



Reference Number: AA-001226-002

Detailed Project Engineering Design, Bid Documents and
Associated Safeguard Instruments Preparation for Agua
Grande Coastal Protection and Reconstruction of Marginal
Road

VOLUME 1 - NON TECHNICAL SUMMARY

FINAL EDITION



São Tomé
April, 2022

Non Technical Summary



■ QUALITY CONTROL SHEET

DOCUMENT	Non Technical Summary				
CONTRACT	Detailed project engineering design, bid documents, and associated safeguard instruments preparation (AA-010226-002)				
COD	RD6767-NTS -DD-D02				
AUTHOR	SIGNATURE	HLB			
	DATE	12/04/2022			
REVISED	SIGNATURE	JRC			
	ADDRESS	12/4/2022			
ADDRESSE	EIB/ RVO/INAE				
NOTES					

The Technical Assistance operation is financed by the European Union under Cotonou Investment Facility

The authors take full responsibility for the contents of this report. The opinions expressed do not necessarily reflect the view of the European Union or the European Investment Bank or RVO

Non Technical Summary

■ CONTENT

1	INTRODUCTION AND BACKGROUND.....	5
2	PROJECT JUSTIFICATION	5
3	DESCRIPTION OF PROJECT	6
3.1.	LAGARTO BAY.....	6
3.2.	ANA CHAVES BAY.....	8
3.3.	PANTUFO COASTLINE.....	13
4	CLIMATE AND CLIMATE CHANGES	16
5	ENVIRONMENTAL BASELINE CONDITIONS	18
6	SOCIAL BASELINE CONDITIONS.....	21
7	POTENTIAL ENVIRONMENTAL IMPACTS.....	25
7.1.	LAGARTO BAY.....	25
7.2.	ANA CHAVES BAY.....	27
7.3.	PANTUFO COASTLINE.....	28
8	CUMULATIVE ENVIRONMENTAL IMPACTS	30
9	MAIN POTENTIAL SOCIAL IMPACTS.....	33
9.1.	LAGARTO BAY.....	33
9.2.	ANA CHAVES BAY.....	34
9.3.	PANTUFO COASTLINE.....	35
10	CUMULATIVE SOCIAL IMPACTS.....	36
11	ENVIRONMENTAL MITIGATION MEASURES.....	38
11.1.	ENVIRONMENTAL MITIGATION MEASURES.....	38
11.1.1.	CONSTRUCTION PHASE.....	38
11.1.2.	OPERATION PHASE.....	40
12	MITIGATION AND ENHACEMENT MEASURES FOR SOCIAL IMPACTS	41
12.1.	CONSTRUCTION PHASE	41
12.2.	OPERATION PHASE.....	42
13	MONITORING PLAN.....	42

■ FIGURES

Figure 1	Aerial view of Section 1: Lagarto Bay (0+000-2+760).....	6
Figure 2	Typical cross section. Lagarto Bay (CH 0+000 – 0+448).....	7
Figure 3	Typical cross section. Lagarto Bay (0+580 – 0+743).....	8
Figure 4	Typical cross section. Lagarto Bay.....	8
Figure 5	Aerial view of the Section 2: Ana Chaves Bay. Ch. 2+760 – 5+900	9
Figure 6	Fishery, boat workshop & house public toilets	10
Figure 7	Typical cross section Ana Chaves Bay (2+750 – 2+850).....	11
Figure 8	Typical cross section. Ana Chaves Bay (CH 2+850 – CH 3+420).....	12



Non Technical Summary

■ FIGURES

Figure 9 Typical cross sections .Ana Chaves 4+950 – 5+300	12
Figure 10 Typical cross section Z2D. Ana Chaves Bay.....	13
Figure 11 Pantufo Coastline .5+900 – 8+820	14
Figure 12 Typical cross section.Pantufo Coastline (CH 6+260 – CH 6+320)	15
Figure 13 Typical cross section. Pantufo Coastline (CH 7+260 – CH 7+300; CH 7+600-CH 7+860).....	15

■ TABLE

Table 1 Environmental Cumulative Impacts Assessment. Construction Phase	31
Table 2 Environmental Cumulative Impacts. Operation phase	32
Table 3 Social Cumulative Impacts Construction phase	37
Table 4 Social Cumulative Impacts.Operation phase.....	37

Non Technical Summary

1 INTRODUCTION AND BACKGROUND

This document constitutes the Non Technical Summary Report of Environmental and Social impact Assessment for Água Grande Coastal Protection and Reconstruction of Marginal Road. In its preparation the provisions of the São Tomé legislation projects and aligned with EIB policies and standards, as well as applicable IFC Performance Standards

The project is funded by the European Investment Bank, the Bilateral Aid from the Kingdom of the Netherlands, and the Government of São Tomé and Príncipe STP.

The area covered by this Requalification Project includes the three sections that make up the Marginal Road of the City of São Tomé, District of Água Grande, namely:

- Lagarto Bay
- Ana Chaves Bay
- Pantufo Coastline

At the end of 2017, The Ministry of Infrastructure, Natural Resources and Environment (MOPIRINA) of São Tomé e Príncipe assigned with CDR International to carry out the consultancy services for a Vulnerability Analysis, Feasibility Study and Preliminary Environmental and Social Impact Analysis (ESIA) for the Água Grande Coastal Protection Project.

Based on Vulnerability Analysis, the subsequent draft revisions of the Feasibility Report and the comments and discussion regarding the draft revisions, three Alternatives (Alternative A, B and C) for the combination of coastal protection and road rehabilitation were prepared.

Based on the pros and cons of Alternative A and B, Alternative C including a combination of Alternative A and B was prepared and confirmed as the Preferred Alternative.

On 10th November 2020, the Executive Director of National Institute of Roads confirmed Alternative C as the preferred option considering that it best responds to the need to rebuild the Marginal both from the point of view of road design and coastal protection.

2 PROJECT JUSTIFICATION

The Marginal Road is a very important road in São Tomé because it is the main access to São Tomé's airport, Central Hospital (Hospital Dr. Ayres Menezes) and the country's capital, with intense economic activity and population along the coast.

São Tomé island population and economic activities are mainly located along the coast, away from the steep inland slopes that comprise the rest of the islands. Tourism has hitherto been associated with these coastal areas and remains an important source of revenue for the national economy. These coastal roads and the increased tourist activity along them exacerbate the damage caused by coastal erosion and increase the economic costs of loss.

According to the previous studies done in the Preliminary Environmental Impact Assessment the effect of climate change in the study area has been leading to strong erosion of the coastline and beaches throughout the island of São Tomé, with particular incidence in the bays located in the capital, dilapidation, and disintegration of walls in Ana Chaves Bay and partially in Pantufo; damage of pavements and collapsing of retaining walls, beach erosion and consequent reduction of the fishermen's landing places, occasional overtopping of the waves and consequent flooding of the marginal access roads.

Non Technical Summary

3 DESCRIPTION OF PROJECT

3.1. LAGARTO BAY

The Lagarto Bay section starts near the Airport, besides the O Bigodes Hotel (0+000), continues along Lagarto Bay for 1,9 km, crosses inland the promontory between both bays and ends to the south of Central Hospital of Sao Tome specifically next to the access to CKDO Supermarket (2+760).



Figure 1 Aerial view of Section 1: Lagarto Bay (0+000-2+760)

The design speed throughout the section is 50 km/h. But in some sections where the available space did not allow to create a cycle lane, speed limit has been reduced at 30 km/h.

Two new hydraulic structures are foreseen at CH 0+450 and CH 1+340.

Along the pavement adjacent to Lagarto Bay, there are no plans to propose new trees due to the limited space of the pavement (approximately 2 m) wide. The alignment of coconut trees is maintained. The shaded walking space is on the other side of the pavement next to the houses where the large Indian Almond trees are located.

A space on the side of the promenade adjacent to the sea between km 0+120- 0+320 of the road, allows the development of a recreational area that houses

- A green area with shady trees under which there are rest areas with benches.
- A children's play area.
- Lighting to enhance the value of the new recreational area.
- Street furniture, corrosion and vandalism resistant close to the sea:
 - Concrete bins.
 - Drinking water fountains located in recreational areas.
 - Bike parking.

Non Technical Summary

- Benches: The benches are made of recycled concrete and glass. Currently there is a local company that makes urban furniture with this material with interesting aesthetic results, mixing new designs that play with straight and curved geometric lines depending on the public space design, with others that recover the aesthetics of colonial models.

To reduce the impact created by the new maritime protection wall along the promenade, a tile cladding is proposed as a solution that requires less maintenance (without the need for periodic coats of paint), it is easy to implement, and it provides beauty and identity to the wall. The wall is reused and it is proposed to make it larger in certain sections along the promenade to create new areas of benches.

At CH 1+860 it is proposed to locate a new building, a wash house to allow the washing of clothes which is currently done on the Lagarto beach where there is a water access point. This measure aims to improve the current situation of the population by offering suitable space for the washing activity that is recurrent in their day-to-day lives in the public space due to the lack of water in their homes.

Lagarto Bay requalification includes benches every 100 m and concrete bins every 40 m.

For Lagarto bay is foreseen the following new tree species and tree species affected:

- 36 new tree species (14 robusta washingtonianas, 17 karroo acacias and 5 tamarinds, or similar)
- 16 tree species affected (12 coconut palms and 4 terminalia catappa, or similar)

For **coastal protection** three different sections are designed along Lagarto's Bay.

The first section consists on installing a main protection of rocks. A filter layer is placed under the main protection. The crest of coastal protection is crowned by a concrete. Additionally, a geotextile is placed between rock protection and natural terrain to avoid loss of terrain.

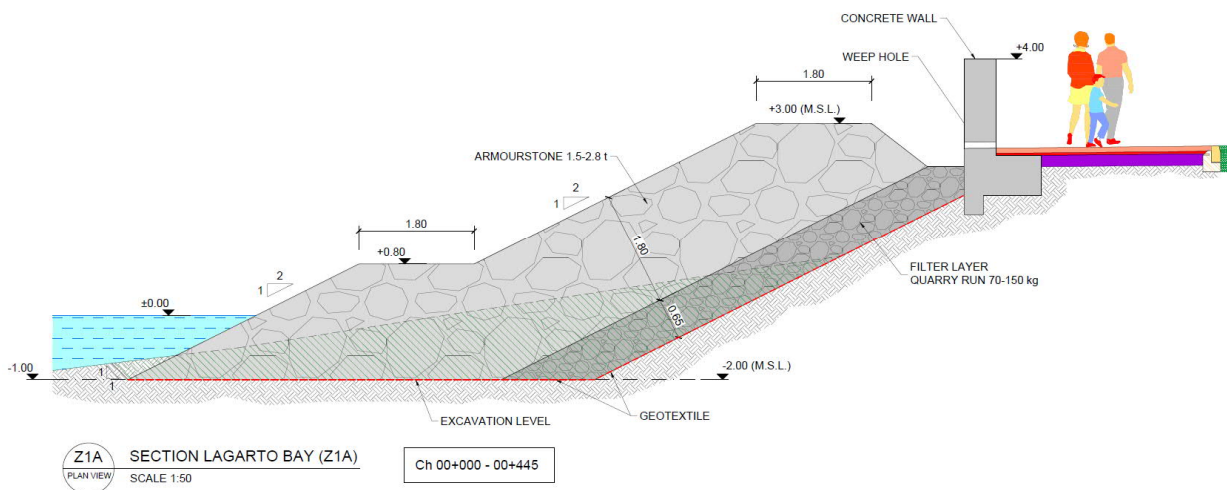


Figure 2 Typical cross section. Lagarto Bay (CH 0+000 – 0+448)

Second section consists on installing a main protection of rocks. A filter layer is placed. To crown the coastal protection a concrete wall and also a geotextile between rock protection and natural terrain is placed.

