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AFRICAN DEVELOPMENT BANK GROUP

PROJECT : MULTINATIONAL SEYCHELLES SUBMARINE CABLE PROJECT

COUNTRY : SEYCHELLES

SUMMARY OF THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

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LIST OF ACRONYMS

AfDB	African Development Bank
BMH	Beach Man Hole
DFI	Development Finance Institutions
EASSy	East African Submarine Cable System
EHSC	Environmental Health and Safety Coordinator
EIA	Environmental Impact Assessment
EIB	European Investment Bank
ESAP	AfDB Environment and Social Assessment Procedures
ESIA	Environment and Social Impact Assessment
ESMP	Environmental and Social Management Plan
MARPOL	International Convention for the Prevention of Pollution from Ships
NEMC	National Environmental Management Council
RAMSAR	The Convention on Wetlands of International Importance
SEAS	Seychelles East Africa System
ZANTEL	Zanzibar Telecom Ltd

Environmental and social impact assessment (ESIA) Summary

Project title	:	**SEYCHELLES SUBMARINE CABLE PROJECT**
Country	:	**SEYCHELLES**
Project reference	:	**P-SC-GB0-002**

1. INTRODUCTION

This document is a summary of the Environmental and Social Impact Assessment (ESIA) for the proposed Seychelles East African System (SEAS) submarine cable project. Two separate ESIA Reports for the Seychelles and Tanzania respectively have been prepared and finalised by iXSurvey in 2010. Visits were made to the participating countries (Seychelles and Tanzania) in the autumn of 2009.

This ESIA Summary is prepared in accordance with the African Development Bank's (AfDB) 2001 Environmental & Social Impacts Assessment Procedures (ESAP). In order to fulfil the requirements of the Bank's Information Disclosure and Public Consultation Policy, this ESIA summary will be posted on the Bank's website at least 60 days prior to presentation of the investment proposal for Board approval.

Specifically, this summary provides information on project activities; anticipated impact of the project activities; measures to be put in place to mitigate identified adverse impacts; and institutional arrangement to facilitate implementation and monitoring of the environmental management plan.

2. PROJECT DESCRIPTION & JUSTIFICATION

2.1.Project Description

The submarine cable system (SEAS) will include installation of approximately 2 000 km of subsea cable, running from Beau Vallon Seychelles to shore crossing and landing site in Dar es Salaam in Tanzania (**Figure 1**). The cable will consist of an inner optical fibre, surrounded by a polyethylene or fibreglass core for strength and fibre separation. The cable will rest off the continental shelf on the seabed in deep water, and will be buried to a target depth of at least 1.0 metre below the seabed in shallower waters (0-1000m).

The system will have a terrestrial component in the two countries which will provide the link between the marine component and the domestic telecommunications network.

