Meeting of the Board
21 – 24 October 2024
Songdo, Incheon, Republic of Korea
Provisional agenda item 10

GCF/B.40/02/Add.13

30 September 2024

Consideration of funding proposals – Addendum XIII

Funding proposal package for FP251

Summary

This addendum contains the following seven parts:

a) A funding proposal titled "Barbados Climate Resilient South Coast Water Reclamation Project (SCWRP)";
b) No-objection letter issued by the national designated authority(ies) or focal point(s);
c) Environmental and social report(s) disclosure
d) Secretariat's assessment;
e) Independent Technical Advisory Panel's assessment;
f) Response from the accredited entity to the independent Technical Advisory Panel's assessment; and
g) Gender documentation.

Table of Content

Funding Proposal

Project/Programme title:	Barbados Climate Resilient South Coast Water Reclamation Project (SCWRP)
Country(ies):	Barbados
Accredited Entity:	Inter-American Development Bank (IDB)
Date of first submission:	2024/03/29
Date of current submission	2024/09/26
Version number	V.009

GREEN CLIMATE FUND

Contents

Note to Accredited Entities on the use of the funding proposal template

- Accredited Entities should provide summary information in the proposal with cross-reference to annexes such as feasibility studies, gender action plan, term sheet, etc.
- Accredited Entities should ensure that annexes provided are consistent with the details provided in the funding proposal. Updates to the funding proposal and/or annexes must be reflected in all relevant documents.
- The total number of pages for the funding proposal (excluding annexes) **should not exceed 60**. Proposals exceeding the prescribed length will not be assessed within the usual service standard time.
- The recommended font is Arial, size 11.
- Under the GCF Information Disclosure Policy, project and programme funding proposals will be disclosed on the GCF website, simultaneous with the submission to the Board, subject to the redaction of any information that may not be disclosed pursuant to the IDP. Accredited Entities are asked to fill out information on disclosure in section G.4.

Please submit the completed proposal to:

fundingproposal@gcfund.org

Please use the following name convention for the file name:

"FP-[Accredited Entity Short Name]-[Country/Region]-[YYYY/MM/DD]"

A. PROJECT/PROGRAMME SUMMARY

A.1. Project	Project	**A.2. Public or private sector**	Public
A.3. Request for Proposals (RFP)	Not applicable		

A.4. Result area(s)

	GCF contribution	Co-financers' contribution[1]
Mitigation total	0 %	0 %
☐ Energy generation and access	0 %	0 %
☐ Low-emission transport	Enter number %	Enter number %
☐ Buildings, cities, industries and appliances	Enter number %	Enter number %
☐ Forestry and land use	Enter number %	Enter number %
Adaptation total	100 %	100 %
☒ Most vulnerable people and communities	14 %	14 %
☒ Health and well-being, and food and water security	15 %	15 %
☒ Infrastructure and built environment	68 %	68 %
☒ Ecosystems and ecosystem services	3 %	3 %

A.5. Expected mitigation outcome *(Core indicator 1: GHG emissions reduced, avoided or removed / sequestered)*		**A.6. Expected adaptation outcome** *(Core indicator 2: direct and indirect beneficiaries reached)*	*Indicate total number of direct and indirect beneficiaries*	
			50,707 direct beneficiaries	231,293 indirect beneficiaries
			18 %	82 %

A.7. Total financing (GCF + co-finance[2])	USD 110 million	**A.9. Project size**	Medium (Upto USD 250 million)
A.8. Total GCF funding requested	USD 70 million		

[1] Co-financer's contribution means the financial resources required, whether Public Finance or Private Finance, in addition to the GCF contribution (i.e. GCF financial resources requested by the Accredited Entity) to implement the project or programme described in the funding proposal.
[2] Refer to the Policy of Co-financing of the GCF.

A.10. Financial instrument(s) requested for the GCF funding	*Mark all that apply and provide total amounts. The sum of all total amounts should be consistent with A.8.* ☒ Grant USD 40 million ☒ Loan USD 30 million ☐ Guarantee USD Enter number ☐ Equity Enter number ☐ Results-based payment Enter number		
A.11. Implementation period	*Indicate the number of years and months the project/ programme is expected to be implemented.* 5 years	**A.12. Total lifespan**	*Indicate the maximum number of years over which the outcomes of the investment are expected to be effective, i.e. to lead to adaptation and/or mitigation results.* 25 years
A.13. Expected date of AE internal approval	*This is the date that the Accredited Entity obtained/will obtain its own approval to implement the project/ programme, if available.* Feb 2025	**A.14. ESS category**	*Refer to the AE's safeguard policy and GCF ESS Standards to assess your FP category.* B
A.15. Has this FP been submitted as a CN before?	Yes ☐ No ☒	**A.16. Has Readiness or PPF support been used to prepare this FP?**	Yes ☐ No ☒
A.17. Is this FP included in the entity work programme?	Yes ☐ No ☒	**A.18. Is this FP included in the country programme?**	Yes ☐ No ☒
A.19. Complementarity and coherence	*Does the project/programme complement other climate finance funding (e.g. GEF, AF, CIF, etc.)? If yes, please elaborate in section B.1.* Yes ☒ No ☐		
A.20. Executing Entity information	The Borrower will be the Government of Barbados, through the Ministry of Finance, Economic Affairs and Investments (MFEI) for the channelling of IDB and GCF funds. For implementation of the Project's activities, the Executing Entity is the Government of Barbados, through the Barbados Water Authority (BWA). BWA is a fully owned entity of the Government of Barbados.[3] It is 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. BWA is a Statutory Body established by an act of Legislature on October 8, 1980, to replace the Waterworks Department of Government. It commenced operations on April 1, 1981. BWA's full registered address is The Pine Commercial Estate, The Pine St. Michael BB11000, Bridgetown, Barbados. A Project Executing Unit (PEU) will be established in the Project Management Office (PMO) of the Barbados Water Authority. The Project Management Office under the Office of the CEO is mainly responsible for managing all of BWA's investment programs and projects financed by international funding Institutions including coordination, management, administration, financial management, procurement and planning and monitoring.		

A.21. Executive summary (max. 750 words, approximately 1.5 pages)

Barbados faces significant water scarcity, with just 285 m^3 of fresh water available per capita each year[4], relying mainly on underground streams through sinkholes to replenish its aquifers. The country is highly vulnerable to droughts and climate hazards, as rising temperatures may boost evapotranspiration, reducing soil moisture and aquifer recharge rates. Decreasing rainfall and changing patterns exacerbate water shortages, with water extraction expected to exceed sustainable levels. Moreover, rising sea levels threaten to introduce seawater into coastal aquifers, compromising the quality of the freshwater reserves.

With nearly all groundwater resources already developed and the increasing frequency in droughts, the island is now experiencing challenges on the water supply side.

Estimated annual water production in Barbados for 2020 is as follows: potable groundwater production is 64.4 Mm^3; non-potable groundwater production (for agriculture, estimated by BWA) is 10.5 Mm^3; total groundwater production is 74.9 Mm^3 (Cashman, 2022).

Agriculture, a key water user consuming over 68% of total water production (23% from BWA production)[5], is especially hit by weather variability, affecting food security island wide. This situation may heighten competition for water among sectors like household (which consumes over 22% of the total), tourism and industry (both together consuming less than 10%). Thus, Barbados aims to diversify its water sources to ensure a resilient supply and protect its aquifers, aligning with the goals of the GCF-supported project.

In addition to grappling with water scarcity, the increased frequency of extreme weather events risks overwhelming the existing sewage treatment facilities of the country, leading to issues on water quality, sanitation, and environmental pollution. Barbados Water Authority (BWA) currently operates two municipal sewage treatment plants, which treat the wastewater of approximately 3% of the population (Cashman, 2022): Bridgetown Sewage Treatment Plant (BSTP), and South Coast Sewage Treatment Plant (SCSTP). Both plants are underutilized compared to their design capacity and have suffered from failures due to a lack of maintenance.

Across the nation, the primary method of wastewater and sewage disposal is through septic tanks. Improper management of septic tanks poses significant environmental and groundwater contamination risks, as well as making a notable contribution to methane emissions.

The existing SCSTP, commissioned in 2003, can process 9,000 m^3/day, serving the southern island with primary wastewater treatment before marine disposal. The existing outfall for discharge is located next to the Graeme Hall Wetlands National Heritage and RAMSAR Site, a 33-ha area containing the only freshwater mangrove wetland in the island[6]. Historically, the plant's inefficiencies and failures have significantly impacted the wetlands' water quality.

The water quality in the Graeme Hall Swamp is affected by the lack of connection to the sea and by pollution loads resulting from discharges of untreated effluents of the SCSTP Plant.

With the increase in water demand for tourism[7], food security, and urbanisation[8] and expected impacts of climate change on freshwater supplies, opportunities arise for improving the level of wastewater treatment

[3] The government of Barbados does not require the signature of a subsidiary agreement, or any similar agreement, to provide funds to BWA from this project
[4] World Bank (2020). https://data.worldbank.org/indicator/ER.H2O.INTR.PC?locations=BB.
[5] Horace Archer (2016). Division of Energy and Telecommunications. Caribbean Water-Energy Nexus. https://ecpamericas.org/assets/Site_18/files/Events/2016/Energy%20Water%20Nexus/Horace%20Archer%20Caribbean%20Water-Energy%20Nexus%20rev1.pdf
[6] Graeme Hall Swamp Stewardship Committee (2019). Natural Heritage Conservation Area Surveillance Programme within the Graeme Hall Watershed.
[7] Current plan for new hotels in the South Coast area.
[8] Projected 1.5% increase in water demand with increased urbanization (Source: comments from BWA Manager of Water Resources and Environmental Management 17/10/23 - http://barbadostoday.bb/2023/10/17/water-not-enough-for-large-scale-food-production-says-bwa-official/)

to facilitate the safe reuse of reclaimed water through irrigation and recharge of aquifers to augment existing potable water supplies.

The South Coast Water Reclamation Project (SCWRP) aims to upgrade the SCSTP into a modern Water Resource Recovery Facility, enhancing Barbados' water 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 nearshore coral reef ecosystems, and contributing to food security and rural livelihoods by utilizing reclaimed water for agricultural irrigation in smallholder farming districts. These goals are aligned with the Roofs to Reefs Programme (R2RP) of the country, which represents the sustainable development model for Barbados for the next decade and is the basis for its Nationally Determined Contribution.

The water management and use of alternative sources promoted by the project aim to achieve several key outcomes, each closely aligned with specific outputs tailored to address distinct challenges in water security, environmental conservation, and institutional capacity-building. The first set of outcomes revolves around increasing the availability of high-quality reclaimed water for non-potable uses, reducing the dependence on potable water sources, and enhancing water supply resiliency (Outcome 1). This entails implementing reclaimed water treatment systems, promoting reclaimed water use through public awareness campaigns, upgrading water supply infrastructure to reduce leakages, and diversifying water sources to mitigate the risks of water scarcity and supply disruptions. These efforts aim to bolster the efficient delivery of reclaimed water for agricultural irrigation and aquifer recharge (Outcome 2).

The project emphasizes ecological health improvement and resilience of Graeme Hall Swamp, supporting biodiversity and ecosystem services (Outcome 3) as well as enhancing institutional capacity, public awareness, gender and social inclusivity for water resource management (Outcome 4). Activities include conducting biodiversity studies, restoring habitats, reforming policies for better water management, and enhancing institutional capabilities. Through partnerships and stakeholder involvement, it aims to advance sustainable practices, ecosystem protection, and resilience against environmental challenges. These coordinated efforts are designed to secure long-term water resource availability and sustainability while protecting ecosystems and bolstering water management resilience.

The project seeks additional benefits towards sustainability, including reducing the carbon footprint from reclaimed water use through energy-efficient technologies, PV panels, and Battery Energy Storage Systems (Co-benefit 1), and minimizing pollution impacts on water bodies and ecosystems by improving wastewater treatment and enforcing regulatory standards (Co-benefit 2). These efforts aim to lower energy consumption and emissions, enhance environmental quality, and support sustainable water management, benefiting ecosystems and communities.

On the other hand, the project introduces a novel financing approach for climate-resilient infrastructure. Building on the success of a previous debt-for-nature swap, Barbados will now embark on a “Debt-for-Climate Conversion” (DfCC) supported by guarantees from the Inter-American Development Bank (IDB) and the European Investment Bank (EIB) of USD 150M each. The objective of these transactions is to create fiscal space by seeking (i)the reduction of costs and lengthening the terms of the issuance, and (ii) mobilizing additional resources from international investors.

The country will issue a Sustainability-linked Bond or Loan (SLB/SLL) supported by Water Resilience Commitments, which will enable the repurchase and retirement of current sovereign debt.

The Debt for Climate Conversion is expected to generate savings derived from the interest rate differential between the repurchased debt and the SLB/SLL. This fiscal space will enable Barbados to invest in climate resilient infrastructure. Specifically, these savings will primarily be used to cover the SCWRP investment over a period of 10 to 15 years. The Excess Savings will be allocated to an independent account to support additional investments in climate resilience measures through specific projects, such as pipelines to the irrigation and groundwater recharge areas, groundwater recharge facilities, solar panels with battery and

storage facilities, investments for conservation and protection of the Graeme Hall site, Non-revenue water interventions, amongst other interventions that will enhance the impact of the SCWRP(see section B.4).

In this way, 100% of the savings from the debt-for-climate conversion will be directed to climate adaptation and mitigation objectives. GCF will participate in the debt swap by funding part of the institutional arrangements and training required for BWA to deliver the required **Measurement, Reporting, and Verification (MRV)** duties under the DfCC, specifically (a) the use of proceeds from the DfCC and (b) related Water Resilience Commitments.

Overall, through these measures, the project will increase water availability, protect water quality, preserve marine ecosystems, and mitigate the adverse impacts of pollution on human health and the environment. By leveraging a Debt-for-Climate Conversion to invest in resilient infrastructure, the collaboration between Barbados and its international partners in this initiative showcases a new era of innovation in climate action, underlining how joint efforts can result in tangible benefits for citizens and the environment while considering the financial constraints of indebted Small Island Developing States (SIDS).

B. PROJECT/PROGRAMME INFORMATION

B.1. Climate context (max. 1000 words, approximately 2 pages)

Barbados is among the top 10 of the world's most water-scarce countries[9], with approximately 285 m³ of fresh water available per capita per year. Instead of surface water, Barbados relies on water filtering into underground streams through sinkholes, periodically replenishing the underlying aquifer. Based on the 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.[10]

Water scarcity has been especially critical during the last El Niño oscillation phase. At the onset of the 2020 wet season, the island had completed a 24-month period with below-normal rainfall that had a severe impact on aquifer recharge and resulted in seawater intrusion into coastal aquifers and reduced yields[11].

According to the analysis conducted for the 3R's (Reduce, Reuse, and Recycle) for Climate Resilience Wastewater Systems in Barbados (3R-CReWS) Project (FP192), the climate trends in the country show that during the last decades (1991 to 2020), there's a trend of increased rising occurrences of dry periods[12], despite monthly precipitation levels not having changed significantly. Additionally, notable increases in daily minimum temperatures and extreme heat events were observed in that period.

To project climate change in Barbados until 2050, as part of the 3R-CReWS Project, precipitation forecasts were compared against current climate conditions. A suite of CMIP6 models, including ACCESS-CM2, ACCESS-ESM1-5, and others, were utilized with the SSP2-4.5 scenario, analysing data retrieved from KNMI Climate Explorer. The results showed that precipitation is forecasted to decrease by 119 mm annually, extending the dry season by two months and exacerbating drought conditions, with potential increases in extreme weather events[13]. The IPCC AR6 report states that it is highly likely precipitations decline over the Caribbean, in the annual mean, with a stronger and more coherent signal in CMIP6 compared to CMIP5. For the 3-degree global warming level (GWL), it is likely that the annual average precipitation changes in the Caribbean will be in the ranges of –17 to -2%. Projections agree to indicate a generally drier Caribbean and a robust summer drying[14].

On the other hand, Barbados' climate projections until 2050 expect a significant rise in average annual temperatures, with a faster increase in minimum temperatures during the wet season[15]. In this regard, the IPCC AR6 Atlas indicates there is a high agreement and robust evidence that at the 1.5°C global warming level the Caribbean region will experience a 0.5°C–1.5°C warming compared to the 1971–2000 baseline period. There is high confidence in the projections of an increase in warm days and warm nights over the region.

The agricultural sector is notably impacted by fluctuations in the duration and intensity of dry seasons due to the rain-fed and open-field nature of the agricultural sector, which has led to the loss of crops, low water supply, poor soil quality, increase in food prices and decrease in production (FAO 2016). Extreme weather events have also impacted the sector. After Tropical Storm Tomas in 2010, more than 200 farmers suffered complete crop losses due to severe flooding, and many others were unable to harvest because of saturated fields. Additionally, farmers noted a rise in bacterial diseases affecting their crops (MAFS 2022). Consequently, the entire food value chain is affected, posing a significant constraint on establishing a comprehensive food security strategy. Results from a country assessment commissioned by the Climate

[9] UN Office for the Coordination of Humanitarian Affairs (OCHA) 2022. Barbados Country Profile
[10] Cashman, A. Water Sanitation and Solid Waste Sector Note for Barbados, IDB (2022)
[11] Barbados experiences a subtropical maritime climate with rainfall variations largely influenced by the prevalence of El Niño (dry) or La Niña (wet) Southern Oscillation phases
[12] Climpact analysis of the CIMH data, conducted as part of the 3R's (Reduce, Reuse, and Recycle) for Climate Resilience Wastewater Systems in Barbados (3R-CReWS) Project (FP192)
[13] CMIP6, as cited in 3R's (Reduce, Reuse, and Recycle) for Climate Resilience Wastewater Systems in Barbados (3R-CReWS) Project (FP192)
[14] Gutiérrez et al, 2021: Atlas. In Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change
[15] 3R's (Reduce, Reuse, and Recycle) for Climate Resilience Wastewater Systems in Barbados (3R-CReWS) Project (FP192)

Vulnerability Forum by the DARA organization estimated losses between US $5 – $45 million in direct losses to the Barbados agricultural sector as a result of unmitigated climate change between 2020 and 2023 (MAFS 2022).

The Ministry of Agriculture is unable to meet the current demand for irrigation water, and there is likely a significant suppressed demand due to intermittent restrictions on the supply of water for irrigation purposes. Limited access to affordable irrigation water is a major challenge for the agriculture sector in Barbados, especially for small-scale farmers who heavily rely on rainfall.

Barbados' water scarcity, compounded by the anticipated effects of climate change on freshwater sources prompts the country to focus on developing strategies for efficient water usage and implementing a circular economy model, aiming to reuse wastewater whenever feasible safely. Therefore, enhancing wastewater treatment is crucial to enable safe and viable wastewater reuse, including irrigation and recharge of aquifers. Furthermore, enhancing the existing wastewater treatment infrastructure is essential for preventing contamination and prioritizing ecosystem preservation. Untreated wastewater poses a threat to the fragile aquatic ecosystems of the island, which contain over 50 hard coral species and 600 species of fish.

The SCWRP is a sustainable water initiative that helps BWA and its partners in transforming the existing SCSTP into a futuristic New South Coast Water Reclamation and Re-use Facility (SCWRRF). The goals of the Project are multiple: augment existing water supplies, address seawater intrusion and sea level rise, diversify potable water sources, enhance water supply resiliency, and reduce the impact of treated effluent on marine life and the environment. **Error! Bookmark not defined.Error! Bookmark not defined.**

B.2 (a). Theory of change narrative and diagram (max. 1500 words, approximately 3 pages plus diagram)

Barbados faces water stress due to increasing droughts that compromise aquifer recharge and reduce groundwater resources. Climate change further exacerbates the issue by increasing temperatures and evapotranspiration rates, which diminish soil moisture and infiltration capacity.

The main goal of the project is to increase Barbados' water resilience to climate change with a focus on increasing water security, food sovereignty and improvement of environmental conditions linked to the holistic approach of upgrading the South Coast Water Treatment Plant.

The specific objectives of the Project are to:

- Improve water supply resiliency by increasing the availability of potable water through the reuse of reclaimed wastewater for agricultural irrigation;
- Reduce water insecurity through reuse of reclaimed water to recharge aquifers;
- Strengthen key sector institutions such as the BWA and the Natural Habitat Conservation Areas (NHCA) to enhance water resource management, operational efficiency, MRV and promote gender equality and social inclusion.

The project focuses on increasing the resilience of the water sector and ecosystems by providing advanced treatment to sewage flows in the new SCWRRF and conducting restoration activities in aquatic habitats affected by untreated effluents and other contamination sources in the downstream site of Graeme Hall. This will result in high-quality reclaimed water meeting international standards that can be used for agricultural irrigation and aquifer recharge and a better condition of the adjacent ecosystems to the plant, including a RAMSAR site, which is the Graeme Hall Swamp.

By implementing this initiative, potable water use for irrigation by smallholder farmers will be switched to treated sewage water use, thereby preserving potable water for other essential purposes, particularly human consumption and reducing the pressure on existing sources of water which are already severely stressed. Additionally, habitat restoration will improve ecosystem services, protecting biodiversity and providing water

regulation. This approach not only enhances agricultural practices but also significantly contributes to long-term ecosystem health.

The Theory of Change (ToC) statement is: IF the South Coast Water Treatment Plant is upgraded and wastewater is treated and reclaimed for non-potable uses such as agricultural irrigation and aquifer recharge, THEN Barbados will increase its water resilience to climate change by improving water security, and enhancing ecosystem resilience BECAUSE the implementation of advanced wastewater treatment will enhance water resource availability, reduce pressure on potable water sources, restore ecosystems, and strengthen institutional capacity for sustainable water management.

The Project aims to achieve several key outcomes, each closely aligned with specific outputs tailored to address distinct challenges in water security, environmental conservation, and institutional capacity-building.

The first set of outcomes revolves around increasing the availability of high-quality reclaimed water for non-potable uses, reducing the dependence on potable water sources and enhancing water supply resiliency (Outcome 1). This entails improving the wastewater treatment system and the installation of infrastructure for reclaimed water reuse (irrigation and aquifer recharge). This new infrastructure allows diversifying water sources for irrigation to mitigate the risks of water scarcity and supply disruptions. Additionally, aquifer replenishment protects groundwater resources from SLR and droughts, making them more climate resilient.

These efforts contribute to bolstering the sustainability and efficiency of water resources and to the efficient delivery of reclaimed water for agricultural irrigation and aquifer recharge, contributing to water security and sustainable agricultural practices (Outcome 2). The use of reclaimed water will improve households' water supply. As supply interruptions decrease, gender inequalities caused by water scarcity will be reduced, allowing women more time to engage in productive, educational, and even leisure activities. Simultaneously, the project strengthens the resilience of wastewater treatment by introducing a renewable energy supply to the system, making the electricity supply redundant.

On the other hand, the Project is intended to improve the ecological health and resilience of Graeme Hall Swamp, supporting biodiversity and ecosystem services (Outcome 3) through comprehensive monitoring, environmental assessments, risk evaluations, and targeted conservation strategies designed to achieve ecosystem restoration in a NHCA.

The proper functioning of the ecosystem will enhance water regulation and ecosystem services. Additionally, the Project seeks to enhance the institutional capacity and public awareness and promote gender equality and social inclusion for water resource management (Outcome 4). This involves strengthening governance and project management, fostering gender and diversity inclusion, installing MRV systems, overseeing groundwater usage, and raising public awareness for wastewater reuse. Institutional strengthening enhances the efficiency of reclaimed water facilities and supports ecosystem restoration in the NHCA. It aims to improve partnerships and compliance to protect the adjacent swamp, promote sustainable water management, and build resilience to environmental challenges.

Through concerted efforts across these outcomes and outputs, the project aims to create lasting impacts, ensuring the availability and sustainability of water resources for present and future generations while safeguarding the natural environment and enhancing the resilience of water management systems.

In addition to its primary outcomes, the Project also aims to achieve co-benefits that contribute to broader sustainability goals.

Co-benefit 1 consists of the reduction of GHG associated with the provision of reclaimed water. Particularly, this is related to the installation of PV panels with Battery Energy Storage System (BESS) in pumping stations to offset the emissions produced during the treatment process (Component 3). GHG emissions are to be reduced by 2,657 by 2029. Additionally, the Project involves the implementation of energy-efficient treatment technologies, optimization of operational processes to minimize energy consumption and exploration of other

renewable energy sources to power water treatment facilities. By reducing carbon emissions from the energy used in reclaimed water provision, the project contributes to mitigating climate change and promoting environmental sustainability.

