DOCUMENT OF THE INTER-AMERICAN DEVELOPMENT BANK

BARBADOS

BARBADOS CLIMATE RESILIENT SOUTH COAST WATER RECLAMATION PROJECT

(BA-L1063)

PROJECT PROFILE

This document was prepared by the project team consisting of: Project Team Leader; Gilroy Lewis, Team Leader (INE/WSA); Keisuke Sasaki, Alternate Team Leader (INE/WSA); Jennifer Doherty, Alternate Team Leader (CSD/CCS); Kambiri Cox, Alternate Team Leader (INE/WSA); Liliana Lopez, Kleber Machado, Rodrigo Riquelme, Melissa Barandiaran and Leticia Ortega (INE/WSA); Carlos Rodrigues (WSA/CSU); Gloria Visconti (CSD/CCS); Janette Archer-Headley, CCB/CBA; Monica Centeno Lappas (LEG/SGO); Johanna Pelaez and Naveen Jainauth-Umrao (VPC/FMP), Laura Romero and Sarah Mangones (VPS/ESG), Ana Rios Galvez (CSD/RND), Carlos Echeverria (INE/ENE).

Under the Access to Information Policy, this document is subject to public disclosure.

PROJECT PROFILE

BARBADOS

I. BASIC DATA

Project Name:	Barbados Climate Resilient South Coast Water Reclamation Project		
Project Number:	BA-L1063		
Project Team:	Gilroy Lewis, Team Leader (INE/WSA); Keisuke Sasaki, Alternate Team Leader (INE/WSA); Jennifer Doherty Bigara, Alternate Team Leader (CSD/CCS); Kambiri Cox, Alternate Team Leader (INE/WSA); Liliana Lopez, Kleber Machado, Rodrigo Riquelme, Melissa Barandiaran and Leticia Ortega (INE/WSA); Carlos Rodrigues (WSA/CSU); Gloria Visconti (CSD/CCS); Janette Archer-Headley (CCB/CBA); Monica Centeno Lappas (LEG/SGO); Johanna Pelaez Restrepo and Naveen Jainauth-Umrao (VPC/FMP), Laura Romero Villamizar and Sarah Mangones (VPS/ESG), Ana Rios Galvez (CSD/RND); and Carlos Echeverria (INE/ENE).		
Borrower:	Government of Barbados		
Executing Agency:	Barbados Water Authority (BWA)		
Financial Plan:	IDB (Ordinary Capital):	US$	40,000,000
	Local:	US$	70,000,000
	Total:	US$	110,000,000
Safeguards:	Policies triggered:	ESPS1, ESPS2, ESPS3, ESPS4, ESPS5, ESPS6, ESPS8, ESPS9, ESPS10	
	Classification:	B	

II. GENERAL JUSTIFICATION AND OBJECTIVES

2.1 **Country Profile**. Barbados is an independent island nation in the Southern Caribbean. The country occupies 430 km^2 with a length of 34 km from north to south and 23 km from east to west. Barbados is among the top 10 of the world's most water-scarce countries[1], where competing demands for freshwater resources are increasing. The Barbados economy is primarily based around tourism and offshore banking. Services account for 75% of the Gross Domestic Product (GDP) with agriculture accounting for less than 2% of GDP, underlining its food insecurity challenges as Barbados relies on imports of near the full range of food products to meet the needs of its population.

2.2 According to the sixth assessment report (AR6) of the Intergovernmental Panel on Climate Change (IPCC), projections for Caribbean SIDS regarding drought risk based on the Shared Socioeconomic Pathway 2 (SSP2) scenario indicate that a 1°C increase in temperature could result in a 60% increase in the number of people projected to

[1] Barbados Country Profile. UN Office for the Coordination of Humanitarian Affairs, OCHA 2022.

experience severe water resources stress from 2043 to 2071 (Mycoo et al., 2022)[2]. In this context, Barbados is highly vulnerable to the impacts of climate change, including hurricanes and tropical storms, whose intensity is projected to increase, as well as droughts and heat waves. Daily temperatures are expected to increase under future climate change scenarios. This warming trend has been identified in data collected between 1960 to 2000 in Barbados and underlines that both daytime and night-time temperatures have increased (Farrell et al. 2007). Increasing temperature is expected to intensify evapotranspiration rates thereby reducing soil moisture, infiltration, and aquifer recharge. Furthermore, reduced rainfall and sea level rise[3] have reduced the availability, quality, and reliability of fresh water as these affect the country's groundwater resources. As a consequence, the country faces water shortages and rationing as well as competition over water among tourism, agriculture, and other sectors.

2.3 Climate change will not only influence the quantity of water entering aquifer systems but may also reduce the quality of groundwater. In coastal environments for example, changing recharge patterns including reduced long-term recharge and/or temporally variable recharge, coupled with rising sea-level will increase the likelihood of seawater intruding into coastal aquifers thereby degrading the water quality of freshwater reserves in the aquifers. Barbados is a water scarce country with an estimated 285 m³ of fresh water available per capita per year[4]. Groundwater abstractions for water production are between 75% - 100% of the renewable aquifer yield[5]. This limits the resilience of Barbados' primary water resource to buffer against periods of low recharge and puts the country in a precarious position regarding water security.

2.4 To confront the challenges of climate change, the Government of Barbados (GoB) launched the Roofs to Reefs Programme (R2RP) as a holistic, integrated national initiative for the resilient development of Barbados. R2RP is an integrated public investment program founded on principles of sustainable development and climate change resilience and represents the development model for Barbados for the next decade. The focus is on creating a bankable portfolio of projects that will seek to improve the social and environmental circumstances of Barbadians. It is the action umbrella for resilient infrastructure and social benefits for higher quality-of-life standards, while leading to improvements in terrestrial and marine ecosystems. It is expected that, through the program, the country will become more resilient to the impacts of climate change on rainfall variability and periods of intense drought through measures which include increasing water storage capacity and water use efficiency, decreasing land-based sources of pollution through sustainable land use practices, making critical water and sanitation infrastructure climate resilient, and capturing stormwater and reusing treated effluent to reduce pollution and contribute to the sustainable use of water resources. In an effort to mitigate the effects of climate change and protect the fragile coastal reef ecosystems, the GoB intends to implement the South Coast Water

---

2 Mycoo, M., M.Wairiu, D. Campbell, V. Duvat, Y. Golbuu, S. Maharaj, J. Nalau, P. Nunn, J. Pinnegar, and O.Warrick, 2022: Small Islands. In: Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 2043–2121, doi:10.1017/9781009325844.017.

3 Over 80% of the drinking water resources are linked to shallow coastal aquifers, highly responsive to droughts, and sea level rise.

4 AQUASTAT Main Database. Food and Agriculture Organization of the United Nations, FAO (2020).

5 Cashman, A. Water Sanitation and Solid Waste Sector Note for Barbados, IDB (2022).

Reclamation Project (SCWRP) aimed at increasing the country's resilience by augmenting existing water resources, diversifying water supply sources, enhancing water supply resiliency and reliability, reducing the impact of treated effluent on marine life, and contributing to food security by utilizing reclaimed water for agricultural irrigation. This operation thus falls neatly within the framework of the R2RP.

2.5 **Water and Sanitation Sector in Barbados.** The Barbados Water Authority (BWA) is the governmental institution responsible for supplying the island with potable water, wastewater treatment, and disposal services. BWA also acts as a regulator with respect to water resources management as there is no separate entity with that legal function. The utility supplies approximately 116,000 customers, of whom 95% are residential (Burdescu, et al. 2020). According to statistics from BWA, 99.9% of the population have access to improved water supply and 99% have access to improved sanitation[6]. In respect of improved sanitation however, only 3% is collected in the centralized sewerage system and most of the population utilizes septic tanks and suck wells, with approximately 1% using pit latrines[7]. Commercial developments (including hotels) that are not located on sewage collection networks but discharge wastewater in excess of 10,000 gallons per day are required to install private wastewater treatment plants[8]. Information from BWA (2022), indicates that there are 2,500 km of water transmission and distribution pipelines ranging in diameter from 25 mm to 500 mm. Information on the pipe network is not complete: data is missing on materials, diameter, capacity and age of installation as well as other parameters such as installation depth. BWA is in the process of implementing a targeted mains replacement program commencing with an initial 125 km of aged water mains with the most frequent breakages across the island.

2.6 BWA currently operates two municipal sewage treatment plants on the island. The Bridgetown Sewage Treatment Plant commissioned in 1982 services the Bridgetown catchment area. It receives approximately 7,000 m^3/day average dry weather flow (ADWF) and provides secondary treatment of wastewater by use of activated sludge process. Approximately 2,000 properties are currently connected to the system. The South Coast Sewage Treatment Plant commissioned in 2003 has a capacity of 9,000 m^3/day – average dry weather flow (ADWF). The plant services part of the southern section of the island and treats the wastewater to a primary stage before disposal via a temporary marine outfall constructed at Worthing Beach opposite the Graeme Hall Swamp. Approximately 2,900 properties are currently connected to the system, including residents, hotels, and other commercial enterprises in the area as well as two industrial enterprises. The total population served is approximately 48,825 and ultimately is expected to grow to about 52,000 inclusive of transient workers and tourists.

2.7 **Institutional Aspects.** Ultimate responsibility for policy and decision-making lies with the Prime Minister and the Cabinet. Responsibility for the water sector falls under the Prime Minister's Office, as of January 2024. BWA is the state-owned utility responsible for providing public water supply and wastewater services in Barbados. As Executing Agency, BWA will be responsible for the procurement, management of funds and monitoring of the investments of this operation. BWA has experience

---

6 Joint Monitoring Programme for Water Supply, Sanitation and Hygiene, WHO/UNICEF (2021).

7 Cashman, A. Water Sanitation and Solid Waste Sector Note for Barbados, IDB (2022).

8 Guidelines for the Submission of Building Development Applications to the Environmental Protection Department, Environmental Protection Department, (EPD 2021).

executing a large portfolio of projects with loans from multilateral development banks, including the US$50 million IDB loan operation for water and sanitation upgrade (BA-L1015 / 2255/OC-BA) closed in 2016. The Utilities Regulation Act mandates that the Fair Trading Commission (FTC)[9] be the regulator of BWA's water and sewerage services. However, the FTC has not yet conducted a review of BWA's rate since assigned the regulatory function. At present, the FTC only regulates the BWA with respect to General Conditions of Service. Environmental and water quality regulation of the sector is carried out by the Environmental Protection Department (EPD), under the Ministry of Environment and National Beautification and the Environmental Health Department (EHD) under the Ministry of Health and Wellness. Climate Change falls under the Ministry of Environment and National Beautification as well as in part under the Prime Minister's Office with respect to climate resilience.