Non Technical Summary

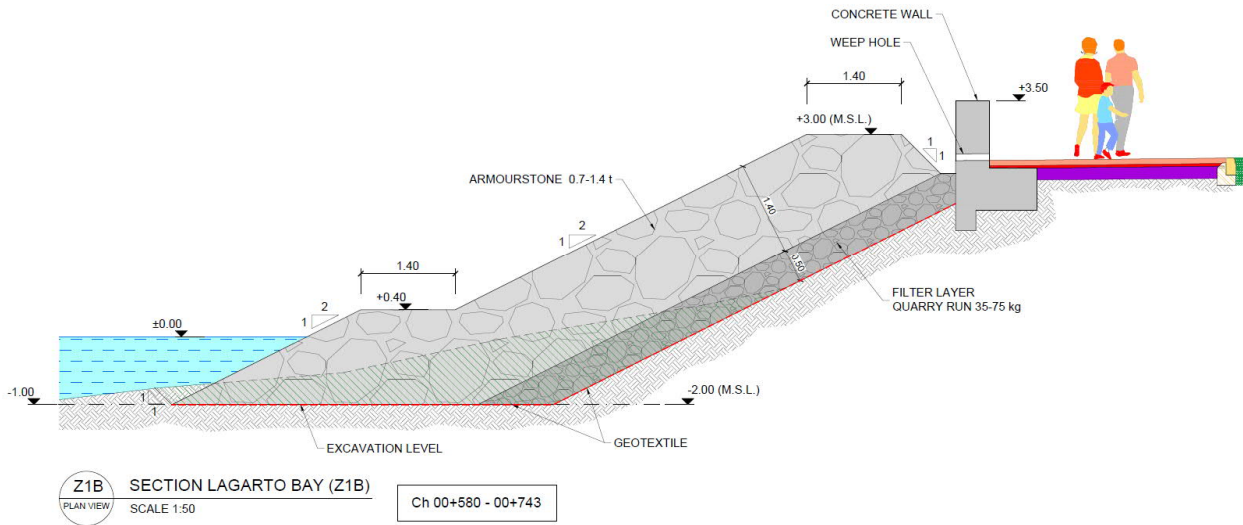


Figure 3 Typical cross section. Lagarto Bay (0+580 – 0+743)

Third section consists on installing a main protection of rocks. A filter layer is placed. To crown the coastal protection a concrete wall is proposed and also a geotextile between rock protection and natural terrain.

Furthermore, to keep existing use of the area a beach nourishment is considered, also this sand contribution reduces wave agitation within the bay dissipating wave energy. This typical section is foreseen to 0+ 800 – 1+335, 1+345 – 1+740 and 1+750 – 1+860.

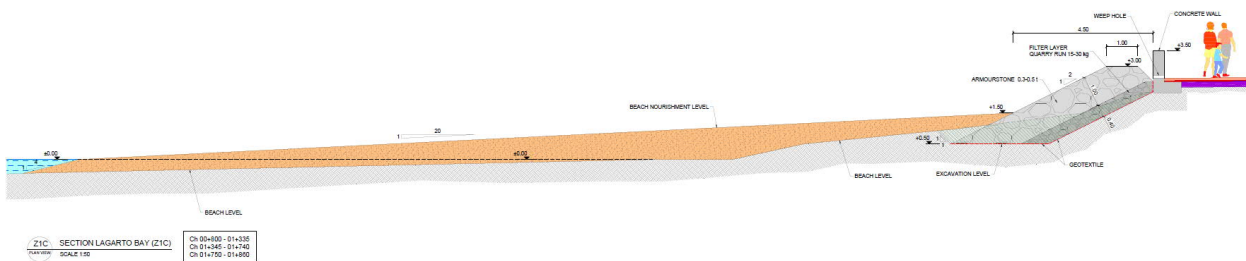


Figure 4 Typical cross section. Lagarto Bay

3.2. ANA CHAVES BAY

The Ana Chaves Bay section is the most densely urbanised section of the Project as it contours the centre of the capital. The length of this section is 3+140 m.

Begins in the access to CKDO Supermarket (2+760), continues along Avenida 12 de Julho passing several landmarks: intersection (round about) with EN1 National Road (3+700), Avenida Água Grande (4+800), Post Office (5+100), Parque Ucla (5+150), Praça da Juventude (5+650 and finally the Forte de São Sebastião (5+900).

Non Technical Summary



Figure 5 Aerial view of the Section 2: Ana Chaves Bay. Ch. 2+760 – 5+900

The design speed throughout the section is 40 km/h, except from 4+150 to 4+700, which will be 30 km/h due to the largest number of people on this section and the existence of several successive crossings.

The design includes the incorporation of two roundabouts at different intersections of the projected road: connection with EN1 road and Port access.

A new bridge Água Grande is foreseen to be constructed at 4+790.

Several spaces of singular presence appear due to their proximity to important buildings and squares of the city, where the development of recreational areas is proposed:

- Area São Pedro Church: 3+620- 3+920
- Area Pier- Independência Square: 4+480- 4+600
- Area Post Office 5+020 - 5+220
- Area São Sebastião Fort: 5+620- 5+860 (also in this area will be public toilets enabled in an existing spa building).

In these areas, each with its own character and different landscape design, large green areas are proposed with existing trees and proposed shade-generating trees, under which rest areas with benches are provided, as well as other interventions:

- A children's play area.
- Fitness area (next to São Sebastião Fort)
- Lighting to enhance the value of the new recreational area.
- Street furniture, corrosion and vandalism resistant, close to the sea:
 - Concrete bins.

Non Technical Summary

- Drinking water fountains located in recreational areas.
- Bike parking.
- Benches: The benches are made of recycled concrete and glass. Currently there is a local company that makes urban furniture with this material with interesting aesthetic results, mixing new designs that play with straight and curved geometric lines depending on the public space design, with others that recover the aesthetics of colonial models.

Close to São Sebastião Fort public toilets in existing building will be available in public space.

Ana Chaves Bay requalification includes benches every 100 m and concrete bins every 40 m.

For Ana Chaves Bay is also foreseen the following new tree species and tree species affected:

- 100 new tree species (1 *Robusta washingtonianas*, 83 *Karoo acacias* and 16 tamarinds, or similar)
- 4 tree species affected (1 coconut palms and 3 *Terminalias catappa*, or similar)

Fishery, boat workshop and house public toilets

The fishery, boat workshop and house public toilets are designed between 5+200 and 5+280, see following Figure.



Figure 6 Fishery, boat workshop & house public toilets

Non Technical Summary

Fishery has been estimated for the available space that allows the provision of product for sale in 9 exhibition workbenches, which would allow up to 36 exhibitors and 4 per workbench in area of 221 m².

Likewise, there will be the provisions for electrical supply, water supply for cleaning, installation of sanitation and drainage for septic tank and installation of rainwater evacuation.

Public toilets has an area of 157 m² an area are capacity of 50 p/h a day with a usual distribution of three differentiated spaces for men, women and disabled people is proposed, with direct access from the street. The installation will have the provisions for electrical supply, water supply, installation of sanitation and drainage to septic tank and installation of rainwater evacuation.

Workshop as an total area of 221 m² and working area of 127 m² for the service of maintenance and repair of the boats, an open space has been designed to allow the correct development of the work to be carried out in its interior for two boats simultaneously. The installation will have the provisions for electrical supply, water supply, installation of sanitation and drainage to septic tank and installation of rainwater evacuation.

For **coastal protection** four different sections are designed along Ana Chaves Bay.

First section consists on installing a main protection of rocks. The crest of coastal protection is crowned by a concrete wall that is built on the existing wall. Additionally, a geotextile is placed between rock protection and existing wall and natural terrain as well to avoid loss of terrain.

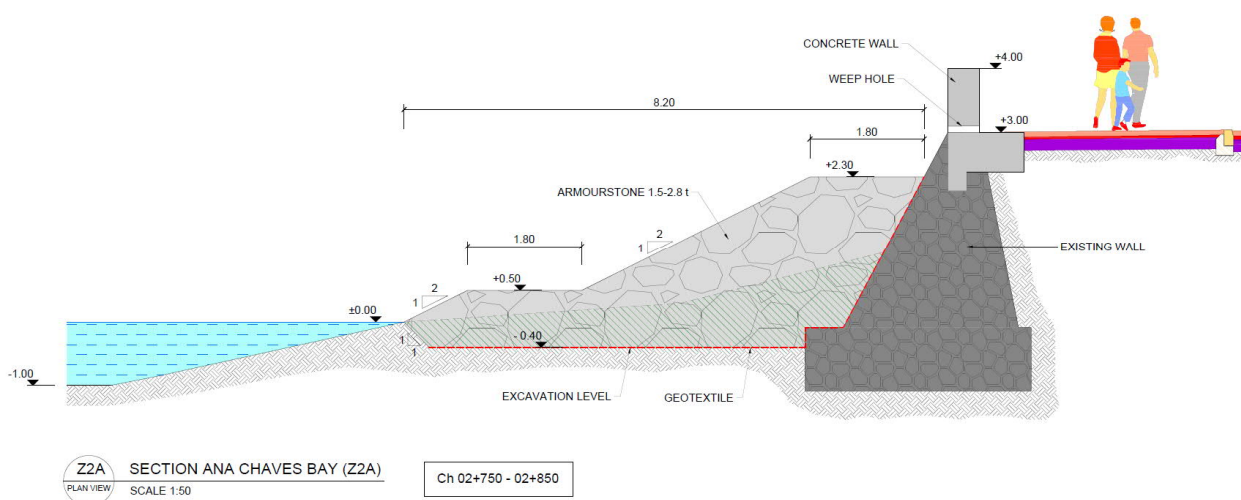


Figure 7 Typical cross section Ana Chaves Bay (2+750 – 2+850)

Second section consists of installing a main protection of rocks to crown the coastal protection a concrete wall that reaches and a geotextile between rock protection and natural terrain and existing wall as well.

Non Technical Summary

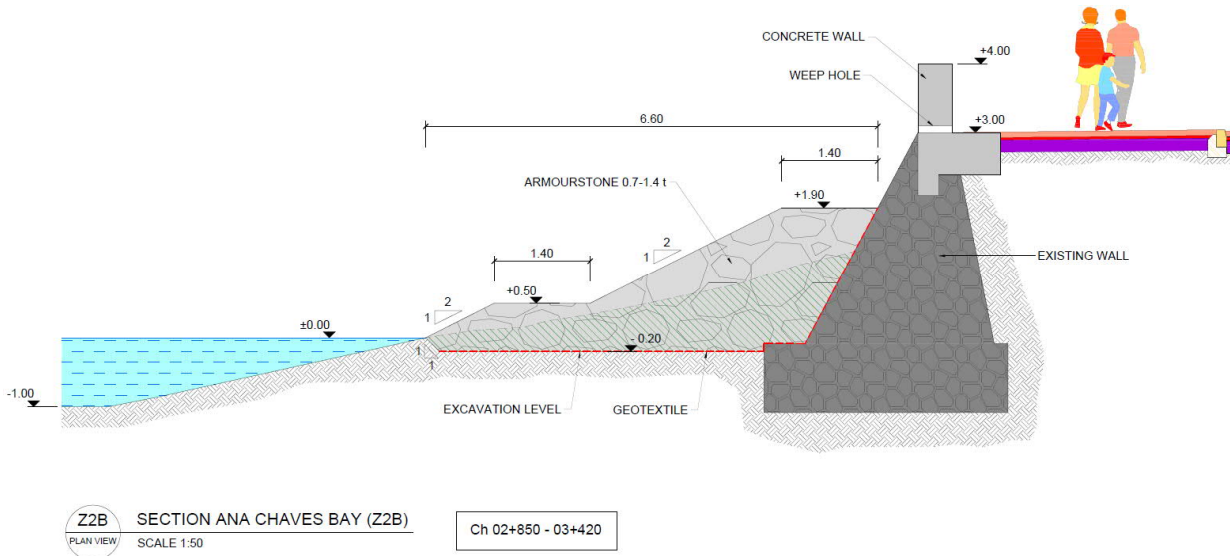


Figure 8 Typical cross section. Ana Chaves Bay (CH 2+850 – CH 3+420)

Third section consists on installing a main protection of rocks. To crown the coastal protection a concrete wall that reaches and a geotextile between rock protection and natural terrain.