Furthermore, ecosystem restoration activities will also play a significant role in climate change mitigation. Mangroves possess the capacity to capture and store carbon, thereby contributing to efforts aimed at mitigating climate change.

Co-benefit 2 involves the reduction of the pollution impacts on water bodies and ecosystems. The project addresses this by implementing advanced treatment systems to remove pollutants and contaminants from wastewater (Component 1). Additionally, the development and implementation of a Pilot Monitoring Plan for the Graeme Hall Swamp (Component 3) will contribute to the identification and better management of the impact of the SCWRRF as well as other possible impacts. The proposed monitoring program is intended to assist with the establishment of baseline information ahead of the commencement of capital works at the site of the sewage treatment plant, allowing the monitoring of biodiversity flora, fauna, hydrogeology, community engagement, and land use. Component 4 will also contribute to Co-benefit 2, since strengthened regulatory functions and monitoring systems help regulate and reduce pollution risks, which will also feed into the capacity building of the MRV capacities required under the Debt for Climate transaction (SLL KPI).

Through these measures, the project protects air and water quality, preserves marine ecosystems, and mitigates the adverse impacts of pollution on human health and the environment.

By achieving these co-benefits, the Project enhances overall environmental quality and promotes the sustainable management of water resources for the benefit of ecosystems and communities alike.

Barriers and Risks

The project aims to improve water security and climate resilience in Barbados by building a water reclamation plant, conserving ecosystems, and enhancing policies and stakeholder engagement. It addresses socio-technical, environmental, and organizational challenges. The initiative proposed adopts a comprehensive approach that ensures sustained changes in water resource availability and ecosystem conservation. The project employs a transdisciplinary methodology to tackle the barriers identified. Strategies include environmental conservation, capacity building, climate-proofing irrigation, technological innovation, and stakeholder engagement. The barriers are described below.

- **Barrier 1. Limited knowledge on the usefulness of reclaimed water as a resource.** Concerns about the quality and potential health risks associated with reclaimed water may lead to resistance or hesitancy among smallholder farmers and the broader community. Building trust and confidence in reclaimed water systems is crucial for overcoming social barriers.
- **Barrier 2. Inadequate up-to-date technologies on water treatments.** There is limited access to advanced technologies and best practices. This can exacerbate disparities in development, particularly in regions or communities with fewer resources or infrastructure. Such disparities may hinder economic growth and perpetuate inequalities.
- **Barrier 3. Inefficient use of water resources leading to higher demands.** Inefficient water use in Barbados can lead to heightened water demands due to wasteful practices, inadequate conservation measures, and aging infrastructure. Whether through leaking pipes, inefficient irrigation, or overuse in industrial processes, such practices contribute to unnecessary water consumption. Population growth further intensifies the demand for water.
- **Barrier 4. Depletion of freshwater resources and potential damage to ecosystems.** High water demand and pollution risk depleting freshwater resources and harming ecosystems. Over-extraction can reduce water levels, threatening both human populations and aquatic species. This also causes saltwater intrusion into coastal aquifers, worsening water quality. Pollution from untreated wastewater disrupts aquatic ecosystems by introducing nutrients and toxins, leading to algae overgrowth and

harming mangrove plants and wildlife. Sedimentation from wastewater can further damage mangrove roots, impacting their growth and stability.

- **Barrier 5. Institutions lack strong governance mechanisms for climate change and natural resources due to limited technical capacities.** The absence of strong governance and technical capacities in institutions impedes effective management of climate change and natural resource issues, making it hard to develop responsive policies. The shortage of trained personnel further hinders stakeholder collaboration. This highlights the need for comprehensive provisions in new projects like SCSTP to ensure adequate technical support and personnel training.
- **Barrier 6. Lack of systematic and solid monitoring and evaluation data.** Without reliable monitoring and evaluation data, stakeholders lack the necessary insights to assess the progress, impact, and efficiency of initiatives, projects, and policies. This absence hinders the ability to identify strengths, weaknesses, and areas needing improvement, making it challenging to allocate resources effectively and address emerging issues promptly.
- **Barrier 7. Poor dissemination of best practices and successful stories.** A lack of stakeholder awareness about the benefits of reclaimed water initiatives, combined with insufficient funding for knowledge-sharing efforts, hampers interest in sharing success stories and creates challenges in establishing effective information dissemination platforms and networks.
- **Barrier 8. Lack of effective initiatives and policies to address gender and diversity disparities.** Despite progress made by Barbados in human development aspects, gender inequalities and social disparities remain. The BWA organization lacks a formal, written Gender Strategy or Action Plan to advance initiatives to promote gender equality and social inclusion.

Additionally, two risks were identified:

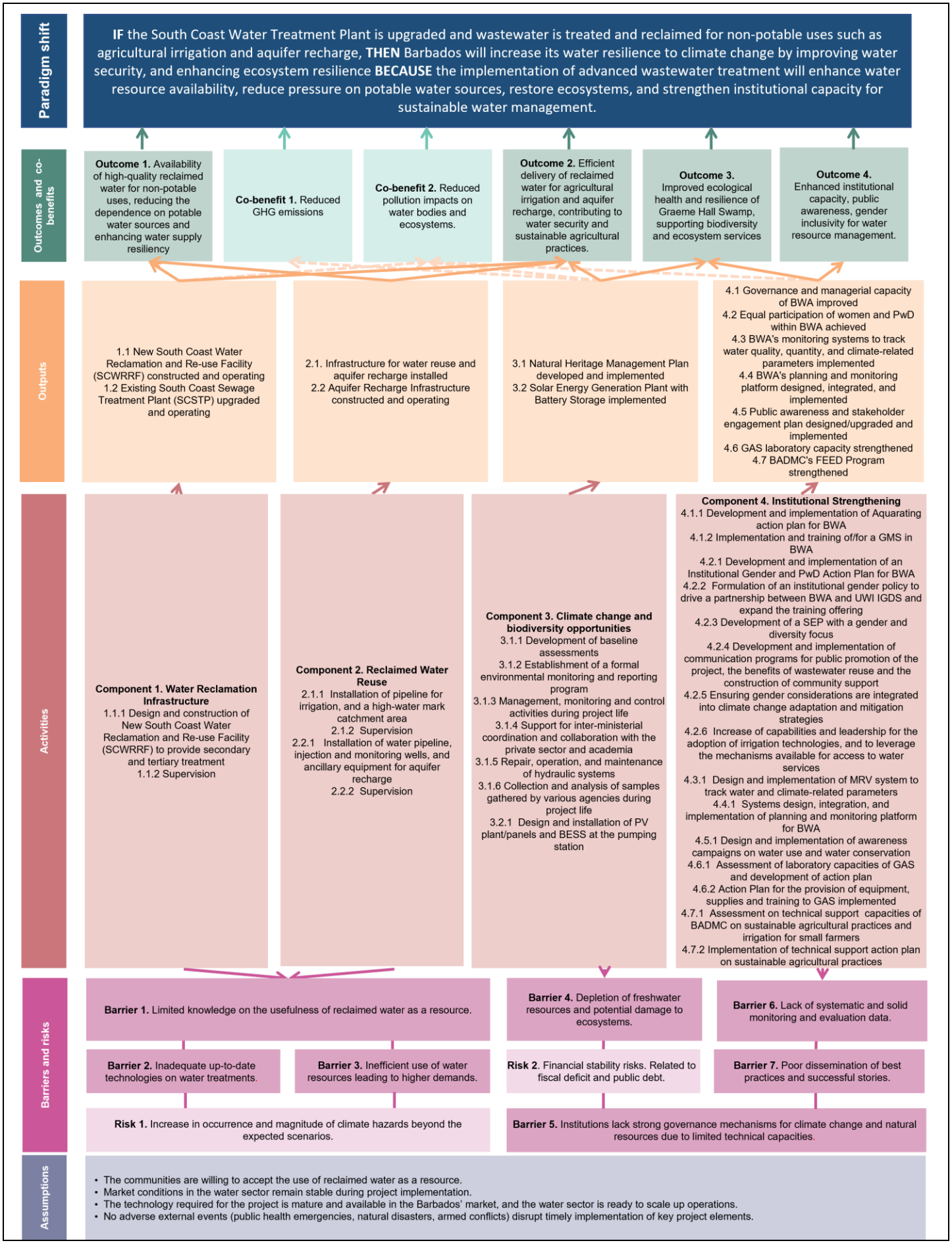
- **Risk 1. Increase in occurrence and magnitude of climate hazards beyond the expected scenarios.** The increasing frequency and severity of climate hazards heighten risks for communities, ecosystems, and infrastructure. These events lead to more frequent disasters, water contamination, and extensive damage, straining governments and responders. Limited resources and fragmented governance further challenge effective management and mitigation of these impacts.
- **Risk 2. Financial stability risks. Related to fiscal deficit and public debt.** Barbados has made progress in lowering its public debt to 122.5% of GDP by the end of fiscal year 2022/23, nearing pre-pandemic levels. Despite this improvement, the country faces challenges related to fiscal deficit, which, if not effectively managed, could escalate public debt.

Finally, several **assumptions** and considerations have been discussed regarding project implementation and the necessary conditions for ensuring timely execution and achieving expected outcomes.

- **Community acceptance of reclaimed water:** The project assumes communities are open to using reclaimed water, considering it safe and beneficial. Stakeholder participation revealed smallholder farmers had no concerns about the water source.
- **Stability of market conditions in the water sector:** The project's success depends on the assumption of stable market conditions in the water sector, including consistent demand for services, predictable pricing, and reliable supply chains for essential materials and technologies. Such stability fosters investor confidence, streamlines procurement processes, and ensures uninterrupted activities, helping achieve project objectives within set timelines and budgets.
- **Availability and maturity of technology:** The project assumes that the necessary technology, including water treatment, distribution systems, monitoring devices, and data management platforms, is readily available and mature within the Barbados market. This readiness implies that innovative solutions are in place to meet project needs efficiently. It also presupposes that the local workforce has the skills and expertise to deploy, operate, and maintain these technologies throughout the project’s lifecycle.

- **Absence of adverse external events:** A critical assumption is that no adverse external events, such as public health emergencies, natural disasters, or armed conflicts, disrupt the timely implementation of key project elements. This assumption highlights the need for contingency planning, robust risk mitigation strategies, and monitoring systems to anticipate disruptions and ensure project continuity while minimizing adverse impacts on outcomes and stakeholders.

The following diagram shows the ToC for the project, which illustrates the change pathway and interactions of different elements of the intervention logic proposed by the project. As shown in the theory of change diagram, the project has established an integrated self-supporting approach, addressing the identified barriers and risks.


Paradigm shift
IF the South Coast Water Treatment Plant is upgraded and wastewater is treated and reclaimed for non-potable uses such as agricultural irrigation and aquifer recharge, THEN Barbados will increase its water resilience to climate change by improving water security, and enhancing ecosystem resilience BECAUSE the implementation of advanced wastewater treatment will enhance water resource availability, reduce pressure on potable water sources, restore ecosystems, and strengthen institutional capacity for sustainable water management.
Outcomes and co-benefits
Outcome 1. Availability of high-quality reclaimed water for non-potable uses, reducing the dependence on potable water sources and enhancing water supply resiliency
Co-benefit 1. Reduced GHG emissions
Co-benefit 2. Reduced pollution impacts on water bodies and ecosystems.
Outcome 2. Efficient delivery of reclaimed water for agricultural irrigation and aquifer recharge, contributing to water security and sustainable agricultural practices.
Outcome 3. Improved ecological health and resilience of Graeme Hall Swamp, supporting biodiversity and ecosystem services
Outcome 4. Enhanced institutional capacity, public awareness, gender inclusivity for water resource management.
Outputs
1.1 New South Coast Water Reclamation and Re-use Facility (SCWRRF) constructed and operating
1.2 Existing South Coast Sewage Treatment Plant (SCSTP) upgraded and operating
2.1. Infrastructure for water reuse and aquifer recharge installed
2.2 Aquifer Recharge Infrastructure constructed and operating
3.1 Natural Heritage Management Plan developed and implemented
3.2 Solar Energy Generation Plant with Battery Storage implemented
4.1 Governance and managerial capacity of BWA improved
4.2 Equal participation of women and PwD within BWA achieved
4.3 BWA's monitoring systems to track water quality, quantity, and climate-related parameters implemented
4.4 BWA's planning and monitoring platform designed, integrated, and implemented
4.5 Public awareness and stakeholder engagement plan designed/upgraded and implemented
4.6 GAS laboratory capacity strengthened
4.7 BADMC's FEED Program strengthened
Activities
Component 1. Water Reclamation Infrastructure
1.1.1 Design and construction of New South Coast Water Reclamation and Re-use Facility (SCWRRF) to provide secondary and tertiary treatment
1.1.2 Supervision
Component 2. Reclaimed Water Reuse
2.1.1 Installation of pipeline for irrigation, and a high-water mark catchment area
2.1.2 Supervision
2.2.1 Installation of water pipeline, injection and monitoring wells, and ancillary equipment for aquifer recharge
2.2.2 Supervision
Component 3. Climate change and biodiversity opportunities
3.1.1 Development of baseline assessments
3.1.2 Establishment of a formal environmental monitoring and reporting program
3.1.3 Management, monitoring and control activities during project life
3.1.4 Support for inter-ministerial coordination and collaboration with the private sector and academia
3.1.5 Repair, operation, and maintenance of hydraulic systems
3.1.6 Collection and analysis of samples gathered by various agencies during project life
3.2.1 Design and installation of PV plant/panels and BESS at the pumping station
Component 4. Institutional Strengthening
4.1.1 Development and implementation of Aquarating action plan for BWA
4.1.2 Implementation and training of/for a GMS in BWA
4.2.1 Development and implementation of an Institutional Gender and PwD Action Plan for BWA
4.2.2 Formulation of an institutional gender policy to drive a partnership between BWA and UWI IGDS and expand the training offering
4.2.3 Development of a SEP with a gender and diversity focus
4.2.4 Development and implementation of communication programs for public promotion of the project, the benefits of wastewater reuse and the construction of community support
4.2.5 Ensuring gender considerations are integrated into climate change adaptation and mitigation strategies
4.2.6 Increase of capabilities and leadership for the adoption of irrigation technologies, and to leverage the mechanisms available for access to water services
4.3.1 Design and implementation of MRV system to track water and climate-related parameters
4.4.1 Systems design, integration, and implementation of planning and monitoring platform for BWA
4.5.1 Design and implementation of awareness campaigns on water use and water conservation
4.6.1 Assessment of laboratory capacities of GAS and development of action plan
4.6.2 Action Plan for the provision of equipment, supplies and training to GAS implemented
4.7.1 Assessment on technical support capacities of BADMC on sustainable agricultural practices and irrigation for small farmers
4.7.2 Implementation of technical support action plan on sustainable agricultural practices
Barriers and risks
Barrier 1. Limited knowledge on the usefulness of reclaimed water as a resource.
Barrier 2. Inadequate up-to-date technologies on water treatments.
Barrier 3. Inefficient use of water resources leading to higher demands.
Risk 1. Increase in occurrence and magnitude of climate hazards beyond the expected scenarios.
Barrier 4. Depletion of freshwater resources and potential damage to ecosystems.
Risk 2. Financial stability risks. Related to fiscal deficit and public debt.
Barrier 5. Institutions lack strong governance mechanisms for climate change and natural resources due to limited technical capacities.
Barrier 6. Lack of systematic and solid monitoring and evaluation data.
Barrier 7. Poor dissemination of best practices and successful stories.
Assumptions
• The communities are willing to accept the use of reclaimed water as a resource.
• Market conditions in the water sector remain stable during project implementation.
• The technology required for the project is mature and available in the Barbados' market, and the water sector is ready to scale up operations.
• No adverse external events (public health emergencies, natural disasters, armed conflicts) disrupt timely implementation of key project elements.

B.2 (b). Outcome mapping to GCF results areas and co-benefit categorization

Outcome number	GCF Mitigation Results Area (MRA 1-4)				GCF Adaptation Results Area (ARA 1-4)			
	MRA 1 Energy generation and access	**MRA 2** Low-emission transport	**MRA 3** Building, cities, industries, appliances	**MRA 4** Forestry and land use	**ARA 1** Most vulnerable people and communities	**ARA 2** Health, well-being, food and water security	**ARA 3** Infrastructure and built environment	**ARA 4** Ecosystems and ecosystem services
Outcome 1	☐	☐	☐	☐	☐	☐	☒	☐
Outcome 2	☐	☐	☐	☐	☒	☒	☐	☐
Outcome 3	☐	☐	☐	☐	☐	☐	☐	☒
Outcome 4	☐	☐	☐	☐	☒	☒	☐	☒
Outcome ...	☐	☐	☐	☐	☐	☐	☐	☐
Outcome ...	☐	☐	☐	☐	☐	☐	☐	☐

Co-benefit number	Co-benefit					
	Environmental	**Social**	**Economic**	**Gender**	**Adaptation**	**Mitigation**
Co-benefit 1: Reduced GHG emissions	☐	☐	☐	☐	☐	☒
Co-benefit 2: Reduced pollution impacts on water bodies and ecosystems	☒	☒	☐	☐	☐	☐

Regarding the Strategic Plan for the Green Climate Fund 2024–2027, GCF aims to achieve or surpass its portfolio-level mitigation and adaptation targets, delivering a mitigation of 1.5 to 2.4 gigatonnes of CO2 equivalent and enhancing the resilience of 570 to 900 million people for the period 2024-2027.

On the other hand, one of the GCF's programming priorities for 2024-2027 is addressing urgent and immediate adaptation and resilience needs for particularly vulnerable countries, including SIDS. The SCWRP makes a significant contribution in this regard, as it presents a holistic approach to water management that enhances resilience and adaptation in Barbados, a country highly susceptible to the adverse effects of climate change.

Through the construction of the New SCWRRF the project promotes water reuse for irrigation, thereby enhancing food security by ensuring a sustainable water supply for agriculture. Additionally, the installation of aquifer recharge infrastructure facilitates the replenishment of groundwater resources, bolstering water availability and resilience against droughts. Moreover, the integration of solar energy generation with battery storage enhances the resilience of the water sector by providing electricity redundancy, ensuring the continued operation of critical infrastructure during power outages.

Additionally, the GCF Strategic Plan delineates 11 Targeted Results extending from 2024 to 2027, with the project directly impacting two of these outcomes. The Project contributions are the following:

- Target Result 4. Food: 194 beneficiaries adopting low-emission climate-resilient agricultural practices, securing livelihoods while reconfiguring food systems.
- Target Result 5. Ecosystems: 33 hectares of terrestrial and marine areas restored.

- Target 6: 1 developing country supported to develop low-emission climate resilient infrastructure.
- Target 7: 1 developing country supported to increase renewable energy sources in the energy mix.
- Target 9: 1 Proposal for adaptation projects.

B.3. Project/programme description (max. 2500 words, approximately 5 pages)

The SCWRP aims to upgrade the SCSTP into a modern Water Resource Recovery Facility, enhancing Barbados' water 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 nearshore coral reef ecosystems, and contributing to food security and rural livelihoods by utilizing reclaimed water for agricultural irrigation in smallholder farming districts.

To attain the intended outcomes elaborated in Section B.2, the Project includes the following components:

- Component 1: Water Reclamation Infrastructure
- Component 2: Reclaimed Water Reuse
- Component 3: Climate Change Biodiversity Opportunities
- Component 4: Institutional Strengthening

Component 1 involves the construction of the New SCWRRF and the upgrading of the existing SCSTP. It is primarily intended to produce high-quality reclaimed water to augment the amount of water available for non-potable uses and diversify water sources. **Component 1** also have an impact on **Co-benefit 2**, given though it seeks to improve the treatment level and capacity of the plant, thereby preventing potential contamination of the swamp due to emergency discharges. Advanced treatment at the SCWRRF and odor control at SCSTP minimize untreated effluent, mitigating pollution risks. Additionally, this reduced pollution will potentially improve the ecosystem services of coral reefs.

Component 2 encompasses the construction of a pipeline for agricultural irrigation with reclaimed water, along with the essential infrastructure for aquifer recharge (comprising pipelines and wells). This enables the direct reuse of the treated water generated in Component 1. The implementation of both components together allows the availability of high-quality reclaimed water for non-potable uses, reducing the dependence on potable water sources and enhancing water supply resiliency (**Outcome 1**) and enhances the efficient delivery of reclaimed water for agricultural irrigation and aquifer recharge, contributing to water security and sustainable agricultural practices (**Outcome 2**). These first two components equally support both outcomes, acting in a complementary and interdependent manner.

These infrastructures will significantly contribute to diminishing the utilization of potable water for irrigation, ensuring the availability of this resource for other essential purposes. Moreover, they will help safeguarding aquifers in two ways: reducing the extraction of agricultural water and recharging the aquifer with reclaimed water. These actions will serve as a protective measure against saline intrusion, enhancing the resilience and sustainability of aquifer systems. The use of reclaimed water will improve household water supply, allowing a more efficient use of the resource. Likewise, awareness campaigns, leak reduction, and diversification of water sources will contribute to more stable and reliable access to water, which will also result in more efficient use. As supply interruptions decrease, gender inequalities caused by water scarcity will be reduced, allowing women to have more time to engage in productive, educational, and even leisure activities.

Component 3 includes two sets of activities: on one hand, conservation measures for biodiversity protection at the Graeme Hall Swamp; on the other hand, solar energy generation with battery storage. The first set of activities primarily contributes to **Outcome 3** (improved ecological health and resilience of Graeme Hall Swamp, supporting biodiversity and ecosystem services). These activities involve developing studies to enhance the understanding of the swamp and implementing measures to restore mangrove ecosystems, aiming at improving ecosystem services of coastal protection and biodiversity conservation while helping reduce pollution impacts on water bodies and ecosystems (**Co-benefit 2**). Regarding the implementation of

solar energy generation, this activity will contribute to water security (**Outcome 2**) by providing energy redundancy to the treatment plants. It will also help mitigate the increased energy consumption of the upgraded treatment plant, therefore strongly supporting **Co-benefit 1**: Reduced GHG emissions.

Finally, **Component 4**, related to Institutional Strengthening, is directly targeted to support **Outcome 4** (enhanced institutional capacity, public awareness, gender equality and social inclusion for water resource management). In this regard, the activities aimed at improving the governance and project management capacity of BWA through the implementation of an action plan based on AquaRating (4.1.1) will improve decision-making processes, resource allocation, and overall management efficiency, thereby establishing a solid foundation for a well-structured policy framework. The development and implementation of an Institutional Gender and Persons with Disabilities Action Plan (4.2.1.) ensures inclusivity and diversity within the project's institutional framework, fostering a more comprehensive and sustainable policy environment. In addition, other activities to promote gender and social inclusion include the formulation of an institutional gender policy to drive a partnership between BWA and UWI IGDS[16], and expand the training offering (4.2.2.), a gender-sensitive mapping of actors and specific consultations on gender and social inclusion aspects (4.2.3.), the development and implementation of communication programs for public promotion of the project, the benefits of wastewater reuse and the construction of community support (4.2.4.), the implementation of gender and diversity considerations into climate change adaptation and mitigation strategies within the Project (4.2.5.), and the delivery of education programs targeting farmers, particularly women, to enhance capabilities and leadership for the adoption of irrigation technologies, and to leverage the mechanisms available for access to water services (4.2.6.).The activity of implementing robust monitoring systems (4.3.1.) to track water and climate-related parameters ensures the availability of reliable data for evidence-based decision-making. Implementing and training in the use of a Groundwater Modeling System (GMS) in BWA (4.1.2) ensures responsible and sustainable use of groundwater resources. Lastly, conducting public awareness and stakeholder engagement campaigns (4.5.1.) will raise awareness and involve the community, contributing to building a more informed and supportive public, and strengthening the overall policy framework of the reclaimed water project.[17]

Furthermore, Component 4 contributes to facilitating health ecological improvement (**Outcome 3**) and pollution impacts reduction (**Co-benefit 2**) within the NHCA, since the operation of the treatment plant can exert direct impacts and risks on the adjacent area. Component 4 will guarantee the proper operation of the facilities, thereby ensuring harmonious coexistence between the plant and the swamp ecosystem.

The table below summarizes the project elements that will overcome each one of the barriers identified in section B.2.

