding this matter.
Department of Local Government (Ile Perseverance 1 DA)	Andre GABRIEL - District Administrator	22/02/2019	<ul style="list-style-type: none"> - Local Community Issues - Recreational Activities - Local Cultural Issues 	- Pathway of cable from Pakistan/France to Seychelles plus mitigation measures at ocean floor and landing point at Perseverance Beach

Stakeholders		Date	Subject of interest	Responses/Request
Organisation	Name of stakeholders & post title/s			
				<p>- Risk of anchorage – mitigation measures taken by Port Authority to established no anchorage corridor which will be highlights or Marine ch</p> <p>Risk to picnickers, cable will be laid 2m from bedrock of the beach at Perseverance</p>
Marine Conservation Society Seychelles	David ROWAT – Chairman	26/02/2019	<ul style="list-style-type: none"> - Environmental Matters - Environment Policies - Environmental Legislations & Processes - Reserves / Conservation Areas - Oceanography? - Mineral activities? - Sensitive Areas - Potential Landing Stations 	<p>Location site: This site is on the reclaimed land and will require removal of rock armoring and the breaching of the anti-siltation barrier. As a consequence a floating siltation barrier will need to be installed around the site prior to work commencing with appropriate facility to remove suspended silt from the trapped water during trenching and pipe laying activities. The anti-siltation membrane will need to be repaired after pipe laying to prevent excessive leach out of fine sediment.</p> <p>Near shore trenching: The basin where the pipe is likely to come ashore appears to be a basin cut by the previous dredging to reclaim the now adjacent land; as such this may be a hard limestone bed with a layer of fine sediment which leaches out from the reclaimed land. If so, this will require cutting of the trench with a cutter suction head or similar. Blasting should not be allowed in this area due to its proximity to the Marine National Park and potential damage to fish and other marine life. Again, due to the location and very fine sediments found in this area, effective siltation barriers should be deployed around the working site with appropriate facility to remove suspended silt from the</p>

Stakeholders		Date	Subject of interest	Responses/Request
Organisation	Name of stakeholders & post title/s			
				trapped water during trenching and pipe laying activities. Impact to the marine environment: Due to this location being on a man-made island there is little of ecological value on the rock armoring or the adjacent sea floor which has been dredged clean in the previous land reclamation process. The major risks to adjacent marine life and the St. Anne's Marine National Park is that of increase siltation both during the works and afterwards if remedial anti-siltation steps are not taken.
Department of Culture	Julienne BARRA - Not specified	Not specified	<ul style="list-style-type: none"> - Environmental Matters - Environment Policies - Environmental Legislations & Processes - Reserves / Conservation Areas - Oceanography? - Mineral activities? - Sensitive Areas - Potential Landing Stations 	<p>The Department of Culture has no objection in regards to the installation of a new Submarine Fiber Optic Cable in the northern part of Mahe for the following reasons:</p> <p>There is no cultural activities organized in this area, activities are organized on the playing field or near the church.</p> <p>There are no cultural sites or artefacts that are known to the Department in this area.</p> <p>However there is a need to inform the District Administrator about the upcoming development so that they will be able to inform the community of Perseverance.</p>

6. PROJECT DESCRIPTION

6.1. LOCALISATION OF THE LANDING SITE SELECTED

The preferred landing site is located on Perseverance beach (Figure 3) in the North East of Mahé less than 5 km from Victoria town center. It is an artificial beach resulting from natural evolution of the bay of reclaimed lands (Figure 2).



Figure 2 : Landing site on Perseverance beach.

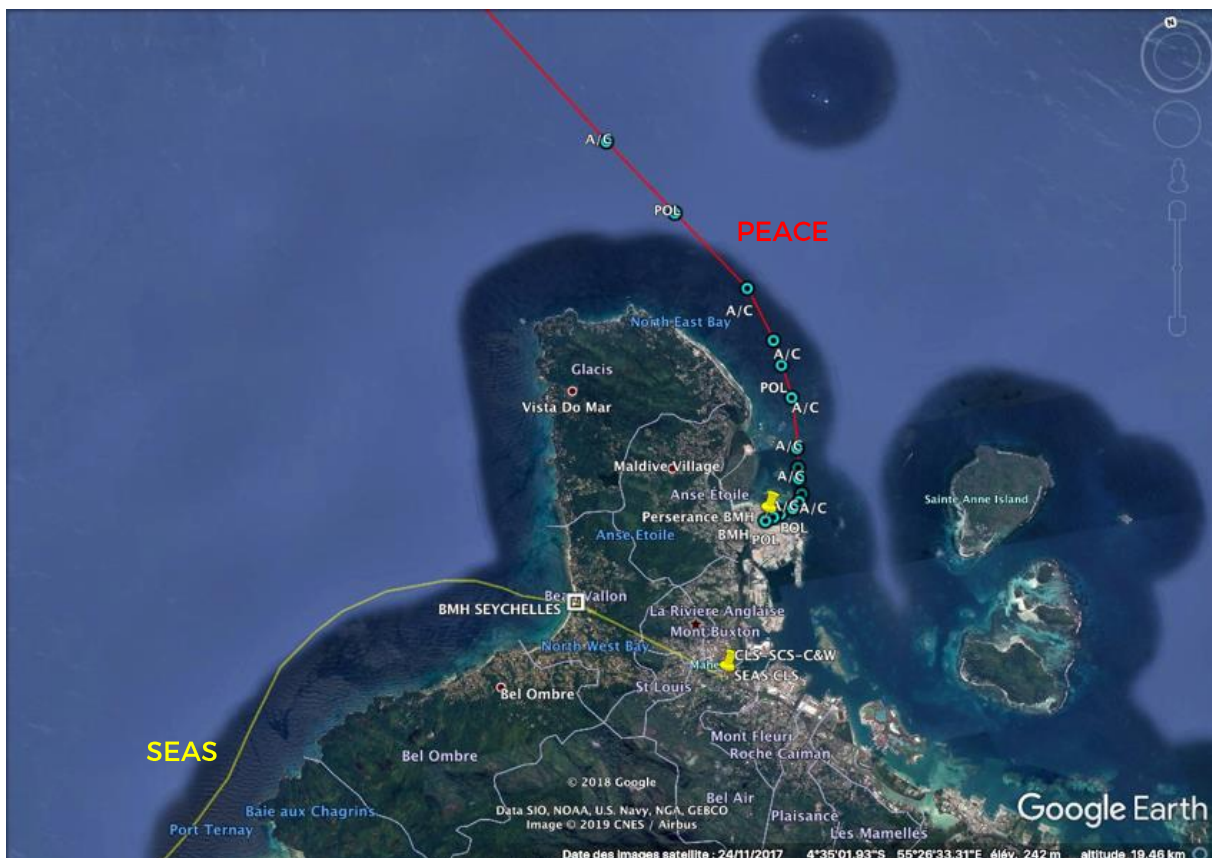


Figure 3 : Location of Perseverance landing site and PEACE cable route.

6.2. DESCRIPTION OF THE ROUTE SELECTED

6.2.1. Proposed route

The Figure 4 presents PEACE cable route from Pakistan to East Africa and France.

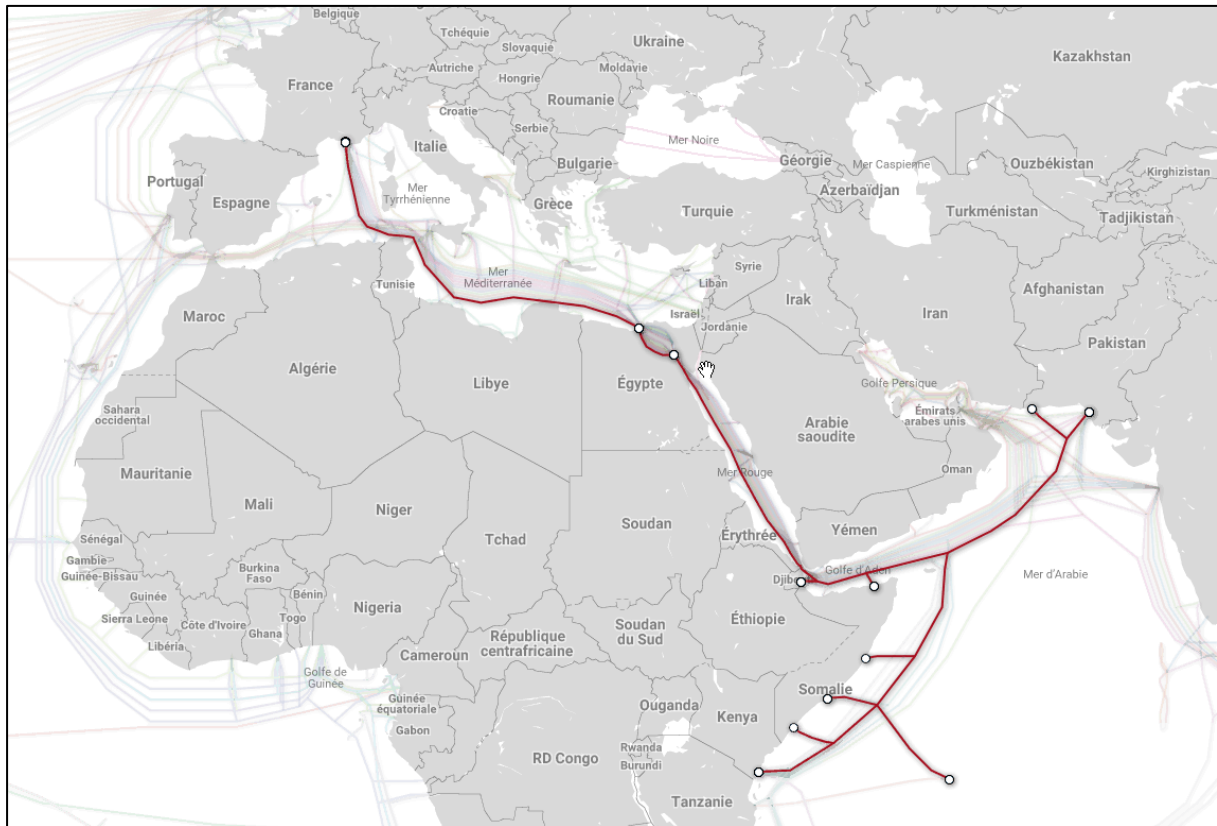


Figure 4 : PEACE general cable route.

The cable will be deployed in international waters as well as the national waters of Seychelles. Seychelles branch is 900 km long from the BMF at Perseverance. The cable arrives from the north-west of the Seychelle bank and pass through the North of Silhouette island as shown on the chart of the Figure 5. It will run about 57km in Territorial Water (TW) and 488km in the Economic Exclusive Zone (EEZ). The cable Route Position List (RPL) is detailed in Table 1.



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Pos No.	Event	Latitude	Longitude	Bearing°T	Distance Between Positions	Distance Cumulative total	Cable Type	Cumulative by type	Cable totals By Type	Approx. Depth	Burial Depth	Additional Route Features
1	BMH	4 ° 36.143 'S	55 ° 27.900 'E			0.000		0.000	0.000	0		Perseverance island beach, Customer suggested BMH
				77.04 °	0.162		DA]				1.0	
2	POL	4 ° 36.123 'S	55 ° 27.985 'E			0.162		0.164				Enter rock exposure area
				77.04 °	0.138		DA]				1.0	
3	POL	4 ° 36.107 'S	55 ° 28.058 'E			0.300		0.303				End of rock exposure area
				77.04 °	0.263		DA]				1.0	
4	A/C	4 ° 36.074 'S	55 ° 28.197 'E			0.563		0.569				
				56.69 °	0.168		DA]				1.0	
5	A/C	4 ° 36.025 'S	55 ° 28.273 'E			0.731		0.738				
				29.17 °	0.153		DA]				1.0	
6	A/C	4 ° 35.952 'S	55 ° 28.313 'E			0.884		0.893				
				1.19 °	0.287		DA]				1.0	
7	A/C	4 ° 35.797 'S	55 ° 28.316 'E			1.171		1.182				
				8.82 °	0.202		DA]				1.0	
8	POL	4 ° 35.688 'S	55 ° 28.333 'E			1.373		1.387	1.387	13		End direct shore end, 13m WD
				8.82 °	0.359		DA *				1.0	
9	A/C	4 ° 35.496 'S	55 ° 28.363 'E			1.732		0.362				
				6.34 °	0.648		DA *				1.0	
10	Cable Crossing	4 ° 35.146 'S	55 ° 28.401 'E			2.380		1.017				Telegraph_Cable, Unknown Local Cable
				6.34 °	0.298		DA *				1.0	
11	A/C	4 ° 34.985 'S	55 ° 28.419 'E			2.678		1.318				
				354.55 °	0.635		DA *				1.0	
12	POL	4 ° 34.643 'S	55 ° 28.387 'E			3.313		1.959		20		20m WD
				354.55 °	0.490		DA *				1.0	
13	A/C	4 ° 34.378 'S	55 ° 28.362 'E			3.803		2.454				
				345.37 °	1.099		DA *				1.0	
14	A/C	4 ° 33.801 'S	55 ° 28.211 'E			4.902		3.564				
				328.12 °	0.907		DA *				1.0	
15	Cable Crossing	4 ° 33.383 'S	55 ° 27.952 'E			5.809		4.480				Telegraph_Cable, Seychelles-Zanzibar
				328.12 °	0.199		DA *				1.0	
16	Cable Crossing	4 ° 33.291 'S	55 ° 27.895 'E			6.008		4.681				Telegraph_Cable, Mauritius-Seychelles
				328.12 °	0.878		DA *				1.0	
17	POL	4 ° 32.887 'S	55 ° 27.645 'E			6.886		5.567		30		30m WD

Pos No.	Event	Latitude	Longitude	Bearing°T	Distance Between Positions	Distance Cumulative total	Cable Type	Cumulative by type	Cable totals By Type	Approx. Depth	Burial Depth	Additional Route Features
				328.12 °	1.906		DA *				1.0	
18	A/C	4 ° 32.009 'S	55 ° 27.100 'E			8.792		7.493				
				329.59 °	1.768		DA *				1.0	
19	Cable Crossing	4 ° 31.181 'S	55 ° 26.617 'E			10.560		9.278				Telegraph_Cable, Seychelles-Zanzibar
				329.59 °	6.078		DA *				1.0	
20	PLUP	4 ° 28.337 'S	55 ° 24.953 'E			16.638		15.417	15.417	50		End of plough burial, 50m WD
				329.59 °	10.508		DA				-	
21	A/C	4 ° 23.420 'S	55 ° 22.078 'E			27.146		10.613				
				322.84 °	12.615		DA				-	
22	A/C	4 ° 17.965 'S	55 ° 17.959 'E			39.761		23.355				
				317.57 °	16.967		DA				-	
23	Maritime Boundary	4 ° 11.170 'S	55 ° 11.772 'E			56.728		40.491				Seychelles TW to CZ
				317.57 °	51.670		DA				-	
24	A/C	3 ° 50.475 'S	54 ° 52.937 'E			108.398		92.678				
				322.15 °	6.439		DA				-	
25	Transition	3 ° 47.717 'S	54 ° 50.804 'E			114.837		99.181	99.181	100		DA to SA, 100m WD
				322.15 °	7.837		SA				-	
26	Transition	3 ° 44.359 'S	54 ° 48.206 'E			122.674		7.916	7.916	1 500		SA to LWP, 1500m
				322.15 °	0.882		LW P				-	
27	Maritime Boundary	3 ° 43.981 'S	54 ° 47.914 'E			123.556		0.908				Seychelles CZ to Seychelles EEZ
				322.15 °	5.531		LW P				-	
28	A/C	3 ° 41.611 'S	54 ° 46.081 'E			129.087		6.605				
				306.70 °	31.484		LW P				-	
29	Transition	3 ° 31.401 'S	54 ° 32.448 'E			160.571		39.034	39.034	2 500		LWP to LW, 2500m
				306.70 °	10.981		LW				-	
30	A/C	3 ° 27.840 'S	54 ° 27.694 'E			171.552		11.310				
				329.66 °	28.350		LW				-	
31	A/C	3 ° 14.564 'S	54 ° 19.963 'E			199.902		40.510				
				344.98 °	35.167		LW				-	
32	A/C	2 ° 56.134 'S	54 ° 15.045 'E			235.069		76.732				
				355.29 °	99.718		LW				-	
33	A/C	2 ° 02.209 'S	54 ° 10.626 'E			334.787		179.442				
				339.27 °	24.802		LW				-	
34	A/C	1 ° 49.623 'S	54 ° 05.891 'E			359.589		204.988				
				334.12 °	21.854		LW				-	
35	A/C	1 ° 38.953 'S	54 ° 00.746 'E			381.443		227.498				
				329.53 °	106.860		LW				-	
36	Maritime Boundary	0 ° 48.975 'S	53 ° 31.537 'E			488.303		337.563				Seychelles EEZ to High sea
				329.53 °	4.174		LW				-	

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Pos No.	Event	Latitude	Longitude	Bearing°T	Distance Between Positions	Distance Cumulative total	Cable Type	Cumulative by type	Cable totals By Type	Burial Depth Approx. Depth	Additional Route Features
37	A/C	0 ° 47.023 'S	53 ° 30.396 'E			492.477		341.863			
				309.11 °	116.306		LW			-	
38	POL	0 ° 07.210 'S	52 ° 41.754 'E			608.783		461.658		5 150	Maximum water depth, 5150m
				309.11 °	3.940		LW			-	
39	A/C	0 ° 05.861 'S	52 ° 40.107 'E			612.723		465.716			
				292.06 °	202.427		LW			-	
40	Cable Crossing	0 ° 35.387 'N	50 ° 58.984 'E			815.150		674.216			IS FO Cable, TEAMS
				292.06 °	83.329		LW			-	
41	BU SEY	0 ° 52.367 'N	50 ° 17.355 'E			898.479		760.045	760.045	5 050	BU SEY to PEACE main trunk. 5050m

Table 1 : Cable Route Position List. (LC=,Land Cable, DA=Double Armour, SA=Single Armour, SAL= Single Armour Light, LWP=Lightweight Protected, LW=Lightweight=

6.2.2. Nature of seabed along the route

According to the marine chart and the survey performed for SEAS cable implementation, Seychelles continental shelf mainly consist in soft sediment, from fine sand to coarse cobble. It appears that very near the beach, seabed is made of very thin sand (more likely mud), but thickness is not known.

No dedicated survey has been done for this document.

6.2.3. Bathymetry of the seabed along the route

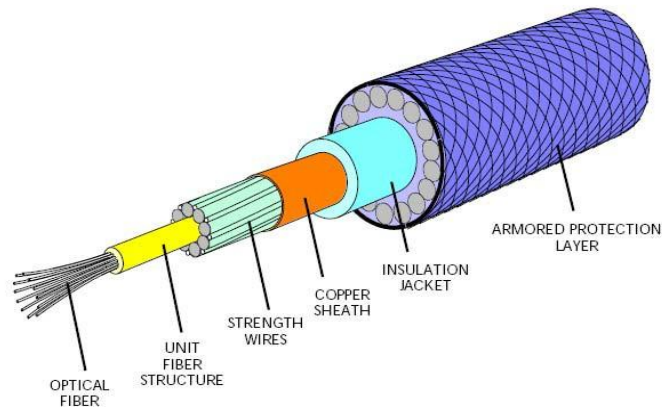
The only topography known is given by general admiralty nautical charts. No dedicated survey has been done for this document.

6.3. DESTINATION, NATURE AND COST OF THE WORK

6.3.1. System overview – subsea cable

The optical fiber cable consists in a central optical fiber bundle. The type of cable mainly used in territorial waters will be surrounded by a double frame of steel fibers surrounded by a polyethylene or fiberglass core for strength and fiber separation. The overall cable diameter will be 43 mm. The weight, in air, is approximately 5.4 kg/m and 3.9 kg/m in water.

The Figure 6 below shows the characteristics of the double-armored cable in exploded view and in cross section:



CHARACTERISTICS	UNIT	VALUE
Cable core diameter	mm	17
First layer steel wires diameter	mm	3.4
First layer steel wires # (left hand)		18
First layer steel wires lay length	mm	470
Second layer steel wires diameter	mm	4.7
Second layer steel wires # (left hand)		21
Second layer steel wires lay length	mm	590
Outer diameter	mm	43
Weight in air	kg/m	5.4
Weight in water	kg/m	3.9
Storage factor	m ³ /km	1.85
PERFORMANCES	UNIT	VALUE
Ultimate Cable Tensile Strength (UTS)	kN	600
Permanent tension acceptable (NPTS)	kN	100
Operating tension acceptable (NOTS)	kN	250
Short term tension acceptable (NTTS)	kN	400
Modulus	km	15
Crush resistance	kN	40
Impact resistance	J	400
Pressure resistance	MPa	70
Hydrodynamic constant (lay and recovery)	deg.knots	99

Figure 6 : Exploded views, cross section and technical characteristics of the cable with double armature (source: Alcatel).

Optical fiber cables carry signals that do not generate a magnetic field. Indeed, there is no service voltage and the cable will be buried at the ends. The cable will be uninterrupted in Seychelles territorial waters. Given the distances, repeaters are required to amplify the signal.

Therefore, cable engineering specifications for the proposed Project will be based on cable industry standards. Along all the cable route, the diameter of the subsea cables will vary between 17 and 20 mm for sections without protective armor; armored cables may have 50 mm diameter. Generally, once the coastal constraints are passed, the cable will have a simple protective armor.

6.3.2. Nature of work

The cable laying work use different techniques depending on seabed type and environmental constraints:

- On shore, the cable will pass through the rock armor of Perseverance beach to join the BMH.
- From the beach to 15 m WD, the cable will be buried using jetting or anchored using an appropriate mean to preserve environment, especially coral reef and seagrass. The cable will be armored along about 400m, till 10 m WD.
- From 15m WD to north of Mahé, along about 13 km, the cable will be buried in a trench using a subsea plough.
- Offshore, the cable is just laid on the seabed.

The cable vessel is equipped with a dynamic positioning system which allows to hold a position without anchorage. The boat will also be assisted by tender and professional diver to lay the cable in shallow areas and pull it ashore.

6.3.3. Duration of the work and budget estimate

BMH construction will take about 3 days on the parking.

Cable deploying phase will close the beach during about 3 days, time to prepare all operations and close trenches.

All operations will take less than a week.

The project budget is detailed in the table below.

Shore landing: Cost items	Costs in € excl.VAT
Cable laying by cable ship and ancillaries	380 000
Cartography et bathymetry	85 000
Cable supply	165 000
Civil work for beach landing incl. manhole.	200 000
Total in € excl. VAT	830 000

Table 2 : Project budget.

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6.4. LAYING TECHNIQUE

If submarine cables do not constitute a source of potential pollution of the seabed, their installation can have an environmental impact. Therefore, all phases of this project have been designed to identify these impacts in order to monitor and reduce the potential nuisance on the marine environment.

6.4.1. Work during pre-installation

This stage includes a detailed cable route survey to investigate the safest possible environment for the cable and prepare for installation as well as engineering design and fabrication of the subsea equipment.

6.4.1.1. Cable route survey preconization

Prior to cable installation, marine geophysical survey will be realized to investigate the best and safest route for the cable. This survey will be complemented by a land inspection survey in the vicinity of the landing sites.

Cable routes are carefully surveyed to minimize environmental impacts and to maximize cable safety. Seabed mapping systems accurately chart depth, topography, slope angles and seabed type.

In shallow water, diver inspections will include seabed probing and visual recording in order to assess the feasibility of cable burial within the corridor width.

From 3m to 1000m waterdepth, seabed and subsoil will be surveyed to characterize the sediment, the bathymetry and the seabed roughness, and the biocenosis.

Before the cable is laid, a Pre Lay Grapnel Run (PLGR) is required all along the route where the cable shall be buried. This involves dragging a grapnel as an attempt to clear the seabed of debris, i.e. wires or hawsers, fishing equipment, etc. Any debris recovered during these operations is discharged ashore upon completion of the operations.

6.4.1.2. Engineering design and fabrication of subsea

Detailed cable design would be carried out using input from the cable route survey. Cables specifications will be developed to ensure protection of the cable in an appropriate manner for the marine environment. The equipment will be fabricated off-site in China.

6.4.2. Installation of the subsea cable

Telecommunication cables are generally laid unburied on the seabed in deep waters off the continental shelf, where the risks of damage by activities such as fishing, or vessel anchoring are minimal.

In shallow waters, subsea cables are usually buried to minimize the risk of damage by, for example, anchors and fishing gear. The cable burial depth depends on the type of threats, the type of habitat, the seabed hardness and the water depth.

Where cables cannot be buried, e. g. in areas of rock outcrop, or where it is not legally required to bury them, they are directly laid down on the seabed and fully or partially covered with mechanical protection (e.g. dumped rocks). In unconsolidated sediments, the cable is expected to self-bury. Emu Ltd (2004) specifies typical burial depths depending on seabed types (Table 3).

SEABED TYPE	TYPICAL BURIAL DEPTHS (M)
Exposed bed rock	0.0
Chalk	0.0 – 0.6
Stiff clay	0.4 – 0.8
Clay	0.6 – 1.2
Gravel	0.4 – 1.0
Coarse sand	0.4 – 1.0
Silty sand	0.6 – 1.2
Sand waves	0.0 – 3.0
Intertidal mud flate	0.6 – 3.0
Beach sand	1.0 – 2.0

Table 3: Typical subsea cable burial depths (after Emu Ltd 2004).



6.4.2.1. Offshore work

In deep water, where burial is considered unnecessary, the cable is directly laid on seabed surface.

6.4.2.2. Coastal work (Deeper than 15 m WD along 13 km)

From 15m WD along about 13 km (40mWD), the cable will be buried in a narrow trench (<0.5m wide) using a sea plough while the cable is being laid.

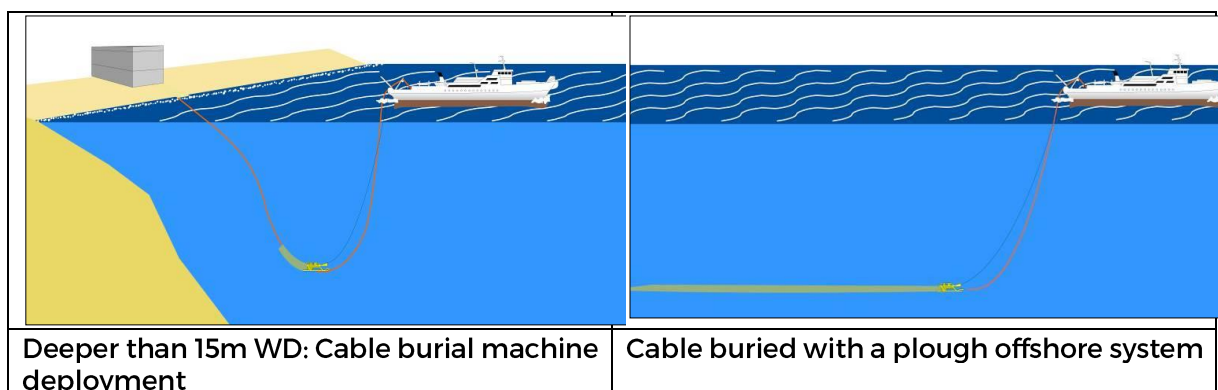


Figure 8: Cable laying and burial work using a plough system (ASN).

A plough is a system towed by the cable ship which opens a furrow in the seabed (Figure 9).



Figure 9: Typical sea plough.

