



SOUTH SAN PEDRO TOWN WATER NETWORK EXPANSION ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN



BELIZE BLUE CITIES AND BEYOND

Project (P181064)

Final Version
- July 2025

Abbreviations

AoI	Area of Influence
BBRRS	Belize Barrier Reef Reserve System
BWS	Belize Water Services, Limited
CoC	Code of Conduct
CSO	Civil Society Organization
DAoI	Direct Area of Influence
DOE	Department of the Environment
EA	Executing Agency
E&S	Environmental and Social
ESHS	Environmental, Social, Health and Safety
ESA	Environmental and Social Assessment
ESMP	Environmental and Social Management Plan
C-ESMP	Construction Environmental and Social Management Plan
ESF	WB's Environmental and Social Framework
GHG	Greenhouse Gas
GRM	Grievance Redress Mechanism
IAoI	Indirect Area of Influence
KBA	Key Biodiversity Area
LMP	Labor Management Procedure
NRW	Non-Revenue Water
OA	Operational Area
OSG	On-site Generation
PM	Particulate Matter
SEP	Stakeholder Engagement Plan
WB	World Bank
USD	United States Dollars

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1. Introduction

The objective of this Environmental and Social Management Plan (ESMP) is to evaluate the environmental and social risks and impacts of Subcomponent 2.2: Water Supply Expansion in South San Pedro in the World Bank Belize Blue Cities and Beyond Project. Implement measures to mitigate adverse environmental and social impacts, enhance benefits, and ensure compliance with relevant laws and regulations, in alignment with the World Bank Environmental and Social Framework (WB ESF).

The general objective of the Water Supply Expansion in South San Pedro is to reduce service gaps between urban and peri-urban areas in South Ambergris Caye.

The activity with a total cost of USD 1.5 million, will be executed by Belize Water Services Limited (BWS), financed through a grant from the Government of Belize within a loan operation with the World Bank (WB).

As part of the environmental and social evaluation process of the activity, this ESMP was developed. Its purpose is to predict, identify, assess and manage potential environmental and social risks and impacts of the activities that are part of the representative sample of the Project, and to ensure that the project complies with the requirements established in the Environmental and Social Standards (ESS) of the WB Environmental and Social Framework.

1.1 Objectives of the Environmental and Social Impact Assessment and the Environmental and Social Management Plan

The specific objectives of the Environmental and Social Assessment were:

1. Carry out a diagnosis of the Environmental and Social Baseline of the Project Intervention Areas, as well as the legal and institutional regulatory framework.
2. Identify and assess the main environmental and social impacts and risks on the physical, biological and socioeconomic environment, in the Construction, Demobilization, and Operation stages of the activity.
3. Identify the mitigation measures and management procedures to minimize the impacts and risks assessed and detail them in the Project's Environmental and Social Management Plan.

2. Project Description

This chapter presents a description of the San Pedro Water Network Expansion, including objectives, activities and costs.

2.1 Background and Justification

Belize's population is currently growing at a rate of 1.8% a year, driven mostly by immigration from neighbouring countries. By 2025, the total population of Belize is expected to reach about 450,000 from today's 405,000 inhabitants, increasing demand for basic services such as water.

Access to potable water in Belize varies significantly between urban (95%) and rural areas (78%), generating a service gap between these two geographic zones. It also fluctuates significantly between geographic regions. In the two largest districts, Belize and Cayo, more than 80% of households have access to potable water.

Belize Water Services Limited (BWS) is the national water and sewerage utility that was vested with the Assets and Liabilities of the Water and Sewerage Authority (WASA) in March 2001. BWS is a regulated utility – the regulatory controls include a statutory regulator, the Public Utilities Commission (PUC), the Water Industry Act (2001), an operating license issued by the PUC and a Codes of Practice which is agreed by the Regulator and BWS and updated periodically.

BWS is the autonomous provider of water and sanitation services in Belize's major urban areas, including Belize City, Belmopan City, San Ignacio, Santa Elena, Benque Viejo Del Carmen, Caye Caulker, San Pedro, Dangriga, Placencia, Punta Gorda Town, Corozal and Orange Walk. As of April 2022, BWS had an active customer base of 64,000 water connections and 11,654 sewer connections. It provided water services to approximately 70% of Belize's population.

BWS is one of the best performing water utilities in the Caribbean¹. Service continuity (the average hours of service per day) is estimated at 23.98 hours. The company reports that 100% of its users have metered water consumption. In FY 2021/2022, BWS registered non-revenue water levels at 20% on average across the company's 12 major water distribution systems (significantly below the 46% regional average).

Population growth is putting pressure on BWS to attend to the new demand and to maintain service quality. To address these challenges, BWS needs to improve its operational and financial performance to be able to finance new capital and operational investments and sustain service coverage. Additional resources for capital investments can help the company attend to these needs and support the country's efforts to reduce service gaps between urban and peri-urban/rural areas. BWS's capital investments are financed by the company's net profits, as it does not receive government subsidies to cover operating expenses or finance capital investments.

2.2 Objectives

The general objective of the South San Pedro Town water network expansion (Subcomponent 2.2) is to reduce service gaps between urban and peri-urban areas through the following specific

¹ Inter-American Development Bank (2013), Javier Grau, et. al., Water and Sanitation in Belize

objectives: to meet current and future potable water demand for the residents and tourism development of South San Pedro area.

2.3 Description of the activity

This ESA also analyses the environmental, social, and occupational health and safety (OHS) risks using a strategic analysis and applying the criteria of proportionality (in terms of the lower environmental and social impacts expected under this component).

South San Pedro Water Network Expansion

Ambergris Caye, the location of the Project, is the largest island of Belize, located northeast of the old capital, Belize City. It is the most popular tourist and expatriate destination in Belize because of its proximity to the coral reef. It is approximately 40 km long and 1.6 km wide.

The largest settlement and the only town is San Pedro, which is located in southern Ambergris Caye, the Project area. The town, with an estimated population of 15,456 (June 2022, Statistical Institute of Belize), is the second largest town in the Belize District. BWS currently distributes potable water to 4,565 commercial and residential customers.

Provision of safe potable water to meet growing demand is vital to supporting economic development on Ambergris Caye. The proposed expansion of the system will directly benefit the Caye, providing access to water to support continued development, and will further BWS's continued drive to improve its operational effectiveness and efficiency. Currently, the residents of South San Pedro that are outside of the BWS distribution network rely on bulk water sales, rainwater harvesting and beach wells to meet their water needs.

The scope of works to be implemented by BWS as part of this subcomponent includes the following:

- 11,440 feet of 8-inch distribution water main;
- 2,100 feet of 6-inch distribution water main;
- 12,300 feet of 4-inch distribution water main;

Total beneficiaries include:

- 113 households
- 43 businesses
- Expected increase in connections (3 – 5 years): up to 265
- Expected increase in connections (10+ years): up to 483

Figure 1 to 4 show the location of the proposed water main expansions in the south and north of the island, respectively.



Figure 1 – Location of proposed water mains in San Pedro south Water Network Expansion project



Figure 2 Location of proposed water mains in San Pedro south Water Network Expansion project



Figure 3 Location of proposed water mains in San Pedro south Water Network Expansion project



Figure 4 Location of proposed water mains in San Pedro south Water Network Expansion project

2.4 Costs and Financing

The total cost of the San Pedro Water Network Expansion project is USD 2.3 **million**, to be fully financed by a grant to BWS (including counterpart funding) through a loan Operation between the World Bank and the Government of Belize.

2.5 Expected Benefits

The activity is expected to immediately benefit at least 113 households with no current access to piped water services, as well as about 43 commercial users. An additional 150+ households are expected to benefit in the mid to long term since the presence of watermains in the area will promote development.

2.6 Analysis of Alternatives for Projects in the Representative Sample

Alternative Without Project

Under the “without project” alternative, the expansion of the water network in San Pedro would not be built and operated.

The Project is part of an effort by BWS to improve the access to potable water, which is an integral part of its mandate. In the “without project” alternative, BWS's ability to fulfil its mission would be reduced, since the Project is aligned with the fulfilment of that mandate.

Additionally, increased access to potable water will enhance resilience against climate change impacts by reducing reliance on wells during droughts and improved public health by reducing waterborne diseases, enhanced quality of life through reliable water supply, and economic growth by supporting local businesses and tourism.

Alternative Traces and Locations

The prioritization of intervention areas in San Pedro was carried out by BWS's technical team. BWS's goal is to achieve universal coverage of potable water in its served areas.

Regarding the prioritization criteria, the areas chosen for this project represent the projects where BWS has a higher readiness (more advanced engineering design) and also match with urban and tourism development plans in San Pedro.

In terms of project design, the interventions take place on existing streets, avenues and street accesses, with no new road network openings planned under this project. A right of way will be granted to ensure access and to maintain the infrastructure and ensure that the service can be delivered efficiently.

3. Legal and Institutional Framework

This chapter describes the legal, sectoral and institutional framework, considering the environmental, social, health and safety areas directly linked to the interventions to be carried out.

3.1 Summary of National Regulations and Relevance to the Project

This section presents the International Agreements and National regulations related to the activity.

Table 1 Summary of National Regulations and Relevance to the Project

National Legislation	
<p>Environmental Impact Assessment Regulations S.I. 107/1995 and Amendment - 2020</p>	<p>It establishes that all persons, agencies, institutions (whether public or private), unless exempted pursuant to these Regulations, shall, before embarking on a proposed project or activity, apply to the Department of Environment for a determination whether such project or activity would require an environmental impact assessment (EIA).</p> <p>It also divides the projects into categories that determine, according to their classification, required documentation to be submitted to the DOE:</p> <ul style="list-style-type: none"> • Schedule I: It requires an environmental impact assessment. The scope and extent of the environmental impact assessment shall be determined by the DOE. • Schedule II: The DOE shall determine or cause to be determined whether any of the undertakings, projects or activities specified in Schedule II require an environmental impact assessment or a limited level environmental study. <p>In accordance with the classification, this project is classified as Schedule II, (12) Infrastructure projects, (f) A long-distance aqueduct.</p>
<p>Environmental Protection Act Chapter 328 of the Substantive Laws of Belize - Revised Edition 2011</p>	<p>It established the Department of Environment (DOE) and designated it as responsible for monitoring the implementation of the Act and subsequent regulations. The Act provides the DOE with broad regulatory and enforcement authority for the prevention and control of environmental pollution, conservation and management of natural resources, and environmental impact assessment.</p>
<p>Environmental Protection (Effluent Limitations) Regulations (S.I. 94/1995) and Amendment - 2009</p>	<p>It established a licensing system for effluent discharge under specific conditions. The regulation establishes measures for the treatment of industrial effluents, as well as limitations or standards for physical and chemical effluent parameters.</p> <p>In August 2009, the Effluent Limitation Regulation was amended to include provisions for the treatment of domestic wastewater. This amendment also introduced improvements in effluent standards for both industrial and domestic effluents.</p>
<p>Summary Jurisdiction (Littering Offences) Act Chapter 98 - Revised Edition 2003</p>	<p>It deals with the issue of littering, outlines the process for violation tickets and determines the officials authorized to enforce them.</p>
<p>The Belize Building Act (No. 131/2003)</p>	<p>This Act and its 2005 Revision repeals the Belize City Building Act (CAP. 131 Revised Edition 2000).</p> <p>It establishes the Central Building Authority to administer the provisions of the Act. The Act establishes that the Authority</p>

	shall appoint a professional engineer or architect as the Director of Building Control who shall sign and issue all building permits, notices of execution and other related documents. The Authority may appoint construction inspectors in order to determine compliance with the terms of the building permit.
Disaster Preparedness and Response Act, Chapter 145 - Revised Edition 2000	It is often referred to as the NEMO Act. The National Emergency Management Organization (NEMO) is responsible for coordinating national responses to disasters. This regulation deals with the response to any kind of disaster, being natural or man induced.
The National Integrated Water Resources Act - 2011	This Act provide for the management, controlled allocation and the sustainable use and protection of the water resources of Belize. It establishes the National Integrated Water Resources Authority with responsibility for the preparation and implementation of a National Water Resources Master Plan, licensing of water abstraction, and responsibility for dealing with issues related to easements required by licensees, control and protection of groundwater and well drilling, and the protection of gathering grounds. It should be noted, however, that this Act has not been fully implemented.
Water Industry Act Chapter 222 - Revised Edition 2020	This Act regulates the provision and control of water and sewerage services in Belize; promotes the conservation and proper use of water resources; provides for the issuance of licenses to water supply companies; provides for the transfer of the assets and liabilities of the Water and Sewerage Authority to the company or companies authorized by the Public Utilities Commission. This Act repeals the Water and Sewerage Act, Chapter 185 of the Laws of Belize.
Labour Act Chapter 297 - Revised Edition 2011 and Amendment Act 2020	It establishes the conditions for labor relations between contractors and their workers (hiring of employees, conditions of employment, payment of wages, disputes resolution, etc.).
Workmen’s Compensation Act Chapter 303 - Revised Edition 2000	The law establishes provisions on the liability of contractors for workers who are involved in accidents at work or while being transported to their workplace (compensation, insurance, insolvency, etc.).
Social Security Act Chapter 44 -Revised Edition 2011	It requires the contractor to pay worker’s social security contributions in case of sickness or injury.
National Occupational Safety and Health Bill	It is a projected National Law that aims to regulate worker’s safety and health. Although it is not yet a law, the provisions of this bill serve as an excellent guide for good practices.

<p>Town Council Act Chapter 87 Revised Edition 2020</p>	<p>It establishes Town Councils as body corporate with perpetual succession and a common seal. The Council shall consist of a Mayor and six other members duly elected in accordance with this Act and regulations made thereunder. Town Councils have wide powers to manage the affairs of the towns, and operate within declared town limits. They can make subsidiary laws or by laws for the good governance of the towns.</p>
<p>Protection against Sexual Harassment Act Chapter 107 Revised Edition 2000</p>	<p>This Act provides for the prohibition of sexual harassment in the workplace by an employer to his or her co-workers so that both men and women work in a respectful and pleasant environment.</p>
<p>Public Roads Act - Revised Edition 2003</p>	<p>The Public Roads Act charges the Chief Engineer, subject to the Minister's consent, with the construction, alteration, maintenance and supervision of all public roads of Belize.</p>
<p>Motor vehicles and Road Traffic Act Chapter 230 - Revised Edition 2011</p>	<p>This Act establishes conditions for registration and licensing of motor vehicles; driving and other offences and general conditions relating to the use of roads; legal proceedings, suspension, cancellation and endorsement of Driving Licenses; and fees and duties.</p>
<p>Pollution Regulations S.I. 56 - 1996 and Amendment - 2009</p>	<p>Part XI of the Pollution Regulations sets out the conditions under which certain activities resulting in the emission of noise nuisance are deemed to be violations.</p>
<p>The Solid Waste Management Authority Act, Chap. 224 - Revised Edition 2000</p>	<p>It establishes that The Solid Waste Management Authority regulates the management of waste material resulting from new construction or other work. Contractors are required to properly remove and dispose of all waste material.</p>
<p>Environmental Protection (Prohibition of the open-burning of refuse and other regulations) - 2020</p>	<p>It establishes the prohibition of open-burning and other combustible materials for the protection of the environment. During the period of public emergency, no person shall cause, suffer, allow, or permit open-burning of any refuse or combustible matter on any private or public land. A person that contravenes this regulation commits an offence and is liable on summary conviction to a fine not exceeding five thousand dollars or to a term of imprisonment not exceeding two years.</p>
<p>The National Lands Act No. 6 - 1992 and SI 191 - Revised Edition 2000</p>	<p>The Act is designed to establish a framework for the management of national lands, where "national lands" means all lands and seabed, other than reserved forest within the meaning of the Forest Act.</p>
<p>Land Utilization Act Chapter 188 - Revised Edition 2000</p>	<p>It provides the primary authority for land-use planning in Belize. The Act requires that government approval be obtained before any parcel of land can be subdivided and provides general authority to regulate land use in order to protect watersheds, prevent soil erosion, control clearing of forest, and regulate the type of development permitted in designated areas.</p>
<p>Horizon 2030 National Development Framework for Belize 2010-2030.</p>	<p>It is a strategic instrument with a multi-sectoral approach relating to the period 2010-2030. The document embodies the vision for Belize in the year 2030 and the core values that are to guide citizen behavior and inform the strategies to achieve this common vision for the future. The Horizon 2030 Framework covers several thematic areas that are organized</p>

	<p>under four main pillars: 1) Democratic governance for effective public administration and sustainable development; 2) Education for Development - Education for Life; 3) Economic resilience: Generating resources for long term development; 4) The Bricks and the Mortar - Healthy Citizens and a Healthy Environment.</p>
National Gender Policy	<p>This policy aims to identify the inequalities experienced by both men and women and suggests actions for the correction of gender disparities. This ensures that every citizen has an equal opportunity to participate fully in all actions that have a positive impact on human development.</p>
National Sustainable Tourism Master Plan for Belize 2030	<p>The National Sustainable Tourism Master Plan for Belize is the strategic guideline for tourism development in Belize up to 2030. The master plan divides the country into seven unique destinations that all together converge in a cohesive offering that make Belize a distinctive and highly competitive destination.</p>
Land Acquisition (Public Purposes) Act Chapter 184 - Revised Edition 2000	<p>It establishes provisions for compulsorily acquiring land for public purposes, assessment and compensation, etc.</p>
Public Utilities Commission Act Chapter 223 - Revised Edition 2000	<p>Provides for the establishment of a Public Services Commission to regulate the provision of public services in Belize. The function of the Commission will be to ensure that the services provided by a public service provider are satisfactory and that reasonable rates are charged for such services. Public utilities include water supply and sewerage services.</p>
Wildlife Protection Act, Chapter 220 - Revised Edition 2010	<p>The Wildlife Protection Act regulates the hunting of wildlife as game or for other use. This act allows for the establishment of regulations controlling hunting by the declaration of closed hunting areas, determining periods for the prohibition of hunting, the prohibition of hunting of specified animals of specific size limits, etc.</p>
The Forest Act, Chapter 123 - Revised Edition 2000	<p>It regulates the exploitation of forest in nationally held lands. The Forest Act authorizes the Minister to declare forest reserves and to de-reserve forest reserves. The act also authorizes Forest Officers from the Forest Department with wide functions to regulate the forest industry.</p>
Forest (Protection of Mangroves) Regulations Chap 213 – Revised Edition 2003	<p>It establishes the prohibition to alter, permit, or cause to be altered any mangrove forest in jurisdictional waters without first obtaining a permit from the Department of Forestry. This prohibition applies to both privately and publicly owned land.</p>

<p>National Institute of Culture and History Act (Chapter 331)</p>	<p>Serves as Belize's foundational legislation for safeguarding the nation's cultural and historical assets. It grants NICH authority to promote, preserve, and manage Belize's tangible and intangible heritage through a heritage register and advisory council, while also empowering it with funding, enforcement, and protection powers for heritage sites and assets.</p>
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Table 2 Summary of Multilaterals Agreements Relevant to the Project

<p>Multilateral Agreements</p>	
<p>London Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter - 1972</p>	<p>The purpose is to control sea pollution by waste dumping.</p>
<p>International Labour Organization Conventions Act Chapter 304:01 - Revised Edition 2003</p>	<p>These agreements govern the relationship between contractors and their workers. They include, among others, minimum age, right of association, minimum wage, freedom of association and protection of the right to organize, abolition of forced labor, protection against radiation, paid vacations, etc.</p>
<p>Convention on Biological Diversity. Rio de Janeiro 1992. - Ratified 1993</p>	<p>Its objective is to conserve biological diversity, promote the sustainable use of its components and encourage the equitable sharing of the benefits derived from the natural resource use.</p>
<p>Convention for the Conservation of Biodiversity and Protection of Priority Wilderness Areas of Central America - 1992</p>	<p>Its objective is to promote sustainable development in order to conserve the biological diversity and biological resources of the Central American region.</p>
<p>Convention on International Trade in Endangered Species of Wild Fauna and Flora - 1975</p>	<p>It was designed to ensure that international trade of animals and plants does not threaten their survival in the wild.</p>
<p>Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat - 1971</p>	<p>Its main objective is to ensure the conservation and sustainable use of Ramsar sites (wetlands).</p>

**Regional Agreement on
Access to Information,
Public Participation and
Justice in Environmental
Matters in Latin America
and the Caribbean, also
known as the Escazú
Agreement - 2023**

Adopted under the auspices of the United Nations Economic Commission for Latin America and the Caribbean (ECLAC), aims to ensure access to environmental information, allow public participation in environmental decision-making, and provide access to justice for environmental issues.