Barrier	**Interventions to overcome the barrier**
Barrier 1. Limited knowledge on the usefulness of reclaimed water as a resource.	The project will overcome the barrier of limited knowledge about reclaimed water by demonstrating its benefits through case studies from refurbishing and constructing plants. These real-world examples will show reclaimed water's feasibility, safety, and advantages for uses like agricultural irrigation and aquifer recharge. Additionally, comprehensive studies will provide scientific evidence of its benefits, such as improved water quality and crop yields. Disseminating these findings through publications and workshops will build stakeholder confidence and expand understanding of reclaimed water's potential (Output 4).
Barrier 2. Inadequate up-to-date technologies on water treatments.	The project involves a comprehensive upgrade of the SCSTP, including refurbishing or replacing influent lift pump station and headworks equipment, and installing an odor control system to address environmental concerns. Enhancements will also include new installations to improve treatment capabilities, covering all process units and ancillary facilities to deliver secondary and tertiary treatment, an Advanced Water Treatment (AWT) side stream, an equalization basin, and advanced sludge treatment and management

[16] University of the West Indies, Institute of Gender and Development Studies (UWI IGDS).

[17] There will be an open, and inclusive engagement process with all stakeholders, including women, women's groups or organizations and marginalized groups. The gender and disability approach will be integrated by: (i) calling on organizations committed to gender and disability inclusion to participate in activities and events; (ii) conducting consultations at adequate times and on days to ensure the participation of women and people with disabilities; (iii) ensuring accessibility in meeting spaces; (iv) registering attendees at events disaggregating data by gender and disability status; (v) including any other measures considered relevant to ensure the participation of these and other marginalized groups.

	systems. The project aims to reduce greenhouse gas emissions, promote circular economy principles, and explore energy production options, while integrating climate change considerations to enhance resilience and sustainability in wastewater management (Output 1).
Barrier 3. Inefficient use of water resources leading to higher demands.	Addressing inefficient water resource use in Barbados requires enhancing governance, implementing monitoring systems, and engaging stakeholders. The Barbados Water Authority (BWA) will improve water conservation policies, demand management, and distribution efficiency while strengthening managerial capabilities for informed decision-making. Robust monitoring systems will use advanced technologies to track consumption and climate impacts, enabling proactive management. Public awareness campaigns and stakeholder engagement will promote responsible water use and community involvement, fostering a culture of conservation and sustainable water management practices for long-term resource sustainability and resilience (Output 4).
Barrier 4. Depletion of freshwater resources and potential damage to ecosystems.	The initiative entails conducting additional studies to assess the environmental condition of the Graeme Hall Swamp (that has been used for the emergency discharge of SCSTP effluent), including water quality, habitat integrity, and biodiversity, to inform targeted conservation and restoration efforts. The biodiversity action plan tailored to swamp conservation will include conservation measures, outline habitat restoration efforts, and present ecosystem management strategies to promote biodiversity conservation and ecosystem resilience, while engaging stakeholders in collaborative initiatives Through these coordinated efforts, authorities can effectively manage and protect freshwater resources and ecosystems, ensuring their long-term sustainability for future generations (Output 3).
Barrier 5. Institutions lack strong governance mechanisms for climate change and natural resources due to limited technical capacities	Addressing this barrier requires targeted efforts to enhance governance structures and managerial capacity within organizations like BWA. By investing in professional development and empowering staff with the necessary knowledge and skills, institutions can strengthen their governance mechanisms, enhance transparency and accountability, and effectively navigate the complexities of climate change and natural resource management. Additionally, fostering a culture of continuous learning, innovation, and collaboration within institutions further facilitates adaptive management strategies and promotes resilience in the face of environmental challenges. (Output 4).
Barrier 6. Lack of systematic and solid monitoring and evaluation data.	Firstly, conducting studies to assess the benefits and potential impacts or risks of the new plant will provide valuable insights into water usage, discharge patterns, pollutant emissions, and ecological impacts, facilitating evidence-based decision-making and policy formulation. Secondly, implementing robust monitoring systems to track water and climate-related parameters is essential for ensuring data accuracy, reliability, and comprehensiveness. By deploying advanced monitoring technologies and data management systems, authorities can collect real-time data on water quality, quantity, and climate-related parameters, enabling continuous monitoring and analysis of environmental trends and impacts. Together, these activities will enhance transparency, accountability, and responsiveness in water resource management, enabling stakeholders to identify emerging threats, assess mitigation measures, and make timely interventions to safeguard water resources and ecosystems, thereby overcoming the barrier of a lack of systematic and solid monitoring and evaluation data. (Outputs 3 and 4)
Barrier 7. Poor dissemination of best practices and successful stories.	Addressing the barrier of poor dissemination of best practices and successful stories requires targeted efforts through public awareness and stakeholder engagement campaigns. By highlighting case studies, testimonials, and success stories, stakeholders can gain valuable insights into effective strategies, approaches, and initiatives that have yielded positive outcomes in similar contexts. Through interactive workshops, seminars, and communication channels, stakeholders will have opportunities to share experiences, discuss challenges, and co-create solutions, promoting continuous improvement and innovation in practice. These initiatives will help to overcome the barrier of poor dissemination of best practices and success stories, enabling stakeholders to replicate successful models and drive positive change across sectors and communities (Output 4).
Barrier 8. Lack of effective initiatives and policies to address gender and diversity disparities.	The project seeks to address gender disparities, elevate women's participation, and create an enabling environment for marginalized groups, thereby contributing to the resilience and sustainability of the Barbados Water Resilience Project. Activities include the development and implementation of a Gender and Diversity Assessment and Action Plan for BWA;

Below is a concise overview of the aforementioned components, specifying their key characteristics.

Component 1. Water Reclamation Infrastructure ($63.4 Million). This component will finance the construction of the New SCWRRF 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 1 year[18], including climate change considerations. 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 the aim to reduce GHG emissions and considerations for circular economy and energy production. 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 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.

The outputs of Component 1 are the following:

Output 1.1 New SCWRRF constructed and operating

This output includes the following activities:

Activity 1.1.1.: Design and construction of the SCWRRF to provide secondary and tertiary treatment.

Activity 1.1.2: Supervision.

Output 1.2 Existing SCSTP upgraded and operating

This output includes the following activities:

Activity 1.2.1: Upgrade, refurbish, or replace equipment in the existing SCSTP, and commission of plant.

Activity 1.2.2: Supervision.

Component 2: Reclaimed Water Reuse ($19.6 Million). This component will finance:

Output 2.1. Infrastructure for water reuse and aquifer recharge installed ($ 14.28 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 (“Trailway”) and ancillary equipment, and a high-water mark catchment area to allow the irrigation pipeline to be gravity fed.

This output includes the following activities:

Activity 2.1.1: Installation of pipeline for irrigation, and a high-water mark catchment area

Activity 2.1.2: Supervision

Output 2.2. Aquifer Recharge Infrastructure constructed and operating (5.32 Million), consisting of the installation of 4 km water pipeline, 5 injection wells, 6 exploratory boreholes, 3 abstraction boreholes and pump stations, 3 monitoring wells and ancillary equipment for aquifer recharge, with due considerations of resiliency and adaptation to climate change measures as well as low carbon emissions.

This output includes the following activities:

[18] Y1 O&M to be financed by IDB loan. BWA will then pursue under a separate contract for (outside the scope of project financing) with the Contractor for an operational assistance program for 3 years (Y2 to Y4) to support integration of BWA staff in O&M, including BWA staff initially shadowing the Contractor and then eventually supervision by the Contractor while BWA staff execute O&M. Full O&M responsibilities will be assumed by the BWA from Y5 onwards.

Activity 2.2.1: Installation of water pipeline, injection and monitoring wells, and ancillary equipment for aquifer recharge

Activity 2.2.2: Supervision

The Operation and Maintenance Cost per year* for **Components 1 and 2** are the following:

Process Area	**Class 5 Estimate – Opex (US$)**
Headworks – Rehabilitation of Existing Screening Structure	1,920,000
Secondary treatment	
Tertiary treatment (disk filters and UV disinfection)	140,000
AWT (UF/ RO)	1,685,000
Reclaimed water pipelines and recharge wells	175,000
Total	**3,920,000**

**for two years (2025-2026)*

Component 3: Climate change and biodiversity opportunities ($16 Million).

Output 3.1. Natural Heritage Management Plan developed and implemented ($2 Million) supports development and implementation of a Monitoring Plan for the NHCA: biodiversity, hydrogeology, soils, general use and community engagement. This plan will guide development of the Integrated Management Plan for NHCA.

The Bisecting Canal within the Swamp has been utilized for emergency discharge of effluent from the SCSTP, resulting in the release of untreated effluent into the Graeme Hall Swamp. Given the swamp's isolation from the sea, pollutants accumulate within its confines, leading to ecosystem degradation over time. Additionally, pollution originating upstream in the Graeme Hall Watershed, stemming from various land uses and sources, further exacerbates the issue. These contaminants, arising from diverse sources, present significant threats such as eutrophication and the introduction of various toxins (see section B.1).

The Graeme Hall Swamp serves as a vital element of the watershed's floodplain, functioning as a natural reservoir for subsurface drainage and stormwater runoff from nearby agricultural and residential areas. Therefore, restoring the swamp's functionality is crucial not only for preserving its intrinsic ecological worth but also for mitigating flood risks and building the resilience of neighbouring communities against natural disasters and to climate change.

The implementation of the new treatment plant will prevent the discharge of untreated wastewater into the swamp, while activities under subcomponent 3.1 aim to restore the NHCA and enhance its ecosystem services which contributes to the increased resilience of the island's natural heritage system, and by extension, the island as a whole. Specifically, restoration of the Graeme Hall Swamp and improvement of the ecosystem services at the Swamp and associated marine environment may contribute to blue carbon potential and is aligned with marine spatial planning through their shared goal of promoting sustainable management and conservation of coastal resources that bolster climate resilience. The inclusion of this therefore utilizes a holistic and science-based management approach that emphasizes the interlinkages between the Graeme Hall NHCA and the SCWRRF/SCSTP.

This output includes the following activities:

Activity 3.1.1: Development of baseline assessments

Activity 3.1.2: Establishment of a formal environmental monitoring and reporting program

Activity 3.1.3: Management, monitoring and control activities during project life

Activity 3.1.4: Support for inter-ministerial coordination and collaboration with the private sector and academia

Activity 3.1.5: Repair, operation, and maintenance of hydraulic systems

Activity 3.1.6: Collection and analysis of samples gathered by various agencies during project life

Output 3.2. Solar energy generation with battery storage implemented ($14 million) consisting of estimated 7 MW of solar photovoltaic panels and associated energy storage capacity on lands owned by the BWA, increasing the resilience of the BWA pumping stations by allowing continued operation in case of a power outage, and mitigating the additional carbon footprint of the upgraded wastewater treatment facilities.

This output will enhance the resilience of the water sector by furnishing energy redundancy to the treatment plants, while assisting in mitigating the escalated greenhouse gas emissions resulting from the amplified energy consumption linked to the upgraded treatment plant.

This output includes the following activity:

Activity 3.2.1: Design and installation of solar photovoltaic plant/panels (PV), and BESS at the pumping station.

Component 4: Institutional Strengthening ($1.5 Million)**.** This component will finance institutional strengthening activities including: (i) Improving the governance and project management capacity of BWA through the implementation of an action plan based on AquaRating and training in O&M 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 (¶1.45); (iii) Implementing robust MRV)systems to track water quality and quantity, soil quality and climate-related parameters; (iv) Developing and implementing a planning and monitoring system for BWA; (v) Developing and implementing an action plan to increase capacity at GAS; (vi) Strengthening the BADMC Farmers' Empowerment and Enfranchisement Drive program; and (vii) Designing and implementing public awareness and stakeholder engagement campaigns to promote the benefits of wastewater reuse and build community support.

The outputs of Component 4 with their respective activities are the following:

Output 4.1 Governance and managerial capacity of BWA improved

Activity 4.1.1: Development and implementation of Aquarating action plan for BWA

Activity 4.1.2: Implementation and training of/for a Ground Water Modeling System (GMS) in BWA

Output 4.2. Equal participation of women and Persons with Disabilities (PwD) within BWA achieved

Activity 4.2.1: Development and implementation of an Institutional Gender and PwD Action Plan for BWA

Activity 4.2.2: Formulation of an institutional gender policy to drive a partnership between BWA and UWI IGDS and expand the training offering

Activity 4.2.3 Development of a Stakeholder Engagement Plan with a gender and diversity focus

Activity 4.2.4: Development and implementation of communication programs for public promotion of the project, the benefits of wastewater reuse and the construction of community support

Activity 4.2.5: Ensuring gender considerations are integrated into climate change adaptation and mitigation strategies

Activity 4.2.6: Increase of capabilities and leadership for the adoption of irrigation technologies, and to leverage the mechanisms available for access to water services

Output 4.3. BWA's monitoring systems to track water quality, quantity, and climate-related parameters implemented:

Activity 4.3.1: Design and implementation of a MRV system to track water and climate-related parameters

The BWA will deploy monitoring and data management systems to collect data on water quality and quantity, as well as climate-related metrics, enabling monitoring and analysis of trends and environmental and climate resilience impacts. These will be measured by installing a smart flow meter at the outlet of the SCWRRF.

Analysis of water samples will provide the information on reclaimed water quality (parameters include total suspended solids (TSS); Biological Oxygen Demand (BOD); Total Nitrogen; Total Phosphorus (as needed); Total Coliform; Fats, Oil and Grease (GOG); and Total Dissolved Solids (TDS)) and results will be monitored to ensure compliance with stipulated effluent quality standards. These water quality standards are provided in the annex.

Output 4.4. BWA's planning and monitoring platform designed, integrated, and implemented

Activity 4.4.1: Systems design, integration, and implementation of planning and monitoring platform for BWA

Output 4.5. Public awareness and stakeholder engagement plan designed/upgraded and implemented

Activity 4.5.1: Design and implementation of awareness campaigns on water use and water conservation

Output 4.6. Government Analytical Services (GAS) laboratory capacity strengthened

Activity 4.6.1: Assessment of laboratory capacities of Government Analytical Service (GAS) and development of action plan

Activity 4.6.2: Action Plan for the provision of equipment, supplies and training to GAS implemented

Output 4.7. BADMC's Farmers Empowerment and Enfranchisement Drive (FEED) Program strengthened

Activity 4.7.1: Assessment on technical support capacities of BADMC on sustainable agricultural practices and irrigation for small farmers

Activity 4.7.2: Implementation of technical support action plan on sustainable agricultural practices (water use and conservation), extension, training

Project administration, evaluations, external audits and other costs ($3.15 Million). This component will finance project management expenses including, support for project execution (PEU) dedicated staff, audits, project monitoring and evaluation, communication, and supervision and implementation of an Environmental and Social Management Plan (ESMP). The component will also finance construction supervision services for the water reclamation infrastructure works.

Contingency resources ($6.35 Million). This component will finance unanticipated costs arising from risks factors during construction of the new SCWRRF, upgrades to the SCSTP and construction of the aquifer recharge infrastructure.

The project's implementation period spans 5 years, encompassing the construction of the plant, pipelines, and associated components.

Analysis of Alternatives

As part of the prefeasibility study for the SCSTP Upgrading (BWA, 2020)[19] four screening-level options were selected for the end uses of reclaimed water, and these options are described below.

- **Scenario A** which includes the following end uses: Potable aquifer recharge in St. Philip Aquifer; Unrestricted agricultural food crop irrigation at River Plantation, Sandford/Mapps, and Golden Grove areas in St. Philip;
- **Scenario A1** which includes the following end uses: Non-potable aquifer recharged in Christ Church Aquifer; Unrestricted agricultural food crop irrigation at River Plantation, Sandford/Mapps, and Golden Grove areas in St. Philip;
- **Scenario B** which includes the following end uses: Non-potable aquifer recharged in Christ Church Aquifer; Unrestricted agricultural food crop irrigation at Gibbons Boggs, Fairy Valley and Fairview areas;
- **Scenario C** which includes the following end uses: Potable aquifer recharge in St. Michael Aquifer; Unrestricted agricultural food crop irrigation at St. George Valley.

A triple bottom line (TBL) analysis for potential impacts of water reclamation on the region was used to select the scenario that best suits the goals of the project. The following factors were considered: Public Health Risk/Regulatory Compliance; Economic Boost/Food Security; Potential Impacts to Marine Environment; Potential Impacts to Groundwater Resources; Relative Operation and Maintenance Costs; Relative Capital Costs of Treatment Facility Upgrades.

The Figure below shows the summary of the TBL Analysis, and the scores obtained by the scenarios for the different factors considered. According to these scores **scenario A1 was selected as the preferred water reclamation option**. Scenario A1 consists of non-potable water reclamation involving the use of reclaimed water for agricultural food crop irrigation in the River Plantation area and for non-potable aquifer recharge in the Christ Church aquifer.

[19] BWA (2020). https://barbadoswaterauthority.com/virtual-townhall-meeting-south-coast-water-reclamation-project/

		Scenario A		Scenario A1		Scenario B		Scenario C	
Potable Aquifer Recharge Location		St. Philip Aquifer		N/A		N/A		St. Michael Aquifer	
Non-Potable Aquifer Recharge Location		Optional		Christ Church Aquifer		Christ Church Aquifer		Optional	
Food Crop Irrigation Location		River Plantation		River Plantation		Gibbons Boggs/Fairy Valley Irrigation		St. George Valley Irrigation	
Social Factors	Potential Health Risks (Regulatory Compliance)	Designed to meet requirements	5	Designed to meet requirements	5	Designed to meet requirements	5	Designed to meet requirements	5
	Food Security (Additional Agricultural Expansion)	Addresses the need for water. Highest potential agricultural acreage	5	Addresses the need for water. Highest potential agricultural acreage	5	Moderate potential agricultural acreage	3	Relatively lower potential agricultural acreage	2
Environmental Factors	Impacts to Marine Environment	Reduces discharge of effluent to marine outfall but generates concentrate	3	Reduces discharge of effluent to marine outfall	4	Reduces discharge of effluent to marine outfall	4	Reduces discharge of effluent to marine outfall but generates concentrate	3
	Groundwater Impacts (Quality & Quantity)	Augments GW quantity, potentially enhances GW quality, and potentially reduces GW pumping	4	Augments GW quantity and potentially reduces GW pumping	3	Augments GW quantity and potentially reduces GW pumping	3	Augments GW quantity, potentially enhances GW quality, and potentially reduces GW pumping	4
Financial	Relative Capital Cost	1.38x	3	1.06x	4.5	1x	5	1.23x	3.5
	Relative Operational Cost	1.24x	3	1.03x	4.5	1x	5	1.21x	3.5
Total			23		26		25		21

Water Reclamation Treatment Approaches

Considering the reclaimed water destinations, diverse approaches along the different stages of treatment were compared in the study, and the best one was chosen for each stage. The following table shows conclusions for the different stages:

Stage	Considerations
Headworks	• The existing headworks facility is suitable for rehabilitation and can potentially be retrofitted with new process equipment where needed. • It would be less expensive to retrofit the existing facility and replace the medium screening with 6 mm bar screens. If a conventional activated sludge (CAS) process is selected for the secondary process (below), then the fine screening will not be required and can be removed from the treatment train. • A new lift station will need to be constructed to pump the screened wastewater to secondary treatment. The size of the lift station is expected to be approximately 5 m x 3 m. • Additional changes: replacing the screens, retrofitting the grit system, new engineered odor control system, new air conditioning system, and the screenings from the headworks will be stored in a new enclosed container ventilated to odor control.
Secondary Treatment Comparison	The comparison of the four-stage Bardenpho conventional activated sludge with a membrane bioreactors system allowed to conclude that the first is best for this case because among other things, it has a long track record; it is simple to operate; it is consistent with other treatment plants in Barbados (commonality in training and parts); it has low operational cost; its ability to consistently meet < 5 mg/L TN.
Filtration	The comparison between Disk Filtration; Granular Media Filtration; and Low-Pressure Membrane Filtration allowed to conclude that a disk filtration process would be the chosen technology. It is the solution that implies the lowest capital cost, the lowest energy cost and the lower pumping and storage needs.
Disinfection	Pathogen removal/ inactivation is a foremost requirement for any water reclamation project, and it may be done through chlorination or UV disinfection. The comparison between both technologies allowed to conclude that UV disinfection is the best solution. However, chlorination (i.e., chlorine residual) should be used for maintaining the pipelines and injection wells.
Side Stream Salinity Reduction Options	The comparison between Reverse Osmosis (RO) and Electrodialysis Reversal (EDR) showed that RO is the best solution for the non-potable water reclamation scenarios.

Solids and Residuals Handlin	Thickening – dissolved air flotation is the technology recommended because its ability to handle solids limitation, and therefore is suitable for high flow, and low concentration of mixed liquor wasting. • Digestion – Two 13-meter digesters will be required. • Dewatering – Dewatering of digested solids will be accomplished using drying beds. It is estimated that the plant will require a sludge bed area of approximately 75 m x 75 m.

Sizing

The new treatment system was designed based on an average dry weather flow (ADWF) of 9,000 m³/day, which matches the current average daily capacity of the SCSTP, also at 9,000 m³/day. The sizing of the plant considers both existing flows as well as future flows. Existing flow rate data indicate an average daily flow rate of around 6,000 m3/day, but this does not account for peak weather flows, which can be as high as 16,000 m3/day. These flow rates were, however, measured during the Covid-19 pandemic and do not account for flows associated with a typical high tourist season. Additionally, the BWA has indicated plans for expansion of the sewerage network (starting with an expansion of 300 connections in the near future).

Process Flow Diagram of Preliminary Design

This section describes the process flow diagram for the new plant[20], necessary for Scenario A1, as outlined in the prefeasibility study.

The diagram below (Figure 1) is a simplified schematic of the entire system showing broad system components (detailed process flow diagrams for the plant and conceptual site layout are provided separately in Figure 2).

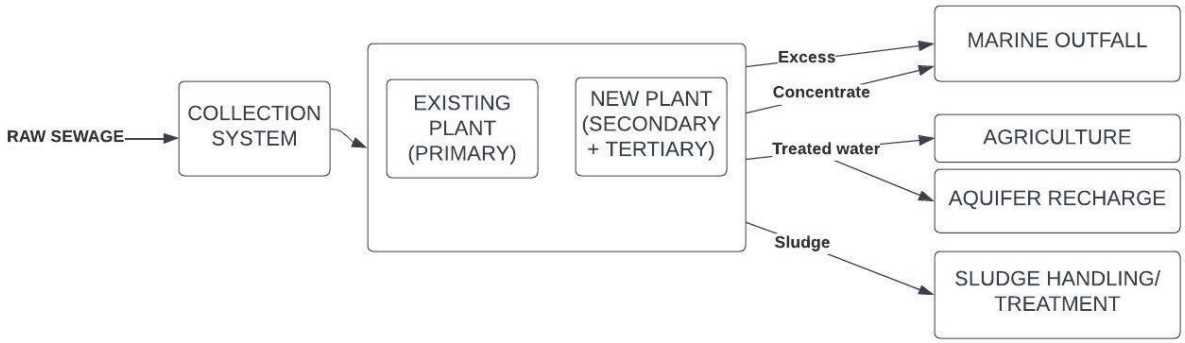


Figure 1. simplified schematic of the entire South Coast Sewage Treatment System.

The influent flow (2000 households currently connected to SCSTP will be received by the headworks and conveyed to the lift station after undergoing screening and grit removal. From the lift station, the flow will be pumped to the channel upstream of the CAS (Conventional Activated Sludge) systems (two operating in parallel), where the flow from the headworks and the Return Activated Sludge (RAS) will be combined before entering the CAS system. Treatment through CAS will remove a portion of the carbon and nitrogen present in the wastewater.

From the CAS, water will flow by gravity to the secondary clarifiers. The secondary clarifiers will remove a large portion of the solids formed during the biological treatment. Through a dedicated pump station, the secondary clarifier underflow will be recirculated to the CAS as RAS. The waste activated sludge will be diverted to a dissolved air flotation (DAF) thickener, and after thickening to the aerobic digester. The sludge from the aerobic digester will be pumped to the drying beds and, after drying, it will be collected for off-site disposal.

[20] This includes all the improvements in the plant: refurbishment of the existing SCSTP and new SCWRP to provide secondary and tertiary treatment.

The effluent from the secondary clarifier will be conveyed by gravity to tertiary disk filters or diverted to the marine outfall when the flow exceeds 18,000 m3/day. The tertiary filters will remove residual solids from the secondary clarifier.