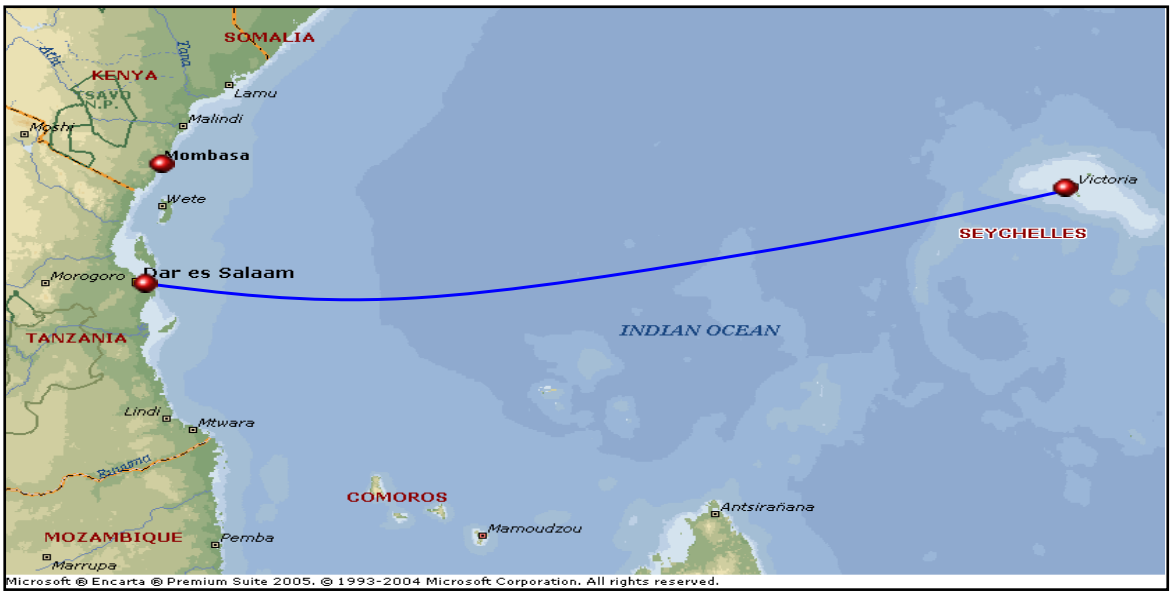

Figure 1: The proposed Seychelles Cable Telecommunication Network

2.2. Project Justification

Currently, the Seychellois telecommunications operators heavily rely on satellite systems to carry the bulk of their international traffic. The proposed SEAS cable will directly link Seychelles (Victoria, on the Mahé Island**)** to Tanzania (Dar Es Salaam). This connection will allow the project company to buy capacity on the East African Submarine Cable System[1] (EASSy) for onward international connectivity. The configuration of the system is a 1 fibre pair cable equipped at a maximum of 32 wavelengths, allowing a maximum design system capacity of 320 Gbit/s. Fibre optic cables provide increased bandwidth, higher transmission speed and are significantly cheaper than satellite.

3. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

The SEAS ESIA studies have been carried out in accordance with the Environmental Policy, Procedures and Guidelines of the AfDB and have also taken in to account the requirements of the European Investment Bank (EIB). Specifically, the ESIAs conform to the AfDB Environment and Social Assessment Procedures (ESAP, 2001). The ESIAs, with regards to the near-shore and the onshore portions also conform to the national regulations of the Seychelles and Tanzania in which the landing points are situated.

3.1. Legislative and Institutional Framework

ESIA in the Seychelles is governed by the provisions of the Environment Protection Act No.9 of 1994. The implementation of the project requires administrative clearance from the Ministry of Environment and Natural Resources, in conformity with the provisions of the

[1] The African Development Bank provided USD 14.5m for the financing of the EASSy cable, "a 10,000km submarine fibre-optic cable system deployed along the east and south coast of Africa, making it economical to connect the eastern and southern coast of Africa into the high-speed global telecommunications network.

Act. The Ministry is mandated to monitor and follow-up on the implementation measures highlighted in the impact study reports. Furthermore, at present the country is implementing its second, ten year Environment Management Plan (2000-2010) whose guidelines must also be referred to by developers and their consultants to ensure that all key issues specified in the guidelines are addressed in the Environmental Impact Assessment (EIA).

In Tanzania, the Environmental Management Act No.20 (2004) encompasses all matters pertaining to the environment. The Act defines standards and procedures, duties and limits, and obligations of all stakeholders. In addition and specifically, the Environmental Impact Assessment Guidelines and Audit Regulations (2005) provide the legislative framework for the impact assessment process from screening of projects to their review. All environmental issues in Tanzania are regulated and controlled by the Minister for the Environment under the Vice Presidents Office. Two institutions provide technical support to the Ministry: the Division of Environment, which is responsible for issuing all environmental certificates based on advice from the Technical Review Committee; and the National Environment Management Council, established by Act of Parliament No.19 of 1983, to perform an advisory role to the government on all matters relating to environmental management including review of ESIA procedure and monitoring of environmental management plans.

4. DESCRPTION OF PROJECT ENVIRONMENT

4.1.Seychelles

4.1.1. The bio-physical environment

Geography: Seychelles 115 granite and coral islands extend from between 4 and 10 degrees South of the Equator and lie between 480 km and 1,600 km from the East coast of Africa in the Western Indian Ocean. The Republic occupies a land area of approximately 455 km² and an Exclusive Economic Zone of 1.4 million km². The interior geologic structure of Seychelles is mainly composed of Granite; the Granit layer extends to a depth of 13 km.

Soils: The coastal shore lands of Beau Vallon consist of calcareous sands. The coastal plain is composed of a number of different soil types: sandy alluvial soils and marsh dominate most of plateau with the more elevated areas consisting predominantly of clay/sandy red earth; laterites and to a lesser extent pale brown kaolonitic clays; and pockets of laterites and kaolinitic clays (red earth) behind the coastal plain.

Hydrology: Two main rivers emptying into the Bay, the Sullivan River and the Mare Anglaise River; which form the main estuaries in the area. There are also five smaller rivers in the study area. There is no in-depth seepage and virtually no groundwater reservoirs. Despite the retarding effect of the dense vegetation, the runoff water concentration times are very short and as a consequence, rainfall immediately causes flooding in certain areas.

Meteorology: Average temperature is relatively stable (between 26 and 28°C). The monsoon is characterized by 2 seasons and 2 inter-seasons: North-east monsoon (November to March), rainiest with norois winds (North-easterly; and South-east monsoon (May to September), driest, windiest with suete winds (South-easterly. The calmest period is between April and November.

Oceanography, and sea temperature and salinity: Seasonal swell due to monsoon (norois: < 2m during 93% of the time, suete: > 2m during 40% of the time) and exceptional cyclonic swells (very low probability). Slow intensity of the current (maximum 1 to 2 knots); Longshore drift: oriented from North to South/Southwest at the Beau vallon site. Foreshore area: Beau vallon: 450 m length. Sea surface temperature is stable between November to May (at least 29°C) and lowest one during the South-east monsoon; Surface salinity is relatively stable and around 35.2 parts per million (PPM).