3.2 WB Environmental and Social Framework

This section presents a summary of the Environmental and Social Standards (ESS) that are part of the WB's Environmental and Social Framework (ESF). These E&S Standards must be considered during the preparation and implementation of all projects financed under the Program.

Table 3: ESS and Relevance to the Project

Environmental and Social Standards	Explanation of Relevance to the Project
ESS1 - Assessment and Management of Environmental and Social Risks and Impacts	In compliance with the provisions of the Standard, this Environmental and Social Assessment (ESA) of the activity was prepared, with its corresponding Environmental and Social Management Plan.
ESS2 – Labor and Working Conditions	BWS, will adopt and apply labor management procedures (LMP) appropriate to the nature and size of the projects financed under the Program and their workforce. Those procedures and policies will stipulate the approach for the management of workers in accordance with the requirements of ESS2, and the corresponding national legislation. Consistent with the LMP, there will be a dedicated Grievance Mechanism (GM) with channels to update SEA/SH-related complaints.
ESS3 – Resource Efficiency and Pollution Prevention and Management	In compliance with this Standard, the ESMP addresses water use, energy efficiency, and pollution impacts anticipated under the activity.
ESS4 - Community Health and Safety	With the purpose of avoiding and mitigating impacts and risks in terms of health, safety and protection of the community, the following Management Programs are included in the ESMP guidelines (Chapter 6): 8 – Occupational Health and Safety, 9- Road Safety and Traffic Management, 10 – Pest and Vector Control; 11- Coordination with Service Providers; 12- Socio-environmental Training for Construction Personnel, 13- Natural Disaster Management and Emergency Response, 14- Information and Community Participation and 17 - Prevention of Infectious Diseases (with a focus on COVID-19).
ESS5 - Land Acquisition, Restrictions on Land Use, and Involuntary Resettlement	In the works of the representative sample of the activity, no need for involuntary resettlement was identified, nor for the acquisition of land. These are works on the public right-of-way / public easement areas. The works in the sample are not expected to generate economic impact or loss of livelihoods.
ESS6 - Biodiversity Conservation and Sustainable Management of Living Natural Resources	The activities to be financed do not include works that impact critical or natural habitats. While the San Pedro project is technically within a Key Biodiversity Area, the nature of the project (small diameter water network mains in right-of-way of existing roads) – both in terms of complexity and its linear typology, negative impacts are not expected.

ESS7- Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities	The works of the activity have no effects on indigenous communities, as there are no Indigenous People as per the characteristics under ESS7
ESS8 - Cultural Heritage	For the activity, no sites of recognized historical, paleontological, archaeological, architectural, religious, aesthetic or other type of patrimonial significance were identified in the areas of direct influence (100-meter perimeter). The Project will apply a chance find procedure to manage impacts during excavations.
ESS10 - Stakeholder Engagement and Information Disclosure	<p>In accordance with the guidelines of the Stakeholder Engagement Plan (SEP) included, It considers a gender-sensitive approach and methodology, to promote the equitable participation of men, women, the LGTBI+ community and vulnerable groups. The results of the consultation process will be documented in the final version of this ESA.</p> <p>Likewise, during the design, construction and operation phases of the works, there will be a Grievance Mechanism (GM) at the overall Project level, which will address the concerns of the affected and interested parties throughout the life cycle of the sample projects. Details of the GRM are documented in the SEP.</p>

4. Environmental and Social Baseline

4.1 Introduction

The main objective of this chapter is to characterize the area where the activities under analysis will be developed. The analysis provides information on the location and description of the area of execution and influence of the projects, to determine its current situation and the relevant environmental and social aspects.

This chapter analyzes general aspects and components of the natural and social environment and specifies the area of influence (Aoi) of the specific activities, to enable analysis of the potential environmental and social impacts attributable to, or derived from, project activities.

4.2 Definition of Area of Influence

This ESA considers the design, construction, demobilization and operations phases of the Project, and focuses mainly on the relevant existing physical, biological, and socioeconomic environments within the direct footprint of the Project, namely the area surrounding the proposed section of roadway. However, it is understood that in the case of some impacts such as air quality, noise and traffic, impacts may extend beyond the immediate Project footprint. As such, both a Direct Area influence (DAI) and an Indirect Area of Influence (IAI) are defined for the Project as follows below.

Direct Area of Influence

The DAI for the Project is defined as the footprint of the Project, where majority of the E&S impacts from the Project are expected to occur and/or be experienced most acutely, namely a radius of 100 meters around the water network expansion networks.

Indirect Area of Influence

Indirect Area of Influence is the area within which indirect impacts are expected to occur, that is, those impacts that occur later in time or are farther removed in distance in relation to the project and its associated infrastructure.

For this ESA, the town of San Pedro was defined as an Indirect Area of Influence. This expanded area of influence is the one that will receive the environmental and social benefits derived from the water network expansion projects. In addition to improved access to safe and reliable water services, the community is expected to experience enhanced public health outcomes, increased climate resilience, and strengthened economic opportunities through tourism and development. Furthermore, the project will foster greater community engagement in sustainable water management practices and contribute to long-term urban planning and infrastructure development for the town.

The water network expansion project, while bringing significant benefits may also result in several negative impacts. These include increased development pressure that could lead to unregulated urban growth and strain on existing public services, particularly wastewater and solid waste management systems. Additional concerns include temporary public nuisances during construction and increased environmental stress from tourism-driven growth. Without proper planning and mitigation, these impacts could undermine the long-term sustainability of the improvements.

4.3 Physical Environment Baseline of Indirect Area of Influence

Climate

Ambergris Caye, the island on which the city of San Pedro is located, has a sub-tropical climate like most of Belize, but it is the driest region of the country getting less than 60 inches of rain a year. The dry season in this region extends from December to May, and the wet season from June to November.

Temperatures at Ambergris Caye varies between 21 and 32°C and the difference between nighttime and daytime at coastal locations are moderated by the warm offshore water.

Climate Change and Vulnerability

Climate change has significant impacts on Belize's territory, population and major economic sectors.

Ecological resources, such as rainforest, mangroves, wetlands and coral reefs, are highly sensitive to changes in rainfall, temperature and extreme weather events; tourism, which accounts for a large part of the country's income, is affected by sea level rise, coral bleaching and impacts on biodiversity; and Belize's major infrastructure, such as public buildings and health, commercial and transportation facilities located on or near the coast, are extremely susceptible to sea level rise.

However, the country is committed to achieving the ultimate objective of the United Nations Framework Convention on Climate Change and supports the target to limit the increase in global average temperature to 1.5°C, and to developing a long-term strategy aligned with achieving net zero global emissions by 2050.

Geology

The geology of the San Pedro area is typical of that associated with coralline islands. Southern Ambergris Caye is comprised of shallow layer of calcareous sands underlain by limestone bedrock. These soils are very porous and in that area the water table could be found at a depth of 12-18 inches.

Topography

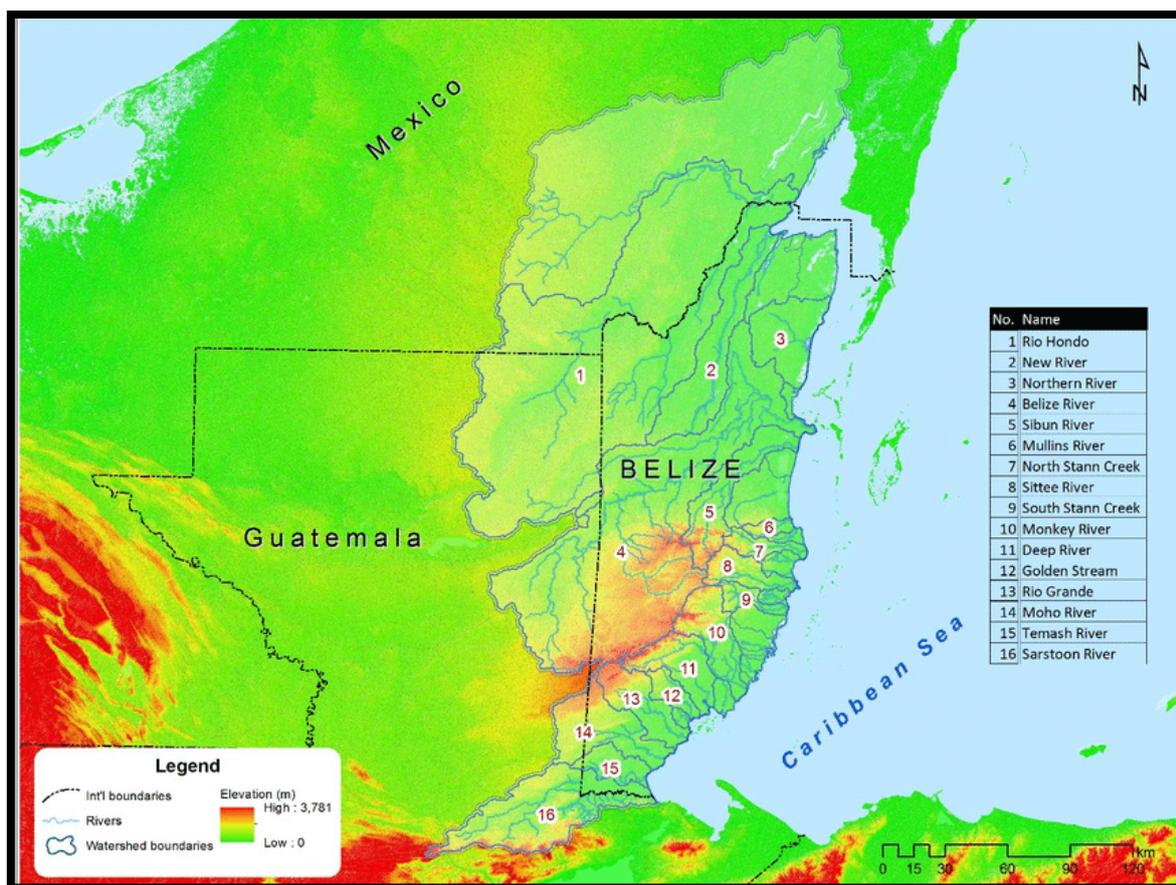
The topography of Ambergris Caye from the coastline to the inner lagoon to the west ranges from 0 ft at the shoreline to 4 ft, as can be seen on the map in Figure 5. The make-up soil is that coral sand and peat. The island is protected on the east by a living reef that extends 185 miles down the coast of Belize.

Water Resources

Belize is divided into 33 watersheds distributed in five main regions, most of which originate in the Maya Mountains and flow into the Caribbean Sea. Some of them share international boundaries such as the largest watershed in Belize (the Belize River), which originates in the Maya Mountains and connects with watersheds in eastern Guatemala and southern Mexico and is the second largest river basin system in Belize.

Belize's watersheds consist of both surface water, which include springs, streams, rivers, and lagoons and also groundwater resources which are found under our soils and rocks. They are often renewed mostly from rainfall, ground-water and surface storage in the large lagoon systems in the Northern lowlands (Department of the Environment).

Figure 5 – Belize rivers map. Source: ResearchGate



Recurrent atmospheric/oceanic phenomena such as the El Niño Southern Oscillation (ENSO) and the North Atlantic Oscillation (NAO) generate periods of drought that affect these watercourses, but these are recovered thanks to the tropical rainfall regime that occurs in the northwestern region.

Generally, groundwater is available throughout the less mountainous areas of Belize and favourable yield characteristics can be attributed to geology and climatic conditions.

Water Use, Quantity and Quality

The freshwater resources demand in Belize comes from three major economic sub-sectors: agricultural, industrial and domestic/residential. In 2005, agricultural, industrial and domestic/residential users required 43.7 per cent, 36.5 per cent and 19.7 per cent respectively of the total demand (UN Global Compact, n.d.). Regionally, the Savannah Groundwater Province on mainland Belize provides a reference point for recharge potential. According to a comprehensive groundwater assessment, this region receives an estimated natural recharge of approximately 774 million gallons per day (MGD), largely from rainfall infiltration over an area of approximately 787.7 square miles. Of this, only 570 to 950 gallons per minute per square mile (gpm/mi²) is considered exploitable without causing long-term depletion or degradation of the aquifer (UNDP & Ministry of Natural Resources, 2017). While these figures pertain to the mainland, they help illustrate the limited scale of recharge and extraction possible in smaller, more vulnerable systems like those beneath San Pedro.

In San Pedro, Ambergris Caye, water is abstracted from two shallow wells adjacent to the lagoon and treated at the desalination plant operated by Belize Water Services Limited (BWS). The aquifer beneath Ambergris Caye remains susceptible to over-extraction and salinization. Given these limitations, continued reliance on desalination, supported by careful groundwater monitoring and minimal abstraction, is necessary to maintain water security on the island (UNDP & Ministry of Natural Resources, 2017; San Pedro Sun, 2019).

BWS is responsible for monitoring water in urban areas and ensuring good water quality. In rural areas, however, only 30% of the water is treated in the systems connected to BWS's urban systems.

Belize generally possesses abundant and good-quality water resources. However, in urban areas, a significant portion of surface water is believed to be polluted due to the improper disposal of domestic, agricultural, and industrial waste—both liquid and solid. Municipal waste is the leading source of water pollution, with untreated wastewater from households and commercial establishments frequently entering rivers and streams.

Oceanography

The long eastern coast of Belize faces the Caribbean Sea and is protected by the second longest barrier reef in the world; in perspective, it is about 10% the length of Australia's Great Barrier Reef.

Off the northern coast of Belize, from San Pedro northward to the Mexican border, lies a narrow, shallow-water shelf behind a well-developed curvilinear barrier reef. This shelf is generally a half-mile wide or less and contains numerous small patch reefs, biogenic banks, and a variety of generally high- to moderate-energy sands. It is bounded on the west by a long, low-lying peninsula about 60 miles long which varies from less than one mile to about 20 miles in width. Due to high marine energies, there is little lime mud on this shelf. The peninsula is called "Ambergris Caye" because it is broken by a channel at its northern end, which was excavated by the Mayans and is now maintained by tidal exchange flowing through it. The peninsula is underlain by Pleistocene limestone with a thin, discontinuous cover of Holocene sediment, some of which is dolomitic.

Vulnerability to Natural Disasters

According to a systematic diagnosis conducted by the World Bank Group ², Belize is one of the most affected countries in the world by weather events and other natural hazards, ranking 8th out of 167 countries by climate risk.

Based on the Belize Updated Nationally Determined Contribution the key vulnerabilities identified include:

- Hurricanes and tropical storms causing severe losses from wind damage and flooding due to storm surges and heavy rainfall. On average, hurricanes happen about 3 times a year.
- Flood damage due to its low-lying land and exposed positions on the coast; low lying topography makes the country's coastal areas especially vulnerable to sea level rise.
- Extreme temperatures affecting crops and livestock.
- Coral Reef vulnerability due to global warming.

Belize hurricane and storms season officially runs from June 1 until November 30 each calendar year. The most sensitive areas to hurricane damage are the cayes and coastal areas, including popular destinations such as San Pedro on Ambergris Caye, Caye Caulker, and Placencia on the mainland (U.S. Embassy in Belize, n.d.).

In addition to these climatic events that occur by geographical area, Belize, like the rest of the world, is facing the consequences of global warming. Projected climate change impacts for Belize include a rise in temperature of between 2°C and 4°C by 2100, a 7-8% decrease in the length of the rainy season, a 6-8% increase in the length of the dry season and a 20% increase in the intensity of rainfall in very short periods (Belize GOB, 2021).

In April 2016, Belize ratified the Paris Agreement and submitted its first Nationally Determined Contributions (NDCs) to implement the agreement, and it includes actions to mitigate climate change consequences in multiples sectors.

² Dilley, M., Chen, R. S., Deichmann, U., Lerner-Lam, A. L., Arnold, M., Agwe, J., Buys, P., Kjekstad, O., Lyon, B., & Yetman, G. (2005). *Natural disaster hotspots case studies*. The World Bank. <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/962921468763472562/natural-disaster-hotspots-case-studies>

Belize has mainstreamed climate change into its national development planning framework and in addition to NDC, has developed a National Climate Change Policy, Strategy and Action Plan. It sets the guidelines for the strategic transition of Belize's economy towards low carbon development.

Belize Water Services, on its part, has a Disaster Risk Mitigation and Recovery Plan³, defining the emergency response team and chain of command, the preparatory planning, as well as the response protocols for the different phases.

4.4 Biological Environment Baseline of Indirect Area of Influence

Flora

Despite being less than 23,000 km², Belize is home to at least 50 different tree species as almost 60% of the country is covered by forest. The forests extend all the way from the Maya Mountains in the west to the Caribbean Sea, forming a key link in the Mesoamerican Biological Corridor and playing a crucial role in watershed protection.

Ambergris Caye area consists mainly of mangroves trees and littoral forest. Mangroves are trees adapted to live in wetland areas. There are three species of mangroves that grow on Ambergris Caye and throughout Belize: red, black and white. Each has a different tolerance for the amount of salt and water they can live in. They are particularly important species for Ambergris Caye as they help add land to the island thanks to an extensive root system that helps trap and retain the mud and sand brought ashore by the normal action of waves and currents. They also protect the shoreline, shelter juvenile marine life and are the beginning of a food chain for some marine species.