2.8 **Determinants of the Main Problems.** Water resources in Barbados lack resilience to climate change: Barbados relies predominantly on its groundwater resources, aquifers are at risk of over-abstraction with current production near maximum sustainable yields, variability in rainfall is affecting timing and quantity of recharge, and aquifers are vulnerable to contamination from land sources and seawater intrusion. Estimated annual water production in Barbados for 2020 was as follows: potable groundwater production was 64.4 Mm^3; non-potable groundwater production (for agriculture, estimated by BWA) was 10.5 Mm^3; total groundwater production was 74.9 Mm^3. Desalinated water production from brackish water was 11.5 Mm^3. Therefore, the grand total annual water production was estimated at 86.4 Mm^3. Estimates of annual groundwater yield vary between 65.7 Mm^3 and 89.8 Mm^3, suggesting that the current average level of groundwater production (74.9 Mm^3) is between 75% - 100% of the renewable aquifer yield[10]. Based on these abstraction estimates, during below average rainfall years abstraction levels for water production would be more than 100% of sustainable aquifer yields leading to water shortages. Barbados will need to incorporate more diverse potable water sources that can lead to a more resilient and continuous water supply.

2.9 The Bridgetown and South Coast Sewage Treatment Plants provide secondary and primary treatment, respectively, and treat wastewater for safe discharge into the environment. However, with the increase in water demand and expected impacts of climate change on water resources, opportunities arise for improving the level of wastewater treatment to be compliant with regulations that make it safe enough for reuse for irrigation, recharge of aquifers and creating the potential for future reuse of reclaimed water to augment potable water supplies.

2.10 The Bridgetown and South Coast Sewage Treatment Plants are underutilized compared to their design capacity and both systems have suffered from failures due to lack of maintenance. Upgrades to existing wastewater infrastructure will allow for improved efficiency in treatment and mitigation against equipment failures. These are indicators of the lack of resilience of the systems. Furthermore, in the medium term it will be necessary to increase connections to the sewer network to effectively utilize the capacity of the plants and reduce the discharge of untreated wastewater to the environment. Untreated wastewater discharge poses risks and challenges not only from the public health standpoint, but also for the preservation of marine ecosystems, water quality of aquifers and of nearshore waters, and the coral reefs. Consequently, there is a pressing

---

9 Utilities Regulation Act, Chapter 282, Laws of Barbados (2002).

10 Cashman, A. Water Sanitation and Solid Waste Sector Note for Barbados, IDB (2022).

need for upgraded facilities that can efficiently treat these higher volumes of wastewater and therefore reduce contamination of groundwater and the marine environment, as well as adopt reuse/reclamation technologies and practices that will contribute to the augmentation of existing water resources.

2.11 While the project is not directly addressing non-revenue water reduction, water resilience in Barbados is also challenged by high levels of Non-Revenue Water (NRW), which was estimated in 2019 at 38% in Barbados vs 17% in the Cayman Islands and 24% in Belize[11]. The estimated volume of physical losses is 16.8 Mm^3 per year and commercial loses 2.24 Mm^3 per year. In 2018, Liemberger and Wyatt reported that Barbados had an NRW of 55% or 79,673 m^3/day and that NRW represented lost revenue of US$9.9 Mn per year[12]. BWA is currently executing two projects and a third under preparation with multilateral development banks with themes that address NRW reduction. BWA has also struggled financially. In the past BWA was highly subsidized by the GoB. However, with the introduction of the Garbage and Sewerage Contribution (GSC) Levy and the tariff adjustments in 2009 and 2019, the financial situation of BWA has improved.

2.12 **Gender Considerations**. The Global Gender Gap Index in Barbados is 0.769 (where parity = 1 and no-parity = 0), a value that places the country in 31st place out of 146 countries. It is observed that in political empowerment (which measures autonomy in decision-making) the participation of women is less than 26% (WEF, 2023)[13]. When conducting a detailed study of female and male participation in different areas within BWA, several gaps can be noted: at the operational and technical levels, women's participation is less than 8% and less than 25%, respectively, while at the administrative level, it exceeds 85%. At the management level, women surpass 55%, hence achieving parity in leadership positions within the institution. For the 2010 Census, the total population with disabilities (PwD) was 11,546 (4.2% of the total population for the same year), of which 43% are men and 57% are women[14]. According to data from the ILO (2022)[15], PwD in Barbados earn 77% of the monthly income of people without disabilities. Although there are laws that establish non-discrimination against PwD, no specific laws were found that mandate accessibility in buildings and transportation, which creates significant barriers for PwD. There is also no regulation on this topic within BWA. In 2007 Barbados ratified the Convention on the Rights of PwD. In its national public policies, Barbados has not yet explicitly included inclusive education, nor specific protection for girls, women, older adults, indigenous people, or people of African descent with disabilities (World Bank, 2021, p. 203). Globally, the exclusion of PwD can represent a loss between 3 to 7% of a country's GDP[16]. For these reasons, it is considered pertinent to conduct an institutional diagnosis of gender and persons with disabilities to prepare a Gender and PwD Action Plan that promotes the participation of these groups within BWA.

---

11 Cashman, A. Water Sanitation and Solid Waste Sector Note for Barbados, IDB (2022).

12 Liemberger, R. and Wyatt A., Quantifying the Global Non-Revenue Problem (2018).

13 Global Gender Gap Report 2023, WEF (2023).

14 2010 Population and Housing Census: https://stats.gov.bb/wp-content/uploads/2020/03/2010-PHC-Report-Vol-1.pdf

15 New ILO database highlights labour market challenges of persons with disabilities. Website ILO, 2022.

16 Comunicado de prensa: La inclusión de las personas con discapacidad, clave para el desarrollo sostenible de América Latina y el Caribe, World Bank (2021).

2.13 **Climate Change and Environmental considerations**. Climate change is expected to increase temperatures, sea level rise (with impacts on erosion, inundation, and saline intrusion), and influence changes in weather patterns (variability in amount and seasonality of rainfall, and changes in storm intensity), which are expected to pose significant challenges. Projections indicate that mean annual temperature will rise by 1.3°C (0.9°C to 1.97°C) and annual precipitation will decrease by 47.8 mm (-290.1 mm to 153.1 mm) by 2040 to 2059[17]. Barbados is also subject to sea level rise, increasing storm intensity, earthquakes, landslides, and tsunamis (UNDP 2020a; World Bank 2020b).[18]

2.14 Critical factors considered in the project development include: (i) Barbados current estimated water demand equals or exceeds maximum annual renewable freshwater resources; (ii) the limited water storage on the island is a product of topography, geology and land use which, combined with a high population density and limited land space, results in the need for careful use of existing water resources; (iii) the Ministry of Agriculture is facing challenges in meeting the current demand for irrigation water and there is likely significant suppressed demand due to intermittent restriction of the supply of water for irrigation purposes, which poses key limitations to building a sovereign food security strategy; (iv) the demand for water in the agricultural sector is expected to increase because of the need for increased food production through irrigation to enhance food security, supported by government initiatives to promote farming; and (v) the GoB set in its Updated Nationally Determined Contribution (NDC, 2021) an aspirational goal to achieve a fossil fuel-free economy and to reduce greenhouse gas (GHG) emissions across all sectors as close to zero as possible by 2030, which requires that all sectors consider their carbon footprint.

2.15 **Objectives.** The general objective of the operation is to increase Barbados' water resilience to climate change with a focus on increasing water security and improving environmental conditions. The specific objectives are to: (i) Improve water supply resiliency by increasing the availability of potable water through the reuse of reclaimed wastewater for agricultural irrigation; (ii) Reduce water insecurity through reuse of reclaimed water to recharge aquifers; and (iii) Strengthen key sector institutions on water resource management, operational efficiency monitoring and gender mainstreaming.

2.16 **Component 1. Water Reclamation Infrastructure – US$64.5 Million** (IDB OC:US$28.5M; Counterpart: US$36M). This component will finance the construction of the **New South Coast Water Reclamation and Re-use Facility (SCWRRF)** with an average dry weather flow (ADWF) of 9,000 m^3/day[19] under a Design Build EPC/Turnkey modality and O&M costs for a number of years. It will include all process units and ancillary facilities to provide secondary and tertiary treatment for the liquid stream, followed by an Advanced Water Treatment (AWT) side stream including safe and sustainable treatment and management of the sludge (solid stream) with the aim to reduce GHG emissions and considerations for circular economy. Due consideration will be given to the use of energy efficient equipment, renewable energy sources and Smart Water Infrastructure Technologies. The facility will be constructed on land already owned by the GoB.

---

17 Barbados Resilience Profile, USAID (2021).

18 Barbados Resilience Profile, USAID (2021).

19 The proposed design flows are: average dry weather flow (ADWF) is 9,000 m^3/day, average wet weather flow (AWWF) 24,000 m^3/day and peak wet weather flow (PWWF) 28,000 m^3/day.

2.17 Additionally, this component will finance the **Upgrade of the existing South Coast Sewage Treatment Plant (SCSTP)** by refurbishing or replacing equipment in the existing influent lift pump station and headworks including interconnecting piping to the SCWRRF and the design and installation of the odor control system. Due consideration will be given to the use of energy efficient equipment and Smart Water Infrastructure Technologies. This component will also finance **Construction Supervision** services of the infrastructural works.

2.18 **Component 2: Reclaimed Water Reuse – US$18.5 Million** (Counterpart: US$18.5M). This component will finance:

Sub-component 1 - **Agriculture Reuse of Reclaimed Water Pipeline** consisting of the installation of a 25 km pipeline for transporting reclaimed water for irrigation of approximately 160 hectares at River Plantation along the old trainline ("Trailway") and ancillary equipment, and a high-water mark catchment area to allow for the irrigation pipeline.

Sub-component 2 – **Aquifer Recharge Infrastructure** consisting of the installation of 4 km water pipeline, 5 injection wells, 6 exploratory boreholes, 3 monitoring wells, 3 abstraction boreholes and pumping stations, and ancillary equipment for aquifer recharge, with due considerations of resiliency and adaptation to climate change measures as well as low carbon emissions.

2.19 **Component 3: Climate Change and Biodiversity Opportunities – US$16 Million** (IDB OC: US$2M; Counterpart: US$14M). This component will finance:

Sub-component 1 – Graeme Hall Swamp Conservation. The Graeme Hall Swamp, located in close proximity of the SCSTP and proposed SCWRRF, is a Ramsar site, a nationally designated Natural Heritage Conservation Area (NHCA), and a critical component of a wider ecosystem complex that includes seagrasses and coral reefs offshore. This component will build the resilience of the island's natural heritage system and its interlinkages to the SCWRRF and SCSTP through a holistic and science-based management approach, by minimizing locally generated stressors on the downstream ecosystems increasing their resilience to external stressors such as climate change and by improving the health and resilience of the natural heritage. This will allow the improved resilience of the island, including enhanced buffering of pollutants and sediments in surface water flows from this watershed. The sub-component will finance: (i) the development of baseline assessments; and (ii) the development of a results-based management plan for Graeme Hall Swamp. These will facilitate the implementation of priority interventions defined in the management plan.