The effluent from the disk filters will flow by gravity to the UV system. The UV system will provide disinfection by inactivating pathogens. Downstream of the UV system, the disinfected water will be collected in an underground basin that will function as a wet well for pumps that will feed the advanced water treatment (AWT) facility. Excess water will discharge to the marine outfall. There will also be the option to feed a storage tank when flows to the treatment plant are low.

A side stream will be treated through reverse osmosis (RO) to meet the 450 mg/L TDS limit for the product water (Figure 2). UV-treated water will be first pumped through a strainer and then through the microfiltration (MF) or ultrafiltration (UF) skids. This treatment will remove fine particulates before RO. After MF/UF treatment, the flow will be collected in an MF/UF break tank that will provide a point for hydraulic control and simplify controls to feed the RO system. From the MF/UF break tank, water will be pumped through the RO cartridges. The cartridges protect the RO from fine particulate and biological growth that may have developed in the pipes feeding the RO. If needed, RO pre-treatment chemicals, such as sulfuric acids and antiscalants, will be added (an inline static mixer should be provided). A small dose of chloramines is also recommended to limit biological growth in the piping feeding the RO. After the addition of pre-treatment chemicals, the flow will be pumped through another set of high-pressure pumps to the RO skids. In this case, the objective of the RO treatment is the removal of salts. The rejected brine from the RO will be conveyed to the marine outfall. The chemical stabilization of RO permeate may not be required. If any chemical stabilization is required, passing a side stream of the RO-treated water through a calcite bed for remineralization should be sufficient. In the end, RO permeate, and UV-treated water will be blended in the pipe (using a static mixer) in approximated 3 RO / 2 UV ratio (assuming 1000 mg/L TDS in the UV-treated water). Sodium hypochlorite to provide residual disinfection should also be added at this stage. The blended water will be collected in a storage tank that will function as a wet well for the pumps feeding the non-potable aquifer recharge and irrigation pipeline.

The marine outfall associated with the SCSTP[21] will discharge into the sea:

- Effluent from the secondary clarifier when the flow exceeds 18,000 m3/d;
- Excess disinfected water (with tertiary treatment) if a storage tank for this water is not foreseen in the project (< 12,000 m3/d); and
- Rejected brine from the RO (900 m3/d).

Water for irrigation and for aquifer recharge (reclaimed water) will result from part of the excess disinfected water (with tertiary treatment) diluted with RO treated water to reduce the TDS concentration to meet the proposed Barbados irrigation water quality standard.

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.

[21] To be implemented through parallel financing.

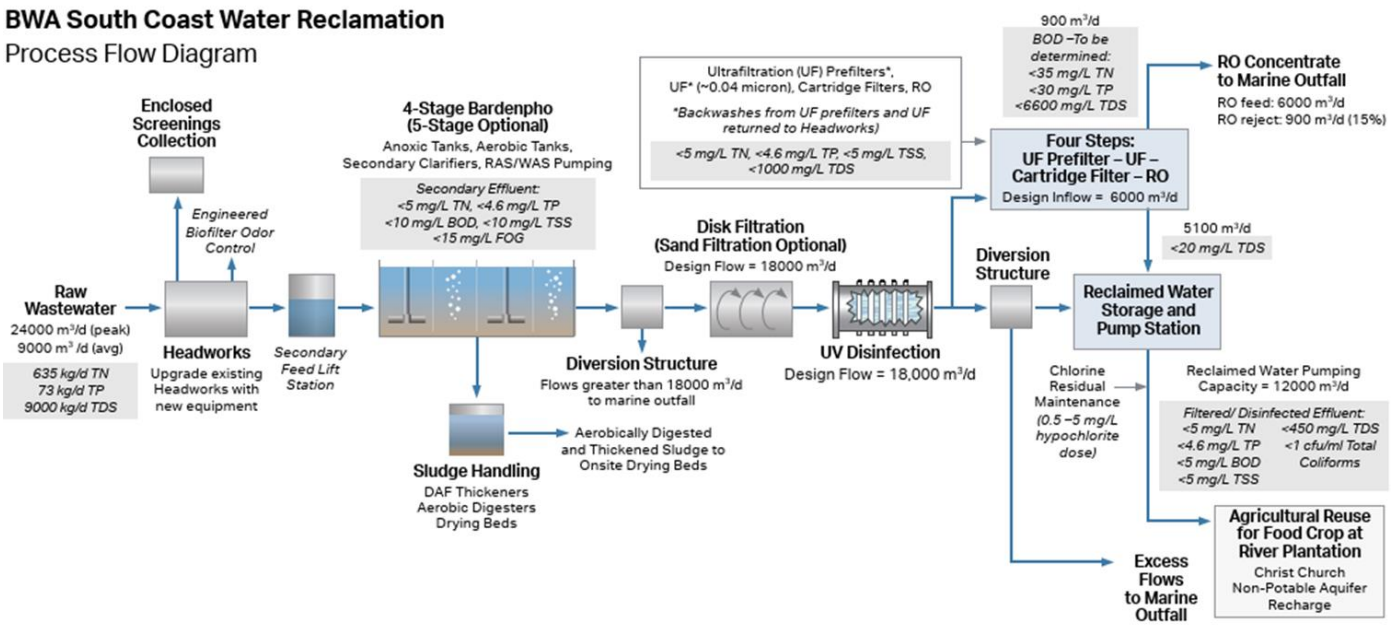


Figure 2. the process flow diagram for the new SCSTP.

Regarding sludge handling, the steps undertaken to ensure effective handling and treatment include Dissolved Air Flotation (DAF) thickening, which facilitates the separation of solids from liquid components through the introduction of air bubbles. Following this, aerobic digestion is employed to break down organic matter within the sludge through the action of microorganisms in an oxygen-rich environment.

Subsequently, screw press dewatering is utilized to further concentrate the sludge by mechanically squeezing out excess water. Finally, solar drying beds are employed as a natural and sustainable method for the further reduction of moisture content in the sludge, utilizing solar energy to facilitate evaporation.

These combined processes aim to meet regulatory standards by achieving Class B solids, ensuring that the treated sludge is suitable for safe disposal. Nonetheless, relying on landfill dumping as a permanent solution is not viable. Utilizing the sludge for agricultural purposes emerges as the most favorable option. This aspect will undergo evaluation in the future, as part of the sludge strategy and a roadmap for its implementation (see section B.4).

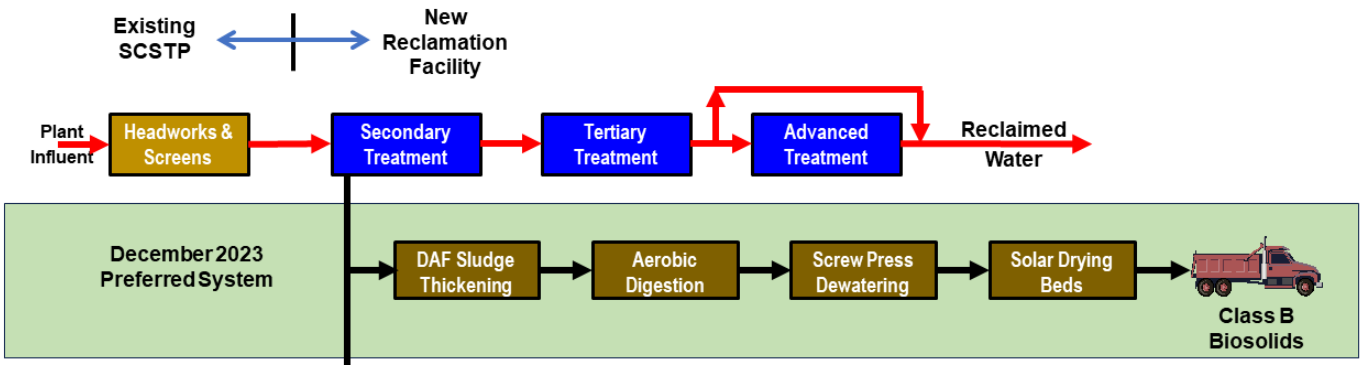


Figure 3. Proposed sludge handling.

B.4. Implementation arrangements (max. 1500 words, approximately 3 pages plus diagrams)

The GCF and the AE will enter into a Funding Activity Agreement (FAA) based on the terms and conditions set out in the Term Sheet of the Project. As provided in the Accreditation Master Agreement (AMA), the FAA will establish the requirements for the transfer, administration and use of GCF Proceeds for the financing of

the Program. The AE will be solely responsible for the management and administration of GCF Proceeds in accordance with its policies, procedures and practices, and following the provisions set forth in the AMA and the FAA. In this context, AE will provide management, monitoring and supervisory mechanisms to maintain a transparent and effective administration of the Program.

The IDB, in its capacity as the AE, will execute Subsidiary Agreements pursuant to the terms and conditions of the FAA, once the Project is approved by the IDB Board of Executive Directors. The Subsidiary Agreements will establish the applicable framework and conditions for the execution of the Program. This includes outlining the roles and responsibilities for each party in the delivery of the proposed activities, including implementation and financial conditions, fiduciary standards, Program schedule, dispute resolution, among other terms.

In this sense, two Subsidiary Agreements will be signed between the IDB and the Ministry of Finance and Economic Investments (MFEI) as representative of the Government of Barbados. The GCF Proceeds will be provided by the Government of Barbados to BWA. No additional execution arrangement is anticipated as BWA is a statutory body of the Government of Barbados.

Considering that the Program includes both reimbursable and non-reimbursable elements, two Subsidiary Agreements will be signed with the EE, as follows:

- Sovereign investment loan contract, corresponding to the reimbursable element of the financing of the Project. The parties of such sovereign investment loan contract will be the AE and the EE, the Government of Barbados (MFEI through BWA).
- Investment Grant Agreement, corresponding to the non-reimbursable element of the financing of the Project. The parties of such Investment Grant Agreement will be the AE and the EE, the Government of Barbados (MFEI through BWA).

The Borrower will be the Government of Barbados. For the purposes of this Project, the Executing Entity is the Government of Barbados, through the Barbados Water Authority (BWA). The Barbados Water Authority (BWA) is a Statutory Body established by an act of Legislature on 8th October, 1980 to replace the Waterworks Department of Government. BWA is a fully-owned entity of the Government of Barbados; the government of Barbados does not require the signature of a “subsidiary agreement”, or any similar agreement, to provide funds to BWA from this Project. A Project Executing Unit (PEU) will be established in the Project Management Office of the Barbados Water Authority (PMO). The Project Management Office under the Office of the CEO is mainly responsible for managing all of BWA's investment programs and projects financed by international funding Institutions including coordination, management, administration, financial management, procurement and planning and monitoring. It, however, discharges its responsibilities in direct coordination/collaboration with the Company's central departments, including, among others, the Engineering Department, the Finance Department, and the Human Resource Management and Development Department. The PEU will provide dedicated management, engineering/technical, administrative, financial, planning, and monitoring and control capacities to the Project, in direct coordination and collaboration with/to BWA personnel of the PMO and as means to permeate Project execution throughout the Company’s organizational structure. In addition, a Project Steering Committee will be established. The PMO will detail the governance structure, the institutions, and procedures of the PSC.

Project Execution Unit. Project implementation will be the responsibility of the PEU in direct coordination with the BWA PMO. The PEU will be responsible for: (a) acting as focal point with the Bank; (b) conducting the financial management and the necessary internal and external controls; (c) executing the overall procurement for the Project, and providing contract management; (d) undertaking the planning, monitoring and evaluation activities, and reporting based on Bank requirements and tools; (e) monitoring and supervising all technical activities; (f) leading the Project’s information and stakeholder engagement activities and (g) implementing and monitoring the activities contained in the ESMP. The PEU staff will be financed through the IDB loan project and will at least comprise: (i) Project Coordinator; (ii) Project Engineer; (iii) Procurement Specialist; (v) Financial Specialist; (vi) Planning, Monitoring and Evaluation Specialist; (vi) Social Management and Public

Relations Specialist; and (viii) Environmental Management Specialist. The PMO will allocate its personnel to the Project, on a shared basis with other projects.

Program Operations Manual (POM). Project execution will be governed by the provisions of the IDB Loan Contract and those established in the POM, which will include, at a minimum: (i) the organizational structure and corresponding execution mechanism of the Project; (ii) the activities and responsibilities of the various actors of the Project including BWA, PMO, and other public and private institutions; (iii) the main technical, administrative, and control activities; and (iv) the main environmental and social management procedures.

The objective of the POM is to (a) establish the organizational structure and corresponding execution mechanism of the Program; (b) delineate the activities and responsibilities of the various actors of the Program including the BWA--as Executing Agency (EA)--and its Project Management Office, and other internal departments and units, and other public and private institutions; (c) establish the main technical, administrative, control and monitoring activities, which will contribute to an effective, efficient, and transparent implementation of the Program, as well as to the corresponding attainment of its objectives and tasks, in particular, with respect to planning, execution, monitoring and evaluation, financial management, procurement administration, and other; (d) establish the Program's main environmental and social management procedures; (e) define the relations and the coordination mechanisms between the internal and external actors implementing the Program; and (f) establish the necessary mitigation actions for the overall categories of risks surrounding Program implementation, operations, and sustainability. The POM will act as the Execution Arrangement to implement all resources (IDB and GCF).The POM establishes the general policies and terms and conditions applicable to the activities of the Program as contained in the Loan Contract signed between the Inter-American Development Bank (IDB) and the Ministry of Finance, Economic Affairs and Investment (MFEI) of Barbados. The main user of the present POM is BWA, the Project Management Office, and the Program Execution Unit (PEU), within the scope of their actions established in the present document based on their direct coordination, technical, fiduciary, planning, monitoring and evaluation, and other responsibilities, and taking into account their overall governance and institutional structures and inter-institutional coordination channels and mechanisms. Its application also extends to other institutions of the Government of Barbados (GoB) including MFEI and other ministries and statutory entities of the Central Administration.

Special Contractual Conditions for Execution of the IDB Loan. BWA shall provide evidence to the satisfaction of the IDB that: (i) the GoB holds the legal ownership of, and adequate rights-of-way to the land where the new water reclamation and reuse facility described in Component 1 will be constructed; (ii) the GoB holds the legal ownership of the land where the aquifer recharge wells will be developed under Component 2.2, and adequate rights-of-way of the land where the new pipeline for irrigation and recharge will be placed under Component 2.1; (iii) the GoB holds the legal ownership and adequate rights-of-way of the land where the panels and battery storage system will be installed under Component 3.2; and (iv) the GoB will commit to transfer resources from the national budget to the PEU in the event revenues from tariffs do not cover the operating costs of the works financed by the Project. These conditions are necessary to ensure that the Project is appropriately supervised and managed, and to facilitate the financial sustainability of the investments and BWA's long-term coverage of O&M costs of the works.

Other Contracts. As outlined in the POM of the IDB loan , BWA will be responsible for preparing terms of reference, technical specifications, costs/bills of quantities, Expressions of Interest (EOI), public bidding documents, and other notices, as part of the bidding, selection and contracting of works, and procurement of goods, services other than consulting, and consultancy services that form part of the Project, fully in accordance with procurement norms and procedures of the IDB, and the use of Standard Bidding Documents (SBD) agreed between the IDB and GoB, when applicable. Further, BWA will be responsible for drafting contracts and award documentation, registering of the selected bidders, consulting firms, and individual consultants, and forwarding final contracts to Office of the Solicitor General. The POM provides further

guidance for BWA on procurement, including procedure for procurement of consulting services that aligns with Bank policies and procedures.

Procurement Execution. Procurement activities will be carried out in accordance with the Policies for the Procurement of Goods and Works financed by the IDB (GN-2349-15), and the Policies for the Selection and Contracting of Consultants Financed by the IDB (GN-2350-15). All procurement processes must be included in the procurement plan approved by the Bank through the client portal and will be conducted in accordance with the methods, supervision modalities, and thresholds established therein. The PEU and the Bank have agreed on a procurement plan for the first 18 months of execution. The bidding documents may include additional sustainability requirements in the procurement process.

Auditing. BWA will submit to the IDB the Project's annual audited financial statements within 120 days of the close of the fiscal year. The audit is to be performed by a Bank-eligible independent audit firm. The determination of the scope and other related aspects will be Governed by the Financial Management Guidelines for IDB-financed Projects OP-273-12) and the Audited Financial Reports and External Audit Management Handbook. Audits may be financed with Project funds.

Co-financing

The total amount of Co-financing for the Project is estimated to be USD 40,000,000 to be provided by the Accredited Entity.

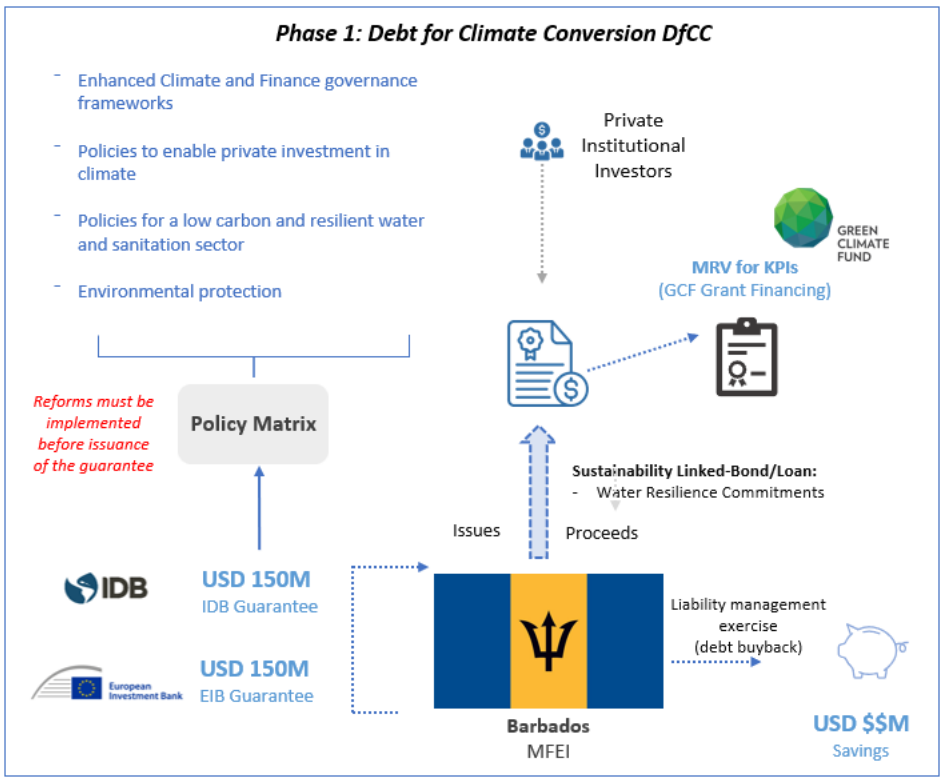
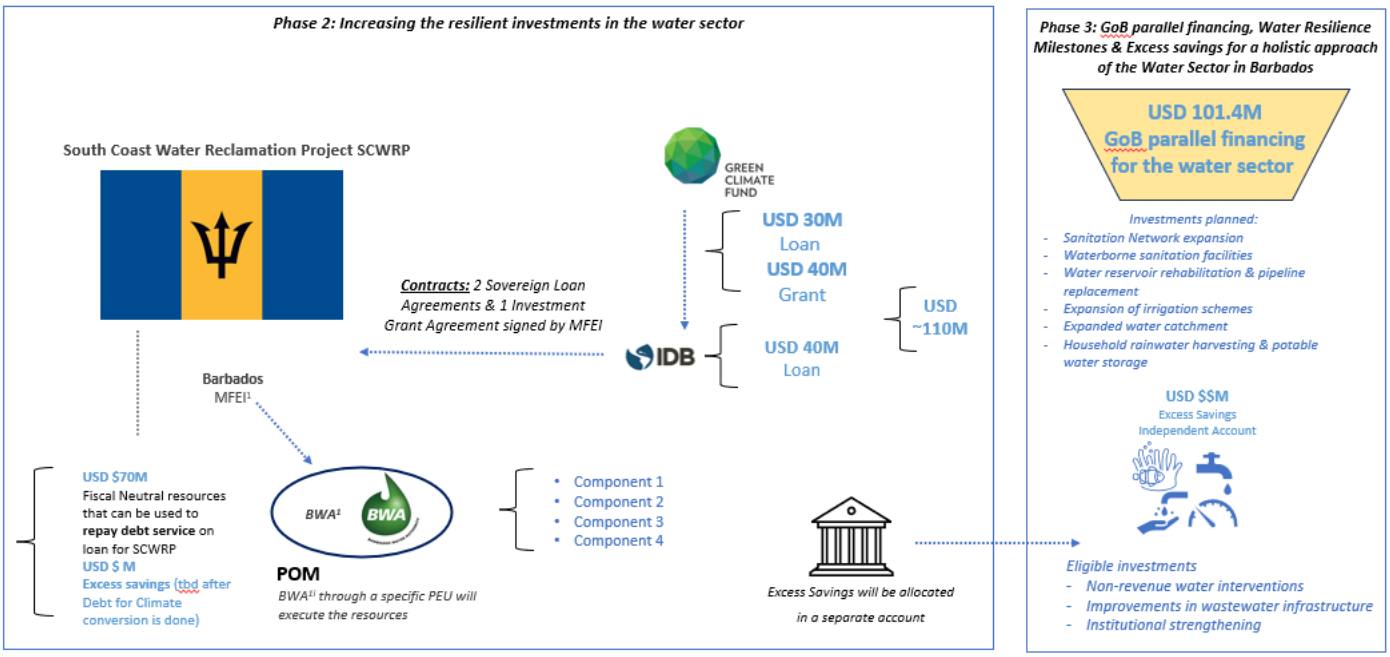


Figure 4. Implementation Arrangement diagram Phase 1

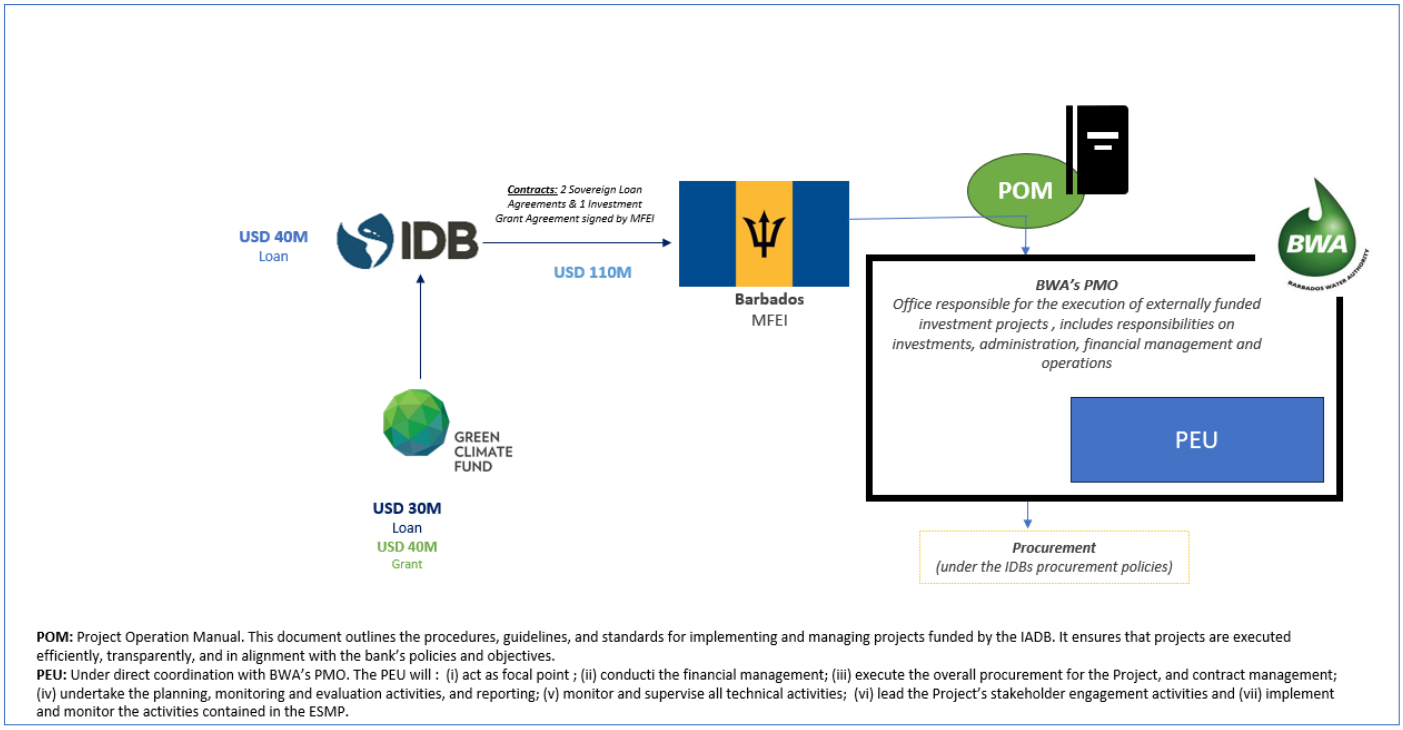


Notes:

i The Government of Barbados, through the Ministry of Finance, Economic Affairs and Investment (MFEI) is the borrower of the loan and will channel the loan proceeds to BWA who will implement the project's activities.

ii The resources will be executed by BWA, through a specific Project executing Unit, in close collaboration with the required technical responsible entities. The resources of the program will be disbursed to a dedicated bank account, specifically for this project. This account and its resources will only be accessible to the respective authorized PEU personnel, that are specified in the list of authorized representatives, (or equivalent), as mandated to the Bank by the Borrower. The Project Executing Unit (PEU) members will oversee the implementation of the program, that encompasses the financial management and procurement activities of the project.