The littoral forest is characterized by vegetation with high salt tolerance. This forest grows in a thin strip along the coast of Ambergris and is mainly composed of sea grape, cocoplum, potion wood, wild oregano, gumbo limbo and palmetto. Like the mangroves, they are of great importance for the shelter of native fauna.

Ambergris Caye is also home to part of the Belize Barrier Reef, the second largest in the world known as "the jewel" to Belizeans. More details of this ecosystem are presented in the "protected areas" section.

Fauna

Belize has a great variety of both terrestrial and aquatic species. The country's savannahs and lowlands are home to waterfowl and tropical birds, tapirs, pumas, while the mountainous regions are home to jaguars and other felines.

There are an estimated 145 species of mammals, 580 species of birds and 139 species of reptiles and amphibians. The Jaguar (*Pantera onca*) is considered an important indicator species in Belize. The presence or lack thereof of this top predator can reveal the health of Belize's forest ecosystems (Government of Belize, 2010).

On the coast of Ambergris Caye it is common to encounter several kinds of sea turtles. Around the island other species include the iguana, the wishy-willy and small saltwater crocodiles in the lagoons. In addition, more than 250 species of birds can be sighted, among the most common, frigate birds and brown pelicans.

Protected Areas

Belize has a National Protected Areas System (NPAS) plan created with the intention of protecting and preserving the country's biological diversity. The main objective of the plan is to maintain healthy ecosystems and maximize their social, cultural and economic contribution to local and national development.

The San Pedro project area is close to the Belize Barrier Reef Reserve System (BBRRS). This reserve comprises 12% of the entire Reef Complex and it was inscribed as a UNESCO World Heritage Site in 1996. The reef is unique in the world for the variety of reef types it contains in a relatively small area, and is the longest in the northern

³ BWS, Disaster Risk Mitigation and Recovery Plan. June 2022.

and western hemispheres. The property provides important habitat for a number of threatened marine species, harboring a number of species of conservation concern including the West Indian manatee (*Trichechus manatus*), green turtle (*Chelonia mydas*), hawksbill turtle (*Eretmochelys imbricata*), loggerhead turtle (*Caretta caretta*), and the American crocodile (*Crocodylus acutus*) as well as endemic and migratory birds which reproduce in the littoral forests of cayes, atolls and coastal areas (UNESCO, 2022). It is located in the Belize Coastal and Near Shore Islands Key Biodiversity Area (KBA).

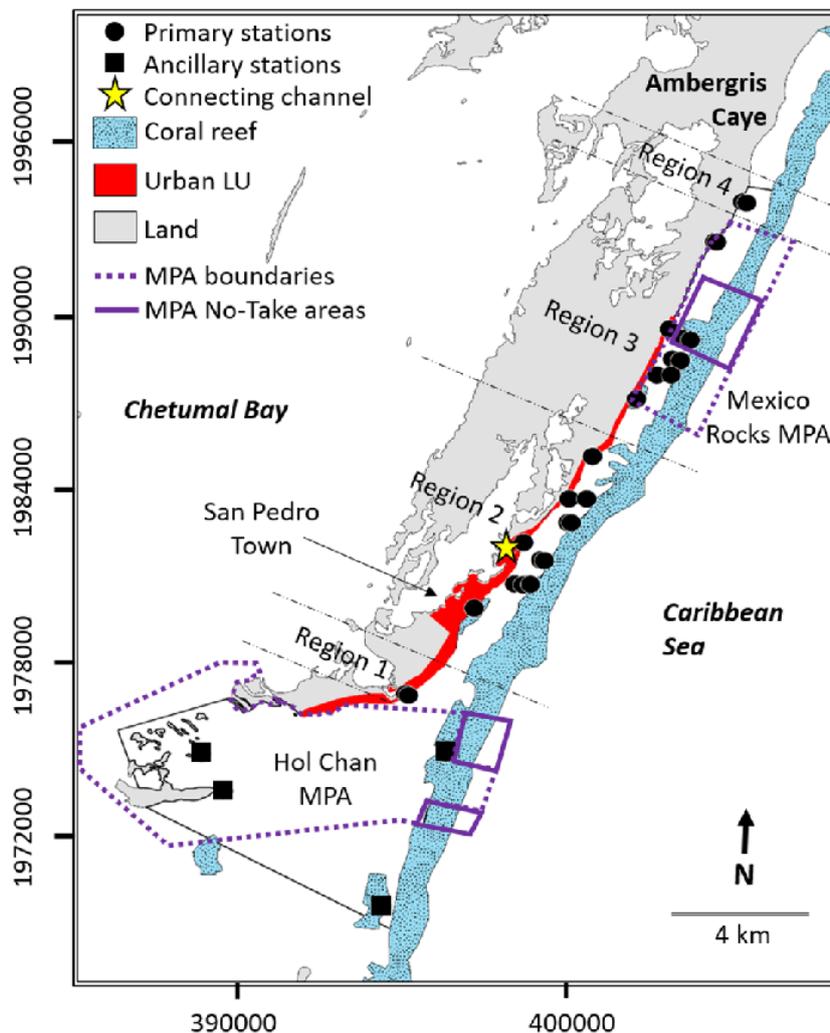


Figure 6 Murphy et al. (2022). Map of area adjacent to Ambergris Caye showing marine protected area boundaries, including Hol Chan MPA zones and Mexico Rocks

4.5 Socioeconomic Environment Baseline of Indirect Area of Influence

Population and Growth

San Pedro Town is the only island municipality in the country, located on Ambergris Caye. According to census results, between 2000, 2010 and 2022, San Pedro Town experienced a population growth of more than 17% annually.

The community of San Pedro is predominantly mestizo, with Spanish as its most widely spoken language, although 74% of the population also speaks English, indicating that the majority of the population is bilingual.

Table 4 - San Pedro population according to census data

Area	Census 2000			Census 2010			Census 2022			Percentage Change
	Total	Male	Females	Total	Male	Females	Total	Male	Females	
San Pedro Town	4267	2186	2081	11765	6051	5714	15456	8061	7395	131

Infrastructure and Services

Housing

Household size is a key indicator for examining social issues such as poverty and health, especially as it relates to the risk of exposure to communicable diseases (Statistical Institute of Belize, 2010).

According to census data, of all the urban areas, San Pedro Town has the smallest average household size at 3,15 persons per household (a decrease from 3,4 persons at Census 2000), despite the fact that the number of households has tripled (from 1,248 to 3,769 households) in the last ten years. This could be associated with the fact that, as indicated in Table 4, the population has also approximately tripled.

Household Services

In the case of San Pedro City, the main source of energy for lighting is electricity from public electrical company the Belize Electricity Limited (BEL). It is estimated that about 96% of households have this service available.

The source of drinking water in San Pedro is mainly bottled water. According to 2010 statistics, 90% of households purchase bottled water for consumption. Tourist towns like San Pedro choose alternatives to piped water, such as rainwater catchment, bottled water, or filtration systems due to concerns over taste and odor, with some users reporting issues like a strong chlorine flavor (Wright, 2021).

San Pedro Town is one of only three municipalities in the country with an established sewer system for wastewater disposal and treatment (UNICEF, 2017). Almost 34% of households have flush toilets connected to the sewer, while the rest are connected to a septic tank and are the main type of sanitary facility for most households.

Road Connectivity, Routes and Highways

Regarding San Pedro, there are two ways to get there from Belize: by ferry or flight. There are frequent daily trips from the Belize City water cab port to San Pedro and they last approximately 75 min. The second option is the flight from Belize City airport to San Pedro airport, with an approximate duration of 20 minutes. Once on the island, the most common way to get around is by golf carts on unpaved roads.

Education

Under the Laws of Belize, the mandatory school age begins at five years, and children are required to be in school as long as they have not attained their fourteenth year or have not completed primary school (Statistical Institute of Belize, 2010). People who have completed at least Standard Five at primary school are considered literate.

San Pedro City has 7 primary schools, 1 high school and 1 sixth form. According to the census data, the primary school enrollment rate has declined significantly, from 102% in 2004 to 89% in 2010. This decline may be largely due to the 205% increase in the population of children aged 5 to 14 years over the intercensal period. The secondary school gross enrollment rate increased from 53% in 2000 to 68% in 2010 for males, and from 64% in 2000 to 76% in 2010 for females.

The youth literacy rate (15 to 24 years) increased from 86% in 2000 to 93% in 2010 for male youth, and from 85% in 2000 to 95% in 2010 for females.

Technical and vocational training also experienced strong growth, with the number of students increasing by more than 600% between 2000 and 2010.

Disadvantaged Groups

San Pedro displays stark economic and social disparities. While the town thrives on tourism, marginalized neighborhoods like San Mateo remain overlooked, with high poverty and deteriorated living conditions. Vulnerable groups — women, youth, and persons with disability — are disproportionately affected by limited opportunities, inadequate infrastructure, and social exclusion. Tailored interventions for inclusive infrastructure, education, social protection, and accessibility are essential to bridge these gaps and support equitable development.

Indigenous Peoples and Communities

In a general context, Belize has a population formed by several indigenous communities. According to the Statistics Institute of Belize 2010 Census, 52,9 per cent of population are Mestizo, 26 percent Creole, 21 per cent are descendants of black Africans and Mulattos (descendants of black Africans and Europeans), 11,3 per cent are indigenous Maya and 6,1 per cent are Garifuna (descendants of black Africans and Caribbeans), and 7,8 per cent are white, of British or Spanish origin. The rest of the population comprises small communities of European, Mexican, Guatemalan, U.S., Honduran, Jamaican, East Indian, Chinese and Far Eastern origins (Centre for Indigenous Peoples' Autonomy and Development, 2017).

Archaeological, Historical and Cultural Heritage

Belize has a unitary system of management in which ownership of all cultural heritage is vested in the people and government of the country.

In 2003, the National Institute of Culture and History (NICH) was created and it is responsible for the management of the country's tangible and intangible heritage. It comprises of four institutions, each with their own mandates and missions but subject to Chapter 331 of the Laws of Belize, called the NICH Act.

The four institutions that comprise the NICH are:

- Institute of Archeology
- Institute of Social & Cultural Research
- Museum of Belize and Houses of Culture
- Institute Creative Arts

Outstanding Heritage Resources

Among some of the heritage resources of Belize, the following are relevant to the project area:

- The Belize Barrier Reef, the only UNESCO world Heritage Site in Belize, which consists of seven reserves: Bacalar Chico National Park and Marine Reserve, Blue Hole Natural Monument, Half Moon Caye Natural Monument, South Water Caye Marine Reserve, Glover's Reef Marine Reserve, Laughing Bird Caye National Park and Sapodilla Cayes Marine Reserve. This barrier reef is the largest in the Northern Hemisphere and is an important habitat for some endangered animal species such as sea turtles, manatees and the American crocodile.
- Located in South San Pedro, the Marco Gonzalez Archaeological Reserve is a 2,000-year-old Maya site that contains no house structures or temples. It lies approximately 0.1 mile from the nearest planned water network expansion area.



Figure 7 - Access sign at the Marco Gonzalez Archaeological Reserve (Photo: PlanEHS, Nov. 2022)

4.6 Characterization of the Direct Area of Influence

This section describes the Direct Area of Influence for the San Pedro Water Network Expansion.

San Pedro Water Network Expansion

To understand the characteristics of the environmental, social and territorial context of the project, a field visit was conducted in November 2022. The photographic record detailing the key features of the areas is presented below. The conditions observed during the visit have remained unchanged as of 2025. The field visit allowed to visualize the general characteristics of the project context and identify early problems or situations that are useful for its evaluation and environmental and social management.



Figure 8 - Initial point of south San Pedro main (Photo: PlanEHS, Nov. 2022)

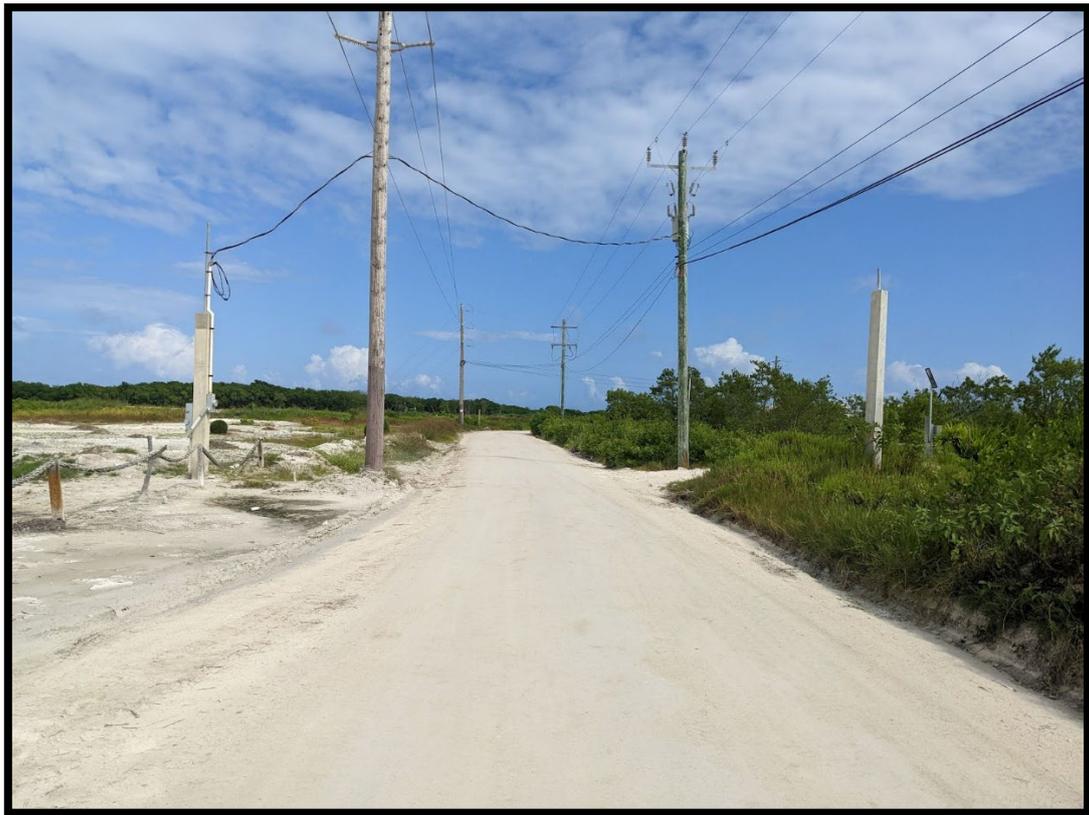


Figure 9 - Suburban characteristics of south San Pedro proposed main (Photo: PlanEHS, Nov. 2022)



Figure 10 - Lodge / beach resort (Photo: PlanEHS, Nov. 2022)



Figure 11 - Final point of south main. Residential complex under construction (Photo: PlanEHS, Nov. 2022)



Figure 12 - San Pedro north main to Port Authority. Initial point (Photo: PlanEHS, Nov. 2022)



Figure 13 - Ramification on proposed main to Port Authority (Photo: PlanEHS, Nov. 2022)



Figure 14 - Street narrowing on side ramification from north San Pedro main (Photo: PlanEHS, Nov. 2022)



Figure 15 - Micro-dumpsite (front back) on ramification from north San Pedro main (Photo: PlanEHS, Nov. 2022)



Figure 16 - Signs of inadequate waste disposal on streets in small shipyard. North San Pedro (Photo: PlanEHS, Nov. 2022)



Figure 17 - Proposed water main location in north San Pedro, urban profile (Photo: PlanEHS, Nov. 2022)

5. Environmental and Social Impacts and Risks

This chapter describes the potential environmental and social impacts and risks for the activity, on the physical, biological and socioeconomic environment.

5.1 Impact and Risk Assessment Process

The steps involved in the impact and risk assessment are:

- 1 **Impacts Identification:** determine what could happen in the different environment components, because of the project and its associated activities and facilities.
- 2 **Impact Assessment:** evaluate the significance of the predicted impacts and risks, considering their magnitude and occurrence probability, and the sensitivity, value and importance of the factor or component of the impacted environment.
- 3 **Mitigation / Improvement:** identify appropriate measures to mitigate negative impacts and enhance positive impacts.

5.2 Analyzed Phases

For the identification of environmental and social impacts and risks, the analysis time horizon was divided into three phases:

- **Design**
- **Construction**
- **Operation and Maintenance**
- **Decommissioning or abandonment**

The project involves infrastructure that is considered to have a long service life (water distribution network). It is assumed that this infrastructure will be permanently incorporated into the service provider assets. Therefore, the decommissioning or abandonment stage **was not considered for the impact assessment**.

5.3 Project Activities Summary

Project Activities in the Design Phase

There are several activities in the design phase that must be considered from the socio-environmental perspective. Activities identified for the project included:

Work Preparation

- A. Visit proposed sites to understand baseline environmental and community conditions.
- B. Compilation of existing topographic maps, utility layouts, land use data, and population projections.
- C. Identify environmentally sensitive areas (wetlands, protected zones, cultural sites).
- D. Identify affected communities and stakeholders.
- E. Conduct initial consultations to understand local concerns and priorities.

Main work

- F. Consider environmentally and socially responsible alternatives.
- G. Integrate findings from baseline and stakeholder input into design criteria.
- H. Include measures to reduce habitat disturbance, preserve access, and mitigate pollution.
- I. Select eco-efficient and socially appropriate technologies.
- J. Incorporate design features to withstand floods, droughts, and other climate risks.
- K. Determine pipe diameters, materials, and optimal alignment, integrated with the existing distribution system, including consideration of pressure zones, flow control, and overall hydraulic efficiency.
- L. Preparation of Environmental and Social Management Plans (ESMPs) and implementation plan

Project Activities in the Construction Phase

There are several activities in the construction phase that must be considered from the socio-environmental perspective. Activities identified for the project included:

Work Preparation

- A. Purchase, transport, movement and stockpiling of materials, equipment, machinery. Labor transportation.
- B. Area clearing and road breakage (where applicable)

Main work

- C. Aqueduct laying. Excavation, trenching, soil movement
- D. Aqueduct laying. Pipeline laying.
- E. Aqueduct laying. Installation of instrumentation, valves, measuring chambers, etc. Hydraulic testing

Work demobilization

- F. Demobilization of construction sites and workers. Removal of surplus materials. Camps closure.

Project Activities in the Operational Phase

For the purposes of the analysis, the operational phase was divided into:

- A. Operation of water network.
- B. Maintenance of water network.

5.4 Physical, Biological and Socioeconomic Environment Components Summary

The components of the physical, biological and socioeconomic environment likely to be affected by the project include:

Physical Environment

1. Air. Gaseous emissions and particulate matter.
2. Air. Noise and vibrations.
3. Air. Suspended dust particles.
4. Waters. Water table and groundwater. Surface water courses.
5. Soil.

Biological Environment

6. Flora (vegetation cover, tree, shrub), Wildlife.

Socioeconomic Environment

7. Infrastructure and services. Road network and traffic.
8. Infrastructure and services. Mains services (water, sewage).
9. Infrastructure and services. Waste Management. Municipal solid waste.
10. Infrastructure and services. Waste Management. Special and hazardous waste.
11. Infrastructure and services. Waste Management. Surplus work, aggregate construction and demolition waste.
12. Infrastructure and services. Waste Management. Excavation surpluses.
13. Occupational Health and Safety. Risk of occupational and road accidents. Health impact.