Terrestrial habitats: There is a wetland (0.215ha) in the Beau Vallon area; however it is of significant distance from the landing site.

Marine Habitats: The Beau Vallon costal zone is ecologically diverse, both spatially and in terms of biodiversity. Eight areas can be considered to be of significance (**Table.1**):

Table.1: Areas of ecological significance (Beau Vallon)

Area	Size M^2	Description
Northern Fringing Reef	700,000	Coral Reef
Southern Fringing Reef	260,000	Coral Reef
Northern Fringing Reef Flat	250,000	Inter-tidal and littoral ecosystem
Southern Fringing Reef Flat	62,500	Inter-tidal and littoral ecosystem
Mare Anglaise Rivers Estuary	5,500	Ecosystem of estuaries and enclosed seas
Sullivan river Estuary	3,900	Ecosystem of estuaries and enclosed seas
Mare Anglaise River wetlands	46,800	River and stream ecosystems
Sullivan River Wetlands	15,600	River and stream ecosystems

Marine fauna: Seychelles is sanctuary for diverse species of flora and fauna. Two orders of marine mammals (Sirenia and Cetacea) occur in Seychelles waters. And although not situated along any important migratory route, migratory species, especially waders, occur regularly.

Specifically, four species of sea turtles are found in Seychelles waters. However, only the Green turtle (*Cheloniamydas*) and the Hawksbill turtles (*Erethmochelys imbticata*) nests in the Seychelles. The main nesting sites are the Marine National Parks of Ste. Anne and Curieuse, and the two Special Reserves of Cousin and Aride located several kilometres away.

Protected areas and RAMSAR sites: There are no protected areas in the vicinity of the proposed landfall; neither are there any designated RAMSAR sites.

4.1.2. Socio-economic context

Population: Beau Vallon has a population of approximately 7,000 or 9% of the total Seychelles. The main employer is the tourism sector.

Fisheries: There are a very small number of artisanal fishers in the Bay, with about 25 fishing boats, making the area the second largest fishing site on Mahé. Coastal fishing at the Beau Vallon bay is mainly dominated by hand-lines, traps and beach seines. The annual tonnage caught is estimated at some 1,100 tons. Most fishing activity takes place from boats: there is also a small amount of artisanal fishing by foot.

Recreation: Beau Vallon Bay is Mahé's most popular resort beach. Several large hotels (3) and guest houses (10), as well as water sports and diving centres are situated in the Bay. Beau Vallon is a very important zone for recreation not only for the tourists but also for the local community; activities include swimming, snorkelling, diving and events.

National heritage: Beau Vallon District currently does not have any heritage sites.

Anchorage: There are two recreational mooring areas at Beau Vallon

Hydrocarbon exploitation: offshore geophysical and geological exploration ongoing on the Seychelles plateau. There are two actively oil companies.

Mining: There is mining of sand in the vicinity of the landfall site.

4.2.Tanzania

4.2.1. The bio-physical environment

Geography: Most of the country lies on the Great African Plateau. Much of the coast is of Pleistocene and Recent coral limestone. A belt inland from the coast, an area of continental and coastal deposition of Cretaceous and Tertiary period, includes limestone, sands and gravel.

Soils: The soils of coastal areas in Tanzania include: recently deposited alluvium in river estuaries; dark clays on older alluvial deposits along the Rufiji Delta and Tanga; and grey bottomland soils, in the coastal plains. In the coastal area and islands, the soils are predominantly sandy and coralline with poor moisture-holding capacity, extreme alkalinity and hard subsoil, resulting in poor drainage.

Hydrology: The coast is strongly influenced by rivers that bring to it water, sediment, nutrients and pollutants. The surface river flow regime and moisture conditions in the country correspond to the general rainfall pattern, with peak outflow from major rivers that discharge into the Indian Ocean occurring between March and May. The Rufiji (south of Dar es Salaam), one of the largest rivers in Africa, contributes 50% of the surface runoff. The river has an annual discharge of 1133 m^3/s.

Meteorology: Climate is influenced by the monsoon (North-east monsoon from November to February, and South-east monsoon from April to September), and by tropical storms and cyclones. Windiest period is the South-east monsoon; calmest and most variable periods are March, April and November; driest period is from June to September; and rainiest period is February to May. Air temperature is between 26°C (July) to 30°C (January), and the main wind directions are North-easterly and South-easterly.

*Oceanography, and sea temperature and salinity: S*ea surface temperature is highest during the North-east monsoon (maximum 30°C, March) and lowest during the South-east monsoon (minimum 25°C, July-August). Surface salinity is influenced by rainfall, in particular lower during May (following the peak freshwater outflow) and higher in November. Semi-diurnal tide.