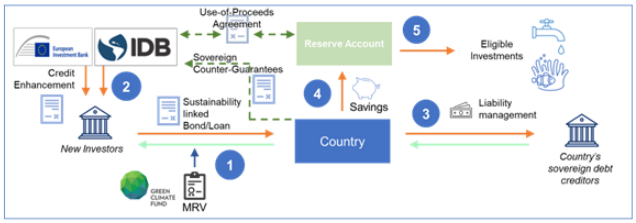
Figure 5. Implementation Arrangement diagram Phase 2 & 3



POM: Project Operation Manual. This document outlines the procedures, guidelines, and standards for implementing and managing projects funded by the IADB. It ensures that projects are executed efficiently, transparently, and in alignment with the bank's policies and objectives.

PEU: Under direct coordination with BWA's PMO. The PEU will : (i) act as focal point ; (ii) conducti the financial management; (iii) execute the overall procurement for the Project, and contract management; (iv) undertake the planning, monitoring and evaluation activities, and reporting; (v) monitor and supervise all technical activities; (vi) lead the Project's stakeholder engagement activities and (vii) implement and monitor the activities contained in the ESMP.

Figure 6. Procurement Arrangement diagram



Governing Document	Counterparts	Main Aspect	Link to Adaptation Objectives
Sustainability-linked Bond / Loan Agreement	Government, Private Investors	Describes borrowing terms and sustainability objectives	Sustainability Key Performance Indicators (KPIs, volume of reclaimed water for agriculture and aquifers)
Credit Enhancement for SLB/SLL	IDB, EIB and Private Investors	Describes guarantee terms to cover repayment risk between government and private investors	Reduce the interest rate on the SLB/SLL to generate savings for investment in climate
MRV Mechanism	Government, Private Investors, GCF	Independent verification of achievement of KPIs for SLB/SLL	Ensures Adaptation Objectives of SLB/SLL have been met
Use-of-Proceeds Agreement	Government, IDB, EIB	Ensure transparency on use-of-proceeds from debt-swap and compliance with standards	Defines eligible climate investments in e.g. water security, capacity building, mitigation and protection of mangroves
Sovereign Counter-Guarantee	Government, IDB, EIB	Ensures Government meets Resilience Commitments and correct use-of-proceeds	Default on the Resilience Commitments and Use-of-Proceeds leads to Default on the Counter-Guarantee; Government has to pre-pay

Climate Target / Condition	When achieved	Relevant Documentation	Counterparts
Policy Condition	Prior to issuance of Credit Enhancement	Policy Matrix for Counter-Guarantee	Government, IDB, EIB
Water Resilience Commitments	During the life of the Counter-Guarantee	Counter-Guarantee	Government, IDB, EIB
Key Performance Indicator (KPI)	During the life of the SLB/SLL	SLB/SLL and MRV mechanism	Government, private investors, GCF

Figure 7. Overview of Agreements underpinning the Debt-for-Climate Transaction

Debt-for-Climate Conversion

BWA will receive USD 110 million upfront capital from IDB and GCF loans (USD 40M and USD 30M, respectively) and a GCF grant (USD 40M), to finance climate resilience in the water sector through the SCWRP.

The innovation enabling this investment proceeds from the Government conducting a Debt-for-Climate Conversion which will create the fiscal space needed to allocate the savings to solely climate resilient investments, including the SCWRP. The conservative projections totally cover the expenses incurred under the GCF and IDB loans. Further details on the DfCC can be found in Additional Annexes.

The country will issue a SLB/SLL with co-guarantees from the European Investment Bank (EIB) and IDB. This collaboration not only ensures the sustainability of the initiative but also significantly lowers the interest rates of the SLB/SLL. The core sustainability dimension of the transaction relies on the strict environmental Key Performance Indicators (KPIs) where financial penalties apply with non-compliance. A specific MRV framework will be implemented to monitor the performance of the KPIs. This MRV system will rely on the BWA capacities being built and financed with GCF and IDB grant resources under Component 4.

Monitoring, Reporting and Verification (MRV) Framework for the SLL KPIs

The proposed, and under negotiation KPIs for the SLL are the following Sustainability Performance Targets:

Proposed KPI	Relevant & material?	Focused on sovereign actions?	Measurable & transparent?	Externally verifiable & benchmarkable?
SPT 1: [1,971,400 m3/year] of reclaimed water available for reuse at the SCWRRF that meets local and international standards by [2030].	Total renewable water resources for Barbados at 80 million m3/year under average rainfall conditions, equivalent to 281 m3/year per inhabitant	BWA mandate includes National Water Reuse Policy, water quality assurance, and water licensing.	Calculate the volume of treated wastewater effluent supplied to priority uses like agriculture, industry etc. as a % of total treatment plant capacity during the	Water use statistics can be collected by BWA via meter readings and measurements from utility connections to industry asset types.

			dry season. Flow meter data and supply records.	
SPT 2: Reduce NRW from 46% to 35% by 2030.	The BWA has conducted regular assessments to track NRW levels over the years. Historical trends indicate an increase in the NRW index with surveys in 2012, 2013, and 2023 estimating NRW levels at 43%, 44%, and 46%, respectively.	BWA's NRW Reduction Strategy and Implementation Plan is to be approved in 2024 and a specific target will guide its implementation	Measure volume of treated effluent discharged to recharge wells, infiltration basins etc. to replenish aquifers, using flow meters. Compare annual volumes.	A recent study of water utilities in the Caribbean shows that the average level of NRW for the sampled utilities is 46 percent, placing BWA within the regional average. NRW levels <30% are considered "Well Performing", between 30-40% "good performance", 40-60% "Basic" and <60% "Poor". Given the average level of NRW for the Caribbean, a reduction from 46% to 35% by 2030 is ambitious.

Policy matrix

To establish the institutional set up required to undertake the Debt for Climate Conversion (DfCC) and ensure transparency and accountability of the resources and project impact, the Project will support a set of policy reforms (see Annex 03c). Compliance with the policy measures is a necessary condition for the issuance of the guarantee under the linked IDB policy-based guarantee operation.

The first group of reforms is aimed at strengthening climate governance to finance resilient infrastructure, especially in the water and sanitation sector, through: (i) the creation of a robust governance structure that will create the capacity to monitor and foster climate-resilient investments; and (ii) the development of an enabling environment for resilient investments with a particular focus in the water and sanitation sector. The establishment of robust governance structure and MRV system is key to ensure transparency and accountability of the resources generated through the DfCC and project impact. All savings will be allocated in a dedicated account which guidelines for specific use of the proceeds are being negotiated. The resources do not require a trust fund, as it would imply additional human and financial resources, as well as further delays in the deployment of the resources as observed in other transactions. A Procedures Manual for fund allocation, usage, monitoring and reporting will be approved. A robust MRV system will be established for independent audit, verification and reporting of the use of resources and project impact reporting, including KPIs.

The second group of reforms is aimed at strengthening debt management practices to improve the resiliency of the sovereign balance sheet by: (i) strengthening the debt management institutional framework; and (ii) developing new financial instruments to improve climate and financial resilience. To this end, a diagnostic and roadmap for institutional strengthening of the DMO will be approved by the Ministry of Finance, Economic Affairs, and Investment (MFEI) (policy 3.1) and high and medium priority reforms will be implemented (policies 3.2 to 3.6). Moreover, the approval of a Disaster Risk Financing Strategy (policy 3.7) will enhance Barbados' financial resilience to disasters by managing fiscal impacts from natural disasters and ensure readily available financial resources if a catastrophe occurs. Finally, to promote the use of new financial instruments linked to sustainability and to provide transparency to the DfCC, the MFEI will approve a strategy to implement a DfCC (policy 3.8) and a sovereign sustainability-linked/bond (SSLB/SSLL) Framework for Water Sector and Reporting Guidelines including: (a) KPIs related to the water and sanitation sector; (b) Sustainability Performance Targets (SPTs); (c) associated penalties in case KPIs are nor met; and (d) reporting mechanisms (policy 3.9).

Savings

The savings from the transaction will be transferred to an account which governance is under negotiation. There will not be a trust fund established given the amount of human and financial resources it requires, and the resources left from the waterfall. Furthermore, there are no further resources expected to be assigned to this account.

The USD 126 million savings on debt swap over 15 years will be used for:

- **Repay IDB & GCF loans (principal and interest): USD 102 M**
- **New environmental and adaptation investments: USD 24M**

These savings will be allocated according to an Excess Savings Strategy that will include the specific projects to be financed. This will include a sludge strategy and a roadmap for its implementation that will:

- Assess the amount and quality of the sludge generated on the island.
- Assess potential outlets for the sludge, such as agriculture, soil improvement, co-incineration.
- Determine long-term reliability and requirements for these outlets, regarding quality, dry substance.
- Determine the CAPEX, OPEX, NPV for each of these outlets.
- Get the commitment for the most beneficial(s) of these outlets.
- Determine additional investment needs and financing sources for CAPEX and OPEX.
- Determine an implementation plan, including pilot projects.
- Determine responsibilities and monitoring needs.

Additionally, GoB's proposed projects for the use of savings will revolve around the following themes:

Water security and water efficiency

- Aquifer augmentation interventions, such as deblocking wells to increase aquifer recharge, reduce stormwater run-off and increase stormwater retention.
- investments in water conservation interventions, such as domestic water storage tanks, rainwater harvesting, water-saving devices, targeting low-income and vulnerable households.
- Non-revenue water interventions, such as restructuring and rehabilitation of water networks, improving pressure management, leak detection and network repair equipment and asset management purchases, satellite data, data analytics, public awareness campaigns.

Expansion of sanitation services

- Additional sewage connections to increase the sewage flow to the South Coast WRF.
- Rehabilitate and extend wastewater networks.
- Extend wastewater and/or sludge treatment facilities at the South Coast WRF.

Sustainable finance and disaster risk financing:

- Consultancies related to strengthening the debt management office’s capacity for reporting on climate investments, manage climate disaster risk financing, prepare reports and analysis and strengthen investor relations, and support monitoring and reporting on the Sustainability Linked Loan and excess savings. Additional capacity / tasks for monitoring, reporting and verification activities.

Natural heritage and environment:

- Interventions related to Natural Heritage Policy, System of parks and open spaces, Natural Heritage Conservation Areas (these include the Graeme Hall Wetlands), in the area of influence of the South Coast WRF: including studies for baselines and pre-feasibility studies for required investments that may be identified.

- Interventions related to increasing resilience in marine ecosystems in the coastline and marine area of influence of the South Coast WRF.

Irrigation

- Collect and distribute rainwater for farming.

Complementary initiatives:

- Training and capacity building around any of the above-mentioned topics.
- Consultancies around any of the above-mentioned topics.

Additional value generated over 15 years:

- 9,000 m^3 per day of water USD 1.10 per m^3 = USD 54M economic value
- Water security and avoided costs of desalination = *[calculation underway]*
- Food security and improved smallholder incomes = *[calculation underway]*
- Improved coastal resilience = *[calculation underway]*
- Improved investment climate for private investors = *[calculation underway]*

B.5. Justification for GCF funding request (max. 1000 words, approximately 2 pages)

Barbados Economic Context and Overview

Barbados has faced economic challenges since the 2008 financial crisis, with the COVID-19 pandemic exacerbating existing issues. Inflation has averaged approximately 4% annually, with forecasts suggesting a stabilization around 3% in the coming years. Various factors, including international commodity price fluctuations, natural disasters, and the pandemic, contributed to a rise in the public debt-to-GDP ratio, reaching 144% by the end of 2020.

The GDP saw a reduction of 17.3% by Q1 2021, and the unemployment rate rose to 10.8% by September 2019. The poverty rate increased from 15.1% in 2010 to 17.2% in 2016, with expectations of further rises due to the pandemic's economic impacts.

Natural disasters, including the eruption of La Soufrière Volcano and Hurricane Elsa in 2021, further strained the economy. Despite these challenges, the tourism sector's resurgence led to a notable 10% growth in real GDP in 2022, lowering unemployment rates.

However, this growth brought a rise in inflation (6.6% as of February 2023), influenced by global food and fuel price increases. The external current account deficit remained stable at about 11% of GDP in 2022, with international financial institution support helping finance it.

Looking ahead, Barbados projects a 4.5% growth in real GDP and a decline in inflation to 5% by the end of 2023. However, risks such as a slower-than-anticipated recovery in tourism, global geopolitical uncertainties, and potential shifts in global financial conditions could impact the economic outlook. Additionally, as a small island state, Barbados faces inherent vulnerabilities to climate change, which could further strain the economy and fiscal balance.

Government's Resilience Strategy in the Water Sector

The Barbadian government is actively addressing challenges in the water sector by allocating significant funds for infrastructure improvements. Acknowledging the critical state of the nation's water infrastructure and its pivotal role in economic stability, the government utilizes budgetary allocations, the Tourism Enhancement Fund, and international sources, including a USD 55 million loan from the Inter-American Development Bank. The SCWRP is part of broader climate change adaptation initiatives. Barbados faces a climate crisis impacting water availability, exacerbating food security concerns. To counter this, the

government aims to enhance food production, requiring accessible water for farmers. The linear model of water provision, with significant waste, must shift to a closed loop through reuse and replenishment. The BWA plays a crucial role in ensuring water security, requiring enhanced efficiency, climate resilience, and community awareness.

A major component of building and planning for resilience on the island is related to obtaining the required financing in coordination with the government's overall debt management strategy. Barbados' high vulnerability to natural disasters, climate change and inherent water scarce situation will affect sovereign credit ratings in the long terms, default probabilities, and the cost of borrowing.

Barbados investment would require between US$3.7 billion to US$5.1 billion to close its infrastructure gap and meet its policy targets, increase the quality and quantity of infrastructure, and improve the sustainability of its infrastructure services. However, Barbados' debt sustainability situation and its agreement with the IMF limits Barbados' borrowing capacity.

Barriers to Investment

Given this economic backdrop, the investment climate in Barbados, particularly for large-scale infrastructure projects like the South Coast Sewage Project, faces several barriers:

- **High National Debt**: The substantial debt-to-GDP ratio limits the government's capacity to finance large projects without exacerbating its fiscal burden.
- **Inflation and Currency Risks**: Inflationary pressures and potential currency fluctuations increase the financial risk for investors.
- **Vulnerability to External Shocks**: Dependence on tourism and susceptibility to natural disasters create an unpredictable economic environment.
- **Limited Access to Capital**: The economic conditions limit access to capital, especially for environmentally-focused projects that require substantial upfront investment.

The concessionality of GCF financial instruments, in this context, is vital as it offers a more favorable and less risky investment option compared to traditional financing. This concessionality is crucial to make the SCWRP viable, considering Barbados' high indebtedness and economic vulnerabilities.

Extending the concessionality for the solar plant subcomponent aligns with Barbados' efforts to increase renewable energy sources in its energy mix. This concessional financing not only supports the country's sustainability goals but also helps reduce reliance on fossil fuels, enhance climate resilience, and address economic challenges effectively.

Alternatives Explored

In evaluating alternatives for funding, the Government of Barbados (GoB) and the BWA conducted a thorough analysis of potential financing options:

- **Bilateral or Official Sector Loan Direct to BWA**: One of the first options considered was securing a bilateral or official sector loan directly to the BWA, bypassing the GoB's balance sheet. This approach, however, presented significant challenges. The BWA's financial position was in recovery, and the environmental focus of the project necessitated a lender with specialized expertise. Moreover, the viability of such a loan was questionable without a government guarantee, given the BWA's financial constraints.
- **Private Sector Financed Concession (Public-Private Partnership - PPP)**: Another alternative was a private sector financed concession, leveraging a Public-Private Partnership (PPP) model. This option, however, was deemed unfeasible for several reasons. Firstly, there was a lack of capacity within the BWA and the GoB to manage a PPP for a project of this scale and complexity. Furthermore,

the BWA's weak balance sheet made it difficult to attract private investment without substantial government guarantees. Previous experiences where the government had to effectively guarantee similar projects also influenced this decision, indicating a reluctance from private entities to engage without strong governmental backing.

- **Full Grant Funding:** The GoB and BWA also considered the possibility of obtaining grants to cover the entire cost of the project. However, this option was not feasible as the Green Climate Fund (GCF) had recently funded a similar initiative in Barbados, focusing on sewage treatment plant upgrades. The likelihood of securing another full grant for a similar project within a short time frame was low, given the fund's policies and the need to distribute resources equitably among various global initiatives.
- **Government Borrowing from Multilateral Development Banks (MDBs)**: The alternative for the GoB to seek funding through a loan from a MDB for the full project amount was not possible because of the strict debt targets which the GoB has committed to under its borrowing arrangement with the IMF.

In summary, after evaluating various funding mechanisms, the GoB concluded that an innovative financing model which involved a swap to finance the sewage facility and grants to fund the highly critical conservation investments was the most appropriate and feasible option to finance the SCWR project. This decision was influenced by the limitations in BWA's financial standing, the lack of capacity for managing large-scale PPPs, the unavailability of full grant funding, and the necessity of the project in addressing pressing environmental and economic needs. Despite the fiscal challenges, this approach was deemed essential to build resilience in the water sector and to support the nation's broader economic and environmental objectives.

Because of this situation, the government is seeking to strengthen its debt management capacity and explore innovative financial instruments that enable long-term financing for adaptation without increasing the debt stock. The structure of this operation, which combines loans, grants and guarantees, is one of the very few options Barbados has to invest in resilient infrastructure without increasing the debt stock. The IDB and GCF loans alone would not be an option because the government will have to reduce other priority expenditures to maintain their debt levels constant.

Overview of the Co-financing Structure

Barbados proposes a Debt-for-Climate Swap to finance the SCWRP, aiming to reduce debt in exchange for investments in climate projects. This innovative mechanism, previously successful with the IDB in 2022, involves issuing SLBs with strict environmental criteria. Collaborating with the EIB and IDB, Barbados seeks to optimize debt management, utilizing savings from lower interest rates to fund the SCWRP and climate resilience measures. This proactive approach is expected to generate significant savings, enabling repayment of the SCWRP investment and covering operational costs while advancing environmental and climate goals.

Additional details on this mechanism can be found in section B.4.

Cash Flow and Financial Internal Rate of Return

The cash outflows and inflows of the Project are projected for the period of 30 years (see Annex 3). Two scenarios were analyzed: with GCF grant, and without GCF grant.

Under both scenarios net cash flow of the project is negative during the entire period of the analysis, and therefore, the Financial Internal Rate of Return (FIRR) are incomputable. What this means is that each year the financial revenue which the BWA will receive from the Project is smaller than the costs to be incurred after the Project’s implementation. The Project’s revenue generating capacity is low. The BWA will need to

utilize its existing sources of revenue (such as the water sales revenue and sewage contribution levy[22]) as well as revenue from the solar PV investment (component 3)[23] [24] to cover the O&M costs of the Project.

Given that the net cash flow remains negative throughout the analysis period, it is clear that the project will struggle to sustain itself financially. Without sufficient funding support, the project might never get off the ground or might fail shortly after implementation, depriving the intended beneficiaries of its outcomes.

Therefore, **the GCF grant of USD 40M becomes crucial** as it provides the necessary financial injection to bridge the gap between the project's costs and its revenue generation. By covering the upfront investment and ongoing operational expenses, the grant ensures the project's implementation and sustainability, ultimately enabling it to fulfil its intended purpose and benefit the target population.

In essence, the grant serves as a catalyst for realizing the project's objectives, ensuring that the beneficiaries receive the much-needed services or improvements despite the project's financial challenges. Without the grant, the project would likely remain unrealized, leaving the beneficiaries underserved and perpetuating the existing issues the project aims to address.

The non-repayable nature of this grant is in line with the non-repayable nature of the swap and enhances the project's viability and feasibility, demonstrating the GCF's commitment to promoting environmental sustainability and climate resilience in regions vulnerable to climate change and economic challenges.

Concessionality beneficiaries

The project aims to benefit a wide range of stakeholders, including farmers facing irrigation challenges, agricultural enterprises of various sizes, and the general population through improved sewage connections. Additionally, it provides training opportunities for technical staff, contributing to overall agricultural productivity and climate resilience in Barbados.

Those who will benefit from this project are:

Direct Beneficiaries – 50,707

- 296 beneficiaries at 114 Farms at River Plantation, St. Phillip will benefit. Currently, only 17 of these 114 are functioning on a regular basis. Non-operating farms do not have access to irrigation water (**beneficiaries estimated at 296** – 114*2.6 (avg. household size))
- 676 additional beneficiaries located on 260 smallholder farms in the other four districts along the proposed irrigation water pipeline route could benefit if there is an increase in water flow in the future (**beneficiaries estimated at 676** – 260*2.6 (avg. household size)).
- Aquifer Replenishment – 250 beneficiaries: it is expected that 96 farmers from Silver Hill and Gibbon's Boggs districts, producing in 160 hectares, will benefit from improved groundwater abstraction from the Christ Church aquifer. The reclaimed water injected into the aquifer will augment the water stored in the aquifer for future use and at the same time counter saline intrusion. Furthermore, a portion of the reclaimed water utilized for irrigation purposes will

[22] revenue from sewage levy estimated at USD12M/year

[23] estimated at USD1.3M/year

[24] For solar PV projects the regulation sets a buy-all, sell-all scheme, on which project developers are remunerated based on the amount of generation actually fed into the grid, at a rate of BD$0.2525/kWh (for a 7MW plant), for a period of 20 years.(Source: Fair Trading Commission Barbados. 2022. Decision On Feed-in-Tariffs for Renewable Energy Technologies Above 1MW and up to 10MW)

For BESS, the Energy Storage Tariff (EST) rate, which is intended to cover roughly 70% of a project cost, is set for capacity payments of BD$30.34kW-month (for projects between 1 and 10 MW) for a period of 10 years, as long as the projects meet the "used and useful" criteria (i.e., able to provide 3 or more storage services and 2 or more power services, as detailed in the Decision). In order to recover the remaining costs, a Power Purchase Agreement (PPA) needs to be signed between the project developer and BLPC as operator of the BESS,. The PPA will include, besides the EST rate previously mentioned, reimbursable expenditures and additional financial gaps to reach an Internal Rate of Return (IRR) of 8% (Source: Fair Trading Commission Barbados. 2023. Decision On Energy Storage Framework and Tariffs)

permeate through the soil, ultimately contributing to the recharge of the aquifers. (**beneficiaries estimated at 250** – 96*2.6 (avg. household size))

- 16 Main Commercial Farms in the St George Valley: Currently, around 24 hectares irrigated and cultivated for food crops using private extraction wells, with limited water supply capacity. The beneficiaries encompass the families and employees linked to these farms, with an estimated average of 10 individuals per farm. Beneficiaries is estimated at 160 – 16 farms*10 employees,
- Potential engagement of 50 to 150 small to medium-sized farming enterprises: Discussions are currently underway with the BACT to expand irrigated land in the St. George district, encompassing 57 hectares in Vineyard and 142 hectares in Constant. The beneficiaries encompass the families and employees linked to these companies. **The number of beneficiaries is estimated at 500** (50 companies * 10 individuals).
- Population served by existing sewage connections to SCSTP (**48,825 inhabitants**).

Assessing the impact of substituting reclaimed water for BWA \ potable water in agriculture poses challenges due to the dispersed nature of licensed farmers who utilize BWA water for irrigation purposes.