Furthermore, a beach nourishment is considered this measure will ensure that these (beach) landing sites do have a minimum landing space required for fishing boats, also this sand contribution reduces wave agitation within the bay dissipating wave energy.

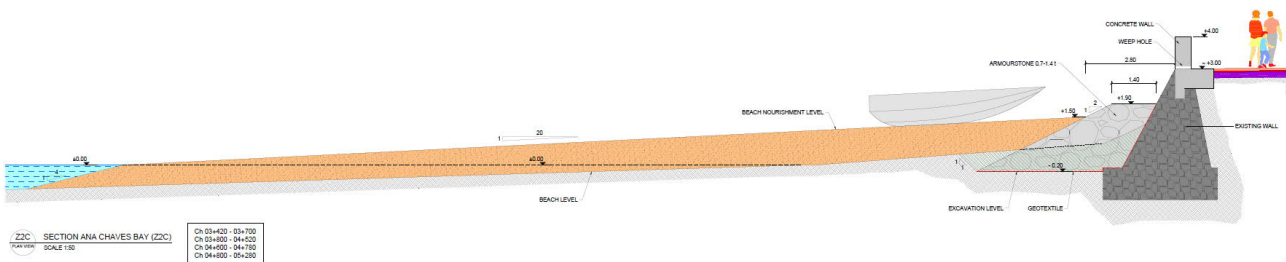


Figure 9 Typical cross sections .Ana Chaves 4+950 – 5+300

The fourth section is installed for fill protection in the area of the cycle lane extension and the new platform for fishermen's buildings. It consists of installing a main rock protection up to the crest of the fill. To complete the coastal protection, a concrete wall is designed and a filter and geotextile between the rock protection and the natural terrain to prevent the loss of fines.

Non Technical Summary

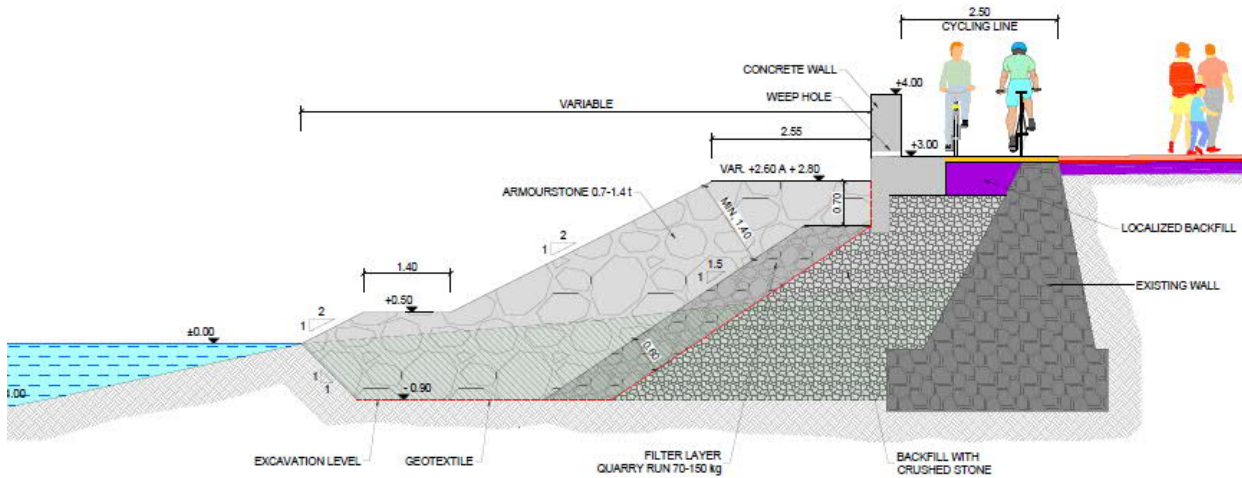


Figure 10 Typical cross section Z2D. Ana Chaves Bay

Additionally, two groynes are implemented in the design to assure the stability of the beach at chainage 03+710 and 04+950. The groynes will have a length of 25 m long.

3.3. PANTUFO COASTLINE

The Pantufo Coastline section starts besides the Sao Sebastião Fort (5+900) and ends around 1.000 m southwards the Pirata Bar, in the intersection with Estrada São Marçal (8+220 m) (the village of Pantufo) through several landmarks: Avenida da Independência (6+200), Liceu Nacional (6+600), Avenida Kwama N'Kruma (6+950), Avenida das Nações Unidas - Estrada Nacional 2 EN2 (7+150), Hotel Pestana (seaside) and Assembleia Nacional (landside) (7+500) and finally the Estrada São Marçal (8+820 m). The Length is 2,920 m.

Non Technical Summary



Figure 11 Pantufo Coastline .5+900 – 8+820

The design speed throughout the section is 50 km/h except between 6+459 and 6+700 where it is 30 km/h, near the National Lyceum.

The design includes the incorporation of two roundabouts at different intersections of the projected road: connection with road National Lyceum road and United Nations.

A enlargement of hydraulic structure is foreseen to be constructed at 7+300.

A space of singular presence appears between 6+480 - 6+600, next to the National Lyceum and the Ministry of Foreign Business, which allows the development of a recreational area that houses:

- A green area with shady trees under which there are rest areas with benches.
- A children's play area.
- Lighting to enhance the value of the new recreational area.
- Street furniture, corrosion and vandalism resistant, close to the sea and vandalism:
 - Concrete bins.
 - Drinking water fountains located in recreational areas.
 - Bike parking.
 - Benches: The benches are made of recycled concrete and glass. Currently there is a local company that makes urban furniture with this material with interesting aesthetic results, mixing new designs that play with straight and curved geometric lines depending on the public space design, with others that recover the aesthetics of colonial models.

Pantufo Coastline Bay requalification includes benches every 100 m and concrete bins every 40 m.

For Pantufo Coastline is also foreseen the following new tree species and tree species affected:

- 36 new tree species (15 *Karoo acacias* and 21 tamarinds, or similar)

Non Technical Summary

- 2 tree species affected (*Terminalia catappa* or similar)

For **coastal protection** two different sections are designed along Pantufo Coastline.

First section consists on installing a main protection of rocks. The crest of coastal protection is crowned by a concrete wall that reaches that is built on the existing wall. Additionally, a geotextile is placed between rock protection and existing wall and the natural terrain as well to avoid loss of terrain.

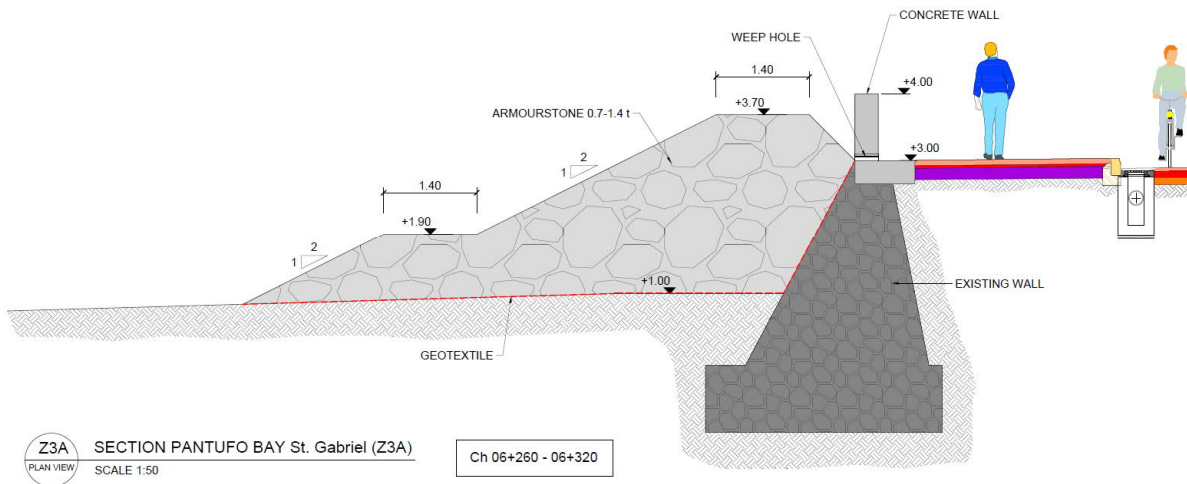


Figure 12 Typical cross section. Pantufo Coastline (CH 6+260 – CH 6+320)

Second section consists on installing a main protection of rocks. A filter layer is placed. To crown the coastal protection a concrete wall is proposed and a geotextile between rock protection and natural terrain is placed.

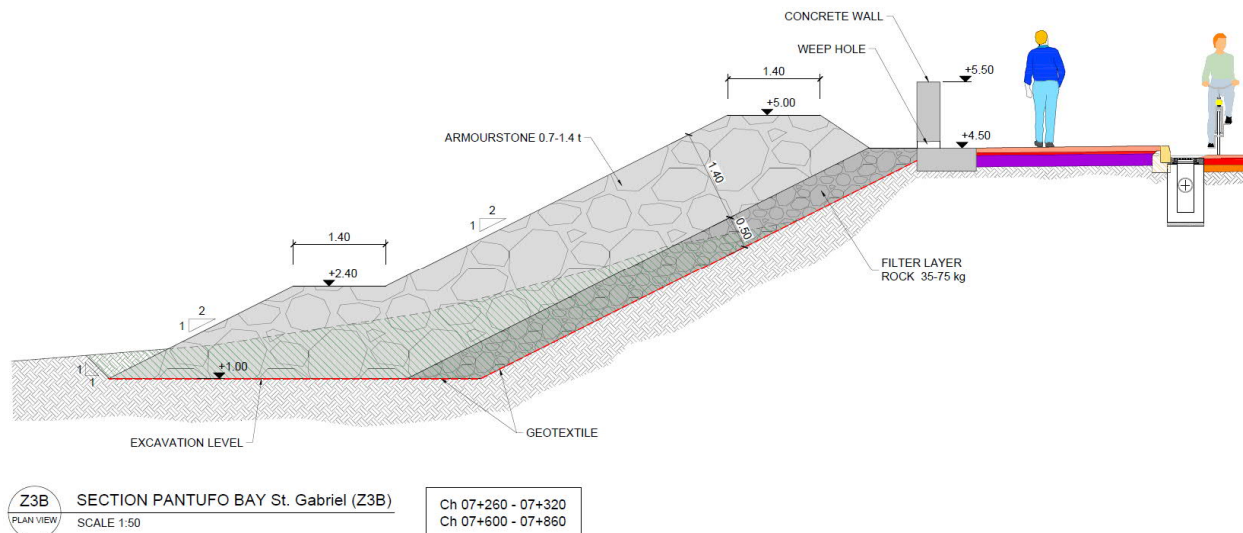


Figure 13 Typical cross section. Pantufo Coastline (CH 7+260 – CH 7+300; CH 7+600-CH 7+860)

Non Technical Summary

4 CLIMATE AND CLIMATE CHANGES

The Environmental and Social Impact Assessment has a chapter dedicated to Climate and Climate Change, and the main aspects are presented below.

Temperature and Pluviosity

The climate of São Tomé and Príncipe (STP) is typically equatorial and, therefore, with little variation throughout the year and is characterized by persistent high temperatures and frequent episodes of high humidity.

The islands are located in the humid tropical range resulting in average annual temperatures ranging from a maximum of 30° to 33°C to a minimum of 18° to 21°C, with little seasonal variation and high humidity throughout the year (WWF, 2012; McSweeney et al., 2012). Annual precipitation ranges from 1,000 mm in the northeast of São Tomé Island to over 4,000 mm in the southwest, with the pattern of precipitation being similar (WWF, 2012).

Wind

The southern part of the island of São Tomé is listed as the windiest and gravana is the time of year when occurring the most winds in the territory of São Tomé and Príncipe, together with the For the project area, in the northeast part of Sao Tome island, the closest weather station is located at ST airport.