*Terrestrial habitats: C*oastal forests occur along the Tanzanian coastline, however most are highly fragmented patches and less than 500ha in size; some carry conservation status. The forests are threatened by unsustainable exploitation through logging, removal of hardwood for housing and burning of woody plats as fuel wood. Coastal grasses and Mangroves also occur.

Marine Habitats: At Msasani Bay, the intertidal zone surrounding the Project Area comprises small sandy beaches as well as coral based rocky flats. The underwater habitat ranges from shallow gently sloping coral reefs, sandy expanses to sea grass bed.

Marine fauna: Five species of marine turtles are found in the waters of Tanzania: green turtle, *Chelonia mydas* (locally known as 'kasa' or 'nduvi'); hawksbill turtle, *Eretmochelys imbricate* ('ngamba'); leatherback turtle, *Dermochelys coriacea*; olive ridley turtle, *Lepidochelys olivacea* and loggerhead turtle, *Caretta caretta* ('mtumbwi', 'ranga'). The most common type is the green turtle followed by the hawksbill, which is smaller. The loggerhead and leathery turtles are less common, while the olive ridley is very rare. Various Cettaceans, whales, dolphins and porpoises also frequent the waters of Tanzania. Migratory and other birds are also found along the coast.

Protected areas and RAMSAR sites: Dar es Salaam Marine Reserves (Bongoyo, Fungu, Yasini, Mbudya, Pangavini) (**Figure 2**), in which the Ministry of Natural Resources and Tourism has designated all areas within a 5 fathom (about 10m) contour depth as Marine Reserves. Bongoyo Island (80.5 hectares) is the Marine Reserve closest to the direct impact area of the SEASs Cable; an 800m buffer zone boundary acts as a cushion against activities outside the marine reserve. It is one of the nesting sites of the main species of marine turtles; Coral reefs occur mostly on the sheltered western side and on the north western side; the cable route is to the South of the Island. There are no RAMSAR sites in the project area of influence.

