Government of Sao Tomé and Principe

Central African Backbone (CAB) Project
Africa Coast to Europe (ACE) Submarine Cable

Environmental and Social Management Framework

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EXECUTIVE SUMMARY

The Government of Sao Tomé and Principe and the Companhia Santomense de Telecomunicaçoes (CST), with assistance from the World Bank, are going to finance the first submarine cable landing for the Republic of Sao Tomé and Principle (STP), the Africa Coast to Europe (ACE) submarine cable.

The final cable route, landing sites and cable station sites are still to be confirmed, although various alternatives have been identified. As per World Bank policy this Environmental and Social Management Framework has been prepared to identify potential environmental and social impacts and to inform and guide the ongoing project design and planning process. The focus of this ESMF is to the seaward limit of STP's Exclusive Economic Zone.

Submarine telecommunication cables form the backbone of the global communications network. The proposed cable will extend from Europe to South Africa and will connect a number of countries along the west coast of Africa. The main cable segments from Europe and South Africa will be joined in STP's cable station. This cable will provide STP with improved communication infrastructure and will be able to accommodate future ultra-broadband networks.

The cable will pass through STP's exclusive economic zone (EEZ) (including the Joint Development Zone shared with Nigeria) and territorial waters before landing at one of identified landing alternatives. Parts of the cable connecting Cameroon, Equatorial Guinea and Gabon also fall within STP's EEZ, but do not pass through STP's territorial waters.

The alternative landing sites are Praia Meleo, Praia Pomba and two locations at Santana. From the beach man-hole (BMH) at the landing point the cable will be trenched under existing roads back to the site of the proposed cable station. Each BMH will be approximately 9 m² and will be 3 m deep. Access to the BMH will be through a man-hole placed level with the ground.

The cable station will include offices, the telecommunication computer equipment, a small parking area as well as a generator and a 20,000 litre diesel storage tank in case of electricity interruptions. The building will be approximately 1,400 m² within a 0.5 ha plot of land.

The Republic of Sao Tomé and Principe consists of two main islands of volcanic origin in the Gulf of Guinea. Sao Tomé is the larger of the two islands and the city of Sao Tomé is the capital and the main commercial centre for the country. Due to its volcanic origins Sao Tomé has a relatively small continental shelf that drops off rapidly to greater water depths. At Praia Meleo the continental shelf is at its widest part with approximately 4-5 km where the water depths are no more than 50m before quickly dropping to water depths of over 1000m. At Praia Pomba the continental shelf is slightly smaller with approximately 3km of shallower water before dropping to over 1000m deep.

There are a range of different ecosystems in Sao Tomé, namely forests, mangroves, inland waters, and coastal and marine ecosystems. There are also modified ecosystems these being secondary forests and old plantations, shade forests, savannahs and dry forests. The coastal ecosystems are comprised of beaches, rocky coastlines, estuaries and marshlands.

The proposed cable and associated infrastructure will occur in the north-east of the island, near and within the City of Sao Tomé. The project will not occur in any natural undisturbed ecosystems of importance. There are some coral reefs around the island, with the most important reefs being on the north-west side of the island. No coral reefs were reported along continental shelf where the proposed cable is proposed.

The estimated population of STP is approximately 175,808 made up of a range of ethnic groups and origins. The majority live on the island of Sao Tomé and 61% of the population is urbanised. The main

industries are plantation agriculture which has declined since independence and there is now more of a focus on marine resources and a developing tourism industry.

The marine economic activities involve fishing and offshore petroleum resources. There are coastal artisanal and small-scale fisheries as well as large off-shore fisheries operated by foreign fleets. Fish is the main source of protein for the Santomean population. There are petroleum concessions which are now starting to be explored with most blocks still being advertised but not yet awarded.

The constitution of STP grants everyone the right to own private property as well as the right to housing and a humane living environment. In terms of environmental protection, Law 10/99 outlines various mechanisms and instruments required for sustainable development, one being the preliminary assessment of impacts. Decree Law 37/99 defines the rules and principles applicable for environmental impact assessments. Although submarine cables are not specifically listed as activities requiring environmental authorisation this project may involve other listed activities such as the displacement of communities and work and development of land along the seafront. Thus, it is expected that environmental authorisation will be required from the Directorate of Environment.

In terms of World Bank safeguard policies this project will trigger Operational Policy 4.01 and 4.12 dealing with environmental assessment and involuntary resettlement, respectively.

A significant positive impact of the project will be the improved communication capacity and speed that will be available to industry, business and government on the island.

Submarine cables are relatively small and have little or no impact upon marine ecology or marine species during operational activities. The only impact which may potentially occur is if endangered turtle species are disturbed or injured during the beach landing operation if this occurs during the turtle nesting period between October to February. However, the landing beaches are either rocky or populated and are, thus, likely to be avoided by turtles.

During the cable laying procedures there will be minor and temporary disturbances over a small 2m to 8m wide portion of the continental shelf. No bottom trawling fishing activities occur around the island and other commercial fishing operations will not be affected. The possible presence of fish attracting devices around the island to improve artisanal fishing catches should be noted. These have not been placed yet, but may have been when cable laying activities occur.

The impact of the cable upon offshore oil concessions is not considered significant. There is also an anchoring zone near Praia Pomba where a petroleum ship anchors twice a year to supply the Voice of America radio station. This needs to be taken into consideration during cable routing. There are two further socio-economic aspects related to Praia Pomba which make this site less preferable. One is that it is recognised as a beach where illegal sand mining is occurring and it is likely the cable will be exposed. It is also subject to a tourism enterprise concession which was granted in 2008. A possible alternative is to rather land the cable directly into the grounds of the Voice of America radio station.

The construction of the Beach Man-Holes and the cable trenching along the roads will not result in any significant impacts as the majority will occur in already surfaced areas. This temporary construction work will not result in any significant loss of access to surrounding residents or businesses.

CST has identified a preferred cable station site at Sao Gabriel. However, during the site visit an additional possible option at Sao Marçal was identified and has also been recommended to CST for consideration.

The preferred site at Sao Gabriel is an area of approximately 4 – 6ha of actively cultivated land within the City of Sao Tome. The total number of households cultivating land within the entire garden area is

estimated at between 45 – 65 households with between 15 – 20 households potentially impacted by the proposed 0.5 ha cable station site and building.

The other site is nearby within the suburb Sao Marçal. This area is far less suited to agriculture but is still being cultivated by two individuals. The women interviewed is considered vulnerable being over 60 years of age with a disabled husband who does not work.

The potential loss of land resources to these homesteads will range in significance depending on the household's income status and access to other resources. There is little alternative vacant land to cultivate and as a result the project may impact upon the livelihoods of affected households.

The different in significance is due to there being more people impacted at Sao Gabriel and the land is better for agriculture. The soil at Sao Marçal is relatively poor and, thus, the value of the resource lost is less.

In terms of alternatives, from a social and environmental perspective the cable station site at Sao Gabriel is not preferred, but is not fatally flawed either.

The impact or cost to compensate households for standing crops is estimated to be quite small. However, the task of restoring or ensuring livelihoods, if required, may be considerably more difficult and complex. Taking into account the drop in agricultural production in the rural areas after independence, the fact that the majority of STP's citizens are urban dwellers and the increasing food security issues associated with poor urban dwellers around the world, it is strongly recommended that this site rather be conserved for urban agriculture. In the author's opinion it is a valuable resource that could not easily be replaced.

The cable station site at Sao Marçal is significantly less suited to agriculture and will impact upon less resource poor households. This site appears to be technically feasible and would also reduce the distance between the landing sites and cable station.