Sub-component 2 – Solar Energy Generation with Battery Storage consisting of 7MW solar photovoltaic plant and associated energy storage capacity, increasing the sustainability of the Barbados' power grid and also fostering the resilience of BWA's pumping stations, and mitigating the additional carbon footprint of the upgraded wastewater treatment facilities. The new solar plant will be co-located with existing 3MW solar systems located at BWA's central pumping stations serving the main population areas. The design of the 7MW system will complement an existing design for the 3MW solar PV plant. The allocated storage capacity will be determined to maximize the revenues from the existing Feed in Tariff pilot project.

2.20 **Component 4: Institutional Strengthening – US$1.5 Million** (Counterpart: US$1.5M). This component will finance institutional strengthening activities of the Executing Agency BWA as the public utility responsible for supplying potable water, and sewage services (wastewater and treatment), and protecting the country's water resources through governance, efficiency, and sustainable management. In addition, this component will finance institutional strengthening support to stakeholder institutions of the GoB, which form part of the overall governance structure of the program. These include: (i) the Fair Trading Commission (FTC), responsible for consumer protection, fair competition, and utility regulation regulatory strengthening; (ii) Barbados Agricultural Development and Marketing Corporation (BADMC) – Irrigation Engineering Unit, responsible for the provision of agricultural irrigation infrastructure and services, including the support to farmers access to agricultural reuse infrastructure and capacity development towards adopting water efficient practices; (iii) Environmental Protection Department (EPD), responsible for environmental monitoring and control, and ensuring compliance with environmental standards and regulations; (iv) Government Analytical Services (GAS) laboratory, responsible for providing microbiological and chemical analyses of water (potable, wastewater and marine), soil, food, and environmental samples, including analyses that support monitoring of effluent quality; and (v) Ministry of Agriculture, Food and Nutritional Security (MAFS), responsible for promoting climate smart agricultural practices and the provision of farmer support services to facilitate agri-business industries.

2.21 Potential institutional strengthening activities include: (i) Improving the governance and project management capacity of BWA through the implementation of an action plan based on AquaRating and training in operations and maintenance of the SCWRRF; (ii) Implementing an Institutional Gender and PwD Action Plan to promote the equal participation of women and PwD within BWA, and data collection on PwD within BWA; (iii) Supporting the execution of FTC's regulatory functions in the water and sewerage sector; (iv) Implementing robust monitoring, reporting and verification (MRV) systems to track water quality, water quantity, soil quality and climate-related parameters; (v) Regulating the abstraction and use of groundwater; (vi) Designing and implementing public awareness and stakeholder engagement campaigns to promote the benefits of wastewater reuse and build community support, with gender and diversity considerations, as well as related studies[20]. This includes implementation of robust public health and safety measures, including appropriate signage, education programs, and guidelines for the safe use of reclaimed water.

2.22 **Project Administration and Other Costs – US$3.15 Million** (IDB OC: US$3.15M). This component will finance Project Management including, support for project execution (PEU) dedicated staff, audits, monitoring and evaluation, communication, and supervision and implementation of an Environmental and Social Management Plan (ESMP).

2.23 **Contingency Resources – US$6.35 Million** (IDB OC: US$6.35M). This component will finance unanticipated costs arising from risks factors during design and construction of

[20] Potential activities include the implementation of robust public health and safety measures, including appropriate signage, education programs, and guidelines for the safe use of reclaimed water and consultancies such as Cost of Service Study and Tariff Review Proposal, Water Efficiency, Baseline Studies for NRW Reduction among other possible studies to be determined during project preparation.

the new SCWRRF, upgrades to the SCSTP, construction of the pipelines and aquifer recharge infrastructure.

2.24 **Benefits and Expected Beneficiaries**: The main benefit of the project is its contribution to improving resilience (adaptation to climate change) through reclaiming and repurposing treated sewage flows for agricultural irrigation and aquifer recharge, diversifying water sources for agriculture and human consumption. This, in turn, will increase water availability, improve water security and food security, safeguard public health and protect the environment. Specifically, the operation focuses on the treatment of sewage flows to international standards[21] (Component 1) such that the high-quality reclaimed water can be used for unrestricted agricultural irrigation and aquifer recharge instead of being discharged into the environment. It is expected that the reuse water distribute to farmers will reduce the dependency on potable water, provided by BWA, making this water available for other uses.

2.25 The project will directly benefit some 196 small farmers distributed on around 1,000 acres of arable land who will have access to water for irrigation during the dry season and who will be able to farm all year round, allowing them to diversify to less drought resistant crops, increasing their yearly income and improving their quality of life. The increase in agriculture output will also contribute to improving food security in the island, reduce food imports and generate employment[22]. Specifically, with the agriculture reuse of reclaimed water pipeline (Component 2.1), it is expected that the project will benefit some 100 small farmers leasing government land mainly in the River Plantation farming district[23] on 347 acres of arable land, with a sustainable water yield for irrigation[24]. With the aquifer recharge (Component 2.2), it is expected that 96 farmers in 2 districts at Silver Hill and Gibbon's Boggs (630 acres) will benefit from improved groundwater abstraction from the Christ Church aquifer,[25] as the project can supplement

---

21 Designed to meet the water quality standards stipulated for its various water streams including discharges into Class 1 ocean waters; future product water for agriculture re-use and future non-potable aquifer recharge; and RO brine for discharge into Class 1 ocean waters.

22 According to a study prepared by the Agricultural Planning Unit of the Barbados' Ministry of Agriculture and Food Security (MAFS) in 2021, the increased acreage of land expected to be brought back into production in the River Plantation alone will not only provide the opportunity to enhance farmers' incomes, but the benefits to be derived would also be expected to redound to increased employment. In addition to the prospect of having a total of approximately 123 farmers allocated to plots at River Plantation, this level of activity can potentially lead to the creation of 477 jobs for individuals. This is projected to result in the generation of an estimated $8.7 million in wages annually.

23 Other accessible BADMC farming districts which would potentially benefit from reclaimed water are located in the irrigation networks of Haggatt Hall (60 farmers – 100 acres), Salters (72 farmers – 110 acres), Marchfield (36 farmers – 50 acres), and Sandford (88 – 140 acres).

24 Assumes 1 farmer per farm. Target beneficiaries of 342 small farmers constitutes 260 farmers in irrigation districts along pipeline (1.100 acres) in addition to 82 farmers at River Plantation (600 acres).

25 The reclaimed water injected into the aquifer will augment the water stored in the aquifer for future use and at the same time, depending on location, counter saline intrusion. A study planned for Q1 2024 by the MAFS will determine the exact location of the acreage that will benefit from the reclaimed water for irrigation across the 10,050 acres of land that the reclaimed water pipeline will reach, with priority given to River Plantation Haggart Hall, Salters, Marshfield, and Sanford irrigation districts, as well as other small farmers leasing land from the government and several commercial plantations along the distribution pipeline for reuse water for irrigation.

groundwater resources by up to 1 million m^3 per year, resulting in the improved resilience and reliability of the water supply for the irrigation of crops.

2.26 The project will also indirectly benefit all the population of Barbados (some 282,000 inhabitants) by: 1) Improving the resilience of the potable water services infrastructure and 2) reducing the impact of raw sewerage discharge through the upgrading and rehabilitation of the SCSTP improving the quality of the water discharged through the marine outfall will reduce impacts on the marine ecosystems and the pressure on the Grame Hall Site as a Natural Heritage Conservation Area (Component 3.1). The recharge will occur during the 4 months of rainy season per year, when there is less demand for water for irrigation. The other 8 months per year the water will be used for irrigation purposes. Replacement of the potable water customarily used for agricultural irrigation in the Silver Hill and Gibbon's Boggs area with the reclaimed water from the new SCWRRF, will allow for the unused potable water to be available for redistribution to potable water customers within the surrounding districts, if needed.[26] Further, by increasing undergrown water stocks (via aquifer recharge), BWA will be in a better position to weather any prolonged droughts by having additional water sources, in the eventuality that Barbados would have to face a drought of such magnitude that the excess desalinization capacity would not be enough to meet potable water demand. Further, by installing a 7MW capacity solar energy plant and battery storage capacity (Component 3.2), BWA will increase the resilience of its services, as well as improve its energy efficiency which, in turn, improve operational efficiency by reducing O&M costs. Usually, droughts and electricity interruption disrupt potable water services, disproportionally impacting low-income households and vulnerable populations.

2.27 Finally, the project will also benefit (Component 4) the Fair Trading Commission (FTC), Government Analytical Services (GAS) laboratory, Ministry of Agriculture, Food and Nutritional Security (MAFS), Environmental Protection Department (EPD), Barbados Agricultural Development and Marketing Corporation (BADMC) Irrigation Engineering Unit and the Barbados Water Authority (BWA) to improve governance, efficiency, monitoring capabilities, and sustainable management of water resources; and in the case of BWA, also improve operational capacity for the new infrastructure and improve equality and diversity (gender and PwD).

2.28 **Strategic Alignment**. This operation is aligned to the IDBG Country Strategy with Barbados 2019-2023 (GN-2953-1)[27], under the Strategic Objective – 3.4 Promote private sector engagement that encourages greater productivity, as well as in resilient infrastructure investments. Likewise, the program is consistent with the IDB Group Institutional Strategy: Transforming for Scale and Impact (CA-631) and is aligned with the development challenges of: (i) Reducing poverty and inequality by improving access to irrigation water for farmers through reuse of reclaimed water year round, allowing them to increase irrigated areas, productivity, income, as well as contributing to improve food security in the island; and (ii) Addressing climate change by improving resiliency of Barbados' water resources through the reuse of reclaimed water to recharge aquifers and to supplement potable water supplies for agricultural irrigation. Furthermore, the program also aligns with the operational focus areas of: (i) biodiversity, natural capital, and climate action; (ii) gender equality and inclusion of diverse population groups;

[26] However, except for registered farmers connected to the BWA water supply network, it is difficult to quantify the additional distributed back yard gardening demand.

[27] The IDBG Country Strategy with Barbados 2019-2023 is still valid.

(iii) institutional capacity, rule of law, and citizen security; and (iv) sustainable, resilient, and inclusive infrastructure

2.29 In addition, the operation is aligned with the Sustainable Infrastructure Strategy for Competitiveness and Inclusive Development (GN-2710-5), particularly with the priority area of “Supporting the construction and maintenance of social and environmentally sustainable infrastructure to contribute to increasing the quality of life”, and consistent with the Water and Sanitation Sector Framework’s Dimensions of Success (GN-2781-8) for universal access and improved service and social and environmental sustainability. The project is included in the Barbados Country Programming Document 2024.