Maritime currents

The Project area is located on the coastline of the Island of São Tomé, the water column consists of distinct layers that circulate at different speeds and directions. In general, the water circulation in the Gulf of Guinea is dominated by the Guinea Current, which flows parallel to the coast from Senegal to Nigeria, and the South Equatorial Current or Benguela Current, which flows northwards along the coast of Gabon and then in a westerly direction along the equator.

The predominant surface current in the study area is therefore the South Equatorial Current (or Benguela Current), which flows westward at a velocity of approximately 0.25 m/s (at depths of 0 to 100 m) (Findlay et al., 2006).

Tide and Swell

The study area presents simultaneous waves with little difference between their directions. The waves come from the ESE or E depending on the point analyzed. The highest significant wave height is found at a point in Pantufo Coastline which is more exposed to the ocean and has more depth.

Bathymetry

The bathymetry is one of the important aspects of this project. The study area presents two distinct bathymetric zones: one characterized by a very shallow slope zone in the north (Lagarto and Ana Chaves Bay) with dispersed rocky areas with depths between 0 and 5 meters, and a second zone (Pantufo) with a steeper slope, plus rocky area to the south, with depths between 0 and 9 meters.

The study area has approximately 8 km², mostly formed by sand and scattered rocks, with greater concentration in the north of Ana Chaves Bay and mainly in the Pantufo area, where we can observe several rocky hills, elevations, and protrusions that compose it, while the southern area has a higher relief.

The entire area of influence of the project is strongly influenced by the tides, with about 1.5 - 2 m difference between low and high tide. This variation and the low gradient of the bay in some areas results in a large, emerged area during low tide.

The main winds in this area are mainly from the south and southeast, having also these winds more potential for higher velocities (below 11 m/s).

Coastal Dynamics

Non Technical Summary

São Tomé and Príncipe is made up of small volcanic islands with very rugged relief and heavily covered with vegetation.

The coasts of the island of São Tomé, sometimes cut straight, constituting low sandy or pebbly beaches, form inlets with points that penetrate the sea (Cardoso, 1962 in CARRASCO *et al.*, 2017¹). In the coastal zone, there are marshy areas caused by the invasion of the sea which, during spring tides, leaves small lakes of brackish water in the terrain depressions, and increases the level of mangroves.

CLIMATE CHANGES

Despite significant deforestation and forest degradation, STP is not a country that emits greenhouse gases (GHG) at significant levels. The country is essentially a carbon sink, i.e. a country where GHG absorption levels are higher than emission levels.

Nevertheless, the country comprises factors that translate into the possibility of a certain degradation of its current condition in the future, if adaptation and mitigation measures are not taken in a timely and decisive manner. As in other developing countries, the poverty levels in which most of the population lives and their heavy dependence on natural resources turns most of the country's inhabitants into agents who present threats to global warming. These are driven by activities such as the extraction of aggregates on beaches and other inadequate areas (mountain slopes), uncontrolled cutting of trees, and fires in which a significant part of the population engages, regularly.

Two sectors of activity, namely Energy and Forests and Land Use Change are responsible for the emission of total Carbon Dioxide, i.e. 163.49 Gg in the country, with the energy sector being the largest emitter with 66, 29 Gg. These emissions result from the combination of the use of firewood and charcoal as the main source of energy as well as the generation of electricity based on fossil sources, which is the main form of energy generation in STP (Second National Communication (SCN) On Climate Change (Ministry of Public Works and Natural Resources/Directorate General for Environment (August 2011).

Above all, and as already mentioned, due to its geographical situation, social and economic conditions, STP has high levels of vulnerability to the global climate change phenomenon, mainly in the form of temperature increase, precipitation decrease, and sea-level rise (SLR), and coastal erosion. The latter two with the potential to occur in the project area.

CLIMATE VARIABLES TREND

Characterization of the main climate variables trend related to climate changes was made.

Rising Temperature

Under a high emissions scenario, the mean annual temperature is projected to rise by about 3.2°C on average by the end-of-century. If emissions decrease rapidly, the temperature rise is limited to about 1°C.

Small increase in total precipitation

Total annual precipitation is projected to increase by about 7% on average under a high emissions scenario, although the uncertainty range is large (-10% to +44%). If emissions decrease rapidly, there is less projected change on average: an increase of 4% with an uncertainty range of -5% to +20%.

Small increase in extreme rainfall

¹ CARRASCO, N., H.P.COSTA & R.M.SÉCA (2017). *Plano multi-setorial de investimentos para integrar a resiliência às alterações climáticas e o risco de desastres na gestão da zona costeira de São Tomé e Príncipe*. World Bank Group Document.

Non Technical Summary

Under a high emissions scenario, the proportion of total annual rainfall from very wet days (about 28% for 1981–2010) could increase a little by the end-of-century (to about 33% on average with an uncertainty range of about 20% to 50%), with little change if emissions decrease rapidly. These projected changes are accompanied by small increases in total annual rainfall under a high emissions scenario

Wind

It is therefore assumed no climate change effect on the wind conditions (both extreme and average normal climate) will take place till 2100.

CLIMATIC HAZARDS

Flooding

For riverine flooding and precipitation, there are two main catchments in the project area: the Agua Grande and one smaller river outflow in Lagarto bay. Studies done by CDR (2019) concluded that although some areas are getting wet, the impact of intense precipitation events is small, mainly because such events are relatively short (<1 hr) and stormwater drains relatively fast.

In Marginal Road the sea level does reach the buildings.

The risk of swell waves is very limited for Lagarto and Ana Chaves Bay and a little higher for Pantufo coastline, due to its exposition to the sea and depth.

Wind Sea

The rocky promontory between Ana Chaves Bay and the Pantufo coastline stretch has been occupied ages ago, providing a stable foundation as well as protection against erosion. The promontory between the Ana Chaves Bay and the Lagarto Bay consists of volcanic harder deposits, whereas the bays themselves consist of sand and alluvial deposits, possibly underlain by harder volcanic material. So the bays are more susceptible to erosion by hydraulic forcing from the ocean (mainly waves and wave-induced currents discharging the sediments in the bay), which is also the reason why the bays have been formed and developed this way.

Most of the coastline is already protected and the remaining small strip of beach is already eroding.

VULNERABILITY ASSESSMENT

The results of vulnerability assessment are presented in ESIA presenting the most vulnerable areas due the changes of conditions of beaches, wave attack and coastal defense collapsed and erosion in the three bays.

5 ENVIRONMENTAL BASELINE CONDITIONS

EIA presents a description of the existing environmental conditions in relation to the Marginal de São Tomé project.

Geology and Geomorphology

The island of São Tomé is located in the Gulf of Guinea. It is a complex trato-volcano about 5000 m high.

Non Technical Summary

Due to the volcanic origin of the island, the topography is quite rugged and steep, mainly in the central area of the island, where the Pico São Tomé and Pico de Ana Chaves are located. The project area in the western half of the Island in Água Grande district is in the coastal zone in the lowest altitudes.

The archipelago of São Tomé and Príncipe consists of volcanic islands that form part of the oceanic sector of a major volcanic alignment.

In Lagarto Bay, quaternary soils cover the flat area.

Along Ana Chaves Bay, alluvial soils cover most of the area, although in the coastal strip there are beach deposits and outcrops of volcanic rocks.

Alluvial soils are expected to cover most of the area of the Pantufo coastline, although in the coastal strip there are beach deposits and outcrops of volcanic rocks. Quaternary soils are expected to cover this area, covering the basaltic rock substratum.

Seismotectonic area where São Tomé Island is located, is generally considered to be a stable part of Africa, although several major historical and recent earthquakes have struck the region.

Therefore, seismicity along São Tomé Island is located, is infrequent according to the geological context.

Hidrology

The hydrographic network of São Tomé has a radial distribution from the centre to the coastline. The hydrological regime of the rivers depends on the precipitation regime. In the dry season, from June to September, the run off represents no more than 10% of the annual total.

The main rivers in the island of São Tomé are: Yô Grande (the biggest in the country), D'Ouro, Contador, Lembá, Quijá, Manuel Jorge and Abade. The water courses feed the different hydrographic basins.

Lagarto Bay

Água Palito: a basin have an elongated shape, it covers an area of approximately 10,38 km². The main tributaries, all on the left bank, are Água Telha and Água Xóxó and Água da Vila. The main watercourse is 6,72 km long up to its mouth. The average slope of the basin is 0,02 m/m and the Time concentration 1,69 h and rain intensity is 34,80 mm per hour.

Água Melo: a basin have an elongated shape is longer than Água Palito with 11,69 km and covers an area of approximately 18,62 km². The average slope of the basin is 0,06 m/m and the Time of Concentration 2,00 hours and rain intensity is 31,32 mm per hour. In the headwaters is in medium-altitude forest. In almost all its extension, it covers areas of shade forest for cocoa and coffee. In the zone of the mouth, which is located between Nazaré beach and Lagarto beach, the last stretch of the basin has been occupied with a tourist development,

Ana Chaves Bay

Água Grande : This watercourse runs in a southwest-northeast direction, flowing into the Ana Chaves Bay in the capital, the city of São Tomé. The basin has an area of approximately 26.09 km² and an average slope 0,06 m/m. In the Água Grande district, the basin drains in an area occupied by precarious constructions in the peri-urban area of the capital and in the final stretch, by consolidated urban area. Upstream, the shade forest for cocoa and coffee represents the largest strip of land occupation. From its source (aprox. 800 m altitude) in the Mé Zóchi district to its mouth, the watercourse is about 13 km long. The rain intensity in the basin is 29,68 mm per hour.

Pantufo Coastline

Non Technical Summary

Água Selá 2: This watercourse is about 500 m long. The catchment area is approximately 0,31 km² and has an average slope of 0,01 m/m . The rain intensity is 90,82 mm/hour. Almost the entire length of the catchment and the floodplain of the watercourse is occupied by precarious constructions in the peri-urban area of São Tomé (capital city).

Biologic Environment

The study area is located in the Guinea Current Large Marine Ecosystem (GEM), which extends along the area occupied by the Guinea Current and the northern boundary of the Benguela Current.

The GEM is characterized by a water column that overlies the West African continental shelf and is fed by the seasonal upwelling of nutrient-rich water, particularly during the rainy seasons, as a result of offshore winds. This phenomenon sustains a high phytoplankton productivity, which in turn provides a diverse marine ecosystem and associated fisheries.

The major biological groups that can reasonably be expected to occur in the project's area of influence are: benthos, coral reefs and corals, fishes, protected and/or threatened species, marine mammals, cetaceans, sea turtles, hawksbill sea turtles (*Eretmochelys imbricata*), green turtle (*Chelonia mydas*), loggerhead turtle (*Caretta caretta*), leatherback turtle (*Dermochelys coriacea*), olive ridley turtle (*Lepidochelys olivacea*); mammals, birds, amphibians and reptiles.

Migratory species occasionally approach the study area either in migration, resting or daily foraging.

Air Quality

The study area is located in the urban area of the city of São Tomé and there is no monitoring of air quality in the city, however direct observation allows to identify as main sources of air pollution: circulation of motor vehicles and diesel generators in operation.

It is expected that the air quality in the project's area of influence will be relatively compromised by suspended particles from motor vehicle traffic, with particular importance in the gravitational period.

On the other hand, the air quality in the area of influence of the project can be affected by the emission of gases and particles into the atmosphere (CO, CO₂, NO_x, SO_x, Pb), resulting from the circulation of motorcycles, light and heavy vehicles that travel with frequency on the roads located in the area of influence of the project.

Water Quality

Water quality throughout the project's area of influence has not been measured, although, several events contribute to the decrease in seawater quality in the bay:

During the rainy season, there is an increase in siltation of rivers with sediment deposits along the Bays;

Over several years, there has been a discharge of hydrocarbon wastes in the Bay through the Água Grande River during the supply and disposal of wastes by the power station of EMAE, Empresa de Água e Eletricidade.