Various mitigation measures are recommended in Section 7 for the planning and design phases and in order to manage and monitor construction.

In terms of the way forward, further screening of the natural environment and potential impacts is not deemed necessary. The project and associated impacts upon the natural environment will be minor. The implementation and monitoring of the construction related mitigation measures is recommended. The requirement for further environmental assessment work in terms of STP's national regulations needs to be confirmed with the Directorate for Environment.

The main uncertainty is the extent of the potential social impacts depending on the cable station alternative selected. It is recommended that the RPF be triggered for any sites that have compensation or resettlement issues associated with them.

All recommended mitigation measures, within this document or in a further ESMP should be incorporated into the contract documents and enforced by the project engineer. It is recommended that environmental and social monitoring be the responsibility of an independent environmental official from the Directorate of the Environment or an appointed environmental consultant. The institutional capacity of the Directorate of Environment was found to be relatively limited, particularly with regard to knowledge of the potential issues and impacts associated with submarine cables. This is partly to be expected as this will be the first submarine cable to land at STP. There is also little experience of internationally recognised resettlement and compensation procedures.

Due to the relatively short duration over which implementation will take place, it is recommended that a one day training and awareness workshop be held with officials from the Directorate.

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ACRONYMS

ACE	Africa Coast to Europe submarine cable
BMH	Beach Man-Hole
CST	Companhia Santomense de Telecomunicaçoes
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EMSF	Environmental Management and Social Framework
ESMP	Environmental and Social Management Plan
GIS	Geographic Information Systems
GoSTP	Government of Sao Tomé and Principe
OP	Operational Policy
PAPs	Project Affected Persons
RAP	Resettlement Action Plan
SIA	Social Impact Assessment
STP	Republic of Sao Tomé and Principe
RPF	Resettlement Policy Framework
WDM	Wavelength Division Multiplexing

1. INTRODUCTION

The Government of Sao Tomé and Principe (GoSTP) and the Companhia Santomense de Telecomunicaçoes (CST) are going to finance the Africa Coast to Europe submarine cable (ACE). The World Bank is providing financing to support the linking of the ACE cable to the Republic of Sao Tomé and Principe (STP). This cable will be the first international submarine cable to land in STP.

The final cable route, landing sites and cable station sites are still to be confirmed, although various alternatives have been identified. This Environmental and Social Management Framework (ESMF) (and accompanying Resettlement Policy Framework (RPF)) is aimed at providing an overview of the natural and social environment and potential impacts to inform and guide the ongoing project design and planning process.

The focus of this ESMF is to the seaward limit of STP's Exclusive Economic Zone. For the purposes of subsequent environmental assessment work regarding benthic habitat and ecology, the Cable Route Survey will provide this analysis between the outer limit of the EEZ and the 50 m isobath. Between the 50 m isobath and the shoreline, the Cable Route Survey will provide environmental baseline information regarding benthic habitat and ecology, augmented as deemed necessary by other sources of information. Activities of cable-laying ships and support vessels will be required to comply with STP regulations regarding such maritime activities.

2. PROJECT DESCRIPTION

2.1 ACE Cable Segments

Submarine cables have become key facilitators of modern life. Telecommunication cables form the backbone of the global communications network. Fibre optic cables transmit voice and data traffic with higher reliability and security at a cheaper rate than satellite (www.iscpc.org).

In its planned configuration the ACE cable will be 17,000km long and will run from France to South Africa (Figure 1). However, the project is being constructed and financed in phases.

Segments 1, 2 and 3 of the ACE cable are expected to be operational in the first half of 2012. These segments will connect France, Portugal, Morocco, Tenerife, Nouakchott, Senegal, The Gambia, Guinea, Sierra Leone, Liberia, Ivory Coast, Ghana, Benin, Nigeria, Cameroon, Equatorial Guinea, Gabon and Sao Tomè.

Segment 4 will connect Sao Tomè, the Democratic Republic of the Congo, Angola, Namibia and end in South Africa. The timeframes for Segment 4 are still being finalised.

The ACE system will deploy wavelength division multiplexing (WDM) technology, which is currently the most advanced for submarine cables. With WDM, cable capacity can be increased without additional submarine work. With an overall potential capacity of 5.12 Tbps, the system will support the new 40 Gbps technology which will accommodate future ultra-broadband networks.

Figure 1: Route of the ACE Cable Project

2.2 Project components in STP

The main cable (Segments 3 and 4) will land in Sao Tomé and be connected in STP's cable station. To reduce the risk of a single incident, such as a ship dragging its anchor, and breaking the two cables, CST proposes to land Segments 3 and 4 at different Beach Man-holes (BMH)[1] and use different terrestrial cable routes back to the cable station.

Thus, the terrestrial infrastructure will include two Beach Man-Holes, terrestrial land cables and the construction of a cable station.

Infrastructure designs have not been finalised but preliminary components and dimensions are as follows:

[1] The BMH is the first manhole on land where the marine portion of the cable is connected to the land-based cable. The BMH is never on the beach itself but is rather usually set back from the beach at a practical location.

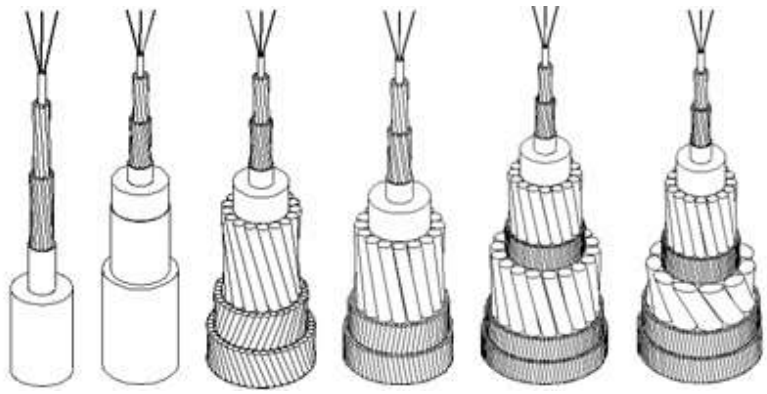
2.2.1 Marine cable

From Europe the main cable will run through STP's Joint Development Zone, exclusive economic zone (EEZ) and territorial waters. The Joint Development Zone is an area where STP and Nigeria's EEZ's overlap and economic proceeds from this portion of the ocean are shared between the two countries. Parts of the cable connecting Cameroon, Equatorial Guinea and Gabon also fall within STP's EEZ, but do not pass through STP's territorial waters.

The cable consists of a number of optical fibres encased in polyethylene surrounded by protective armouring (Figure 2). The number and diameter of armour wires surrounding the cable will be increased depending on the level of risk. A typical lightweight cable design will have a 17mm outer diameter whilst a high strength double armoured cable will have an outer diameter of approximately 45mm.

The cables contain repeaters and branching units and are laid in one length as they are discharged overboard. Repeaters are optical amplifiers placed along the cables to maintain the strength of the signal.

Figure 2: Illustration of cables and increasing levels of armouring



In order to reduce the risk of cable damage from fishing activities, anchoring or offshore petroleum activities, the cable will be buried wherever possible in water depths of less than 1,000m. Cable burial is achieved with the use of a specially designed sea plough or remotely operated vehicle that trenches and buries the cable.

The extent to which cable burial will be possible on the continental shelf of Sao Tomé, which is relatively rocky, is still being determined.

2.2.2 Cable Station

The cable station will be constructed of bricks and mortar and will include offices, the telecommunication computer equipment and a small parking area. In addition, a generator and 20,000 litre diesel storage tank will be installed to ensure continued operation in the event of electricity interruptions. It is estimated that the building will be approximately 1,400m² within a 0.5ha plot of land.