Regarding the acreage benefiting from the project, the current irrigation infrastructure covers 45 hectares, which will expand to 160 hectares when water becomes available.

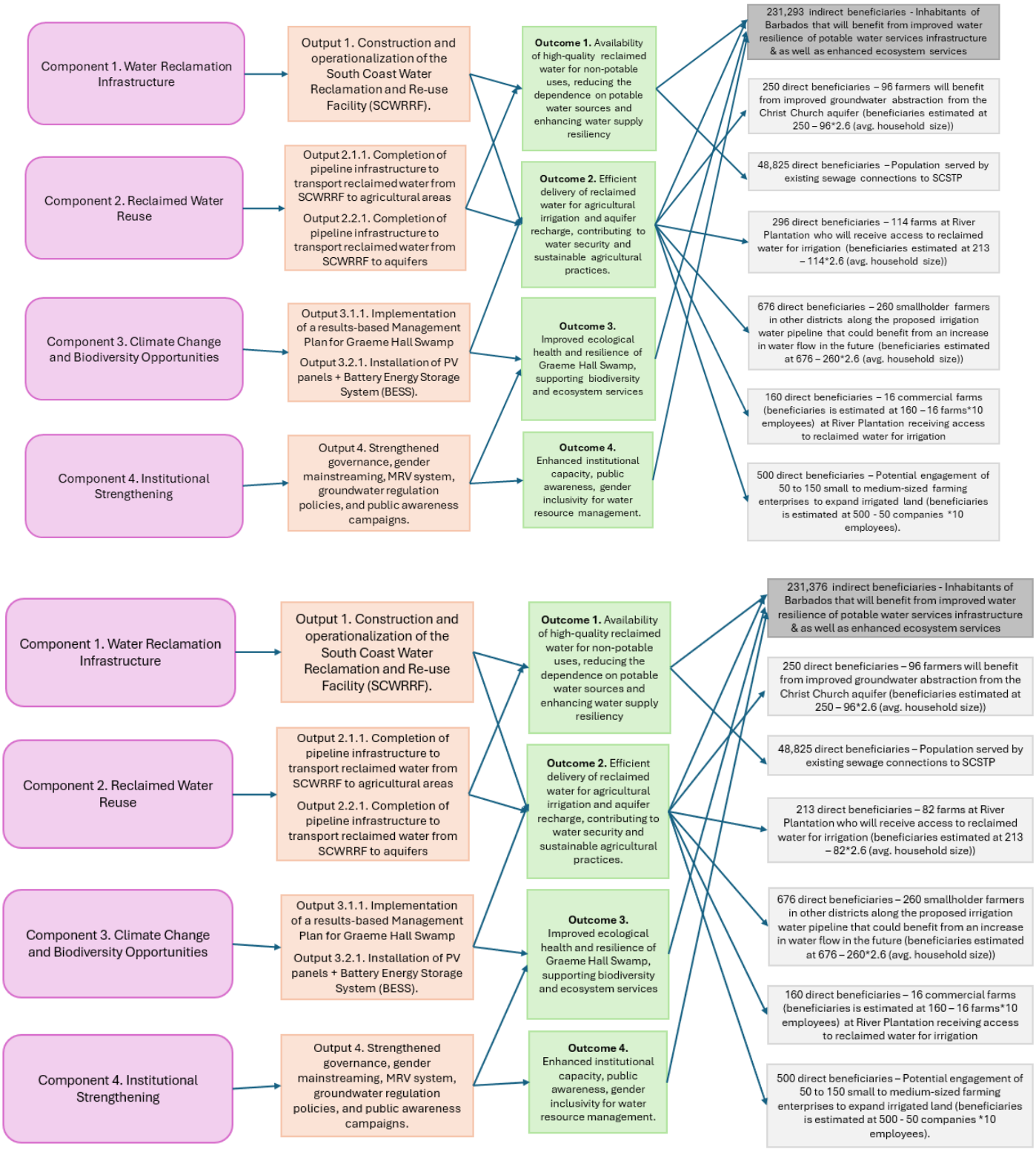


Figure 8. Beneficiaries from each project outcome.

Indirect Beneficiaries – 231,293 (*total population – direct beneficiaries*)

- Community and Employment Opportunities: Increased agricultural productivity and expanded cultivation indirectly create broader employment opportunities, contributing to regional food security and economic stability.
- Reduced Pressure on Public Water Systems: Providing a sustainable alternative water source for agriculture indirectly eases demand on public water systems, enhancing overall water security in Barbados.
- Ecosystem services: Commercial and residential facilities, particularly those associated with tourism, within the vicinity of the Graeme Hall Watershed NHCA are expected to gain substantial advantages from heightened ecosystem services, enhanced water regulation, and improved landscape conditions. Moreover, the conservation efforts aimed at preserving the biodiversity of the NHCA and enhancing its ecosystem will yield widespread benefits across the nation, since the area will serve as a draw for tourism and provide a conducive environment for scientific research and activities.
- The Project will also indirectly benefit all the population of Barbados 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).

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.

The GCF *grant* component is critical to the Project from four different perspectives.

- **Reducing Financial Burden**: The GCF grant component allows for the Project to be funded through a debt-for-climate swap without requiring a tariff increase in the sewage tariff, water tariff, or irrigation tariff. After a comprehensive debt restructuring in 2018, Barbados is in a second, consecutive IMF program, under which it has ambitious targets to reduce its public debt to GDP ratio to 60% of GDP. Despite the impacts of the COVID pandemic reducing gross national product by 17.3% in 2021 and increasing government borrowing, Barbados is still on track to reduce its public debt burden to a sustainable level with IMF-supported reforms.

- **Enhancing project viability for social welfare**: Given the limits on public borrowing, the costs of large investments in public infrastructure must be passed onto the public in the form of increased taxes or tariffs. The direct beneficiaries of this project are smallholder farmers, who must compete with commercial farms and imports to sell their produce. The cost of irrigation water is, therefore, a key determinant of the economic sustainability of their farms. A cost-covering irrigation tariff would make the water unaffordable for farmers from the SCWRRF, and eliminate any of the benefits for resilience for vulnerable communities and increased national food security.

- **Enabling a larger, transformative project**: Without GCF grants, it would only be possible to upgrade the South Coast sewage treatment plant to secondary treatment standards to meet Barbados' obligations under the Cartagena Convention, the legal agreement that protects the Caribbean Sea, which imposes obligations to prevent, reduce, and control pollution and promote sound environmental management.

- **Restoring vital ecosystems**: The grant component allows the restoration of the Graeme Hall Watershed NHCA, which is of paramount importance due to its unique ecosystem composition. The area is the sole location on the island where a freshwater mangrove wetland, seagrass bed, and shallow near-shore hard coral reef coexist in close proximity. Beyond its ecological significance, the swamp plays a crucial role as the primary 100-year floodplain for the watershed, acting as a natural buffer against stormwater runoff and subsurface drainage from surrounding agricultural and residential areas. By recovering the swamp's functionality, the grant will not only enhance flood mitigation efforts but also bolster the provision of essential ecosystem services, including water filtration, habitat provision, and carbon sequestration. Moreover, the restoration project will contribute to biodiversity conservation, support local communities by improving recreational opportunities, and promote overall well-being through the sustainable management of natural resources, underscoring the importance of preserving and restoring this invaluable natural asset.

The GCF grant contribution is funding the investments for water reclamation re-use in agriculture (pipelines) therefore directly contributing to the resilience of agricultural sector in a context where water and food security are highly threatened by climate change. Additionally, the grant from GCF is funding the installation of solar panels to offset emissions from the SCWRRF, as well as the implementation of a MRV system to ensure the proper use of proceeds from the debt-swap and the adherence of the government to climate resilience policy commitments associated with the debt-swap.

Support from the GCF is, therefore;

- helping to bridge a significant financing gap and lowering the debt burden on Barbados, making it possible to finance this essential infrastructure without compromising fiscal stability or diverting resources from other vital public services,
- enhancing project viability for social welfare, ensuring that the project is viable and inclusive, addressing the needs of all citizens, especially the most vulnerable such as smallholder farmers, whilst avoiding tariff increases,
- allowing an investment in climate resilience for water security with first-of-its-kind replicable financing structure that can serve as a model for resilience investments for indebted, vulnerable nations around the world.

Notably, because of the debt swap, a larger grant contribution is avoided because of the savings generated through the debt-swap transaction.

B.6. Exit strategy (max. 500 words, approximately 1 page)

Economic/Financial Sustainability

The financial model for the SCWRP in Barbados incorporates a "Debt for Climate Transaction" to enhance economic and financial sustainability. This mechanism, backed by the IDB and EIB, aims to restructure government debt, potentially improving terms such as interest rates or repayment periods. This restructuring generates savings that can be redirected for other purposes, crucial for the substantial upfront investment required for the SCWRP—approximately USD 110 million, sourced from loans and grants, including those from the IDB and Green Climate Fund.

The saved funds from the debt restructuring are specifically allocated to repay the SCWRP's investment loan, ensuring the project's financial self-sufficiency without adding to the country's long-term financial burden. This strategic use of funds aligns with fiscal prudence, reinvesting savings into a project that provides immediate environmental and health benefits, supporting Barbados' sustainability goals and promising long-term economic advantages.

Revenue for the SCWRP is expected from three sources, including the Garbage and Sewage Collection Levy (GSC), sale of treated wastewater, and income from renewable energy. The latter, generated from on-site solar panels, will offset energy costs, freeing up resources for equipment maintenance and staff training. BWA will take ownership of project outputs, ensuring revenue generated is reinvested in operation and maintenance, complemented by the GSC.

At the national level, the SCWRP is anticipated to contribute significantly to sustainable development, making Barbados more attractive to regional and international tourists. Improved water availability will positively impact residents and businesses, fostering employment. The project also aims to stimulate the private sector through a circular economy, fostering job creation and enhancing government revenues. The government envisions private sector involvement in expanding decentralized plants, implementing waste-to-energy facilities, and utilizing wastewater by-products for fertilizer production. The commitment to de-risking the sector aims to attract private sector investment, including from agricultural cooperatives utilizing reclaimed water for farming.

Furthermore, the IDB has included a relevant clause in the project document (POD), to facilitate the financial sustainability of the investments and BWA's long-term coverage of O&M costs of the works.

Prior to the start of construction for any of the works, the Borrower, through the EA, shall provide evidence to the satisfaction of the Bank, that the Government of Barbados will commit to transfer resources from the national budget to the EA in the event revenues from tariffs do not cover the operating costs of the works financed by the project.

Institutional Sustainability

The Project prioritizes institutional sustainability through Component 4's emphasis on Governance and Efficiency Improvement. Strengthening the Prime Minister's Office, BWA, the Government Analytical Service (GAS) and the Barbados Agricultural Development and Marketing Corporation (BADMC) is paramount for effective water management. Robust monitoring systems track water parameters, allowing continuous assessment and adjustment for environmental changes. Proper groundwater management prevents over-extraction, sustaining the project long-term. Public awareness and stakeholder engagement campaigns, including gender and diversity considerations, foster community support and understanding, contributing to the project's enduring sustainability.

Social Sustainability, Gender and Diversity

The project prioritizes social sustainability through the integration of a Gender and Diversity Action Plan, ensuring equal participation and inclusivity. Robust monitoring and effective regulation safeguard environmental well-being and equitable resource access. Public awareness campaigns foster community understanding and support for wastewater reuse, with safety measures enhancing the initiative's long-term viability and success. The focus on inclusivity, environmental protection, and community engagement contributes to the project's enduring social sustainability.

Environmental Sustainability

Since the Project focuses on producing tertiary quality reclaimed water, it has the potential of safeguard groundwater quality, address water scarcity, and expand wastewater treatment technologies while protecting aquatic habitats from wastewater pollution. The activities aimed at monitoring and management of the Graeme Hall Watershed NHCA contribute to enhance ecosystem protection to maximize ecosystem services.

Effluent monitoring and a sewer program mitigate pollution risks, while integrating renewable energy aligns with sustainable goals. Advocating water conservation and reuse, the project plays a vital role in reducing demand on limited water resources.

Mandated TDS standards for reclaimed water ensure safe agricultural irrigation, emphasizing a circular economy for water management. Ongoing assessment and monitoring uphold operational and environmental standards, underscoring the crucial role of SCWRP in sustaining Barbados' water infrastructure in the face of changing climate conditions.

C. FINANCING INFORMATION

C.1. Total financing

(a) Requested GCF funding (i + ii + iii + iv + v + vi + vii)	Total amount	Currency
	70	million USD ($)

GCF financial instrument	Amount	Tenor	Grace period	Pricing
(i) Senior loans	30	20 years	Enter5 years	0.75%
(ii) Subordinated loans	Enter amount	Enter years	Enter years	Enter %
(iii) Equity	Enter amount			Enter % equity return
(iv) Guarantees	Enter amount	Enter years		
(v) Reimbursable grants	Enter amount			
(vi) Grants	40			
(vii) Results-based payments	Enter amount			

(b) Co-financing information	Total amount	Currency
	40	million USD ($)

Name of institution	Financial instrument	Amount	Currency	Tenor & grace	Pricing	Seniority
IDB	Senior Loans	40	million USD ($)	25 years 5.5 years	4.83%[25]	Options

(c) Total financing (c) = (a)+(b)	Amount	Currency
	110	million USD ($)

(d) Other financing arrangements and contributions (max. 250 words, approximately 0.5 page)

Beyond the fundamental contributions through loans and a grant from the GCF and IDB, the project incorporates a USD 300 million debt swap mechanism, structured around the issuance of SLBs guaranteed by the EIB and the IDB. This mechanism is a cornerstone in the project's strategy, ensuring long-term sustainability and economic efficiency.

The involvement of institutional investors in purchasing the SLBs, attracted by the stringent environmental KPIs and financial penalties for non-compliance, is critical to the success of this financial approach. These proceedings of these bonds are used specifically to buy back outstanding debt.

This financial arrangement is expected to yield significant savings that will be allocated to repay the investment loan from GCF and IDB.

Regarding **parallel financing**, the Government of Barbados is developing the following projects that contribute to the functioning and goal of the SCWRP:

[25] The IDB loan's interest rate will be fixed based on interest rates prevailing at the time of approval, the above is indicative based on current levels

		Investment	Investment Cost USD	
		Conditions Assessment Sanitation Network	3,000,000	
		Expansion of the Sanitation Network: Sewer the Bailey's Alley, Chapman Lane, and environs	19,660,000	
		Provision of waterborne sanitation facilities – for 4,400 houses	30,000,000	
		Force main to Marine Outfall from SCWRRF to Hastings	6,000,000	
		Water reservoir rehabilitation and pipeline replacement project	24,000,000	
		Irrigation schemes BADMC Districts benefiting from reclaimed water	500,000	
		Expanded water catchment at River Plantation	2,750,000	
		Additional impoundment ponds along irrigation route	5,500,000	
		Household rainwater harvesting and potable water storage	10,000,000	
		TOTAL	**101,410,000**	

C.2. Financing by component

Please provide an estimate of the total cost per component and output as outlined in section B.3. above and disaggregate by source of financing. More than one co-financing institution can fund a single component or output. Provide the summarised cost estimates in the table below and the detailed budget plan as annex 4.

Component	Output	Indicative cost Options	GCF financing		Co-financing		
			Amount Options	Financial Instrument	Amount Options	Financial Instrument	Name of Institutions
1. Water Reclamation Infrastructure	Output 1.1 New SCWRRF constructed and operating).	63.4 M	20 M	Grants			
	Output 1.2 Existing SCSTP upgraded and operating		16.0 M	Loan	27.4 M	Loan	IDB
2. Reclaimed Water Reuse.	Click here to enter text. Output 2.1. Infrastructure for water reuse and aquifer recharge installed	19.6 M	18.5 M	Grants	1.1M	Loan	IDB
	Output 2.2. Aquifer Recharge Infrastructure						

	constructed and operating						
3. Climate Change and Biodiversity Opportunities	Output 3.1. Natural Heritage Management Plan developed and implemented	16 M	14 M	Loan	2 M	Loan	IDB
	Output 3.2. Solar Energy Generation Plant with Battery Storage implemented						
4. Institutional Strengthening, including	Output 4.1. Governance and managerial capacity of BWA improved .	1.5 M	1.5 M	Grants			
	Output 4.2. Equal participation of women and Persons with Disabilities (PwD) within BWA achieved						
	Output 4.3. BWA's monitoring systems to track water quality, quantity, and climate-related parameters implemented						
	Output 4.4. BWA's planning and monitoring platform designed, integrated, and implemented						
	Output 4.5. Public awareness and stakeholder engagement plan designed/upgraded and implemented						
	Output 4.6. Government Analytical Services (GAS) laboratory capacity strengthened						
	Output 4.7. BADMC's Farmers Empowerment and Enfranchisement Drive (FEED) Program strengthened						

Project management costs		2.855 M			2.855 M	Loan	IDB
Evaluation		0.295 M			0.295 M	Loan	IDB
Contingency resources		6.35 M			6.35 M	Loan	IDB
Sub-total (GCF – IDB)	Click here to enter text.	110 M	40 M 30 M	Grant Loan	40 M	Loan	IDB
Indicative total cost (USD)		110 M	70 M		40 M		

C.3 Capacity building and technology development/transfer (max. 250 words, approximately 0.5 page)

C.3.1 Does GCF funding finance capacity building activities?	Yes ☒ No ☐
C.3.2. Does GCF funding finance technology development/transfer?	Yes ☒ No ☐

Component 4 of the Project aims to enhance the institutional framework of the BWA with a focus on achieving resilient and sustainable water management in Barbados, supported by a GCF funding allocation of $1.5 million.

Key expected results from this component include:

- Enhancing Governance and Managerial Capacity (**4.1.1 & 4.1.2**): Efforts are directed towards strengthening leadership and decision-making within the BWA, which is essential for the effective oversight and successful execution of the Project. AquaRating tool for assessing water utility performance and Groundwater Modelling System (GMS) for sustainable groundwater management to ensure responsible resource usage that supports overall water management goals, along with training for the operations and maintenance of the SCWRRF, also enhances the BWA's capacities.
- Implementing an Institutional Gender and Action Plan (**4.2.1.**) as well as an institutional gender policy (**4..2.2**): These promote a more inclusive and equitable working environment by considering the diverse needs of various demographic groups, aligning the project with broader societal objectives.
- Establishing a MRV System (**4.3.1 and 4.4.1**): The MRV system will track key water and climate-related parameters, enhancing the technical capabilities of the BWA and ensuring accountability in water management and climate adaptation.
- Public Awareness and Stakeholder Engagement Campaigns (**4.5.1, 4.2.3 and 4.2.4**): These campaigns are vital for encourage community support and understanding, promoting ownership of the project while considering gender and diversity for inclusivity.
- Support for GAS (**4.6.1 and 4.6.2**) and BADMC (**4.7.1 and 4.7.2**) to support water quality monitoring activities under the project as well as promote sustainable agricultural practices and irrigation, respectively.

The project also includes the adoption of advanced treatment technology through the implementation of the SCWRRF, while energy-efficient equipment and renewable energy sources further promote sustainability and technology integration within the water sector.

D. EXPECTED PERFORMANCE AGAINST INVESTMENT CRITERIA

This section refers to the performance of the project/programme against the investment criteria as set out in the GCF's Initial Investment Framework.

D.1. Impact potential (max. 500 words, approximately 1 page)

Contribution to the Fund's Objectives

The SCWRP is directly aligned to the Fund's strategic vision of promoting the paradigm shift towards low-emission and climate-resilient development pathways in the context of sustainable development and supporting developing countries, like Barbados, to implement the requirements of the Paris Agreement and the UNFCCC. Overall, the project is anticipated to directly benefit over 194 farms and potentially enable 50 to 150 additional farming enterprises, alongside indirect benefits to the broader community and agricultural sector in Barbados.

In its **Strategic Plan for 2024–2027**, the Green Climate Fund (GCF) aims to exceed its targets for both mitigation and adaptation efforts. This includes reducing CO2 emissions by 1.5 to 2.4 gigatonnes and bolstering the resilience of 570 to 900 million people. Notably, the project within this plan is set to mitigate 66,430 metric tons of CO_2 equivalent, averaging 2,657 tons annually.

Addressing urgent adaptation needs, particularly for vulnerable countries like Small Island Developing States (SIDS), is a priority established in the Plan. The SCWRP in Barbados exemplifies this approach, enhancing water management resilience. By constructing the New SCWRRF, the project promotes water reuse for irrigation, ensuring sustainable agriculture and replenishing groundwater through aquifer recharge infrastructure. Furthermore, integrating solar energy with battery storage enhances water sector resilience. The project aligns with two of GCF's strategic outcomes: promoting climate resilience agricultural practices benefiting 194 beneficiaries and restoring 33 hectares of ecosystems (see section B2).

Adaptation Impact

Regarding **ARA 1 (Assistance for the Most Vulnerable People and Communities)**, the project is designed to establish an accessible and affordable water supply for small-scale farmers, thereby bolstering food security and livelihood opportunities. Furthermore, it aims to deliver comprehensive training sessions to empower farmers, enabling them to optimize their agricultural output and economic gains, all while promoting the sustainable utilization of water resources for irrigation purposes.

Regarding **ARA 2 (Health, well-being, food and water security)**, the SCWRP in Barbados is a crucial strategic response to climate change, specifically targeting the island's severe water scarcity and the imperative for resilience agriculture.

With unpredictable rainfall patterns and prolonged dry periods becoming more common, the SCWRP ensures a steady and reliable **water supply for irrigation** contributing to:

- Diversification of irrigation water resources to reduce dependence on dwindling freshwater reserves.
- Conservation of potable water, mitigating its consumption for irrigation and ensuring availability for essential uses.
- Enhanced agricultural productivity in currently irrigated areas, and expanding the productive surface area under irrigation, therefore contributing to the country's food security.
- Rural income boost through the facilitation of affordable irrigation water for smallholder agriculture, contributing to the economic well-being of rural communities.

- Financial stability and avoidance of tariff increases, supported by the GCF grant, ensuring the prevention of tariff hikes for new infrastructure.

On the other hand, by facilitating the replenishment of depleted aquifers, the Project actively preserves the robustness of groundwater resources. This endeavor concurrently shields the aquifer from saline intrusion, thereby conferring significant benefits upon the entire Barbadian populace and contributing to a comprehensive enhancement of water security.

In the context of **ARA 3 (Infrastructure and built environment)**, this Project is a key initiative that focuses on innovative infrastructure to tackle climate change challenges, particularly water scarcity. It aims to strengthen the nation's water infrastructure and enhance the resilience of the water sector through the construction of treatment facilities, irrigation piping, and aquifer recharge systems, promoting responsible water management and alternative water sources. The incorporation of renewable energy sources, like solar panels with battery storage, further bolsters critical infrastructure resilience while mitigating the environmental impacts of traditional wastewater treatment.

The project's contributions to **ARA 4 (Ecosystems and Ecosystem Services)** entail the advancement of monitoring practices to enhance our understanding of the ecological dynamics within the NHCA Graeme Hall Watershed. These monitoring efforts include investigating biodiversity, hydrogeology, soil composition, general usage patterns, and community engagement dynamics. The insights gleaned from these studies will play a crucial role in guiding the implementation of management strategies aimed at facilitating ecosystem restoration and strengthening conservation endeavors. As a result, this initiative will lead to an increase in ecosystem services, particularly in terms of water regulation, biodiversity preservation, and landscape enhancement.

D.2. Paradigm shift potential (max. 500 words, approximately 1 page)

Paradigm shift potential is defined as 'degree to which the proposed activity can catalyse impact beyond a one-off project or programme investment'. In this section, elaborate on the contribution to paradigm shift and how the proposed project/programme aims to contribute towards it based on the theory of change described in section B2(a). Also describe how and to what extent the project/programme will be able to promote or contribute to paradigm shift through the below.

- *Potential for scaling up and replication*
- *Potential for knowledge sharing and learning*
- *Contribution to the creation of an enabling environment*
- *Contribution to the regulatory framework and policies*
- *Overall contribution to climate-resilient development pathways consistent with relevant national climate change adaptation strategies and plans*

SCWRP paradigm shift

This project represents a paradigm shift in water management, showcasing a transition from traditional wastewater treatment to advanced, sustainable practices. Central to this shift is the use of cutting-edge technologies for treating and reusing wastewater. This approach not only conserves valuable freshwater resources but also turns wastewater into an asset for agriculture and aquifer recharge, combating seawater intrusion. The project's emphasis on community engagement, institutional strengthening, and capacity building ensures its sustainability and scalability. By shifting the focus from disposal to resource recovery and sustainable management, the SCWRP sets a new standard for water resource management in Barbados, addressing critical needs in the face of climate change and water scarcity, and providing a replicable model for other island nations facing similar challenges.