PNOT (2020) refers that "in the sanitation sector, the situation observed in the district Agua Grande is characterized by the generalized lack of effluent drainage systems and the absence of collective treatment systems. Globally there are three domestic wastewater sanitation systems in use in the Água Grande district: in center of capital city sewerage networks very old, septic tanks and latrines.

In Direct Influence Area outdoor defecation is a constant the Pantufo and Ana Chaves bays by residents without adequate basic sanitation and citizens.

Noise and Vibration

Non Technical Summary

In the area of influence of the project and its surroundings, its characteristics of urban centers, which implies a strong presence of human activities, give this area high levels of noise pollution, especially during daytime periods when these activities are more intense. Noise pollution is mainly associated with light and heavy vehicle traffic along the waterfront associated with the transport of people and goods (fish, and other products) in the city and towards the capital city

Waste Management

Currently, in São Tomé and Príncipe, the responsibility for the collection and transport of waste lies with waste is the responsibility of the District Councils and the Regional Service of Salubrity in the Autonomous Region of Príncipe. In the capital city, containerization and collection, besides being insufficient, are limited to the main roads of the city, which leads to most of the waste being deposited on the ground.

In the rest of the city and the Água Grande district, there is no containerisation or collection by the municipal services, which causes the proliferation of rubbish in the proximity of houses, schools, markets and hospitals. However, the final destination of the waste, including hospital waste, is also inappropriate.

Landscape

Lagarto Bay has a length of 1,800m and is characterised by tourism assets (hotel plots) at the landside of the coastal road, and contains a beach profile at the seaside of the coastal road for the larger share of the bay length. The coastal road in this bay is the main connection between the capital and the airport. This coastal stretch has a typical 'beach appearance' with a sandy beach and coconut trees along the road. Tourists staying at the hotels have to cross the road to go to the beach.

Ana Chaves Bay has a length of 2,500m and is an urbanised environment, having higher building densities. The capital's centre is located along this bay, having a mixed-use of residential, commercial and governmental functions. Also one of the national roads merges with marginal for a certain stretch of the bay. The bay has clear spatial and architectural values, among other aspects expressed by its typical colonial features and old trees with wide canopies.

The North-South oriented stretch of coastline up to Pantufo has a lower building density and has mainly residential functions and a few hotels. It has a length of 4,400m.

6 SOCIAL BASELINE CONDITIONS

Demography

The district of Água Grande concentrates 80.908, approximately 40% of the country's total population.

The population of São Tomé and Príncipe is mostly young, 52.1% of the population is between 15 and 49 years old, and 20.8% is between 15 and 24 years old.

The country's population density was 197.5 inhabitants per km², but with great disparity at the district level. The district of Água Grande, where the country's capital is located, has a higher density of 3,700 inhabitants per km², being an area of high population density.

The average life expectancy was around 67.3 years, and the literacy rate was around 90.1%, according to the National Institute of Statistics in 2017. However, the country continues to face the great challenge of combating poverty that it reaches about 66.7% of the population (IOF- Survey of Family Budgets 2018).

Economic Activities

Employment

Non Technical Summary

Economic activity in Sao Tomé and Principe is characterised by high levels of informality.

Recent studies on the situation in Sao Tome and Principe, reveal that only 15.9% of Sao Tomean workers work under contract, 37.5% work for an employer, but without a contract, and 34.9% are self-employed.

Along the Marginal several informal employment posts can be found. At Ana Chaves bay and Lagarto bay, women and young people sell vegetables and fruits, recharge cards for the telephone companies and some traditional sweets. In Pantufo bay the dominant informal business is the sale of fish by the "palaies2 (women fish sellers), there are many small greengrocers and sales of used clothes and shoes and fast food restaurants.

Tourism and Leisure

Lagarto Bay

There are already some hotels located on land off the coastal road, such as Hotel Omali Lodge and Hotel Praia and a travel agency Mistral Voyage. There is also potential land available for future hotel development. The location is close to the airport and close to the city of São Tomé and Príncipe.

One of the most frequented beaches by the national population and tourists is Emilia beach in Lagarto bay. It is one of the most beautiful beaches in the capital city. Every day hundreds of people, including tourists and nationals, choose this beach for their leisure time, physical exercise or simply for a walk.

Despite the state of the sidewalk, the waterfront is used daily by hundreds or thousands of people, pedestrians, sports enthusiasts, cyclists, and joggers.

Emilia beach is one of the reference places for end of the year festivities in São Tomé City.

Ana Chaves Bay

There are no hotels at Ana Chaves bay but we can find guesthouse, restaurants, bar and chocolate house, banking, commercial and car stand.

This Bay encompasses several emblematic points of our city and country, such as the port of Ana Chaves the largest port in the country, the Cathedral.,

The ex-PM beach is situated in the bay and is one of the capital's emblematic beaches and a meeting and leisure place for the young population of São Tomé. Usually has a large number of bathers especially on Sundays. This beach is also one of the reference places for New Year festivities.

As is tradition in São Tomé and Príncipe, communities celebrate the festivities of popular saints. the beach community São Pedro, annually celebrates the popular festival alluding to the patron saint of fishermen, São Pedro.

The waterfront of Ana Chaves bay, despite the state of the sidewalk, is used daily by hundreds or thousands of people, pedestrians, sports enthusiasts, cyclists, and joggers.

The only museum in the country, in the old Fort São Sebastião fortress, a unique cultural and historical site in the country.

Pantufo Coastline

Pantufo Coastline encompasses three of the capital's main hotels, the Miramar Hotel, the Pestana Hotel, and the Emoyeny Garden Hotel, and several restaurants and cafés, as well as other economic activities.

It encompasses areas of strong historical, cultural and touristic interest, such as the Fort of São Jerónimo.

The National Lyceum the largest national high school, until recently the only one in the country, is one of the most important buildings in the city.

Non Technical Summary

The Pantufo Coastline also gives access to the Estadio Nacional 12 de Julho, the largest football stadium in the country. We can also observe along the bay small informal businesses such as the sale of phone recharges from communication companies, small kiosks and greengrocers and some street vendors, especially “palaies”.

This waterfront of Pantufo Coastline bay, is used daily for sports practices and walking for students of National Lyceum.

Dangerous Beach (Praia Perigosa) in Pantufo Coastline, usually has a large number of bathers especially on Sundays and Tourists.

Fisheries

Agua Grande is one of three main fishing sites in São Tomé with around 710 fishermen. Within the project area there are two fishing communities: San Pedro and the Old Pier, with a total of about 120 fishermen. San Pedro Beach is situated in the centre of the Ana Chaves Bay, near the small chapel with the same name. About 40 canoes (pirogues) operate from here, employing about 50 fishermen. Only 11 boats have outboard engines. Most fishermen are seasonal fishermen from Nevis who come here during November-March as they are closer to Tuna populations from here than from Nevis. Coastal erosion / dynamic behaviour of the beach severely restricts space for landing the boats. Occasionally, fishermen have to take their boats over the wall onto the side-walk for more safety, putting them close to the Marginal road.

At the Old Jetty, about 16 mechanized multiday boats with inboard engines take advantage of the anchoring facilities provided by the old jetty. At least 60 fishermen operate here. They go out for 3-5 days sometimes as far as Gabon and Príncipe. Around 120 boats operate from Pantufo Beach. Over 86% are non-mechanised. They employ about 135 fishermen providing for approximately 600 persons.

Education

The illiteracy rate reaches around 6.3% of the adult population (over 15 years of age), having this rate has been decreasing significantly in recent years, as a result of education policies.

With regard to primary education, 92.7% of children of appropriate age attend school. The percentage of adults who have attended and concluded primary education is currently 67.7%, while these figures drop significantly when we analyse the attendance and conclusion of secondary education (28.2%). The average for the African continent for primary school attendance, the percentage of adults who have concluded primary and secondary education is 71.2%, 67.75% and 22.1%, respectively.

The situation is inverted when we analyse the rate of adults who attended and concluded higher education, which stands at 2.1%, while in the African continent this rate is 3.2%.

The National Lyceum is in direct area of influence and one kindergarden and a School are in indirect area of influence at a distance less than 200 m the Marginal road.

Health

The only reference hospital in the country, Dr Ayres de Menezes Hospital is located in the capital city, very close to the Largo Bay and the Ana Chaves Bay.

The epidemiological profile of São Tomé and Príncipe is marked by the predominance of non-communicable diseases whose trend is increasing. Communicable diseases continue to be a public health problem, with a high incidence of acute respiratory diseases, diarrheal diseases and other communicable diseases or those linked to the environment. These constitute the main causes of morbidity and mortality in the country.

In April 2020, the first cases of Covid 19 appeared in São Tomé and Príncipe. In 23 December 2021 it amounted to 3737 confirmed cases of Covid 19 and 57 deaths.

Non Technical Summary

Economy

The performance of economic activity in 2020 was attributed firstly to the Industries sector which grew by 4.4%, driven by Construction activities (5.8%); followed by the Services sector with 2.6%, where the activities of Public Administration Defence, Health and Social Welfare were those that grew most in this sector 13% and 6.1% respectively. It should be noted that Accommodation and Catering activities fell by 16.2% due to the decrease in tourism in the country as a result of the pandemic. The Primary sector, despite showing a decrease in the year in question (-1.1%), Agriculture, Animal Production, Hunting and Forestry and Extractive activities showed a growth of 2.5% and 4% respectively, which was not enough to boost the sector. The Taxes on Products and Import Duties, despite not being activities, presented their growth of 22.9% and (2.3%).

Transports infrastructures

Road Transport: São Tomé and Príncipe benefits from a road network of around 1180 km, of which 250 are asphalted. However, road infrastructure suffers from a chronic lack of maintenance.

Maritime transport: The country is endowed with four seaports, three of them on Sao Tome and the fourth in the city of Santo Antonio on the island of Príncipe. The port of Ana Chaves in Sao Tome, apart from the low productivity of its equipment, associated with its obsolescence, is very shallow (the depth reaches a little more than 3 m at high tide), which makes it unsuitable for international vessels. With these restrictions, most freight services are forced to load and unload outside the port, on barges that provide transport between the ship at anchor and the port. This force ships into long waiting times (typically 5 to 8 days) and increases the risk of container damage and cargo loss.

Air transport: São Tomé and Príncipe has two airports, one in São Tomé and another on the island of Príncipe. São Tomé airport is near Marginal road

Marginal Road has an important function in urban traffic, links with EN1, EN2 and EN3, airport and Ana Chaves Port.

There is no public transport in city of São Tome, people who do not have a car, use private transportation taxi or mototaxi.

Energy infrastructures

The National Water and Energy Company (EMAE) has a network of 52.030 customers (in September 2021). Electricity access rate is around 90%. i.e., about 90% of the population has access to 15 megawatts of electricity produced.

The São Tomé and Príncipe electricity system is composed of generation power plants, transmission and distribution grid and electricity supply. The transmission and distribution grid consist of medium voltage (MV) of 30 kV and 6 kV, low voltage (LV) of 0.4 kV, 30/6 kV substations and switching stations.

Languages and religion

Portuguese is the official language. Besides the official language of Portuguese, three distinct Afro-Portuguese Creole languages are spoken.

The vast majority of the people are Christians, with around 80% Roman Catholic, 15% Protestant and the remainder other or no religion. Protestant groups are growing and include New Apostolic, Baptist, Evangelical, Seventh Day Adventist, the Portuguese Maná and pentecostal denominations. There is also a growing number of Jehovah's Witnesses, a growing community of about 200 Muslims and a similar number of the Baha'i faith.

Gender

There is no current statistical data with a degree of specificity on the numbers of gender-based violence that would allow characterizing the context of GBV in the country.

Non Technical Summary

Gender equality and equity at national level, confirmed that from 2013-2015 the numbers of recorded cases of violence continue to be mostly against women.

Along the waterfront from Lagarto to Pantufo we find the sexual division of labour clearly evident. It is the women who wash clothes and cutlery in the rivers, it is they who sell fruit and fish while the men appear as fishermen.