2.2.3 Beach Man-Holes

Each BMH will be approximately 9m² and will be 3m deep. Access to the BMH will be through a man-hole placed level with the ground.

2.2.4 Terrestrial cable

The terrestrial cable ducts will be placed under the existing tarred road surfaces from the BMH back to the cable station. Man-holes, approximately 1m deep will be positioned at various points along the road to allow the cable to be pulled through the ducts.

Depending on the final landing point, and the position of the cable station, the distance of these road works will be between 4km to 16km.

2.3 Infrastructure alternatives

The proposed landing site alternative for the main cable from Europe is Praia Meleo (0°18'25.37"N 6°44'52.87"E) (Plates 1 and 2). The BMH will be located adjacent to the road and a small shop on a concrete walkway down to the sand.

The proposed landing site alternative for the main cable from South Africa is further south at Praia Pomba (0°17'23.33"N 6°44'57.16"E) (Plates 3 and 4).

Alternatives initially considered for the landing were near Santana (north – 0°15’24.85’’N 6°44’35.93’’E or south - 0°14’46.46’’N 6°44’41.01’’E) (Plates 5, 6, 7 and 8).

Two possible cable station sites have thus far been identified. The initial site at Sao Gabriel (0°19’ 31.12’’N 6°44’ 16.46’’ E) and an another alternative identified during the field visit at Sao Marçal (0°19’ 09.77’’N 6°44’ 13.19’’ E) (photographs included in Section 5.3.2).

However, other cable site alternatives could also be identified during more detailed design and planning.

Plate 1: Praia Meleo BMH position

Plate 2: Praia Meleo

Plate 3: Praia Pomba

Plate 4: Praia Pomba

Plate 5: Santana (north)

Plate 6: Sea-wall at Santana (north)

Plate 7: Santana (south) BMH position

Plate 8: Santana (south)

3. DESCRIPTION OF THE ENVIRONMENT

This description of the environment provides a general description of the natural and social environment of the study area but focuses primarily on describing the environment which could potentially be impacted upon by the proposed project.

3.1 Physical environment

3.1.1 Climate and geographical context

The Republic of Sao Tomé and Principe is an island country located in the Gulf of Guinea, just north of the equator, approximately 380km off the west coast of Africa. Both islands are of volcanic origin and are mountainous.

Sao Tomé is the larger of the two islands with a land surface of approximately 859km² as compared to Principe's 142km². The city of Sao Tomé is the capital and the main commercial centre and port for the country.

The islands have a humid tropical climate with an average annual rainfall between 2,000 – 3,000mm per year. There are two seasons, a hot rainy season from October to May and a dryer season from June to September. The average annual temperature is 26°C.

Most of the island is less than 800m above sea level. However, there are peaks reaching over 1,500m with the highest being Pico de Sao Tomé at 2,024m above sea level. This results in the different ecological zones found on the islands.

3.1.2 Oceanography

Due to its volcanic origins Sao Tomé has a relatively small continental shelf that drops off rapidly to greater water depths. The continental shelf is wider on the eastern side of the island with a smaller continental shelf on the western side.

At Praia Meleo the continental shelf is at its widest part. In this area for approximately 4-5 km the water depths are no more than 50m before quickly dropping to water depths of over 1,000m. At Praia Pomba the continental shelf is slightly smaller with approximately 3 km of shallower water before dropping to over 1,000m deep.

3.2 Biological environment

3.2.1 Ecosystems and habitats

There are a range of ecosystems in Sao Tomé, namely forests, mangroves, inland waters, and coastal and marine ecosystems. There are also modified ecosystems, these being secondary forests and old plantations, shade forests, savannahs and dry forests.

The forest ecosystems on the island play an important role and part in the biodiversity and livelihoods of the people of Sao Tomé. Rainforests around the world are important and vital for biodiversity and conservation and also are important in terms of regulating climate change.

In terms of livelihoods the preservation of forest mantles is important for agrarian practises in tropical climates. The forest mantle helps with the regulation of rainfall, evapo-transpiration, erosion control and the recycling of nutrients and maintenance of soil fertility.

3.2.2 Terrestrial Ecology

The two islands are part of the western African sub-region related to the Congo River basin and are known for high rates of endemism. Both Sao Tomé and Principe exhibit a rate of endemism around 14%, the highest in the Gulf of Guinea (GoSTP, 2007).

The list of endemic plants on both islands comprises of 148 endemic taxa, 123 in Sao Tomé and 50 in Principe. These 148 endemic taxa have been assessed as follows:

- 14.9% are deemed extinct.
- 12.8% are critically endangered.
- 10.8% are endangered.
- 41.9% are vulnerable.
- 12.2% are near threatened.
- 7.4% are of least concern.

(GoSTP, 2007)

On the island of Sao Tomé, 46% of the species in non-protected areas have been deemed extinct, 41% in the buffer zone around Park Obô are threatened and may disappear if no action is taken, and 39% of the threatened species are located within the Park Obô. The latter will be effectively protected if the Park's boundaries are legalised and protected (GoSTP, 2007)[2].

The faunal biodiversity is summarized in Table 1 (GoSTP, 2007).

Table 1: Species occurring on the island of Sao Tomé

Category	Number of species	Endemic (%)
Mammals	10	30%
Bats	9	20%
Birds	49	57%
Reptiles	16	44%
Amphibians	6	100%
Insects	47 species of butterfly	38%
Molluscs	39	77%

3.3 Marine and coastal environment

Coastal ecosystems in STP comprise beaches, rocky coastlines, estuaries and marshlands.

Coastal flora is not very diverse and consists of typical species in preferential habitats. There are only a few endemic species occurring in coastal regions. The coastal flora, particularly in north-east parts of the island have been significantly disturbed and modified by human activities. This flora consists predominantly of pioneer plants that stabilise sand allowing other species to colonize the area. Coconut and banana trees are common within this coastal vegetation.

The most important fauna species with regard to this project is the occurrence of endangered sea-turtle species. Five different sea turtle species come to nest on the coast, all of which are endangered. Nesting takes place between October to February with greater frequency during November, December and January.

[2] At the time of writing this Park appeared to still not be formally protected.

There is a wide range of commercial marine fish including pelagic species such as mackerels and tunas and deep water demersals such as sharks and rays. Whale species and dolphins also occur.

There are some coral reefs around the island with the most important coral area being between Praia das Conchas and Logoa Azul on the north-west side of the island. No coral reefs were reported along the continental shelf where the proposed cable will be laid.

No Marine Protected Areas have been established and no areas are currently being proposed.

3.4 Social environment

3.4.1 Demographics

The estimated population of STP is approximately 175,808 (CIA, 2010). The majority live on the island of Sao Tomé. Literacy is estimated at 84% of the population and 61% of the population is urbanised (CIA, 2010).

There are a range of ethnic groups that have migrated to the islands since 1485. These groups are Mestico (descendants of Portuguese colonists and African slaves), Angolares (descendants of Angolan slaves), Forros (descendants of freed slaves), Servicais (contract labourers from Angola, Mozambique, and Cape Verde), Tongas (children of Servicais born on the islands) and Europeans (primarily Portuguese).

3.4.2 Politics and socio-economics

STP was a Portuguese colony for five centuries before becoming independent in 1975. In its first 15 years of independence the state had a single party system with a pro-socialist Government. In 1991 a new constitution and multi-party system was implemented. Since then there have been a number of political and government changes as a result of internal power struggles which has affected policy development.

The main industries are plantation agriculture with predominately cocoa, coconut, coffee and vanilla being grown. After independence, the plantations were nationalised and production from the plantations declined resulting in rural-urban migration into Sao Tomé.