The communications cable passes through the plough and exits the plough share at the aft lower extremity. As the plough moves forward, the cable is left in the bottom of the furrow. The furrow fills by natural movement of sediment. Normal target burial depths are on the order of 1m.

If cable crosses an existing active cable or other obstructions, the plough is lifted off the seabed and the cable is laid on the seabed (a fly-over). Later the cable ship returns with a Remotely Operated Vehicle (ROV) to bury the cable using water jets at this crossing point. In rocky areas, places with hard bottom or steep slopes, the cable is laid on the seabed.

6.4.2.3. Nearshore work (From 15m WD to shore)

In very shallow water, less than 15m waterdepth the cable is first laid down on the seabed and then buried at 1 m depth with the support of the divers and using water jetting equipment. This process begins immediately after installation in order to avoid any damage risk and interference with other activities. The water jetting act to remove and liquefy sediment, resulting in digging a trench. The process should locally produce turbidity and affect the benthic biocenosis as coral or seagrass. The trench backfills naturally, at varying rates, depending on local currents and sediment characteristics.

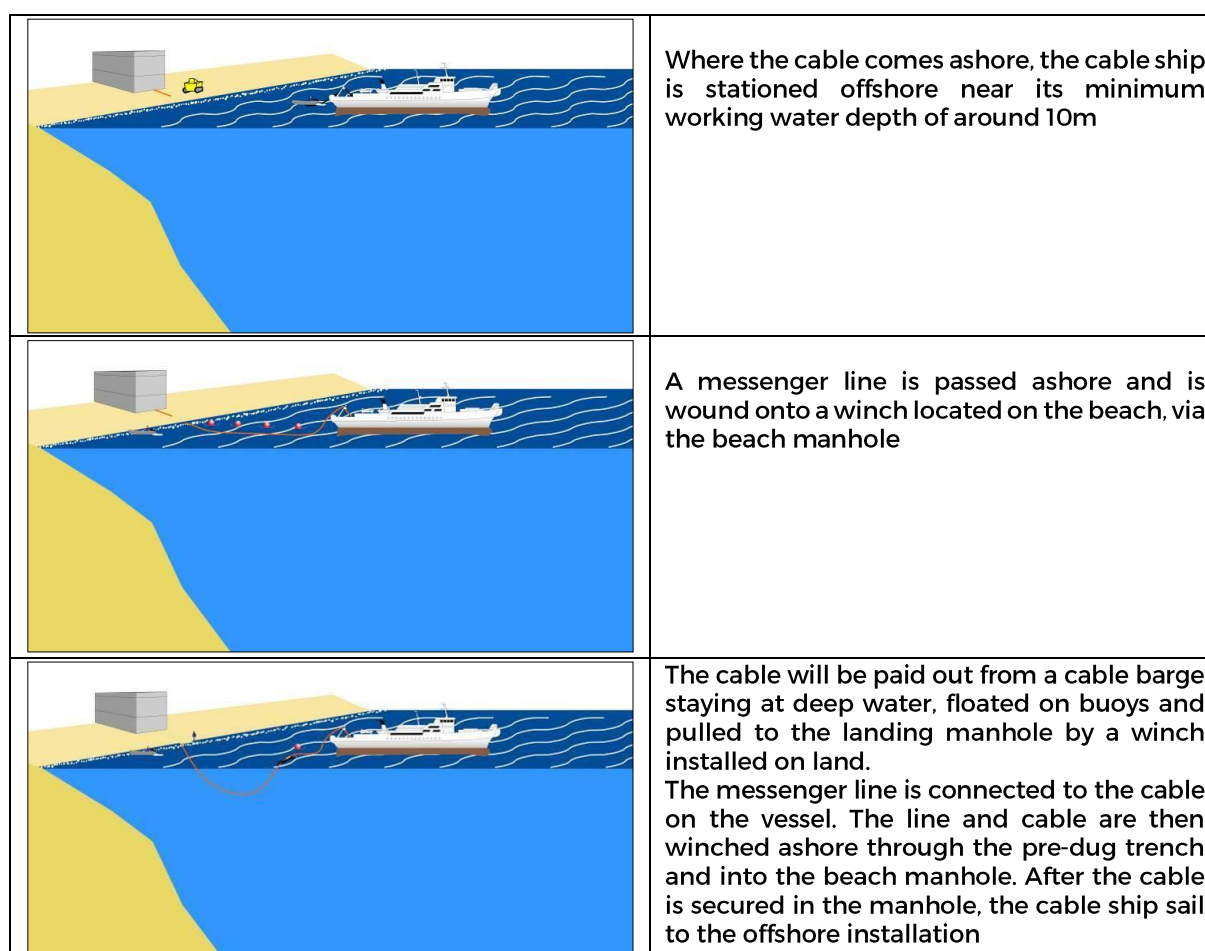


Figure 10 : Nearshore laying process (ASN)



Figure 11: Cable ship is stationed offshore Beauvallon beach for SEAS landing work.

6.4.2.4. Onshore work

❖ **Beach Manhole**

The marine cable is connected to the land network in the beach manhole (BMH). The BMH will be created on the parking behind Perseverance public beach.

On the beach, the cable is typically installed in flexible steel pipe of about 0.2m outside diameter and buried at 2m depth. In case of severe erosion, if the pipe becomes exposed, it may be reburied.

The cable shall be pulled from the beach to the beach manhole through preinstalled PCV tubes under the rock armoring wall. According to the plan (Figure 12), the Rip Rap stones will be removed using an excavator to allow the cable burial operation through the coral fill bund. The rock armor will finally be rebuilt as its initial structure, including the filter cloth. This work is fully achievable in about 2 days without any effect on the island stability.

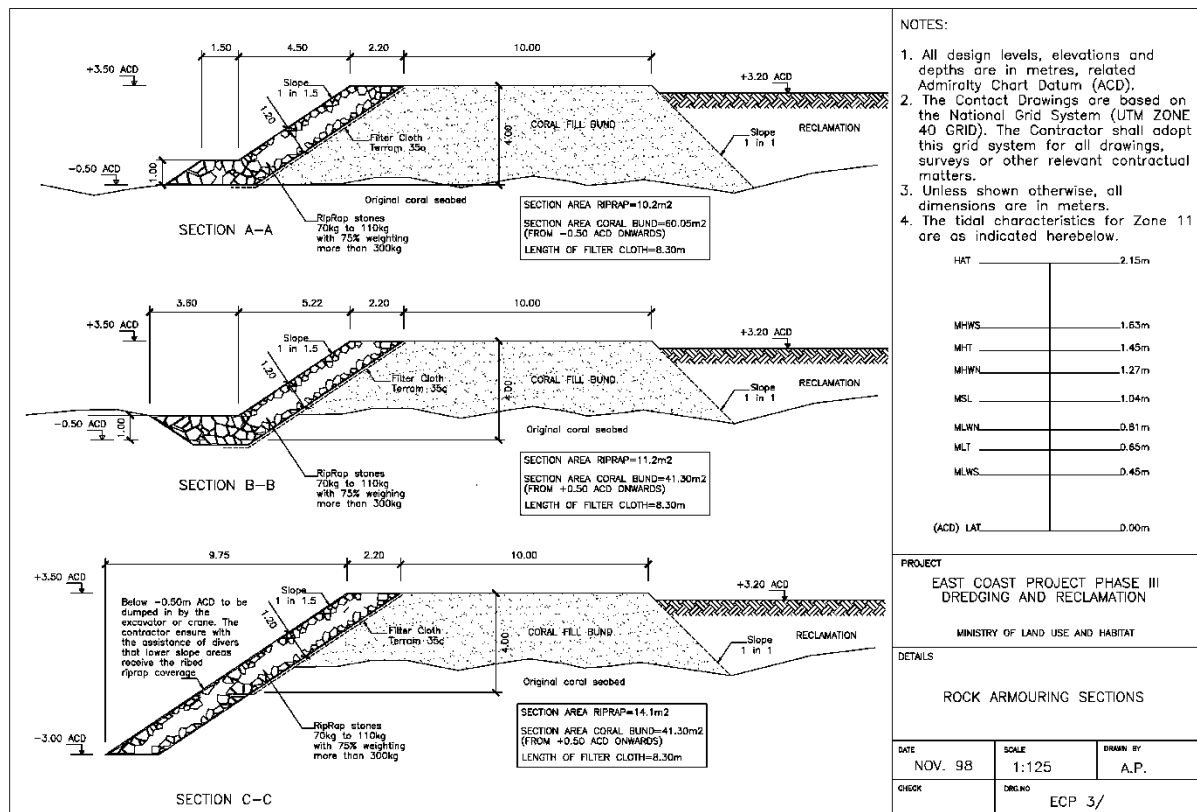


Figure 12 : Rocky armor of Perseverance island cross section plan.

The BMH provides a chamber located above the high-tide level where the marine and terrestrial cables are connected. Once constructed, with the exception of the manhole cover, there is little or no visible evidence of a BMH.

Localized disruptions of recreational activities are expected during the construction phase. But after installation, beach frequenters are typically unaware of the cable and it has no effect on their activities.

The beach will be restored to its original state after the completion of cable installation.

Installation of the BMH will take less than one week.



Figure 13 : Photography of the BMH on Beauvallon beach.

❖ **Construction of terminal station**

A Cable Landing Station (CLS) will be required to connect the cable from the BMH to the domestic cable infrastructure. A typical landing configuration is shown in Figure 14. The preferred location for the CLS is north of the BMH, behind the rocky barrier as shown on the Figure 15.

It will be necessary to connect the BMH to a ground system, on the parking. As standard procedure, a dedicated 30m long copper cable will be connected to the system and will be laid in a trench. Vertical anodes (1,5m long) will be installed, allowing the main system to be connected to earth.

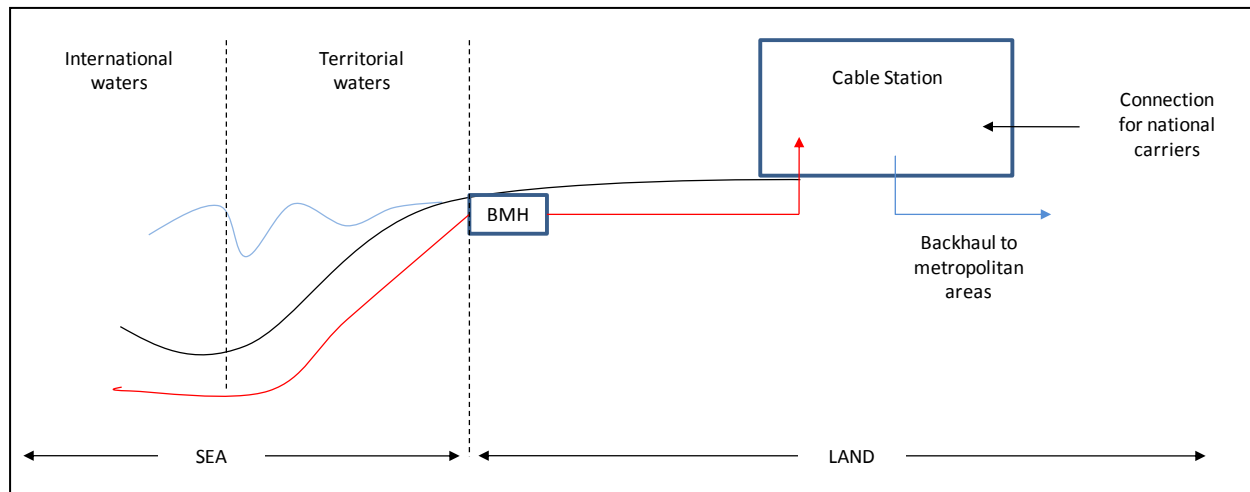


Figure 14: Typical landing configuration.

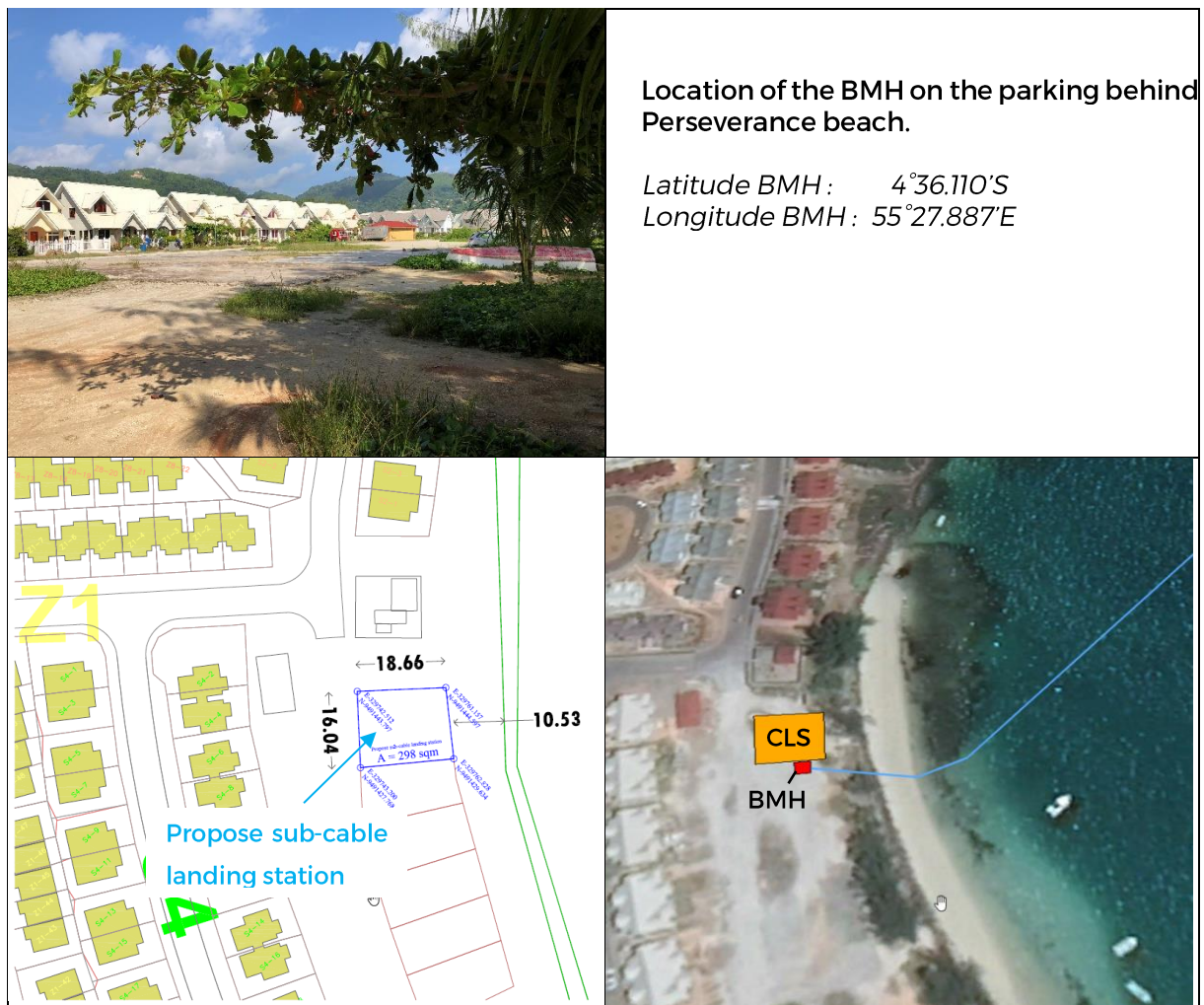


Figure 15 : CLS and BMH location and coordinates.

❖ **Construction of terrestrial ducted systems**

The cable duct already exists from the CLS station project to connect the land network.

Indeed, construction activities will include:

- Construction of the BMH;
- Cable laying from the waterline to the BMH (20-30m trench on the beach);
- Cable laying via a trench (existing ducts) from the BMH to the Cable Station (cable and wireless).

6.4.3. Operation and maintenance/repair

Once in place and connected, the cable system requires no intervention. The cable is to be regularly serviced during a standard 25 years design life. The power is provided to the system through electrical connection in the cable. This also provides power to the repeaters. The electrical current is fully shielded from the environment. The cable repair and maintenance may be required as a result of damage, failure, age /redundancy or clearance of congested routes.

Onshore, the CLS will require power for their operations. The power will come from the national electricity grid with backup provided by diesel-powered generators.

For underwater sections, the cable has to be recovered from the seabed for repairs, replacement or removal. The recovery may result from damage, failure, age/redundancy or clearance of congested routes (Figure 16).

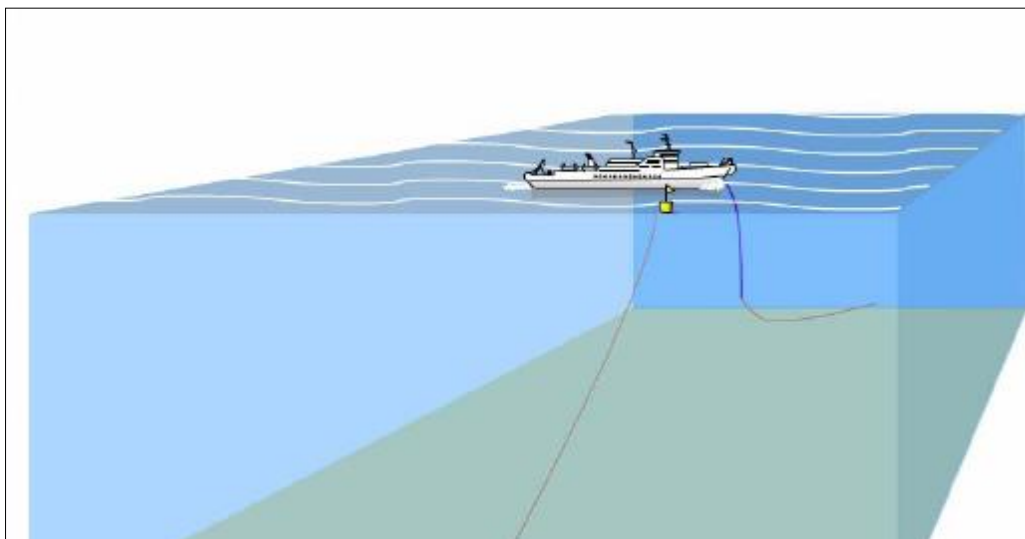


Figure 16: Replacement or removal of a cable of an underwater condition (Alcatel Submarine Networks).

6.4.4. Decommissioning activities

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An evaluation should consider environmental issues in conjunction with technical, safety and cost implications to establish the best practicable environmental options for the decommissioning of the cable. An assessment will also be conducted to ensure that nothing will be left at the site that could constitute a hazard for other users of the area or for the environment. The site will be returned in a safe and environmentally acceptable condition.

7. INITIAL STATE OF ENVIRONMENT

7.1. INITIAL STATE OF MARINE ENVIRONMENT

7.1.1. General

The Seychelles archipelago comprise more than one hundred islands between 4° and 10°S and 45° and 56°E, far from 480km to 1,600km of the east coast of Africa in the western Indian ocean. The Republic of the Seychelles consists of over 115 islands scattered in the Western Indian Ocean and has a total land area of 452km² and an Exclusive Economic Zone of 1.4 million km². The population was estimated at 87 000 in 2011 with over 90% concentrated in the narrow coastal strips around the three main islands of Mahe, Praslin and La Digue. The country depends on its coastal zones for most of its economic activities such as tourism and fishing. About 200 000 tourists visit the Seychelles annually.

The islands are divided into the inner granitic islands to the north-east (41 islands) and the outer coralline islands (74 islands and islets) to the south and west (Figure 17).



Figure 17 : Seychelles archipelago, inner and outer islands.

The Inner Islands which are mostly granitic, cluster mainly around the principal islands of Mahé, Praslin and La Digue. There are 43 Inner islands in total – 41 granitic and 2 corallines. Mahé is the largest island of the Seychelles archipelago with its capital Victoria.

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The Outer Islands are those situated beyond the Seychelles plateau. They comprise 72 low-lying sand cays and atolls lying anywhere between 230km and 1150km from Mahé. Less visited than their granitic cousins due to their relative remoteness, these pristine miniature worlds, some little more than sand spits or lonely rocky outcrops, offer untouched habitats for many species of wildlife.

The Seychelles area represents an archipelago of timeless beauty, tranquility and harmony that is famous for its world-beating beaches and for its great diversity which rolls from lush forests down to the warm azure ocean.

7.1.2. Geology and geomorphology

The spectacular granite outcrops of the Seychelles inner and main islands in the central Indian Ocean are an evidence for the continental drift theory (Wegener, 1924). Ridge-plume interactions have been responsible for separating a thinned continental sliver from a large continent (India) (GAINA et al., 2002).

The complex tectonic evolution of the Seychelles micro-continent can be summarized by the following steps:

- Gondwana supercontinent beginning to break up about 167 million years ago when East Gondwana, comprising Antarctica, Madagascar, India and Australia, began to separate from Africa (Figure 18 a.)
- East Gondwana then began to separate about 115-120 million years ago when India began to move northward (Figure 18 b.)
- Between 84-95 million years ago rifting separated Seychelles/India from Madagascar. An initial period of transform rifting moved the Seychelles/India block northward (Figure 18 c.)
- This continued until 65 million years ago when new rifting severed the Seychelles from India (Figure 18 d.);

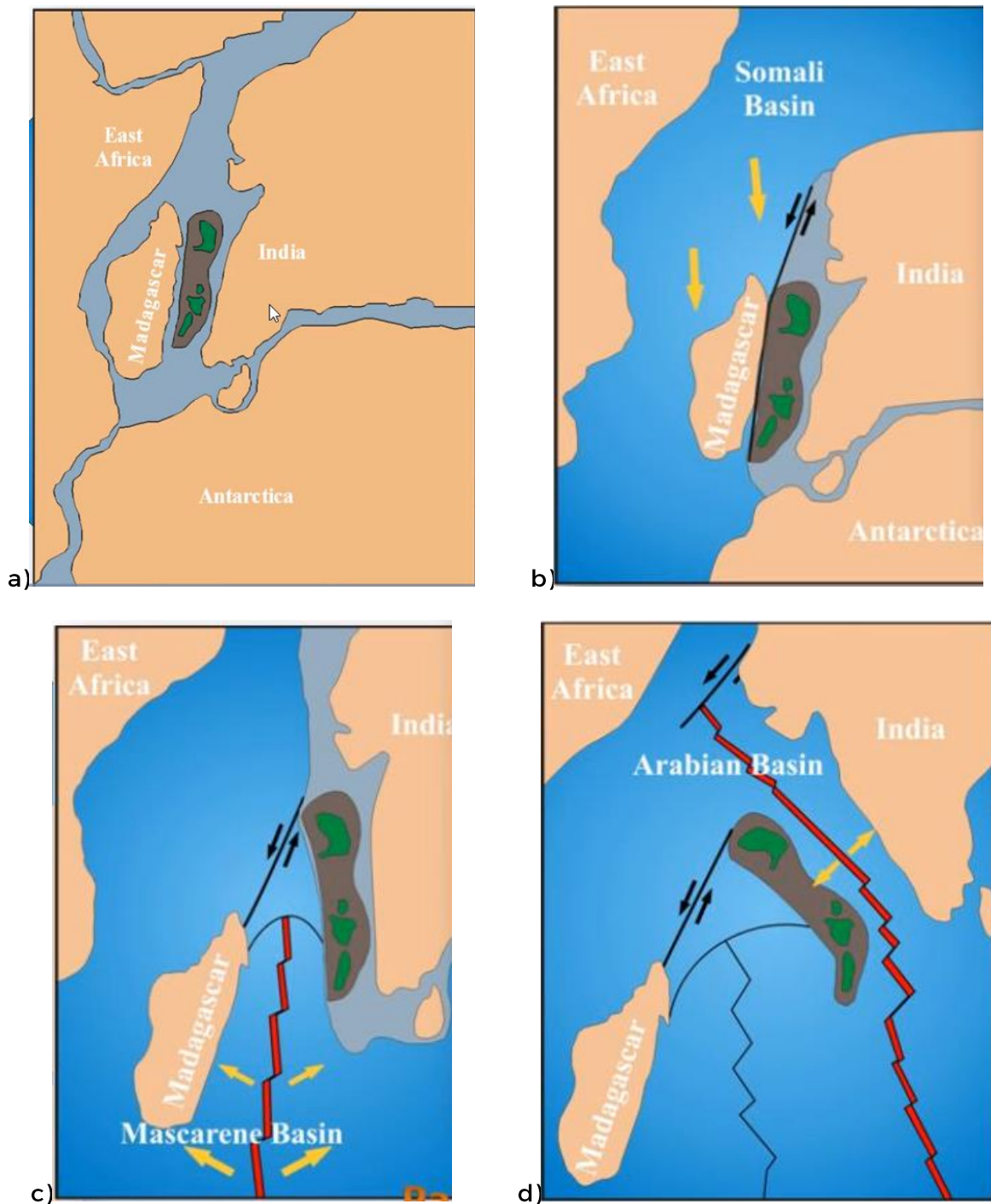


Figure 18 : Reconstructed tectonic evolution of Seychelles: (a) -167 Ma (b) -115-120 Ma (c) -84-96Ma (d) -65Ma (PetroSeychelles, Stewart, 2013).

Onshore, the geology of the inner Seychelles islands is mainly composed of granitic rocks forming a layer up to 13km thick (Duvat, 1999).

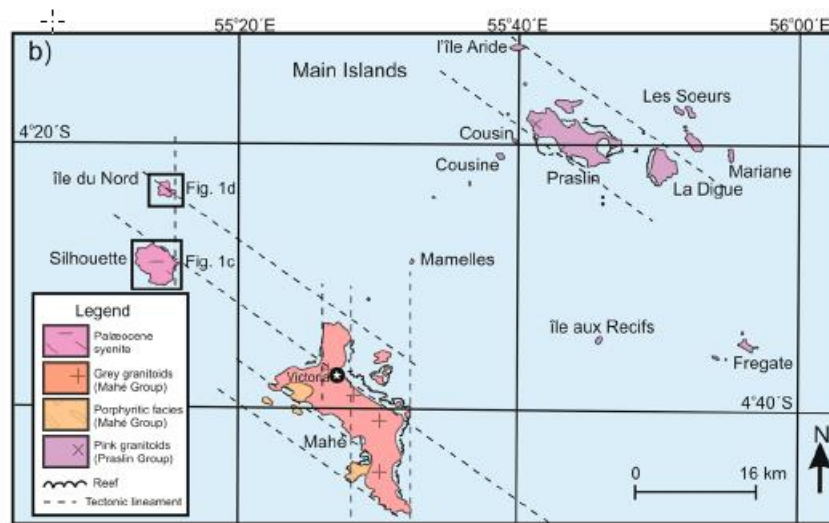
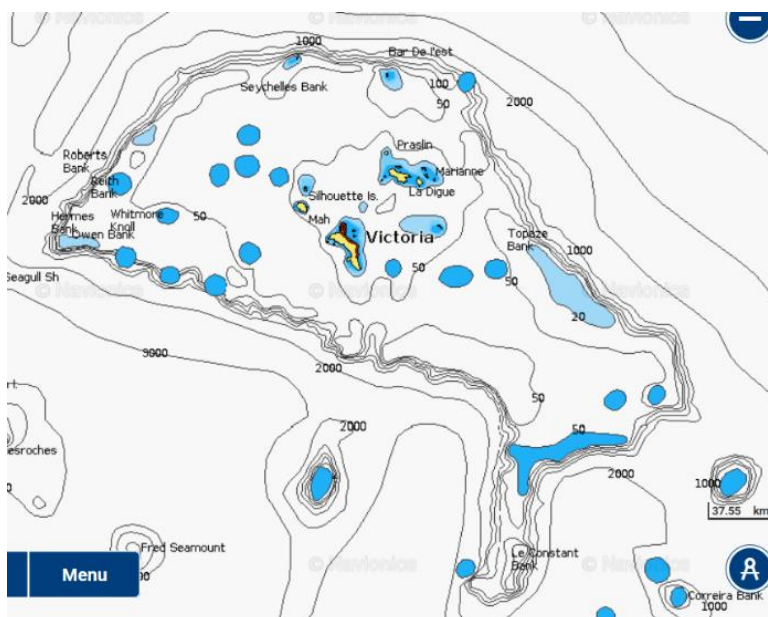


Figure 19 : Geological map of the main Islands of the Seychelles (Shellnutt et al, 2017).