2.30 Furthermore, the operation is aligned with ONE Caribbean (Partnering for Caribbean Development Framework) [GN-3201-5], particularly on the key priority area of “Climate adaptation, disaster risk management and resilience” as well as the crosscutting area of “Institutional Strengthening”. Specifically, the objective of the project to increase Barbados’ water resilience to climate change with a focus on increasing water security and improving environmental conditions will support the realization of ONE Caribbean's thrust towards increasing the number of beneficiaries and the value of public investments of enhanced resilient infrastructure.

2.31 **Bank Policies.** The proposed operation will take into consideration the Public Utilities Policy (OP-708) criteria: (I) financial sustainability; and (II) economic evaluation; and its objectives: (i) Promote access: the program will contribute to increase access to service by the population including vulnerable groups; (ii) Deliver a reliable quality of service: increased levels of service, including water quantity, quality and reliability; (iii) Deliver a service efficiently: through the reclaimed water reuse component BWA will improve the delivery of water to farmers for agricultural irrigation that will contribute to improving food security and to increase its efficiency in managing and conserving water supply; improved governance, accountability and transparency; (iv) Create suitable incentives and programs to manage service demand: regulate user demands and conservation of water resources; and (v) Promote sustainability of public utilities through: financial, environmental and social sustainability.

2.32 **Innovation**. In comparison to other sewage treatment plants the new proposed SCWRRF will be equipped with an innovative Advanced Side Stream Treatment process consisting of: Ultrafiltration and Reverse Osmosis (RO). This will produce a high-quality effluent that complies with international standards for water quality in reclaimed water reuse. The facility, pipelines and wells will also be equipped with Smart Water Infrastructure Technologies (SWIT) such as smart meters, valves, and loggers. The project introduces managed aquifer recharge, an innovative method for sustainable groundwater management that remains relatively new to the Caribbean region and is uniquely deployed in this project by coupling with the use of treated wastewater for recharging systems. The monitoring wells will be equipped with smart technology for improved monitoring of groundwater levels. This innovation will allow BWA to safely manage groundwater resources and bolster reserves against increased rainfall variability and droughts as expected impacts of climate change. With the success of this project, the technology can be effectively replicated in other Caribbean countries.

2.33 **Gender Equality and Diversity**. The project will include actions to promote gender equality and the inclusion of PwD in BWA based on the completion of an institutional

gender and diversity diagnosis, which will provide the inputs for the development of a gender and diversity Action Plan to address gender gaps in technical and managerial roles and promote diversity and the inclusion of PwD in BWA. The diagnosis will verify whether the company's headquarters have considered universal accessibility in all its spaces, especially in the main entrances and in the design of the bathrooms[28].

III. TECHNICAL ISSUES AND SECTOR KNOWLEDGE

3.1 **Strategy and Project Design.** The operation is designed as a Specific Investment Loan for a proposed amount of US$40 Million from the Ordinary Capital (OC) resources of the Bank to be implemented with a disbursement period of 5 years. The project will receive local counterpart resources of US$70 Million from the GoB. The IDB provides value added to this program through technical assistance, knowledge sharing, capacity building, as well as expertise in various areas to help the GOB prepare and implement the program. The IDB also facilitates collaboration and networking among the different actors involved in the program, fostering partnerships and promoting innovation. The GoB will deploy further resources estimated at US$32.5 Million towards: (i) condition assessments of the sanitation network (US$3 Million); (ii) development of a Water and Sanitation masterplan, reservoirs and pipeline replacement (US$22 Million); and (iii) the design and construction of a new force main leading to the existing marine outfall at Needham's Point and repairs/upgrades to the collection system (US$7.5 Million).

3.2 **Execution Aspects and Complementary Activities Required.** The Borrower will be the GoB and the proposed Executing Agency will be the Barbados Water Authority (BWA) for all components. BWA will form a Project Execution Unit (PEU) consisting of the following staff: Project Coordinator; Project Assistant; Engineer; Financial Specialist; Procurement Specialist; Environmental Specialist; Social Specialist; and Communication Specialist. The PEU will be funded by the loan's administrative resources. BWA will also be responsible for the operation and maintenance of the infrastructure to be constructed under this project. The Borrower will establish a Project Steering Committee to provide a governance and strategic framework and to address any bottlenecks encountered during the Program implementation. An Institutional Capacity Assessment Platform (ICAP) will be conducted to evaluate BWA's governance, administrative and operating structure, and procedures. The results will inform capacity building needs of BWA. The Program's Operations Manual (POM) will define responsibilities of the PEU and the overall implementation arrangements for the program. The details of program execution and fiduciary arrangements will be defined in the POD.

3.3 **IDB's Assistance:** The IDB previously supported the GoB and BWA by way of a loan for the South Coast Sewage Treatment Plant in 1998. This plant only provided primary treatment and the effluent was discharged via a marine outfall. New treatment process units will be added to this plant so that it can provide secondary and tertiary/advance treatment. The high-quality effluent will be utilized for agricultural irrigation and aquifer recharge. In December of 2009, the Bank approved BA-L1015 / 2255/OC-BA Water and

[28] Accessibility is a precondition for People with Disabilities (PwD) to be able to live independently and fully participate in society on equal terms. Without access to the physical environment, PwD would not be in equal conditions and opportunities to participate in their respective societies (Convention on the Rights of Persons with Disabilities. UN, 2006).

Sanitation Systems Upgrade Project with the goal of improving water resources management and sustainable water and wastewater service provision by the BWA. Specifically, the project sought to support the GoB' efforts to modernize the institutional setting of the water and sanitation sector and improve the efficiency of the operations of the BWA. The operation consisted of the following three components: (i) Reorganization and modernization of the BWA, (ii) Rehabilitation of the potable water supply infrastructure, and (iii) Development of a wastewater treatment action plan and upgrades.

3.4 IDB brings considerable experience in tertiary wastewater treatment plants. The Bank has financed several tertiary treatment plants in Trinidad and Tobago: the 40 MLD Malabar WWTP and 45 MLF San Fernando WWTP under the Multi-Phase Wastewater Rehabilitation Program Phase I, 2890/OC-TT and the 4.3 MLD Trincity WWTP and Waste Stabilization Pond Systems in South West Tobago under the WASA Modernization and Wastewater Infrastructure Rehabilitation Program, 260/OC-TT. Lessons learned from these operations will inform the preparation of the project. The Bank will also leverage its expertise in water resources management through the use of the HydroBID suite to improve water resources management and improve resilience to climate change. The institutional component will seek to strengthen sector actors, particularly the BWA in areas of governance, water efficiency and water resources management.

3.5 **Lessons Learned and Past Knowledge.** Lessons learned and knowledge from past operations highlighted challenges in project execution, specifically regarding capacity at the Executing Agency. Success of this operation therefore builds on the following recommendations based on lessons learned: (i) the need to complete assessment of the institutional capacity of the BWA as well as other GOB entities will be undertaken through the Institutional Capacity Assessment Platform (ICAP) to inform the technical assistance and institutional strengthening required for program preparation and execution; (ii) previous projects have demonstrated the need for single source responsibility: overall responsibility for execution will rest with the BWA; (iii) coordination, oversight and monitoring of results by government entities have proven effective and therefore it is recommended to establish a steering committee chaired by the Prime Minister's Office (PMO) will provide strategic guidance, oversight, coordination, monitoring and support in resolving challenges; (iv) full involvement of the PMO and BWA during program preparation and definition of the Results Matrix; (v) fulfilling ESG requirements and procurement planning should be efficient and streamlined; and (vi) the Results Matrix outputs should be as specific as possible.

IV. ENVIRONMENTAL SAFEGUARDS AND FIDUCIARY SCREENING

4.1 **Environmental and Social Classification.** According to the Bank's Environmental and Social Policy Framework, the operation is classified as Category B. This is due to its potentially adverse environmental and social impacts and risks particularly during construction activities. An Environmental and Social Assessment and Environmental and Social Management Plan (ESA/ESMP) will be prepared for the operation. It is expected that most impacts will occur under construction of Components 1 and 2 for the rehabilitation and construction of the wastewater treatment plant and construction of the pipelines and updating and retrofitting the water treatment plant with energy efficient equipment and adaption of carbon capture technologies in sewage treatment. Activities under Components 1 and 2 are not likely to result in involuntary resettlement but may

result in economic displacement. In compliance with ESPS 5 these potential impacts will be assessed, and, in case of physical displacement, a Resettlement Plan will be required. If only economic displacement is identified, the appropriate mitigation plan will be prepared to mitigate/compensate the impact, be it a livelihood restoration plan or another plan within the ESMP. Key project documents will be consulted and disclosed in compliance with ESPS 10 prior to the Analysis Mission and the Operations Policy Committee. A stakeholder engagement plan will be determined as part of the studies, as well as the design of a Grievance Redress Mechanism.

4.2 The project Environmental and Social Risk Rating (ESRR) is substantial due to the cause, contextual and performance risk factors. The Disaster and Climate Change Risk Classification (DCCRC) assigned to the project is moderate due to the high exposure to hazards from hurricane force-winds, storm surge, flooding, as well as drought in Barbados, as well as the critical nature of the wastewater treatment infrastructure, which provides a key public service that, in case of failure during a natural hazard, would lead to significant environmental and social impacts.

4.3 **Advance Procurement.** The Borrower requested the Bank to proceed with the initial steps of procurement before signing the loan. As such, the Borrower has agreed that the procurement procedures, including advertising, will be in accordance with the Bank's Core Procurement Principles for the eventual contracts to be eligible for Bank financing, and the Bank will review the process used by the Borrower. Borrower undertakes such advance contracting at its own risk, and any concurrence by the Bank with the procedures, documentation, or proposal for award does not commit the Bank to make and/or approve a loan for the project in question (See Section 1.11, of GN-2349-15).

4.4 **Fiduciary Screening.** Procurement Financed through the project will be carried out in accordance with the Procurement Policies GN-2349-15 and GN-2350-15. The financial management of the program will follow provisions of Guide OP-273-12. Fiduciary arrangements and requirements for the operation will be prepared during the POD stage.