Achieving this paradigm shift required the project design to place emphasis towards putting processes, structures, stakeholders, knowledge and systems in place that would catalyze scalability, replicability, learning, and an enabling environment. The sections below demonstrate how the project addresses these areas to increase the paradigm shift potential.

Scaling-up and replication

The SCWRP offers significant potential for scaling up and replication to meet the critical regional need for sustainable water management. The key aspects to consider for scaling up and replication include:

- Barbados' strategy to allocate savings from the debt swap toward new adaptation projects represents a commitment to holistic sustainability and resilience, offering a noteworthy example for other countries seeking effective finance strategies for climate change adaptation. The proposed debt swap for Barbados could serve as an innovative financing solution to address environmental issues, allowing nations to replace costly debt with more favorable terms that promote climate resilience.
- By converting wastewater into a resource for irrigation and aquifer recharge, the project addresses the growing demand for innovative water management solutions. The 2008 IWRM Road Map for Barbados identified wastewater reclamation as a key recommendation, highlighting strong stakeholder interest and policy support.
- With a projected supply of approximately 5,476 m^3 of reclaimed water per day from the upgraded South Coast Sewage Treatment Plant, there is ample opportunity for its use in agriculture, especially considering that in the southern part of Barbados alone, there is at least 505.9 to 607.0 hectares of land (equivalent to 5,059 to 6,070 m2) eligible for irrigation. This indicates a significant chance to boost water security and agricultural productivity, fulfilling both environmental and economic needs.
- Current facilities serve only 3% of the Barbadian population, showcasing the vast potential for expanding reclaimed water reuse

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Knowledge Sharing and Learning

The project's collaboration with regional initiatives, such as the Water Sector Resilience Nexus for Sustainability in Barbados (WSRN S-Barbados) and the Roof-to-Reef Programme (R2R), enhances its reach. This cooperation allows for the exchange of insights and strategies across various sectors, supporting a unified approach to climate resilience and water resource management. The project's conformity with the broader climate adaptation and mitigation objectives specified in Barbados' Nationally Determined Contributions (NDCs) highlights its role in facilitating systemic change.

Additionally, the BWA is a member of The Caribbean Water and Wastewater Association (CWWA), which is a regional non-governmental organization established by an Act of Parliament in Trinidad & Tobago in 1991. The CWWA brings together experts from the water, wastewater, and solid waste sectors, both from governmental and private organizations. Through this platform, the BWA plans to disseminate the insights gained. The IDB as a regional entity, key project partner and accredited entity, collects and shares valuable climate change insights and project experiences with CARICOM member nations. Through established platforms for knowledge sharing, the IDB ensures that lessons from the SCWRP contribute to regional best practices, strengthening CARICOM members' capacity to undertake similar resilient water management initiatives.

Creating an Enabling Environment

The policy reforms supported by the project to establish the necessary institutional framework for the DFCT will create a conducive environment for future initiatives. This framework will ensure that operations are carried out effectively and with favorable outcomes in upcoming projects.

On the other hand, component 4 of focuses on institutional strengthening, which is pivotal in fostering a paradigm shift towards sustainable water management in Barbados. By improving the legal and regulatory frameworks, this component ensures a robust governance structure that supports the long-term viability and effectiveness of water resource management initiatives. Moreover, capacity building and training in advanced treatment technologies and operation & maintenance (O&M) are essential for enhancing local expertise and ensuring the sustainability of the project's infrastructure and practices. These interventions collectively contribute to creating an enabling environment that not only supports the current project but also paves the way for future initiatives in sustainable water management. This

component, therefore, plays a crucial role in institutionalizing best practices and reinforcing the commitment to environmental stewardship and climate resilience in Barbados.

Regulatory Framework and Policies

The policy reforms supported by the project within the DFCT context are expected to significantly influence Barbados' policy framework and promote sector transformation. Component 4 includes activities aimed at enhancing the regulatory framework in the water sector by improving the governance and managerial capacity of the BWA, implementing an action plan for gender and Persons with Disabilities (PwD), and supporting the Fair Trading Commission's functions. It also involves monitoring water quality, quantity, and climate parameters, as well as regulating groundwater abstraction to ensure data-driven decision-making. Additionally, public awareness and stakeholder engagement campaigns focus on gender and diversity, fostering community support and ensuring diverse participation in decision-making. Collectively, these efforts build a sustainable regulatory framework for the water sector.

Contribution to National Climate-Resilient Development Pathways

The Project also support of the achievement of the R2RP, which provides an overarching framework that allows an integrated approach to addressing the negative impacts of climate change. The R2RP is the Government's sustainable development model for the next decade and represents the country programme for Barbados. The primary focus is on improving the social and environmental circumstances of the people in Barbados. The R2RP will enhance the country's ability to recover from climatic events and is hinged on six thematic areas: Shelter, Water, Energy, Waste, Land use, and Ecosystems Management. This project is in alignment with 4 (Water, Energy, Waste and Ecosystems Management) of the 6 thematic areas. Notable is that the thematic areas under the R2RP are also aligned to Barbados' Nationally Determined Contribution (NDC) priority areas.

D.3. Sustainable development (max. 500 words, approximately 1 page)

The proposed project, encompassing components of resilient infrastructure, ecosystem protection and institutional strengthening, offers a multi-faceted approach to sustainable development in Barbados. This aligns closely with the United Nations Sustainable Development Goals (SDGs), particularly those related to Clean Water and Sanitation (SDG 6), Sustainable Cities and Communities (SDG 11), Responsible Consumption and Production (SDG 12), Climate Action (SDG 13) and Life Below Water (SDG 14).

Environmental co-benefits

The project's environmental co-benefits are significant. These are supported by:

- **Sustainable Water Management**: Enhances water security by promoting efficient use and reuse of water resources, supporting SDG 6 (Clean Water and Sanitation).
- **Climate Action:** Incorporates climate change considerations, energy-efficient technologies, and renewable energy sources, contributing to SDG 7 (Affordable and Clean Energy) and SDG 13 (Climate Action).
- **Biodiversity Conservation:** Protects and conserves biodiversity in critical habitats like the Graeme Hall Swamp, aligning with SDG 14 (Life Below Water) and SDG 15 (Life on Land).
- **Pollution Reduction:** Improves water quality by treating wastewater to advanced levels, and air quality by providing enhanced pathways for non-motorized vehicles and pedestrians, thereby reducing pollution and protecting marine and terrestrial ecosystems.

Social co-benefits including Health co-benefit

The project promises substantial social benefits. These are supported by:

- **Public Health:** Mitigates health risks by improving water quality and reducing exposure to pollutants, contributing to SDG 3 (Good Health and Well-being).

- **Food Security:** Enhances agricultural productivity through the provision of reclaimed water for irrigation, supporting SDG 2 (Zero Hunger) and contributing to rural development.
- **Community Well-being:** Strengthens community resilience and well-being through improved environmental health and sustainable water resources management (SDG 11).

Economic co-benefits

Economically, the project is poised to boost local economies, supported by:

- **Agricultural Productivity**: Boosts economic growth by enhancing agricultural productivity and sustainability, linking to SDG 8 (Decent Work and Economic Growth).
- **Infrastructure Development:** Represents a significant investment in sustainable infrastructure, promoting innovation in water management technologies and practices, contributing to SDG 9 (Industry, Innovation, and Infrastructure).
- **Resource Efficiency**: Encourages the efficient use of water and energy resources, leading to cost savings and economic efficiencies over the long term.
- **Debt Sustainability:** The financing structure ensures the project contributes to the public debt's sustainability, aligning with SDG 17 (Partnerships for the Goals) by showcasing how integrated financing strategies can support large-scale environmental projects.
- **Financial Resilience:** The project's financing mechanism, including the debt swap, contributes to the Barbados Economic Recovery and Transformation (BERT) and Extended Fund Facility (EFF), supporting the country's macroeconomic stability, also aligning with SDG 17.

Gender-sensitive Development Benefit

Gender-sensitive development is a core component of this project, supported by:

- **Inclusive Participation and Empowerment**: Promotes gender equality and the empowerment of all individuals, including women and persons with disabilities, by ensuring their participation in water management and decision-making processes, aligning with SDG 5 (Gender Equality).
- **Capacity Building**: Offers targeted training and capacity building in water management technologies, operations, and maintenance, including increased female and PwD access to technical and operational jobs, ensuring that programs are inclusive and accessible to all, fostering SDG 4 (Quality Education) and SDG 10 (Reduced Inequalities).

The integration of the project's financial and operational benefits with its environmental, social, and economic impacts reinforces its role as a key driver for sustainable development in Barbados. It showcases a model for sustainable infrastructure projects that effectively blends environmental goals with economic and social imperatives, including gender considerations, ultimately contributing to the broader agenda of sustainable development and resilience.

D.4. Needs of recipient (max. 500 words, approximately 1 page)

Vulnerability of Barbados

Barbados, a Small Island Developing State (SIDS), faces heightened vulnerability to climate change due to its geographical location, small size, concentrated coastal population, and limited economic base reliant on natural resources. With over 60% of the population residing in vulnerable coastal areas, the island is exposed to threats like sea-level rise and storm surge, contributing to unsustainable debt levels and economic instability. The country's unique characteristics, such as water scarcity, early socio-economic development, high population density, and modified natural environment, further complicate its environmental risks[26].

Climate change poses disproportionate impacts on vulnerable groups, including youth, women, and lower-income communities, including small farmers. Beyond direct environmental effects, there are significant social and economic consequences, including health risks, damage to coastal tourism infrastructure,

[26] Stennett-Brown (2019) https://doi.org/10.1371/journal.pone.0219250.g008

biodiversity loss, reduced water availability, and challenges to the fishery and agricultural industries, among others.

Of particular concern is the vulnerability of the agriculture sector, especially for small-scale farmers. The adverse effects of climate change, such as drought and water scarcity, directly affect the livelihoods of farmers. The implications extend beyond immediate agricultural concerns, impacting the overall economic stability of these communities.

Recognizing climate change as a significant threat to growth and prosperity, the nation faces complex challenges that require urgent adaptation strategies to address environmental, social, and economic vulnerabilities.

Economic and Social Development Characterization

Barbados faces substantial economic and social challenges, as indicated by assessments such as the IDB's Barbados Survey of Living Conditions 2016/2017. Poverty levels were reported to have risen from 15% in 2010 to 17%, with women and children disproportionately affected. The unemployment rate stood at around 10%, with higher rates among men (11.6%) than women (8.5%), and the pandemic worsened job losses, particularly in low-income households. Despite ranking 31st on the Global Gender Gap Index, significant disparities persist, notably in labor participation (women lag by 6.84%) and wage equality (earning 71.20% of men's pay for similar work). Political representation of women is under 26%, yet women's involvement in business is notable, with 43.50% of firms owned by women and 25.40% led by female top managers, reflecting complex gender dynamics in Barbados.[27]

The economy contracted sharply due to a decline in tourism[28], further worsened by the volcanic ash crisis and Hurricane Elsa, which damaged the agricultural sector and infrastructure. These challenges highlight the need for timely adaptation to climate change and the transition to a fossil fuel-free economy.

Moreover, the water and wastewater sector in Barbados faces limitations in human and financial resources, affecting compliance with legal and regulatory requirements and underscoring the necessity for improved policy coordination and training for operational staff at the Barbados Water Authority[29].

Absence of alternative sources of financing

After evaluating various funding mechanisms, the GoB concluded that borrowing from an MDB was the most appropriate and feasible option to finance the SCWR project. This decision was influenced by the limitations in BWA's financial standing, the lack of capacity for managing large-scale PPPs, the unavailability of full grant funding, and the necessity of the project in addressing pressing environmental and economic needs. Despite the fiscal challenges, this approach was deemed essential to build resilience in the water sector and to support the nation's broader economic and environmental objectives (for additional details refer to B.5).

Project's Role in Addressing Risks

The SCWRP in Barbados confronts various economic, social, environmental, and climate risks. Upgrading the sewage treatment plant and incorporating advanced water treatment directly addresses water scarcity, reducing the island's vulnerability to droughts and the risks of saline intrusion, exacerbated by high population density. The project's focus on sustainable water management minimizes reliance on limited freshwater resources, mitigating environmental risks.

In addition to environmental concerns, the SCWRP significantly reduces social risks. By improving wastewater treatment, it lowers the prevalence of waterborne diseases, particularly among vulnerable

27 World Bank, Poverty & Equity and Macroeconomics, Trade & Investment Global Practices.
28 2021 Barbados NDC Update (July 2021)
29 GEF (2019). National Package for Barbados under the CReW+: an integrated approach to water and wastewater management using innovative solutions and promoting financing mechanisms in the Wider Caribbean Region (RG-G1016) Project

groups, thus addressing public health risks. The project's impact on key economic sectors, such as agriculture and tourism, helps mitigate risks associated with economic instability.

The initiative also plays a crucial role in reducing unemployment and poverty risks. Through job creation during construction and operation, it provides economic stability, particularly important given recent surveys indicating increased poverty levels. Moreover, the SCWRP addresses gender disparities in employment, contributing to broader social equality goals.

Need for strengthening institutions and implementation capacity

Barbados faces significant challenges in its wastewater management, characterized by several weaknesses. In the first place, the lack of comprehensive planning to address the growing demand for water resources and potential supply-demand gaps. Financial constraints, notably high implementation costs for infrastructure projects, pose obstacles. Operational deficiencies, such as poor facilities and a shortage of skilled personnel, underscore institutional vulnerabilities. In terms of collaboration, both public and private sectors operate independently, hindered by historical trust issues. Moreover, the dependence on consultants for technology decisions and uncertainties around incorporating timely private sector input present technical challenges. Component 4 of the Project involves a holistic approach that includes strategic planning, monitoring, and workforce development to strengthen BWA's wastewater management.

D.5. Country ownership (max. 500 words, approximately 1 page)

Barbados, having ratified the United Nations Framework Convention on Climate Change (UNFCCC) in 1994 and the Kyoto Protocol in 2000, reaffirmed its dedication to climate action by endorsing the Paris Agreement in April 2016. Despite its historically modest contribution to greenhouse gas concentrations, Barbados, in its 2019 Barbados National Energy Policy (BNEP) and Implementation Plan, articulated an ambitious objective of achieving a fossil fuel-free economy and minimizing greenhouse gas emissions across all sectors to the greatest extent feasible by 2030.

Within the sphere of climate change adaptation, Barbados has established significant legal frameworks. These include the Planning and Development Act and the 2021 Physical Development Plan (PDP), which integrates climate change considerations and has been endorsed by the Cabinet. The Roofs-to-Roofs Programme (R2RP) operationalizes the PDP and aligns with its objectives. The R2RP aims to enhance resilience, freshwater storage, renewable energy deployment, pollution reduction, sustainable land use, and coral reef restoration.

The Barbados Growth and Development Strategy 2013-2020 identified pivotal areas for reform, aligning with the National Climate Change Policy (NCCP). Relevant sections include Tourism, Agriculture, GHG reduction, Education and Training, Environmental Sustainability, and Green Economy. These align with the government's commitment to climate change adaptation and mitigation, evident in policies such as the White Paper on Tourism Development, Coastal Zone Management Plan, and Storm Water Management Plan.

The water sector plays a pivotal role in Barbados' sustainable development, guided by various policies and legislation. The Barbados Water Authority Act (1980), Underground Water Control Act (1953), and National Water Conservation Plan provide the groundwork for water resource management.

The establishment of the Wastewater Department and the enactment of the National Water Reuse Policy in 2018 demonstrate Barbados' commitment to managing wastewater issues and promoting safe water reuse for non-potable purposes. The policy aligns with broader sustainable development goals and supports a paradigm shift in water management.

The project receives support from various national policies, including the Barbados Sustainable Development Policy (2004) and the National Strategic Plan of Barbados 2006-2025. These policies emphasize conservation, resource efficiency, and the development of a green economy.

In November 2022, Barbados initiated a Green Climate Fund (GCF) funded project, named 3R-CreWS, focusing on wastewater management to mitigate water scarcity due to climate change. The Inter-American Development Bank (IDB), accredited by the GCF, has played a crucial role in financing projects across Latin America and the Caribbean, including eight GCF-funded projects.

The National Designated Authority (NDA) supports the project's development, ensuring political buy-in and acting as the GCF's focal point in Barbados. The NDA, along with a technical-working group, facilitates coordination among ministries and provides in-kind support for project implementation.

Barbados demonstrates a robust commitment to climate change mitigation and adaptation through comprehensive policies, legal frameworks, and ongoing initiatives, positioning itself as a proactive actor in the global effort to address climate challenges.

D.6. Efficiency and effectiveness (max`. 500 words, approximately 1 page)

Through a meticulous integration of innovative financial strategies and advanced technical approaches, the project aims to optimize resource allocation, foster transparency, and ultimately bolster the overall success and impact of the investments involved.

Financial Mechanisms

Barbados, which underwent its first debt restructuring in 2018, is working towards reducing its debt-to-GDP ratio to 60% by 2035 and is exploring further liability management moves to generate fiscal space. The current initiative involves issuing a new SLB to finance a buyback of the sovereign's most expensive remaining debt. These savings will fund critical environmental and economic resilience projects, including the present Project.

The SLB will be jointly guaranteed by the Inter-American Development Bank and the European Investment Bank, with the latter's participation underlining its involvement in similar policy lending for the first time. The success of this SLB model in Barbados could have broader implications for the design of debt swaps globally, impacting other sovereigns seeking to redirect resources for resilience-building initiatives.

The SLB issued by the country will be monitored through KPIs to ensure the efficiency and transparency of the process. KPIs are specific, measurable metrics that are set to assess and track the issuer's performance in meeting predefined sustainability targets. The use of KPIs serves as a robust tool for enhancing accountability in bond issuance, providing investors with a clear framework to evaluate the issuer's progress in meeting its sustainability objectives.

Technical approaches

The project includes several innovative techniques, highlighting the following:

- Digitalization: The Project supports the digitalization of operation processes and adoption of smart water infrastructure technologies, and related information and communication technologies for managing reclaimed water.
- Wastewater treatment: 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.
- Smart Water Infrastructure Technologies (SWIT): The project emphasizes the use of SWIT such as smart meters, valves, and loggers. These technologies enhance the efficiency and management of water treatment processes, distribution, and overall infrastructure.

Overall, the funds allocated to this Project will allow the creation of a paradigm shift in the wastewater management practices of Barbados through the deployment and transfer of appropriate technologies and the promotion of an enabling environment that promotes institutional, financial, social and environmental sustainability.

E. LOGICAL FRAMEWORK

*This section refers to the project/programme's logical framework in accordance with the **GCF's Integrated Results Management Framework** to which the project/programme contributes as a whole, including in respect of any co-financing.*

E.1. Project/Programme Focus

Please indicate whether this proposal is for a mitigation or adaptation project/programme. For cross-cutting proposals, select both.

☐ Reduced emissions (mitigation)

☒ Increased resilience (adaptation)

E.2. GCF Impact level: Paradigm shift potential (max 600 words, approximately 1-2 pages)

This section of the logical framework is meant to help a project/programme monitor and assess how it contributes to the paradigm shift described in section D.2 above by applying three assessment dimensions – scale, replicability, and sustainability.

Accordingly, for each assessment dimension (see the definition per assessment in the accompanying guidance note), describe the current state (baseline) and the potential scenario (target) and rate the current state (baseline) by using the three-point-scale rating (low, medium, and high) provided in the guidance note. Also describe how the project/programme will contribute to that shift/ transformation under respective assessment dimensions (scale, replicability and sustainability). In doing so, please refer to section B.2(a) (theory of change).

Assessment Dimension	Current state (baseline)		Potential target scenario (Description)	How the project/programme will contribute (Description)
	Description	Rating		
Scale	The focus on wastewater reuse in the context of water security and climate resilience has been well-documented over an extended period. For instance, the IWRM Road Map for Barbados, created in 2008, highlighted the importance of promoting wastewater reuse based on input from stakeholder consultations. Additionally, the legal and regulatory framework in Barbados has undergone recent revisions to enhance guidance	Low	The paradigm shift is a move toward resilient, sustainable and efficient water management and wastewater treatment. In particular, the provision of reclaimed water will replace part of the BWA water supply for agriculture. The reclaimed water will offer a crucial solution by providing additional water for agriculture, where there is a desperate shortage. At River Plantation, where reclaimed water will be transported, current land	*Describe key applicable outputs and or resulting outcomes relevant to increasing (scaling up) quantifiable results within and beyond the scope of the intervention.* Output 2.1.1 includes the execution of 25 km of pipeline that will enable the distribution of reclaimed water to farmers located at River Plantation in Saint Philip. Also included is a 4 km water pipeline, 5 injection wells, 6 exploratory boreholes, 3 abstraction boreholes and pump stations, 3 monitoring wells and ancillary equipment that will allow Christ Church aquifer recharge.

	on wastewater management and reuse, encompassing aspects such as the Zoning Policy, Planning and Development Act, and the Wastewater Reuse Bill, among others. This signal of interest at the policy level in the use of treated wastewater is an important precondition for scaling up the scope and impact of this project. However, there are no pipelines installed to date to transport reclaimed water for irrigation and aquifer recharge purposes. Given that the SCSTP plants currently cater to only a fraction of Barbados' population, there exists considerable potential for augmenting the volume of treated water with future household connections. Consequently, this could result in an expansion of direct beneficiaries utilizing reclaimed water for irrigation purposes.		with irrigation infrastructure is 45 hectares, with insufficient water. There are plans to expand this to 140 hectares when water is made available. There is a capacity to irrigate 480-600 hectares of farmland sustainably with the reclaimed water from the plant. Additionally, the replenishment of the Christ Church aquifer provides indirect benefits to approximately 160 hectares (400 acres) in Silver Hill and Gibbons Bogs, which currently rely on aquifer irrigation. The aquifer recharge plays a crucial role in ensuring a sustainable water source for these agricultural activities. Concerning wastewater management, enhancements involve an elevation in the quantity of wastewater systematically collected and subjected to tertiary-level treatment for subsequent non-potable water applications. The incremental capital expenses associated with the treatment and provision of reclaimed water exhibit a diminishing trend with the augmented availability of wastewater volume. This progression contributes to fostering a conducive environment that supports the deployment, dissemination, and innovation of wastewater treatment technologies.	These two outputs contribute to the target scenario paradigm shift by increasing the availability of high-quality reclaimed water for non-potable uses (Outcome 1) and enhancing water security (Outcome 2). **Output 4** is specifically targeting a combination of activities for the institutional and technical strengthening of BWA which will improve its capacity to scale-up the project vision to other areas of the country in the future. These activities include i) assisting BWA in personnel training for the operations and maintenance of the SCWRRF (Activities 4.1.1, 4.1.2), ii) improving software and administrative capacities of BWA (Activities 4.1.1, 4.1.2), iii) Promoting equal participation of women and Persons with Disabilities (PwD) within BWA (Activities 4.2.1 to 4.2.6), and iv) implementing robust monitoring systems within BWA to track water quality and quantity, thereby regulating and making the use of water more efficient (4.3.1., 4.4.1). Additionally, the project is foreseen to improve the capacity of the GAS (Activities 4.6.1, 4.6.2) which will support monitoring activities for the project, and BADMC (Activities 4.7.1, 4.7.2), which will promote sustainable agricultural practices for use of irrigation water. Output 4 contributes to the potential target scenario by improving governance, efficiency, and sustainable management of water resources (Outcome 4).