STP has to import all fuels, most manufactured goods, consumer goods, and a substantial amount of food (CIA, 2010).

There are two types of fisheries in STP, the coastal artisanal and small-scale fisheries and the large off-shore fisheries operated by foreign fleets. Fish is the main source of protein for the Santomean population, supplying 60-70% of the protein consumed nationally (Alegre, 2009).

Potential exists for the development of petroleum resources in Sao Tomé's EEZ in the oil-rich Gulf of Guinea. A portion of this, the Joint Development Zone, is being jointly developed in a 60-40 split with Nigeria, and concessions have been granted with some exploration commencing. Concessions within STP's EEZ are being advertised but have not yet been awarded.

In recent years STP's vision for economic development has diversified from agricultural exports to exploitation of commercial fish resources, oil reserves and tourism. There is also a new Deep Water Port currently being planned with the intention of the port to act as a regional container terminal link for the countries in the Gulf of Guinea. A concession to build and operate the Port

was granted to Terminal Link in 2008, but implementation has been delayed due to the world-wide economic recession.

3.4.3 Land-use and livelihoods

Agricultural land is apparently still owned by the State but during agricultural reforms in the mid-1990s the former plantations were divided up and redistributed to former employees. Private land ownership does exist in the urban areas.

Livelihoods and income sources ranges from formal employment in the towns, either in government services or private enterprises, through to livelihoods that are more subsistence in nature being based either on artisanal fishing, agricultural cultivation or small service industries in support of these populations.

4. LEGISLATIVE AND REGULATORY CONSIDERATIONS

4.1 Relevant STP Legislation

4.1.1 Constitution

The Constitution is the overarching legislation of STP. Sections of relevance to this assignment include:

- Article 47 - Private property.
  Article 47 grants everyone the right to own private property and transfer it in life or death and that the requisition and expropriation of this property for public purposes can only be made based on the law.

  The Civil Code also provides in Article 1308 that no-one may be deprived of their right to property in whole or in part, except in cases defined by the law. When expropriation in the public interest does occur, adequate compensation must be paid to the owner(s) (Earth Institute, 2008).

- Article 49 – Housing and environment.
  Article 49 grants everyone the right to housing and a humane living environment. It also grants everyone the right and duty to defend these rights.

  In the spirit of the Constitution all laws on the environment permit citizens to access natural resources and use them for sustainable economic and social development, contributing to the acquisition of financial means to combat poverty, to preserve biodiversity and protect biological resources.

- Article 43 – Rights of workers.
  Article 43 grants all workers to be entitled to fair remuneration and to work in a hygienic and safe environment.

4.1.2 Environmental legislation

There are a few laws dealing with the environmental. Most of these relate to the National Park or specifically to forests, waste and pollution or the management of fish stocks and resources. The following legislation is deemed to relevant:

4.1.2.1 Framework Law on the Environment (Law no. 10/99).

This law provides the basis for the national environmental policy which outlines the various mechanisms and instruments required for sustainable development such as the preliminary assessment of impacts, limits on polluting activities, strategic plans for the development and/or protection of important natural resources of conservation or economic importance etc.

The environment is defined as the physical, chemical, biological elements and the relationship between them and economic, social and cultural conditions that directly or indirectly affect the quality of human life.

Article 7 of this law defines the principle of participation whereby citizens and various social groups must be involved and participate in decision-making processes whilst Article 8 grants everyone the right to adequate access to environmental information.

Article 8 (4) requires that the State facilitate and encourage public awareness and public participation by making information available.

Article 45 (1) states that plans, projects, activities and actions which may have an impact on the environment, territory or quality of life of populations, must meet environmental standards and must be accompanied by an environmental impact study.

Article 45 further outlines the contents of an environmental impact study and that approval of the impact assessment by the Ministry for the Environment is a prerequisite for the licensing of works.

4.1.2.2Regulation on the procedure for environmental impact assessment (Decree Law no. 37/99)

This decree defines the rules and principles applicable for environmental impact assessment.

In summary it requires that all activities which by their nature, size or location may result in significant impacts upon the environment should undertake an environmental impact assessment prior to implementation.

The regulations provide a pre-assessment mechanism whereby the proponent submits a description of the project to the Government authority whereby it is then determined what level of assessment is required. The terms of reference and the intention to undertake the assessment are then made public.

Depending on the size and scale of the proposed development, the Government authority may grant an exemption from further environmental impact studies. The regulations outline the requirements and content of impact assessment reports.

Once the assessment has been completed it is submitted to the Government authority for review and upon acceptance an environmental permit is issued. Other licenses can only be granted once the environment permit has been obtained.

The public consultation process is outlined in detail, requiring the involvement of stakeholders and describing the process followed, as well as the concerns raised and responses provided.

The Government authority is required to undertake regular inspection and supervision of the monitoring activities undertaken by the proponent to ensure environmental aspects are addressed.

Article 15 of the law requires that environmental consultants be registered in STP prior to being allowed to undertake environmental impact studies.

Annexure 1 lists the type of activities for which environmental assessment, or at least pre-assessment reports are required.

Although submarine cables are not specifically referred to, of relevance to this project and triggering the requirement for some assessment are the following:

- Programs and projects involving the permanent or temporary displacement of populations or communities.
- Master plans for development and land occupation.
- Programs and projects that may directly or indirectly affect sensitive areas such as:
  - Barrier reefs.
  - Areas of eminent erosion (slopes of mountains, sand dunes along the seafront).
  - Areas where endangered plant or animal species are located.

4.1.2.3 Law on the Preservation of Fauna, Flora and Protected Areas (Law no. 11/99)

This governs the preservation of fauna, flora, the establishment of protected areas, establishes lists of protected species and allocates areas of national territory for the preservation of habitats and biodiversity. However, no reference appears to have been made to cover the marine environment or species but legally it should still apply within the territorial waters of STP.

4.1.3 Land Management Act

The Law on the Management of State Land Property (Law no. 3/91) defines the framework for matters related to government owned land. Dealing with ownership, identifying public and private property of the state and also defines the basis for private leasing and use of state land, particularly in terms of distribution for investment purposes.

4.1.4 Miscellaneous

No laws were identified or mentioned by stakeholders that dealt with items that may cover aspects such as occupational health and safety regulations for workers dealing with diesel storage on site at the cable station. Neither were any specific building fire-safety specifications or groundwater pollution preventative measures identified.

However, the Director of Public Works and Urbanisation did indicate that although not in any legislative requirement, such practices would be required in terms of standard engineering building design and structural approval by the Department.

4.2 World Bank Safeguard Policy

The Bank's environmental and social safeguard policies are designed to avoid, mitigate or minimize any adverse environmental and social impacts of projects supported by the Bank.

The Bank has a range of potential Operational Policy (OP) safeguards that can apply to different projects. However, the two triggered by this project are:

4.2.1 Environmental Assessment (OP 4.01).

Operational Policy 4.01 requires environmental assessment of projects to ensure they are environmentally sound and sustainable, and thus to improve decision making. Initial screening is undertaken to determine the appropriate extent and type of the environmental assessment according to the following three categories:

- Category A – requiring a full environmental assessment.
- Category B – requiring partial or less detailed environmental assessment.
- Category C – requiring no further environmental assessment after screening.

Depending on the project a range of instruments can be used to satisfy the Bank's environmental assessment requirements such as: environmental impact assessments, regional or sectoral environmental assessments, environmental audits or environmental management plans.

4.2.2 Involuntary Resettlement (OP 4.12)

Involuntary resettlement may cause severe long-term hardship, impoverishment, and environmental damage unless appropriate measures are carefully planned and carried out.