14. Socio-Economic development. Labor employment. Commercial and service activities.
15. Cultural and Archaeological Heritage.
16. Land Use and Activities in the Area. Residential Use.
17. Landscape and Public Space. Visual impact. Landscape perception.

5.5 Impacts Identification and Assessment

For the impact identification, the **interactions between the project actions** (identified above) and **the environmental components** (physical, biological and socioeconomic environment) were analyzed.

As a representative graphic synthesis of this process, a **matrix** was constructed, which reproduces in a simplified way the conditions of the studied system and allows to visualize with simple symbology the representative interactions. It is a double-entry table in which the columns correspond to actions owned or induced by the project with environmental or social implications, while the rows are the physical, biological and socioeconomic environment components likely to be affected.

The intersections between Project actions and the environmental components considered, allow us to visualize interaction relationships where differentials were evaluated between the "without project" situation and the "under project" situation, that is, impacts and risks.

The impact assessment to complete the matrix was carried out through: (i) interviews with sector experts and project team staff; (ii) expedited field survey; (iii) literature review – including checklists and impact evaluations for similar projects; and (iv) the consultant's experience.

Details of the impact assessment can be found in the matrix report.

Impact Attributes

In each matrix cell, the impact is rated according to the attributes detailed below:

1. **Impact Sign:** refers to the nature of the impact (whether it is a positive or negative impact)
2. **Impact Magnitude (scale):** qualitatively, it will be indicated if it is an impact of high, medium or low significance (see Table 5).
3. **Impact Scope:** indicates whether it is a restricted impact (effect restricted to the Operational Area - OA), specific (effect located within the Direct Area of Influence - DAoI), or major (if it impacts neighboring areas, outside the Indirect Area of Influence - IAoI).
4. **Impact Duration (persistence):** it is determined whether it is a transitory or permanent impact.
5. **Impact probability:** it is a measure of the probability of the impact occurrence.
6. **Accumulation:** for the most significant impacts identified, the cumulative impacts of the execution and operation of the works in the sample with respect to existing or potential projects will be analyzed.

Regarding the **magnitude of the impact**, the definitions in Table 5 as a basis for their determination.

Table 5 - Keys to determine the impacts magnitude

Impact Magnitude	Physical and Biological environment	Socio-economic environment
High	It is defined as one that affects the environment or a subcomponent thereof, either in its entirety, or in a high percentage, altering its characteristics in a forceful way, so that it can be presumed that the impact will make it impossible to use it in the current conditions of this environment, in the modality and abundance in which it is currently used.	It is defined as one of long duration (persisting over several generations), or one that affects a definable group of people to such an extent as to cause a significant change in the quality of life or in culturally established and socially valued positive or appropriate patterns of an activity that will not return to pre-project levels for at least several generations.

Substantial	It is defined as an impact that affects the environment or a subcomponent of it in a more than moderate but less than high proportion. The characteristics of the environment are altered in a clear and measurable way, potentially limiting certain uses or reducing the quality or availability of environmental functions. However, it is presumed that with proper mitigation or over time, the environment may continue to be used in a similar modality and abundance as it is currently	It is defined as an impact that affects a definable group of people in a more than moderate but less than high in a clearly noticeable way. The impact may cause temporary or medium-term changes in the quality of life or in culturally established and socially valued patterns of activity, potentially disrupting daily routines, access to services, or livelihoods. However, it is presumed that conditions may gradually return to pre-project levels within one or two generations, especially with mitigation or adaptive measures.
Medium	It is defined as that which affects the environment or a subcomponent of it, partially, in a non-majority fraction, altering its characteristics in an evident manner, but in such a way that it can be presumed that the impact will not significantly impede the use of the resource in the current conditions of this environment, in the modality and abundance in which it is currently used.	It is defined as one that affects a definable group of people in a significant magnitude, enough to cause an alteration in the quality of life or in culturally established and socially valued as positive or adequate patterns of an activity.
Low	It is defined as that which affects the environment or a subcomponent of it, partially, in a clearly minority fraction, not significantly altering its characteristics, in such a way that it can be presumed that the impact will not make it impossible to use this environment in the current conditions, in the modality and abundance in which it is currently used.	It is defined as one of short duration or one that affects a reduced group of people in a localized area but does not imply an evident alteration in the quality of life or in culturally established and socially valued as positive or adequate patterns of an activity.

Risk and impacts classification matrix

		Probability			
		Low	Medium	Substantial	High
Magnitude	Low	Low	Low	Moderate	Moderate
	Moderate	Low	Moderate	Substantial	High
	Substantial	Moderate	Substantial	High	High
	High	Moderate	Substantial	High	High

5.6 Mitigation Measures Identification

Once the impacts have been identified and assessed, mitigation measures are identified to avoid, reduce, correct or compensate for them.

Mitigation Hierarchy

All negative impacts identified in the impacts and risks analysis of this Study require preventive, mitigatory, corrective or compensatory measures, which must be incorporated to minimize environmental and social impact and ensure the sustainable performance of the project.

Within the mitigation hierarchy, preventive (pre-impact, avoid impact at source) and mitigatory measures (minimize impact, reduce impact at source, or on the receiving body) are preferred over measures involving offsetting (post-impact), such as restoration and compensation.

5.7 Residual Impact Determination

Once mitigation measures are identified, the next step in the assessment process is to assign a residual impact value. This step is, in essence, a new impact assessment, considering the effective implementation of the mitigation measures identified.

5.8 Management, Monitoring and Audit

The last stage in the impact assessment process is the definition of monitoring and management measures, to ensure that the identified impacts remain within the ranges of applicable standards, and that mitigation measures are being effectively implemented, reducing impacts in the manner originally predicted in the analysis.

The summary of these management processes is part of the Environmental and Social Management Plan (ESMP), which is the subject of the next chapter (**Chapter 6**).

5.9 Environmental and Social Risks and Impacts Matrix Report

The following report explains the criteria used in the weighting of the impacts, it also expands on the valuation of the other attributes identified for the impacts (scope, duration, frequency and duration). Finally, it identifies mitigation measures to be applied, determining the residual impact resulting from effectively applying these measures.

Impacts - Construction Phase

Air. Gaseous Emissions and Particulate Matter.

Impact Assessment

Impact Description	Air quality impacts of gaseous emissions and particulate matter		
Impact Nature	Negative	Positive	Neutral
Magnitude	Low	Medium	High
Scope	Restricted (OA)	Punctual (DAoI)	Local (IAoI)
Duration	Transitory		Permanent
Probability	Low	Medium	High
Accumulation	Non-cumulative		Cumulative

Impact Discussion

The actions of the construction phase, including material storage, movement of machinery and vehicles affected by the work, clearing top soil, excavations, are characterized by the emission of particulate matter and gaseous emissions of combustion engines, which can cause air pollution.

These high probability impacts are valued as negative, of low magnitude, of punctual scope (direct influence area) and of a transitory nature (they only occur during the construction phase).

Mitigation Measures

- All materials that could give off dust will be transported in vehicles covered with tarpaulins, with sufficient humidity to minimize their dispersion.
- During the on-site stockpiling of aggregates, dust-generating materials will be periodically wetted to minimize airborne particles. Wherever operationally feasible, stockpile volumes will be limited to the quantities required for approximately one week of work. The materials to be stockpiled primarily include those intended for trench backfilling, pipe bedding, and road surface restoration.
- Periodic watering of roads without asphalt layer to be used on site will be implemented (twice a day).
- Limiting the speed of construction vehicles on access roads without asphalt surface (depending on the case, between 20 and 40 km/h).
- During excavation and soil movement, dust emissions will be mitigated by spraying the material.
- Maintenance of construction machinery in good condition (technical verification).

Residual Impact

The associated residual impact remains of low.

Noise and vibration

Impact Assessment

Impact Description	Impacts by noise and vibration generation		
Impact Nature	Negative	Positive	Neutral
Magnitude	Low	Medium	High
Scope	Restricted (OA)	Punctual (DAol)	Local (IAol)
Duration	Transitory		Permanent
Probability	Low	Medium	High
Accumulation	Non-cumulative		Cumulative

Impact Discussion

- The materials transport and stockpiling of aggregates intended for trench backfilling, pipe bedding, and road surface restoration. The labor transportation, the operation of demolition and excavation machinery, are activities that generate noise and vibrations (noise pollution). In both cases, these are negative impacts and of a transitory nature (they only occur during the construction phase). No impacts are expected outside the direct influence area. These are temporary exposures. Given that it is a predominantly rural and/or peri-urban environment, the impacts are assessed as low magnitude.

Mitigation Measures

- Implement an **Information and Community Participation Program** in the ESMP, which provides information to neighbors about the works duration and scheduling.
- In the vicinity of population settlements, high noise generation activities will be scheduled with the community in order to avoid impacts at sensitive hours.
- Maintain construction machinery and equipment in good condition.
- Implement IFC Guidelines noise guidance levels – 55 dBA during the day, and 45 dBA will be maintained at night (work during nighttime hours will be avoided whenever possible. Nighttime work will only be permitted in the event of necessary emergency repairs) for equivalent continuous noise levels in residential, institutional and educational settings; and/or compliance with specific legislation at national and local level (International Financial Corporation, 2007)

Residual Impact

The associated residual impact remains of low magnitude.

Water table and groundwater. Surface water.

Impact Assessment

Impact Description	Impacts on groundwater and surface water resources		
Impact Nature	Negative	Positive	Neutral

Magnitude	Low	Medium	High
Scope	Restricted (OA)	Punctual (DAol)	Local (IAol)
Duration	Transitory		Permanent
Probability	Low	Medium	High
Accumulation	Non-cumulative		Cumulative

Impact Discussion

Construction activities can have a negative impact on the water table due to the risk of accidental spills (hydrocarbons, oils or other chemical substances used on site), or due to poor effluent management during construction work (for example, sanitary effluents, effluents from hydraulic tests, or *mixer* washing).

Natural site drainage and surface runoff are also affected in works involving topsoil removal and movement, and removal of vegetation cover.

These identified impacts are negative, transitory (they only occur during the work implementation), and of low magnitude.

Mitigation Measures

- Establish an **Effluent Management Program** in the **ESMP**.
- Provide sanitation systems for personnel from the beginning of the project implementation (portable toilets, toilets with connection to the sewer, etc.).
- Identify and properly manage non-domestic effluents (including *mixer* washing effluents).

Residual Impact

The residual impacts is low.

Soil

Impact Assessment

Impact Description	Impacts on soil resources from conversion, erosion, sediment runoff, and/or pollution		
Impact Nature	Negative	Positive	Neutral
Magnitude	Low	Medium	High
Scope	Restricted (OA)	Punctual (DAol)	Local (IAol)
Duration	Transitory		Permanent
Probability	Low	Medium	High
Accumulation	Non-cumulative		Cumulative

Impact Discussion

The stockpiling and handling of construction materials, and the operation of machinery and equipment in all work activities, can give rise to the risk of soil contamination by oil and hydrocarbon spills, by washing concrete mixers, or by poor management of sewage effluents or solid construction waste.

The removal of vegetation and tree cover, soil movement, drilling and excavations, demolition and breakage of road, and post-excavation filling always mean a negative impact on the

composition of the soil, which can lead to erosion, compaction, alteration of the edaphic sequence, etc. The stockpiling of soil during excavations can lead to sediment runoff to nearby water streams and water courses and mangrove areas. This effect can also be exacerbated during flooding events or tropical storms. No trenching activities will occur near mangrove areas, as all pipe installation will be confined to existing road infrastructure.

In addition, soils movement can cause the dispersion of rodents and other vectors to surrounding areas.

These identified impacts are negative, of low magnitude, of a transitory nature (they only occur during the work implementation phase) and localized (they affect only the direct influence area of the project).

Mitigation Measures

- Establish a Chemical Management Program in the ESMP, including storage within the containment area, fuel refill and oil change protocols with spill protection.
- Establish a Contingency Plan, which includes spill preparedness and actions (anti-spill kits, training, etc.).
- Establish protection measures to avoid sediment runoff, including: limiting the extent of open trenches to minimize stockpiling volumes; close out trenches as works schedule permits in anticipation of strong storms / tropical storms; cover soil stockpiles with tarpaulin sheets, etc.
- Establish an Effluent Management Program in the ESMP.
- Provide sanitation systems for personnel from the beginning of the project implementation (portable toilets, toilets with connection to the sewer, etc.).
- Prohibit the washing of concrete mixers in the operational area of the project. These activities must be carried out in authorized sites.
- Establish a Pest and Vector Control Program in the ESMP.

Residual Impact

The residual impact is low.

Flora and Fauna

Impact Assessment

Impact Description	Impacts on Flora and Fauna due to construction activities		
Impact Nature	Negative	Positive	Neutral
Magnitude	Low	Medium	High
Scope	Restricted (OA)	Punctual (DAoI)	Local (IAoI)
Duration	Transitory		Permanent
Probability	Low	Medium	High
Accumulation	Non-cumulative		Cumulative

Impact Discussion

Tasks related to vegetation clearing and work fronts, stockpiling of materials in preparation for construction, and excavations for civil works for the construction of new storage tanks and laying of pipelines, will involve the removal of vegetation and shrub cover and in some cases, the removal of trees. This will also affect the fauna associated with this vegetation (including birds). There is also a risk of fauna being run over by vehicles and construction machinery.

These identified impacts are considered negative, of medium magnitude for the critical activities of the project (land clearing, excavations, civil works for the construction of new tanks and pumping stations) and of a permanent nature and affecting the direct influence area of the project.

Mitigation Measures

- Establish a Vegetation and Fauna Management Program in the construction ESMP, with specific guidelines aimed at preventing impacts on flora and fauna. Likewise, the Program will explain the mitigating and compensatory measures for the removal of trees, communication actions to neighbors, and the prohibition of introducing invasive species. No trenching activities will occur near mangrove or forested areas, as all pipe installation will be confined to existing road infrastructure.
- Allow the removal of vegetation cover only in designated areas necessary for the works associated with the project.
- Respect the edaphic sequence in soil movements: after cleaning, the upper layer (stored separately) will be used for leveling and reprofiling.
- Land used for temporary construction facilities must be restored to its original condition.

Residual Impact

Effective implementation of detailed mitigation measures is expected to result in low negative residual impact.

Road and Traffic Impacts

Impact Assessment

Impact Description	Competitive impacts on the use of the road network		
Impact Nature	Negative	Positive	Neutral
Magnitude	Low	Medium	High
Scope	Restricted (OA)	Punctual (DAoI)	Local (IAoI)
Duration	Transitory		Permanent
Probability	Low	Medium	High
Accumulation	Non-cumulative		Cumulative

Impact Discussion

During the entire construction phase, impacts will be generated by increased traffic, competition in the use of the road network (by the transport of materials, equipment and machinery for all well drilling works, laying of aqueducts, civil and electromechanical works of the project), and by the reduction of effective road areas (by the presence of camps and fencing of the front of work, pavement breakage due to excavation works, and machinery parked or in operation).

In general, since the majority of the impact is on rural roads, secondary roads and/or tracks, this impact is not significant. Impacts are classified as negative, low magnitude, localized in the direct influence area, and transitory in nature (only occurring during construction), for preparation and closure activities.

Mitigation Measures

- Implement the Stakeholder Engagement Plan, which provides information to neighbors about the works duration, scheduling and mitigation measures of possible risks and impacts produced by the works.
- Establish a Road Safety and Traffic Management Program in the ESMP.

Residual Impact

The residual impact remains low.

Impacts on Public Services

Impact Assessment

Impact Description	Risks of ruptures and service cuts due to interference during excavation and laying of aqueducts		
Impact Nature	Negative	Positive	Neutral
Magnitude	Low	Medium	High
Scope	Restricted (OA)	Punctual (DAoI)	Local (IAoI)
Duration	Transitory		Permanent
Probability	Low	Medium	High
Accumulation	Non-cumulative		Cumulative

Impact Discussion

During the construction phase, in the excavation actions, soil movement and laying of pipes, and in the construction of new infrastructure such as storage tanks and pumping stations, installation of valve instrumentation, measuring chambers, among others, interference with the existing service network may occur, which could result in accidental breaks and service interruptions to users.

However, given the rural and/or peri-urban nature of the area where the main works are developed, it is not expected to find a significant number of interferences. The impact is assessed as negative, localized, and is considered of low magnitude, and of a transitory nature (only occurs during the work phase).

Mitigation Measures

- Establish a Coordination Program with Service Providers in the ESMP, which allows a correct identification of interferences.
- Establish a Contingency Plan, which includes preparation and actions before water, sewer or gas service pipes ruptures.
- Implement an Information and Community Participation Program in the ESMP, which provides information to neighbors about the works duration, scheduling and mitigation measures of possible risks and impacts produced by the works.

Residual Impact

The residual risk of breakages and service outages due to interference remains low.

Waste Management

Impact Assessment

Impact Description	Contamination by improper disposal of solid waste		
Impact Nature	Negative	Positive	Neutral
Magnitude	Low	Medium	High
Scope	Restricted (OA)	Punctual (DAol)	Local (IAol)
Duration	Transitory		Permanent
Probability	Low	Medium	High
Accumulation	Non-cumulative		Cumulative

Impact Discussion

The operation of the camp and the construction front involve the generation of solid waste assimilable to domestic.

In all construction activities, surplus construction, demolition waste (iron cuttings, cables, remains of plastic pipes, wood, aggregates from pavement breaks, dismantling/demolition of facilities, etc.) and green waste (resulting from weeding, land cleaning, etc.) are also expected.

Due to the characteristics of the activities to be carried out in the works of the project, it is not expected that special or hazardous waste will be generated, except for smaller quantities resulting from the maintenance of machinery and vehicles affected by the work (lubricating oils, etc.) and the washing of concrete mixers. These special waste streams must be disposed of in accordance with current regulations, using authorized transporters and operators, and in compliance with specific regulations.

Surplus excavation soils (if any) must be properly disposed of (e.g., used as backfill at other approved sites – quarries).

Improper waste management on site can cause contamination, and risk of proliferation of rodents and other vectors.

The risk of contamination due to poor solid waste management on site is considered a low negative impact, of medium probability and of a transitory nature (occurring during the work execution phase).

Mitigation Measures

- Establish a Waste Management Program in the ESMP, which defines the guidelines for proper management of all waste streams to be generated on site – including surplus excavations, in accordance with current legislation and good practices.
- Establish a Socio-Environmental Training Program for Construction Personnel, which includes training in the correct management of construction waste.
- Establish a Monitoring and Control Program that includes a protocol for analyzing soil contamination from excavations.
- Establish a Pest and Vector Control Program in the ESMP.

Residual Impact

The residual impact of solid waste management is expected to remain low.