The East coast shore of Mahé island is dominated by a coral reef which make difficult humans' access and settlement. Perseverance is an artificial island located at 2 km north-east of Victoria and reclaimed to the sea in 2000s. It is mainly made of marine aggregates such as sand materials forming a polder.

7.1.3. Bathymetry

The Seychelles archipelago are 115 disseminated islands, separated each other's by a critical bathymetry which can locally reach 6000m within trench sections (CEBCO, 2014).



The inner Seychelles islands (Mahé, Praslin, La Digue) locate on a large plateau named Seychelles bank, extended over 43 000 km² and between 20 and 70m waterdepth.

Figure 20 : Bathymetry overview of the Seychelles bank.

The coastline of Mahé in the vicinity of Victoria has been extensively modified over the last 30 years. Large tracts of the reef, which was in places more than 1.25 km wide, have been

completely removed or built upon to create reclaimed land areas for development. Figure 21 compares the extents of areas designated as intertidal reef on the 1978 vs 2016 nautical charts. The change in the two images is striking.



Figure 21 : (left) 1978 reef areas (in green) and reclaimed areas (in blue) based on the nautical chart. (right) 2016 reclaimed areas (in white) and reef areas (in red) – Source ; Jose C. and Al., 2016.

Perseverance island present a narrow reef nearshore and a very gentle slope. The 20m waterdepth contour is 1800m from the coastline at the landing site.

A reef rises to the sea surface at 150m from the coast. It has a major role for protection against wave and contributes to the beach development. The cable should avoid this reef by turning around with a gentle curve.

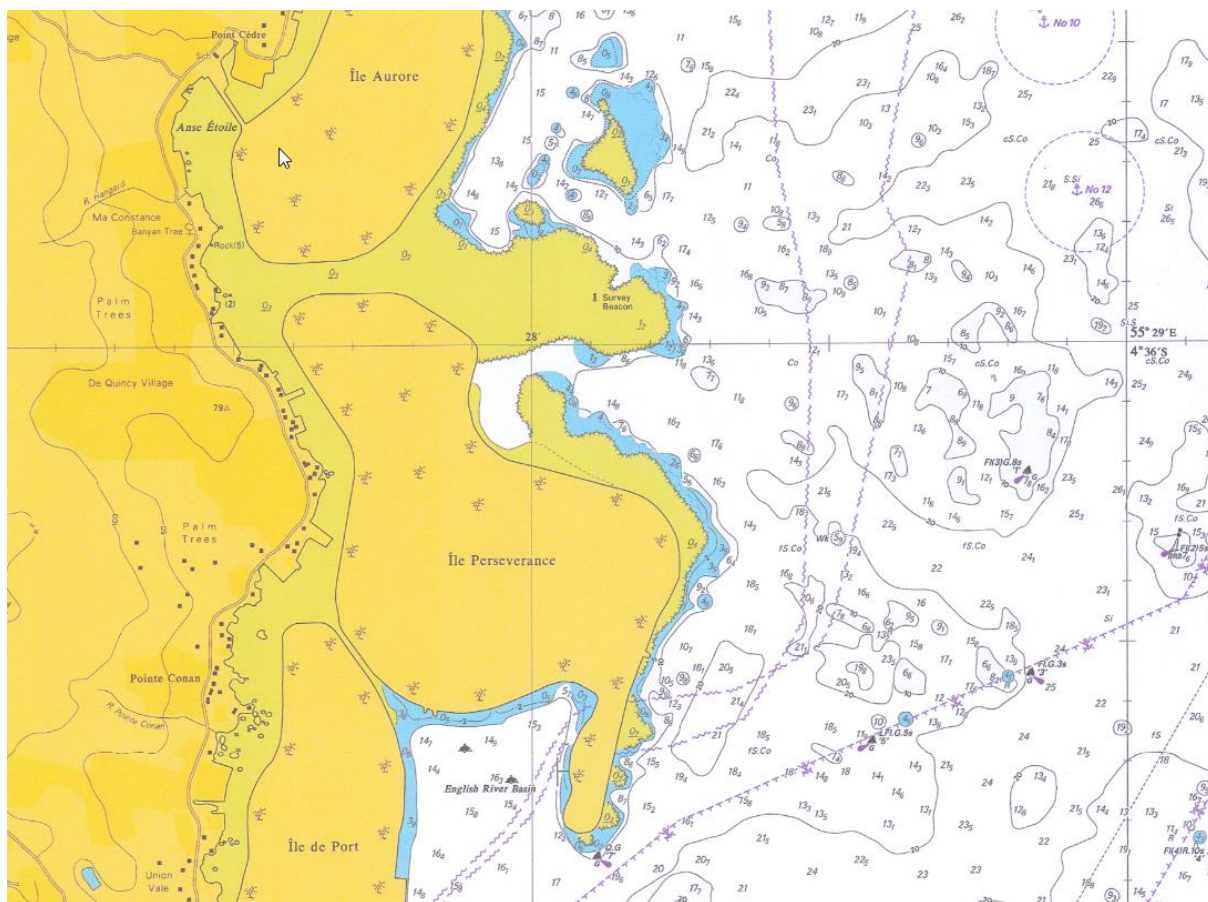


Figure 22 : Perseverance island bathymetry.

7.1.4. Climate and meteorology

Seychelles archipelago is located 4° South of the equator and thus has a warm tropical climate all around the year. The climate of the Seychelles is classified into two types: northwest monsoons (NWM) from December to March and southeast monsoon (SEM), associated with trade winds, from May to October.

Statistical meteorological information are available at the Seychelles International Airport. The Figure 23 illustrates the wind statistics based on 10 years observations from July of 2008 to November of 2018 (<http://www.windfinder.com>). The Figure 24 is retrieved from Weatheronline website (<http://www.weatheronline.co.uk>) and resumes the monthly variations of: maximum and minimum temperature, number of sunny hours, relative humidity, number of days with precipitation, cumulative precipitations, and wind characteristics.

Wind direction distribution in %

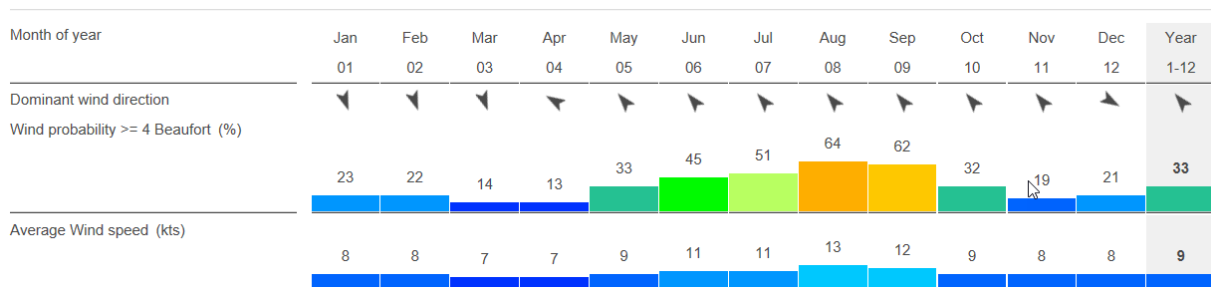
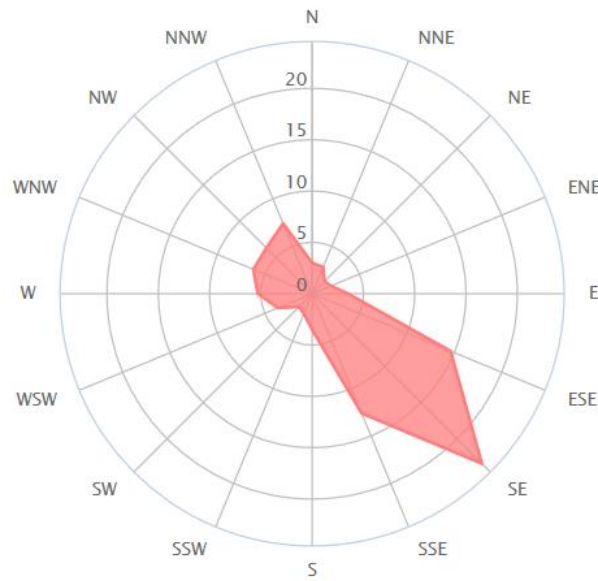


Figure 23 : Wind statistics for the Seychelles International Airport from July of 2008 to November of 2018 (www.windfinder.com).

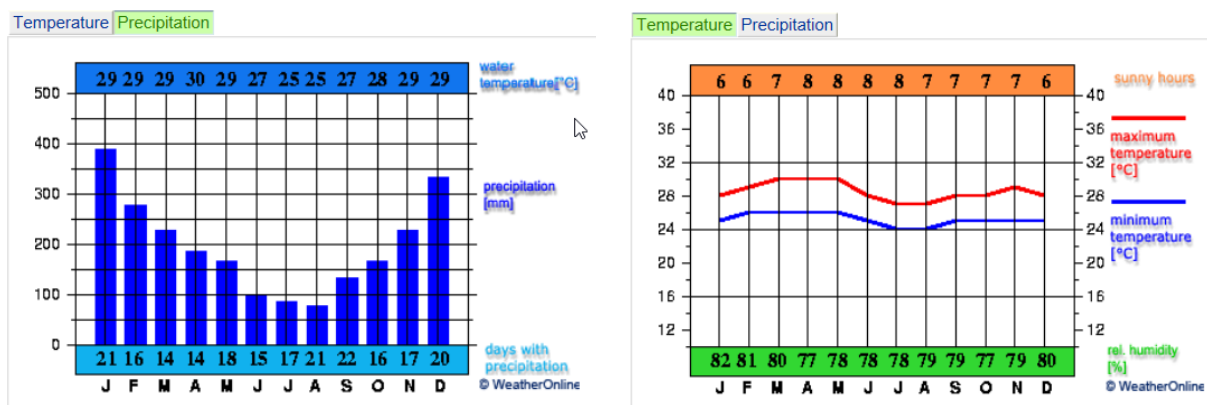


Figure 24 : Statistics of precipitation and temperatures for Seychelles International Airport (<https://www.weatheronline.co.uk/>).

The climate is largely influenced by the monsoon, which is characterized, in this area mainly by two seasons: the wet season from November to March, and the dry season from May to September.

Two systems of winds characterize respectively those two seasons: north-westerly winds during the wet season and the trade winds from southeast during the dry season. The trade winds are the strongest and are statically greater than 10 knots from June to September.

The dates of reversing winds, and consequently the duration of the seasons varies from one year to another. The first reverse can occur in October or November, and the second one in May or June.

The rainiest period is December to January with monthly about 300mm of rain and the driest one is June to August with monthly less than 100 mm of rain.

The averages maximum and minimum temperature are relatively stable month after month, with highest values during the inter-season from March to May and coolest ones during the dry season in July and August. The relative humidity is high and nearly constant (77% in April and October, to 82% in January). The number of sunny hours per day varies between 6 (December to February) and 8 (April to July).

The landing site is exposed to the two prevailing winds but appears partially sheltered from the south-eastern trade winds behind the Island of Cerf and Saint-Anne.

7.1.5. Physical oceanography

The tide is semi-diurnal and characterized by two cycles by day with uneven range. The tidal regime is defined as mesotidal with an average range of 1.2m. The tidal levels at Port Victoria are illustrated on the tidal chart of the Figure 25. The tide currents are very weak and have a very limited contribution in the sediment dynamics.

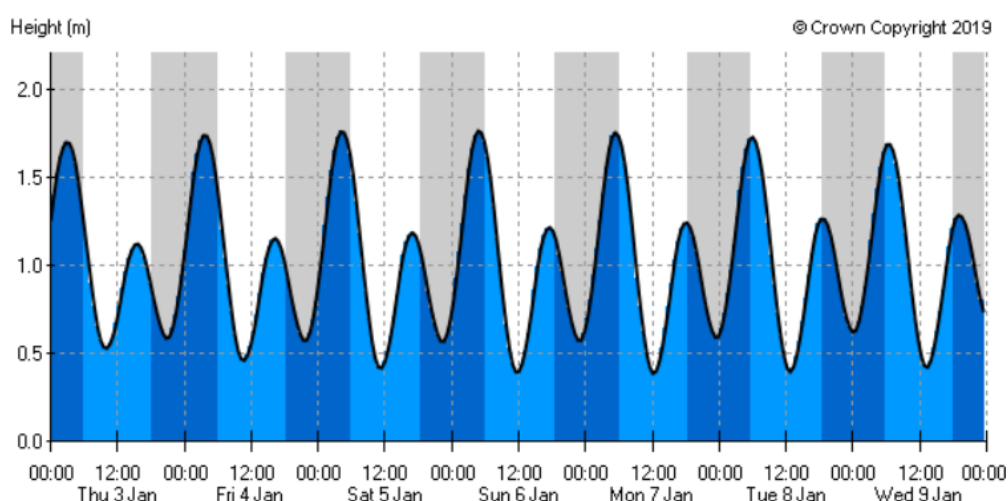


Figure 25: Example of tidal prediction chart at Port of Victoria (<http://www.ukho.gov.uk>).

7.1.5.1. Swell

Swells are the main driving forces of the coastal system. They are generated by alternating south-eastern trade winds and north-eastern monsoon wind. Rarely, tropical cyclones that form in southeast of Seychelles generate heavy swells that affect the coast.

The swell conditions encountered in the Seychelles islands area has been described by Cazes-Duvat (1999) and at the north-east point of Mahé by Borrero and al. (2016).

The wave climate of Mahé is summarized in the wave roses shown in Figure 26. The roses show that most of the wave energy comes from the southeast with heights generally less than 3m. Peak periods from the southeast are typically between 8 and 10 seconds. The wave roses are divided into swell wave and wind wave components and show that there is essentially no long period swell coming from the northwest quadrant. However, on the wind wave component, there is a clear signature of the shorter period wind waves generated by the NWM.

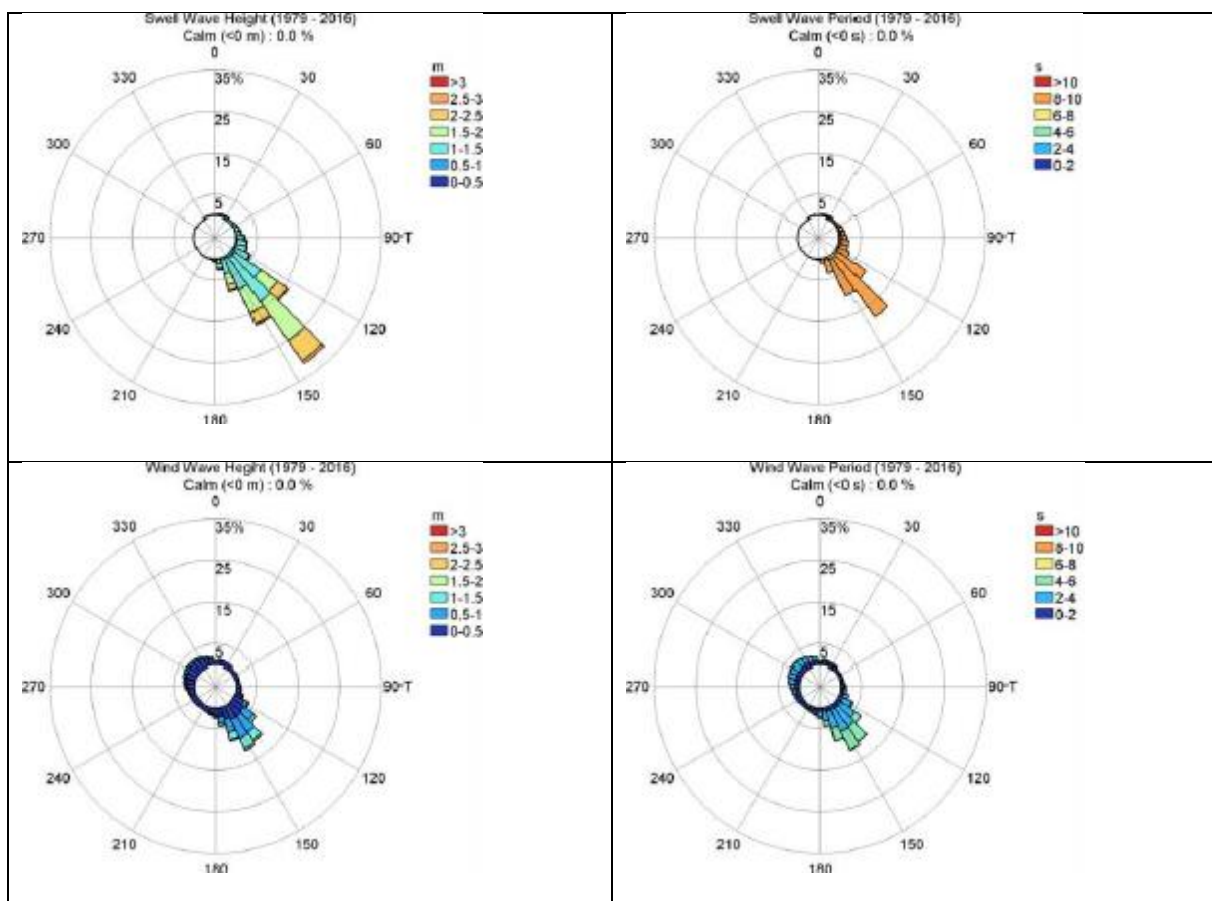


Figure 26: Wave roses of the long-term wave record. The left column is significant height, the right is peak period, the top row is the swell component only and the bottom row is the wind-wave component only (Borrero and al. 2016)

Seasonal swell

During NWM, winds are more variable and generally lighter than in the SEM. When the winds do blow from the northwest, they are associated with short period wind waves coming from that direction. During to the SEM, the south-easterly winds dominate during the months of April – October and are responsible for the strong southeastern swell. At the north-east point of Mahé, most values of H_s are less than 2.5 m with peak periods typically between 8 and 12 seconds.

Perseverance landing site appears well sheltered from those two prevailing wave directions as shown on the Figure 27.

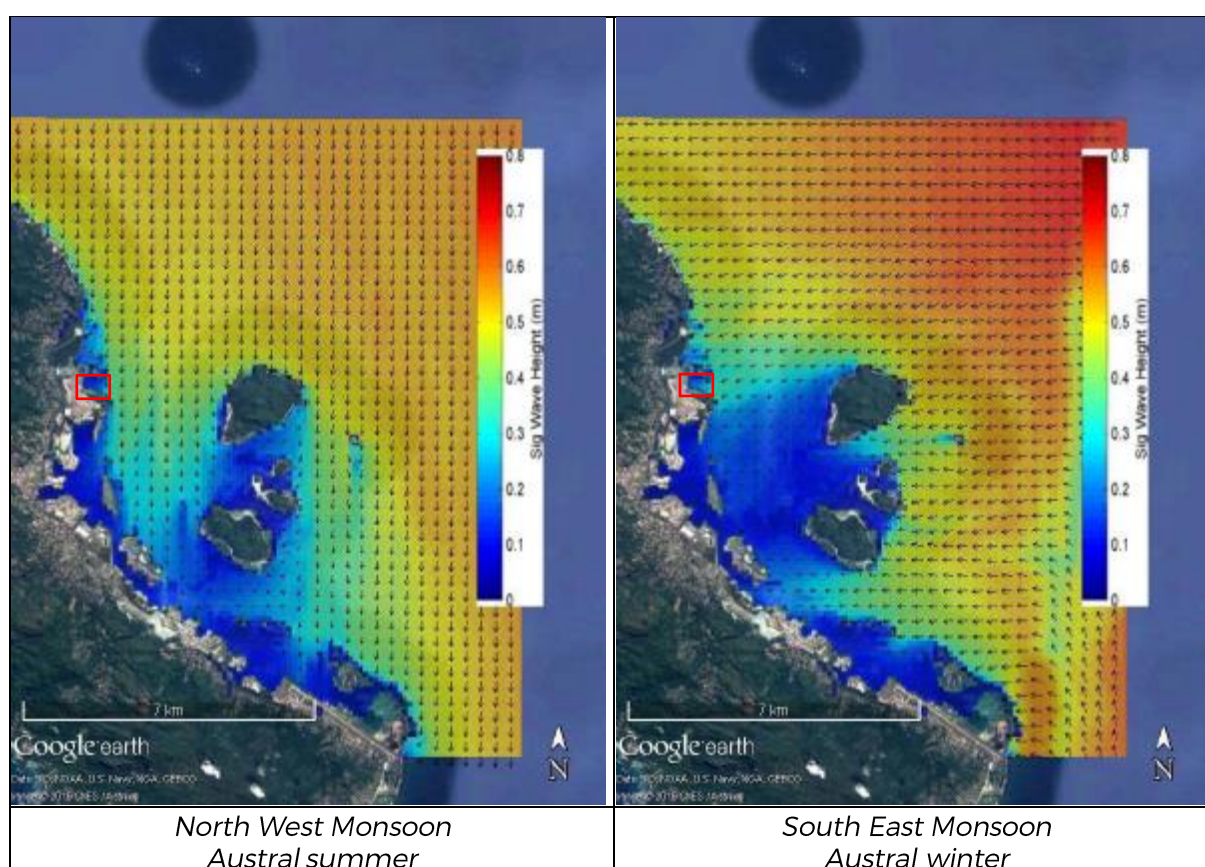


Figure 27 : Mean significant wave height and peak direction during the NWM and SEM.
(Borrero and Al. 2016)

Storm swells (cyclonic origin)

Even if the islands of the Seychelles archipelago are, in theory, located at too small latitude to be submitted to cyclones, some storm swell are rarely observed near the islands. They could have their origin at a few hundreds or thousands of kilometers south off the archipelago and reach the islands if the fetch conditions are favorable.

The Figure 28 shows the path of the tropical storms in the Indian Ocean and let observe that most of them doesn't affect the islands of the North of the Seychelles archipelago. The frequency of storm passing throw this area is 4 events from 10 000 (Meteo-France, 1992).

Little information can be found on the effects of those swells, but waves generated can be of several meters height, and, some have, in the past, flooded coastal areas and carried off parts of beaches.

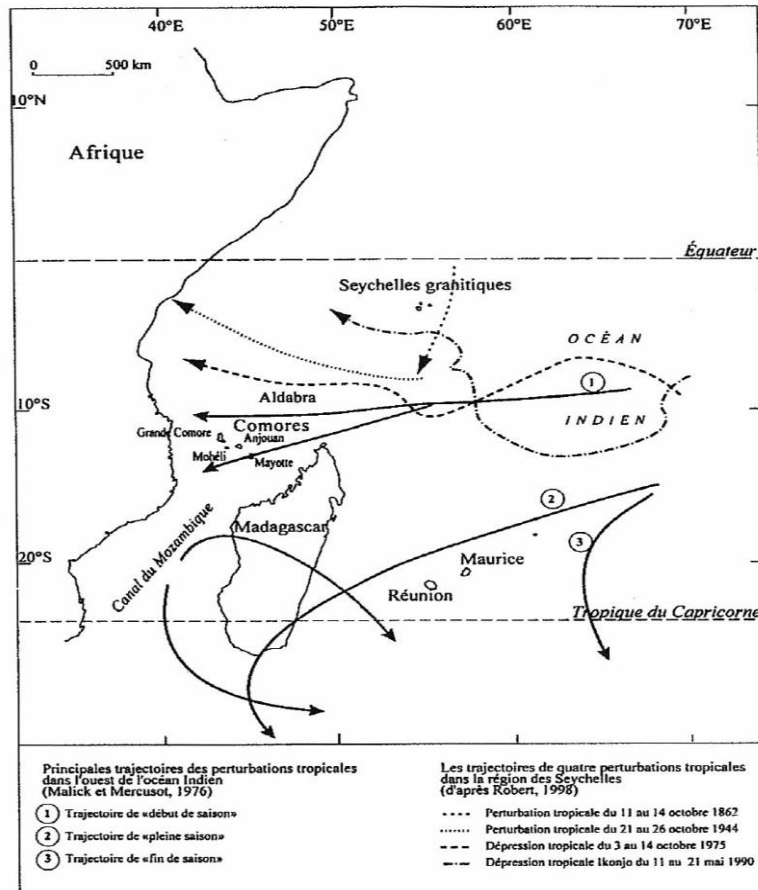


Figure 28 : Trajectory of tropical storm in the Seychelles area (Cazes-Duvat, 1999).

The landing site location appears well sheltered, especially from the prevailing south-eastern swells thanks to the Islands of Saint Anne and Cerf.

7.1.5.2. Currents

General circulation

The marine currents of the South Indian Ocean are described in the literature by Cutler and Swallow (1984). The study was conducted over the period 1854-1974 and show for the North islands of the Seychelles archipelago, four periods, which have been detailed by Cazes-Duvat (1999; 2001):

- During austral summer (December - April): the islands are situated into the Equatorial Counter Current. It is slow, 1 to 2 knots in average, and the flux towards the Seychelles set to West/South-west direction.
- A transition period (April to June) with very slow current and no prevailing direction.
- During austral winter (June to September): the Equatorial Counter Current pass into the North hemisphere. The South Equatorial Current shows a net lane at 10° South, but its direction is disrupted further to the North, and there is no prevailing and stable direction at the Seychelles latitude.
- A second period of transition (September - December): the Equatorial Counter Current take down to the South hemisphere. During this period, a divergence zone appears between the Equatorial Counter Current and the South Equatorial Current (between 6° and 9° South, varying location from one year to another, relatively to the North-east monsoon intensity). It conducts to an upwelling phenomenon south-east of the Granitic islands (Piton, 1976).

7.1.5.3. Salinity and sea water temperature

Monthly averages sea surface temperatures data, measured at Mahe (Seychelles), are available on the Weather Online website (address: <http://www.weatheronline.co.uk>). They are reported in following table 15.

Table 15. Temperature of sea water measured at Mahé

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Tw (°C)	29	29	29	30	29	27	25	25	27	28	29	29

The sea surface temperature in Mahe remains at least at 29°C between November and May (30°C in April). It reaches its minimum (25°C) during July and August. The lowest sea surface temperatures occur during the South-east monsoon.

The surface salinity takes a value of about 35.2 PPS and does not vary significantly all over the year.

7.1.6. Coastal process and erosion

The Government of the Republic of the Seychelles is very sensitive to this erosion problematic and prioritizes the actions to be carried out.

The causes of this erosion are numerous: the Seychelles are marked by a low sedimentation of reef origin, an exploitation (in the process of reduction) corals which are thus no longer deposited on the beaches as well as human actions carried out in a total indifference to the operation of coastal dynamics (example of the airport). The protections are most often to protect the beach of a hotel by imposing structures without necessarily interested in the long-term consequences of this infrastructure in other points of the coast.

Recent study of Borrero and al. (2016) focus on the coastal processes and erosion of the north east cost of Mahé. The study clearly highlights the effect of the reef destruction as result of land reclamation and reef bleaching which have reduced the amount of sand being produced (Figure 29).