With regard to fishing, only the men practise it and sell to the women who in turn sell to the final consumer. When a husband and wife are involved, the man fishes and delivers to his wife who sells to the consumer and then bills him. In the old pies area, many consumers go to buy directly from the canoes in the hands of the fishermen, although some of the fish is sold to the ladies fish sellers "palaies".

There are young boys under 18 selling coconut water on Emilia beach in Lagarto Bay, a practice done only by boys.

Information and communication media

The country has two operators in the telecommunications sector.

there is only one television channel, TVS, but the line is open to other international broadcasters such as RTP Africa and RFI International.

As for radio, apart from the national state radio, there are private radios, Radio Jubilar and Radio Viva, and the community radios tlacha, Anguéne and Lobata. With the advent of the internet, there has been a proliferation of online radio stations.

Cultural Heritage

Along Ana Chaves Bay were identified Colonial Warehouse, Discovery Monument and Justice Palace, Church of Bom Despacho, Church of Bom Jesus, Port Buildings, Ministry of Finance,, Santa Casa da Misericórdia Building, Statue and Obelisk near São Sebastião Fort (and São Sebastião Fort and in Pantufo Coastline, colonial houses.

Along Pantufo Bay also is identified Portugal Embassy and Infante D.Henrique Monument.

In Lagarto Bay there is no elements identified.

Land Use

In the Água Grande maginal land use activities includes gardens, parks, squares, tree-lined avenues and other green areas near built-up areas. The public spaces along the waterfront of the Ana Chaves Bay, which include the Independence Square, the green spaces framing the Cathedral of São Tomé and the Presidential Palace, the UCCLA Park, the surroundings of the Church of Bom Jesus/Bom Despacho and the green space next to the Captaincy, are currently highlighted in the urban mesh. In addition, next to the coastline, there is also an expressive green space around the United Nations. Inside the urban mesh, we highlight the space around the Curadoria, the alignment of spaces along the Água Grande Avenue and the Gago Coutinho square. It is also important to mention the tree-lined streets, which are extremely important in articulating the different green spaces and in materializing the intended green structure, namely along the avenues Marginal 12 de Julho, Água Grande, Independência and Nações Unidas.

7 POTENTIAL ENVIRONMENTAL IMPACTS

7.1. LAGARTO BAY

Negative Impacts

Non Technical Summary

Construction and Demobilization Phases

- Geomorphology alteration due extraction of materials in quarries and beach nourishment in beach (low significance);
- Disturbance in terrestrial fauna in flora due extraction of material in quarries and construction activities (low significance);
- Disturbance of marine ecosystems due construction activities in coastal area, including sea turtles nesting (low significance);
- Dust and noise emission due construction activities (low significance);
- Contamination of surface/groundwater in work fronts and in construction site due to solid waste disposal in inadequate sites and storage and handling of hazardous products (significant): where soil is very permeable and the percolation of liquids is facilitated and may reach the water table. If this contamination occurs, it will contribute to the current degradation of soil quality and surface and underground water resulting from the discharge of domestic wastewater from households, washing of clothes in watercourses and open defecation.
- Reduced quality of life in work fronts and construction site neighboring residents and road users due to use of machinery and equipment and heavy vehicles for materials transportation (significant): The planned interventions in the roads, being a much sought after leisure area, with hotels and residential areas, will interfere in the life of the population, in their habits of walking or going to the beach, with a large number of road users and near hotels and the bathing area of Lagarto beach, the movement of equipment, machinery, and vehicles, especially heavy vehicles, will interfere in the life of the population, restrict local traffic, reduce parking places and have an effect on road safety.
- Reduced quality of life due to removal of demolition rubble of walls, pavement (significant).

Operation Phase

- Soil contamination resulting from disposal of solid urban waste in inadequate locations, Accidental spillage of hazardous products (fuel, oil, lubricants Production of solid waste and liquid effluents (low significance);
- Water and energy consumption (low significance);
- Degradation of marine ecosystems resulting form accidental spillage of hazardous products as fuel, oil and lubricants (low significance);
- Risk of death of sea turtle hatchlings due artificial light pollution (low significance).

Positive Impacts

Construction and Demobilization Phases

- Using locally recycled glass in the construction of benches (significant): it will reduce the volume of waste (glass bottles, etc.) that is out in the open on the island, as well as prevent possible accidents (cuts with glass) of people who frequent the streets.
- Increased water infiltration into the soil through reforestation, with the planting 36 trees (significant): with the reforestation of the affected area there will be a higher rate of water infiltration into the soil, because the roots of the plants promote the improvement of soil structure, increasing soil permeabilization.
- Improving the landscape due to restoration of the affected and soil decompaction (significant);
- Biophysical restoration of the affected area (significant).

Non Technical Summary

Operation Phase

- Increase in traffic volume with motorized and no motorized transports resulting in a reduction of greenhouse gas emissions, noise and air pollution (significant);
- Reduced exposure to erosive agents (water, wind, sea waves) associated with the presence of coastal protection infrastructure (very significant);
- Improve drainage capacity of structures, avoiding flooding in the period of heavy rains (significant), mainly associated with the presence of drainage infrastructures that are resilient to climate change, in order to favor natural drainage;
- Improving the Marginal's image, increasing local tourism (very significant), associated with landscape requalification, with an increase in green spaces and the planting of 36 trees, urban equipment, litter bins, playgrounds, cycle lanes, among other;
- Creation of new habitats for marine species (significant);
- Reduction in the number of accidents (very significant), associated with improved road safety with the implementation of speed restrictions, vertical road signs, crosswalks, and the installation of lighting and reduction of velocity for vehicles;
- Improve health habits (significant), caused by the presence of one drinking water fountain;
- Reduction of disposal of waste on sidewalks and roads due to existence of litter bins every 40 m along Marginal road (significant).

7.2. ANA CHAVES BAY

Negative Impacts

Construction and Demobilization Phases

- Geomorphology alteration due extraction of materials in quarries and beach nourishment in beach (low significance);
- Disturbance in terrestrial fauna in flora due extraction of material in quarries and construction activities (low significance);
- Disturbance of marine ecosystems due construction activities in coastal area, including sea turtles nesting (low significance);
- Dust and noise emission due construction activities (low significance);
- Contamination of surface/groundwater in work fronts and in construction site due to solid waste disposal in inadequate sites and storage and handling of hazardous products (significant): where soil is very permeable and the percolation of liquids is facilitated and may reach the water table. If this contamination occurs, it will contribute to the current degradation of soil quality and surface and underground water resulting from the discharge of domestic wastewater from households, washing of clothes in watercourses and open defecation.
- Reduced quality of life in work fronts and construction site neighboring residents and road users due use of machinery and equipment and heavy vehicles for materials transportation (significant): The planned interventions in the roads will interfere with habits of sports practices, walking or going to the beach (significant).
- Reduced quality of life due to removal of demolition rubble (significant).

Operation Phase

- Soil contamination resulting from disposal of solid urban waste in inadequate locations, Accidental spillage of hazardous products (fuel, oil, lubricants Production of solid waste and liquid effluents (low significance);

Non Technical Summary

- Water and energy consumption (low significance);
- Degradation of marine ecosystems resulting from accidental spillage of hazardous products as fuel, oil and lubricants (low significance);
- Risk of death of sea turtle hatchlings due artificial light pollution (low significance).

Positive Impacts

Construction and Demobilization Phases

- Improving the landscape due to restoration of the affected area and soil decompaction (significant);
- Biophysical restoration of the affected area (significant).

Operation Phase

- Creation of new habitats with green spaces and 100 trees (significant);
- Air quality improvement (significant), due to creation of green spaces with the consequent increase in the number of trees, which will favor the reduction of dust generation on the roadway;
- Reduction of noise emissions (significant), due to proposed footpaths along the entire route and cycle lanes, and the existence of new 100 trees that will consequently contribute to the use of non motorized transport with reduction of noise emissions by vehicles;
- Reduced exposure to erosive agents (water, wind, sea waves) associated with the presence of coastal protection infrastructure (very significant);
- Improve drainage capacity of structures, avoiding flooding in the period of heavy rains (significant);
- Reduction in the number of accidents (very significant), associated with improved road safety with the implementation of speed restrictions, vertical road signs, crosswalks, and the installation of lighting and reduction of velocity for vehicles;
- Improve health habits (significant) caused by the presence of the five drinking water fountains;
- Reduction of disposal of waste on sidewalks and roads due to existence of litter bins every 40 m along Marginal road (significant).

7.3. PANTUFO COASTLINE

The main environmental impacts for the construction, demobilization and operation phase for Pantufo Coastline are presented below, considering the mitigation measures proposed:

Negative Impacts

Construction and Demobilization Phases

- Geomorphology alteration resulting due extraction of materials in quarries (low significance);
- Disturbance in terrestrial fauna in flora due extraction of material in quarries and construction activities (low significance);
- Disturbance of marine ecosystems due construction activities in coastal area, including sea turtles nesting (low significance);
- Dust and noise emission due construction activities (low significance);

Non Technical Summary

- Contamination of surface/groundwater in work fronts and in construction site due to solid waste disposal in inadequate sites and storage and handling of hazardous products (significant): where soil is very permeable and the percolation of liquids is facilitated and may reach the water table. If this contamination occurs, it will contribute to the current degradation of soil quality and surface and underground water resulting from the discharge of domestic wastewater from households, washing of clothes in watercourses, and open defecation.
- Loss of Biodiversity and affectation of Fauna and Flora in the Intertidal area (significant). Construction activities can affect the intertidal area in Pantufo coastline, which can be sandy beach or rocky coast This area is already subject to human pressure, with hunting, fishing or trampling of fauna, with more generalist species;
- Reduced quality of life due to removal of demolition rubble and noise and dust associated (significant).

Operation Phase

- Soil contamination resulting from disposal of solid urban waste in inadequate locations, Accidental spillage of hazardous products (fuel, oil, lubricants Production of solid waste and liquid effluents (low significance);
- Water and energy consumption (low significance);
- Degradation of marine ecosystems resulting from accidental spillage of hazardous products as fuel, oil and lubricants (low significance);
- Risk of death of sea turtle hatchlings due artificial light pollution (low significance).

Positive Impacts

Construction and Demobilization Phases

- Using locally recycled glass in the construction of benches (significant): it will reduce the volume of waste (glass bottles, etc.) that is out in the open on the island, as well as prevent possible accidents (cuts with glass) of people who frequent the streets;
- Increased water infiltration into the soil through reforestation, with the planting of 36 trees (significant);
- Improving the landscape due to restoration of the affected area and soil decompaction (significant);
- Biophysical restoration of the affected area (significant).

Operation Phase

- Creation of new habitats with green spaces and 36 trees (significant);
- Air quality improvement (significant) due to creation of green spaces with the consequent increase in the number of trees, which will favor the reduction of dust generation on the roadway;
- Reduction of noise emissions (significant): the proposed of footpaths along the entire route and cycle lanes and the existence of new 36 trees contributes to the use of non motorized transport with reduction of noise emissions by vehicles;
- Reduced exposure to erosive agents (water, wind, sea waves) associated with the presence of coastal protection infrastructure (very significant);
- Improve drainage capacity of structures, avoiding flooding in the period of heavy rains (significant);
- Reduction in the number of accidents (very significant) associated with improved road safety with the implementation of speed restrictions, vertical road signs, crosswalks, and the installation of lighting and reduction of velocity for vehicles;
- Improve health habits (significant) caused by the presence of 3 drinking water fountains;

Non Technical Summary

- Reduction of disposal of waste on sidewalks and roads due to the existence of litter bins every 40 m along Marginal road (significant).