The fundamental objective of resettlement planning is to avoid or minimize resettlement whenever feasible. When resettlement is unavoidable the policy requires that resettlement is undertaken as part of a sustainable development program that assists displaced persons in their efforts to improve their livelihoods and standards of living or at least to restore them. If incomes are adversely affected, adequate investment is required to give the persons displaced by the project the opportunity to at least restore their income.

4.2.3 Policies not triggered

From the site visit and information gathered to date there are a number of safeguards which are not triggered.

Natural Habitats (OP4.04) and Forests (OP 4.36) will not be triggered as the project occurs predominately within Sao Tomé's marine waters and urban environment affecting no noteworthy terrestrial or marine ecosystems or forests.

Projects on International Waterways (OP7.5) will not be triggered as this policy applies to shared rivers, lakes or bays or gulfs that are shared for international water links and communication.

The Joint Development Zone shared by STP and Nigeria does not fall into this category as this agreement relates to simply sharing proceeds from this portion of the ocean.

4.3 International Conventions

STP has signed and ratified the following international conventions (GoSTP, 2007):

- UN Convention on Maritime Law.
- Convention on Biological Diversity.
- Convention on Climate Change.
- Convention to combat against desertification.
- Convention on the Protection of the Ozone Layer.
- Convention on Persistent Organic Pollutants.

There are numerous other conventions signed but not yet ratified, yet none with immediate relevance to the proposed project.

5. POTENTIAL IMPACTS OF THE PROPOSED PROJECT

The environmental impacts of submarine cable projects are relatively limited in significance and extent and are also relatively well understood world wide. Potential impacts are described below for different phases and components of the project.

5.1 Communication benefits

It is generally recognised by industry, business and government's world wide that, in order to remain competitive and to function adequately, affordable and reliable communication and bandwidth is required.

Currently STP is exclusively reliant upon satellite which is expensive and limited in capacity and speed. In order to improve World Wide Web connectivity and telecommunications, STP needs to be linked to the international submarine cable network.

There will be numerous indirect benefits and strengthening of the economy with the implementation of this submarine cable project.

5.2 Marine cable component

5.2.1 Ecological impacts

Submarine cables are relatively small and have little or no impact upon marine ecology or marine species during operational activities. At water depths of more than 1,000m the cable will simply rest on the sea-floor. As the continental shelf of Sao Tomé is relatively small, the cable will be, for most of STP's territorial waters and EEZ, in depths greater than 1,000m.

Where the cable is in water depths shallower than 1,000m, the cable will be buried where possible. During operation, whether the cable is buried or not, there will be little or no significant ecological impact upon benthic biota, marine mammals or fish.

Where cables are exposed and strong currents occur the cable may move slightly resulting in abrasion marks between 6 to 45 cm wide (UNEP, 2009). Mitigation measures such as avoiding rocky reefs or securing the cable to the rocks using stainless steel bolts can reduce this risk.

Often benthic organisms will colonise the firm surface of a cable particularly in sandy sections of the sea-floor. One of the purposes of the detailed marine survey is to identify any important reef outcrops that should be avoided by rerouting the cable slightly. This not only protects the cable from abrasion but also reduces the potential of any environmental impacts.

During the cable laying process, there will be no burial of the cable in depths greater than 1,000m and the cable will just be placed on the sea-floor. This will have little or no impact upon marine ecology. Any disturbance to fish species or whales is unlikely and will temporary disturbances no different than other normal shipping activity.

The alignment of the cable onto the landing site will aim to miss any reef or rock outcrops in order to protect the cable from potential damage. The disturbance during cable laying produced by the plough-share and skids in direct contact with the seabed, ranges from approximately 2 m to 8 m wide, depending on the plough size (UNEP, 2009).

The only impact which could potentially occur is if endangered turtle species are disturbed or injured during the beach landing operation. This impact would only occur if the cable landing takes place during the turtle nesting season from October to February. The likelihood of this impact is already reduced as a result of the alternatives being considered. Praia Meleo is a sandy beach suitable for nesting but has a large fishing and nearby residential population which is likely to reduce the chance of turtles selecting it.

Praia Pomba is a slightly more remote beach but is being targeted for illegal sand mining and, thus, is rocky with a relatively small area of sandy beach remaining. Santana (north) is not a beach site, but is where the sea comes up against a small wall protecting the road (Plate 6). Santana (south) has a beach that may be more suitable for turtle nesting but is also inhabited by fishermen, but to a lesser extent than Praia Meleo. Mitigation measures have been recommended in Section 7.

Impact analysis
No important coral reefs or other potential marine ecological sites have been identified that will be impacted. Furthermore, submarine cables are small in size and have been well researched world-wide and have little or not impact upon marine ecology or species during operation.

During cable laying there will be minor disturbance of the sea-floor directly around the cable path. The affected area will be small and the disturbance will be of a short duration. In deeper water off the continental shelf sea-floor disturbance will be even less.

Thus, the significance of impacts upon marine species and ecology from cable laying or operation are considered minor after taking into account the recommended mitigation measures in Sections 6 and 7.

5.2.2 Socio-economic impacts

The cable infrastructure that will occur in STP's EEZ, includes the branching components going to Cameroon, Equatorial Guinea and Gabon.

The cable depths off the continental shelf will not result in any impacts or effects upon commercial fishing fleets within STP's EEZ. These fishing fleets fish at mid-water depths and the cable will be at depths of more than 1,000m. No bottom-trawling fishing operations within STP's EEZ have been identified or raised by stakeholders.

The cable will also not impact upon existing or planned shipping and port activities as these areas are more to the north and north-west of the island.

On the continental shelf and for the beach landing the following potential impacts should be noted:

5.2.2.1 Presence of Fish Attracting Devices

There are plans to place a number of fish attracting devices, referred to locally as DCPs, around the island at different depths. The aim of these is to attract and concentrate fish in areas and at distances that will improve artisanal fishing catches.

These devices will have a large concrete block (approximately 1 m^3) anchoring them. None have been placed yet but planning is currently underway. It is likely that some will be placed in

areas near the proposed cable route. Figure 2 provides a draft layout of the bathymetry and proposed devices.

These devices will not have any impact on the cable, unless they are dropped directly on top of the cable, and the cable will not impact upon these devices. If these devices are placed prior to the cable being laid, then the cable ship and route planners need to be made aware of their presence. If the cable is placed prior to these devices then the local fishing authorities need to be provided the coordinates of the cable route in order to ensure they do not damage the cable. Communication and awareness between these two stakeholders will address any potential impacts.

5.2.2.2 Disturbance of artisanal fishing activities

The landing of the marine cable, particularly at Praia Meleo, will result in a minor short-term (one or two days) disturbance to other users of the beach. This could also be a minor impact in the case of the Santana (south) alternative.

This impact is unlikely to affect or reduce income or fishing activities and is more likely to be a source of interest and entertainment. However, in order to ensure that no fishermen's boats are prevented from accessing the sea, a few days advanced warning should be provided to all fishermen on the particular beach. This warning should highlight the approximate extent of the beach that will used for the landing and that there will be temporary access constraints in this area.

Once the cable is secured and buried no further impacts during operation are envisaged.

Impact analysis
The offshore laying and operation of the cable will not have any significant negative socio-economic impacts upon other marine users around Sao Tomé, particularly commercial or artisanal fishing operations.

Mitigation measures include standard communication and awareness procedures as recommended in Section 7.

The significance of impacts during cable laying or operation are considered minor.