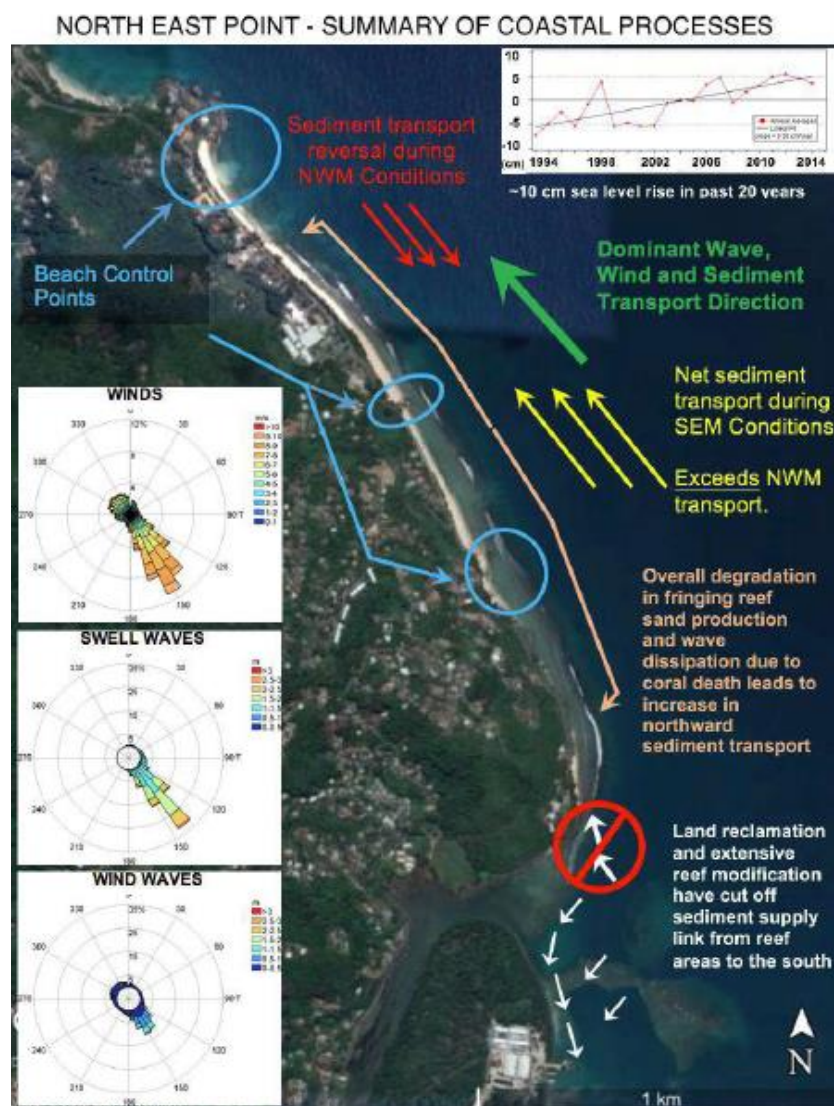


Figure 29: Schematic of seasonal sediment transport and control points along North East Point Beach (Borrero and al. 2016).

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7.1.7. Coastal terrestrial habitats

According To UNEP report 2008 (Bijoux *et al.*)

The coastal plateau is made up of calcareous sand derived from adjacent fringing reefs which have accumulated over the last 6,000 years. These coastal plateau have been colonized by coastal plants such as coconut (*Cocos nucifera*), takamaka (*Calophyllum inophyllum*) and badamier (*Terminalia catappa*). Coastal brackish water marshes are also present and have important role in settling out sediments from freshwater before entering the sea. The islands have many white sandy beaches which are used extensively by the hotel industry and the locals for picnics. Many of these beaches are also used for nesting by marine turtles. The terrestrial coastal habitats of many of the inhabited inner islands have been heavily modified for human settlement, industries, public infrastructure and tourism.

Although rocky shores are a common feature in the granitic islands, as well as in the raised coralline islands, they were generally poorly studied, mostly because of difficult human access.

The intertidal communities are relatively narrow due to the low tidal range, the commonest animals found there being limpets, barnacles and rock crabs.

7.1.8. Mangroves and mudflats

The Mangroves for the Future (MFF) initiative is a unique partner-led programme that promotes investment in coastal ecosystem (including coral reefs, estuaries, lagoons, sandy beaches, sea grasses and wetlands) for sustainable development.

The original mangrove forests on the East coast of Mahé were rapidly cleared after human settlement and the resulting mud flats progressively reclaimed to meet the need for flat buildable land. Mangroves were also harvested for timber and for bark, for example on Aldabra, well into the 20th Century. Total natural mangrove area continued to decline through much of the 20th Century but has been considered relatively stable since the 1980s at approximately 29 km² (Mark D. Spalding, 2001).

Six species of mangroves are described from Seychelles and four Sites of international significance (Port Launay, Mare Aux Cochons, La Plain Hollandaise and Aldabra Atoll) have been declared under the RAMSAR Convention. Aldabra Atoll has extensive systems of mangroves that provide feeding and nesting habitats for many seabirds and waders. In Seychelles, all mangroves species are indigenous, having been brought to the islands by the sea. Some species of mangroves are able to act as pioneer species, colonizing new areas of sand and mud which are still unstable, for example *Rhizophora* (mangliye rouz) and *Avicennia* (mangliye blan). Other species are found in sheltered areas or along river edges.

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Other grows towards the landward side of mangroves where sea water only penetrates at very high tides, for example Lumnitzera (mangliye pti fey) and Xylocarpus (mangliye ponm). At the edges of mangroves, on slightly higher land, it is possible for other plant species to grow, but these are usually adapted to wet or marshy conditions or are tolerant of salt, for example fouzer lanmar and patatran. Algae of various types frequently grow as epiphytes on the aerial roots of mangrove trees, for example on Sonneratia (mangliye fler).

Mangroves provide habitats for fish and other animals; Traps, concentrates and recycles nutrients; protects the coast from erosion; supports bird life; supports recreational activities; source of food; provides fuel; provides building materials; supports scientific research; source of traditional medicine (<http://www.meec.gov.sc>).

The main threats to mangroves are coastal development and climate change with rising sea levels posing a significant threat to mangrove forests in the Seychelles.

No mangrove and mudflat are located in the landing point.

7.1.9. Marine biodiversity

The granitic islands originally supported populations of salt water crocodile; seals were found on the smaller granite and more isolated islands of the central archipelago and were abundant in the Amirantes. The coral reefs teemed with fish, rays and sharks; and the beaches supported huge rookeries of hawksbill and green turtle. These resources were exploited heavily by man on his arrival, supporting the human population by providing cheap high quality protein and commodities for trade driving the socioeconomic development of the colony. Today the coastal environment of Seychelles remains central to the country's development. The beautiful coconut and Takamaka fringed white sand beaches and crystal clear tropical blue waters provide the key basis for the tourism industry. The coastal environment today however is very different from that found by the first settlers in the 181 Century. Crocodiles and seals were early victims of human activity and were extirpated. Marine turtles supported prolonged exploitation that has drastically reduced their occurrence and abundance. Marine turtles received full protection under the law in 1994 but poaching remains an issue and their nesting habitat is unprotected outside of protected areas. Sharks a vitally important component in marine ecosystems were dramatically reduced in abundance on the Mahé plateau by a targeted fishery in the 1940s-1960s and the populations on the smaller banks of the outer islands soon followed suit. The rising commodity value of shark fin has maintained fishing pressure and the downward trend in shark populations continues. It has become increasingly apparent since the mid-1980s that the demersal fishery resources of the Mahé plateau are being overexploited. Initially it was considered a concern of the inner reefs, but Vessel Monitoring System data coupled with steadily declining catches since 1991, indicate that the entire plateau is overexploited. This is particularly apparent in the decline of the occurrence, diversity and

abundance of Serranidae on the plateau with several species now very scarce or absent from the Mahé plateau catch. Declines are also apparent in key commercial species most notably the Emperor red snapper (*Lutjanus sebae*) and the Brownspotted grouper (*Epinephelus chlorostigma*) (GOS (2014). Seychelles Biodiversity Strategy and Action Plan 2015-2020 – p115).

The removal of so many key species, entirely or functionally, and the progressive fishing down of the food chain has a destabilizing effect on the ecosystem with likely impacts upon: future productivity coral reef recovery from the 1998 major bleaching event and reef resilience to climate change. Key steps however have been taken; all marine mammals and marine turtles have received complete legal protection since 1979 and 1994 respectively. Turtle rookeries in some key protected areas have shown significant and sustained population recoveries. There are management plans and approaches for various fisheries and Seychelles was amongst the first ten countries globally to develop and commence implementation of a National Plan of Action for the Conservation and Management of Sharks.

The marine environment is central to Seychelles' development; artisanal, semi-industrial and industrial fisheries are key to the economy and local food security and hence improved management of these activities and the ecosystems upon which they depend, is a priority for the country's sustainable development.

Despite historical upheavals mainly related to the installation and growth of humans on this island, the exceptional marine biodiversity of Seychelles is at the heart of the concerns.

7.1.9.1. Marine ecosystems

Coral reef

Seychelles has some 1,700 km² of coral reef the vast majority of which occurs around the south eastern islands. The ENSO¹-related coral bleaching event in 1998 had a major impact on Seychelles' reefs. The reefs of the central archipelago were particularly badly affected with some 90% coral cover mortality. Fast growing *Acroporas sp.* and *Pocilloporas sp.* suffered most and a phase shift from live coral cover to coral rubble/macroalgae dominated-reefs was initiated. The outer islands were in general less badly affected with coral mortality more in the region of 40-50% and it has been postulated that this may reflect greater resilience due to reduced anthropogenic stress and an existing natural adaptation to greater temperature fluctuations.

¹ Very strong 1997-98 Pacific warm episode (El Niño)

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Reef fish diversity showed a lag effect following the bleaching event with some impact noted on certain live-coral dependent species but in general diversity was maintained. However as time progressed recruitment of new individuals to fish populations appears to be reduced possibly related to the progressive break down of reef structure.

In the sixteen years following the bleaching event natural recovery has been slow. Various factors are believed to have contributed to this:

- The loss of live coral was so extensive and widespread that sources of coral larval influx for recruitment are greatly reduced.
- The spread of algae coverage is limiting to coral recruitment and development.
- There have been further bleaching events in 2002, 2003 and 2010 that have accounted for much of the natural recovery.
- Most recently a new Crown-of-thorns starfish (*Acanthaster planci*) outbreak, the first since 1996/97 has been recorded in the reefs around Mahé, signaling further problems for recovering reefs and likely reflecting the impacts of ongoing overfishing and enrichment pollution around the main islands.

Recognizing that enhanced reef ecosystem resilience is vital to fend off the impacts of stresses Seychelles has embarked on a series of measures that have the objective of greatly improving management of the demersal fishery and designating approximately 30% of the EEZ as protected areas, half of which or 15% of the EEZ to be strict no take zones. Area prioritization and marine spatial planning initiatives are underway to support this.

General climate trends suggest that raised sea-temperature events will occur with increasing regularity in the future and as such temperature induced coral bleaching remains the primary threat to coral reefs and their wider recovery in the Seychelles. An innovative pilot project, led by Local NGO Nature Seychelles, has been initiated at two sites near the island of Praslin to plant climate- resilient coral species with the objective to restore ecosystem services. Coral nubbins are cultivated in mid-water ocean nurseries made of ropes or nets. Corals are then transplanted onto bleached and degraded reefs. By mid-2014 some 30,000 corals from 45 species had been transplanted. It is intended to expand these trial projects to larger areas under this NBSAP.

Reef flats

This mixed habitat complex has been subject to intensive disturbance around populated islands. In the central archipelago reef flats are utilized extensively for gleaning fisheries (e.g. octopus and shell fish) and shell collecting activities. In the last 25 years significant areas of this habitat have been lost to major land reclamations. Sedimentation and in some areas pollution are also factors of concern.

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Most reef flats consist of a complex patchwork of habitats: areas of sand and gravel interspersed between areas of coral rubble, coral outcrops, sea grass and algal growth. In their natural state these habitats are rich in life and commodity species such as octopus, lobster and sea cucumber. Mollusc fauna can be very rich with Cowries (*Cypraea moneta*, *C. annulus*, *C. Lynx*, *C. caurca* and *C. helvola* being common), Cones (*Conus /eopardus*, *C. litteratus*, *C. virgo*, *C. maldivus*, *C. betulinus* and *C. quercinus*) readily found in the seagrass; whilst species such as *Bittium zebrum* and *Smaragdia rangiana* can be found in algal mats. Four Shell Reserves were declared in the 1960s and were subsequently incorporated under the 1986 Fisheries Act (1987 Shell Reserve Regulations) but the areas are not managed or enforced. Reef flat areas are also covered in other Protected Areas most notably Aldabra.

Seagrass bed

The extensive shallow submarine banks of Seychelles support significant seagrass areas. A particularly large sea grass bed (estimated at 45km long and 15km at its widest) lies on the Providence-Cerf bank. Many of the outer islands, such as the lagoons of Aldabra, Cosmoledo and Astove, support large sea grass communities. Sea grass habitats are also common around the granitic islands notably in the St Anne Marine National Park and off Grand Anse-Amities coast of Praslin. A brief survey of inshore sea grass bed substrate around the island of Mahé recorded 58 species of infauna invertebrates. Seagrass beds are also essential for many marine herbivore species including megafauna such as the green turtle and the Dugong.

There is evidence that sea grass beds around the main populated islands are in decline due to a combination of anthropogenic factors - pollution, reclamation, coastal development and climate change. It also likely that the historical exploitation of the main sea grass grazers, green turtles, and ongoing fishery activities mean that the natural grazer/growth balance in sea grass beds has been lost potentially leading to changes in community structure and health.

Cartography habitats on the landing point

Sediment and soft bottom habitats are the most common marine habitats in the Seychelles but are often overlooked often as a result of their lack of marine life and the depths (deep sea) at which they are often found.

As can be seen hard substrate makes up 45% of the Mahé plateau. The rest of the plateau is made up of soft sediments of different categories of which muddy sand and mud are the most common.

During the field visit, the MEEC database was made available to IXBLUE. In this database several GIS files concern the seabed nature on the North-East of Mahé Island and the Islands of Saint Anne and Cerf.

As illustrated in the following figure, seagrass and coral reef are present in our area of interest. The meadow is concentrated along the coast in shallow depths while the coral is further offshore, beyond 500 m from the coastline. However, the source and the date of the data are unknown. It is likely that the period of these surveys is prior to the creation of Perseverance Island because in the picture the meadows are on the ground. It would be interesting to update the delimitation of these marine biocenoses before installing the cable.

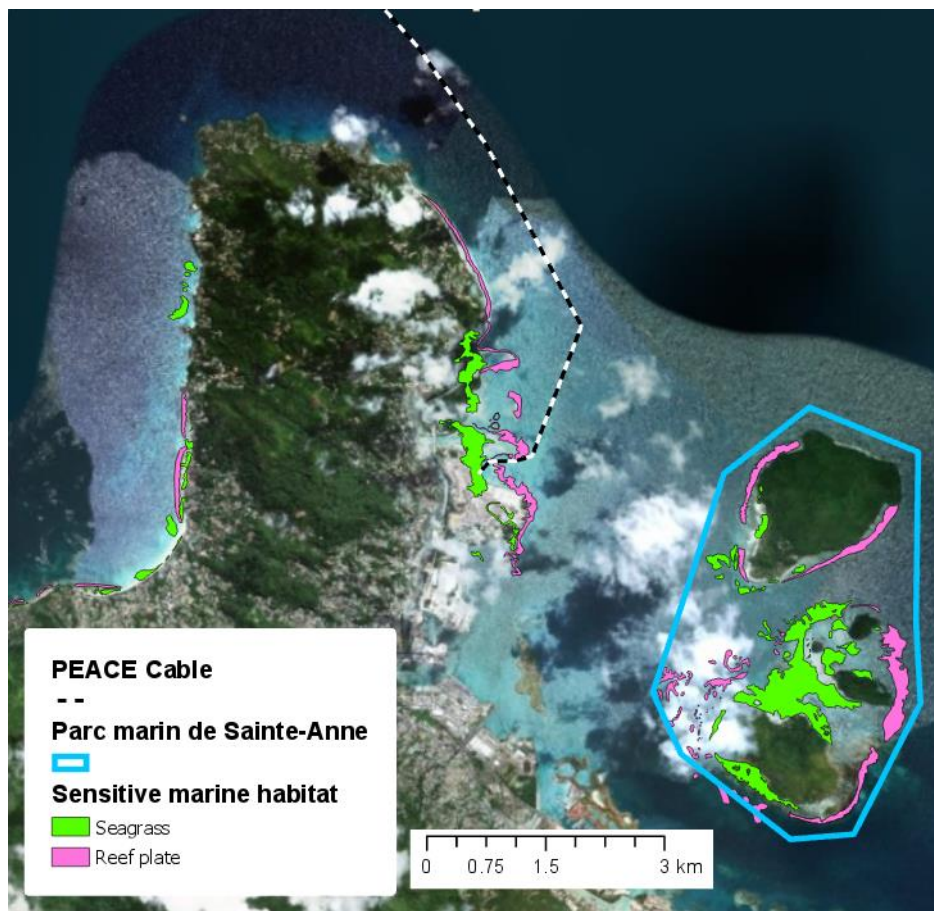


Figure 30 : Marine habitats next to the landing point (source: MEEC database).

Up to this day, no study of the state of preservation of marine ecosystems seems to have been done in Perseverance landing site. The only cartography we have available seems obsolete. An update is recommended before installing the cable.

7.1.9.2. Marine Fauna

Seychelles is a sanctuary for diverse species of flora and fauna. Islands are home to exciting diversity of birdlife that can be discovered in the wild or in specially designated reserves.

Seychelles is home to significant biodiversity with high endemism: 50-85% for different animal groups and approximately 45% of plants in general and is recognized as a biodiversity hot spot by Conservation International and a center of plant biodiversity by the International Union for the Conservation of Nature (IUCN) and the World Wildlife Fund (WWF) (COS (2014). Seychelles Biodiversity Strategy and Action Plan 2015-2020 – p115).

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Marine mammals

The waters surrounding the Seychelles have long been associated with whales and historically with whaling.

Since the mid 1900's Seychelles has become a strong advocate for conservation and was instrumental in the setting up of the Indian Ocean Whale Sanctuary in 1979. Currently 26 species of marine mammal are recorded from Seychelles waters making this the most diverse area within the Indian Ocean (Mr. P. Holden and al., 2014).

At least three of these species are classified as Endangered (Blue, Fin and Sei whales), one as Vulnerable (Sperm whale), whilst many remain data deficient according to the IUCN Red List of Threatened Species (IUCN, 2013).

Recent dedicated aerial surveys for marine mammals have confirmed that the Seychelles remain an important area for populations of marine mammals (REMMA, 2012).

Birds

Seychelles is not situated along any important migratory route, however many migratory species, especially waders, occur regularly. Some of these migratory waders show site-fidelity to Seychelles as wintering or stopover grounds e.g. *Arenaria interpres* (Ruddy turnstone). Very few species of waders occur in concentrations of international importance, except for *A. interpres* and *Dromas ardeola* (Crab plover) and Curieuse is of particular interest. The Seychelles islands are the only place in the African and Western Indian Ocean regions where this Asian species can be found. Two subspecies of waterbirds, *Butorides striatus degens* (Green-backed heron) and *Bubulcus ibis sechellarum* (Cattle egret) have been described in the granitics.

Seabird colonies of regional or global importance are found in the granitic islands on Aride, Cousin, Cousine and Bird Island.

The tiny Seychelles Sunbird or Kolibri in creole is one of the few endemic species that have thrived since the first settlement.

Sea turtles

Out of the seven remaining turtle species, five have been recorded in Seychelles waters. These include the Leatherback turtles or torti karanbol (*Dermochelys coriacea*), Green turtle or torti d'mer (*Chelonia mydas*), Hawksbill or Kare (*Eretmochelys imbricata*) and Loggerhead or Nanm kayo (*Caretta caretta*). Sea turtles are protected in Seychelles under the 'Wild Animals and Birds Protection Act of which the Wild Animals (Turtles) Regulations enacted in 1994, completely bans all disturbances, harvest, sale, possession of turtles, turtle products or eggs. The penalty for committing such an offence under the Wild Animals and Birds

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Protection (Amendment) Act, 2001, is 2 years imprisonment and a maximum fine of SCR500,000 (<http://www.meecc.gov.sc>).

The Marine National Parks of Ste. Anne and Curieuse and the two Special Reserves of Cousin and Aride and the island of Cousine remain some of the most important hawksbill nesting sites in Seychelles.

Aldabra atoll is both a Special Reserve and a UNESCO World Heritage site and has one of the largest populations of nesting green turtles in the Seychelles.

Endangered species

The Seychelles has a number of its species listed as endangered on the International Union for Conservation of Nature (IUCN) red List. Many of these species are being threatened by natural factors, such as climate change, as well as anthropogenic factors including pressure from introduced invasive species.

The granitic islands of Seychelles have around 75 endemic plant species, with Silhouette island a particular center of diversity, and around 25 more endemic species are found in the Aldabra group. More species are continually being discovered, and these are generally very rare. Critically endangered plant species include the jellyfish tree *Medusagynae oppositifolia*, the Seychelles balsam *Impatiens gordinii*, and Wright's gardenia *Rothmannia annae*, which is found only on Aride island. Endangered species include the orchid *Hederorkis seychellensis*. The well-known Coco de Mer, incorrectly named *Lodoicea maldivica* but which actually grows only on the islands of Praslin and Curieuse, as considered Vulnerable, due mainly to poaching activities (the giant nuts are valuable in producing kernel (which is considered an aphrodisiac in oriental medicine) and the dried nuts are sold to tourists as a curiosity.

Endemic bird species at risk include the Seychelles black parrot – found only on Praslin and Curieuse and recently recognized as a distinct species – Seychelles magpie robin, Seychelles paradise flycatcher, Seychelles fody, Seychelles scops owl, Seychelles white-eye, Seychelles swiftlet, Seychelles kestrel and Seychelles blue pigeon. The Seychelles parakeet unfortunately became extinct in the late 1800s. Many of these endemic birds have been translocated between islands to build up numbers and guard against local critical events.

There are only four endemic land mammals in Seychelles, all of them bats, of which the Seychelles sheath-tail bat *Coleura seychellensis* is critically endangered and known to persist only in 3 roosts on Mahé and Silhouette.

The Aldabra giant tortoise *Aldabrachelys gigantea* has now been introduced to many islands and is not considered endangered. Five turtle species occur in Seychelles of which the Endangered Hawksbill turtle is the most common nesting species. There are five endemic

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species of frogs and six endemic species of caecilians, which may be considered vulnerable to climate change or to the introduction of viruses which can be lethal to amphibians.

Large marine mammals, whales and dolphins, are vulnerable to global threats. The waters around the Seychelles are visited by the following threatened species: Southern sei whale *Balaenoptera borealis schlegelii* (Endangered), Southern fin whale *Balaenoptera physalus quoyi* (Endangered), Southern blue whale *Balaenoptera musculus intermedia* (Endangered), and the Sperm whale *Physeter microcephalus* (Vulnerable). The Critically Endangered Dugong *Dugong dugon* has a small breeding colony in Aldabra lagoon where it is fortunately well protected.

More than 1000 species of fish have been recorded. Many of the local fish species are vulnerable to over-fishing, even though the use of spear-guns and dynamite has been banned since the 1960s. The use of gill nets for shark fishing as well as the practice of shark finning are now banned, although they still occur due to difficulties in enforcement of the law, and shark numbers have declined by 90% or more throughout Seychelles' waters. Coral bleaching events in 1998 and 2016 have unfortunately severely damaged coral reefs and reduced the habitat for coral fish species.

Among all the marine species found in Seychelles and particularly those with high heritage value, only corals that are static can be more impacted by this project. There are no Marine National Park, Protected Marine and Terrestrial and RAMSAR at the proposed landfall on Perseverance Island, but the marine parc of Saint Anne is less than 3 km south east of Perseverance

7.1.9.3. Key threats to biodiversity

In Terrestrial Ecosystems the primary threat is posed by invasive alien species in particular in terms of the intermediate, montane and palm forest habitats which harbor the highest level of endemism. The secondary threat is change in land use or habitat loss and this particularly prevalent in coastal habitats such as lowland forest and most dramatically for lowland wetlands where development pressures are threatening the last remaining examples of this habitat. A cross-cutting threat for all terrestrial ecosystems is the projected impacts of climate change and how it may "squeeze" habitats and species niches which have little scope for movement/migration in the very limited landmass of the islands.

In Marine Ecosystems over-fishing constitutes the primary and most immediate threat and in particular with regard to demersal stocks where there is strong and clear evidence of decline in many species and collapse of some populations, particularly of megafauna - e.g. primary herbivores (green turtles) and primary and secondary predators (elasmobranchs and serranids). Climate change is again a cross-cutting and complicating factor. In Seychelles the prolonged raised sea temperatures in 1998 caused severe and extensive coral

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bleaching and death in Seychelles resulting in some 90% and 50% loss of live coral cover in the central archipelago and outer islands respectively. Recovery from this bleaching has been patchy and hindered by three subsequent bleaching episodes. Issues of changing currents and shifts in seasonal weather patterns may have significant impacts upon the occurrence and distribution migratory and pelagic species with potentially damaging ramifications for conservation and sustainable use. Raised levels of atmospheric carbon dioxide a key driver of global climate change is also driving acidification of marine environments which is a longer-term threat to marine biodiversity. Finally, the ongoing exploration for oil and its potential future exploitation pose significant risks for biodiversity on the Mahé plateau and beyond.

7.1.9.4. Protected areas/RAMSAR Site

The modern era of conservation and protected area policy in Seychelles is commonly considered to have started in the 1960s, stimulated by the works of Swabey (1960) and Jeffrey (1962), with various protected area-based legislation being enacted notably: the Protection of Shells Ordinance (1965), the Wild Birds Protection (Nature Reserves) Regulations 1966 and most notably the National Parks and Nature Conservancy Ordinance 1969 (<http://www.meecc.gov.sc>).

The Seychelles terrestrial Protected Area Network (PAN) constitutes 46.6% of Seychelles' total landmass, an enormous commitment to biodiversity conservation. The vast majority of Seychelles endemic biodiversity is to be found in the ancient granitic islands. Within the granitic islands however, "only" 22.3% of the landmass or significantly less than the national average is protected. Currently the resources are not available to implement the management measures required to fulfil its conservation objectives in all protected areas.

Unlike the terrestrial scenario where nearly 50% of the landmass lies within the PAN, the existing MPAs in Seychelles constitute less than 1% of the country's EEZ.

The Ramsar site convention entered into force in the Seychelles on 22 March 2005. The Seychelles currently has three sites designated as Wetlands of International Importance (Ramsar Sites) including two on Mahé Island (mare aux cochons High altitude freshwater wetlands and Port Launay Coastal Wetlands).

According to the Environmental Protection Act, 2000 (CAP 71) Schedule 2; Regulation 3 (2), following tables show areas of outstanding natural beauty.