8 CUMULATIVE ENVIRONMENTAL IMPACTS

The cumulative environmental impact assessment carry out to assess the potential impacts of the three Projects and associated with EN1 (Guadalupe and Neves) which potentially occur in close proximity. The following tables summarizes these assessments for construction and operation phases:

Environmental Factor	Impact	Description
Climate and Climate changes	GHG emissions 	Potential cumulative construction periods between EN1 requalification Project and each Marginal Road Lot (machinery and equipment fuel emissions and electricity consumption)
	CO2 sequestration 	Cumulative removal of trees that will decrease the CO2 sequestration.
Soils	Compaction and decrease of water infiltration 	Potential cumulative needed materials from quarries, for the 3 projects at same time can cause compaction of soil and decrease of water infiltration caused for a increase of heavy vehicle circulation.
Biodiversity	Removal of vegetation 	The removal of trees and aquatic vegetation may decrease the existing biotopes for terrestrial and aquatic fauna, which are already adapted to disturbed conditions.
	Fauna disturbance 	Occur mainly because of the traffic and people noise, Is not expected that it will cause any significant impact, since is already an altered ecosystem
Air Quality	Decrease of air pollutants emissions (CO2, CO, NOX, SOX, HC, VOC's) 	Potential cumulative construction periods when all the Projects (three lots and EN1) transport goods and materials by road there will be increased vehicle movements in the area as trucks will be required to transport materials and equipment. The increase in traffic can create dust and emissions of air pollutants that affects other road users and people living or working within close proximity to the roads on the selected transport routes
Noise and Vibration	Noise and vibrations emissions 	Potential cumulative construction periods when all the Projects (three lots and EN1) transport goods and materials by road there will be increased vehicle movements in the area as trucks will be required to transport materials and equipment. The increase in traffic can create noise and vibrations that affects other road users and people living, working within close proximity to the roads on the selected transport routes

Non Technical Summary

Environmental Factor	Impact	Description
Landscape	Landscape alteration 	Potential cumulative construction of three projects with land occupation and placement of fence along marginal change scenic view, don't allow visualization of the sea, along majority of Marginal roads for inhabitants of Sao Tomé and tourists,
Community Health and Safety	Decrease of safety 	Potential cumulative construction periods when all the Projects (three lots and EN1) transport goods and materials by road there will be increased vehicle movements in the area as trucks will be required to transport materials and equipment. The increase in traffic can create decrease of road safety (including injury or even death due to accidents) that affects other road users and people living or working within close proximity to the roads on the selected transport route.
Waste Management	Increased of Construction and Demolish Wastes 	Potential cumulative construction when all the Projects produces larges quantities of wastes from demolitions can create congestions in accesses of Penha Dump for disposal of wastes.

Table 1 Environmental Cumulative Impacts Assessment. Construction Phase

Environmental Factor	Impact	Description
Climate and Climate changes	Electricity consumption 	Lighting and eventual installations of each road will need electricity that will increase the CO2 emissions.
	Requalification of the drainage system 	The improvement of the existing drainage system for all the roads contribute for a better adaptation to extreme climate events
Hydrology and water quality	Improvement of water courses drainage 	The improvement of the existing drainage system for all the roads contribute for a better drainage in basins that flow to sea.
Biodiversity	Increased number of planted trees – new biotopes 	The plantation of a higher number of trees along each lot will contribute to create ecologic corridors and provide new biotopes for feeding and nesting.

Non Technical Summary

Environmental Factor	Impact	Description
	Artificial lighting 	Although temporary in the construction stage, it becomes permanent in the operation stage. Since is mainly nocturnal, it can affect the turtles nesting behaviour along bays of Marginal Road. Monitoring and avoid direct lighting to the beaches is mandatory.
	Coastal protection structures 	During construction, they may affect aquatic communities, although these are already adapted to disturbed conditions. After stabilization, these structures can provide new biotopes for the aquatic organisms.
	Fauna disturbance 	Occur mainly because of the traffic and people noise, Is not expected that it will cause any significant impact, since is already an altered ecosystem.
Air Quality	Decrease of air pollutants emissions (CO, NOX, SOX, HC, VOC's) 	Potential cumulative impacts of 3 Projects results of alternative non motorized transportation along Marginal road with creation of cycle lanes and sideways for walking that permits a reduction of dust and air pollution.
Noise and Vibration	Decrease of noise 	Potential cumulative impacts of three Projects results of alternative non motorized transportation along Marginal road with creation of cycle lanes and sideways for walking that permits a reduction of noise along the marginal road.
Landscape	Landscape Alteration 	The requalification of waterfront in the three lots in terms of landscape and urbanism allows for a continuous improvement tacking in account the particular characteristics of each bay.
Community Health and Safety	Increase of road safety 	Potential cumulative of three Projects results of increase of safety circulation for road users of motorized and no motorized transports with safety signage, speed limitations for vehicles that contributes to an increase of road safety (including injury or even death due to accidents) that affects all users of Marginal road
Waste Management	Decrease of incorrect waste disposal 	Potential cumulative of three lots with litter bins in every 40 m contribute to avoid wastes disposal in ground and for population create new habits.

Table 2 Environmental Cumulative Impacts. Operation phase

Non Technical Summary

9 MAIN POTENTIAL SOCIAL IMPACTS

9.1. LAGARTO BAY

The main Social impacts for the construction, demobilization and operation phase for **Lagarto Bay** are presented below with the mitigation measures proposed:

Negative Impacts

Construction and Demobilization Phases

- Distancing bathers and tourists (significant), because during the construction phase they will see limited access and movement on the beaches. On the other hand, for those people who in the late afternoon stroll along the waterfront will be deprived of the sea view;
- Increased risk of sexual harassment and gender-based violence (significant), because the construction site is predominantly male, and saotomean society is still dominated by a macho culture.

Positive Impacts

Construction and Demobilization Phases

- Job creation (very significant) due employment for the execution of the construction work can increase the income of the local population, improving their current condition. Also during the construction phase, there are indirect employment opportunities through other local services, such as small businesses and services for construction workers and construction sites in general. It will also provide an opportunity for the ladies who sell food, water in the vicinity of the construction sites;
- Increased demand for housing and food consumption (significant), due to increasing food consumption and demand of housing due of workers there are not inhabitants of São Tomé city and surroundings;
- Increased tax collection and coins circulation (significant);
- Business opportunities through itinerant businesses or in areas bordering the works (significant);
- Increased family income due to participation in benches construction (significant).

Operation Phase

- Job creation (significant), as rehabilitation of marginal road needs maintenance of infrastructures, cleaning, green spaces maintenance and also creates opportunities for national companies and organizations;
- Improved access to the international airport and the largest supermarket in the country , CKDO with reduced travel time and cost (significant);
- Improved access to the coastline and capital city centre, reduced travel time and cost (significant);
- Improving the road network by reinforcing the links between national roads EN1, EN2 and EN3 (significant);
- Improved access and reduced cost and time at the only referral hospital in the country, Hospital Dr. Ayres Menezes (significant);
- Improved accessibility to various institutions and services (significant);
- Improvement of road traffic safety conditions, with cycle lanes and pedestrian circulation (very significant);
- Increased protection from flood, coastal erosion and storm surge risks (significant), as the construction of coastal protection infrastructure will reduce wave agitation within the bay by dissipating wave energy;
- Better conditions for sports on the waterfront (significant) due to the reconstruction and upgrading of the waterfront;

Non Technical Summary

- Increase in the number of people on the beaches and the Marginal , namely praia Emilia, (significant), due to improvements of the coastal protection and road infrastructure;
- Creating a new image for capital city and country (very significant);
- Improving the quality of urban space green spaces, cycle lanes, children's playground and one drinking water fountain (very significant);
- Improvement of the conditions for the development of economic activities in the communities affected by the project and construction of a Laundry (very significant).

9.2. ANA CHAVES BAY

The main Social I impacts for the construction, demobilization and operation phase for Ana Chaves Bay are presented below with the mitigation measures proposed:

Negative Impacts

Construction and Demobilization Phases

- Distancing bathers and tourists (significant), because during the construction phase they will see limited access and movement on the beaches. On the other hand, for those people who in the late afternoon stroll along the waterfront will be deprived of the sea view;
- Increased risk of sexual harassment and gender-based violence (significant), because the construction site is predominantly male, and saotomean society is still dominated by a macho culture;
- Reduced quality of life due to removal of demolition rubble (significant)
- Displacement of economic activities (fishermen, fruit sellers, fish sellers, removal restaurant, ice-cream candy kiosk (small container shop) and outdoor publicity space (low significance);

Operation Phase

- Alteration of the location of vulnerable persons women fruit sellers (low significance).

Positive Impacts

Construction and Demobilization Phases

- Job creation (very significant), due to employment for the execution of the construction work can increase the income of the local population, improving their current condition. Also during the construction phase, there are indirect employment opportunities through other local services, such as small businesses and services for construction workers and construction sites in general. It will also provide an opportunity for the ladies who sell food in the vicinity of the construction sites;
- Increased demand for housing and food consumption (significant), due to increasing food consumption and demand of housing due of workers there are not inhabitants of São Tomé city and surroundings;
- Increased tax collection and coins circulation (significant);
- Business opportunities through itinerant businesses or in areas bordering the works (significant);
- Increased family income due to participation in benches construction (significant).

Operation Phase

Non Technical Summary

- Improved access to the international airport and the largest supermarket in the country, CKDO with reduced travel time and cost (very significant);
- Improved access to the coastline and capital city centre, reduced travel time and cost (very significant);
- Improving the road network by reinforcing the links between national roads EN1, EN2 and EN3 (very significant);
- Improved access and reduced cost and time at the only referral hospital in the country, Hospital Dr. Ayres Menezes (very significant);
- Improvement of road traffic safety conditions, with cycle lanes and pedestrian circulation (significant);
- Increased protection from flood, coastal erosion and storm surge risks (significant);
- Better conditions for sports on the waterfront (significant) due to the reconstruction and upgrading of the waterfront;
- Increase in the number of people on the beaches and the Marginal (very significant), due to improvements of the coastal protection and road infrastructure;
- Creating a new image for capital city and country green spaces, cycle lanes, children's playground, fitness park, five drinking water fountains, toilets, boat shop and fish market. (very significant);
- Improving the quality of urban space with a new image of capital city (very significant);
- Improvement of the conditions for the development of economic activities in the communities affected by the project and construction of boat workshop and fish market (very significant).

9.3. PANTUFO COASTLINE

The main Social impacts for the construction, demobilization and operation phase for Pantufo Coastline are presented below with the mitigation measures proposed:

Negative Impacts

Construction and Demobilization Phases

- Road damage due to circulation of heavy vehicles for transporting materials on the access roads to the construction site (significant);
- Increased risk of sexual harassment and gender-based violence (significant), because the construction site is predominantly male, and saotomean society is still dominated by a macho culture;
- Reduced quality of life due to removal of demolition rubble (significant)
- Displacement of economic activities (one roulote near National Museum other near Restaurant O Pirata (low significance).

Positive Impacts

Construction and Demobilization Phases

- Job creation (very significant), due to employment for the execution of the construction work can increase the income of the local population, improving their current condition. Also during the construction phase, there are indirect employment opportunities through other local services, such as small businesses and services for construction workers and construction sites in general. It will also provide an opportunity for the ladies who sell food in the vicinity of the construction sites;

Non Technical Summary


- Increased demand for housing and food consumption (significant) due to increasing food consumption and demand of housing due of workers there are not inhabitants of São Tomé city and surroundings;
- Increased tax collection and coins circulation (significant);
- Business opportunities through itinerant businesses or in areas bordering the works (significant);
- Increased family income due to participation in benches construction (significant).

Operation Phase

- Improved access to the international airport and the largest supermarket in the country, CKDO with reduced travel time and cost (very significant);
- Improved access to the coastline and capital city centre, reduced travel time and cost (very significant);
- Improving the road network by reinforcing the links between national roads EN1, EN2 and EN3 (very significant);
- Improved access and reduced cost and time at the only referral hospital in the country, Hospital Dr. Ayres Menezes (very significant);
- Improvement of road traffic safety conditions, with cycle lanes and pedestrian circulation (significant);
- Increased protection from flood, coastal erosion and storm surge risks (significant);
- Better conditions for sports on the waterfront (significant);
- Increase in the number of people on the beaches and the Marginal (significant);
- Improving the quality of urban space with a new image of capital city green spaces, cycle lanes, children's playground, three drinking water fountains very significant (very significant);
- Improvement of the conditions for the development of economic activities in the communities affected by the project (very significant).