Occupational Health and Safety

Impact Assessment

Impact Description	Risk of accidents (occupational - road)		
Impact Nature	Negative	Positive	Neutral
Magnitude	Low	Medium	High
Scope	Restricted (OA)	Punctual (DAol)	Local (IAol)
Duration	Transitory		Permanent
Probability	Low	Medium	High
Accumulation	Non-cumulative		Cumulative

Impact Discussion

It can be anticipated that the execution of the work implies a risk of accidents (both occupational, due to the work tasks and road due to the circulation of vehicles and machinery affected by the work). This is due to the critical activities that are part of the construction process, and that may include: excavations (with the consequent risk of collapses and burial of people during the execution of the activity), construction of tanks and pumping stations, electrical work in installation of electromechanical equipment, accidents involving construction machinery, temporary or permanent hearing loss due to the operation of noise-generating equipment and machinery, welding and hot working, and ergonomic hazards.

This impact is classified as negative, of high magnitude for certain work instances of the (including the trenching and laying of pipes, construction of new storage tanks and pumping stations, dismantling/demolition of facilities and electrical work), and of a transitory nature (occurring during the work execution phase).

Mitigation Measures

Occupational Health and Safety

- Establish an Occupational Health and Safety Program in the ESMP, aligned with ISO 45001:2018 and national regulations, addressing high-risk activities including trenching, electrical work, confined spaces, and equipment operation.
- Implement a Socio-Environmental Training Program for all site personnel, covering PPE use, risk awareness, safe chemical handling, emergency procedures, and specific hazards related to the project.
- Establish a Road Safety and Traffic Management Plan, ensuring proper signage, speed control, designated routes, traffic separation from pedestrian paths, and driver training.
- Implement a Works Installation and Camp Set-up Plan, with fencing, access control, visible hazard signage, and secure storage for hazardous materials.
- Develop and regularly update a Medical Emergency Contingency Plan, including onsite first-aid resources, coordination with local health facilities, and emergency response protocols.

Community Health and Safety

- Conduct community awareness sessions prior to the start of works to inform residents of construction schedules, hazards, detours, and safety protocols.

- Install barriers and warning signs around all excavation sites and areas with restricted access to prevent accidental entry by the public.
- Implement dust and noise control measures (e.g., wetting stockpiles, scheduling noisy work during daytime, maintaining equipment).
- Designate safe pedestrian crossings and detours near construction zones, especially near schools, clinics, or residential areas.
- Establish a grievance redress mechanism to allow the public to report safety concerns or incidents promptly and ensure timely responses.
- Maintain clear communication with local authorities, emergency services, and community leaders regarding traffic management and emergency procedures.

Residual Impact

As a result of the effective implementation of the proposed mitigation measures, the residual impact associated with occupational safety is reduced to low.

Economic development

Impact Assessment

Impact Description	Impacts on employment, business and services		
Impact Nature	Negative	Positive	Neutral
Magnitude	Low	Medium	High
Scope	Restricted (OA)	Punctual (DAol)	Local (IAol)
Duration	Transitory		Permanent
Probability	Low	Medium	High
Accumulation	Non-cumulative		Cumulative

Impact Discussion

The activities foreseen in the construction phase will require labor – skilled and unskilled – and acquisition of construction materials and services. This will have a positive impact on employment generation, and on the dynamization of the activity of trade in goods and services. In particular, the items that will benefit include those related to the sale of construction inputs and materials, equipment, vehicles, machinery, spare parts and accessories, mechanical services, fuel, logistics, and food, among others.

No risks related to the influx of workers are foreseen, since the project is framed in an area with available labor supply, and the developer is committed to using local labor.

These impacts are considered positive, of low magnitude, of a transitory nature, and geographically distributed in the indirect influence area of the project.

Mitigation Measures

- Require the contractor to establish a Code of Conduct, which has a transversal gender approach and guarantees respect for the community and harmonious coexistence during the works. The code of conduct shall include commitments to ensure the creation and maintenance of a work environment free from: (i) discrimination based on ethnic, racial,

gender, gender identity, sexual orientation, or religion; (ii) violence, in particular violence against women, girls and adolescents; (iii) child labor.

- Establish a Training Program that includes training in the Code of Conduct and gender issues for the Company's employees.
- Establish a Grievance Management Mechanism for the Project.

Residual Impact

The residual impact of the area revitalization by the action of the Project implementation remains in positive low.

Land Use and Activities in the Area

Impact Assessment

Impact Description	Disruptions to established activities due to the presence of personnel, construction machinery and asset assignment.		
Impact Nature	Negative	Positive	Neutral
Magnitude	Low	Medium	High
Scope	Restricted (OA)	Punctual (DAol)	Local (IAol)
Duration	Transitory		Permanent
Probability	Low	Medium	High
Accumulation	Non-cumulative		Cumulative

Impact Discussion

Construction activities, including the presence of personnel and machinery, may temporarily disrupt normal use of the project sites. However, loss of income or disruption to local businesses is not anticipated, as all trenches excavated for pipe installation will be backfilled and closed on the same day (mainly residential dispersed in some sectors where the works will be developed mainly of laying of aqueduct), for road safety accidents related to the works and for the inconvenience inherent in construction tasks in more urban areas (noise, visual pollution). There is also the risk of conflicts between workers and the population.

During the construction phase, the work activities may temporarily affect both residential and commercial uses in populated areas. However, loss of income or disruption to local businesses is not anticipated, as all trenches excavated for pipe installation will be backfilled and closed on the same day. Residential driveways will be restored to their original condition or improved, ensuring no long-term inconvenience to property owners. Although the contractor is contractually obliged to limit the duration of these impacts, due to the nature of the works, they may cause temporary difficulties in accessing housing or productive establishments. The exact time for which each home, business or equipment for community use will be affected will be determined once the executive project and the adjusted work schedule are available. In all cases, the corresponding measures will be implemented to minimize the impacts and compensate those whose will be affected as a consequence of the extension of the interruption of access to their premises or productive establishment. In the case of mobile posts or seasonal posts in public domain areas, if any, the necessary accompanying measures will be implemented so that those affected can continue to develop their activity in nearby areas with similar influx of public. It should be noted that in some cases commercial activities may also have positive impacts derived from the presence of workers linked to the work.

Regarding potential effects on community uses, from the existing information at the moment it does not emerge that this type of impact will be generated. However, in the event that the executive design of the project affects common uses in public domain properties, it must be ensured that the impact on the use of the property is minimized, and the uses that would have been affected by the construction are restored (both those temporary ones that derive from the activities of the work and the permanent ones, such as the impacts on equipment).

The impact on residential use is categorized as low negative for the entire work. These impacts are of a transitory nature.

Mitigation Measures

- Follow up on the procedure for the constitution of an aqueduct easement in all existing aqueduct replacement works.
- Implement an Information and Community Participation Program in the ESMP, which provides adequate communication to neighbors about the type and duration of the impact, measures planned to mitigate it, hours of traffic and services cuts, if applicable, as provided in the corresponding section of the PGAS, and expected date for the restoration of the existing conditions before the work on the road and sidewalks.
- Implement prevention and mitigation measures during the construction phase, including work programming and coordination with roadside owners, forecasts of pedestrian and vehicular access, opening and closing of ditches on the day, etc. These measures may include compensation for those affected by the interruption of access to their premises for extended periods. In the case of mobile posts, the necessary accompanying measures will be implemented so that those affected can continue to develop their activity in nearby areas with similar influx of public. It should be noted that in some cases the activity of the shops may also have positive impacts derived from the presence of workers linked to the work.
- Definition of specific measures to minimize and compensate for these impacts when it is not possible to avoid them. Specific measures shall include, among others:
 - In all cases, adequate communication to the neighbors about the type and duration of the impact, measures planned to mitigate it in the ESMP, and the expected date for the restoration of the existing conditions before the work in front of their houses.
 - Specific complementary measures for particular cases (for example, if the survey arises from the fact that in any of the front homes there are people with disabilities or elderly people who require specific measures to ensure accessibility while the works are carried out in front of their home).
 - Require the contractor to establish a Code of Conduct, which has a transversal gender approach and guarantees respect for the community and harmonious coexistence during the works. The code of conduct shall include commitments to ensure the creation and maintenance of a work environment free from: (i) discrimination based on ethnic, racial, gender, gender identity, sexual orientation, or religion; (ii) violence, in particular violence against women, girls and adolescents; (iii) child labor.
 - Establish a Training Program that includes training in the Code of Conduct and gender issues for the Company's employees.

- Establish a Grievance Management Mechanism for the Project.
- Entering into use agreements with the jurisdictions to which the land belongs.
- Conduct surveys, based on the final designs of the project, to determine if there is any impact on common use facilities. In the event that the survey identifies any impact on equipment or facilities (street furniture, sports or play areas, etc.), a plan will be designed and implemented to reestablish uses (e.g., relocation of equipment within the same site or other improvements agreed upon with local or national authorities, as appropriate, and in consultation with the neighbors using the site) to ensure that activities can continue to be carried out normally on the area of the site not affected by the work.

Residual Impact

The residual impact of land use and activities in the area by Project action remains low.

Cultural and Archaeological Heritage

Impact Assessment

Impact Description	Negative impacts on cultural and archaeological heritage		
Impact Nature	Negative	Positive	Neutral
Magnitude	Low	Medium	High
Scope	Restricted (OA)	Punctual (DAoI)	Local (IAoI)
Duration	Transitory		Permanent
Probability	Low	Medium	High
Accumulation	Non-cumulative		Cumulative

Impact Discussion

According to the information in the Environmental and Social Baseline, there is no probability of finding evidence of cultural or historical heritage on the operational area of the project. However, the possibility of chance finds must be addressed. The activities of the construction phase – soil movement and excavations for laying aqueducts, civil works for the construction of new tanks and pumping stations – could entail a risk of impact on the cultural, historical and archaeological heritage of the area, due to the degradation or loss that could result from improper management of archaeological assets that are in the intervened area.

This risk is assessed as negative, of low magnitude, irreversible (permanent).

Mitigation Measures

- Implement a Chance Find Procedure in the ESMP, which ensures the correct management of findings that could have archaeological value.

Residual Impact

The residual risk of negative impacts on the archaeological heritage remains low.

Landscape and Public Space

Impact Assessment

Impact Description	Visual and landscape impact		
Impact Nature	Negative	Positive	Neutral
Magnitude	Low	Medium	High
Scope	Restricted (OA)	Punctual (DAoI)	Local (IAoI)
Duration	Transitory		Permanent
Probability	Low	Medium	High
Accumulation	Non-cumulative		Cumulative

Impact Discussion

The activities of the construction phase and presence of camps, fences, construction machinery, excavation, etc. have a negative effect on the perception of the landscape (visual alteration).

This impact is valued as low negative, and transitory.

Mitigation Measures

Mitigation measures are not considered for this impact.

Residual Impact

The residual impact is considered low.

Impacts - Operational Phase

Groundwater

Impact Assessment

Impact Description	Impacts on groundwater from aquifer exploitation		
Impact Nature	Negative	Positive	Neutral
Magnitude	Low	Medium	High
Scope	Restricted (OA)	Punctual (DAoI)	Local (IAoI)
Duration	Transitory		Permanent
Probability	Low	Medium	High
Accumulation	Non-cumulative		Cumulative

Impact Discussion

The actions foreseen in the project will involve the increased use of existing aquifers to ensure adequate supply of potable water to the new connections (water network expansion). In the case of water obtained by reverse osmosis, increased production also induces increased disposal of brine (which is injected back in disposal aquifers).

The increased induced exploitation of aquifers is valued as a negative impact, of low magnitude (given the relatively small number of new connections in comparison to the current supply), and of a permanent nature. This impact is cumulative since other current or future uses of this aquifer will be enhanced.

Mitigation Measures

- Establish a Physical Loss Detection Program in the operational phase EMP, in order to avoid superfluous consumption of the resource (NRW).

Residual Impact

The assessment of the magnitude of the residual impact remains negative low.

Services by Network (Access to Drinking Water)

Impact Assessment

Impact Description	Impacts of increased coverage of access to drinking water		
Impact Nature	Negative	Positive	Neutral
Magnitude	Low	Medium	High
Scope	Restricted (OA)	Punctual (DAol)	Local (IAol)
Duration	Transitory		Permanent
Probability	Low	Medium	High
Accumulation	Non-cumulative		Cumulative

Impact Discussion

The main objective of the Program is to implement actions in the potable water supply system to ensure the availability of potable water for the population and beneficiary towns.

Given the benefits derived from the Program's actions on the integral and sustainable improvement of access to potable water, it is considered a positive impact of medium magnitude.

Mitigation Measures

No measures to enhance this impact were identified.

Residual Impact

The residual impact is qualified as positive, of medium magnitude.

Occupational and Community Safety

Impact Assessment

Impact description	Risk of accidents (occupational / road) in operation and maintenance tasks of the aqueduct		
Impact Nature	Negative	Positive	Neutral
Magnitude	Low	Medium	High
Scope	Restricted (OA)	Punctual (DAol)	Local (IAol)
Duration	Transitory		Permanent
Probability	Low	Medium	High
Accumulation	Non-cumulative		Cumulative

Impact Discussion

The operation and maintenance of the built infrastructure (laying of aqueducts) gives rise to risks of accidents and occupational diseases. These can arise from exposure to energized equipment, ergonomic hazards, road safety hazards, etc.

These are qualified as a low negative impact, of a permanent nature.

Mitigation Measures

Occupational Health and Safety (Workers)

- Reinforce signage and occupational health and safety measures in the intervened facilities.
- Establish an Occupational Health and Safety Program in the ESMP for the operational phase, which complies with the requirements of current national and local regulations, and is nourished by elements of internationally recognized occupational health and safety management systems (ISO 45001: 2018).
- Establish a Contingency Plan in the operational ESMP, which ensures the response to medical emergencies.
- Establish a Socio-Environmental Training Program for Plant Personnel in the operational ESMP, which includes training in the use of PPE, risks during maintenance tasks, contingency plan, etc.

Community Health and Safety

- Conduct community awareness sessions prior to the start of works to inform residents of construction schedules, hazards, detours, and safety protocols.
- Install barriers and warning signs around all excavation sites and areas with restricted access to prevent accidental entry by the public.
- Implement dust and noise control measures (e.g., wetting stockpiles, scheduling noisy work during daytime, maintaining equipment).
- Designate safe pedestrian crossings and detours near construction zones, especially near schools, clinics, or residential areas.
- Establish a grievance redress mechanism to allow the public to report safety concerns or incidents promptly and ensure timely responses.
- Maintain clear communication with local authorities, emergency services, and community leaders regarding traffic management and emergency procedures.

Residual Impact

As a result of the proper implementation of the proposed mitigation measures, the residual impact associated with occupational safety is considered of low magnitude.

Residential use

Impact Assessment

Impact Description	Positive impacts on residential activity due to access to drinking water		
Impact Nature	Negative	Positive	Neutral
Magnitude	Low	Medium	High
Scope	Restricted (OA)	Punctual (DAoI)	Local (IAoI)
Duration	Transitory		Permanent
Probability	Low	Medium	High
Accumulation	Non-cumulative		Cumulative

Impact Discussion

The integral and sustainable improvement of access to drinking water would lead to the reduction of public health problems related to the unsafe water consumption and the probable reduction in the future availability of the resource, and therefore a medium positive impact, of a permanent nature, and an indirect benefit are considered.

In addition, through the comprehensive improvement of the health infrastructure for the population, it will result in an increase in property prices. This real estate valuation is qualified as a low positive impact, of a permanent nature and medium probability.

Mitigation Measures

No mitigation measures are considered for this impact.

Residual Impact

The residual impact is considered medium positive.

5.12 Specific Impacts and Risks

Below is an analysis of the specific risks and impacts for the San Pedro Water Network Expansion.

San Pedro Water Network Expansion

In terms of construction-phase impacts, the field visits highlight the presence of small open dumps and solid waste collection issues in general, which could be further exacerbated by the fact that San Pedro exports its solid waste to the continent landfill (Mile 24, George Price Highway) through a transfer station and barge operation. The contractor for the works should ensure, through its Solid Waste Management Program in the ESMP, adequate collection and disposal for all waste generated during the construction. Additionally, the presence of small open dumps poses a risks of increase vectors and pests. The contractor should reinforce the Pest and Vector Control Program of the ESMP accordingly.

In terms of operational-phase impacts, the provision of water services, particularly for the south part of San Pedro, could induce further urban development in that area (indirect impact), which could lead to degradation of natural habitats such as mangroves and shoreline.

5.13 Risk Analysis

The preceding analysis considers the impacts and risks caused by the project implementation on the environment, whether physical, biological or socioeconomic.

To complement this, an analysis will be made of: (i) Disaster and climate change risks to the project and its feasibility, and (ii) Risks that the project will increase the vulnerability of human populations to existing disaster and climate change risks.

Risk Definition

For the purposes of this Study, a risk is defined as any element or situation of the environment (physical or anthropic) that may represent a threat to the Project, and that is caused by external (not predictable) forces.

Project Risk Identification

The risks in the project areas include:

- Hurricanes and tropical storms causing severe losses from wind damage and flooding due to storm surges and heavy rainfall.
- Flood damage due to its low-lying land and exposed positions on the coast; low lying topography makes the country's coastal areas especially vulnerable to sea level rise.
- Extreme temperatures.

Project Criticality and Vulnerability

The criticality and vulnerability of the Project is defined according to the criteria included in the criticality graph presented below in **Figure 17** .

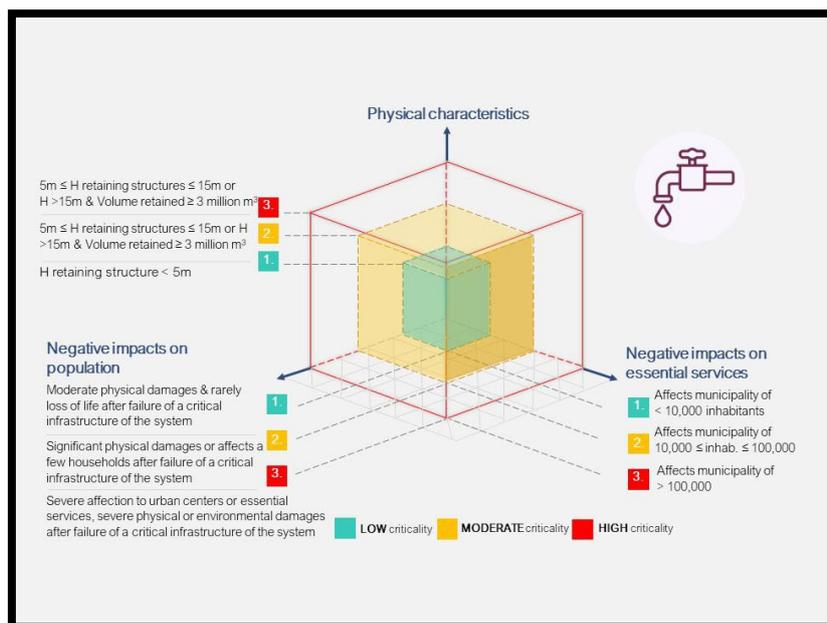


Figure 18 – Criticality graph for drainage, water supply and wastewater management (WSA) infrastructure⁴

Analyzing the **physical characteristics** of the infrastructure (water networks – underground piping) and the magnitude of the works (significantly less than 10,000 served connections), the criticality is classified as **low**. The infrastructure considered in the project - in case of failure of the works - would not affect a population greater than 10,000 inhabitants.