Area name	Regulation authority	Type of area	Creation date	Area (km²)	Comments
Sainte Anne Marine Park	Seychelles National Parks Authority	Marine National Park	1973	14	Protects and provide nursery for over 150 species of fish; nesting sites for Hawksbill turtle
Aldabra Lagoon and surrounding MNP	Seychelles Islands Foundation	Marine National Park	1981	281.2	
Curieuse Marine National Park	Seychelles National Parks Authority	Marine National Park	1979	0.03	Wild population of Giant land Tortoise, extensive mangrove system, coco-de-mer, Black Parrot
Silhouette island Marine National Park	Seychelles National Parks Authority	Marine National Park	1987	10	Almost undisturbed coral reef, high marine biodiversity
Port Launay Marine National Park	Seychelles National Parks Authority	Marine National Park	1979	0.3	Extensive mangrove systems declared as Ramsar Site of Global importance, water catchment
Baie Ternay Marine National Park	Seychelles National Parks Authority	Marine National Park	1979	0.3	Healthy coral reef system, high marine biodiversity
Ile Cocos, Ile La Fouche, Ilot Platte	Seychelles National Parks Authority	Protected Marine and Terrestrial	1997	0.01	
Africa Banks	MND	Protected Terrestrial Area	1987	8.20	
Port Launay	DoE	Wetland of International Importance	2007	0.27	
Mare Aux Cochons	DoE	Wetland of International Importance	2010	0.03	
Aldabra	Seychelles Islands Foundation	Wetland of International Importance	2010		
La Plain Hollandaise	DoE	Wetland of International Importance	2010	0.25	

There is no Marine National Park, Protected Marine and Terrestrial and RAMSAR site's at proposed landfall on Perseverance Island, but the marine parc of Saint Anne is less than 3 km south east of Perseverance.

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7.1.10. Climate change

7.1.10.1. General effects

Since the early 1990's, comprehensive descriptions of the causes and effects of climate change have been produced by Intergovernmental Panel on Climate Change (IPCC). The fifth and most recent assessment report (AR5) was released in late 2013.

In terms of coastal hazards and vulnerability in Seychelles, the two major effects of climate change are long term sea level rise and storm frequency. It is widely accepted that current atmospheric concentrations of greenhouse gasses are much higher than pre-industrial values and contribute to increases in global average temperatures.

Long term changes in the rainfall and temperature patterns will also affect food production (water availability) and also people health. Climate sensitive diseases such as malarias and other food and water bourne diseases are expected to increase as was the case with Chikunguya in 2006. Climate change will also have direct impacts on water availability which is essential for the growth in tourism, manufacturing and the agricultural sector.

These threats will have a significant impact on the environment if not dealt with or tackle in an effective manner. Adaptation and mitigation measures are central for addressing those challenges in the light of inadequate data, limited financial resources and weak technical human & institutional capacity. Government needs a holistic and integrated perspective in order to adopt a sustainable development approach (National Strategy & Action Plan for Mangroves for the Future – Initiative 2013-2016).

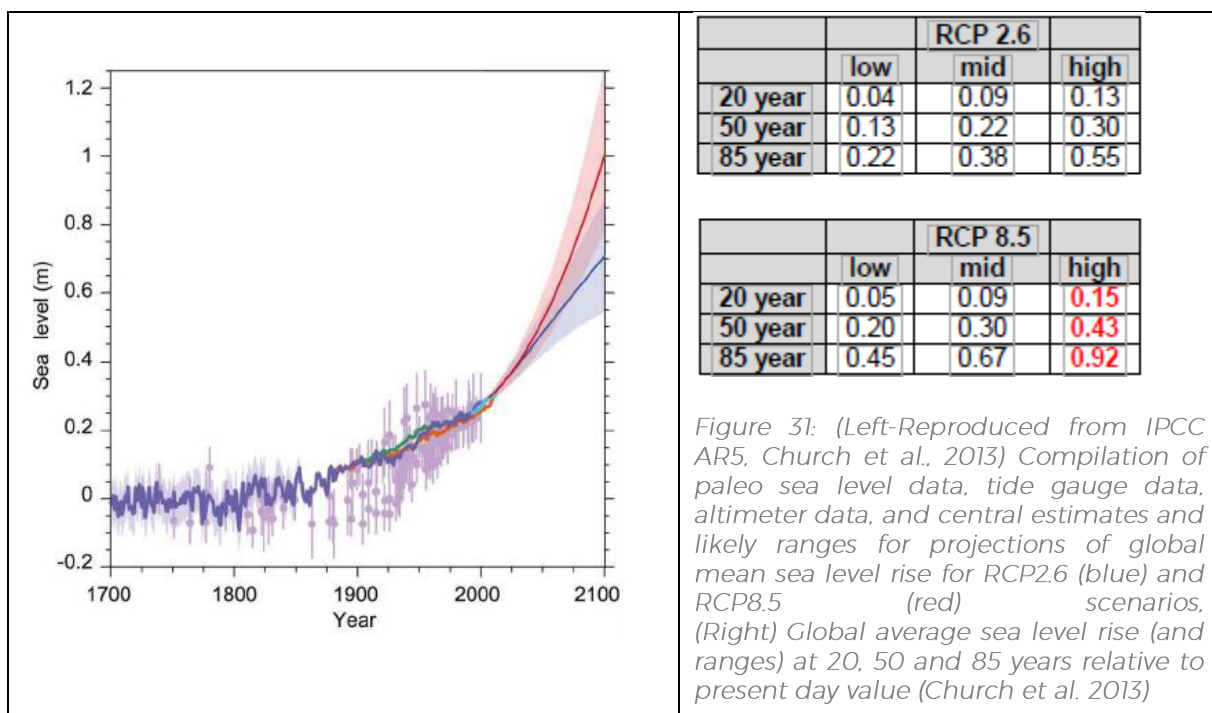
7.1.10.2. Changes in Storm Frequency and Intensity

According to IPCC AR5, it is likely (medium confidence) that annual mean significant wave heights will increase in the Southern Ocean because of enhanced wind speeds. Southern Ocean generated swells are likely to affect heights, periods, and directions of waves in adjacent basins. However, they state that in general, there is low confidence in region-specific projections due to the low confidence in tropical and extratropical storm projections, and to the challenge of downscaling future wind fields from coarse-resolution climate models. They also state there is low confidence in region-specific projections of storminess and associated storm surges.

Seychelles coasts have been affected by several disasters in recent years, such as the coastal erosion of Anse Kerlan on Praslin since 1986, disasters caused by the Indian Ocean Tsunami in 2004, three days of inundation in Victoria in 2004, and tidal flooding in the north of Mahe in 2007. Because of the rising sea level and increased rainfall intensity caused by climate change, the risk of natural disasters is increasing, alongside tourism and housing development in the coastal zones (Japan international cooperation agency and all., 2014).

7.1.10.3. Sea level rise

The sea level rise predictions contained in the IPCC AR5 report (Church et al. 2013) are based on the effects of rising global temperatures due to increased concentration of greenhouse gasses (GHGs), particularly carbon dioxide. Predictive curves for two warning scenario, RCP 2.6 and RCP 8.5, are published in the IPCC report, zooming in on the future projections from present day out to 20, 50 and 85 years (Figure 31). The present relative sea level is 0.33m. For the 20-year projection, global average sea level rise is expected to be between 0.04 and 0.15 m. For the 50-year projection between 0.13 and 0.43 m, and for the 85-year projection (year 2100), it is from 0.22 to 0.92 m.



7.1.10.4. Coral bleaching

The Seychelles is vulnerable to the adverse effects of climate change including climate variability and severe weather events. The environmental impacts can be significant as was the case in 1997/98 during the El Nino event, which lead to the death of 90% of coral reefs.

A study about mapping and assessment of coral reef ecosystem current status at Norths East Point of Mahé Island suggest that the reef have been extensively affected by a recent event, most probably the 2016 mass coral bleaching event, which have caused the extensive coral death throughout the inner islands (Fisheries and Marine Consultancy Services, 2017).

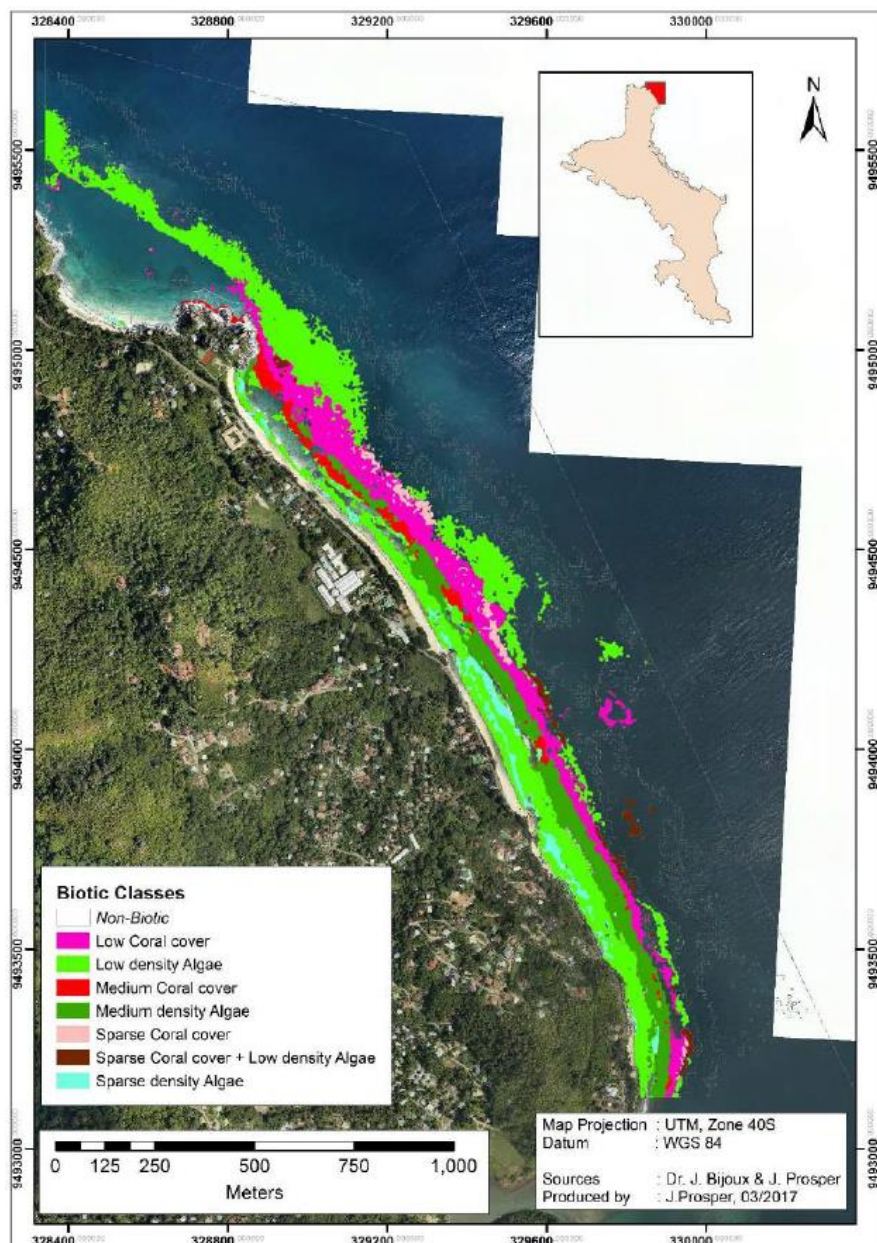


Figure 32 : Distribution of biotic composition of the reef surface at North East Point
(Fisheries and Marine Consultancy Services, 2017)

There has been only one major coral spawning event (which usually occur in November and December) since the 2016 mass coral bleaching event. It is expected that future spawning event will contribute the coral larvae which are required to start recovery of the reef slope at North East Point. The important thing is that the right reef framework is there to provide the substrate for the recruitment of these new corals when the time comes.

Overall, the habitat mapping and the ecological surveys tend to indicate that the reef slope at North East Point have all of the right conditions that makes a reef resilient in the face of climate change. These conditions include things such as steep reef profiles which facilitates sediment shedding, areas of dead standing corals covered by coralline algae, which provides good substrate for the settlement of coral larvae, high biomass of herbivores that grazes

algae, etc...However, the reef flats were found to be highly degraded with very little structure on the reef flat to help in dampening wave action. Wave action seems to be moving large amount of sand and some rubble over the reef flat. Movement of sand and rubble would tend to abrade the surface of the reef flat and prevent the growth of corals. Without much structure on the reef flat, waves would have little physical resistance before they crash on the beach and contribute to sediment erosion.

7.2. SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT

7.2.1. Population, habitat and infrastructure

The total population of the Seychelles was about 90,000 in 2011 with 86% living on Mahé (Japan international cooperation agency, 2014). The following picture show classification made from the satellite image of Mahé. It allows to give a vision of the types of occupation of the soil of the island. It dramatically demonstrates how the island's population of 86% of Seychelles' total population is concentrated on the coastlines and backfilled areas on the ocean (principally the East Coast).

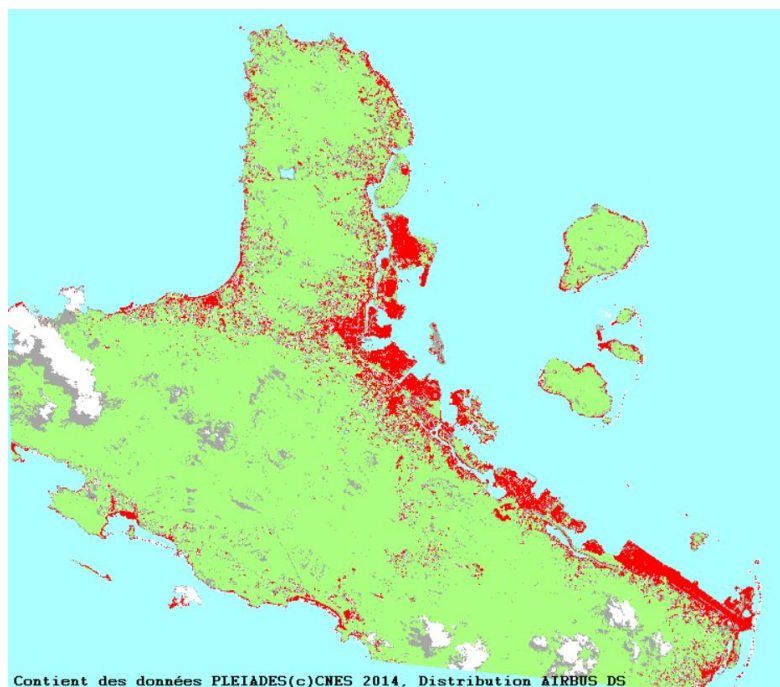


Figure 33 : Occupation of the territory in Seychelles (<https://geoimage.cnes.fr/>).

Perseverance Island is urban development with housing and apartments for local population with a very high concentration as shown on the master plan of the Figure 34. Perseverance public beach is dedicated to leisure activities for resident.



Figure 34 : Master plan of Perseverance artificial island (ISOCARP Congress, 2008).

The Landing point is envisaged on the public beach of Perseverance outside residential area.

7.2.1. Dumping, dredging and reclamation

The Ministry of habitat, Infrastructure and Transport, and Planning Authority provide actualization of the planned projects in Perseverance vicinity during a meeting on the 6th of February 2019:

- A new project of reclaimed land in the south of Aurore island; the cable will run along the south edge of this project (Figure 35);
- A marina for mega-yatch in the north of Aurore island (Figure 36).
- A sand stock pile north of Aurore island (Figure 37).

Those projects are all mapped on the Figure 38.



Figure 35 : Ile Aurore extension project.



Figure 36 : Mega-yacht marina project.

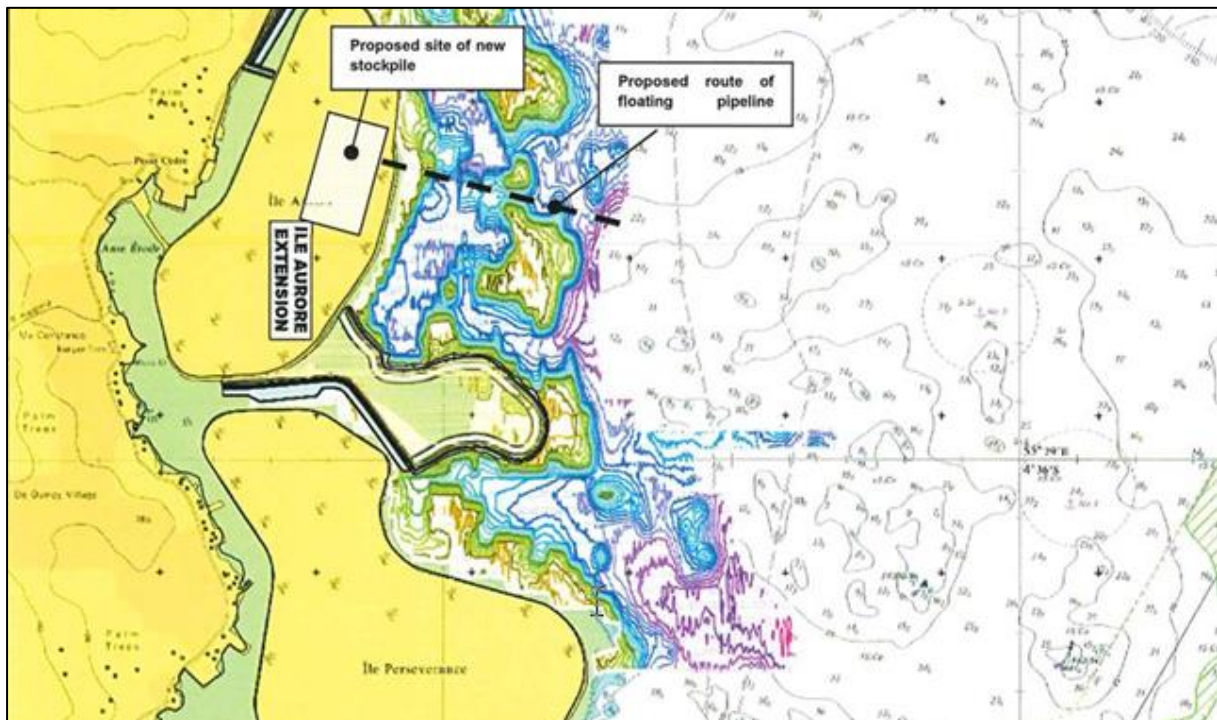


Figure 37 : Sand stock pile project.

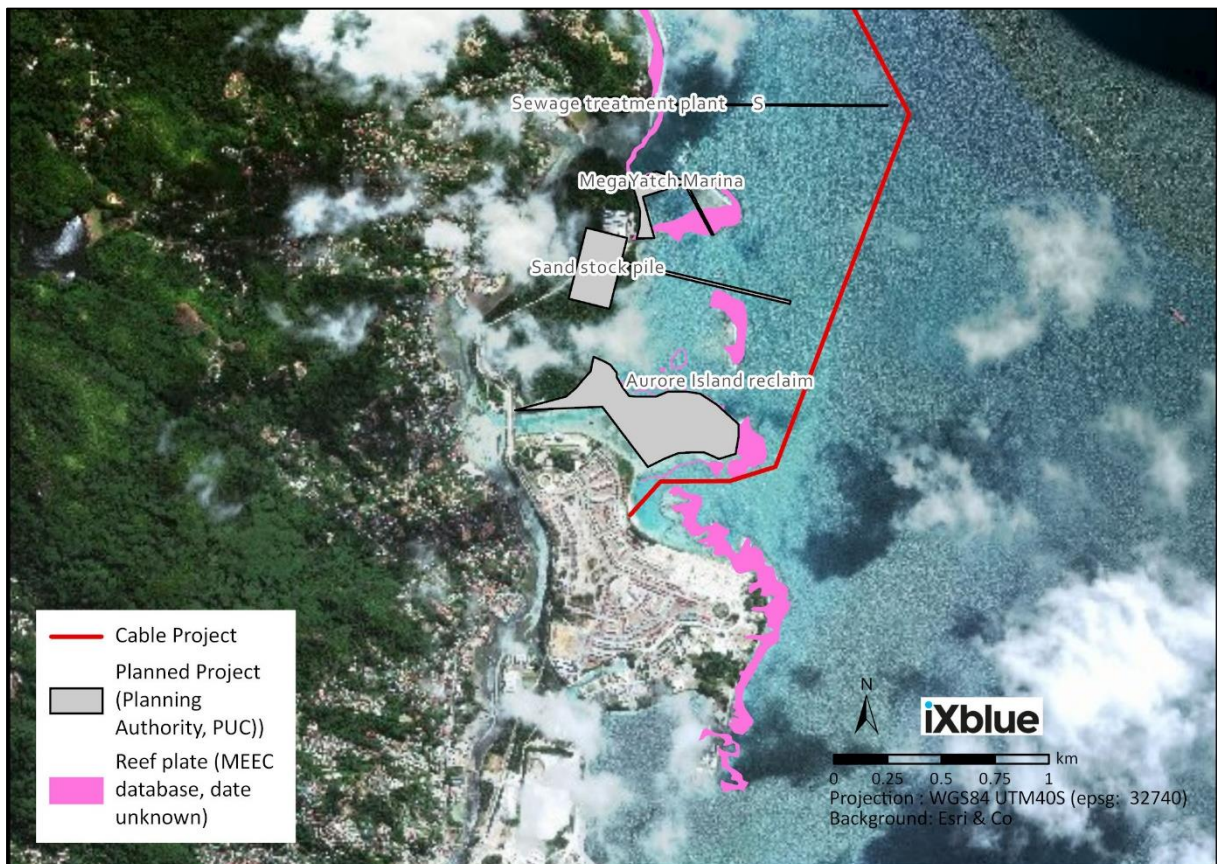


Figure 38 : Planned project near Perseverance along the cable route.

Several projects are planned near Perseverance: extension of Aurore island reclamation, sand stock pile, mega-yatch marina.

7.2.1. Submarine pipeline/cables

The Public Utilities Corporation has a project in the next 3 years to implement a sewage treatment plant on the north-east coast. A discharge pipe of about 1km long will be laid at sea to spread the treated water (Figure 38).

Two subsea cables are noticed on the marine charts and also on Navionics apps (Figure 39). During the meeting of the 5th of February 2019, Seychelles Port Authority explains that ships often entangle in them. These are Out of Service telegraphic cables since the 50's. PLGR will clear them if they are on PEACE route.

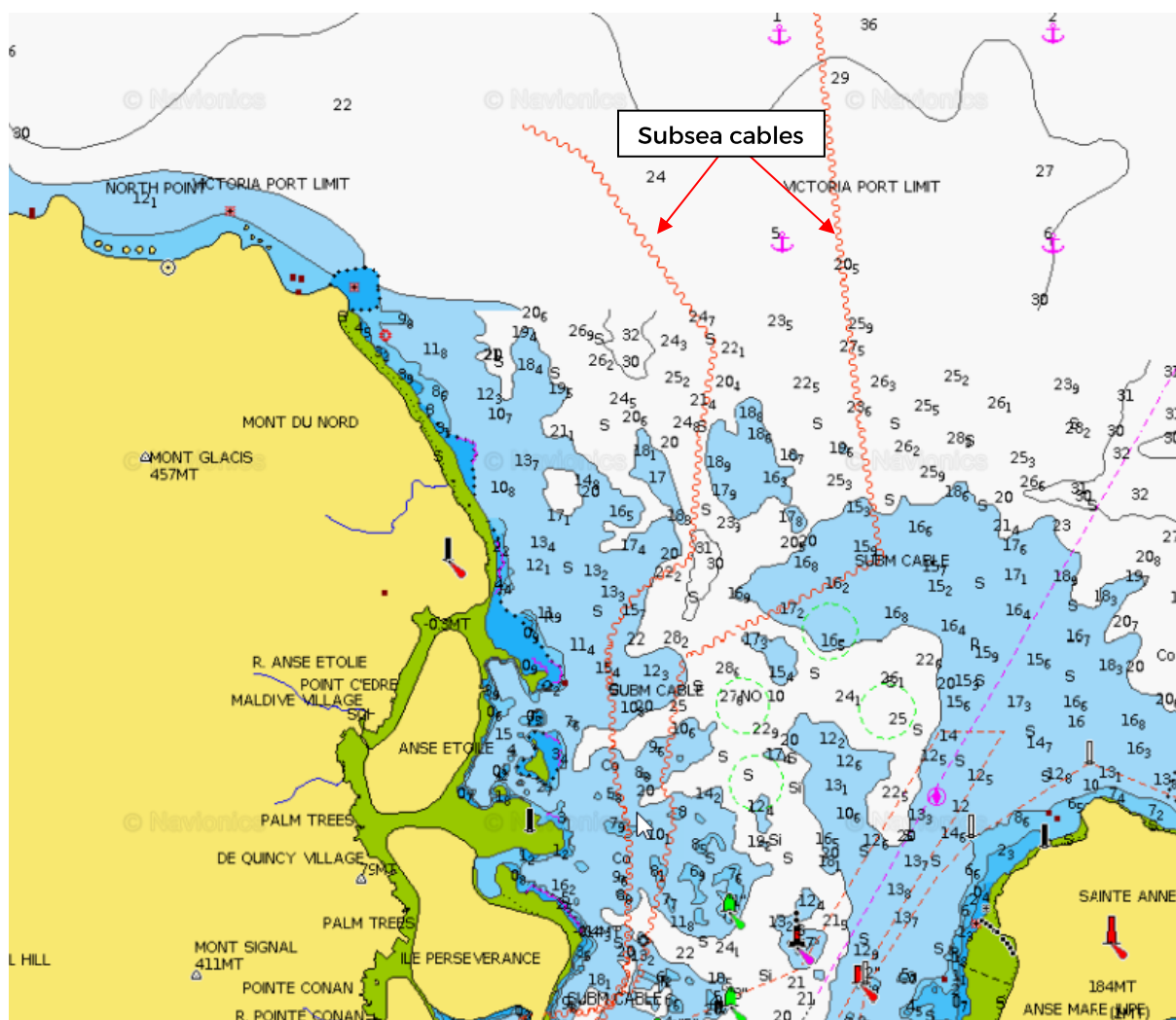


Figure 39 : Existing subsea cables location.

A sewage treatment plant project is planned north of Perseverance. Two existing cables are also charted.

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7.2.2. Tourism

The main industries in Seychelles are tourism and fishing. Tourists account for 90% of visitors, numbering about 200 000 in 2012.

Tourism is the major source of 70% of foreign exchange and employs 30% of the workforce (Japan international cooperation agency, 2014). Whilst the uncrowded and stunning beaches of the Seychelles are its main drawcard, there are plenty of other things to see and do for tourists. Wildlife spotting, diving, snorkeling and trekking along its jungle trails are just some of the highlights of a tour in the Seychelles.

Perseverance island is not a touristic place. The landing beach is mainly use by resident.

7.2.3. Fishing

The submarine banks of the Seychelles form the basis of the artisanal fishery providing vital food security, employment and high value trade commodities. The Mahe plateau supports important demersal fisheries such as: Lethrinidae, Lutjanidae, Scaridae, Serranidae, Siganidae. Some 100 species of demersal fish are commonly caught in the fishery. Also important are the sea cucumber, lobster and octopus fisheries.

Seychelles Fishing Authority state 10 fisherman's in Perseverance. They mainly use trap and angling from small boat (less than 10m long) but need to anchor.

There is no trawling in the Seychelles bank area. Fishing activities mainly consist in angling, trap and net fishing from anchored boat.

7.2.4. Hydrocarbon exploitation

The potential for producing oil and gas exists and offshore geophysical and geological resources are explored over the Seychelles Bank. In 1984 the Seychelles Government established a national oil company, currently PetroSeychelles, to strengthen its capabilities to deal with exploration and other activities related to the development of the petroleum potential of the State. The Figure 40 below presents the area hydrocarbon exploration by PetroSeychelles (red = exclusion area, brown = exploration area and small black spots = wells).