Figure 3: Fish attracting devices and bathymetry

5.2.2.3 Offshore oil and petroleum

There a number of oil concession blocks within STP's EEZ and also in the Joint Development Zone shared with Nigeria. Drilling exploration has started in the Joint Development Zone. No drilling has yet been undertaken in STP's concession blocks but four blocks have been awarded (Blocks 4, 5, 11 and 12). Seven other concession blocks are still open for bidding.

The impact of the proposed cable upon these concessions is not considered significant and discussions between off-shore oil and cable consortiums are routinely undertaken with a view to avoiding each other's infrastructure.

There is also an anchoring zone nearby Praia Pomba where a petroleum ship anchors twice a year to supply the Voice of America radio station.

Impact analysis
The offshore laying and operation of the cable will not have any significant negative socio-economic impacts upon oil and petroleum concession holders or ships around STP.

Mitigation measures include standard communication and awareness procedures as recommended in Section 7.

The significance of any impacts during cable laying or operation are considered minor.

5.3 Terrestrial cable components

5.3.1 Beach Man-Hole and Cable Trenching

The construction of the Beach Man-Holes and the cable trenching along the roads will not result in any significant impacts.

The BMHs at either Praia Meleo, Santana (north) or Santana (south) are all in existing hard-surface areas. The BMH at Praia Pomba is planned along an existing dirt track (Plate 9).

The cable ducts will be placed under the existing roads and will run back to the proposed cable station. All roads were deemed sufficiently wide enough to allow trenching and work to be undertaken in the road whilst still allowing traffic to pass around (Plate 10 illustrates similar cable work being undertake during the site visit).

The only portion of the terrestrial cable that will go through a more natural environment is that at Praia Pomba from the beach up to the BMH. This cable trenching would occur alongside a small river and follow a footpath up to the existing dirt track (Plates 11, 12, 13).

There are two socio-economic aspects related to Praia Pomba of which the GoSTP needs to be aware. Praia Pomba is one of the beaches highlighted by Alegre (2009) where illegal sand mining is occurring. Indeed, this beach lost a visibly noticeable quantity of sand over three days during the site visit.

In addition, the Ministry of Public Infrastructure and Urbanisation granted in 2008 a concession to Gibela Lda to build a 15,000m² tourism enterprise at this beach. Nothing has occurred yet and plans may be on hold, however, there could be conflicting development plans should the cable route affect any development alternatives.

Impact analysis

There will no significant biophysical or social impacts as a result of trenching or construction work. Any disturbance will be no different to temporary service infrastructure maintenance or construction.

Mitigation measures are recommended in Section 7.

The significance of any impacts during cable laying or operation for Praia Meleo, Santana (north) or Santana (south) are considered minor.

The significance of any impacts during cable laying or operation for Praia Pomba are considered of medium significance and alternatives and mitigation measures are recommended in Sections 6 and 7.

Plate 9: Praia Pomba BMH

Plate 10: Cable being placed under the road

Plate 11 & 12: Cable route from beach to Praia Pomba BMH

Plate 13: Cable route from beach to Praia Pomba BMH

5.3.2 Cable station sites

CST has identified a preferred cable station site at Sao Gabriel. However, during the site visit an additional possible option at Sao Marçal was identified and has also been recommended to CST for consideration. These two sites and issues associated with them are described below.

5.3.2.1 Socio-economic/resettlement impacts

SITE 1: SAO GABRIEL

This site is within the city of Sao Tomé in the suburb Sao Gabriel. CST owns approximately 3.8 ha of the land outlined (in white) (Figure 4)[3]. CST have a small existing building (1) on the site and there is also a fuel station and a small chapel (2). The proposed site for the new cable station will be 0.5 ha on the south-west corner of the property (in red). The route of the proposed terrestrial cables from Praia Meleo and Praia Pomba are shown in green and yellow, respectively.

The number of 'plots' potentially affected within the 0.5 ha is estimated to be 15-20 households. Some of these plots may be allocated to different members of the same household or households of close relatives. The soil and agricultural potential of this land is considered to be quite good for a city-based area.

The total number of households cultivating land within the entire garden area is estimated at between 45 – 65 households. This area has apparently been used for cultivation for the last 15-20 years although those interviewed were aware that the land belongs to CST. One garden member interviewed claimed to have written permission from CST to manage and cultivate a piece of this land. This appears to be the case.

No fixed infrastructure improvements or dwellings were identified, although there are a few temporary tool sheds outside of the footprint of the proposed cable station. There is a make-shift system of irrigation whereby a small stream is diverted around the garden and small ponds have been dug at individual plots to ease irrigation. The bulk of the irrigation channels appeared to be outside the direct cable station footprint but flows could be impacted by earthworks and construction. One plot was seen to have a small irrigation pump and pipes, although more were reported (Plates 14 – 20).

[3] The land demarcated in white measures approximately 6.3 ha on Google Earth, but measurements taken from the plan seen at the Directorate of Geographical Services and Land Ownership measured 3.8 ha.

Figure 4: Proposed San Gabriel cable station site

Those interviewed reported that cultivating these plots provided the bulk of their household income. One gardener interviewed also claimed to work as a night guard for CST.

All those observed working in the garden area were males between 20 – 50 years of age although they mentioned that female relatives also worked in the garden.

There is a small restaurant business being run immediately on the border of the cable station site, but this should not be directly impacted. The fuel station and small chapel will also not be impacted upon.

Plate 14: Cultivation on the cable site

Plate 15: Cultivation on the cable site

Plate 16 & 17: Pump equipment

Plate 18: Irrigation diversions

Plate 19: Irrigation diversions

Plate 20: Cultivation in areas not directly impacted.

SITE 2: SAO MARÇAL

This site is two blocks south within the suburb Sao Marçal. CST also owns this plot of land (outlined in white). CST have an existing building and satellite dish adjacent to this land (1). There is a junior school to the north of the existing CST site (2).

The routes of the proposed terrestrial cables from Praia Meleo and Praia Pomba on the way to the cable station at Sao Gabriel are shown in green and yellow, respectively.

Figure 5: Proposed Sao Marçal cable station site

This area is apparently only being cultivated by two individuals, one female and one male. The women was present and claimed to have been cultivating this area for the past 10 years. She was over 60 years of age and stated that two of her children lived in other countries and another one in the city of Sao Tomé. Her husband is blind and does not work.

The potential impact upon these households, at either site, is a loss of land and source of income. The extent to which income from this land contributes to each household's total livelihood strategy would need to be determined to quantify the potential significance of this impact. However, it is anticipated that for most, cultivation of this land will contribute a large portion of their income and household food supply.

Plate 21: Marginal cultivation

Plate 22: Poor soil quality

Impact analysis
The potential loss of land resources to these homesteads will range in significance depending on the household's income status and access to other resources. There is little alternative vacant land to cultivate and as a result the project could potentially impact upon the livelihoods of affected households.

This may result in permanent displacement or lost opportunities to a small number of households. This impact is considered of medium significance for Site 1 Sao Gabriel and of medium to low significance at Site 2 Sao Marçal.

The difference in significance relates to the fact that there are more people impacted at Sao Gabriel and the land is better for agriculture. The soil at Sao Marçal is relatively poor and, thus, the value of the resource lost less.

The analysis of these alternatives and mitigation measures are recommended in Sections 6 and 7, respectively.

5.3.2.2 Occupational health, nuisance and pollution impacts

The construction of any of the buildings and to a lesser extent the cable trenching and BMH construction, can result in some nuisance, dust and pollution impacts. Impacts such as temporary dust, noise and constricted traffic flows are commonly associated with construction of any building and are easily managed by implementing standard environmental management actions.