V. OTHER ISSUES

5.1 **Risks.** The entire operation is expected to cost US$110 Million. IDB's investment loan is US$40 Million and the operation is expected to receive counterpart resources from the GoB. The risk with public finance, categorized as Medium-high, is if there are delays in the GoB being able to secure the counterpart resources. This risk will be mitigated by the GoB seeking funding from donor agencies. The second main risk arises in considering the success of the project depends on achieving a minimum level of effluent to generate expected volumes of reclaimed water. However, breakdowns in the collection system and treatment plant processes can impact these minimum flows. This risk is categorized as 'medium-high' and will be mitigated by including in project design modular systems that can allow for intermittent changes in flow, and smart monitoring systems to quickly identify and repair potentially failing systems. Further risks identified in Appendix II were also categorized as Medium-high, including: (i) delays in program implementation owing to extensive administrative processes and approval times for procurement management at the various levels; (ii) delays in procurement owing to adoption of corresponding regulations and procedures under the new legal framework and new procurement platform for mandatory use by public institutions; (iii) limitations in BWA's financial and operational capacity due to the utility's limited

revenue-generation capacity; (iv) potential damage to infrastructure and equipment during construction and operation due to natural disasters; (v) delays in program execution owing to BWA's limited experience under the Engineering, Procurement and Construction (EPC) modality (i.e., design/build/operate); and (vii) potentially adverse environmental and social impacts during construction and operation due to the scope of the program's infrastructure works.

VI. RESOURCES AND TIMETABLE

6.1 An estimated budget of US$300,000 from the Bank's administrative budget will be needed to prepare this operation. In terms of timeline, the POD due date is scheduled for April 5th, 2024; and the Loan Proposal for consideration by the IDB Board of Executive Directors by June 20th, 2024. In addition, a Non-Reimbursable Client Support TC "Support for the Preparation and Execution of the Barbados Climate Resilient South Coast Water Reclamation Project" (BA-T1107) is being prepared to support the Government of Barbados. The TC resources of US$150,000 will be used to support the preparation of supplementary environmental and social impact assessments; support the provision of advisory services to BWA in the evaluation of bids; support the development and implementation of a communication plan; support the executing agency with data collection efforts via the provision of automatic data gathering equipment; and provide initial support for the PEU.

This document contains confidential information relating to one or more of the ten exceptions of the Access to Information Policy and, therefore, shall not be disclosed to external Bank audiences. It is available only to Bank employees.

Operation Information

Operation Name	
Barbados Climate Resilient South Coast Water Reclamation Project	
Operation Number	BA-L1063

Operation Details

Organizational Unit	IDB Sector/Subsector
INE/WSA	SANITATION URBAN
Type of Operation & Modality	Original IDB Amount
LON / ESP	$40,000,000.00
Executing Agency	Borrower
BA-BWA	BARBADOS
ESG Primary Team Member	Team Leader
Laura Romero Villamizar	Gilroy Francis Lewis
Toolkit Completion Date	Author
04/04/2024	Laura Romero Villamizar
Applicable ESPSs with requirements	
ESPS 1; ESPS 2; ESPS 3; ESPS 4; ESPS 5; ESPS 6; ESPS 9; ESPS 10	

Operation E&S Classification Summary

Environmental and Social Impact Categorization (ESIC)	B

Disaster and Climate Change Risk Classification (DCCRC)	Moderate

Environmental and Social Risk Rating (ESRR)	Substantial
Overwritten ESRR Justification	Elevate: Additional risk likely
Overwritten ESRR Comments	
Due to risk factors cause, contribution, context and performance the overall rating is substantial.	

Summary of Impacts / Risks and Potential Solutions

The operation will not have direct impacts associated with child labor or forced labor in the workforce.

The operation will not have significant indirect and/or cumulative impacts associated with child labor or forced labor in the workforce.

The Executing Agency or other relevant entity (in relation to the operation) has limited proven track record to respect and protect the fundamental principles and rights of workers (including fair treatment, commitment to non-discrimination, equal opportunity, protection of workers including workers in vulnerable situations, work accommodations, migrant workers' rights, collective bargaining and rights of association) and compliance with national employment and labor laws.

The operation will not result in the direct loss of employment (i.e. retrenchment).

The operation will not result in the indirect and/or cumulative loss of employment (i.e. retrenchment).

The Borrower will prepare and operate a Grievance Redress Mechanism for all workers (direct and contracted).

The operation will not cause indirect and/or cumulative impacts associated with accidents, injury, and disease arising from, associated with, or occurring in the course of work.

The operation will promote a sustainable use of resources including energy, water and raw materials.

The operation will not have direct adverse impacts on human health and the environment due to pollution from project activities.

The operation will not have indirect and/or cumulative adverse impacts on human health and the environment due to pollution from project activities.

The operation will not generate direct impacts generated by solid waste (hazardous and/or non-hazardous).

The operation will not generate indirect and/or cumulative impacts generated by solid waste (hazardous and/or non-hazardous).

The operation will not have direct negative impacts to the environment and human health and safety due to the production, procurement, use, and disposal of hazardous materials such as PCBs, Radiological Waste, Mercury, CFCs, etc.

The operation will not have indirect and/or cumulative negative impacts to the environment and human health and safety due to the production, procurement, use, and disposal of hazardous materials such as PCBs, Radiological Waste, Mercury, CFCs, etc.

The operation will not have direct negative impacts to the environment and human health and safety due to the production, procurement, use, and disposal of pesticides.

The operation will not have indirect and/or cumulative negative impacts to the environment and human health and safety due to the production, procurement, use, and disposal of pesticides.

The operation is not expected to or currently produce indirectly-cumulatively GHG emissions.

The operation is considering alternatives to implement technically and financially feasible and cost-effective options to avoid or minimize project-related GHG emissions during the design and operation of the project.

The operation has no exposure to climate transition risks related with a loss of value of a project driven by the transition to a lower-carbon economy, result from extensive policy, legal, technology, and/or market changes to address climate change.

There are no indirect and/or cumulative health and safety risks associated with the design of structural elements or components of the operation (e.g. existing or new buildings, earthworks, bridges, drainage, roadways, power stations, transmission and distribution poles, underground utilities, and dams), and/or road transport activities (e.g. transport of heavy or over-sized equipment) which could result in health and safety impacts to third parties and project-affected people.

The project will not directly affect the public (including workers and their families) by exposing them to hazardous materials released by the project, particularly those that may be life threatening.

The project will not indirectly-cumulatively affect the public (including workers and their families) by exposing them to hazardous materials released by the project, particularly those that may be life threatening.

The project's direct impacts on priority ecosystem services will not result in adverse health and safety risks and impacts to the project-affected people.

The project's indirect and/or cumulative impacts on priority ecosystem services will not result in adverse health and safety risks and impacts to the project-affected people.

There is no potential direct impacts to workers and project-affected people related to the use or arrangement of security services to safeguard personnel and/or property.

There is no potential indirect and/or cumulative impacts to workers and project-affected people related to the use or arrangement of security services to safeguard personnel and/or property.

The project will not lead to indirect and/or cumulative impacts related to physical, and/or economic displacement - Impacts include, and are not limited to, relocation; expropriation; loss of shelter; loss of land; loss of assets; restrictions on land and natural resources; loss of income; loss of livelihoods; loss of social safety net.

Vulnerable people will not be disproportionately affected by indirect and/or cumulative impacts related to land acquisition - people may be considered vulnerable by virtue of disability, state of health, indigenous status, gender identity, sexual orientation, religion, race, color, ethnicity, age, language, political or other opinion, national or social origin, property, birth, economic disadvantage, or social condition. Other vulnerable people include the elderly, children, single-headed households, refugees, internally displaced persons, natural resource dependent communities.

The operation doesn't have the potential, including through the supply chain, to indirectly-cumulatively impact modified habitat that include significant biodiversity value.

The operation doesn't have the potential, including through the supply chain, to indirectly-cumulatively convert or degrade natural habitat.

The operation doesn't have the indirect and/or cumulative potential, including through the supply chain, to implement project activities in critical natural habitat.

The operation is not expected, including through the supply chain, to indirectly-cumulatively impact a legally protected area or an internationally recognized area.

The project will not directly introduce (intentionally or accidentally) alien, or non-native, species of flora and fauna that have the potential for invasive behavior in areas where they are not normally found.

The project will not indirectly-cumulatively, including through the supply chain, introduce (intentionally or accidentally) alien, or non-native, species of flora and fauna that have the potential for invasive behavior in areas where they are not normally found.

The project is not likely to adversely directly impact ecosystem services.

The project is not likely to adversely indirectly-cumulatively, including through the supply chain, impact ecosystem services.

The project is not expected to cause adverse direct impact on Indigenous Peoples. FPIC is required when there will be (i) impacts on lands and natural resources subject to traditional ownership or under customary use; (ii) Relocation of Indigenous Peoples from lands and natural resources subject to traditional ownership or under customary use; or (iii) significant impact on Cultural Heritage.

The project is not expected to cause adverse indirect/cumulative impact on Indigenous Peoples.

Indigenous Peoples are not expected to be adversely impacted by direct project related land-acquisition or access restrictions. Note that all impacts on lands and natural resources subject to traditional ownership or under customary law requires FPIC.

Indigenous Peoples are not expected to be adversely impacted by indirect/cumulative project related land-acquisition or access restrictions. Note that all impacts on lands and natural resources subject to traditional ownership or under customary law requires FPIC.

The project doesn't have the potential to cause adverse direct impacts on Indigenous Peoples who live in isolation and initial contact.

The project doesn’t have the potential to cause adverse indirect and/or cumulative impacts on Indigenous Peoples who live in isolation and initial contact.

The project is not expected to directly damage or negatively impact cultural heritage.

The project is not expected to indirectly-cumulatively damage or negatively impact cultural heritage.

The project is not expected to directly damage or negatively impact critical cultural heritage.

The project is not expected to indirectly-cumulatively damage or negatively impact critical cultural heritage.

The project will not negatively directly affect people due to their gender, sexual orientation or gender identity.

The project will not negatively indirectly-cumulatively affect people due to their gender, sexual orientation or gender identity.

The project is not expected to lead to indirect and/or cumulative risks and impacts associated with Sexual and Gender-based Violence.

The project will not potentially face direct barriers to equitable gender-based participation.

The project will not potentially face indirect and/or cumulative barriers to equitable gender-based participation.

The project will not deal with a subject matter and/or be implemented in an area where the manipulation, interference, coercion, discrimination, and intimidation of stakeholders has been documented.

ESPS 1 - Assessment and Management of Environmental and Social Risks and Impacts

The Executing Agency will conduct an Environmental and Social Assessment (ESA) or Environmental and Social Impact Assessment (ESIA) process for the project during preparation.

The Executing Agency will prepare and maintain an Environmental and Social Management System (ESMS) for the operation as defined under ESPS 1.

The Borrower/Executing Agency's has moderate organizational capacity and competency for managing environmental and social issues.

There are moderate levels of contextual risks associated with the project (e.g. political instability, oppression of communities, armed forces in the project area).

ESPS 2 - Labor and Working Conditions

The Executing Agency will prepare and maintain an Environmental and Social Management System (ESMS) for the operation with specific elements related to Labor and Working Conditions under ESPS 2.

The operation has the potential to cause minor direct impacts associated with accidents, injury, and disease arising from, associated with, or occurring in the course of work.