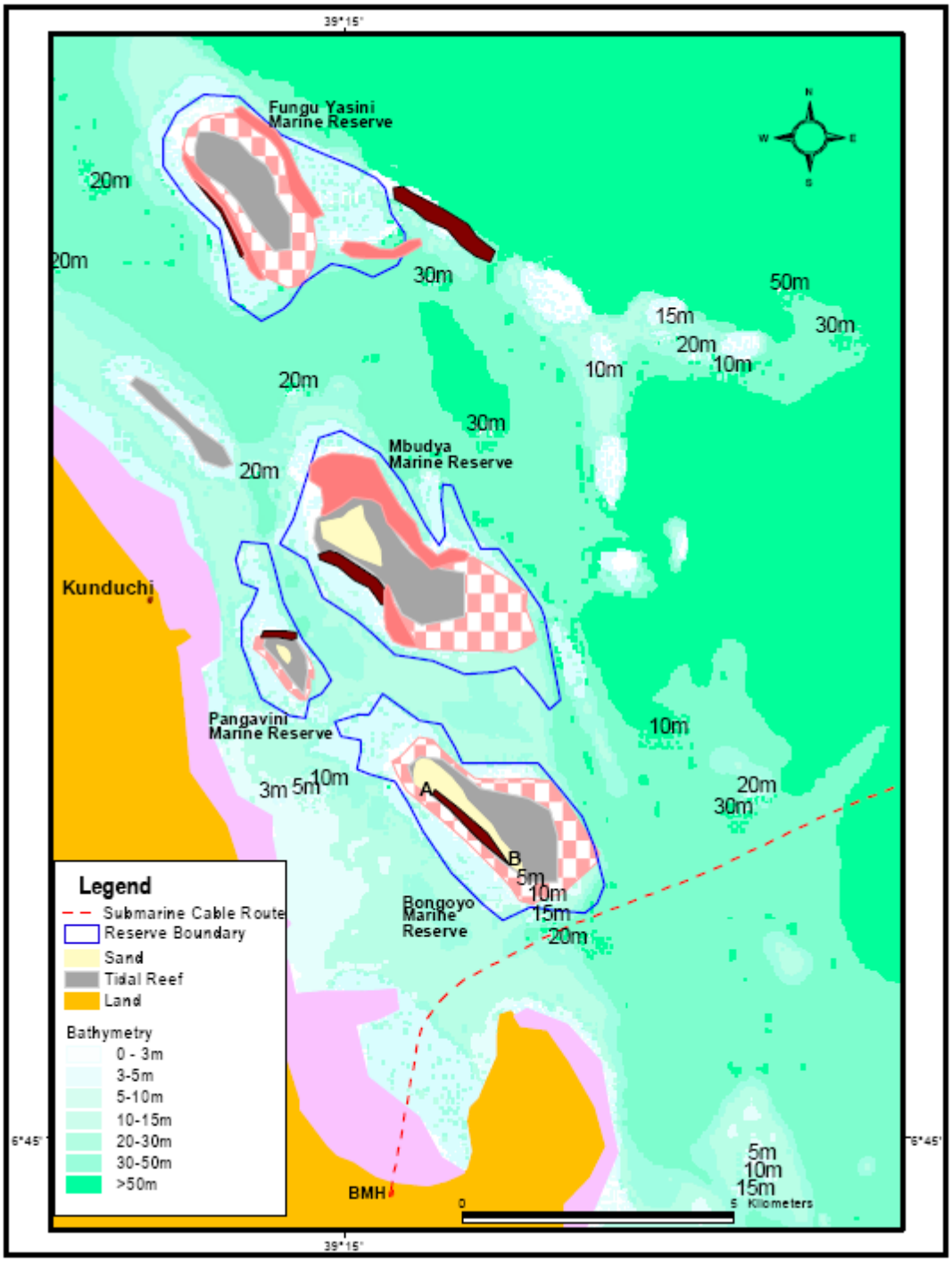

Figure 2: Dar Marine Reserve Boundaries

4.2.2. Socio-economic context

Population: Dar es Salaam has a population of approximately 2,430,500 persons (in 2000) or 7.7% of the total of Tanzanian.

Coastal economy: Economic activities in coastal areas include fishing, subsistence farming, trade and tourism. Small-scale trading occupation involves selling fish, mangrove poles, coconut, salt, lime, charcoal, firewood, and retail trade. Although farming is the nation's most common occupation, agricultural activities are less important economically than fisheries to

the coastal communities. Activities such as coastal tourism, mariculture and natural gas exploitation are seen as potential resources for national economic development.

Fisheries: The area along the Tanzania Mainland coast available to the artisanal fishery is estimated to be around 12,000 km^2, regionally divided into: Tanga (2200 km^2), Coast including Dar es Salaam (8100 km^2), Lindi (1550 km^2) and Mtwara (310 km^2). There are a very small number of artisanal fishers in the Bay.

Shipping and anchorage: The Port of Dar es Salaam is Tanzania's major port, center for industry, largest city, and seat of government. The port has experienced recent expansion and improvement in facilities due to economic developments. A recreational anchorage area also exits near Dar es Salaam.

Hydrocarbon exploitation: Significant gas discoveries have so far be made (at Songo Songo, Mkuranga and Mnazi Bay), explorations are continuing along much of the coast and 35 exploration and development wells have been drilled to date.

Mining: Coastal mining activities being considered for Dar es Salaam.

Dumping, dredging and reclamation: There is a dumping zone near Dar es Salaam.

Submarine pipelines/cables: There are two submarine telecommunication cables in Tanzania (Eassy and Seacom). A crossing (between EASSY and project cable) will be considered for Dar es Salaam landfall.

4.3.Sensitive Environments along the SEAS Route

Coral reefs: These occur along most shallow, tropical coastlines, where the water is clear and warm, and the salinity is constant. Corals provide food, shelter and nursery areas for many fishes and crustaceans. Reefs protect coastal areas from storms and erosion by forming natural breakwaters. Much of the white sand found on beaches originated from coral skeletons, or from the skeletons of creatures and algae associated with the reef.

Sea grass: Large sea grass meadows usually occur in the protected waters landward of coral reefs. Grazers, such as green turtles, fishes, and sea urchins feed directly on the grasses. Sea grass blades provide surfaces for epiphytes like algae and invertebrates to attach to. Seagrass beds also serve as nursery grounds for the juveniles of many commercially important fish species. Sea grasses help keep the water clear. The blades of the grasses act as baffles, inducing the settling of sediment particles, while the rhizome and root system stabilize the bottom, preventing the re-suspension of sediments. Clear water is an important requirement for the maintenance of healthy coral reefs.

Mangroves: These are found along the coasts of tropical and subtropical regions, representing a group of unrelated tree species that are grouped together because they can tolerate having their roots submerged in salt water. Their prop roots provide a surface of attachment for marine organisms in a muddy environment where hard surfaces are in short supply. Mangroves also trap and bind sediments and filter land based nutrients, promoting water clarity. Mangroves, like sea grasses, serve as nursery grounds for the juveniles of many commercially important fisheries species, while also providing habitat for a variety of small

fishes, crabs and birds. Mangroves protect coasts against erosion by breaking storm waves and dampening tidal currents.

Estuaries, wetlands and salinas: Estuaries, coastal lagoons, and other inshore marine waters are very fertile and productive ecosystems. They serve as important sources of organic material and nutrients, and also provide feeding, nesting and nursery areas for various birds and fishes. These ecosystems act as sinks of terrestrial run-off, trapping sediments and toxins, which may damage the fragile ecosystems offshore like coral reefs.

Beaches: The beach serves as a buffer zone between the land and the water. It is usually made up of unconsolidated sediments, such as sand, stones, coral rubble, and boulders. Beaches are dynamic environments, constantly changing as a result of natural processes, including storms, hurricanes, tidal changes, and sea level rise. Beaches also change as a result of man's actions. Removing sand from the beach for construction, vegetation clearance, and building of seawalls are major problems in many areas of the world. Animals occupying this environment have adapted to the constant motion of the sand, gravel, or shell. The beach also provides habitat for a multitude of burrowing species, such as crabs, clams, and other invertebrates.