The Project will contribute to improving the quality of the provision of potable water services to the population.

The project also seeks to strengthen the infrastructure to make it more resilient and to contribute to national efforts by incorporating equipment and infrastructure with characteristics of resilience to climate change and climate risks present in the country's territory (e.g., energy efficiency equipment under Component 2).

In this sense, it is requested as a project preparation criterion that, prior to the start of work, the contractor, as part of the ESMP, develop risk analysis and implementation of mitigation measures, in accordance with the Natural Disaster Management and Emergency Response Program of the ESMP.

To conclude the analysis, considering the identified threats, the estimation of criticality, vulnerability of interventions and levels of risk exacerbation, the risk classification is determined as **Low**, not requiring a complete qualitative evaluation.

For the purposes of responding to extreme events, BWS has a Disaster Risk Mitigation and Recovery Plan⁵, defining the emergency response team and chain of command, the preparatory planning, as well as the response protocols for the different phases.

⁵ BWS, Disaster Risk Mitigation and Recovery Plan. June 2022.

6. Environmental and Social Management Plan

The Environmental and Social Management Plan (ESMP) is a tool that guides the environmental and social implementation of any development project, providing procedures for environmental and social management.

This Plan will guide the Executing Agency (BWS), to ensure an adequate level of environmental and social management in the construction activities of the projects. The ESMP outlines necessary environmental and social mitigation measures during the constructive stage of the infrastructure included in the Project, and the development phase of management and operational activities.

6.1 Roles and Responsibilities

Design

During the design phase of the interventions, BWS, as the Executing Agency of the Program (EA) will develop the executive project (engineering design).

BWS will prepare the bidding documents for the works, and the environmental and social specialist from the EA will incorporate the necessary environmental, social, and occupational health and safety clauses and requirements, both general and specific to the activity, which arise from this ESMP, and including the needs for reporting and monitoring. These aspects will be included in the Environmental and Social Technical Specifications.

The bidding documents must outline the minimum content of the Environmental and Social Management Program at the constructive level (C-ESMP).

The proposals received during the bidding process for the works must contain a budget that includes the cost of implementation and compliance with the environmental, social, and occupational health and safety mitigation measures required by the project, to guarantee compliance with the WB ESF and applicable national and local regulations.

Construction

Prior to the start of the works, BWS will conduct the due diligence with the applicable environmental authority (Department of the Environment) to obtain any required environmental permit for the works, for those cases in which it is required, or a written confirmation that an environmental permit is not required.

During the Construction Phase, the Contractor Company will be responsible for preparing and implementing the Construction Environmental and Social Management Plan (C-ESMP), as well as obtaining the environmental and occupational health and safety qualifications and insurances required according to the national and local regulatory framework. The Contractor will also need to obtain other applicable permits, which could include tree cutting permits, easements, excavation permits, construction permits, public road occupancy permits, waste disposal permits, etc.

Before the start of the works, the Contractor must submit to the EA, for its approval, a Construction Environmental and Social Management Program (C-ESMP). This C-ESMP will contain, as a minimum, the programs and subprograms detailed in the following section of this

ESA, together with the specific recommendations that arise from the analysis of the project and as reflected in the Environmental and Social Technical Specifications of the bidding documents.

Once the C-ESMP is approved, the Contractor Company will be responsible for its compliance, using the necessary means to implement the Programs that are formulated within its framework. The Contractor Company must have an environmental and social representative and a person responsible for hygiene and safety, who will be responsible for carrying out the implementation of the C-ESMP. Likewise, the contractor must comply with and make the operators and subcontractors comply with all the provisions contained in the Plan, national and local environmental legislation, and the WB Environmental and Social Framework, during all stages of the execution of the works at their expense.

The Contractor Company will prepare monthly reports to BWS, detailing the actions and results of the C-ESMP implementation.

The inspection, control and monitoring activities of the C-ESMP will be carried out by BWS. BWS may carry out inspection visits, prepare reports for internal use for the Project, and determine and impose corrective measures based on the stipulations of the bidding documents.

The environmental authority (DOE) may also carry out control audits of the work.

At the end of the works, the Contractor must submit a Final Environmental and Social Report, which includes the information corresponding to the implementation of C-ESMP, including records of implementation of plans and programs, and a report on compliance with all environmental and social indicators considered at different stages of the project cycle.

Operation and Maintenance

During the operational stage, BWS will be responsible for the operation and maintenance of the infrastructure built under the Program, in accordance with its current environmental policies and environmental and social management systems, including the ESMP for the operational and maintenance stage of each work.

Role of WB

The WB will oversee reviewing and supervising the implementation, by BWS, of the environmental and social management system for all projects under the Program. This includes the review and approval of the semi-annual environmental and social compliance reports submitted by BWS, as well as the performance of environmental and social supervision missions. This follow-up is carried out at all stages of the project cycle.

Table 6 summarizes the environmental and social management responsibilities of the entities involved in the different phases of the projects.

Table 6 - Roles and Responsibilities for E&S Management of the Projects

Project Cycle Phase	Activity	Responsible Party	Monitoring	Supervision
Design	Grievance Redress Mechanism (for the duration of the Program)	BWS		WB
	Executive Project / Engineering Design	BWS		WB
	Environmental and Social Assessment	BWS (may use external consultants)		WB
	Public Consultation	BWS		WB
	Preparation of E&S Technical Specifications for Bidding Documents	BWS		WB
	Environmental Permits	BWS		DOE
Construction	C-ESMP: Preparation and Implementation	Contractors	BWS	WB
	Environmental and Social compliance during construction	Contractors	BWS / DOE	WB
	E&S Progress Reports	Contractors to BWS (monthly)	BWS	
	E&S Progress Reports	BWS to WB (half-annually)		WB
	Final E&S Report	Contractors	BWS	
Operation	Final E&S Report	BWS		WB
	Operation and maintenance of the water network infrastructure	BWS	DOE	WB (for a period of 3 years after commissioning)

6.2 Environmental and Social Management Plans

Mitigation measures were grouped into two different ESMPs, each one targeting different phases of the project:

- **Construction ESMP:** aimed at mitigating the impacts and risks of construction activities (see Section “Impacts of the Infrastructure: Construction Stage”).
- **Operational ESMP:** aimed at mitigating the negative impacts and risks of the operational stage (see Section “Management and Operational Activities in PA and Conservancies”).

Construction Environmental and Social Management Plan

This ESMP presents the minimum environmental and social guidelines that must be implemented during the construction activities of the project's infrastructure.

Based on these guidelines, the Contractor Company must prepare the final version of the construction ESMP, which will contain at least all the programs described below.

Number of the Program	Program
1	Monitoring and Control of Compliance with Mitigation Measures
2	Vegetation and Fauna Management Program
3	Air Quality, Noise and Vibration
4	Waste Management Program
5	Effluent Management
6	Chemicals Management
7	Occupational and Community Health and Safety
8	Road Safety and Traffic Management
9	Pest and Vector Control
10	Coordination with Service Providers
11	Socio-environmental training for construction personnel
12	Natural Disaster Management and Emergency Response
13	Information and Community Participation
14	Archaeological, Historical, Cultural and Paleontological Heritage Management
15	Works closure
16	Stakeholder Engagement Plan

Below, the guidelines for each of the Construction ESMP programs are presented.

Program 1: Monitoring and Control of Compliance with Mitigation Measures

Program 1: Monitoring and Control of Compliance with Mitigation Measures	
Socio-environmental effects to be prevented or corrected:	Deviations in implementation of mitigation measures
Management Measures	
<p>For the supervision of compliance with the mitigation measures identified, the Contractor will plan and keep updated a "control panel", which will serve to supervise the execution of each Mitigation Measures planned for the Construction Stage. It shall indicate, at least:</p> <ul style="list-style-type: none"> • actions to be implemented, • necessary material resources, • responsible staff, • indicators of compliance, goals, and frequency of monitoring. 	
Monitoring and Compliance	
Indicators	
<ul style="list-style-type: none"> • Number of ESHS Non-Conformities (environmental, social, health and safety) identified during the inspections. • Number of ESHS Non-Conformities closed on time. 	
Responsible for the implementation of the measure	Works Director
Responsible for the control of the measure	Works Inspector

Program 2: Vegetation and Fauna Management Program

Program 2: Vegetation and Fauna Management Program	
Socio-environmental effects to be prevented or corrected:	Impacts on vegetation cover and wildlife
Management measures	
Flora	
<ul style="list-style-type: none"> • The Contractor must implement a revegetation scheme. These activities will be agreed with PMU prior to the works starting. The minimum compensation ratio for tree removal is 3:1 (3 new trees for every tree removed) • The quantification of the revegetated area will be carried out in the fourth month after planting, counting the surviving vegetation. • The removal of the vegetal cover will be carried out immediately prior to the execution of the construction activities. • The time on the construction sites shall be reduced to a minimum, in order to reduce the disturbance of the natural habitat. • The top layer of excavated soil should be stored separately. This soil will be used for ground levelling activities, respecting the edaphic sequence. • The introduction of invasive species in revegetation activities is prohibited. 	
Fauna	
<ul style="list-style-type: none"> • Workers must be trained in the identification and protection of native vegetation and wildlife, and how to proceed when encountering potentially dangerous animals. • Establish measures to drive away fauna in areas where the clearing of vegetation will take place. The activity will target animals with greater locomotion capacity, mainly medium and large mammals, birds and large lizards. These animals should be chased away to adjacent areas without the need for capture. In the case of less mobile species, their rescue and relocation to nearby areas should be promoted. • It is recommended to establish low circulation speeds • Proper planning of activities to minimize the presence of workers in natural environments. Whenever possible, the use of machinery will be limited and/or equipment with low noise levels will be used. 	
Monitoring and Compliance	
Indicators	
<ul style="list-style-type: none"> • Vegetation cover surface removed, • Revegetated cover surface surviving after the fourth month. 	
Responsible for the implementation of the measure	Works Director
Responsible for the control of the measure	Works Inspector

Program 3: Air Quality, Noise and Vibration

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN	
Program 3: Air Quality, Noise and Vibration Program	
Socio-environmental effects to be prevented or corrected:	Air and noise pollution due to inadequate management of construction activities
Management Measures	
Particulate matter:	
<ul style="list-style-type: none">• All materials that could give off dust will be transported in vehicles covered with tarpaulins, with sufficient moisture content to minimize their dispersion. It must be controlled that the volume of cargo transported by truck in the operational and influence area, ensuring that it is flush with the level of the transport box, in order to avoid dispersion or fall of the material.• During the period of collection on site, periodic wetting (only with water) of materials that could generate dust will be carried out. The quantities in stockpiling will be minimized, whenever it is operationally feasible. The greatest possible distance will be maintained between the collection of materials and the area residents.• Periodic watering of vials without asphalt folder to be used on site will be implemented - once a day, or as often as determined necessary for local conditions.	
Emissions:	
<ul style="list-style-type: none">• Maintenance of construction machinery in good condition (technical verification).• Verification of exhaust emissions by the use of portable opacimeters	
Noise and vibration	
<ul style="list-style-type: none">• Avoid the installation of fixed equipment such as generators, compressors or similar noise sources, in proximity to sensitive areas. In case it is necessary to use it in acoustically sensitive areas, privilege equipment with soundproofing cabinets or implement acoustic shielding designed for this purpose.• Speed limitation of construction vehicles on access roads without bearing folder (define according to case between 20 and 40 km / h).• Maintenance of construction machinery in good condition (technical verification).• The activities of high generation of noise will be programmed with the community to avoid impacts in sensitive schedules.• Implement the strictest value for noise guide levels between local legislation, and IFC Guidelines – 55 dBA during the day, and 45 dBA at night for equivalent continuous noise levels in residential, institutional and educational settings. Daytime schedules will be established for those tasks that involve the generation of relevant noise.• Implement training sessions for construction personnel in order to promote awareness of noise and vibration pollution, and good practices to reduce air pollution as a result of the work.• On windy days or in places highly exposed to wind action, the effectiveness of the mitigation measures applied should be verified in order to prevent the generation of dust and/or dispersion of aggregates (e.g., in the urbanized environment of the camp and construction fronts).• The preservation of vegetation throughout the construction area contributes to reducing the dispersion of particulate matter.	

- Although in principle it is not foreseen necessary to develop activities during the night, if this situation changes, authorization must be requested from the Enforcement Authority.
- Implement acoustic shielding in fixed equipment or machinery (e.g., water table depression pumps) in case their need is evaluated by characterizing the level of noise generation.
- The location of the work equipment with the highest noise emission will be chosen as far as possible considering avoiding sensitive receivers. When they are near sensitive receivers, construction sites will be scheduled and provided with the necessary resources to make the exposure time as short as possible.
- Avoid the installation of fixed equipment such as generators, compressors or similar noise sources, in proximity to house facades. In case it is necessary to use it in acoustically sensitive areas, privilege equipment with soundproofing cabinets or implement acoustic shielding designed for this purpose.
- Install specially equipped and acoustically insulated enclosures for the performance of particularly noisy tasks.
- Avoid obstruction in the circulation of vehicular flow in the area of the work to reduce the noise generated by situations of traffic congestion, through the correct signaling of alternate roads, the deployment of personnel to direct traffic, and the programming of entry and exit sequentially of heavy vehicles affected to the work.

Monitoring and compliance

Indicators

- The local residents concerned are informed, as far as possible, of the planned work and the vibration and noise levels, as well as the periods during which it will occur.
- All staff is professionally trained on good practices to reduce air pollution as a result of the work.
- The recorded values, corresponding to the emission of noise, vibrations, particles and polluting gases do not exceed in any of the parameters, the threshold allowed by current legislation.
- There is no record of impacts (nor claims or complaints) of the local community, nor of the personnel of the work, of the inhabitants of the houses closest to the trace due to a possible decrease in air quality.
- The installation of fixed equipment such as generators, compressors or similar noise sources has been avoided, in proximity to house facades. If it has been necessary to use it in sensitive acoustic areas, the use of equipment with soundproofing cabinets has been privileged or acoustic shielding designed for this purpose has been implemented.

Periodicity of Supervision of the degree of Compliance and Effectiveness of the Measure Monthly

Head of Audit Construction Inspection

Program 4: Waste Management Program

Program 4: Waste Management Program	
Socio-environmental effects to be prevented or corrected:	Pollution due to improper handling of waste generated on site.
Management measures	
<p>The generation of waste during the construction stage is similar to household waste (low hazard) and special waste (dangerous). The first category may include packaging waste, plastics, pipe cuttings, wood, cardboard, food scraps, wires, bags of lime and cement, cables, brick, etc. The second category may include items such as rags, wood, gloves, or other solid items contaminated with oils, hydrocarbons, traces of solvents, paints; used oils; containers or packages with remains of the mentioned substances.</p> <ul style="list-style-type: none"> • The personnel must be duly trained to differentiate these two groups of waste and maintain their separation between them throughout the entire development of the works, as well as for their correct handling and management. • All waste shall be stored separately, according to their nature (reusable or recyclable, household waste, special waste), under suitable conditions to preserve their characteristics and avoid dispersion. • The burning or burial of any type of waste generated during the construction period, whether household or special, solid, or liquid, nor the dumping of any type of waste into watercourses or soil will be permitted. • Under no circumstances will unattended waste be left on the construction sites, which can be accessed by animals or people. • A register of the waste generated in each work site must be carried out, recording the type, volumes, and characterization of waste. • whenever possible, the washing of tools and machinery on the construction site will be avoided. When it cannot be avoided, a site will be provided for temporary storage of effluents, which must be removed from the Project Area at the end of each work. <p>Low hazard waste</p> <ul style="list-style-type: none"> • If the recycling of some similar-to-household waste is technically and economically feasible, it shall be carried out. • If recyclable materials are useful for residents, they will be delivered to whom request it (after consultation and agreement with the residents). • The waste that was not reused in the Project Area must be safely stored and removed immediately upon completion of each work. <p>Special waste</p> <ul style="list-style-type: none"> • Special waste must be stored in suitable containers according to the substance and managed as hazardous waste. • In case of accidental spills, the supervising body must be notified, and the necessary measures must be taken to contain and eliminate the hydrocarbon or chemical product. The spill must be immediately absorbed with appropriate materials (absorbent cloths, clay, etc.). The soil or vegetation contaminated will be treated as special waste. • If any type of pathological waste is generated, due to any personal accident and first aid care, it must be separated and stored properly, and treated in accordance with current legislation. • Special waste must be removed daily from construction sites. They can be temporarily stored outside the Project Area in suitable facilities. Its final disposition must be carried out in accordance with current legislation. 	
Monitoring and Compliance	
<p>Indicators</p> <ul style="list-style-type: none"> • Volume of waste that can be assimilated to domestic waste managed in accordance with defined standards / Total volume of waste that can be assimilated to urban waste generated by the project. • Volumes by type of hazardous waste managed in accordance with defined standards / Total volumes by type of hazardous waste generated by the project. • Volume of dry waste and construction surplus managed in accordance with defined standards / Total volume of dry waste and construction surplus generated by the project. <p>Monitoring</p> <ul style="list-style-type: none"> • Training registration forms for key personnel in the management of different types of waste. 	

- Hazardous waste removal records for final disposal.
- Evidence of the certificate of the accredited company to make the final disposal of hazardous waste.