ESPS 3 - Resource Efficiency and Pollution Prevention

The operation is expected to or currently produce directly GHG emissions (less than 25,000 tons of CO2 equivalent per year).

ESPS 4 - Community Health, Safety, and Security

There are minor direct health and safety risks associated with the design of structural elements or components of the operation (e.g. existing or new buildings, earthworks, bridges, drainage, roadways, power stations, transmission and distribution poles, underground utilities, and dams), and/or road transport activities (e.g. transport of heavy or over-sized equipment) which could result in health and safety impacts to third parties and project-affected people.

There is minor potential for the project or project-related activities (e.g. the influx of temporary or permanent project labor, among others) to directly result in or exacerbate community exposure to water-related (i.e., waterborne, water-based, and vector-borne diseases) and/or communicable diseases (e.g. COVID).

There is minor potential for the project or project-related activities (e.g. the influx of temporary or permanent project labor, among others) to indirectly-cumulatively result in or exacerbate community exposure to water-related (i.e., waterborne, water-based, and vector-borne diseases) and/or communicable diseases (e.g. COVID).

There is moderate potential for an emergency or unanticipated event to occur in the project area of

influence that demands immediate action to prevent or reduce harm to people, property, and/or the environment.

Natural hazards, such as earthquakes, droughts, landslides, floods, wildfires, or others, including those caused or exacerbated by climate change, are likely to occur in the project area, and these may moderately impact the project, and/or the project may moderately exacerbate the risk from natural hazards to human life, property, and/or the environment.

ESPS 5 - Land Acquisition and Involuntary Resettlement

The project will lead to minor direct impacts related to physical, and/or economic displacement - Impacts include, and are not limited to, relocation; expropriation; loss of shelter; loss of land; loss of assets; restrictions on land and natural resources; loss of income; loss of livelihoods; loss of social safety net.

Vulnerable people may be disproportionately affected by minor direct impacts related to land acquisition - people may be considered vulnerable by virtue of disability, state of health, indigenous status, gender identity, sexual orientation, religion, race, color, ethnicity, age, language, political or other opinion, national or social origin, property, birth, economic disadvantage, or social condition. Other vulnerable people include the elderly, children, single-headed households, refugees, internally displaced persons, natural resource dependent communities.

ESPS 6 - Biodiversity Conservation and Sustainable Management of Living Natural Resources

The operation has the potential to minorly directly impact modified habitat that include significant biodiversity value.

The operation has the potential to minorly directly convert or degrade natural habitat.

The operation has the minor direct potential to implement project activities in critical natural habitat.

The operation has the potential to minorly directly impact a legally protected area or an internationally recognized area.

ESPS 9 - Gender Equality

The project will potentially lead to minor direct risks and impacts associated with Sexual and Gender-based Violence.

ESPS 10 - Stakeholder Engagement and Information Disclosure

The Borrower will prepare a stakeholder engagement framework/plan for the lifetime of the program (including the equal participation of women and men and also take into account Indigenous Peoples, vulnerable groups when relevant).

The Borrower will engage in meaningful consultations and engagement with stakeholders which is free of manipulation, interference, coercion, discrimination, and intimidation.

The Borrower will operate a Grievance Redress Mechanism at the Project level (direct and contracted).

DOCUMENT OF THE INTER-AMERICAN DEVELOPMENT BANK

BARBADOS

CLIMATE RESILIENT SOUTH COAST WATER RECLAMATION PROJECT

BA-L1063

INITIAL ENVIRONMENTAL AND SOCIAL REVIEW SUMMARY
APRIL 3, 2024

This document was prepared by:
Laura Romero (VPS/ESG) and Sarah Mangones (ESG/CDR)

With the support of the Project team:
Gilroy Lewis, Keisuke Sasaki (INE/WSA) and Jennifer Doherty (CSD/CCS)

Initial Environmental and Social Review Summary	
Operation Data	
Operation Number	BA-L1063
IDB Sector/Subsector	Water and Sanitation/Urban Sanitation (INE/WSA)
Type of Operation & Modality	Specific Loan Operation (LON/ESP)
Initial E&S Impact Classification (ESIC)	B
Initial E&S Risk Rating (ESRR)	Substantial
Initial Disaster and Climate Change Risk Classification (DCCRC)	Moderate
Borrower	Government of Barbados
Executing Agency	Barbados Water Authority (BWA)
IDB Loan Amount (and total project cost)	USD $40,000,000 (USD $100,000,000)
Applicable ESPS's with requirements	ESPS1, ESPS2, ESPS3, ESPS4, ESPS5, ESPS6, ESPS8, ESPS9, ESPS10

Executive Summary

According to the Bank's Environmental and Social Policy Framework (ESPF), the operation is classified as category B due to its potential adverse environmental and social impacts associated with the upgrade of an advanced primary treatment wastewater treatment plant, the construction of a new wastewater treatment plant for secondary and tertiary treatment, and the construction of water pipelines for aquifer recharge and agriculture reuse of reclaimed water. Potential adverse impacts are expected to be moderate, localized and temporary. The main potential impacts during construction are soil erosion and contamination, runoff and infiltration of hazardous materials and consequent water pollution (surface and groundwater), nuisances such as noise, dust and emissions, traffic disruption and other disruption of communal activities. During operation, there is potential for ground water pollution and impacts from sludge management. There is a key biodiversity area, which is also a protected area, next to the wastewater treatment plant. Impacts on biodiversity will be assessed during project due diligence. Also impacts related to resettlement and cultural heritage.

The Environmental and Social Risk Rating (ESRR) is substantial due to cause, context and performance risks. Context considerations include the 2018 sewage spill which may still affect the engagement with nearby communities. Cause is related to direct impacts such as pollution of soil, water, and air due to construction waste (domestic and hazardous); nuisance affecting local communities during construction (noise, vibrations, dust, emissions and traffic alterations); and impact on economic activities (agriculture and businesses) along the irrigation pipeline route. Regarding performance, the risks are associated with the executing agency not being familiar with the Bank's ESPF and the number of projects in execution.

The Disaster and Climate Change Risk Classification (DCCRC) is moderate due to the high exposure to hazards from hurricane force-winds, storm surge and flooding in Barbados, as well as the critical nature of the wastewater treatment infrastructure, which provides a key public service that, in case of failure during a natural hazard, would lead to significant environmental and social impacts. During due diligence, the risk of exacerbation will be assessed.

An Environmental and Social Management System (ESMS) will be prepared, including an update of the Environmental and Social Assessment and Environmental and Social Management Plan (ESIA/ESMP) developed in 2021, according to the Bank´s ESPF and the final project scope. The ESIA/ESMP will include a Stakeholder Engagement Plan (SEP). The ESIA/ESMP will be disclosed in April, prior to analysis mission. Consultations will be carried out on the ESIA/ESMP before distribution to Board in March as well as the specific consultation with potential affected people by resettlement or livelihood disruption (if required).

Operation Description

The project objective is to improve water security and resilience to climate change. It includes the following components:

Component 1. Water Reclamation Infrastructure ($60 Million).

This component will finance the construction of the New South Coast Water Reclamation Plant (SCWRP) with an average dry weather flow (ADWF) of 9,000 m3/day under a Design Build EPC/Turnkey modality and O&M for an initial period of 3 years. It will include all process units and ancillary facilities to provide secondary and tertiary treatment for the liquid stream, followed by an Advanced Water Treatment (AWT) side stream including treatment and management of the sludge (solid stream) with a view to produce energy and reduce GHG emissions. Due consideration will be given to the use of energy efficient equipment, renewable energy sources and Smart Water Infrastructure Technologies. This component will also finance the upgrade of the existing South Coast Sewage Treatment Plant (SCSTP) by refurbishing or replacing equipment in the existing influent lift pump station and headworks including interconnecting piping to the SCWRRP and the design and installation of the odor control system. Due consideration will be given to the use of energy efficient equipment and Smart Water Infrastructure Technologies.

Component 2: Reclaimed Water Reuse ($ 18.5 Million). This component will finance:

Sub-component 1 - Agriculture Reuse of Reclaimed Water Pipeline ($ 11 Million) consisting of the installation of a 25 km pipeline for transporting reclaimed water for irrigation of approximately 160 hectares at River Plantation along the old Trainway and ancillary equipment.

Sub-component 2 - Aquifer Recharge Infrastructure ($ 5 Million) consisting of the installation of 4km water pipeline, 5 injection wells, 6 exploratory boreholes, 3 monitoring wells, 3 abstraction boreholes and pumping stations and ancillary equipment for aquifer recharge, with due considerations of resiliency and adaptation to climate change measures as well as net-zero emissions.

In addition to the infrastructure works, the project includes:

Component 3: Climate Change and Biodiversity Opportunities.

Sub-Component 1: **Graeme hall Swamp Conservation**, which will include i) the development of baseline assessments, ii) a results-based management plan for Graeme Hall Swamp and iii) implementation of priority interventions defined in that management plan.

Sub-Component 2: Solar Energy Generation with Battery Storage, consisting of 7 MW solar photovoltaic plant and associated energy storage capacity, increasing the sustainability of the Barbados' power grid and also fostering the resilience of BWA's pumping stations, and mitigating the additional carbon footprint of the upgraded wastewater treatment facilities. The new solar panels plant will be co-located

with existing 3MW solar energy systems facilities located at BWA's central pumping stations serving the main population areas. The design of the 7MW system will complement an existing design for the 3MW solar PV plant. The allocated storage capacity will be determined to maximize the revenues from the existing Feed in Tariff pilot project.

Component 4: Institutional Strengthening, which includes activities to enhance monitoring systems to track water quality, quantity and climate-related parameters and regulate the abstraction and use of ground water.

Rationale for Classifications/Rating	
E&S Impact Classification	The operation has been classified as category B, due to negative impacts of a localized and temporary nature and moderate significance. The ESIA will confirm classification during due diligence. Key impacts include: pollution of soil, water, and air due to construction waste (domestic and hazardous); nuisance affecting local communities during construction (noise, vibrations, dust, emissions and traffic alterations); and impact on economic activities (agriculture and businesses) along the irrigation pipeline route.
E&S Risk Rating	The Environmental and Social Risk Rating (ESRR) is substantial due to cause, context and performance risks. Context considerations include the 2018 sewage spill which may still affect the engagement with nearby communities. Cause is related to direct impacts such as pollution of soil, water, and air due to construction waste (domestic and hazardous); nuisance affecting local communities during construction (noise, vibrations, dust, emissions and traffic alterations); and impact on economic activities (agriculture and businesses) along the irrigation pipeline route. Regarding performance, the risks are associated with the executing agency not being familiar with the Bank's ESPF and the number of projects in execution.
DCC Risk Classification	The operation has been classified with a Moderate Disaster and Climate Change (DCC) Risk classification. The project area in Barbados experiences high hazard risk due to hurricane and storm surge, and moderate risks due to tsunami, drought due to climate change and water scarcity. The project will likely help manage drought and water scarcity issues. This project also directly relates to critical infrastructure as it will provide wastewater treatment and access to irrigation water.