4.4.Summary of BMH Conditions

Seychelles: Beach Man Hole (BMH) and Terminal Station are existing and owned by Cable & Wireless. The BMH is approximately 100 meters from the waters edge. The existing cable & wireless infrastructure will be used to link the cable to the terrestrial network. Or alternatively, a BMH will be constructed adjacent.

Tanzania: The cable will be attached to the existing BMH (and Terminal Station) owned by Zanzibar Telecom Ltd (ZANTEL). From the BMH, the Cable will continue a short distance, through a one (1) Km corridor already established for an existing cable, to a 'cable station' where it will connect with the terrestrial network.

5. PROJECT ALTERNATIVES

5.1.Justification on the Choice of Technology

The Seychelles currently relies on terrestrial cable, and satellite links for their data and communication transmissions. In the absence of fibre optic cable connections to the rest of the world, internet services will remain slow and expensive, hampering the integration of the island into the global economy.

The use of fibre optic networks has a number of advantages over satellite, while microwave transmissions and radio have largely been phased out due to restricted bandwidth and poor data transmission. Modern fibre optic networks transmit high volumes of voice and data traffic with higher security and reliability and at lower cost than satellite systems. Cable also has a more dependable installation and repair record. Bandwidth demand, particularly as a result of internet activity far exceeds satellite capacity at the present time (Hogan and Hartson, 1999).

Although there are potential environmental and social impacts associated with marine optical cable systems, for the Seychelles they offer the best practical alternative for a substantial increase in bandwidth and speed at the present time.

5.2. Routing Alternative

The Seychelles archipelago is found in the Western Indian Ocean. A submarine system therefore currently offers the best option given the project's objectives. A second alternative is to land the SEAS in an area other than Msasani Bay. This would imply higher investments for siting and construction of the BMH which would be further from the cable terminal station; the sub-duct cables would also need to be longer lines to connect to users. The latter approach would likely increase the environmental impacts on marine resources and on the land area.

5.3. No Project Alternative

If the project was not realised, the region would continue to be constrained by the lack of telecommunications capacity, especially in the area of international data transfer; the demand for capacity would continue to grow along with the overall economic growth. At some point in time, a different transmission technology (satellite) may become more viable either due to the increased demands of the marketplace or the relative decrease in the cost of the technology. This would reduce the need for cable based system but only temporarily.

6. POTENTIAL IMPACTS

6.1. Impact Periods

The main impact periods have been defined as: *Pre-construction*, marine survey prior to cable installation, in shallow waters and offshore; C*onstruction*: installation of the cable in shallow waters and offshore; and *Repair/Recovery*, repair relates to rare requirements to rectify cable breaks, and recovery refers to decommissioning of the System.

6.1.1. Impacts on the natural environment

Onshore activities (BMH construction, cable installation, operation & maintenance) are anticipated to have minimal and temporal impact on the terrestrial environment (beach). The soil and some vegetation (trees) may be disturbed during excavation and construction of the trench and BMH. Water quality may also be affected through discharges (oil, paint) from machinery and other equipment. There is also potential for dust generation, which will be limited to construction areas and nearby surroundings; additionally emissions from mobile machinery is also anticipated.

The activities (route survey, route clearance, vessel operations, cable installation, operation & repair) in shallow waters (0-1000m depth) are anticipated to have the largest impact, although impacts will be temporal. Marine habitats (coral reefs, sea grass beds) and marine fauna & flora will be disturbed during route clearing, cable burial, and vessel passage. Water quality will be affected by turbidity and an increase in suspended sediment levels. Discharges from vessels and machinery will also affect water quality; the risk of accidents resulting in spills is also of significance. Furthermore, vessels generate various wastes both non-

hazardous (packaging) and hazardous (oil waste, paints), as well as aqueous discharges including sewage water, grey water (discharge from showers and sinks) and potentially contaminated drainages from the ship deck. Sewage and grey water can have high bacteria levels. There is also some potential for invasive (non-native) species to be un-intentionally introduced. Air quality is also anticipated to be affected through emissions from the ship and machinery.

Offshore activities (route survey, route clearance, vessel operations, cable installation, operation & repair) are anticipated to have minimal and temporal impact as the cable will not be buried. However, some disturbance is anticipated on marine habitats and marine flora & fauna. Water quality will also be impacted though turbidity and sea bed disturbance, but to a less extent than anticipated in during shallow water installation. Waste generation and discharges will also potentially impact the environment as described under the shallow waters phase. Air quality will also be affected through emissions from the vessel and machinery.

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

Decommissioning of the cable is anticipated to have minimal impact as the cable will be left in-situ.