There is a risk of groundwater pollution occurring particularly at the Sao Gabriel cable station site if the diesel storage tank is placed underground. This site has a high water table and poor construction resulting in underground leaks will go unnoticed. Thus, it is recommended that the tank be constructed above ground.

The construction of the building and section where the storage of diesel is to occur must be designed and constructed to recognised engineering and fire safety standards.

Impact analysis

No significant noise, dust or nuisance impacts are anticipated during construction, although minor and temporary disruptions may occur.

Pollution, particularly groundwater pollution, is an impact of medium significance that needs to be addressed through recognised engineering and civil construction designs and environmental monitoring.

Similarly, the occupational health and safety of workers using the building where diesel storage occurs needs to comply to recognised industry standards.

Mitigation measures are recommended in Section 7.

The significance of these impacts is considered medium but with acceptable management is deemed to be low.

6. ANALYSIS OF ALTERNATIVES

6.1 Marine cable alignments

In the marine environment the main alternatives are the routing and placing of the submarine cable. The selection of preferable routes from an environmental perspective compares similarly with best technical options. Thus, the cable consortium should seek a final cable alignment that avoids, where possible, reefs and rocky outcrops as well as shipping, fishing and oil drilling activities.

6.2 Landing sites

The comparison of landing sites from an environmental and social perspective has identified that the least preferable site is that of Praia Pomba. This site is not recommended, primarily due to risks to the cable and land-use conflicts. If the cable is uncovered, which is likely, due to a lack of sand on the beach, the GoSTP may need to close and guard the beach. Alternatively, the presence of a cable within a tourism enterprise, if one is ever built, could result in conflicting interests.

In addition, the impact of the cable trenching up to the Praia Pomba BMH may result in additional disturbance and water pollution risks due to the proximity of the small river. This is not considered a fatal flaw preventing this site but does make it less preferable.

The two sites at Santana are both deemed acceptable. However, there will be additional capital costs incurred to lay the cable back to the cable station, due to the increased distance.

An alternative that should perhaps be considered is to land the cable near Praia Pomba directly into the grounds of the Voice of America radio station. There is no beach for this landing, but the cable could possibly be buried under the loose rocks and/or fixed to the rocks. The BMH could then be placed in the grounds of the Voice of America radio station at a suitable location with the cable trenching continuing on the road to the cable station as proposed.

This appears to be a preferable alternative to both the beach at Praia Pomba or Santana, provided that the servitude agreements can be put in place and that the cable can be adequately protected from abrasion.

The Praia Meleo alternative is considered the most preferable.

6.3 Cable station sites

From a social and environmental perspective the cable station site at Sao Gabriel is not preferable, but is not fatally flawed either.

The impact or cost to compensate households for standing crops is estimated to be quite small. However, the task of restoring or ensuring livelihoods, if required, may be considerably more difficult and complex. This area is within the limits of the main city of Sao Tomé and there is no available land nearby. Available land on the outskirts of the city is likely to be too far from the homes of the project affected persons (PAPs) to make daily access and cultivation viable. Dividing up the land remaining between those who were affected and those who will not be, is likely to be a time consuming process that will require more formal land allocations to be recognised.

Identifying alternative sources of income or income earning opportunities for affected households, particularly within this urban environment, is also anticipated to be a difficult process.

Possibly more importantly though is that there are few cities with between 4-6 hectares of agricultural land in the midst of the urban suburbs. The City of Sao Tomé has this and it should possibly be conserved as a valuable environmental and social resource. Internationally recognition of the importance of urban agriculture has been growing as outlined in the text box below.

> Towns and cities are growing rapidly in developing countries. This process is often accompanied by high levels of poverty and hunger, leading many urban dwellers to engage in farming activities to help satisfy their food needs. Policy makers need to recognize this reality and actively seize the opportunities offered by urban agriculture.
>
> The recent spike of world hunger disproportionately affected the urban poor. As a large share of their disposable income is spent on food, the 2007-08 food price crisis was particularly hard on them. The urban poor also suffered from the consequences of last year's global economic downturn, which reduced their employment opportunities and income.
>
> Agriculture can help buffer the effects of such crises. While agriculture is largely a rural phenomenon, urban agriculture can also help increase the resilience of some urban poor to external shocks and improve their access to fresh vegetables, fruits and animal products.
>
> In many countries urban agriculture is informal and sometimes even illegal. Competition for land is a frequent source of conflict. While data are scarce, urban agriculture is an important reality in many developing countries. Up to 70 percent of urban households participate in agricultural activities, according to the first systematic quantification of urban agriculture conducted by FAO, based on data from 15 developing and transition countries for which comparable statistics are available.
>
> Urban agricultural production is generally geared towards consumption within the household. Urban agriculture is thus not primarily a source of cash income, although in some countries (notably Madagascar and Nigeria) the share of income derived from urban agriculture exceeds 50 percent in the lowest income quintile.
>
> The food security benefits of engaging in urban agriculture materialize mostly through better access to additional and more nutritious food. Indeed, urban households engaged in farming activities tend to consume greater quantities of food, sometimes as much as 30% more. (FAO, 2010)

Taking into account (a) the drop in agricultural production which occurred in the rural areas after independence, (b) the fact that the majority of STP's citizens are urban dwellers and (c) the increasing food security issues associated with poorer urban dwellers around the world, it is strongly recommended that this site rather be conserved for urban agriculture. In the author's opinion it is a valuable resource that will not easily be replaced.

The cable station site at Sao Marçal is significantly less suited to agriculture and will impact upon fewer resource poor households. This site appears to be technically feasible and would also reduce the distance between the landing sites and the cable station.

An additional advantage of the Sao Marçal site is that it is likely to require less fill material and earth works in order to prepare a suitable foundation for the proposed cable station.

The potential costs for resettlement and mitigation for each site have been recommended in the RFP.

7. IDENTIFICATION OF MITIGATION AND MONITORING MEASURES

The following mitigation and monitoring measures are recommended.

7.1 Design and Planning Phase

7.1.1 Marine cable planning and alignment

- The cable consortium should select a route that:
  - Avoids reefs where possible or uses the shortest route across reefs. Where the cable will cross reefs, stainless steel bolts should be used to secure the cable. No blasting or concrete to be used.
  - Will allow burial of the cable to a depth of 1 m wherever possible.
- The cable consortium should liaise with all relevant marine stakeholders, specifically the oil and petroleum and fishing industries.
- The optimum beach landing site for STP – South Africa (Segment 4) section of the cable should be reconsidered either during current planning or closer to the time of implementation.
- A pre-beach survey should be undertaken prior to landing to confirm the presence or absence of protected turtle species. Alternative cable landing procedures should be planned should the presence of turtles be confirmed.

7.1.2 Cable station planning and design

- The advantages and costs between the two proposed sites should be considered and additional sites considered if necessary. Where possible, the loss of land resources for agricultural purposes should be minimised, particularly where it affects resource poor households.
- Where resettlement is unavoidable further social assessment work and the implementation of the RPF is recommended.
- Cable station design in terms of structural and safety features must be in accordance with recognised civil engineering standards.

7.1.3 Awareness creation and stakeholder notification

- The GoSTP and the Cable Consortium should maintain contact with groups such as Marapa-ONG to advise them of the proposed cable position and to confirm the presence of any fish attracting devises.
- The GoSTP and the Cable Consortium should request Marapa-ONG to facilitate and assist with notification to the artisanal fishermen of the cable landing procedures and dates.

7.2 Construction and implementation phase

7.2.1 Disturbance and nuisance

- Disruption to other services, vehicle or pedestrian traffic or any other activities must be minimised.
- The contractor must make provisions for maintaining access, providing adequate notice of access closures and alternative routing if required.
- The contractor must identify the location of any existing services under the road prior to commencing with construction.