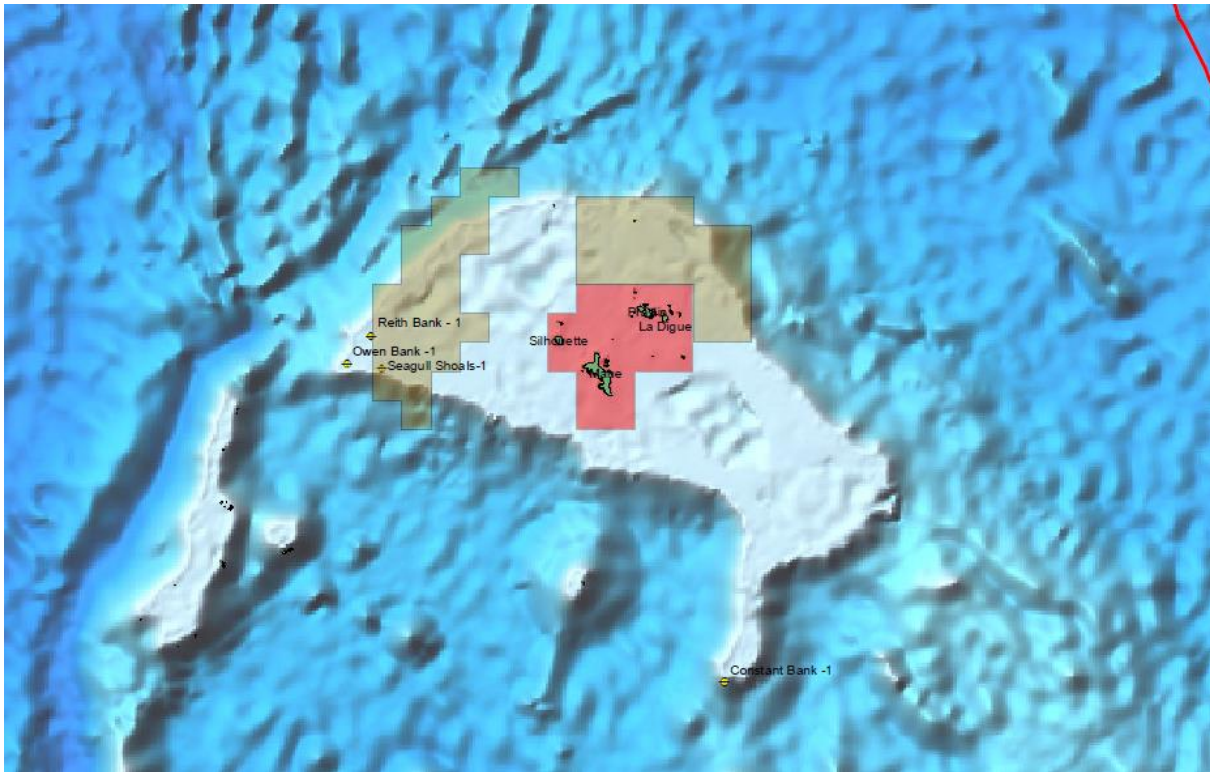


Figure 40 : Hydrocarbon exploration by PetroSeychelles.

The proposed cable route crosses the Petroseychelles exploration area.

Future hydrocarbon exploration activities in the area may include geophysical surveys and drilling. Those operations present a high potential of damaging the cable. Once the cable has been laid, PetroSeychelles will need the accurate cable route position to avoid the area.

7.2.5. Mining

Mining activities in the Seychelles is mostly restricted to the mining of granite from land and coral aggregates from the sea floor. Other mining activities include mining of sand and gravel. The removal of sand and gravel is regulated by the Removal of Sand and Gravel Act of 1982 which was introduced to control the damages which was being caused to beaches and river beds through the removal of sand and gravel.

Marine aggregates are also mined at sea. Two area are allowed around Mahé as shown on the Figure 41.

The cable route does not cross the marine aggregates mining areas.

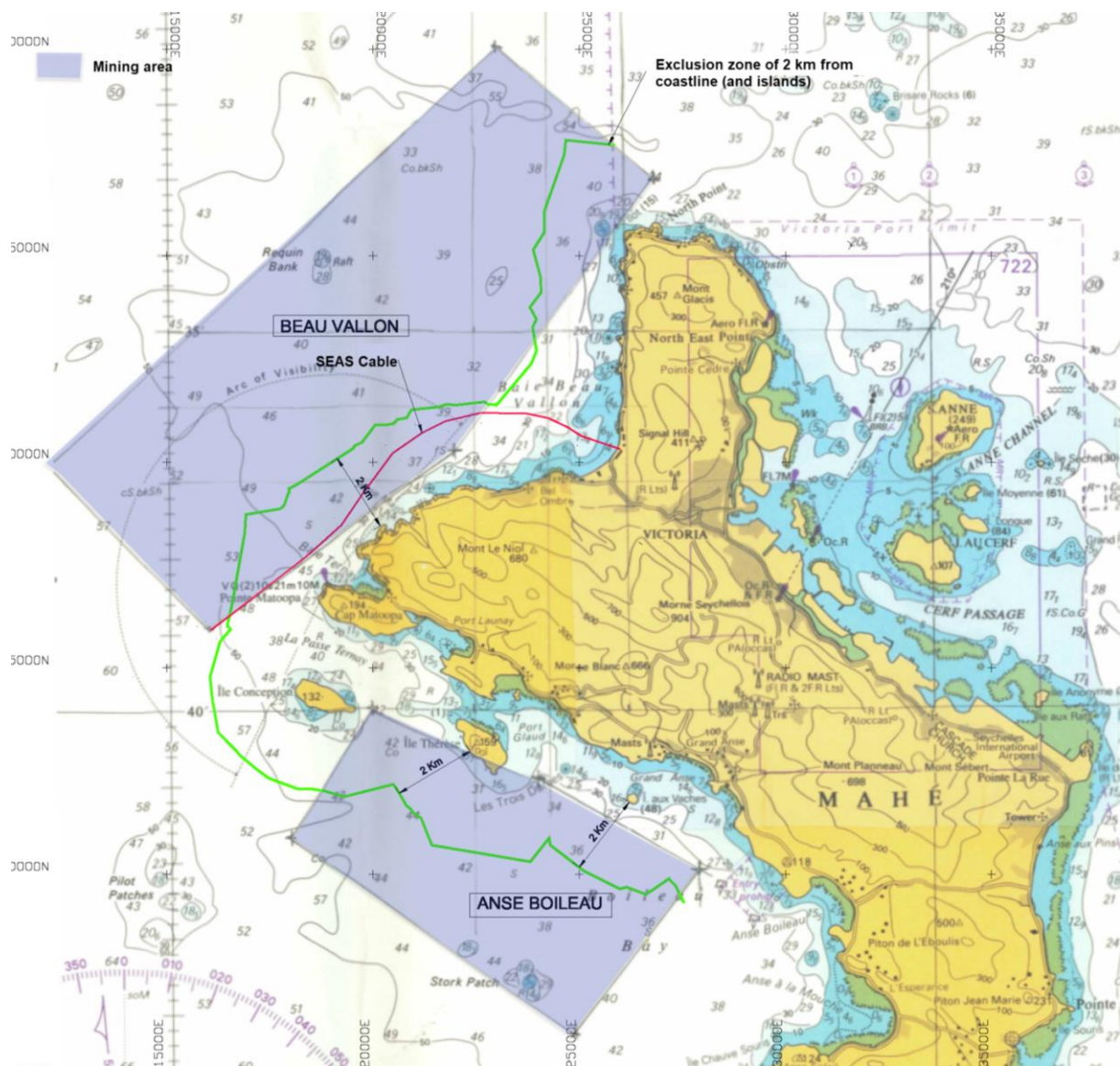


Figure 41 : Location of the marine mining area.

7.2.6. Military activities

There are no naval or coastguard bases near the landfalls. Exercise areas are not marked on the charts, and it is difficult if not possible to obtain detailed information about existing or planned areas military operations.

At this time, no military activity has been identified in our area of interest. The operator in charge of the installation of the cable will have to preliminary inquire to be sure of a lack of activity during the works.

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7.2.7. Charted obstructions and wrecks

No obstruction has been reported in the area of the proposed landfall.

If burial operations are envisaged, a survey is recommended on the final route to be sure that no obstruction or wreck are present along the cable route.

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8. IDENTIFICATION OF IMPACTS

This chapter presents environmental and social impacts that may result from the proposed development. Potential impacts are identified, mitigation measures listed and residual impacts, taking these measures into account, are described.

Potential impacts on environmental and social resources arising from the proposed development include direct and indirect (both permanent and temporary) impacts within the development area and surrounds. There are also potential for impacts relating to cumulative impacts of the proposed cable system and other developments.

The following sections outline these impacts, giving detailed explanations and assessment with regard to the predicted significance of the impacts. Where appropriate mitigation, management and enhance measures are identified to avoid, reduce or remove the predicted impact.

8.1. DEFINITION AND TYPES OF IMPACTS

An impact is defined as any change to a receptor brought about by the presence of a project component or by the execution of a project related activity. Evaluation of baseline data provides important information for the process of evaluating and describing how the project could affect the environment (physical, biological and socio-economic). Impact nature and type are:

- Positive: an impact is considered to represent an improvement on the baseline or introduces a positive change;
- Negative: introduces a new undesirable factor;
- Direct: direct interaction between the project planned activity and the environment (occupation of a site and the pre-existing habitats, other activities...);
- Indirect: impact that results from other activities that are encouraged to happen as a consequence of the project;
- Cumulative: impacts that act together with other impact, affect the same resource/receptor.

Impacts are described in terms of significance. Significance is a function of the magnitude and function of the extent, duration and intensity of the impact. The degree of change brought about in the environment:

- Extent
 - On site (limited to the site area only);
 - Local affect (an area in a radius of 30 km around the area);

- Regional (affect regionally the important environment resources, ecosystems);
 - National (affect nationally important environment resources, have a macro-economic consequences);
 - International (affect internationally important resources such as protected areas – international conventions).
- Duration
 - Temporary (short duration and intermittent/occasional);
 - Short-term (during construction period);
 - Long-term (during the life of the project, but ceases when the project stop operating);
 - Permanent (cause a permanent change in the affected receptor, resource (destruction of an habitat such as coral reef..) and endurs substantially beyond the project lifetime.
 - Intensity

	Environment	
	Biophysical	Socio-economic
Negligible	No detectable	No perceptible change people's away life
Low	No affect/No changes the natural functions	People are able to adapt with relative ease and maintain pre-impact livelihoods
Medium	Affect the natural functions	Able to adapt with some difficulty and maintain pre-impact livelihoods but only with a degree of support
High	Alterations, temporarily or permanently cease	Those affected will not be able to adapt to change and continue to maintain pre-impact livelihoods

8.2. IMPACTS

Modern submarine telecommunication systems are fiber optic cables using pulses of light to transport information. Coaxial cables, as the former standard, use electric current to carry information and are sporadically still in service. However, long-distance optical cables require repeaters and thus also need a constant power supply. Whereas coaxial cables have a diameter of up to 10 cm, fiber optic cables are only 2 – 5 cm thick.

Submarine cables are usually buried to minimize the risk of damage by, for example, anchors and fishing gears.

The various potential impacts of submarine cables differ considerably in terms of their spatial extent, duration, frequency and reversibility. A general overview is given in the following table.

Table 4 : Main environmental impacts associated with submarine cables.

Phase	Installation, maintenance, repair work and removal	Operational phase
Submarine Telecommunication cable	Seabed disturbance	Introduction of artificial hard substrate
	Damage/disturbance of organisms	
	Re-suspension of contaminants	
	Visual disturbance	
	Noise (Vessels, laying machinery...)	
	Emissions and wastes from vessels	

The various impacts act on different components of the ecosystem in different ways. Seabed disturbance may impact benthic organisms, underwater noise is most relevant for marine mammals, electromagnetic fields may have effects on sensitive fish and marine mammals and visual disturbance (including visual and aerial noise) has the potential to displace sensitive sea birds and seals. The extent of such impacts is determined by the technical design of the cables and the laying equipment. Some environmental impacts are mainly linked to the installation phase and/or maintenance, repair activities and removal. Others are only relevant during operation.

8.3. POSITIVE IMPACTS OF THE PROJECT

A number of positive benefits are predicted to be associated with the proposed development. Many of the positive aspects of the project relate to macro and micro-economic opportunities and benefits resulting from increased Information and communication technology connectivity, but many other secondary benefits including, social, employment and educational impacts will also be realized.

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8.4. NEGATIVE IMPACTS AND MITIGATION

Potential impacts are described for the pre-construction, construction, operational and decommissioning phases of the project.

For activities with significant impact, the project would be required to identify suitable and practical mitigation measures and fully implement them. The implementation of the mitigations is ensured through the Environmental Management Plan (EMP) to be followed by the project owner.

Contractors and involved sub-contractors are ISO 9001 and H&S certified, which reduces risk.

8.4.1. Pre-installation

The phase refers to initial route selection work which delineated the cable route, and subsequent onshore/offshore route selection survey work, the marine survey. It therefore includes a number of onshore surveys and the use of vessels and survey equipment. There are no impacts resulting from DTS (Desk Top Study) phase work (selection of the cable route).

The impacts of pre-installation are described in the next two paragraphs 9.4.1.1 and 9.4.1.2.

On the land aspect there is going to be some surveying work to demarcate the route by the surveyors.

8.4.1.1. Environmental impacts

Several techniques are used during route selection studies that include geophysical and geotechnical survey equipment, such as:

Example of geophysical and geotechnical equipment:

- Side scan sonar;
- Sub-bottom profiler;
- Multibeam/Singlebeam Echo Sounder;
- Magnetometer;
- Corer (gravity or vibrocorer);
- Grabber;
- Cone penetrometer.
- Etc.

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These equipment use non-intrusive techniques to record sea bed bathymetry or define the seabed nature. Coring, grabbing or penetration tests involve minimal ground disturbance at location.

Impacts from these survey techniques are all considerate to be low.

8.4.1.2. Social impact

There no discernible social impact associated with the pre-construction phase.

Indeed, cable survey could cause temporary disruption of the flow of shipping traffic or other activities (scuba diving, swimming...). This is particularly the case if the survey vessels have to maintain station for some time (during core penetration for example). However, the cable route avoids maritime corridors. These operations are limited to short periods of time and if it is necessary other marine activities can generally avoid working area without significant diversion.

The project will notify Ports Authority and main actors, so that vessels in the area would be warned in advance of the ongoing operations through a "Notice to Mariners or to marine users (divers...). The cables routes avoid major ports but the contractors will heighten awareness for potential danger posed by and to other vessels/activities (diving, snorkeling...) when working in areas.

8.4.2. Installation

For obvious reasons of scale proportions, the project does not impact the following environmental conditions:

- Local and regional meteorological conditions;
- Offshore metocean conditions;
- Local tide cycles;

Regarding these conditions, because their causes are global / at large- scale, they are very few impacted by a local disruption.

- Local geology or hydrogeology;

For example, installation of the BMH will not involve the construction of any new access roads or large impermeable surfaces that may impact the current surface or ground water flow. Impacts on hydrology are therefore predicted to be negligible.

The project does not imply a disturbance of the substratum; works will only concern shallow/superficial sedimentary layers

- Regional coastal geomorphology.

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The geomorphologic effects (bathymetric and sedimentary changes) of the project are very much localized to the work site.

8.4.2.1. Environmental impacts

Construction activities will result in some negative environmental impacts during route clearance and cable laying, especially to benthic ecosystem along the survey route.

However, at any one location the disturbance will occur over a very short duration. Natural recovery will readily occur, and impacts will therefore tend to be minor in nature.

Offshore and shallow water

The pre-laying grapple run

The grapnel will penetrate the seabed to a depth of up to 0.8 meters. Due to the intrusive nature of this operation some negative impact is unavoidable. Impacts include the generation of:

- A small amount of turbidity;
- Through physical contact mortality or injury to marine organisms, particularly plants and other organisms that have low mobility.

The pre-laying grapple run and cable installation will have some minor physical impact on sea bed geology. This impact will be limited to the area where the cable will be installed only and will vary in intensity depending on the installation method (cable burial in a trench or laying on the seabed).

Cable laying

The laying of cables leads to seabed disturbance and associated impacts of damage, displacement or disturbance of flora and fauna,

- Increased turbidity;
- Release of contaminants;
- Alteration of sediments.

These effects are mainly restricted to the installation, repair works and/or removal phase and are generally temporary. In addition, their spatial extent is limited to the cable corridor (in the order of 5 m width if the cable has been ploughed into the seabed).

Some mobile benthos is able to avoid disturbance and though sessile species (bivalves, tubeworms etc.) will be impacted.

Cable installation process will only result in short term direct impacts to the subtidal bottom habitats and assemblage present on intertidal area at the Perseverance beach

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landing point. The short-term loss of benthic organisms directly along the cable routes is not considered to represent an unacceptable ecological impact. The rapid natural reinstatement of the seabed will result in the area being available for rapid recolonization and hence, no permanent impacts are anticipated from cable project.

Raised turbidity and suspended sediment levels can have a number of adverse effects on marine organisms, particularly in areas that would normally have clear waters.

Where suspended sediment concentrations are present for prolonged periods, or are particularly high and widespread, visibility can be reduced affecting the ability of some fish to feed.

Raised turbidity can also reduce light penetration in the water column and reduce photosynthesis/productivity in sea grasses and affecting the coral reef presents in the area (2 fringing reefs).

Nevertheless, turbidity levels should be minimized during cable lay operations by minimizing the duration and extent of physical seabed disturbance.

Mitigation

No immediate mitigation known due to temporal nature of impact (less than 24h) would be selected. But this can be achieved using the sea plough burial method in preference to jetting wherever possible.

The Project will implement mitigation measures to reduce the risks of impacts on fauna with particular attention paid to sensitive marine species including marine mammals and turtles. This will include:

- Monitoring for the presence of marine mammals and turtles during marine activities;
- Working with an appropriate environmental organization to develop a notification process;
- Minimizing the impact of lighting at the beach areas;
- Work during austral winter, associated to southeastern wind, to avoid the entrance of the turbidity plume into the lagoon.

With appropriate mitigation the significance of impacts on fauna are predicted to be negligible.

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Air quality – Vessels operations

Cable laying will require use of dedicated cable lay vessels resulting in a number of general environmental impacts and risks. During normal operational activities vessels emit exhaust gases.

Assuming that the vessels are well maintained, emissions of pollutants will be minimal and within allowable limits.

Mitigation

To minimize air emissions the Project's cable laying vessels will operate in line with the requirements specified under MARPOL 73/78 Annex VI, Prevention of air pollution from ships.

When mitigated by compliance with MARPOL requirements, the impact of vessel operations on air quality is assessed as being of low significance.

The project should require that construction contractors operate only well-maintained engines.

Solid waste – Vessels operations

A variety of non hazardous (packaging...) and hazardous (oil wastes, paints...) wastes are typically generated during vessels operations.

Hazardous wastes can clearly have a toxic effect on organisms and can in some circumstances lead to bioaccumulation and ultimately lethal or sub lethal affects if badly managed. In addition, some non hazardous waste types can be equally harmful, particularly non degradable plastics that can remain at sea for many years posing an entanglement risk to sea birds and marine life.

Annex V of MARPOL prohibits the disposal to sea of any plastics whilst restricting the discharge of other non hazardous waste in coastal waters and in designated "Special Areas".

Hazardous waste should be stored on board the vessel until it can be disposed at a suitably equipped port, respecting the requirements of the Basel Convention on Transboundary Shipment of Hazardous Wastes.

Mitigation

When mitigated by compliance with MARPOL requirements, the impact of solid waste in vessel operations is assessed as being of low significance.

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Aqueous Discharges - Vessels operations

Planned aqueous discharges can include sewage water, grey waters (discharge from showers and sinks) and potentially contaminated drainage from the ship deck. Sewage and grey waters can have high bacteria levels, surfactants and a high Biological Oxygen Demand (BOD5), all which can result in potential human health issues and harm to marine organisms, particularly in sensitive areas or locations with poor mixing and dilution potential.

These wastewaters should therefore be managed in accordance with applicable international regulations and guidance, including the requirements of MARPOL 73/78, Annex IV (sewage).

MARPOL, Annex 1 also addresses discharge of oily waters, for example bilge waters. For ships of 400 gross tonnage and above, for control of oil from machinery spaces, waste water must have an oil concentration below 15ppm without any prior dilution. More specifically:

- Within special areas – discharges are prohibited, except when the ship is proceeding en route, and the oil content of the effluent without dilution does not exceed 15 ppm, and the ship has in operation oil filtering equipment with automatic 15 ppm stopping device.
- Outside special areas - discharges are prohibited, except when the ship is proceeding en route, the oil content of the processed bilge water (from machinery spaces) effluent is less than 15 ppm, and the ship has in operation an oil discharge monitoring and control systems, oily-water separating or filtering equipment.

Mitigation

When mitigated by compliance with MARPOL requirements and the impact of aqueous discharges (excluding ballast waters) in vessel operations is assessed as being of low significance.

Ballast water management - Vessels operations

It is possible that invasive (predominantly non-native) species may be unintentionally introduced. This has a potential impact habitats and fauna and flora if invasive species become highly aggressive, outcompeting native species and altering the structure and community composition of marine ecosystems.

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Mitigation

Marine vessels will be required to adhere to International Maritime organization (IMO) regulations on bilge and ballast water discharge in order to avoid unintentional introduction of non-native species to the marine environment.

Onshore

At the landing location there will be a small amount of construction work and environmental impact associated with the cable installation and construction of the onshore facilities. Much of this impact will be typical of general construction activity, resulting in short term waste generation and nuisance impacts (Noise, air quality...).

Cable laying, construction of BMH

In the terrestrial environment small amounts of soil will be disturbed during the excavation of the cable trench and during construction of the BMH.

The extent of the impact is limited to on-site and local. The duration will range from temporary to permanent as some impacts will last only a short while (effects of disturbance during construction) and some will cause a permanent change (habitat removal). Although the habitat type and flora species present are predominantly common and widespread, the magnitude of the change will be low as some natural processes will be affected because of small amounts of habitat loss, degradation or disturbance. The impact significance pre-mitigation is minor.

Mitigation

The Project will implement mitigation measures to minimize the extent of the impact to the terrestrial environment and to restore areas that are disturbed. This will include:

- Limiting clearing and restoring areas of disturbance;
- Using controls to prevent incursion into adjacent areas;
- Implementing a hazardous materials management plan;
- To prevent habitat alteration the reinstatement of trench material would be advised. Where possible and appropriate, top soil will be segregated and replaced on other back fill material to promote regeneration of vegetation.
- All soil that is disturbed during trench digging will be restored to approximate original depths as the trenches are backfilled.

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Waste

Construction wastes will be generated during onshore construction. Overall these are expected to be relatively small quantities although they may include some hazardous waste (oily rags, spent fuel cans, batteries etc.).

If a good waste management plan is planned, the impact of onshore waste is as being of low significance.

Mitigation

Waste management is required to avoid the risk of harm to the environment and human health

Air quality

The local air quality in the close proximity of onshore construction activities will be affected by emissions from mobile (construction vehicles) and stationary machinery (portable generators).

Mitigation

Assuming that the engines are well maintained, emissions of pollutants will be minimal and within allowable limits.

Dust

There is potential some dust generation during the construction at the shore crossing BMH and CLS, considering that the ducts are already existing. Dust is most likely to be generated during the transportation of materials on unpaved roads and during trench digging and soil movement.

Increased levels of dust in the air have the potential to impact environment (flora, communities) and social resources. However, the construction (BMH and CLS) period will be very short (approximately 3 weeks); any dust would be limited to the construction area, access route and very near surrounds only. Dust related impacts largely reversible within a short timescale. Therefore, no impacts are predicted to occur as a result of increased dust.

Mitigation

Dust suppression techniques, such as increasing the moisture content of excavated materials and roadways by applying water or nontoxic chemicals, can be used to reduce the amount of dust in the air, particularly where construction activities are taking place in close proximity to dust sensitive receptors e.g. residential/commercial areas. Other dust management measures include speed restrictions on dust generating vehicles.

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Noise

Construction traffic typically consists of large, heavy vehicles which will generate noise and vibration during the transportation of materials for construction of the landing site (BMH and CLS).

Impact to local residences, restaurants, hotel are not predicted to occur as the increase in noise levels associated with the construction of the landing site will only be small, will be limited to short construction period, and because construction will be taking place during day-light hours only.

Mitigation

The project will require contractors to use equipment and vehicles that are in good working order, well maintained, and that have all noise suppression equipment intact and in working order

Contractors will be required to implement best driving practices when approaching and leaving the site to minimize noise emissions

Protected area

There are several marine and coastal protected areas within the region including those which are statutorily protected by international and national legislation. One of the several protected areas to the study area is the Saint Anne marine park, which is located 2.5 km south east of Perseverance. There are no marine park in the area of the project.

Ramsar site

There are no Ramsar sites near the proposed project site.

8.4.2.2. Social impact

Perseverance landing site is a public beach dedicated to resident. There is no tourism activity in the area.

Human health and safety

There is potential for impacts on human health and safety to occur as result of accidents and unplanned events that may occur during the Project installation activities.

The project activities have the potential to results in a direct and indirect negative impact on human health and safety within the development area and near surrounds.

Extend of the impact is limited to on-site and local. The duration will range from temporary to permanent as some impacts will last only a short while (minor injury) and some may cause a permanent change (mortality related to vehicle or vessel strike).



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At risk are artisanal fishermen and other vessels (divers, jet-ski...) that may move at night-time or in reduced visibility conditions when the Project activities are taking place. Collision of Project vessels with fishing boat and nets or other vessels could result in damage of vessels and equipment, injury or loss of life.

Collision of Project vessels with fishing boats and nets or other vessels could result in damage of vessels and equipment, injury or loss of life. In the terrestrial environment, human health and safety could be impacted through road traffic accidents involving construction vehicles.

In onshore environment, human health and safety could be impacted through road traffic accidents involving construction vehicles. The risk of other injury associated with the construction activities at the landing site will be limited to the work force only (as the site will be secured to avoid public incursion into the active development area), but there is some risk of public injury associated with the installation of the cable between the landing site and CLS as this construction will not be fenced.

Mitigation

- All active construction areas will be marked with high-visibility tape to reduce the risk accidents.
- All open trenches and excavated areas will be backfilled as soon as possible after the construction has been completed. Access to open trenches and excavated areas will be secured to prevent pedestrians or vehicle from falling in.
- The project will require all contractors to implement an Environmental, Health and safety plan which will outline procedures for avoiding health and safety incidents and for emergency medical treatment.
- Contractors will be required to wear suitable personnel protective equipment (hard hats, high-visibility vests, safety boots and gloves and life vests).
- All construction and cable repair workers will sufficiently be trained in the safe methods of working with fiber optic cables to avoid injury associated with laser lights and fibers.
- While a ship is laying its maneuverability is restricted, as such it will display the day signals and lights of a hampered vessel to avoid collision with other vessels at sea.
- Vessels will increase watch when navigating in areas that are known to be used by fishermen and other vessels. If other vessels are observed within the near vicinity, the project vessel will stop moving and contact the other vessel if possible and wait until it has been confirmed that the course of both vessels will not result in collision or damage to equipment.

Cable survey and installation could cause temporary disruption to the flow of recreational sea use.

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However, these operations are limited to short periods of time and other activities can generally avoid the work area without significant diversion.

The project will notify the ports authority and others activities, so that vessels in the area would be warned in advance of the ongoing operations through a “Notice to recreational sea users” report transmitted daily.