6.1.2. Impacts on the social environment

Onshore activities (BMH construction, cable installation, operation & maintenance) will cause disturbance in various forms: increased traffic of vehicles and machinery will increase the likelihood of accidents, noise, waste and emissions generation, and general visual disturbance; with regards to the Seychelles in particular, the beach is a tourist area. Loss of access to the beach will also disturb recreation. However, these impacts are anticipated to be site-specific and temporal.

In shallow and offshore waters, potential impacts anticipated (during survey, route clearance, vessel operations, cable installation, operation & repair), include increased risk of collisions with various vessels (recreation vessels, fishing vessels) and disturbance of economic activities such as activities such as diving, water sports, and artisanal fishing. The potential disturbance of artisanal fishing is of particular importance as it is a livelihood option. Other activities that may be disrupted include shipping and anchorage, and mining activities. However, impacts will be temporal, with the exception of those related to anchorage as the cable route will be mapped and designated as an exclusion zone.

The cable is anticipated to have little impact during normal operation and decommissioning.

6.2.Cumulative Impacts

The terrestrial areas along the coast are currently under pressure due to development activities (for example infrastructure development – hotels) and offshore, sand excavation, mining and hydro-carbon exploration are taking place. However, the impacts associated with the Project are mostly minor and temporary and are unlikely to have significant interaction with the activities associated with the other planned activities in terms of environmental and social impacts.

In the medium to long term, positive cumulative impacts with regard to socio-economic effects are likely to result from the projects contribution to improved communications infrastructure and access.

6.3.Impact Mitigation

Potential impacts have been minimised through selection of the best route. The general approach adopted includes: use of existing onshore facilities where possible; avoidance of environmental sensitivities (protected areas, sensitive species…); installation of pre-fabricated facilities where exiting facilities are unavailable; use of existing corridors (and existing exclusion areas).

For impacts that cannot be avoided, mitigation measures are proposed (**Table.2** & **Table.3**), with further consideration of route selection provided for in the country specific ESIAs.

Table.2: Mitigation actions for the natural environment

Impact area	Description	Degree of impact	Scope for Mitigation
Ecology	Terrestrial	Temporal, reversible, direct	Limiting clearing and restoring areas of disturbance Controls to prevent incursion into adjacent areas Top soil will be separated and laced 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.
	Coral reef	Temporal, reversible, direct	Marine vessels will be required to adhere to IMO regulations on bilge and ballast water discharge in order to avoid unintentional introduction of non-native species to the marine environment. The project will ensure that measures are adopted to avoid : incursion into areas adjacent to the work site ; or any secondary effects from pollution, sedimentation, or accidental spills The project will also require that marine vessels have a similarly 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 whilst pre-installation and installation vessels are at sea. Should any fauna be observed in the vicinity of the work area, the vessels will execute measures to avoid collision or disturbance. Vessel operators will maintain a distance of 100 meters or greater and will travel at 10 knots maximum when safety permits, until mammals are more than 500 meters away. Any abrupt changes in direction will be avoided. Vessel crew will report sightings of injured or dead 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 identification and description
	Sea grass bed	Temporal, reversible, direct	
	Marine fauna & flora	Temporal, reversible, direct	
	Marine habitats	Temporal, reversible, direct	

			of the animal. The report will be submitted to a designated ecology organisation. Security lighting will be beamed on the area of operation and at an adequate level of illumination only, in order to avoid impacts on sensitive fauna. Illumination of areas outside the direct work area will be avoided.
Water Quality	Sediment disturbance causing turbidity	Temporal, reversible, direct	Marine vessels will be required to comply fully with 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 on the cable laying will not exceed 5 knots per hour so that the amount of sea sediment disturbed and dispersed during the cable laying process can be kept minimum
	Discharges	Temporal, reversible, direct	
	Accidents causing spills	Temporal, reversible, direct	
Waste	Generation	Temporal, reversible, direct	Waste management is required to avoid the risk of harm to the environment and human health.
Air quality	Dust	Temporal, reversible, direct	The project should require construction contactors operate only well maintained vehicles and machinery. Should considerable dust generation occur during construction, causing plumes of dust in the vicinity of works and behind construction vessels, a routine wetting programme of all unpaved surfaces (construction areas) will be undertaken to ensure sufficient moisture content is maintained to suppress dust generation. Operation in line with the requirements specified under MARPOL 73/76 Annex VI
	Gaseous emissions	Temporal, reversible, direct	
	Odour	Temporal, reversible, direct	

Table.3: Mitigation actions for the social environment

Impact area	Description	Degree of impact	Scope for Mitigation
Traffic	Impacts on traffic in the area	Temporal, reversible, direct	Make contact with other vessels to avoid collision or damage to equipment. Vessels will increase watch when in areas that are known to be used by fishermen and other vessels ; and make contact
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
Socio-economic activities	Fisheries activities	Temporal, reversible, direct	All stakeholders will in informed on activities well in advance and signage will be put in place where appropriate. Prepare a notice for community and fishers with full description of construction activities. All open trenches and excavated areas will be backfilled as soon as possible after the construction has been completed. Access to open trenches will be secured to prevent pedestrians or vehicles from falling in.
	Tourism, diving sites, recreation activities	Temporal, reversible, direct	
	Shipping and anchorage	Temporal, reversible, direct	