7.2.2 Demarcation of the cable station site

- The cable station construction site should be clearly demarcated in order to minimise the construction footprint upon surrounding land.

7.2.3 Protection of habitats/species

- Disturbance around the landing site of Praia Pomba, if selected, must be minimised and pollution and waste prevented from entering the stream.

7.2.4 Water supply and waste management

- The contractor must arrange, in accordance with the relevant GoSTP authorities, water supply on site for construction purposes, as well as access to drinking water and ablution facilities for construction personnel.
- No solid waste may be burned or buried on site. Any waste must be disposed of at a recognised waste disposal site.
- Oil or fuel spills must be prevented from entering the storm water system or surrounding vegetation.

7.2.5 Marine survey and cable-laying activities

- Survey and Cable-ships to abide by all STP's marine legislation and protocols.

7.2.6 Emergency procedures

- Survey and Cable-ships must have the contact details for the Coast Guard and STP medical services in case of any emergency during cable installation.
- Contractor to have the contact details on site for the STP fire department and medical services in case of any emergency during construction.

8. ENVIRONMENTAL AND SOCIAL IMPACT MANAGEMENT PROCEDURES, GUIDELINES AND RESPONSIBILITIES

8.1 Further environmental/social screening

No further screening of the natural environment is deemed necessary. The impacts upon the natural environment are deemed to be minor. The implementation and monitoring of the mitigation recommendations is recommended.

The preparation of an Environmental and Social Management Plan (ESMP), if required, or simply the incorporation of the proposed mitigation measures into the contract documents with monitoring is deemed to be sufficient to address most impacts.

The requirement for further environmental assessment work in terms of STP's national regulations needs to be confirmed with the Directorate for Environment. It is anticipated that this report will fulfill and meet the requirements for the pre-assessment report describing the project and the preparation of an ESMP, if required, should address the various management requirements.

The main uncertainty is the extent of the potential social impacts depending on the cable station alternative selected. It is recommended that the Resettlement Plan Framework (RPF) be triggered for any sites that have compensation or resettlement issues associated with them.

For the Sao Gabriel site, additional social impact assessment work as part of the initial preparation phases of the Resettlement Action Plan (RAP) is recommended. For the Sao Marçal site, a much reduced form of compensation negotiation and assistance is required, especially if alternative land can be offered.

8.2 Incorporation of environmental and social considerations into engineering designs

There are few aspects that need to be incorporated. It is recommended that the GoSTP maintains close liaison with the cable consortium planning the marine components and feeds through the findings of this study.

The recommended mitigation measures (or ESMP) should be incorporated into the contract documents and enforced by the project engineer.

It is recommended that monitoring be the responsibility of an independent environmental official from the Directorate of the Environment, or an appointed independent consultant, to ensure environmental and social compliance. Where issues of non-compliance are identified the Project Engineer should be informed and tasked with the responsibility to ensure compliance by the contractor.

8.3 Public consultation and disclosure

CST has already met many of the key government or institutional stakeholders and informed them of the proposed project. During this assignment most of these stakeholders were again consulted with specific regard to environmental and social concerns.

The GoSTP and CST will advertise and make known the availability of the draft ESMF and RPF for public review and comment. Hard copies of these reports will be made available at specific public places.

The GoSTP and CST currently plan to hold a single stakeholder meeting to present the findings of these investigations and invite stakeholder comment. These stakeholders will include many of the stakeholders previously consulted.

It is recommended that an additional stakeholder meeting, pitched at a different level and focus, be held with the stakeholders potentially affected by resettlement or loss of land at the cable station sites.

8.4 Implementation roles and responsibilities

The responsibility for implementation rests on the GoSTP and CST, however, different components will be delegated to different Directorates. This responsibility will cover the various financial, contractual, cable ship access, building design and construction aspects required.

Adequate monitoring improves the effectiveness of impact management and increases the extent to which mitigation measures are successfully implemented. Monitoring provides an important feedback mechanism on the mitigation measures recommended, highlights potentially new or unforeseen impacts and assists in identifying and incorporating additional remedial actions where required.

The Directorate for Environment will be responsible for monitoring and ensuring environmental and social compliance.

8.5 Environmental and social capacity building and awareness

The institutional capacity of the Directorate of Environment is relatively limited, particularly with regard to knowledge of the potential issues and impacts associated with submarine cables. This is partly to be expected as this will be the first submarine cable to land at STP. It is also anticipated that experience of internationally recognised resettlement and compensation procedures is also lacking.

Due to the relatively short duration over which implementation will take place, it is recommended that a one day training and awareness workshop be held with officials from the Directorate. This training should cover, among other aspects:

- A summary and background to submarine cables and their potential environmental impacts.
- Implementation of World Bank safeguard policies and procedures related to impact assessment and involuntary resettlement.
- Monitoring and auditing compliance with environmental and social requirements during the construction and implementation of the project.
- Monitoring and auditing compliance with the resettlement and compensation procedures required.

8.6 Proposed budget

This proposed budget is based on the assumption that no further detailed environmental assessment work will be required. It assumes that the only further requirement may be to prepare an ESMP incorporating these mitigation measures and defining the roles and responsibilities during the resettlement and compensation process. If this is not required by the World Bank or GoSTP then incorporation of the mitigation measures into the contract documents should suffice.

Additional social assessment work required and the preparation and implementation of a RAP is included in the budget proposed in the RPF.

Table 2 Projected budget

Item/Task	Estimated Cost (USD)
Preparation and completion of an ESMP	$ 10 000
Provision for capacity building and awareness training	$ 2 500[4]
TOTAL	**$ 12 500**

[4] This is based on the assumption that this training and awareness will form part of the continuation of this assignment and a trip budgeted for under the ESMF or RPF work. If another independent consultant is appointed, or a specific trip is required just for this training, then additional budget should be allowed.

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ANNEXURE 1: CONSULTATION AND DISCLOSURE

Stakeholder participation is an important component of environmental and social impact assessment. During the field work and preparation of this report, apart from members of the project team and client, the following stakeholders were consulted.

Name	Role	Organisation
Mr G Carvalho	President	Marapa ONG
Mr JP Lima	Executive Secretary	Marapa ONG
Mr E Paquete	Secretary to Minister	Ministry of Public Works and Natural Resources
Mr J de Oliviera	Director of Legal Regulations and Analysis of Environmental Impact Studies	Directorate of Environment
Mr E Pereira	Technician	European Union Decentralised Food Security Programme
Mr JL Testori	Owner	Maxcel Scuba-diving club
Mr Alavo	Director	Directorate of Fisheries
Mr H Quaresma	Director	Directorate of Geographical Services and Land Ownership
Ms M do ceu Silveira	Director	Ministry of Public Works and Urbanisation
Mr E Aguiar	Architect	Ministry of Public Works and Urbanisation
Mr D Costa	Civil Engineer	Ministry of Public Works and Urbanisation
Mr F Rita	President	ENAPORT
Mr A Olivera	Board member	ENAPORT
Mr J dos Santos		Terminal Link STP
Mr O Tretout		Terminal Link France
Mr J Demenezes	Chief of Department	Directorate of Planning and Cooperation
Mr H de Sousa	Deputy Commander	Coast Guard
Mr P Graca	Subsistence farmer	At Sao Gabriel cable station site
Mr Lopez	Subsistence farmer	At Sao Gabriel cable station site
Mr A Fernades		At Sao Gabriel garden site
Ms J Shinta	Small restaurant owner	At the boundary of the Sao Gabriel cable station site
Ms H Lopez	Subsistence farmer	At Sao Março; cable station site