Use of Borrower E&S Framework	*No*
The Use of a Borrower Framework will not be applied for this project (the ESPF will be used).	
Is a framework approach applied?	*No*
A framework approach will not apply to this project.	
Will the operation be co-financed or is there a possibility of being co-financed?	*No*
There is no co-financing for this project.	

Environmental and Social Performance Standards (ESPSs) that apply to the proposed project	
ESPS-1. Assessment and Management of E&S Risks and Impacts	*Yes*

An Environmental and Social Impact Assessment (ESIA) and an Environmental and Social Management Plan (ESMP) were prepared for the operation in 2021 according to the Green Climate Fund (GCF)'s environmental and social framework. The 2021 ESIA and ESMP considered the upgrade of the South Coast Sewage Treatment Plant (SCSTP), the development of a South Coast Water Reclamation Reuse Plant, a reclaimed water distribution system (which included a pipeline to an aquifer recharge area in Christ Church and a potential route for an irrigation pipeline to River Plantation) and recharge well system. The 2021 ESIA and ESMP did not include the route for the irrigation pipeline to River Plantation, located along the historic railroad, which has been selected by the government as the final route.

The 2021 ESIA includes a description of the project's environmental and social setting, stakeholder mapping, and the assessment of environmental and social risks and impacts of the project. The main E&S risks and impacts identified include:

- Regarding SCSTP refurbishment and development of the SCWRRP: Impacts during the construction phase – Soil erosion, pollution (noise, dust, and possible spillages), occupational health and safety incidents, waste production. Depending on the final project design, construction works could also include impacts on critical habitats (Graeme Hall Swamp and Coral Reefs).
- Impacts during the operation phase – sludge and waste handling and disposal. alteration of agricultural use of the land around the pipeline.

Regarding pipeline construction:

- Impacts during the construction phase – pollution (noise, dust, and possible spillages), occupational health and safety incidents, waste production. Also, potential damages on private property (residences and businesses such as stores, restaurants, accommodations and agriculture). The ESIA/ESMP included a general social baseline of the area around the potential pipeline route but did not include an assessment of physical and/or economic displacement.
- Impacts during the operation phase –Alteration of agricultural use of the land around the pipeline.

The 2021 ESMP includes the following programs:

- Groundwater Monitoring Program
- Upgraded SCSTP Influent and Effluent Monitoring Program
- Marine Water Monitoring Program
- Odors Monitoring Program
- Graeme Hall Wetland's Water Monitoring Program
- Graeme Hall Wetland Ecological Monitoring Program
- Coral Reef Monitoring
- Rehabilitation Plan of the Graeme Hall Swamp
- Occupational Health and Safety
- Disaster Management Plan
- Waste Management Plan
- Public Consultation – Internal and External Communication

A review and update of the 2021 ESIA and ESMP will be conducted in order to ensure alignment with IADB's ESPF requirements and with the final project scope. The gaps identified in the ESIA and ESMP will be addressed to ensure that all project risks and impacts are identified, and the corresponding management measures are established according to IADB's ESPF requirements. The updated ESIA and ESMP of all the works financed by the project, according to the ESPF and national law, will be part of an Environmental and Social Management System (ESMS), which is to be implemented by the executing agencies. The ESMS will include the 7 pillars required by ESPS-1: (i) project-specific environmental and social framework, (ii) identification of risks and impacts, (iii) management programs, (iv) organizational capacity and competence, (v) emergency preparedness and response, (vi) stakeholder engagement, and (vii) monitoring and evaluation).

The main gaps that have been identified so far and will be addressed in the updated ESIA/ESMP include:

- Review of the water quality standards and monitoring system for the treated water.
- Review of current impacts and potential for cumulative impacts regarding bad smells, noise, sludge management and mosquito proliferation causing mosquito-borne infections such as dengue.
- Update of the social baseline for the pipeline routes (pipeline to aquifer recharge area in Christ Church and the irrigation pipeline to River Plantation, which will go along the old trainway) and assessment of potential physical and/or economic displacement in relation to pipeline construction. If impacts are confirmed, a Resettlement/Livelihood Restoration Plan will be developed.
- Assessment of impacts on wetlands (water quality in the wetlands) and identification of preventive and mitigation actions, identification of applicable requirements for protected areas, and biodiversity assessment (including birds and marine life), especially regarding illumination by the wetlands.
- Gender assessment, which identifies potential gender gaps that could be reinforced by the project or disproportionate impacts in relation to gender. Inclusion in the ESMP of actions to enhance gender equality and prevent gender-based violence.
- Review of stakeholder mapping to include all relevant stakeholders in the project area and development of a Stakeholder Participation Plan (SEP) to be implemented by the executing agency, which includes consultations during project design and engagement throughout the life of the project.

An assessment of the executing agency's capacity, including management capacity for environmental and social risks and impacts, will be conducted during project preparation as part of preparation of the ESMS. While the executing agency has already had experience implementing IADB financed projects (construction of the South Coast Sewerage Treatment Plant - 2008 and Institutional Strengthening program for BWA - 2009), this will be the first project under the ESPF and the agency currently has a high workload, which could affect its capacity to manage environmental and social issues.

A consulting firm was hired to support the executing agency in the drafting of the ESMS, the update of the ESIA/ESMP and the consultation process. The same firm will be hired to prepare the Resettlement or Livelihood Restoration Plan, if it is determined it is required, and support the executing agency in conducting the specific consultation.

The fit for disclosure version of the updated ESIA/ESMP will be disclosed before the analysis mission. Consultations will be carried out on the ESIA/ESMP of the project, as well as the specific consultation with the potential affected by resettlement or livelihood disruption (if any). The final versions of the documents that include the Resettlement Action Plan or Livelihood Restoration Plan, if required, and the results of the consultations and their respective reports will be disclosed before distribution to Board.

A Stakeholder Engagement Plan (SEP) will be prepared and disclosed as part of the updated ESIA/ESMP for all works, in accordance with ESPS 1 and 10. These will guide the consultation process before the Board approval, and the engagement with the communities during execution phase. The ESIA/ESMP will include a grievance redress mechanism for the Program.

ESPS-2. Labor and Working Conditions	*Yes*

The ESIA/ESMP will include:

- An assessment of BWA's labor and working conditions for water treatment plant workers. The ESIA will assess BWA's current code of conduct for workers and will review BWA's regulations and practices regarding freedom of association, collective bargaining, prevention of discrimination, and grievance management according to ESPS2 requirements. The ESMP will establish the necessary actions to close the compliance gaps identified with respect to ESPS-2.
- A code of conduct and a grievance redress mechanism for contractor and subcontractors' employees, according to ESPS2 requirements.

The types of work proposed for this Program imply occupational health and safety risks (accidents, health impacts due to noise and vibrations, ergonomic risk, hygienic risk). These risks and impacts will have corresponding management programs listed in the ESMP, aligned with international best practice and the requirements of ESPS-2. The ESIA/ESMP will need to address current gaps regarding the health and safety for open trenches (especially those over 6 feet deep) and working in extreme heat.

Regarding solar panels, the ESMP will include measures the executing agency will take to require evidence from the solar panel supplier of the prevention and mitigation of forced labor and child labor risks in its supply chain, as established in IADB's Action Plan. These measures may involve contractual clauses requiring the supplier to conduct labor audits, provide a labor certification issued by a competent agency and/or sign a sworn statement.

No risks of child or forced labor are expected for the works, however, this will be confirmed during due diligence. The work entails processes of construction and mobilization of personnel which present risks and impacts associated with labor and working conditions. The ESMP will include required measures to address any risks identified through a series of Labor Management Procedures (LMP).

ESPS-3. Resource Efficiency and Pollution Prevention	*Yes*

As a result of the activities in the proposed types of interventions, there is a risk of soil, water, and air pollution if the corresponding management programs are not adequately implemented. These management plans will be further developed in the ESIA/ESMP. The proposed construction activities will likely require the use of hazardous materials (fuel, oils, greases, solvents, coolants, etc.) and generate greater amounts of waste (domestic and hazardous). There are also hazardous materials that will be used and generated during the operation phase of the project, such as sludge, fuels and oils. If these are inadequately stored, managed, and disposed of, there is a risk of surface water and groundwater pollution by runoff and infiltration, respectively, of the spilled materials. Incorrect waste disposal could

also increase the likelihood of unwanted fauna proliferation. The ESIA that was completed in 2021 does address these impacts, but the gap analysis ESIA that is currently underway will fill in any gaps especially due to cumulative impacts.	
ESPS-4. Community Health, Safety, and Security	*Yes*
The proposed work areas are in urban areas and along main or secondary roadways. The proposed areas of influence are prone to natural hazards such as droughts, flooding, hurricanes (wind and storm surge), and tsunami. Additionally, Barbados is subject to climate change: it is expected to affect the islands by resulting in overall reduced rainfall, increased rainfall intensity resulting in higher runoff and flash floods, increased temperatures, sea level rise and more frequent storms. Barbados also suffers from water scarcity, which will be addressed by the project by increasing aquifer recharge and water availability for irrigation use. If there is damage to the infrastructure such as the wastewater treatment plant due to flooding and/or hurricane this can have a negative impact on the surrounding communities and environment if untreated wastewater is released. Heatwaves or droughts can also affect the infrastructure as then there might not be enough water for the system to function as designed, which could create issues and blockages in the system exposing the community and environment to untreated sewage. It will be important for the ESMP to address emergency response planning, as this is a gap in the current ESIA/ESMP. The DRA/DRMP will be included in the ESIA/ESMP and a narrative will be prepared following the DCCRM methodology. In addition, as part of the ESIA/ESMP the cumulative impacts regarding mosquitos, smell and noise need to be investigated a The anticipated impacts and risks to the communities within the immediate area of influence are expected to be those typically associated with infrastructure development, which include: nuisances due to noise, vibrations, dust, emissions, traffic, presence of heavy machinery, temporary blockage of access to residences, businesses and/or public infrastructure, and risk of pedestrian accidents, and possible conflicts between construction personnel and the communities. The health risk of the communities will be evaluated as part of the ESIA, including that related to the influx of workers. There are potential impacts from stagnant and pooling water which may occur during construction due to disruption of drainage within the project's area of influence. This may contribute to increased breeding sites for disease causing vectors (e.g., mosquitoes) and also create an inconvenience to the surrounding community Property damage from both drainage disruption resulting from increased likelihood of flooding, and general construction activities are also likely e.g., dust and emissions may affect not only workers and pedestrians traversing the site, but also the aesthetics of buildings, vehicles and other infrastructure. Given the urban commercialized landscape there are no anticipated impacts to ecosystem services. Mitigation measures will therefore be proposed as part of the ESMP to address these risks/impacts and will include a Traffic Management Plan outlining requirements during roadwork activities to safeguard road users and pedestrians. This plan will include traffic and road safety measures, such as proper road signaling and engagement with the community during construction works, in order to avoid or minimize accidents and disruptions to the community. Measures for noise, dust and emissions will be managed in accordance with local regulations along with the SEP, which will provide steps to guide community	

engagement and adequate notice during the construction phase. A Grievance Redress Mechanism will also be implemented as part of the ESMS for the project.