Responsible for the implementation of the measure	Works Director
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Responsible for the control of the measure	Works Inspector
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Program 5: Effluent Management

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN	
Program 5: Effluent Management	
Socio-environmental effects to be prevented or corrected:	Pollution due to inadequate management of effluents generated by work activities.
Management Measures	
<p>The liquid effluents generated in the camp must be properly managed through the installation of collection and treatment systems, complying with the permissible tipping limits of local regulations, in order to avoid deterioration in the water quality of surface runoff.</p> <p>A drainage system must be designed at the construction site and camp that allows a controlled evacuation of rainwater, thus minimizing the dragging of materials and losses that reach the ground towards the rainwater collectors. The need for flow disposal from actions of water table depression that were required by the works should be considered.</p> <p>The liquid effluents generated from the washing of equipment and machinery (including concrete mixers) must be collected, with the aim of preventing any remaining components from accumulating on any of the existing trenches or ditches, and treated to remove suspended solids (sedimentation), the residues of fats and oils they may contain, as well as by pH correction, prior to discharge into the sewer or rainwater system as appropriate or authorized. Alternatively, the contractor may prohibit subcontractors from washing concrete mixer trucks on the construction site.</p> <p>The drainage of water surpluses, of the movements and stockpiles of the soil, will be conducted respecting as much as possible its natural course and the levels of runoff of the land.</p> <p>Sectors where there is a risk of spills, leaks or leaks of polluting substances must be equipped with an impermeable floor and a perimeter channel connected to an independent channeling system, which will lead the rainwater that flows through them to treatment devices.</p> <p>For the treatment of the sewage effluents that will be generated during the execution of the work, portable toilets or equivalent in sufficient quantity must be installed, both in the camp and in the work fronts, being supervised by the environmental inspection manager in order to avoid an impact on water resources. The effluents accumulated in these toilets must be removed daily and at the same time sanitized, by an authorized operator or by the service provider.</p>	
Monitoring and compliance	
Indicators	
<ul style="list-style-type: none"> ▪ Number of effluent types managed according to defined standards / Total number of effluent types generated by the project. 	
Monitoring	
<ul style="list-style-type: none"> • Record sheet of portable toilet withdrawals and inspections by the contractor to other sources of generation. 	
Periodicity of Supervision of the degree of Compliance and Effectiveness of the Measure	Monthly
Head of Audit	Construction Inspection

Program 6: Chemicals Management

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN	
Program 6: Chemicals Management Program	
Socio-environmental effects to be prevented or corrected:	Pollution due to inadequate management of chemicals used in construction activities
Management Measures	
<p>In the event that the contractor performs the refueling of heavy machinery in the vicinity of the construction site, tank trucks must be used and the following procedure must be taken into account during refueling:</p> <ul style="list-style-type: none"> • Park the vehicle where it does not cause interference, so that it is in a quick exit position • Ensure the presence of extinguishers near the site where the supply is carried out (distance not exceeding 3 m) • Check that there are no sources that could cause fire in the vicinity • Check hose coupling • Use anti-spill trays • In case of spill or fire, follow the procedures of the Contingency Plan • Immediately report any spillage or contamination of the product to the environmental controller. <p>For this there must be a report form and authorization of fuel filling.</p> <p>Polyethylene material should be placed to cover the area where some corrective maintenance is to be carried out on heavy machinery (greasing and checking of oil levels). In this case, the delegated Work Supervision must be notified of the day and place where it took place and the causes that motivated it.</p> <p>The person responsible for the work must report and clean up spills of fuels, oils and toxic substances. If there are accidental spills on the ground, they must be removed immediately and notify the Construction Supervision. In the event that this spill exceeds an approximate volume of 5 liters, the affected soil must be removed and treated as special waste. Small spill volumes can be collected with absorbent synthetic materials, rags, sawdust, or sand. The final cleaning of the site can be done with water and detergent.</p> <p>The minimum daily storage allowed in the camp must be agreed with the competent authority. Tanks containing fuels or lubricants will be stored removed from any building – ideally, more than 6 meters away. The storage of fuels or lubricants shall be carried out in metal containers with spring-loaded lids, or in plastic tanks. They must be properly identified with the substance it contains and carry preventive signs of "flammable" and "no smoking".</p> <p>When concrete is produced on <i>site</i>, the application of chemicals that require management measures is sometimes required.</p> <p>An inventory should be made, prior to the commencement of work, of chemical products by classifying them according to the type and degree of physical and health risks of their use. Any flammable substance must be properly protected, safeguarded and stored under safe and restricted conditions according to its use and degree of danger. All chemicals shall be labelled to provide essential information on their classification, the hazards involved and the safety precautions to be observed for workers.</p> <p>The persons in charge of handling the chemical products must ensure that when they are transferred to other containers, their identification and all industrial safety and occupational health precautions that must be taken are maintained, in accordance with the corresponding Plan.</p> <p>It will be mandatory that the work has the technical safety sheets of the chemical products and within the induction training they are made known to their employees. These sheets should contain detailed essential information about your identification, your supplier, your classification, your hazardousness, precautionary measures and emergency procedures.</p>	

Such records shall constitute a register which shall be accessible to all interested workers and their representatives.

Monitoring and compliance

Indicators

- Percentage of compliance in inspections of chemical management facilities and procedures.

Monitoring

- Training registration sheets for key personnel in chemical management.
- Registration sheets for chemical substances stored on site.
- Report forms and authorization of fuel filling.

Periodicity of Supervision of the degree of Compliance and Effectiveness of the Measure Monthly

Head of Audit Construction Inspection

Program 7: Occupational Health and Safety

Program 7: Occupational Health and Safety	
Socio-environmental effects to be prevented or corrected:	Accidents and incidents that affect occupational and community health and safety
Management measures	
<p>The contractor will verify, with the appropriate periodicity, the compliance with the Requirements and Procedures of the applicable standards according to current legislation, as well as internationally recognized good practices (guidelines of the International Finance Corporation, and Risk Management System of the ISO 45001 standard: 2018), maintaining a professional or team of professional advisers in the field.</p> <ul style="list-style-type: none">• Workers must be trained in the use of equipment and machinery, as well as in driving vehicles, to comply with all the current regulations in the protected areas.• There must be clear identification of all the elements available, in addition to billboards and training notices, as a permanent pedagogical tool.• The contractor is responsible for providing the PPE and for conducting an induction to its workers on the types of existing PPE, the appropriate use, the characteristics and the limitations of the PPE.	
Preventive Occupational Medicine Subprogram	
<p>The main objective of this subprogram is the promotion, prevention, and control of the health of working people, protecting them from occupational risk factors.</p> <ul style="list-style-type: none">• The main activities in the Preventive Occupational Medicine Subprogram are:• Develop epidemiological surveillance activities, together with the industrial hygiene and safety subprogram, which will include at least:<ul style="list-style-type: none">○ accidents at work.○ professional illnesses.○ Risk scenario.• Develop activities for the prevention of occupational diseases, work accidents and health education for project workers, in coordination with the Industrial Hygiene and Safety subprogram.• Investigate and analyze the diseases that have occurred, determine their causes, and establish the necessary preventive and corrective measures.• Organize and implement a timely and efficient first aid service.• Prepare and keep up-to-date statistics on morbidity and mortality of workers and investigate possible relationships with their activities.• Coordinate and facilitate the rehabilitation and relocation of people with temporary and partial permanent disability.	
Industrial Hygiene and Safety Subprogram	
<p>A detailed recognition of the risk factors in each job and the number of workers exposed to each of them must be carried out.</p> <p>The following activities should be considered:</p> <ul style="list-style-type: none">• Conduct 5-minute safety talks each day prior to the start of work. The topics will be programmed based on the risks of the activities carried out according to the progress of the works.• Procedures for carrying out activities safely.• Check and inspect the proper functioning of equipment and machinery, and risk prevention equipment (fire extinguishers).• Application of safety data sheets for dangerous products• Provide the appropriate personal protection elements (PPE) necessary for all workers on the construction site.• Delimit and demarcate work areas and storage areas.• Carry out and publicize the Contingency Plan.• Control the collection, treatment and disposal of residues and waste, applying basic sanitation standards.• Ensure that personnel operating equipment are licensed.• Train staff in Environment, Health, Hygiene and Occupational Safety.• <p>The following are defined as high-risk activities:</p> <ul style="list-style-type: none">• Work at heights and on scaffolding,	

- Hot Work (Welding),
- Machinery maintenance

Community Health and Safety Subprogram

This subprogram addresses the risks and impacts to the health and safety of communities affected by the project.

The Contractor must evaluate the risks and impacts of the project on the health and safety of the affected communities, project workers including those people who, due to their particular circumstances, are vulnerable (children, for instance). Likewise, it must propose mitigation measures in accordance with the mitigation hierarchy.

For that, the following aspects will be considered:

- Design and safety of infrastructure and equipment: consider the safety risks for third parties and for the communities where the works are carried out.
- Traffic and road safety.
- Ecosystem services: the project's impacts on natural habitats can generate risks and adverse impacts on the health and safety of the affected communities.
- Community exposure to disease.
- Management and safety of hazardous materials.
- Emergency preparedness and response (Contingency Plan)
- Mechanism for handling workers' complaints and claims. The contractor must formulate and implement a mechanism for receiving and responding to complaints and claims from direct workers and ensure that subcontractors have a similar one.

Labor Management Procedure Subprogram

The contractor should develop a Labor Management Procedure (LMP). The objective of the LMP is to define actions and responsibilities of the employer, and it applies to employees working directly for the contractor, as well as to personnel hired through third parties (sub-contractors).

The LMP has to establish employment relationships based on the principle of equal opportunities and fair treatment. Child or forced labor will not be allowed. The contractor (or its subcontractors) will not allow employment of children under the minimum age of employment permitted by law, and in no case below the age of 15.

The contractor will establish a specific grievance redress mechanism for workers (and their organizations, when they exist) so that they can express their concerns about the workplace, and for directing complaints about sexual and gender violence. As per the requirement of the ESCP, the project, including contractors and subcontractors will implement incident and accident procedures, including reporting.

Mitigation Measures: Discrimination & Harassment

The contractor shall be responsible for implementing all measures to prevent discrimination and harassment throughout the project. This includes enforcing a Code of Conduct that all workers must sign, establishing a confidential and accessible grievance mechanism, and conducting mandatory training on gender-based violence, non-discrimination, and respectful workplace behavior. The contractor must ensure fair and inclusive recruitment practices, with priority given to local and vulnerable groups, and guarantee equal pay for equal work. Worker accommodations, if provided, must meet safety standards and be regularly monitored. A designated Social Safeguards Officer shall be appointed by the contractor to oversee compliance, manage grievances, and respond to incidents. The contractor is also required to carry out community awareness campaigns and ensure a clear, enforceable incident response protocol is in place to protect both workers and local residents.

Monitoring and Compliance

Indicators

- Frequency rate (number of accidents x 200,000/man-hours worked in the period).
- Severity Index (number of serious accidents x 200,000/ man-hours worked in the period).
- Fatal Accident Incidence Rate (Number of fatal accidents x 200,000/Number of exposed workers).

- Number of personnel using PPE according to the risk of the activity / Total number of personnel.
- Number of workers with Medical and Labour Insurance / Total number of workers in the project

Monitoring

- Work accident registration forms.
- PPE delivery record forms.
- Record sheets for training in the use of PPE.
- Certification forms for the use of specific machinery.
- Safety procedures for critical activities.
- Risk analysis and checklists for critical activities.

Responsible for the implementation of the measure	Works Director
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Responsible for the control of the measure	Works Inspector
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Program 8: Road Safety and Traffic Management Plan

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN	
Program 8: Road Safety and Traffic Management Plan	
Socio-environmental effects to be prevented or corrected:	Road accidents, deterioration of road infrastructure and congestion.
Management Measures	
<p>The Contractor must prepare the Road Safety and Traffic Management Plan. It must be prepared prior to the start of the tasks, and executed throughout the construction phase of the project. The Plan will require the approval of the Construction Supervision, in consultation with the competent Transit and Transport authority.</p> <p>The Program will incorporate the corresponding road safety and signaling plan provided for by current national and local regulations. It will also consider implementing the warnings of the alternative routes with sufficient geographical anticipation, adequately indicating the users of the Passenger Motor Transport lines whose routes must be modified the transitory location of the stops, ensuring that it is maintained throughout the period of work. Likewise, the routes must be drawn and the most convenient schedules established for the circulation of cargo vehicles linked to the work, in order to minimize the effects on traffic and avoid impacts in surrounding areas.</p> <p>The Plan must integrate, both in vehicular and pedestrian traffic, universal accessibility, signage and control devices (in accordance with current regulations), to facilitate and guarantee orderly, safe and predictable movement, guiding and warning all school users during the construction period.</p>	
Monitoring and compliance	
Indicators	
<ul style="list-style-type: none"> • Number of works fronts marked in accordance with the approved Road Safety and Traffic Management Plan/Number of work fronts that require signaling in accordance with the Road Safety and Traffic Management Plan. • Number of road accidents. 	
Monitoring	
<ul style="list-style-type: none"> • Road safety accident records. 	
Periodicity of Supervision of the degree of Compliance and Effectiveness of the Measure	Monthly
Head of Audit	Construction Inspection

Program 9: Pest and Vector Control

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN	
Program 9: Pest and Vector Control Program	
Socio-environmental effects to be prevented or corrected:	Spread of pests and vectors
Management Measures	
<p>To prevent possible effects on the health of the population, it is recommended that the Contractor hire the services of an authorized and competent company, whose responsibility will be:</p> <ul style="list-style-type: none"> - Perform pest disinfection, prior to the removal of green waste and soil movement. - Coordinate with municipal authorities actions aimed at avoiding the deposit of MSW in adjacent properties without building and in the side streets. <p>Anticipating the use of products with side and residual effects, it is suggested to request and control the protocols of the products used for the elimination of pests.</p> <p>The waste generated by the disinfection actions must also be managed, controlling that the company responsible for the activity proceeds to the removal of the containers used, also requiring proof of disposal of these.</p> <p>No food remains should be left or make fire, as hot food or ash can attract species such as rodents and vipers.</p>	
Monitoring and compliance	
Indicators	<ul style="list-style-type: none"> • Number of pest and vector disinfection and control applications carried out / Total number of pest and vector disinfection and control applications provided for in the Program.
Monitoring	<ul style="list-style-type: none"> • Disinfection certificates, according to scheduled disinfection plan (estimated dates of fumigations, products to be used, safety measures to be implemented, Contingency Plan, etc.). ○ Proof of withdrawal and final disposal of baits.
Periodicity of Supervision of the degree of Compliance and Effectiveness of the Measure	Monthly
Head of Audit	Construction Inspection

Program 10: Coordination with Service Providers

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN						
Program 10: Coordination with Service Providers						
Socio-environmental effects to be prevented or corrected:		Impacts on services due to breakages during work activities.				
Management Measures						
<p>The Contractor will establish coordination with the companies providing network services to resolve the interferences that the execution of the Work will produce with the existing infrastructure. For the fulfillment of this, with the agreement of the Work Inspection, it will plan and propose the solution that is considered most appropriate and will agree with the corresponding company, which will be responsible for executing it, minimizing the inconvenience to users. Likewise, the action will be programmed so that the Contractor resolves quickly in the event that a possible situation of unscheduled interference puts the provision of the service in crisis.</p> <p>The Contractor will work from the beginning of the work in the management of the appropriate permits, coordinating with the technical teams of the service providers.</p> <p>An inventory shall be made by the contractor of existing utility networks in accordance with contract specifications and drawings to identify and locate lines that may be affected. Before starting the activities, the Contractor will locate the axes of the different lines of public services that are in the area to be intervened, this in accordance with what is indicated in the design plans of the project and the information obtained from the utility company. At the same time, the plans must be approved by the respective utilities.</p>						
Monitoring and compliance						
Indicators						
<ul style="list-style-type: none"> Number of service outages per network generated by interfering work activities / Number of service outages per network generated by construction activities with coordinated interference with network service providers. 						
Stage of the Project in which it is applied:	Preparation	X	Estimated cost	To be indicated by the contractor in his offer	Expected effectiveness	Loud
	Construction	X				
	Abandonment	X				
Indicators of success				Number of service outages per network generated by interfering work activities / Number of service outages per network generated by construction activities with coordinated interference with network service providers.		
Responsible for the Implementation of the Measure				Project Manager		
Periodicity of Supervision of the degree of Compliance and Effectiveness of the Measure				Monthly		
Head of Audit				Construction Inspection		

Program 11: Socio-environmental training for construction personnel

Program 11: Socio-environmental training for construction personnel	
Socio-environmental effects to be prevented or corrected:	Lack of knowledge about the role of personnel in the preservation, protection and conservation of the environment and occupational safety in the exercise of their functions.
Management measures	
<p>Environmental Training:</p> <p>To carry out the training, informative meetings will be held prior to the start of the work and, after it has begun, exchange and training meetings with contents adjusted to the requirements of the different works with environmental implications, and drills of acting in situations of emergency.</p> <p>The planning and execution of the training will be carried out under the supervision of the professionals responsible for safety, hygiene and the environment of the Contractor. For the implementation of this Program, the development of at least one informative, exchange and training meeting on each of the following topics will be foreseen:</p> <ul style="list-style-type: none"> • Basic induction in environmental protection. • Control of potential environmental contamination of the natural environment: air, soil, groundwater. • Evaluation and control of risks. People safety. • Environmental contingencies: spills, landslides, explosions, etc. • Fire Prevention and Control. • Comprehensive Waste Management. • Protection and management of plant species present in the immediate environment. • Safe handling of chemical substances. • Company Code of Conduct and Gender Issues. <p>Code of Conduct</p> <p>The Contractor shall develop and implement a Code of Conduct for Site Personnel to be included in employment contracts (Contractor and Subcontractors) – in accordance with the guidelines included in the PGL. The Contractor shall take the necessary measures and precautions in order to avoid the generation of gender, social, political, cultural or racial conflicts, and to prevent tumult or disorder on the part of the construction personnel and employees hired by them or by their Subcontractors, as well as for the preservation of order, the protection of the inhabitants and the security of public and private property within the area of influence of the project.</p> <p>This Code prohibits harassment, violence or exploitation, and racism. It must be applied during the working day and outside it, by all the people involved in the project.</p> <p>Sanctions, fines or dismissals will be applied for non-compliance or infringement of the established rules of conduct, depending on their degree of severity.</p> <p>All construction personnel, regardless of their level of hierarchy, must attend talks and training on the Code.</p> <p>The contractor must implement during the development of the work for all the personnel affected by the work, at least two activities on non-discrimination and gender equity, focused on the following topics: 1) Sexual exploitation of children and adolescents including labor and criminal consequences; and 2) Relationship between men and women at the work level.</p> <p>For the aforementioned activities, an Action Plan must be previously submitted for approval by the Construction Management, which includes in detail those responsible for their implementation, form of work and schedule. At the end of the activities, an evaluation report must be submitted.</p> <p>The contractor must implement, within a period of time to be agreed with the Construction Management, a protocol of sexual harassment at work.</p>	

In addition, the camp must have hygienic cabinets and changing rooms for people of both sexes, properly installed and signposted. This requirement must be met both for the facilities of the company's personnel and for the premises destined for the Construction Management.

Monitoring and Compliance

Indicators

- Percentage of personnel trained in accordance with the Training Program.
- Percentage of training sessions given out of the total training sessions required according to the Training Program.