	Mining activities	Temporal, reversible, direct	Vehicles 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 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 the ship is laying cable, its manoeuvring will be restricted; as such it will display day signals and lights similar to a hampered vessel in order to avoid collusion with other vessels at sea. 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 with the Environmental Health and Safety Plan (EHSP). All construction and cable repair workers will be sufficiently trained in the safe methods of working with fibre optic cables to avoid injury associated with laser lights and fibres.
	Dredging/cables/ hydrocarbon exploration	Temporal, reversible, direct	

7. ENVIRONMENTAL RISK MANAGEMENT

The risks linked to public safety and staff welfare mainly stem on-site; for example, accidents during cable installation (collision), and exposure to various hazardous (oil, wastes) and non-hazardous (packaging) materials.

Hazardous wastes can have a toxic effect on organisms and can in some circumstances lead to bio-accumulation and ultimately lethal or sub-lethal effects if badly managed. In addition, some non-hazardous waste types can be equally harmful, partrticularly 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.

8. MONITORING PROGRAMME

The successful implementation of the project Environmental and Social Management Plan (ESMP) requires co-operation between the various parties involved in Project construction, and particularly between the project proponents (Company selected) and the Project contractors.

The monitoring plan of the ESMP defines the roles and responsibilities of the Client and the Contractors. The client will appoint an Environmental Health and Safety Coordinator (EHSC) or its equivalent, to oversee the implementation of the ESMP. The Client will also ensure contractors put in place action plans as appropriate (for example: *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*; and *Erosion Control and Restoration Plan*) to implement the mitigation and management measures outlined. The contractors will also be required to provide the company with regular reports.

The ESMP will be subject to continuous monitoring in accordance with a specific calendar during pre-installation and installation.

As the mitigation measures will be a full part of the contractual obligations of the contractors, no budget has been defined for the ESMP.

9. PUBLIC CONSULTATIONS

Public consultation is integral to the ESIA process.

9.1.Seychelles

Consultants consulted with different parties affected by the project and took their point of view into consideration. Specifically, the Environment and Social Impact Report was made available to the public (at the national library in Victoria and the Beau Vallon District Administration) over a two week period. A public information session was held on 3rd May 2010 at which the project was described and discussion facilitated. Further consultations were undertaken with the Seychelles Fishing Authority.

The main issues raised by those consulted included: loss of access to the beach; danger of beach erosion; impact of cable on marine environment, including impact of cable electromagnetic field; and risks to health. Stakeholders were reassured concerns raised would be taken into account; for example through rehabilitation of the beach and appropriate scheduling of the installation, and verifying the low impact of cable electromagnetic fields on marine life.

The Letter of Authorisation was awarded, with recommendations, by the Ministry of Environment, Natural Resources and Transport on 24th May 2010.

9.2.Tanzania

The SEAS cable will be connected to the terrestrial network through an existing BMH, and will be installed using existing infrastructure (ducts etc…); the same infrastructure used to install the preceding EASSy cable installed in 2010.

No public consultations have been specifically undertaken for the new project. However, the National Environmental Management Council (NEMC) has officially communicated that, given the cable is being routed through existing infrastructure (ducts etc …) for its terrestrial path, a new Environmental Impact Study (EIS) (the detailed ESIA document on the project area of influence in Tanzania prepared simultaneously with that for the Seychelles in 2010) was not required. NEMC requested the client to apply for variation of the initial certificate awarded to the Client for the EASSy Cable in November 2008. All the conditions under

which the initial certificate was awarded apply to the SEAS cable. The SEAS cable is being considered as an extension to the existing EASSy cable.

10. ADDITIONAL INITIATIVES

Indirect impacts of the project anticipated include: improved educational opportunities through increase in access to information and education resources; greater equality of information sharing across groups in society; and enhanced opportunities for small enterprises previously excluded by high cost of technologies.

11. CONCLUSION

The impact assessment has demonstrated that the impacts likely to be generated in the cable laying operation**:** *in deep offshore* waters, will be minimal; *onshore***,** will include noise and dust with potential effects on run-off; and that installation in *shallow waters***,** has the most potential to result in the most significant impacts (habitat disturbance).

The Cable Installer and Survey Company need to comply with the various DFI requirements, and the need to issue Environmental Compliance Reports will have to be stated and fully described in contracts. However, good working practice, health and safety, are usually components of company procedures and vessels usually comply with international laws on vessel discharge and pollution.

REFERENCES AND CONTACTS

The documents reviewed by the AfDB include the Environmental and Social Impact Assessment Studies for the Seychelles East Africa submarine cable for the Seychelles and Tanzania drafted by iXSurvey consultants in early 2010. The ESIA for the EASSY cable in Tanzania was also referred to.

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