ESPS-5. Land Acquisition and Involuntary Resettlement	*Yes*

The 2021 ESIA/ESMP included a social baseline for the areas adjacent to the pipeline to the recharge area and to one of the alternative routes for the irrigation pipeline. However, no assessment on physical and/or economic displacement impacts was included for these pipelines and the social baseline for the area adjacent to the irrigation pipeline which has been selected (route along the historic railroad) was not included either.

The construction of the new South Coast Water Reclamation Reuse Plant (SCWRRP) will take place on government owned-land adjacent to the existing SCWTP. Physical and/or economic displacement is not anticipated regarding this component of the project. The ESIA review and update will confirm that no additional land is required and whether physical and/or economic displacement could occur because of this component.

Regarding the pipeline construction:

- The existing ESIA includes a social baseline for the area of influence of the pipeline from the water treatment plant to the aquifer recharge area in Christ Church. As part of due diligence, this social baseline will be updated and there will be an assessment on the potential for physical and economic displacement resulting from pipeline construction in this area.
- The existing ESIA includes a social baseline for the area of influence of a potential pipeline route from the water treatment plant to an agricultural irrigation area in River Plantation. However, since the government has chosen a different route for the irrigation pipeline (along the historic trainway), a social baseline will be prepared to determine the existence of settlements, businesses or crops along this route and assess the potential for physical or economic displacement.

If physical and/or economic displacement is confirmed for any of the pipeline routes, a Resettlement Action Plan (RAP) or Livelihood Restoration Plan (LRP) will be developed and the corresponding consultations with affected people will be conducted.

ESPS-6. Biodiversity Conservation and Sustainable Management of Living Natural Resources	*Yes*

There is a wetland adjacent to the location of the current wastewater treatment plant and the location for the addition. This wetland is a protected area, half owned by the government and half owned by a private foundation. Water from the wastewater treatment plant has been discharged into the wetlands previously and could again if not properly managed. The ESIA/ESMP will investigate the biodiversity of the wetlands and determine risks and mitigation measures including cumulative impacts. Two critically endangered species, two endangered species as well as one protected area and one key biodiversity area have been noted to be in the area surrounding the site, but physical presence has not been confirmed. A biodiversity assessment will be done as part of the update of the ESIA/ESMP to determine impacts on critical, natural and/or modified habitats. If impacts on critical habitats are confirmed a biodiversity action plan will have to developed as per requirements of ESPS 6.

As part of component 3, in addition to technical studies to assess the swamp's condition and assess benefits to the reef, an action plan will be developed, the scope of this study is still to be determined but will be guided by the ESIA/ESMP.

ESPS-7. Indigenous Peoples	*No*

According to the initial screening, no Indigenous Peoples have been identified within the project's area of influence.

ESPS-8. Cultural Heritage	*Yes*

Cultural and historic sites have been identified near the proposed route for the pipeline to River Plantation (along the historic trainway). These sites include colonial bridges and old colonial wells. The ESIA review will include a risk and impact assessment of project activities in the above cultural and historic sites and, if needed, the ESMP will include programs to manage such risks and impacts and protect the sites. The project is not expected to negatively (directly or indirectly) impact cultural heritage.

Considering the project will include construction works, which will require excavation, the final ESMP will include a chance find procedure.

ESPS-9. Gender Equality	*Yes*

The existing ESIA does not include an assessment of risks and impacts related to gender, sexual orientation and/or gender identity. A gender assessment will be conducted to identify potential gender gaps that could be reinforced by the project or disproportionate risks and impacts in relation to gender (i.e. influx of workers). The ESMP will include actions to enhance gender equality and prevent gender-based violence, including:

- Guidelines for a Code of Conduct for employees and contractors, which includes the prohibition of sexual and gender-based violence and includes the steps to take to respond and help victims in cases when these situations occur.
- Guidelines for training programs to raise awareness and prevent sexual and gender-based violence addressed to project employees and contractors.
- Grievance Redress Mechanism (GRM) for project workers and GRM for communities which can channel grievances related to sexual and gender-based violence. The GRM will include measures to raise complaints anonymously and ensure confidentiality.
- As necessary, specific measures as part of the SEP to promote equitable participation in the process.
- If a Resettlement or Livelihood Restoration Plan is required, it must contain measures to guarantee equitable access to compensation for women or any other vulnerable group.

ESPS-10. Stakeholder Engagement and Information Disclosure	*Yes*

The ESIA prepared for the project in 2021 included stakeholder mapping, which will be updated according to the current project scope and to include all relevant project stakeholders. Since the existing stakeholder mapping has a strong focus on government organizations, its update will ensure all other relevant stakeholders, including local communities, civil society organizations and vulnerable groups are identified. Moreover, since a different route is now being considered for the pipeline to the irrigation area in River Plantation (along the historic trainway), the stakeholder mapping will identify all relevant stakeholders in this potential project area.

A Stakeholder Engagement Plan will be prepared for the project according to ESPS-1 and ESPS-10 and will be implemented by the BWA. The SEP will include an information disclosure process and meaningful stakeholder consultations regarding project objectives, activities, environmental and social risks and impacts, their management measures and grievance mechanism. The consultations (on the project in general and with those affected by physical and/or economic displacement, if applicable) will be documented through reports which will be published on IDB's website prior to distribution to Board. The consultation results will be integrated into the ESIA/ESMP. According to ESPS-10, the SEP will also include guidelines and a strategy for stakeholder engagement during project execution.

Due to the context of incidents in sewage management in Barbados (overflow of raw sewage in 2018, which caused a national crisis) and the lack of public knowledge about the water treatment process, the SEP will include communication and stakeholder engagement strategies that address concerns and negative sentiments regarding the use of reclaimed water for agricultural irrigation.

As part of the ESIA/ESMP update, a Grievance Redress Mechanism (GRM) to channel stakeholder questions, concerns, or claims, will be developed.

IDB Environmental and Social Due Diligence

Strategy for Due Diligence

E&S Assessment requirement	*Status of development*	*Estimated resources to finalize (specify Bank or Borrower cost)*	*Estimated timeline to finalize (inc. consultation)*
Environmental and Social Management System (that includes ESIA/ESMP, DRA/DRMP and the SEP for all works)	An ESIA/ESMP prepared in 2021 is currently being reviewed and updated by a consulting firm.	Combined WSA, Barbados Country Office and ESG budget: (US$70k).	Execution: 3 months Start date: December 2023 Consultation: April2024
Resettlement Action Plan / Livelihood Restoration Plan	Will be developed if required according to ESIA findings	WSA budget: TBD	If needed: Execution: 2-3 months.

Annexes

Annex A.	E&S Maps

Annex A. E&S Maps

Map 1. Key biodiversity areas and Protected areas in Barbados.

The blackline below represents the pipeline and the blue circle the water treatment plan. The red line shows the area of the project.

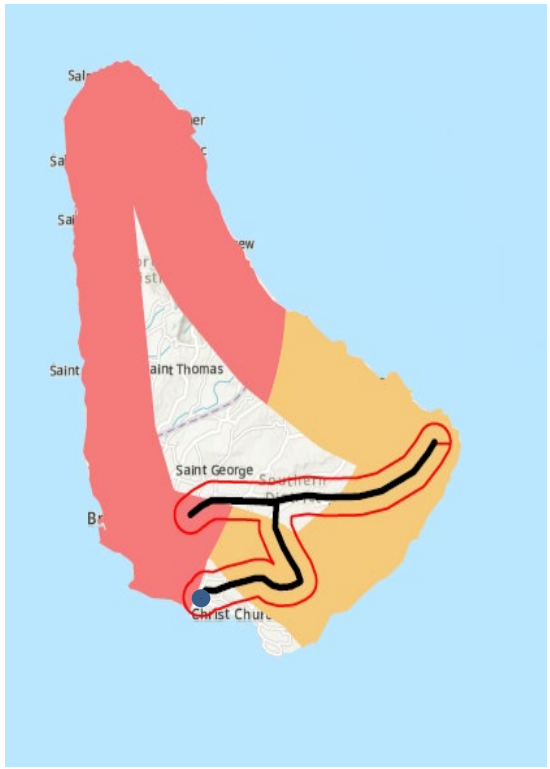
Map 2. Hurricane storm Surge Hazards for project area

Map 3. Hurricane Wind Risk for project area

Hurricane _ Wind hazard

High

Map 4. Tsunami Risk for the Protected area



The entire island also has a moderate rating for water supply scarcity and for drought hazard with climate change.

INDEX FOR COMPLETED AND PROPOSED SECTOR WORK

Issues	Description	Source	Expected Dates
Institutional Capacity Assessment; Results Matrix, and Project Operating Manual; the detailed consolidated budget of the Program; the disbursement schedule;the Pluriannual Program Execution Plan (PEP); the detailed Annual Operational Plan (AOP); and the Procurement Plan (PP).	Institutional Capacity Assessment of BWA as Executing Agency using IDB's ICAP methodology. Development of the Strengthening Plan for BWA as Executing Agency. Evaluation of potential risks associated with the operations (Risk Matrix). Development of Project Operating Manual for the operation.	Transactional	December – March 2024
Environmental and Social Studies (ESA, ESMP, ESMF, ESMS)	Development of Environmental and Social Analysis (ESA) and Environmental and Social Management Plan (ESMP) for Project. Development of Environmental and Social Management Framework (ESMF). Development of Environmental and Social Management System (ESMS).	Transactional	January – April 2024
Economic Analysis	Economic Feasibility Analysis using cost benefit analysis, sensitivity analysis and analysis of beneficiaries.	Transactional	December – March 2024
Technical Analysis	Development of technical specifications, bill of quantities and budget for the disinfection subcomponent.	Transactional	December – March 2024
Financial Analysis	Development of BWA’s financial analysis to identify the company’s capacity to absorb IDB financing.	Transactional	December – March 2024
Procurement Support	Preparation of tender documents for Design Build of the plant and the RFP for Construction Supervision.	Transactional	December – April 2024

Annex V – BA-L1063
CONFIDENTIAL
INTERNAL USE

This document contains confidential information relating to one or more of the ten exceptions of the Access to Information Policy and, therefore, shall not be disclosed to external Bank audiences. It is available only to Bank employees.