Responsible for the implementation of the measure Works Director

Responsible for the control of the measure Works Inspector

Program 12: Natural Disaster Management and Emergency Response

Program 12: Natural Disaster Management and Emergency Response	
Socio-environmental effects to be prevented or corrected:	Human, economic, and environmental losses associated with an emergency situation and protect areas of social, economic and environmental interest located in the area of influence of the project.
Management measures	
<p>Contingency Prevention and Control Strategies</p> <p>Contractor Responsibilities:</p> <ul style="list-style-type: none"> • Comply with and enforce the general and special regulations, rules, procedures and instructions on health, hygiene, and occupational safety, for which it must: • Prevent and control all risks that may cause accidents at work or professional illnesses. • Identify and correct unsafe conditions in work areas. • Enforce the standards and procedures established in the programs of the environmental management plan. • Develop programs to improve working conditions and procedures aimed at providing greater safety guarantees in the execution of work. • Carry out training and awareness campaigns for workers in relation to the practice of Occupational Health. • Periodically inform each worker about the specific risks of their job, as well as those existing in the work environment in which they work, and indicate the correct way to prevent them. • Ensure that the design, engineering, construction, operation and maintenance of equipment and facilities at the service of the company are based on the norms, procedures and safety standards accepted by the Construction Supervision. • Establish periodic and preventive maintenance programs for machinery, equipment, and locative facilities. • Facilitate the practice of inspections and investigations that, on occupational health conditions, are carried out by the competent authorities. • Provide workers with the necessary and appropriate personal protection elements according to the risk to be protected and in accordance with Industrial Safety recommendations, considering their selection according to use, service, quality, maintenance and replacement. • Define the response plan for emergencies that may occur. • Have the necessary resources and materials to respond to emergencies. <p>Workers Responsibilities:</p> <ul style="list-style-type: none"> • Carry out their tasks observing the greatest care so that their operations do not result in unsafe acts for themselves or their colleagues, equipment, processes, facilities and the environment, complying with the standards established in this regulation and in the management plan programs environmental. • Carefully monitor the behavior of the machinery and equipment under his charge, in order to detect any risk or danger, which will be communicated in a timely manner to his immediate superior so that he proceeds to correct any human, physical or mechanical failure or environmental risks. that arise in the performance of the work. • Refrain from operating machines or equipment that have not been assigned for the performance of their work, nor allow unauthorized personnel to handle the equipment under their responsibility. • Do not introduce alcoholic beverages or other intoxicating, narcotic or hallucinogenic substances into the workplace, nor appear or remain under the influence of said substances in the workplace. • Workers who operate machines and equipment with moving parts will not wear loose clothing, rings, hoops, bracelets, chains, watches, etc., and if they wear long hair, they will tie it up with a cap or hairnet that completely holds it. • Safely use and maintain work items, safety devices and personal protection equipment supplied by the company and maintain order and cleanliness in workplaces and services. • Collaborate and actively participate in the programs for the prevention of occupational accidents and occupational and community illnesses scheduled by the company, or with its authorization. • Report in a timely manner the execution of procedures and operations that violate safety regulations and that threaten the integrity of those who execute them, their co-workers and company assets. 	

- The company's vehicle drivers must abide by and comply with the provisions and internal traffic regulations and those of the protected areas, in the execution of their work.
- Propose activities that promote Occupational Health in the workplace.
- Implement the actions defined in the protocols and strategies for action in emergencies.

Fire prevention and control:

The Contractor must prevent and/or control fires in its workplace and will use its equipment and fire extinguishers if necessary. The following actions will be implemented:

- Fight the fire with the closest fire extinguishers to prevent its spread.
- Request external support to control the event when necessary, and initiate control procedures with available resources (first response).
- Provide the means to maintain permanent communication (radios or telephones).
- Evacuate people from the work front and from the camp until the emergency is controlled.
- Identify and evaluate the emergency establishing the point of occurrence, the cause, the magnitude, the consequences, the actions to follow and the necessary support for control.

Actions in case of floods:

- If there is any chance of flash flooding, staff should immediately move to higher ground.
- Maintain alertness for streams, drainage channels, and other areas that may be flooded suddenly.
- Do not drive through flooded areas.

Once the emergency is controlled, the emergency coordinator will prepare a final report on it.

Monitoring and Compliance

Indicators

- Number of environmental and health accidents managed in accordance with the defined procedure / Total number of environmental and health accidents that occurred in the project.

Responsible for the implementation of the measure Works Director

Responsible for the control of the measure Works Inspector

Program 13: Information and Community Participation

Program 13: Information and Community Participation	
Socio-environmental effects to be prevented or corrected:	Misinformation of the public regarding the progress and tasks of the project.
Management measures	
Responsibilities of the Contractor	
<ul style="list-style-type: none"> • The information regarding the implementation and progress of the project will be kept up to date to provide an immediate response to all types of queries, observations, complaints, and claims, identifying problems and adopting actions for their solution at the request of the Works Inspection. • A complaints book will be made available to the population, as well as a 24-hour contact telephone number, an e-mail address, and a web interface through which the community can send their claims, complaints, and suggestions. All comments must be analyzed and must have a quick response. • The Community Information and Participation Program must be implemented throughout the cycle of the work and with special consideration of reaching all the people benefited by the Program in a clear, transparent, and timely manner. • The Contractor will establish a modality of linkage with the community affected by the development of the Work, to whom it will inform about the schedule and the degree of progress of the works. • Access to information will facilitate equal access, promoting gender equity, to all interested social sectors. 	
Monitoring and Compliance	
Indicators	
<ul style="list-style-type: none"> • Percentage of complaints managed properly during the month according to the defined mechanism over the total number of complaints generated. • Percentage of public consultations carried out over the total number of public consultations required. 	
Responsible for the implementation of the measure	Works Director
Responsible for the control of the measure	Works Inspector

Program 14: Archaeological, Historical, Cultural and Paleontological Heritage Management

Program 14: Archaeological, Historical, Cultural and Paleontological Heritage Management	
Socio-environmental effects to be prevented or corrected:	Destruction of historical, cultural, archaeological, and paleontological heritage.
Management measures	
<p>This Program will be implemented throughout the period that these tasks are carried out.</p> <ul style="list-style-type: none"> • A permanent monitoring will be carried out, in search of archaeological elements, in the entire area of direct intervention of the project. • In case of finding any property of possible archaeological interest, the builder must immediately order the suspension of activities that could affect the area. Surveillance should be left in the area of the archaeological sites in order to avoid looting. • If necessary, a new alternative regarding the location of the works should be considered. • The competent national authority will be notified, and their instructions will be followed to proceed with the findings. • Salvage work should be applied to cultural remains that appear during ditching, earth removal, excavations, etc. The rescue will be done in the shortest possible time, but respecting the context of the archaeological remains as much as possible. This must be done by a recognized archaeologist and under supervision. The archaeologist will inspect to determine when and where work can resume. Upon completion of the works, a final report will be prepared detailing the amount and type of material recovered, which will be delivered to the competent authority. • The competent authority should be consulted about the delivery of archaeological materials. 	
Monitoring and Compliance	
Indicators	<ul style="list-style-type: none"> • Number of archaeological and cultural resources found in the project and managed according to the defined procedures / Number of archaeological and cultural resources found in the project.
Responsible for the implementation of the measure	Works Director
Responsible for the control of the measure	Works Inspector

Program 15: Works closure

Program 15: Works closure	
Socio-environmental effects to be prevented or corrected:	Impacts on the environment once the work is finished.
Management measures	
<ul style="list-style-type: none"> • All the installations used in the execution of the works will be removed. • The study of environmental and social liabilities will be carried out and those detected will be remedied. • All waste and solid materials must be transferred to sites approved by environmental and social supervision. • In the places where the vegetation was removed, it must be revegetated with the use of the same species that were previously found. • Leftover reusable or recyclable materials may be donated. The delivery of materials that constitute environmental liabilities will be prohibited. • Burning of waste during the dismantling process is prohibited. • The dismantled sites must be left in perfect condition and integrated into the environment. 	
Monitoring and Compliance	
Indicators monitoring	<ul style="list-style-type: none"> • Absence of claims by the authorities, the surrounding population, and the community in general. • Photographic record before and after work
Responsible for the implementation of the measure	Works Director
Responsible for the control of the measure	Works Inspector

Program 16: Stakeholder Engagement Plan

Program 16: Stakeholder Engagement Plan	
Socio-environmental effects to be prevented or corrected:	Community opposition, misinformation, and exclusion of vulnerable groups by ensuring transparent communication.
Management measures	
<ul style="list-style-type: none"> • Identify all relevant stakeholders, including vulnerable and marginalized groups, and categorize them by level of influence and interest. • Provide timely, clear, and accessible project information through various channels (e.g., flyers, community meetings, WhatsApp, local radio). • Conduct consultations at key stages of the project (planning, implementation, post-construction), ensuring inclusive participation. • Establish a formal process for receiving, tracking, and resolving complaints promptly and transparently. • Develop a calendar of engagement activities with clear responsibilities, frequency, and communication tools. • Ensure community feedback is documented, analyzed, and used to adjust project design or implementation strategies. • Assign personnel to maintain regular communication with stakeholders and act as the point of contact. • Track engagement activities, grievance trends, and resolution outcomes; report regularly to stakeholders. • Maintain detailed records of meetings, attendance, concerns raised, and actions taken. • Provide training or information sessions to enhance stakeholder understanding of the project and its benefits/risks 	
Monitoring and Compliance	

Indicator

- Number and resolution rate of grievances received through the Grievance Redress Mechanism (GRM).

Monitoring

- Stakeholder Engagement Log or Register.

Responsible for the implementation of the measure Works Director

Responsible for the control of the measure Works Inspector

Operational Environmental and Social Management Plan

This ESMP provides mitigation measures for the negative impacts and risks for **the operation and maintenance phase** of the implementation of the projects.

Table 7 outlines the minimum requirements that the Environmental and Social Management Plan must meet for the Operational Phase.

During the Operational Phase, BWS will be in charge of the operation and maintenance of the infrastructure to be built and of the equipment and machinery and will be responsible for the preparation and implementation of an operational ESMP, in accordance with its environmental policy and system. environmental and social management, and with the guidelines below.

Table 7 - Operational Environmental and Social Management Plan

Plan / Program	Impact to avoid	Minimum Mitigation Measures	Responsible Party	Indicators and Compliance, Records	Supervision
Solid Waste Management Program	Contamination due to inadequate solid waste management in the operation and maintenance of water networks or equipment replacement.	Definition of optimal frequencies for the removal of special waste resulting from the maintenance of equipment with authorized operators.	BWS	Environmental Audit of the Site Special waste removal registers and manifests.	DOE
Hazardous Chemicals Management Program	Contamination due to inadequate management of hazardous chemicals used during disinfection and other processes	Development and implementation of a Hazardous Chemicals Management Plan.	BWS	Environmental Audit of the Site	DOE
Occupational Health and Safety Program	Occupational risks due to the operation and maintenance of PPAs and aqueducts.	Compliance with current national regulations consistent with ESS1 and ESS2 Adopt international best practices (including ISO 45001:2018) for the occupational health and safety risk management system and implement a workers grievance mechanism.	BWS	Frequency Index (number of accidents x 200,000/man-hours worked in the period). Severity Index (number of serious accidents x 200,000/ man-hours worked in the period). Fatal Accident Incidence Rate (Number of fatal accidents x	Competent authority

				200,000/Number of exposed workers).
Grievance Redress Mechanism	Impacts on local community and workers of the work for the non-attention to the claims and complaints.	There must be an efficient tool for receiving, registering, monitoring and resolving claims. Implement the stakeholder engagement plan including communities and vulnerable groups.	BWS	Registration of claims and complaints
Stakeholder Engagement Plan	Lack of information, community opposition, mistrust, and unaddressed concerns from affected residents.	Develop and implement in line with national and international standards to ensure inclusive participation, especially of vulnerable groups. It will provide timely and accessible project information, conduct consultations at all project phases, establish a responsive grievance redress mechanism, and maintain open communication through various	BWS	Record of public consultations (attendance, minutes) Community feedback and grievance logs Number and resolution rate of grievances Communication materials (flyers, radio spots)

		channels such as community meetings, notice boards, and local media.		
Preventive Maintenance Program	Contingencies for failures that may leave water networks out of service	Implement a regular maintenance program of electromechanical equipment in networks Implementation of a monitoring plan for the detection of leaks or failures in aqueducts.	BWS	Maintenance record sheets.
Training Program	Lack of knowledge about the role of personnel in the preservation, protection and conservation of the environment and occupational safety in the exercise of their functions.	Minimum training: - Basic induction in environmental protection and safety. - Labor protection in the task of waste classification. PPE and good practices. - Risk assessment and control. Security of persons, movable and immovable property. - Fire Prevention and Control. - Spill prevention and spill management - Sludge management - Electrical Work -Road safety	BWS	Percentage of operators trained according to Training Program Training Registration Sheets

Contingency Plan	Poor management of environmental/occupational contingencies	<p>Strategic Plan Define the structure and organization for emergency response, the roles and responsibilities of the people in charge of executing the plan, the necessary resources, and the preventive and operational strategies to be applied in each of the possible scenarios, defined from the evaluation of the risks associated with construction.</p> <p>Action Plan Establish the procedures to be followed in case of emergency.</p>	BWS	Number of environmental and safety accidents managed according to the defined procedure / Total number of environmental and health accidents occurring in the project.
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6.3 Budget for Implementation of the ESMP

Table 8 includes the estimated costs, schedules, and responsible entities for the implementations of the ESMPs.

Table 8. Costs, Schedules, and Responsible Entities for the implementations of the ESMPs.

Measure	Description	Estimated cost	Schedule	Responsible
Implementation of Mitigation Measures and Programs of Construction ESMP	Preparation of the ESMP at the construction level and implementation during the construction of the project; socio-environmental monitoring of the works.	1,5% of the total cost of the Project	From the beginning of the works, until their finalization	Contractor
Implementation of Mitigation Measures of Operational ESMP	Incorporation of mitigation measures for the operational stage within the project activities	[incorporated in BWS operational budget]	Throughout the lifecycle of the infrastructure	BWS

The cost for the implementation of the ESMP mitigation measures and programs is indicative and does not constitute a prescriptive element of contractual obligation. The implementation of the ESMP is monitored exclusively in terms of its performance (results), and not based on the inputs used (resources expended by the contractor).

7. Conclusions

This Environmental and Social Assessment includes an Environmental and Social Management Plan which evaluates the environmental and social impacts and risks associated with the San Pedro Water Network Expansion Activity.

The analysis of impacts and risks focused on the interactions between project activities and the components of the physical, biological and socioeconomic environment likely to be affected.

As usual in works of these characteristics, there are potential impacts and risks, mainly in the construction phase, such as negative impacts due to the risk of occupational accidents during the works, air pollution due to emissions from vehicles and machinery affected by the work, noise and vibrations, risk of soil contamination due to accidental spills, risk of soil erosion and sediment runoff, and risk of contamination due to poor management of the solid waste generated.

These negative impacts of the construction phase are limited in time, occur during the work period, and affect only the direct area of influence of the projects. For this impacts and risks, the application of adequate mitigation measures detailed in Chapter 5 of this ESA is foreseen, and good construction practices that guarantee compliance with national regulations, and the WB Environmental and Social Standards.

In the operational phase, the projects will have a positive impact for the beneficiary localities due to improvements in the water supply network and access to potable water.

For these reasons, the negative impacts and risks of the construction phase are considered mitigable and acceptable. The positive impacts, in turn, occur throughout the useful life of the works, providing environmental, health and socioeconomic benefits derived from the improvement in access and quality of potable water.

Therefore, the operation is considered feasible, **without significant negative socio-environmental risks or impacts that cannot be mitigated.**

References

- Beardall, A. (2021). Public Archaeology and Cultural Heritage Management in Belize: Successes and Shortcomings.
- Belize GOB. (2021). Belize Nationally Determined Contribution.
- Casado Internet Group, Belize. (n.d.). General Information and Maps for. Retrieved from <https://ambergriscaye.com/pages/town/facts.html>.
- Centre for Indigenous Peoples' Autonomy and Development. (2017). Country technical note on indigenous peoples' issues.
- Department of Environment. (2019). Chapter 5 - Biodiversity. In D. o. Environment.
- Department of the Environment. (2015). Environmental Impact Assessment North Ambergris Caye Water System & Sewage Collection & Treatment.
- Department of the Environment. (n.d.). Water Resources in Belize – Wealth Untold Chapter 4.
- Encyclopedia Britannica, Inc. (2022). <https://www.britannica.com/>. Retrieved from Encyclopedia Britannica.
- Esselman, P. C. (1994). The Monkey River Baseline Study.
- Flowers, B., Aldana, G., & Huang, K.-T. (2020). Analysis of the Habitat Fragmentation of Ecosystems in Belize Using Landscape Metrics. Sustainability.
- Fundación ILAM. (n.d.). ILAM PATrimonio. Retrieved from <https://ilamdir.org/>.
- Geomedia. (2014). Assessment of Groundwater Resources in the Southern Coastal Water Province of Belize Referred to as Savannah Groundwater Province.
- Government of Belize. (2010). IV National Report to the United Nations Convention on Biological Diversity.
- Ministry of Forestry, Fisheries and Sustainable Development Government of Belize. (2015). National Protected Areas System Plan.
- Minority Rights Group International. (2022). Minority Rights. Retrieved from <https://minorityrights.org/country/belize/>.
- Morales-Perez, R., Laurel-Castillo, J., Aguilar, A., Arroyo, V., & Escalante, M. (n.d.). FLOW REVERSAL OBSERVATIONS AT RIO HONDO (MEXICO-BELIZE) INDUCED. 6th SCACR – International Short Course/Conference on Applied Coastal Research.
- Murphy, C. A., Chapman, L. J., Thampy, R., & Solomon, C. T. (2022). Seagrass stable isotope composition provides seascape-scale tracking of anthropogenic nitrogen inputs in a tropical marine lagoon. *Marine Pollution Bulletin*, 177, 113523. <https://doi.org/10.1016/j.marpolbul.2022.113523>
- National Emergency Management Organization. (n.d.). Retrieved from <http://site.nemo.org.bz/>.
- Programme for Belize. (2016). <https://www.pfbelize.org/biodiversity-flora/>. Retrieved from Programme for Belize.
- Statistical Institute of Belize. (2010). Belize Population and Housing Census Report.

U.S. Embassy in Belize. (n.d.). <https://bz.usembassy.gov/>. Retrieved from U.S. Embassy in Belize.

UN Global Compact. (n.d.). Water Action Hub. Retrieved from <https://wateractionhub.org>.

UNDP & Ministry of Natural Resources (2017). *Final Report Volume A: Groundwater Assessment of Belize*. Retrieved from: <https://info.undp.org/docs/pdc/Documents/BLZ/Final%20Report%20Volume%20A%20GM%20Belize%20Final%20Report.pdf>

The San Pedro Sun (2019). *Belize's solution to reliable access to clean water using the sea*. Retrieved from: <https://www.sanpedrosun.com/business-and-economy/2019/08/10/belizes-solution-to-reliable-access-to-clean-water-using-the-sea>

UNESCO. (2022). Belize Barrier Reef Reserve System. Retrieved from <https://whc.unesco.org/en/list/764/>.

UNICEF. (2017). San Pedro Town Municipal Profile. Retrieved from <https://s25924.pcdn.co/wp-content/uploads/2017/12/Municipal-Profile-Report-San-Pedro-Town-final.pdf>.

World Bank Group. (2021). Climate Change Knowledge Portal. Retrieved from <https://climateknowledgeportal.worldbank.org/country/belize/climate-data-historical>.

Wright, A. (2021). Water supply and sanitation in Belize: Gaps and public perception. Retrieved from <https://ambergris caye.com/waterreport>