No impacts to marine activities are thus predicted to occur a result of the project activities.

Visual – landscape

The onshore facilities will either be buried in the case of beach man holes and therefore little visual impact is envisaged.

Mitigation

Efforts will be made to minimize visual impacts; land disturbed by cable laying will be contoured to its original form as part of overall reinstatement.

Odor, Heat and Radiation.

The project will not result in any significant increases in odor, heat or radiation conditions.

Transport Infrastructure

There are no formal or regularly used transport networks (eg roads, ferries) within the site area and no major shipping routes will be impacted by the development. No impacts to transport networks and their function are predicted to occur because of the development.

Education

No negative impacts on education levels or educational facilities are predicted to occur because of the proposed development.

Fishing

Minor interruptions to fishing operations and fish auctioning are expected to occur only during the cable’s deployment phase. This disturbance is predicted to be localized to the area in which the activities occur and near surrounds only and will be short term and progressive in its nature as the activities move along the cable route corridor. Any disturbance to fisheries will be temporary.

Mining

The cable route will not cross the marine mining areas.



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Cultural Heritage

There are no known sites of significant cultural heritage or archaeological interest in the vicinity of the terrestrial components of the development.

There are procedures to address Cultural Heritage in case of discoveries during marine survey and they would be followed. Nothing is expected on land as it is Reclaimed Lands. During the route marine survey, owing to the history of Seychelles, coastal wrecks may be identified to be the most probable cultural resources within the development area and near vicinity, and dealt with the Maritime Authorities, if need be: none have been identified during the desktop study (DTS).

Landscape and Visual Receptors

There will be small amounts of increased light pollution during the construction period at the BMH because of security lighting. There will be no permanent lighting at the beach area.

8.4.2.3. Potential Cumulative Impacts

The terrestrial areas along the coast are currently under pressure due to development activities. Known development planned or active in the marine environment includes the extension of Aurore Island, and the construction of the mega-yacht marina.

The impacts associated with the Project are all minor and would not have a significant interaction with the activities associated with the other planned activities in terms of environmental and social impacts.

Positive cumulative impacts on social and economic receptors resulting from the Project and this development are likely to occur during the progressive development of the site facilitated by improved communications infrastructure and broad access.

8.4.3. Operational Impacts

During operation it is expected that the cable will have no significant negative environmental or social impacts. During the operational phase there will be no routine maintenance of the cable and the cable will have a passive influence on the environment.

8.4.3.1. Electromagnetic fields

Electromagnetic fields are generated by operational transmission cables. Electric fields increase in strength as voltage increases.

In addition, induced electric fields are generated by the interaction between the magnetic field around a submarine cable and the ambient saltwater.

Magnetic fields are generated by the flow of current and increase in strength as current increases. The strength may reach the multiple of the natural terrestrial magnetic field. In general, HVDC cables produce stronger electromagnetic fields than AC cables.

The World Health Organization has considered the effects on EMF on marine life. It concludes that although all organisms are exposed to the geomagnetic field, marine animals are also exposed to natural electric fields caused by sea currents moving through the geomagnetic field. Electrosensitive fish, such as sharks and rays in oceans, can orient themselves in response to very low electric fields by means of electroreceptive organs.

It acknowledges that some investigators have suggested that human-made Electromagnetic fields from undersea power cables could interfere with the sensing or navigational abilities of these animals in the immediate vicinity of the sea cables. However, none of the studies performed, to assess the impact of undersea cables on migratory fish or pelagos and all the relatively immobile fauna inhabiting the sea floor (benthos), have found any substantial behavioral or biological impact.

The potential impact to marine life from electromagnetic fields is considered to be low.

8.4.3.2. Exposed cables

Cables can become exposed on beaches and in other areas prone to erosion. In addition to the unsightly nature of an exposed cable at low tide, it represents a safety risk to beach users and also substantially increases the risk of cable failure.

For landing beach crossing, the cable is typically installed inside a PCV pipe with an outside diameter in the order of 100 mm diameter and buried in a trench 2 m deep dug previously by equipment such as a backhoe. In the unlikely event of severe erosion resulting in the pipe becoming exposed it will be reburied.

The cable during operations is considered to be minimal and therefore the impact of exposed cables is assessed to be low.

8.4.4. Decommissioning

It is expected that the cable will be abandoned in place at the end of the Project's lifetime. No impacts are predicted to occur in association with the cable during this stage of the Project.

The cable will continue to have a passive influence on the environment and will be benign, so will not degrade or pollute the environment.

A full decommissioning plan will be developed at the end of the cable's useful life and it will consider best practice at that time. The plan will consider the potential for environmental and social impacts for the decommissioning alternatives.

8.5. SUMMARY OF ENVIRONMENTAL IMPACT

The potential impacts from the project are limited in scope and are mainly associated with the pre-installation and installation phases. Potential impacts during operations and decommissioning are negligible.

This study indicates that there will be no impacts or negligible impacts on the following resources:

- Soils and geology;
- Oceanography characteristics;
- Air quality;
- Protected areas;
- Landscape and visual receptors;
- Noise and vibration receptors;
- Traffic;
- Social and cultural structure;
- Culture heritage.

Detailed impact assessment was carried out for three potential impact areas:

- Habitats, fauna and flora;
- Water quality;
- Human activities (recreational, fisheries), health and safety.

Potential impact without mitigation			Project stage															
Area of impact	Description	Degree of impact	Onshore				Shallow water				Offshore							
			Construction (BMH)	Cable Installation	Operation / Maintenance	Decommissioning	Marine Route Survey (excl. Vessels)	Route clearance (excl. Vessels)	Submarine cable installation	Vessels (All operation)	Operation/repair	Decommissioning	Marine Route Survey (excl. Vessels)	Route clearance (excl. Vessels)	Submarine cable installation	Vessels (All operation)	Operation/repair	Decommissioning
Environment																		
Geology and soils		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrology		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Meteorology	Winds, rainfall	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oceanography	Swell, current...	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ecology	Terrestrial	Temporary, reversible, direct	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Coral reef	Temporary, reversible, indirect	0	0	0	0	0	1	1	1	1	0	0	1	1	1	1	0
	Seagrass bed	Temporary, reversible, indirect	0	0	0	0	0	1	1	1	1	0	0	1	1	1	1	0
	Marine fauna/flora	Temporary, reversible, direct	0	0	0	0	0	1	1	1	1	0	0	1	1	1	1	0
	Marine habitats	Temporary, reversible, direct	0	0	0	0	0	1	1	1	1	0	0	1	1	1	1	0
Protected area/Ramsar		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Water quality	Sediment disturbance causing turbidity discharges	Temporary, reversible, indirect	0	0	0	0	0	1	2	1	1	0	0	1	2	1	1	0
	Discharges	Temporary, reversible, indirect	1	1	0	0	0	1	2	1	1	0	0	1	2	1	1	0
	Accidents which cause spills	Temporary, reversible, indirect	0	0	0	0	0	1	2	1	1	0	0	1	2	1	1	0
Waste	Generation of wastes	Temporary, reversible, indirect	1	1	1	0	0	1	1	1	0	0	0	1	1	1	0	0
Air quality (Local)	Dust	Temporary, reversible, indirect	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Gaseous emissions	Temporary, reversible, direct	1	1	1	0	0	1	1	1	1	0	0	1	1	1	1	0

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Potential impact without mitigation			Project stage															
Area of impact	Description	Degree of impact	Onshore				Shallow water				Offshore							
			Construction (BMH)	Cable Installation	Operation /Maintenance	Decommissioning	Marine Route Survey (excl. Vessels)	Route clearance (excl. Vessels)	Submarine cable installation	Vessels (All operation)	Operation/repair	Decommissioning	Marine Route Survey (excl. Vessels)	Route clearance (excl. Vessels)	Submarine cable installation	Vessels (All operation)	Operation/repair	Decommissioning
Environment																		
Air quality (Local)	Odour	Temporary, reversible, direct	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Heat/radiation		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Social																		
Traffic	Impacts on traffic in area	Temporary, reversible, direct	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	0
		Temporary, reversible, direct	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	creation of new building, landscape	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cultural and heritage	Impacts to sites of cultural or archeological interest	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Impacts on fisheries activities	Temporary, reversible, indirect	0	0	0	0	1	1	2	2	1	0	1	1	2	2	1	0
	On tourism - diving sites, recreational activities	Temporary, reversible, indirect	1	1	1	0	1	1	2	2	1	0	1	1	2	2	1	0
Human activities	Impact on shipping and anchorage	Temporary, reversible, indirect	0	0	0	0	1	1	2	2	1	0	1	1	2	2	1	0
	Impact on mining activities	Temporary, reversible, indirect	0	0	0	0	1	1	1	1	1	0	1	1	1	1	1	0
	Impact on dredging/submarine cable/hydrocarbon activities	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Impact on employment	Positive																

Table 5: Summary of impacts without mitigation 0: No impact, 1: minimal impact, no need for specific mitigation; 2: low to medium impact, need basic mitigation; 3 medium to high, need specific mitigation measures and careful monitoring program to ensure no adverse effects.

9. ANALYSIS OF ALTERNATIVES

The analysis of alternatives is a component of the ESIA process. Its purpose is to improve project design, construction and operation decisions based on feasible project alternatives. Early consideration of alternatives during the design phase of a project can result in the avoidance/minimization of impacts without the need for expensive or time-consuming mitigation measures at a later stage.

The cable has a small diameter and is designed to be benign in the marine environment. Nevertheless some impacts are likely including:

- Impact to flora and fauna, ecosystems;
- Disruption to recreational activities;
- Disruption/loss of income to fishing communities;
- Construction related nuisance (noise, dust, exclusion areas) ;
- Environmental and health risks.

The impact of others, most notably exclusion areas where fishing and anchoring activity is prohibited, can be minimised if existing corridors (with existing exclusion areas) are used.

During the early stages of Project design an extensive desk top study (DTS) was undertaken to identify a preferred route. Throughout this study environmental issues were considered and potential impacts minimised through selection of the best route. The general philosophy included:

- Use of existing onshore facilities where possible;
- Avoidance of environmental sensitivities (protected areas, sensitive species...);
- Installation of pre-fabricated facilities where exiting facilities were unavailable;
- Use of existing corridors (and existing exclusion areas).

Six landing sites alternative have been explored (Figure 42) and are discussed in the Table 6.

#	Landing Point	Benefits	Constraints
1	Perseverance North 4°36'7.33"S 55°27'54.15"E	Close to new CLS. Direct landing. Rock wall easy to dismount and re-install properly. Sea route away from ship traffic lines and anchoring zones. Duct already installed - Less land work	
2	Perseverance South 4° 36.508'S 55° 28.192'E	Easy direct landing	Military spot not directly accessible No sand beach but rocky bottom. No duct installed
3	Port Launay 4°39'15.33"S 55°23'58.10"E	Existing non-anchoring zone. Easy direct landing.	No ducts available and very long land route across mountain. Crossing of private real estate (Ephelia) Marine Park
4	Anse Nord'est 4°34'4.63"S, 55°27'24.19"E	Reasonable land route along the coast	Very exposed to North-East swell Erosion in progress
5	Anse Macchabee 4°33'52.98"S, 55°26'50.05"E	Reasonable land route along the coast	Rocky bottom Exposed to North-east swell.
6	Beau Vallon	Existing cable (SEAS)	Lack of redundancy for international cables. Far from new CLS.

Table 6: Comparison of the six landing site options.

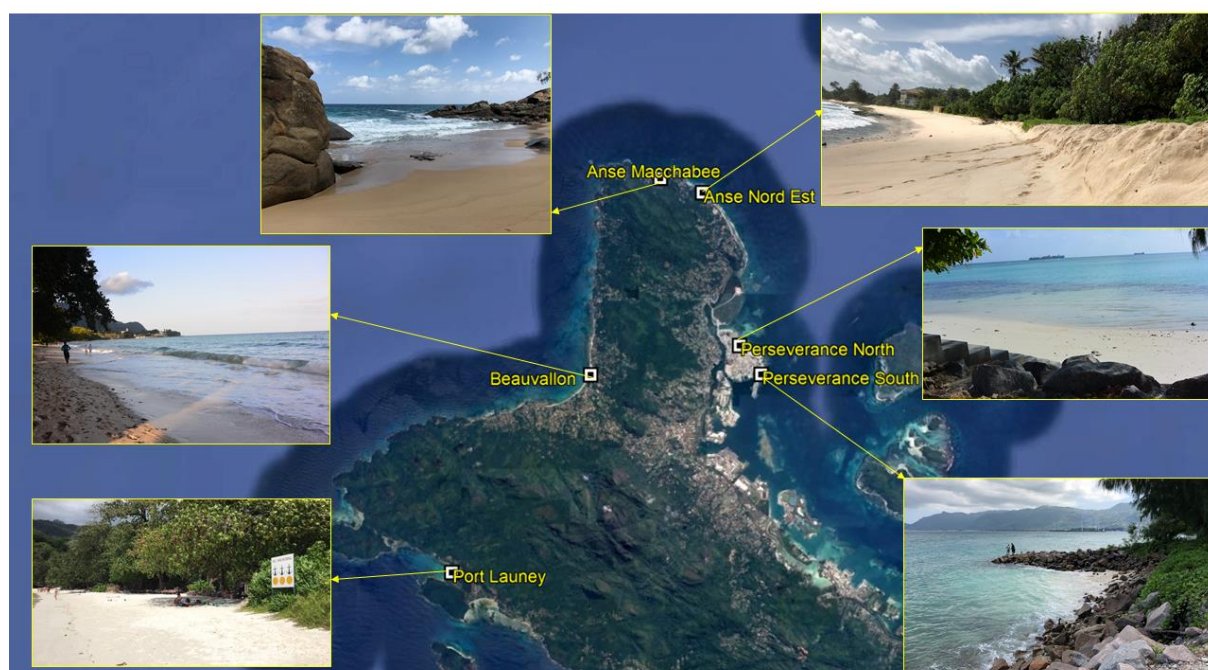


Figure 42 : Location and photography of the alternative landing sites studied.

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10. ENVIRONMENTAL MANAGEMENT PLAN

10.1. DESCRIPTION

In the project impact assessment studies, mitigation measures and best practice have been designed in order to avoid, minimize and reduce negative environmental and social impacts. These measures are reflected in this Environmental Management Plan (EMP) as a set of mitigation measures.

Mitigation measures, when proposed to offset negative impacts are also examined, and whenever necessary, further mitigation is proposed for the efficient protection of environment.

To ensure the actions are managed fully and that unforeseen or unidentified impacts of the project are detected and resolved the project has developed an Environmental Management Plan (EMP).

The contractor will have a key role in delivering on the measures set out in the EMP, as the project proponent, the company selected will have the ultimate responsibility for ensuring the measures are delivered. In this respect the company selected will review and approve contractor plans for delivery of the actions contained in the EMP and during project installations and operation and will review contractor performance through monitoring, audits and inspection. The company will appoint an Environmental Health and safety Coordinator (EHSC) to oversee the implementation of the EMP.

The contractors will be responsible for ensuring compliance with all relevant legislation as well as adherence to all environmental and social mitigation measures specified in the EMP.

Contractors are responsible for managing the potential environmental, social, health and safety impacts of all contact activities whether these are undertaken by themselves or by their subcontractors. The contractor will be required to undertake regular environmental and social inspections and provide reports to allow the company selected and evaluate performance against the measures and objectives established in the EMP.

Detailed action plans will be developed by the contractors to implement the mitigation and management measures outlined in the EMP. The project will continue to engage with stakeholders throughout project installation and operation. The company selected will develop a stakeholder engagement plan to guide the consultation and disclosure activities through the project execution phases. The stakeholder engagement plan will contain a grievance procedure to manage stakeholder issues.

The successful implementation of this EMP requires co-operation between the various parties involved in Project construction, and particularly between the project proponents



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(Company selected) and the Project contractors: key personnel for EMP implementation are the Environmental Health and Safety Coordinator (EHSC).

10.1.1. Company's role

Although the contractor will have a key role in delivering measures in the EMP, as the project proponent, the company will have the ultimate responsibility for ensuring that measures are delivered. In this respect the company will review and approve contractor plans for delivery of the actions contained in the EMP and during project installation and operation and will review contractor performance through monitoring, audits and inspection. Where the measures set out in the EMP do not result in the achievement of objectives, the company will work with the contractor to refine the measures.

The company will appoint an Environmental Health and Safety Coordinator (EHSC) to oversee the implementation of the EMP. The EHSC will ensure that the overall objectives of the environmental and social mitigation measures are met. This will be done by monitoring the implementation of these actions and also by monitoring their success. The EHSC will have the power to stop the work at any time should the actions established in the EMP not be followed.

10.1.2. Contractor's role

During construction (pre-installation and installation), contractors will be engaged to provide technical services and construction. Contractor will be responsible:

- For ensuring compliance with all relevant legislation as well as adherence to all environmental and social mitigation measures specified in the EMP;
- For managing the potential environmental, social, health and safety impacts of all contract activities whether these are undertaken by themselves or by their subcontractors;
- For demonstrating to the company's satisfaction how compliance with the requirements of the EMP will be ensured;
- For expecting to demonstrate commitment to the EMP at all levels in the contractor's management structure;
- For requiring to identify individuals responsible for overall environment, social (community relations) and health and safety management.

The contractor will be required to undertake regular environmental and social inspections and provide reports to allow the company to monitor and evaluate performance against the measures and objectives established in the EMP.

10.1.3. Action plans and stakeholder's engagement

10.1.3.1. Action plan



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Detailed actions plans will need to be developed by the contractors to implement the mitigation and management measures outlined in the EMP. Actions plans could include those as summarized:

- Environmental Health and Safety Plan;
- Journey Management Plan;
- Spill Prevention Control, containment and emergency response plan;
- Marine Logistics Plan;
- Waste management plan;
- Construction site management plan (BMH);
- Erosion control and restoration plan.

ESIA and ESMP preparation costs are estimated around 100kUSD.

Any survey activity is protected by Contractor's management plan: For instance, Survey ship (belonging to well-known EGS Company) follows the Healthy & Safety rules of marine activities and Surveyor(s) endure(s) no specific risk.

10.1.3.2. Stakeholder's engagement

The project should continue to engage with stakeholders throughout project installation and operation. Main objectives of communication and liaison with stakeholders are:

- To provide interested stakeholders in the vicinity of the project with regular information on the progress of work and its implications;
- To monitor implementation of mitigation measures and the impact of construction on communities via direct monitoring and feedback from those affected;
- To manage any disputes between the company, the contractors and local people.

The company will develop a Stakeholder Engagement Plan to guide the consultation and disclosure activities through the project execution phases. The Stakeholder Engagement Plan will contain a grievance procedure to manage stakeholder issues.

10.1.4. Implementation of the EMP

10.1.4.1. Implementation

The EHSC will be accountable for delivering the actions contained in the EMP. The company will train employees and contractors with direct responsibility for activities relevant to the project's social and environmental performance so that they have the knowledge and skills necessary to perform their work, including implementation of the actions made in the EMP.



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10.1.4.2. Monitoring and audit

Monitoring will be undertaken during the project activities to:

- Ensure that the EMP is implemented;
- Provide enough information to permitting authorities and financial lenders;
- Provide information on environmental and social performance to affected stakeholders;
- Assess efficiency of mitigation actions for all stages of project implementation.

Contractors will be required to self-monitor their performance with respect to environmental and social performance. The EHSC will also undertake regular environmental audits and random spot checks throughout the project lifecycle. All audit findings will be reviewed by the project and where corrective actions are deemed necessary, specific plans will be developed, aimed at achieving continuous improvement in performance. The monitoring plan is included in ESMP.

10.1.4.3. Reporting

Contractors will be required to provide the company regular reports on environmental and social performance at a frequency appropriate for the stage. The project will also develop a system of internal reporting that provides solid internal communication on the full range of environmental and socio-economic issues.

10.2. RECOMMENDATION SYNTHESIS

Globally, project activities are expected to have no effect on the environmental or social environment. This is mainly a result of the benign nature of the Project and the associated activities as well as the result of the integration of preventative measures into the project design. The environmental assessment does indicate some potential for limited environmental and social impacts to habitats and flora; fauna; water quality; and human health and safety. The most notable impact is on the coral reef and seagrass areas due to the local and momentary increase in turbidity during the burrowing of the cable.


The potential is reduced through the implementation of standard mitigation measures and industry best practices, none of which are excessive in cost.

Given the low potential for negative impacts and the high potential for significant positive benefits (both direct and indirect), the Project would be deemed to have a high level of environmental and social acceptability.

In order to strengthen institutional capacity, there is a provision included for a workshop, relating to environmental and social capacity building, with AfDB, if need be.

The following table summarizes the recommended environmental management plan.



	Environmental and Social Impact Assessment Study (ESIAS) of PEACE subsea cable project Regulatory file - BIO	SCS Ltd
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Code	Potential environmental impact	Mitigation/Enhancement measures	Monitoring/implementation	Time frame	Deadline for the completion of measure	Estimated cost	Monitoring verification method	Implementation responsibility
I1	Physical environment	Not specific mitigation required	NA	NA	NA	NA	NA	NA
I2	Terrestrial	<ul style="list-style-type: none"> - Limiting dearing and restoring areas of disturbance - Controls to prevent incursion into adjacent areas - All soil that is disturbed during trench digging will be restored to approximate original depths as the trenches are backfilled (sandy beach, rock armor with a new geotextile and the backshore) - Realize the work on the beach during a period of low tourism 	<ul style="list-style-type: none"> - Hazardous materials management plan - Erosion control and restoration plan - Construction site management plan 	Pre-installation and installation	Duct to BMH is planned in Q2 2020	Estimated €400K for construction	<ul style="list-style-type: none"> - Contractors monthly reporting - Weekly check of beach restoration for one month followed by check one per month for six-month international audit program 	Civil work company under SCS monitoring and control
I3	Marine fauna/flora, Habitats	<ul style="list-style-type: none"> - Marine vessels will be required to adhere to IMO regulations on bilge and ballast water discharge in order to avoid tensional introduction of non-native species to the marine environment - Areas of habitat that are temporarily disturbed during installation activities will be rehabilitated ASAP after the cable has been installed - The project will ensure that measures are adopted to avoid incursion into areas adjacent to the work site, especially the coral areas, or any secondary affects from pollution, sedimentation, or accident spills - The project will also require that marine vessels have a similarity comprehensive plan for storage and handling of hazardous materials as well as a plan for containment and cleanup of accidental spills into the marine environment - Contractors will implement a suitable system for spotting marine mammals and turtle whist pre-installation and installation vessels are at sea. Should these species be observed in the vicinity of the work area. The vessels will execute measures to avoid collision or disturbance. Vessel operators will 	<ul style="list-style-type: none"> - Construction site management plan - Hazardous Materials Management Plan - Marine Logistics Plan - Waste Management Plan - Marine Fauna Protection Procedure; - Daily fauna observation report - Lighting Plan - Notification procedure - Environmental training and awareness raising for contractor personnel - Erosion control and restoration plan 	Pre-installation and installation	Cable laying is planned to be completed by February 2021	Laying operations including environmental monitoring are estimated at €500K	<ul style="list-style-type: none"> - Daily self-check and verification by contractors - Monthly reports on performance by contractors to company - Weekly review of grievances recorded - Internal audit program (company) - Lighting plan to approved by EHSC - Weekly check of beach restoration for one month followed by check one per month for six-month internal audit program 	Laying is of the responsibility of the Contactor, HMN with Global Marine partner. SCS Project Manager is supervising the actions

Code	Potential environmental impact	Mitigation/Enhancement measures	Monitoring/implementation	Time frame	Deadline for the completion of measure	Estimated cost	Monitoring verification method	Implementation responsibility
		<p>maintain a distance of 100m or greater and will travel 10 knots or less when safety permits until animals are more than 500m away. Abrupt changes in direction will be avoided</p> <ul style="list-style-type: none"> - Vessel crews must report sightings of any injured or dead marine mammals and sea turtles immediately, regardless of whether the injury or death is caused by a project vessel. The report should include the date and location (latitude/longitude) of the animal/strike, the name of the vessel involved, and the species identification or a description of the animal. The report should be made to a designated ecology organization - Security lighting will be aimed on the area it is required at an adequate level of illumination only to avoid impacts on sensitive I4fauna. Spillage of illumination outside the direct work area will be avoided - Consider the installation of an anti-MES barrier during the burrowing phase of the cable to limit the impact of resuspension of sediment on the corals and seagrass - Advise jetting work period in austral winter (southeastern trade wind) to promote the discharge of the turbidity plume out of the lagoon 						
14	Protected area/Ramsar	No specific mitigation required	NA	NA	NA	NA	NA	NA
15	Water quality	<ul style="list-style-type: none"> - Marine vessels will be required to comply fully with the requirements of the MARPOL Protocol (1978) at all times - Marine vessel anchors will not be dragged along the seabed and they will be retrieved vertically to avoid unnecessary sediment disturbance - The maximum speed of the cable laying will not exceed 5knots per hour so that the amount of seabed sediment 	<ul style="list-style-type: none"> - Marine logistic plan - Journey Management plan - Spill prevention control containment and emergency response plan 	Pre-installation and installation	Marine route survey is planned in Q1 2020 Cable laying is planned in Q1 2021	€2000	<ul style="list-style-type: none"> - Daily self-check and verification by contractors - Monthly reports on performance by contractors to company - Internal audit program 	Global Marine (HMN) under SCS supervision

Code	Potential environmental impact	Mitigation/Enhancement measures	Monitoring/implementation	Time frame	Deadline for the completion of measure	Estimated cost	Monitoring verification method	Implementation responsibility
		disturbed and dispersed during the cable laying process can be kept to a minimum	- Hazardous materials management plan					
16	Waste	- Waste management is required to avoid the risk of harm to the environment and human health	Waste management plan	Pre-installation and installation	During survey & Lay	€2000	Daily self-checks and verification by contractors (...)	EGS & Global Marine (HMN) under SCS supervision
17	Air quality (local)	<ul style="list-style-type: none"> - The Project should require that construction contractors operate only well-maintained engines - Should considerable dust generation occur during construction, causing plumes of dust in the vicinity of the works and behind construction vehicles, a routine wetting program of all unpaved surfaces including roads and construction areas will be undertaken to ensure sufficient moisture content is maintained to suppress dust generation - Construction traffic speed control measures will be enforced on unpaved roads (reduced dust generation levels are often consistent with reduced traffic speeds) - Operation in line with the requirements specified under MARPOL 73/79 Annex VI 	<ul style="list-style-type: none"> - Dust management measures - Vehicle maintenance records - Placement of traffic signs indicating the speed limit along the route used by construction vehicles - Construction Site Management Plan 	Pre-installation and installation	During survey & Lay	€2000	<ul style="list-style-type: none"> - Internal audit Program - Daily self-checks and verification by contractors - Monthly reports on performance by contractors to company - Weekly review of grievances recorded 	EGS & Global Marine (HMN) under SCS supervision
18	Heat/radiation	Not specific mitigation require	NA	NA	NA	NA	NA	NA

Code	Potential social impact	Mitigation/Enhancement measures	Monitoring/implementation	Time frame	Deadline for the completion of measure	Estimated cost	Monitoring verification method	Implementation responsibility
19	Maritime Traffic	<ul style="list-style-type: none"> - Make contact with the other vessel to avoid collision or damage - Vessels will increase watch when navigating in areas that are known to be used by fishermen and other vessels 	Construction site management plan	Pre-installation and installation	Cable laying is planned to be completed by February 2021	€4000	<ul style="list-style-type: none"> - Internal audit Program - Daily self-checks and verification by contractors 	Laying is of the responsibility of the Contractor, HMN with Global Marine partner. SCS Project Manager is supervising the actions
110	Noise	- Use equipment and vehicles in good working order, well maintained	- Best driving practices	Pre-installation	Duct to BMH is	€2000	- Internal audit program	Civil work company under SCS monitoring and control

Code	Potential social impact	Mitigation/Enhancement measures	Monitoring/implementation	Time frame	Deadline for the completion of measure	Estimated cost	Monitoring verification method	Implementation responsibility
		- The Project will require contractors to use equipment and vehicles that are in good working order, well maintained, and that have all noise suppression equipment (mufflers, noise baffles) intact and in working order	- Vehicle maintenance records - Journey management plan - Placement of traffic control signs indicating traffic rules and enforcement of fines and a penalty system for non-compliances	and installation	planned in Q2 2020		- Daily self-checks and verification by contractors - Monthly reports on performance by contractors to company - Weekly review of grievances recorded	
I11	Visual Pollution	Efforts will be made to minimize visual impacts: land disturbed by cable laying will be contoured to its original form as part of overall reinstatement	NA	Pre-installation and installation	Duct to BMH is planned in Q2 2020	€2000	Internal audit program	Civil work company under SCS monitoring and control
I12	Cultural and heritage	Not specific mitigation required	NA	Pre-installation and installation	NA	NA	Internal audit program	NA
I13	Human activities (fisheries activities. On tourism - diving sites, creational activities...)	- Contractors will be required to wear suitable Personal Protective Equipment including hard hats, high-visibility vests, safety boots and gloves and life vests as appropriate in accordance with the EHS plan - All construction and cable repair workers will be sufficiently trained in the safe methods of working with fiber optic cables to avoid injury associated with laser lights and fibers - All open trenches and excavated areas will be backfilled as soon as possible after the construction has been completed. Access to open trenches and excavated areas will be secured to prevent pedestrians or vehicles from falling in - Vessels will increase watch when navigating in areas that are known to be used by fishermen and other vessels. If other vessels are observed within the near vicinity, the project vessel will stop	- Environmental, Health and Safety Plan - Health and Safety training and training records - Health and safety incident register - Marine Logistics Plan - Regular health and safety meetings with all parties in attendance and official minutes taken	Pre-installation and installation	Cable laying is planned to be completed by February 2021	€5000	- Daily checks and verification by contractor - Monthly reports on performance between contractors to company - Internal audit program	Laying is of the responsibility of the Contactor, HMN with Global Marine partner. SCS Project Manager is supervising the actions

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Code	Potential social impact	Mitigation/Enhancement measures	Monitoring/ implementation	Time frame	Deadline for the completion of measure	Estimated cost	Monitoring verification method	Implementation responsibility
		<ul style="list-style-type: none"> - moving, make contact with the other vessel if possible, and wait until it has been confirmed that the course of both vessels will not result in collision or damage to equipment - While a ship is laying cable its maneuverability is restricted, as such it will display the day signals and lights of a hampered vessel to avoid collision with other vessels at sea - Trenches and excavated areas will be backfilled ASAP Require to wear suitable personnel protective equipment - Require day signals and lights of a hampered vessel to avoid collision with other vessels at sea - Fishing representatives to be informed of cable laying schedule and exclusion zones - Community stakeholders to be informed of cable laying schedule and exclusion zones - Local fishermen and other sea users will be informed about the presence of the cable vessel and location of the cables. 						