10 CUMULATIVE SOCIAL IMPACTS

The cumulative social impact assessment carry out to assess the potential impacts of the three Projects and associated with EN1 which potentially occur in close proximity. The following tables summarizes these assessments for construction and operation phases.

Social Factor	Impact	Description
Employment	Jobs creation 	The development of the four projects can have benefits if the projects are developed sequentially permitting the possibility for those who have gained skills working for contractors and sub-contractors in one project and transfer skills acquired in EN1 project or other lots.

Non Technical Summary

Sexual harassment and gender based violence	Increased risk of sexual harassment and gender-based violence 	Potential cumulative impacts of Projects at same time with presence of workforce has potential to increase Increased risk of sexual harassment and gender-based violence
Safety	Decrease of Road Safety 	Potential cumulative impacts of Projects at same time with circulation of heavy vehicles has potential to increase road damage with decrease of road safety for road users. Contractors using the same routes at same time difficult the determination of responsibilities when the repair need to be done right away.
Limitations on accesses to beaches and waterfront	Distancing bathers, sport practitioners and tourists 	Potential cumulative impacts of Projects at same time has a result that inhabitants of Sao Tomé city that usually go to beaches, stroll in Marginal with sea view or practices sports at construction phase it not be possible to these activities.
Stakeholders Engagement	Community Relations 	Potential cumulative impacts of Projects at same time can give rise to discomfort of population and an increase of grievances.

Table 3 Social Cumulative Impacts Construction phase

Social Factor	Impact	Description
Acessibility	Increase of acessibility 	Potential impacts of projects contributes improving mobility and access to such Hospital Dr, Ayres Menezes, Airport and creation of a more coherent urban network, improve the connection between the capital and by reinforcing the connection between the national roads EN1, EN2 and EN3.
Sport Practices	Increase of better conditions for sports practices 	Potential cumulative impacts of Projects give better conditions for sport practices and on a longer stretch of road contributing to healthy habits. Impact Positive permanent, high magnitude, very significant.
Road Safety	Increase of Road Safety 	Potential cumulative impacts of Projects give an improvement of safety road conditions for roads users, motorized and non motorized along Marginal road contributing to reduce accidents.
Stakeholders engagement	Increase of community relations 	Potential cumulative impacts of community relations can give rise can give a more efficient implementation stakeholders engagement , with responses to grievances and other activities being undertake process.

Table 4 Social Cumulative Impacts.Operation phase

Non Technical Summary

11 ENVIRONMENTAL MITIGATION MEASURES

The Environmental and Social Impact Assessment presents two chapters one for environmental mitigation measures and other for social mitigation measures dedicated to mitigation measures for each lot, for construction, demobilization and operation. Also some suggestion area presented to enhancement of positive impacts.

11.1. ENVIRONMENTAL MITIGATION MEASURES

11.1.1. CONSTRUCTION PHASE

For the construction phase demobilization, INEA will require from its contractors to prepare and implement a Construction Environmental and Social Plan, which will covers: Code of Conduct for workers, Solid Waste and Wastewater Management Plan, Emergency Response and Preparedness Plan, Occupational Health and Safety Plan, Community Health and Safety Plan, Contingency Plan Covid 19, Traffic Management Plan, Archeologic Chance Find Procedures, Sea Turtles Find Procedures, Traffic Management Plan, Human Resources Management Plan. Beach Nourishment Management Plan and Sea Turtles Management Plan and a training programme for workers.

Contractor's should also prepare an implement Stakeholders Engagement Plan and establish a grievance redress mechanism for workers.

Contractor also should prepare a Construction Site Plan. The mitigation measures proposed in ESIA and ESMP includes mitigations measures to avoid, eliminate and reduce negative impacts and enhancement positive impacts.

In next sections some measures are presented.

Climate and climate Changes

- Proper maintenance of equipment to ensure efficient operation
- Monitoring of equipment fuel consumption
- Use of low energy consumption LED lamps
- Forward planning to ensure efficient operations, including works planning

Air Quality

- The movement of equipment and machinery during the dry season should be done at reduced speed.
- Reduce dust emission during transport of waste resulting from demolition and dismantling by applying vehicle loading cover
- Carrying out regular maintenance on vehicles and equipment

Noise and Vibrations

- Reduce the speed of vehicles during the execution of the work
- Acquire and use equipment and machinery with low noise emission and approved by inspection
- Carry out regular maintenance of equipment and machinery to detect possible malfunctions

Soil

- The surplus materials from excavations to be carried out during the works, if they have suitable geotechnical characteristics, should, whenever possible, be (re)used in the embankments associated with the construction of the different infrastructures, to restore the morphology of the borrow areas and landscape recovery.

Non Technical Summary

- Excess excavation material should be transported and deposited in suitable locations.
- All solid waste produced on site must be stored in the appropriate area to avoid soil and water contamination
- Stored waste should be handled properly to prevent accidental spillage and packages should be kept closed

Geology

- Contractors shall select a quarry with a licenses/permits from relevant authorities to operate quarry
- Stockpile areas shall be located in areas where trees can act as buffers to prevent dust pollution. Perimeter drains shall be built around stockpile areas. Sediment and other pollutant traps shall be located at drainage exit from workings.
- Extraction of materials shall clearly be demarcated and marked to minimize vegetation clearing, that prevents erosion.

Water Resources

- Implement a water consumption rationalization plan.
- Adopt measures to reuse water, whenever possible.
- Regular maintenance of the water pipes on site to prevent possible leaks.
- Avoid carrying out earthworks during periods of heavy rainfall

Waste Management

- All solid wastes deposited on the ground and all rubble should be removed, leaving the land clean.
- Collection of waste and packaging of hazardous products, which cause adverse effects on the environment
- Proper storage of liquid wastes oils, lubricants, paints, tar and other substances to prevent spills and leakages.

Natural Resources

- Use low consumption vehicles
- Scheduling and rationalizing vehicle movements
- Carry out periodic maintenance of equipment and machinery on site
- Carry out monitoring of water and energy consumption

Landscape

- Place fence with viewing panel or viewing window hole to allow road users see sea and satisfy curiosity in a safe way.
- All removal of vegetation cover must be limited to the areas strictly necessary for the work to be carried out.
- The introduction of exotic/alien species should not be used to restore the vegetation cover.

Biodiversity

- The movement of equipment and machinery should be limited to the construction zone.
- Implement penalties for employees and contractors who violate the code of conduct.
- Preparation and implementation of Sea Turtles Find Procedures

Non Technical Summary

- Planning of works to avoid intervention in interstitial habitats during peak nesting periods for turtles (October – April)
- Preparation and Implementation of Sea Turtles Management Plan.

Occupational Health and Safety

- Provide information and training to workers in the tasks, in the use of equipment of the equipment and the correct techniques for handling loads
- Training road safety for workers
- The site and the different work fronts must be equipped with all the necessary materials and means to respond in incident/accident situations

Occupational Health and Safety

- Placing a signalman at pedestrian crossings, ensuring that vehicles stop before crossing, namely near schools
- The intervention areas should be marked and, where appropriate, fenced
- Implement the Traffic Management Plan

Waste management

- To assign an adequate final destination to all the demolition and construction waste (CDW) produced during the works, complying with the national legislation in force
- Installation of septic tanks to treat domestic wastewater generated on site, avoiding direct discharge into the natural waterways
- All waste classified as hazardous, such as used oils, lubricants, paints and solvents, as well as waste contaminated by oils, should be properly conditioned and stored in an appropriate place.

11.1.2. OPERATION PHASE

Climate and Climate Changes

- Proper maintenance of equipment to ensure efficient operation

Soil

- Prohibit the disposal of municipal solid waste (MSW) on the ground

Natural Resources

- Water management for green spaces irrigation

Biodiversity

- Preparation and Implementation of the Sea Turtles Management Plan and Beach Nourishment Plan.

Water Resources

Non Technical Summary

- Maintenance of hydraulic structures clean without solid wastes
- Install an oil separator for wastewater from workshop for fishermen in Ana Chaves Bay for reuse of oils

Community Health and Safety

- Awareness population about safety signage and new rules of traffic circulation, speeds, use restricted of cycle lanes for bicycles
- As supply of energy is not reliable it is mandatory it's mandatory that at night cyclists use reflectors in bicycles and reflector vest

Wastes Management

- Carrying out campaigns among the population on the proper disposal of wastes
- Carrying out awareness campaign among washwomen (Lagarto Bay) and fishermen and fishsellers (Ana Chaves Bay)

12 MITIGATION AND ENHACEMENT MEASURES FOR SOCIAL IMPACTS

Environmental and Social Impact Assessment presents mitigation measures for social impacts and enhancement measures to potentiate positive impacts. Enhancement measures are suggestion for creation of jobs that contributes for success of Marginal road project.

In next sections are presented mitigation measures for negative impacts.

12.1. CONSTRUCTION PHASE

Working conditions in the communities affected by the project

- Use the Grievance Redress Mechanism to ensure that all participate and that all complaints are resolved.

Displacement of economic activities

- Implementation of A-RAP

Limitations on beach access

- Create, limit space for beachgoers and car parking for people using the beaches
- Signposting temporary access roads to the beaches

Increase in the number of heavy vehicles for transporting materials

- Inform the population in good time about any traffic diversions or changes to traffic circulation
- Signposting temporary access roads to the beaches

Non Technical Summary

- Restoring the pavement as it was before the work

Occupation of public space and roads

- Creation of alternative routes for pedestrians and sports practitioners
- Inform the population in good time about any traffic diversions or changes to traffic circulation
- Implementation of the Traffic Management Plan
- Create an event for fishermen where they can celebrate São Pedro Fest in a more restricted way
- Create an alternative space on the coastline where the New Year's Eve can be celebrated and the traditional washing of the year can take place

Interruption of infrastructures services

- Dissemination of information on the interruption of services to communities

Increased risk of sexual harassment and gender-based violence

- Raising employees' awareness and obligation to respect the individual Code of Conduct

Increase in incidence of contagious diseases COVID 19 sexually transmitted infections STIs

- Awareness raising among employees and obligation to respect the individual Code of Conduct. Awareness-raising actions and prevention measures. Distribution of condoms.

Inadequate participation of VG not meeting their needs

- Continue to ensure participation of VG in consultations know livelihoods to avoid loss of income

12.2. OPERATION PHASE

Working conditions in the communities affected by the project

- Use the Grievance Redress Mechanism to ensure that all participate and that all complaints are resolved.

13 MONITORING PLAN

An Environmental and Social Management Plan are prepared for construction and operation phases with responsibilities in monitoring the project, frequencies and Performance Indicators.

Environmental and social monitoring will be implemented both during construction and operation of the Project. The INEA will require its construction contractors for 3 lots to monitor relevant environmental issues of their operation (e.g. dust emission, gas emissions, noise and vibrations, solid waste and wastewater, biodiversity, water resources, soils, road safety, local employment, gender, health and safety for workers, health and safety for community, emergency response, resettlement, grievance redress mechanism. For lot 2 and 3 will also be needed monitoring cultural heritage.

Contractor should prepare and implement various plans: f Site Construction Plan, Traffic Management Plan, Code of Conduct, Occupational Health and Safety Plan, Community Health and Safety Plan; Emergency Response



Non Technical Summary

Management Plan, Solid Waste and Waste water Management Plan, Archeologic Chance Find Procedures, Sea Turtles Find Procedure, Beach Nourishment Management Plan, Sea Turtles Management Plan and Human Resources Management Plan.

During operation, INEA and Água Grande District Council need to regularly monitor, for e.g. risk of coastal erosion, risk of inundations, waste management, water resources, biodiversity and grievance redress mechanism.