The estimated cost for the implementation of the ESMP amounts to 917 K€.

	Environmental and Social Impact Assessment Study (ESIAS) of PEACE subsea cable project Regulatory file - BIO	SCS Ltd
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11. CONCLUSION

The environmental and social assessment study for the installation of a new fiber optic telecommunications cable network from Seychelles to Pakistan & East Africa Connecting Europe (PEACE) main system suggest that project activities are expected to have no effect on the environmental or social environment.

The study does indicate some potential for limited environmental and social impacts to habitats and flora; fauna; water quality; and human health and safety. The most notable impact is on the coral reef and seagrass areas due to the local and momentary increase in turbidity during the burrowing of the cable. However as indicated by the Department of Government, the cable route avoids areas with environmental issues (the patch of corals and seagrass on the NE part of the island).

The stakeholder's opinion recommends Perseverance landing site with favourable environmental and social context.

Given the low potential for negative impacts and the high potential for significant positive benefits (both direct and indirect), the Project would be deemed to have a high level of environmental and social acceptability.

The Environmental Management Plan proposed is an instrument that details the measures to be taken during the implementation and operation of the project to eliminate or offset adverse environmental and social effects, or to reduce them to acceptable levels; and the actions needed to implement these measures. This plan shall be sent to the contractor for due execution by themselves and their subcontractors.

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13. APPENDICE: SCOPING FORMS





MINISTRY OF ENVIRONMENT, ENERGY & CLIMATE CHANGE
ENVIRONMENTAL ASSESSMENT AND PERMITS SECTION (E.A.P.S)
SCOPING VERIFICATION FORM

PROJECT TITLE: New Submarine Fiber Optic Cable

PROPONENT/CONSULTANT: Department of Information and Technology (DICT)

LOCATION: _____

ISSUES DISCUSSED

(Please use additional sheets if required- a separate sheet is to be used for each organization/person undergoing scoping)

Re: Environmental Impact Assessment study (EIAS) for New Submarine Fiber Optic Cable

The Department of Culture has no objection in regards to the installation of a new Submarine Fiber Optic Cable in the northern part of Mahe for the following reasons:

There is no cultural activities organized in this area, activities are organized on the playing field or near the church.

There are no cultural sites or artefacts that are known to the Department in this area.

However there is a need to inform the District Administrator about the upcoming development so that they will be able to inform the community of Perseverance.

I thank you for your understanding.

Kind Regards

Julienne Barra
Department of Culture

PERSON/ORGANISATION SCOPED

NAME: _____ **Post Title:** _____


ORGANISATION: _____

Phone Number: _____ **Mobile Number:** _____

Email Address: _____

SIGN: _____ **DATE:** _____

The completed form can be posted on the following e-mail addresses Mrs Nanette Laure-
n.laure@env.gov.sc Mrs Marie-Alise Rosette m.rosette@env.gov.sc or contact the ENV ASSESSMENT
AND PERMITS SECTION-Ministry of Environment, Energy & Climate Change-Tel; 4670594 to organise
for collection.

	<p align="center">MINISTRY OF ENVIRONMENT, ENERGY & CLIMATE CHANGE ENVIRONMENTAL ASSESSMENT AND PERMITS SECTION (E.A.P.S) SCOPING VERIFICATION FORM</p>
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PROJECT TITLE: New Submarine Fiber Optic Cable

PROPONENT/CONSULTANT: Department of Information and Technology (DICT)

LOCATION:

ISSUES DISCUSSED

(Please use additional sheets if required- a separate sheet is to be used for each organization/person undergoing scoping)

Following scoping meeting for the landing area of the fibre optic cable the biodiversity conservation division have made the following observations and concerns herewith ;

- The selected area at the Ile perseverance seems to be a good option for landing of the cable as it is not a natural beach and those are usually more frequented by various animal species such as nesting turtles.
- The patch of corals and sea grass on the NE part of the island is not within the proposed route of the fibre optic cable so it poses no threat of destruction.
- Are there new habitats in the area, growing coral over the past ten years after the ile perseverance development? Consultation of the IEA report from the WEP division of the Ile Perseverance development may shed some light on the various studies conducted in the area prior but knowledge of the site right now will put us in a better position for decision making and setting of conditions.

PERSON/ORGANISATION SCOPED

NAME: Kevin Moamou **Post Title:** Senior Conservation Officer

ORGANISATION: Department of Environment (BCS)

Phone Number: 2814805 **Mobile Number:** 4670541

Email Address: kmoumon@env.gov.sc

SIGN:  **DATE:** 14-02-19

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MINISTRY OF ENVIRONMENT, ENERGY & CLIMATE CHANGE
ENVIRONMENTAL ASSESSMENT AND PERMITS SECTION (E.A.P.S.)
SCOPING VERIFICATION FORM

PROJECT TITLE: New Submarine Fiber Optic Cable

PROPOSER/CONSULTANT: Department of Information and Technology (DICT)

LOCATION:

Department of Local Government

ISSUES DISCUSSED

(Please use additional sheets if required- a separate sheet is to be used for each organization/person undergoing scoping)

- Pathway of Cable from Vallistan, France to Seychelles plus mitigation measures at ocean floor and landing point at Perseverance Beach.
- Risk of Anchorage - Mitigation Measures taken by Port Authority to establish no anchorage corridor which will be highlighted on Marine Charts
- Risk to picnickers, Cable will be laid 2 meters from bedrock of the beach at Perseverance

Perseverance I District Administration

PERSON/ORGANISATION SCOPED

NAME:

Andre Gabriel

Post Title:

District Administration

ORGANISATION:

Department of Local Government

Phone Number:

Mobile Number:

2814821

Email Address:

perseveranceda@gov.sc

SIGN:

DATE:

22/02/19

The completed form can be posted on the following e-mail addresses Mrs Nanette Laure-
n.laure@env.gov.sc Mrs Marie-Alice Rosette m.rosette@env.gov.sc or contact the ENV ASSESSMENT
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for collection.



MINISTRY OF ENVIRONMENT, ENERGY & CLIMATE CHANGE
ENVIRONMENTAL ASSESSMENT AND PERMITS SECTION (E.A.P.S)
SCOPING VERIFICATION FORM

PROJECT TITLE: New Submarine Fiber Optic Cable

PROPONENT/CONSULTANT: Department of Information and Technology (DICT)

LOCATION: Ile Perseverance 2 beach

ISSUES DISCUSSED

(Please use additional sheets if required- a separate sheet is to be used for each organization/person undergoing scoping)

With the coming of the second fiber optic cable, the country will benefit from fast internet access. This will facilitate the government offices, the business community, students and other people who uses internet in their daily life and operations.

As discussed, Ile Perseverance is the ideal place other than Beau Vallon for this cable to land and the district is equipped with the right trenching which is already there to facilitate the works needed. It will not embarrass anybody as said the work will be carried out only for three days.

Some people have been told about the cable and work to be carried out, they have no objection and are looking forward to it, as they will benefit in one way or another whilst using internet. It will be more reliable in case of an accident with the first one and internet will be cheaper.

As DA, I give my blessing to this project.

PERSON/ORGANISATION SCOPED#

NAME: _Pharisiannne Lucas **Post Title:** District Administrator

ORGANISATION: Ministry of Local Government (Ile Perseverance 2 DA)

Phone Number: 2810200 (Office) **Mobile Number:** _2722688

Email Address: perseverance2da@gov.sc / plucas@gov.sc

SIGN: _____ *plucas* **DATE:** _____ 12/02/19 _____

The completed form can be posted on the following e-mail addresses Mrs Nanette Laure-
n.laure@env.gov.sc Mrs Marie-Alise Rosette m.rosette@env.gov.sc or contact the ENV ASSESSMENT
AND PERMITS SECTION-Ministry of Environment, Energy & Climate Change-Tel; 4670594 to organise
for collection.



MINISTRY OF ENVIRONMENT, ENERGY & CLIMATE CHANGE
ENVIRONMENTAL ASSESSMENT AND PERMITS SECTION (E.A.P.S)
SCOPING VERIFICATION FORM

PROJECT TITLE: New Submarine Fiber Optic Cable

PROPONENT/CONSULTANT: Department of Information and Technology (DICT)

LOCATION: Off Isle Perseverance

ISSUES DISCUSSED

(Please use additional sheets if required- a separate sheet is to be used for each organization/person undergoing scoping)

Location site: This site is on the reclaimed land and will require removal of rock armouring and the breaching of the anti-siltation barrier. As a consequence a floating siltation barrier will need to be installed around the site prior to work commencing with appropriate facility to remove suspended silt from the trapped water during trenching and pipe laying activities. The anti-siltation membrane will need to be repaired after pipe laying to prevent excessive leach out of fine sediment.

Near shore trenching: The basin where the pipe is likely to come ashore appears to be a basin cut by the previous dredging to reclaim the now adjacent land; as such this may be a hard limestone bed with a layer of fine sediment which leaches out from the reclaimed land. If so, this will require cutting of the trench with a cutter suction head or similar. Blasting should not be allowed in this area due to its proximity to the Marine National Park and potential damage to fish and other marine life. Again, due to the location and very fine sediments found in this area, effective siltation barriers should be deployed around the working site with appropriate facility to remove suspended silt from the trapped water during trenching and pipe laying activities.

Impact to the marine environment: Due to this location being on a man-made island there is little of ecological value on the rock armouring or the adjacent sea floor which has been dredged clean in the previous land reclamation process. The major risks to adjacent marine life and the St. Anne's Marine National Park is that of increase siltation both during the works and afterwards if remedial anti-siltation steps are not taken.

PERSON/ORGANISATION SCOPED

NAME: Dr. David Rowat

Post Title: Chairman

ORGANISATION: MARINE CONSERVATION SOCIETY SEYCHELLES

Phone Number: 4248356

Mobile Number: 2513671

Email Address: david@mcsc.sc

SIGN:

DATE: 26/2/2019

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for collection.



MINISTRY OF ENVIRONMENT, ENERGY & CLIMATE CHANGE
ENVIRONMENTAL ASSESSMENT AND PERMITS SECTION (E.A.P.S)
SCOPING VERIFICATION FORM

PROJECT TITLE: New Submarine Fiber Optic Cable

PROPONENT/CONSULTANT: Department of Information and Technology (DICT)

LOCATION: Cable to land in an area on the eastern side of Ile Perseverance, Mahe.

ISSUES DISCUSSED

(Please use additional sheets if required- a separate sheet is to be used for each organization/person undergoing scoping)

In a GIS point of view, the Centre for GIS does not find any issues regarding the laying and landing of the Fibre Optic Cable, which can negatively impact the environment.

The Centre therefore has no adverse comments regarding this matter.

PERSON/ORGANISATION SCOPED

NAME: Francis Coeur de Lion **Post Title:** Director GIS

ORGANISATION: Ministry of Habitat, Infrastructure and Land Transport

Phone Number: 4674444 **Mobile Number:** 2724 803

Email Address: fcoeurdelion@gov.sc

SIGN:

DATE: 20 February 2019

The completed form can be posted on the following e-mail addresses Mrs Nanette Laure-
n.laure@env.gov.sc Mrs Marie-Alise Rosette m.rosette@env.gov.sc or contact the ENV ASSESSMENT
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**MINISTRY OF ENVIRONMENT, ENERGY & CLIMATE CHANGE
ENVIRONMENTAL ASSESSMENT AND PERMITS SECTION (E.A.P.S)
SCOPING VERIFICATION FORM**

PROJECT TITLE: New Submarine Fiber Optic Cable

PROPONENT/CONSULTANT: Department of Information and Technology (DICT)

LOCATION: MHILT Conference Room 201

ISSUES DISCUSSED

Meeting conducted 6th February 2019.

In attendance:

Michel Laporte – Infrastructure Department MHILT

Patrick Lablache – Consultant MHILT

Alvin Alcindor – Centre for GIS MHILT

Paul Pierre – DICT

Eric Delort – iXBLUE

Purpose:

To gather additional information from MHILT to complement Environment Impact Assessment for the new fibre-Optic cable route.

Information Required:

Possible alternative location for the landing point. West mahe was explored but was found not to be feasible. Eastern Perseverance so far best possible location. No structures where landing point will be. No dredging activities forecasted. Possible reclamation north of Perseverance but well away from the cable route. Possible offshore extraction again well away from the cable route.

Request for bathymetric survey: To be made available by Mr. Patrick Lablache

Request for Cross-sectional drawings of rock armouring: To be made available by Mr. Michel Laporte (attached)

Request for future reclamation: To be made available by Mr. Patrick Lablache

Cable will be buried under seabed for a least 18 km off Mamelles Island.

PERSON/ORGANISATION SCOPED

NAME: Michel Laporte

Post Title: Director Design

ORGANISATION: Ministry of Habitat Infrastructure & Land Transport

Phone Number: 4674463

Mobile Number: 2722587

Email Address: mlaporte@mluh.gov.sc

SIGN:

DATE: 18th February 2019

The completed form can be posted on the following e-mail addresses Mrs Nanette Lauren n.laure@env.gov.sc Mrs Marie-Alise Rosette m.rosette@env.gov.sc or contact the ENV ASSESSMENT AND PERMITS SECTION-Ministry of Environment, Energy & Climate Change-Tel; 4670594 to organise for collection.



MINISTRY OF ENVIRONMENT, ENERGY & CLIMATE CHANGE
ENVIRONMENTAL ASSESSMENT AND PERMITS SECTION (E.A.P.S)
SCOPING VERIFICATION FORM

PROJECT TITLE: New Submarine Fiber Optic Cable

PROPONENT/CONSULTANT: Department of Information and Technology (DICT)

LOCATION: PetroSeychelles

ISSUES DISCUSSED

(Please use additional sheets if required- a separate sheet is to be used for each organization/person undergoing scoping)

We discussed the entry point of the fibre Optic cable on Ile Perseverance Island. PetroSeychelles is of the view that this entry point will not affect its operations. PetroSeychelles requested however that a shape file of the final coordinates of the cable be made available for its GIS database. We noted that this meeting concerned only the environment aspect and that a different team will visit later and may need to interact for future discussions. PetroSeychelles will be available for such future meetings.



PERSON/ORGANISATION SCOPED

NAME: Patrick Samson

Post Title: Exploration Manager

ORGANISATION: PetroSeychelles

Phone Number: 4324422

Mobile Number: 2501220

Email Address: p.samson@petroseychelles.com

SIGN: _____

DATE: 6 February 2019

The completed form can be posted on the following e-mail addresses Mrs Nanette Laure-
n.laure@env.gov.sc Mrs Marie-Alise Rosette m.rosette@env.gov.sc or contact the ENV ASSESSMENT
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MINISTRY OF ENVIRONMENT, ENERGY & CLIMATE CHANGE
ENVIRONMENTAL ASSESSMENT AND PERMITS SECTION (E.A.P.S)
SCOPING VERIFICATION FORM

PROJECT TITLE: New submarine Fiber Optic Cable

PROPONENT/CONSULTANT: Department of information and Technology

LOCATION: _____

ISSUES DISCUSSED _____

(Please use additional sheets if required- a separate sheet is to be used for each organization/person undergoing scoping)

Sewerage

PUC has a proposed sewage treatment plant (STP) on the northern tip of Ile Aurore. As part of the STP, a sea-outfall will be built to discharge the treated effluent into the sea. The outfall will be laid along the sea-bed and will have an approximate length of 1.0 KM.

PERSON/ORGANISATION SCOPED

NAME: Steve Mussard

Post Title: Managing Director (Water & Sewerage)

ORGANISATION: Public Utilities Corporation

Phone Number: 4678000 _____ Mobile Number: 2717180

Email Address: smussard@puc.sc

SIGN: _____

DATE: 11-02-2019

The completed form can be posted on the following e-mail addresses_ Mrs Nanette Laure, n.laure@env.gov.sc ; Mrs. Marie-Alise Rosette, m.rosette@env.gov.sc; or contact the ENV ASSESSMENT AND PERMITS SECTION-Ministry of Environment, Energy & Climate Change-Tel; 4670500 to organise for collection.

NOTE: TO PROPONENT/CONSULTANT - PLEASE RETURN EACH COMPLETED FORM TO THE MINISTRY OF ENVIRONMENT AND ENERGY AS AN APPENDIX TO THE SCOPING REPORT



MINISTRY OF ENVIRONMENT, ENERGY & CLIMATE CHANGE
ENVIRONMENTAL ASSESSMENT AND PERMITS SECTION (E.A.P.S)
SCOPING VERIFICATION FORM

PROJECT TITLE: New submarine Fiber Optic Cable

PROPONENT/CONSULTANT: Department of information and Technology

LOCATION: _____

ISSUES DISCUSSED

(Please use additional sheets if required- a separate sheet is to be used for each organization/person undergoing scoping)

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Phone Number: 4678000 _____ Mobile Number: 2717180

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MINISTRY OF ENVIRONMENT, ENERGY & CLIMATE CHANGE
ENVIRONMENTAL ASSESSMENT AND PERMITS SECTION (E.A.P.S)
SCOPING VERIFICATION FORM

PROJECT TITLE: New Submarine Fiber Optic Cable

PROPONENT/CONSULTANT: Department of Information and Technology (DICT)

LOCATION: SEYCHELLES COAST GUARD (SCG) PERSEVERANCE

PROPOSED LOCATION FOR LANDING OF SECOND OPTIC FIBER CABLE

ISSUES DISCUSSED

(Please use additional sheets if required- a separate sheet is to be used for each organization/person undergoing scoping)

On the 05th Feb 2019 at 1430, Mr Paul Pierre assisted by two agent from ixblue (Mr Eric Delort) came to Seychelles Coast Guard at Perseverance. They had a small interaction with me Major David Arrisol assisted by Lt Samuel King and Mr Denis Naidoo.

The aim of the visit was for the ixblue representative to show us the SCG where they are planning to land the second optic fibre cable. The first proposal is on the beach at perseverance and the second place is close to the PUC desalination plant.

We at the SCG explained to them that the boundary around our base is completely surrounded by coral reef. We also ensure them that the SCG do not have any hazardous matter or equipment positioned in the sea around it base. We also advise them that if they want to carry out any diving or other activities in the area around our base they have to inform us and permission will be granted accordingly.

We also advise them to get a better detail topography of the area at the MLUH. After the meeting ended they went with Lt S King and Mr Denis Naidoo to take a few photograph of the area outside the SCG base and they left.

SEYCHELLES COAST GUARD

PERSON/ORGANISATION SCOPED

NAME: MAJOR DAVID ARRISOL Post Title: TECHNICAL OFFICER

ORGANISATION: SPDF

Phone Number: 4610293 Mobile Number: 2810870

Email Address: arrisoldavid@yahoo.co.uk

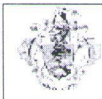
SIGN:

DATE:

06 Feb 19



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n.laure@env.gov.sc Mrs Marie-Alise Rosette m.rosette@env.gov.sc or contact the ENV ASSESSMENT
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MINISTRY OF ENVIRONMENT, ENERGY & CLIMATE CHANGE
ENVIRONMENTAL ASSESSMENT AND PERMITS SECTION (E.A.P.S)
SCOPING VERIFICATION FORM

PROJECT TITLE: Fibre optic

PROPONENT/CONSULTANT

LOCATION:

ISSUES DISCUSSED

(Please use additional sheets if required- a separate sheet is to be used for each organization/person undergoing scoping)

- Point discuss which relate to fisheries
- Vessels anchorage: There are a few vessels which are using the proposed sites as their landing sites. The cable will be buried at depth greater than 1m, so fishers can still use this site as their landing site
 - They will avoid corals, so minimum impact on fish habitat
 - Need to know if the land near the proposed site have been set for fisheries activities so that there is proper planning of infra-structure development

In general the proposed site will not have significant ^{negative} impact on the fishery industry

PERSON/ORGANISATION SCOPED

NAME: Calvin Gerry Post Title: Deputy CEO

ORGANISATION: SFA

Phone Number: 4670312 Mobile Number:

Email Address: cgerry@sfa-sc

SIGN:

DATE: 4/2/19

The completed form can be posted on the following e-mail addresses Mrs Nanette Laure-
n.laure@env.gov.sc Mrs Marie-Alice Rosette m.rosette@env.gov.sc or contact the ENV ASSESSMENT
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MINISTRY OF ENVIRONMENT, ENERGY & CLIMATE CHANGE
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SCOPING VERIFICATION FORM

PROJECT TITLE: New Submarine Fiber Optic Cable

PROPOSER/CONSULTANT: Department of Information and Technology (DICT)

LOCATION:

ISSUES DISCUSSED

(Please use additional sheets if required- a separate sheet is to be used for each organization/person undergoing scoping)

Dr Delort and his team introduced me to the New Submarine Fiber Optic Cable project. I was fully informed of the geographic location of the cable from starting to the end point in France and specifically of the routing of the cable in Seychelles waters. The cable is to come in from East Africa in the North of Mahe.

This is to confirm that SIF does not have any objections to the proposed route and landing area at the beach of Perseverance. Contrary we find this the best possible option in regards to mitigating any environmental impacts of the project.

SIF cannot assist with any marine habitat maps for this area but as mentioned maybe Dr David Rowat from the Marine Conservation Society Seychelles might be in a better position. We recommend that a unclassified remote sensing exercise is being undertaken and suggest that the GIS sections of the Department of Environment or Habitat and Land Use can be of assistance with satellite imagery. SIF also provided contact details of Dr Rowat for further follow up to the consultant Dr Delot.

Seychelles Islands Foundation (SIF)

PERSON/ORGANISATION SCOPED

NAME: Frauke FLEISCHER-DOGLEY **Post Title:** CEO

ORGANISATION: Seychelles Islands Foundation (SIF)

Phone Number: +2482321735 **Mobile Number:** +2482712377

Email Address: ceo@sif.sc

SIGN:

DATE: 7th February 2019

The completed form can be posted on the following e-mail addresses Mrs Nanette Laure-
n.laure@env.gov.sc Mrs Marie-Alise Rosette m.rosette@env.gov.sc or contact the ENV ASSESSMENT
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MINISTRY OF ENVIRONMENT, ENERGY & CLIMATE CHANGE
ENVIRONMENTAL ASSESSMENT AND PERMITS SECTION (E.A.P.S)
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PROJECT TITLE: New Submarine Fiber Optic Cable

PROPONENT/CONSULTANT: Department of Information and Technology (DICT)

LOCATION:

ISSUES DISCUSSED

(Please use additional sheets if required- a separate sheet is to be used for each organization/person undergoing scoping)

- No adverse comments as long as the cable does not pose any direct dangers to Navigation.

PERSON/ORGANISATION SCOPED

NAME: Richard Ernesta Post Title: Director

ORGANISATION: SNBSA

Phone Number: 4224866 Mobile Number: 2722160

Email Address: director@snbsa.sc

SIGN:



Director

DATE:

13/02/19

The completed form can be posted on the following e-mail addresses Mrs Nanette Lauren n.laure@env.gov.sc Mrs Marie-Alise Rosette m.rosette@env.gov.sc or contact the ENV ASSESSMENT AND PERMITS SECTION-Ministry of Environment, Energy & Climate Change-Tel; 4670594 to organise for collection.



MINISTRY OF ENVIRONMENT, ENERGY & CLIMATE CHANGE
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PROJECT TITLE: New Submarine Fiber Optic Cable

PROPONENT/CONSULTANT: Department of Information and Technology (DICT)

LOCATION:

ISSUES DISCUSSED

(Please use additional sheets if required- a separate sheet is to be used for each organization/person undergoing scoping)

The SPA has no objection to the location of the site as long as DICT/Consultants gets the necessary clearance from other stakeholders such as MHILT, SFA, SMSA, Coast Guard, etc...

SPA recommends that cables and dredging restrictions are kept clear of the Port Victoria anchorage and also that future development such as the yacht marina and other potential development should be taken into consideration (check with SIB).

PERSON/ORGANISATION SCOPED

NAME: Diana Renaud Post Title: Social Impact Officer

ORGANISATION: Seychelles Ports Authority

Phone Number: 4294736 Mobile Number:

Email Address: drenaud@seyport.sc

SIGN:

DATE:



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n.laure@env.gov.sc Mrs Marie-Alise Rosette m.rosette@env.gov.sc or contact the ENV ASSESSMENT
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