Replicability	In light of Barbados' escalating water scarcity challenges, the adoption of reclaimed water emerges as a highly replicable solution to address these concerns. On the other hand, given the water stress worsen by climate impacts expected in the Caribbean [30], the Project exhibits significant potential for replication within the region, as well as among other Small Island Developing States (SIDS).	Low	If the execution of an advanced wastewater treatment results in the successful use of reclaimed water, similar initiatives can be replicated across neighboring SIDS on the frontline of climate change and facing similar risks. The project's collaboration with regional initiatives and the implementation of the Roof-to-Reef Programme (R2R) in the country enhances the replicability of the Project inside and outside of Barbados.	Efforts for ecosystem restoration can be tailored to other regions to mitigate climate change impacts (**Output 3.1**). On the other hand, **Output 3.2** integrates sustainability in water management and energy utilization, which can reduce the environmental impact of similar projects elsewhere. Additionally, adopting policies and frameworks that promote sustainable water use, public engagement, and best management practices can be implemented by governments and organizations globally to improve water management systems (**Output 4**). In evaluating the Project replicability, it is it is important to consider the capabilities of the AE and EE, including their local and international roles. The BWA, as a member of The Caribbean Water and Wastewater Association (CWWA), has the opportunity to exchange valuable expertise with fellow member countries. This collaborative engagement enhances the prospect of successfully replicating the project in various locations. The IDB is a pivotal financing entity in Latin America and the Caribbean, supporting economic and social development through projects like infrastructure and sustainability. It has a significant capacity of sharing lessons learned for replication in other countries.

[30] The fourth and fifth Intergovernmental Panel on Climate Change (IPCC) reports predicted heightened water stress due to rising temperatures, diminished annual precipitation, and the salinization of freshwater resources for the Caribbean.

Sustainability	As mentioned above, Barbados legal regulatory framework pertaining to wastewater management and reuse options, quality, and standards has recently undergone updates. This contributes to create an environment conducive to sustained innovation implementation, contributes to fosters stability, transparency and ensures adaptability to technological advancements. Concerning technical capacity, an internal discussion paper at the BWA highlighted the inefficiency and ineffectiveness of the managerial span of control, particularly within the wastewater section. This observation is compounded by the limited availability of external training opportunities and the absence of an internal training program at BWA. Regarding operations and equipment, there has been a shift in maintenance focus at BWA from Preventative Maintenance (PM) to emergency breakdown maintenance due to constraints in dedicated staff and financial resources for PM. The operational manuals are outdated, and there is a notable absence of functional automated control systems to optimize	Low	By enhancing governance and managerial capabilities, the Project holds the potential to strengthen the regulatory framework, thereby establishing a crucial foundation for the successful implementation of the project. Additionally, the Project has the potential to bring about a paradigm shift in the use of reclaimed water across the entire population of Barbados (demand side). The introduction of stringent groundwater regulations and advanced monitoring systems fosters a sense of responsibility and accountability in water resource management. Concurrently, public awareness campaigns create a groundswell of understanding, dispelling misconceptions and actively engaging the population. This collective effort not only ensures a sustainable water supply but also instigates a fundamental shift in public perception, promoting the widespread acceptance and conscious utilization of reclaimed water as a valuable resource. The project will make a positive contribution to the achievement of Sustainable Development Goals,	*Describe key applicable outputs and resulting outcomes that will be sustained beyond the project/programme period.* Output 4 focuses on enhancing capabilities for the long-term operation and maintenance of the infrastructure. p In this regard, **Output 4** will contribute to sustain **Outputs 1, 2.1, 2.2, and 3.2** by different mechanisms. By improving governance and project management through training and action plans such as AquaRating, the BWA will be better equipped to manage and optimize the new facilities. The establishment of a monitoring system for water and soil quality, and climate-related parameters will ensure ongoing environmental compliance and effectiveness. Public awareness campaigns will promote the safe and efficient use of reclaimed water, while the implementation of health and safety measures will safeguard public well-being. These efforts will ensure that all components operate sustainably and effectively beyond the project period. On the other hand, **Output 3.1**, will be sustained beyond the project period through several key mechanisms. Firstly, the development of the Integrated Management Plan for the NHCA will provide a strategic framework for continuous ecosystem management, monitoring, and restoration. Additionally, **Output 4** will equip local entities with the skills and resources needed for ongoing management and conservation efforts. Finally, the promotion of public

	the energy efficiency of the current water treatment systems.		specifically Goals 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15, 17	awareness and stakeholder engagement campaigns will foster community support and participation, creating a collaborative environment where biodiversity and ecosystem resilience can thrive well into the future.

E.3. GCF Outcome level: Reduced emissions and increased resilience (IRMF core indicators 1-4, quantitative indicators)

Select appropriate IRMF core and supplementary indicators to monitor project/programme progress. More than one IRMF (core and or supplementary) indicators may be selected as applicable for each GCF results area and project/programme outcome (as defined in the table in section B.2(b)). If IRMF indicators are unable to measure any given project/programme outcomes, project/programme-specific indicators should be developed under section E.5 (project/programme specific indicators).

GCF Result Area	IRMF Indicator	Means of Verification (MoV)	Baseline	Target		Assumptions / Note
				Mid-term	Final[31]	
All adaptation result areas	**Core 2: Direct and indirect beneficiaries reached**	**BWA Reports, Project Documents Report, Survey/questionnaire reports, evaluation survey, Project Documents Report, site visit and observations**	**0**	**0**	**50,707 direct beneficiaries reached by 2028 (25,313 male; 25,312 female).** **231,293 indirect beneficiaries reached by 2029 (115,688 male; 115,688 female).**	**- Direct beneficiaries include expected and potential beneficiaries of the project.** **- The indirect benefits of the project will reach the entire population of the country.** **- Direct benefits begin once the infrastructure project becomes operational.**

[31] The final target means the target at the end of project/programme implementation period. However, for core indicator 1 (GHG emission reduction), please also provide the target value at the end of the total lifespan period which is defined as the maximum number of years over which the impacts of the investment are expected to be effective.

ARA2 Health, well-being, food and water security	Core 2: Direct and indirect beneficiaries reached	BWA Reports, Project Documents Report, site visit and observations.	0	0	50,707 direct beneficiaries reached by 2028 (25,313 male; 25,312 female). 231,293 indirect beneficiaries reached by 2029 (115,646 male; 115,647 female).	- Direct beneficiaries include expected and potential beneficiaries of the project. - The indirect benefits of the project will reach the entire population of the country. - Direct benefits begin once the infrastructure project becomes operational.
ARA2 Health, well-being, food and water security	Supplementary 2.1: Beneficiaries (female/male) adopting improved and/or new climate-resilient livelihood options	Ministry of Agriculture database/records on Farmers in target areas. BWA Reports, Survey/questionnaire reports, evaluation survey, Project Documents Report, site visit and observations.	0	0	296 beneficiaries at River Plantation by 2028 (148 male; 148 female) 160 beneficiaries in commercial farms by 2028 (80 male; 80 female) 250 beneficiaries from aquifer replenishment in Silver Hill and Gibbon's	The project operates on the following assumptions: - The data sources and methodologies employed for determining baseline and targets are assumed to be accurate and reliable. - It is assumed that each farmer benefiting at River Plantation (114 farms), and in Silver Hill, and Gibbon's Boggs districts (96 farmers) has an average household size of 2.6. - There are 16 commercial farms in the St George Valley. The beneficiaries include the families and employees linked to these farms, with an estimated average of 10 individuals per farm.

					Boggs districts (125 male; 125 female)	
ARA2 Health, well-being, food and water security	Supplementary 2.3: Beneficiaries (female/male) with more climate-resilient water security	Ministry of Agriculture database/records on Farmers in target areas. BWA Reports, Survey/questionnaire reports, evaluation survey.	0	0	40	The reclaimed water from the project will partially replace the current potable water used for irrigation. Initially, farmers who are currently using irrigation will be mapped by location, name, and gender in the areas surrounding river plantations and commercial farms. Monitoring will be conducted to identify which of these farmers begin receiving reclaimed water instead of potable water.
ARA3 Intrastructure and built environment	Core 3: Value of physical assets made more resilient to the effects of climate change and/or more able to reduce GHG emissions	Project financial data Asset value information from asset owners	USD 0	USD 0	USD 68.5m	The value includes equivalent value of physical assets supported (built, installed, distributed, rehabilitated, and or improved/strengthened) by GCF in the framework of the project to make them more resilient to climate change and/or more able to reduce GHG emissions
ARA3 Intrastructure and built environment	Core 2: Direct and indirect beneficiaries reached	BWA Reports, Survey/questionnaire reports, evaluation survey, Project	0	0	Population served 48,825 population	The value represents the current population served by existing sewage connections to the SCSTP. Once the SCWRRF becomes operational, it will

		Documents Report, site visit and observations.			served by 2028	automatically serve this entire population.
ARA4 Ecosystems and ecosystem services	Core 4: Hectares of natural resources brought under improved low-emission and/or climate-resilient management practice	BWA Reports, report and evaluation, Project Documents Report, site visit and observations.	0	0	33 hectares	The NHCA covers a total area of 33 hectares. The activities planned under output 3.1 are expected to enhance the entire Graeme Hall Swamp. This initiative aims to improve ecosystem services, biodiversity conservation, and biodiversity climate resilience through the implementation of management practices.
ARA4 Ecosystems and ecosystem services	Supplementary 4.1: Hectares of terrestrial forest, terrestrial non-forest, freshwater and coastal marine areas brought under resoration and/or improved ecosystems	BWA Reports, report and evaluation, Project Documents Report, site visit and observations.	0	0	33 hectares	The NHCA covers a total area of 33 hectares. The activities planned under output 3.1 are expected to enhance the entire Graeme Hall Swamp. This initiative aims to improve ecosystem services, biodiversity conservation, and biodiversity climate resilience through the implementation of management practices.

E.4. GCF Outcome level: Enabling environment (IRMF core indicators 5-8 as applicable)					
Select at least two relevant IRMF core (enabling environment) indicators to monitor and elaborate the baseline context and project/programme's targeted outcome against the respective indicators. Rate the current state (baseline) vis-à-vis the target scenario and select the geographical scope of the outcome to be assessed. Describe how the project/programme will contribute towards the target scenario. Refer to a case example in the accompanying guidance to complete this section.					
Core Indicator	**Baseline context (description)**	**Rating for current state (baseline)**	**Target scenario (description)**	**How the project will contribute**	**Coverage**
Core Indicator 5: Degree to which GCF investments contribute to strengthening institutional and regulatory frameworks for low emission climate-resilient development pathways in a country-driven manner	Responsibility for the water sector falls under the Prime Minister's Office. The legal regulatory framework in Barbados has been recently updated to better inform wastewater management and reuse options, quality and standards. These include the Zoning Policy, Planning and Development Act, Wastewater Reuse Bill to note a few. The policy and regulatory environment in Barbados are favorable for climate-resilient development, as demonstrated by the Roof to Reef Programme (R2RP).	medium	High degree to which the GCF investment strengthens institutional capacity for climate resilient development pathways.	The project aims to strengthen the PMO, , the BWA and other related institutions to enhance governance, efficiency, and sustainable management of water resources. This will be achieved mainly through: i) Improving the governance and project management capacity of BWA through the implementation of an action plan based on AquaRating, a Groundwater Modeling System (GMS)and assisting BWA in personnel training for the operations and maintenance of the SCWRRF, ii) Improving software and administrative capacities of BWA, iii) Promoting equal participation of women and Persons with Disabilities (PwD) within BWA, iv) Implementing robust monitoring systems within BWA to track water quality and quantity, thereby regulating and making the use of water more efficient, v) Enhancing the laboratory capacity of GAS, vi) Improving the technical capacity of BADMC	National level (one country)
Core Indicator 6: Degree to which GCF	Currently, the SCSTP only presents	low	High degree to which GCF investments	In comparison to other sewage treatment plants the new proposed SCWRRF will be	National level (one country)

investments contribute to technology deployment, dissemination, development or transfer and innovation	preliminary treatment and, therefore, secondary water quality with limited use of reclaimed water. Further, there is a recurring issue of breakdown of equipment (e.g. the screening units failed and were not replaced for several years). Most notoriously, starting in 2016 there was raw sewage from the South Coast system overflowing the streets causing businesses to have to close. The cause was breaks in the collection main and the discharge force main. It took several failed attempts to rectify the problems before solutions were implemented in 2019[32].		contribute to technology deployment, dissemination, development or transfer and innovation	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 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.	
Core indicator 7: Degree to which GCF Investments contribute to market development/transformation at the sectoral, local, or national level	The legal regulatory framework in Barbados has been recently updated to better inform wastewater management and reuse options, quality and standards. Barbados	medium	High Degree to which GCF Investments contribute to market development/transformation at the sectoral, local, or national level	This project is viewed as a significant contributor to market development and transformation within the water sector, specifically concerning wastewater treatment and reuse options. Its potential impact extends nationally, given the pivotal role of water in Barbados' agriculture sector.	National level (one country)

[32] Inter-American Development Bank. 2022. Water Sanitation and Solid Waste Sector Note for Barbados.

	has also adopted an incentive approach, using market instruments to achieve sustainable tourism practices. The Tourism Development Act (2002), states that an operator who incurs expenditure in improving the wastewater disposal system be allowed a tax credit of 20% of the capital cost of fittings, pipes and pumps used in the improvement of the wastewater system. Yet, a very small number of businesses and communities utilizes decentralized wastewater treatment systems.			The first two components of the project highlight technologies that can enhance the viability of water reclamation while mitigating risks associated with climate variability and change. Notably, the project emphasizes private sector involvement, with a private company currently being considered for the operation and maintenance of the Sustainable Clean Water Reclamation and Reuse Facility. Additionally, the project focuses on investing in the technical capacities of wastewater personnel and gaining support for the use of reclaimed water. These efforts aim to ensure a well-rounded approach, addressing both technological and social aspects, thereby contributing to the overall success and sustainability of the initiative.	
Core indicator 8: Degree to which GCF investments contribute to effective knowledge generation and learning processes, and use of good practices, methodologies and standards	The BWA faces constraints in advancing knowledge generation and learning, primarily stemming from financial limitations, and, to some extent, technical constraints. Instances such as the destruction of valuable hard-copy data due to a previous fire have contributed to these challenges.	low	High degree to which GCF investments contribute to effective knowledge generation and learning processes, and use of good practices, methodologies and standards	The project encompasses the incorporation of decision support tools designed to optimize the management of the SCWRRF, thereby improving the cost-effectiveness of plant operations through measures such as reduced energy consumption and the implementation of a preventative maintenance program. Within the institutional strengthening framework (Component 4), the project aims to introduce technology and software for water administration, including AquaRating and	National level (one country)

	Furthermore, there is a scarcity or absence of historical data pertaining to the flow and composition of both raw and treated wastewater. Additionally, the SCSTP lacks a laboratory facility to furnish information on the qualities of influent and effluent. Moreover, Graeme Hall Swamp lacks a consistent time-series dataset that would enable a comprehensive understanding of trends in water chemistry, hydrogeology, and the diversity of biota and fauna within it[33].			monitoring systems for tracking water quality and quantity. Furthermore, as part of Component 4, the project will offer targeted and specialized training for the BWA to effectively manage, monitor, and maintain the upgraded system, along with focusing on key project outputs. Given the project's innovative nature, its substantial scale, and the pressing need to adapt to climate change risks in the water sector, as outlined in the climate rationale (Section B1), prioritizing the potential for learning and identifying best practices and standards is crucial. Regarding knowledge generation, Component 3 comprises the development and implementation of a Monitoring Plan for the NHCA, that will allow the implementation of prioritized actions in the swamp.	

E.5. Project/programme specific indicators (project outcomes and outputs)

*This section should list out project/programme-specific performance indicators (outcomes and outputs) that are not covered in sections above (E.1-E.4). List down tailored indicators to monitor /track progress against relevant project/programme results (outcomes/outputs). AEs have the freedom to decide against which outcomes they would like to set project/programme specific indicators. If any co-benefits are identified in sections B.2(a)(b), and D.3, AEs are encouraged to add and monitor co-benefit indicators under the "**Project/programme co-benefit indicators**" section in table below. Add rows as needed.*

Please number each outcome and output as shown below to indicate association of outputs to the contributing outcome. The numbering for outputs under this section should correspond to the output numbering in annex 4 (detailed budget plan).

Project/programme results (outcomes/ outputs)	Project/programme specific Indicator	Means of Verification (MoV)	Baseline	Target		Assumptions / Note
				Mid-term	Final	

[33] Graeme Hall Swamp Stewardship Committee. 2019. Natural Heritage Conservation Area Surveillance Programme within Graeme Hall Swamp.

		Sources of information and methods used to collect and report data/information to measure progress against targets	*The starting point or current value of the indicators before the implementation of the project*	*The estimated value of the indicator at the mid-point of the implementation*	*The estimated value of the indicator at the completion of the implementation*	*Externalities and factors outside project management's control that may impact on the Component* *Data sources and methodologies applied for estimating baseline and targets*
Outcome 1. Availability of high-quality reclaimed water for non-potable uses, reducing the dependence on potable water sources and enhancing water supply resiliency.	Volume of reclaimed water utilized for aquifer recharge per year	BWA consumption figures (water meters installed at infiltration wells)	0 Currently the preliminary treated wastewater from SCSTP is piped to a sea outfall	No change from baseline	0.44 million m3 per year being utilize for aquifer recharge (10.95 million m3 at the end of the implementation)	Measure volume of treated effluent discharged to recharge wells, infiltration basins etc. to replenish aquifers, using flow meters. Compare annual volumes. It is expected that Aquifer recharge will occur only during the winter months (if the expected demand from agricultural sector is realized). Estimated 9-20% recharge rate average for Barbados, outpaced by consumption levels; hence, it is expected that this percentage will increase with the project. Accurate data is not available.
	Volume of reclaimed water utilized for agricultural irrigation per year	BWA consumption figures (water meters installed at farms along the 25 km pipeline and at River Plantation)	0 Currently BWA does not deliver reclaimed water, but other sources water (including potable water).	No change from baseline	3.94 million m3 per year being utilize for agricultural irrigation (98.55 million m3 at the end of the implementation)	The provision of reclaimed water will replace part of BWA water supply for agriculture, and will negate the need for these farmers to go to the public water supply system for their needs, and reduce water extraction pressure from the St Michael potable water aquifer.

Output 1.1 Construction and operationalization of the SCWRRF.	# of STPs that can treat water to tertiary water quality standard	Reports of contractors hired to upgrade the SCSTP/SCWRRF, BWA progress reports, site visits/observation, Supervising Engineer's Certification of Completion	SCSTP is currently a preliminary treatment plant that is not suitable for wastewater reuse such as aquifer recharge and agricultural irrigation.	No change from baseline. Upgrade should be ongoing.	1 Tertiary Level STP	GOB authorities remain committed to the upgrades and cofinancing materialize, as committed. Expertise exists for the installation of the required upgrades. Favorable conditions exist for the construction works to be done.
	% effluent toxicity levels	Laboratory reports	0	No change from baseline	100 % of laboratory reports meet agricultural quality requirements	
Output 2.1.: Infrastructure for water reuse and aquifer recharge installed	Km of pipeline installed for transporting tertiary treated wastewater	Site visits/observation, Supervising Engineer's Certification of Completion	0 km of pipeline	10 km pipeline Installed	25 km pipeline Installed	GOB authorities remain committed to the upgrades and cofinancing materialize, as committed.
Output 2.2.: Aquifer Recharge Infrastructure constructed and operating	Volume (m3) tertiary treated wastewater made available per day	Reports from flow meter installed at SCWRRF, laboratory reports on water quality	0	0	12,000 m3 of treated wastewater per day	There is public buy-in for the use of reclaimed water for augment groundwater supplies and irrigation.
Outcome 3. Improved ecological health and resilience of Graeme Hall Swamp, supporting biodiversity and ecosystem services	# of Monitoring Plans developed for the NHCA	Final and midterm project reports	0	0	1 Monitoring plan developed	Skilled professionals are available to develop the monitoring plans.

Output 3.1. Natural Heritage Management Plan developed and implemented	# of Monitoring Plans implemented for the NHCA	Final and midterm project reports	0	0	1 Monitoring plan implemented	Skilled professionals are available to develop the monitoring plans.
Output 3.2. Solar Energy Generation Plant with Battery Storage implemented	% of electricity consumption offset by renewable energy	Operational reports from BWA	0	0	100% of electricity consumption covered by renewable energy	The PV panels are routinely monitored and maintained/ repaired to ensure they function optimally.
Outcome 4. Enhanced institutional capacity, public awareness, gender inclusivity for water resource management.	# of implementations of AquaRating system.	Project progress reports BWA reports	0	0	1 system implemented	Skilled professionals are available to develop the system.
	# of monitoring systems implemented to track water quality, quantity, and climate-related parameters.	Project progress reports BWA reports	0	0	1 monitoring system implemented	Skilled professionals are available to implement the monitoring systems. Enhanced training ensures that BWA staff is proficient in monitoring procedures.
	# of public awareness and stakeholder engagement campaigns to promote the benefits of wastewater reuse and build community support developed.	Project progress reports BWA reports	0	20 % of expected campaigns implemented	100 % of expected campaigns implemented	Skilled professionals are available to develop public awareness and stakeholder engagement campaigns. BWA is committed to develop public awareness and stakeholder engagement campaigns
Output 4. Strengthened governance, gender mainstreaming, MRV system, groundwater regulation policies, and public awareness campaigns.	Number of persons trained on implementation, maintenance, operations and management of the SCWRRF who are directly involved in	Registration forms for trainings, certificates of completion. BWA HR information system, work sheets/work assignments, Post and	0	10 persons trained are directly involved (40% are women) (utilizing knowledge from training)	50 persons trained are directly involved (50% are women) (utilizing knowledge from training)	At least 50 staff members from BWA will receive training on the implementation, maintenance, operations, and management of the SCWRRF.

	these activities (disaggregated by sex)	Pre workshop evaluation.		in the implementation, maintenance, operations and management of the SCWRRF	in the implementation, maintenance, operations and management of the SCWRRF	BWA staff are willing and available to participate in training opportunities. There are equal number of men and women working the areas of specialized training, therefore achieving parity in training targets.
	Number of persons trained on Gender Sensitivity (disaggregated by sex)	Registration forms for trainings, certificates of completion.	0	200 BWA staff members trained ongender sensitivity (50% are women)	500 BWA staff members trained on gender sensitivity (50% are women)	At least 500 staff members from BWA will receive training on gender sensitivity. BWA staff are willing and available to participate in training opportunities. There are equal number of men and women working the areas of specialized training, therefore achieving parity in training targets.
	# of customized trainings developed/ adopted	Final course materials/training package	0	4 customised courses developed/ adopted covering the following topics: - gender sensitivity - H&S	10 customised courses developed/ adopted covering topics such as: - SCADA - gender sensitivity - H&S - Industrial waste inspector	It is assumed that BWA staff are willing and available to participate in training opportunities. Skilled trainers are available to lead course design and execution.

					- Laboratory testing, analysis and management - CAS, UV and RO Technologies operation. - Aquarating - Water quality monitoring - PV O&M.	
	# of documents related to regulation policies	Final version of documents: - Governance and Project Management Action Plan for BWA. - Institutional Gender and Persons with Disabilities Policy - Institutional Gender and Persons with Disabilities (PwD) Action Plan.	0	0	Final version of documents: - Governance and Project Management Action Plan for BWA. - Institutional Gender and Persons with Disabilities Policy - Institutional Gender and Persons with Disabilities (PwD) Action Plan.	Expertise available to support the updating of documents. Stakeholders are available and actively participate.
Project/programme co-benefit indicators						
Co-benefit 1. Reduced GHG emissions	# of MW of PV installed	License to operate the PV system from the Division of Energy, GOB Electrical	0	0	7 MW of solar panels installed	Technical expertise exists to install the PV panels.

		Engineering Department (GEED) certificate of compliance, site visits/observation				
	Energy generation from PV	GOB Electrical Engineering Department (GEED) certificate of compliance, site visits/observation, equipment monitoring.	0	0	Renewable energy generated: 4,088 MWh/y by 2029 102,200 MWh at the end of the implementation)	Conditions are favourable for the installation of the PV panels. The PV panels are routinely monitored and maintained/ repaired to ensure they function optimally.
	tCO_2 reduced	Equipment monitoring by BWA: electricity generated by the PV plant (actual values) Updated electric grid emission factor provided by the GOB Electrical Engineering Department (GEED) or other relevant institutions (e.g., Technical Working Group of the International Financial Institutions).	0	0	GHG emissions reduced: 2,657 by 2029 66,430 tOC2 at the end of the implementation	Conditions are favourable for the installation of the PV panels. The PV panels are routinely monitored and maintained/ repaired to ensure they function optimally.
	# of EE technologies Implemented (disaggregate by type – DAF thickeners, aerobic digesters, etc.)	site visits/observation, Supervising Engineer's Certification of Completion	SCSTP does not undertake sludge dewatering.	No change from baseline. Upgrades should be advancing.	Sludge treatment installed	Technical expertise exists to design and install EE technologies

Co-benefit 2. Reduced pollution impacts on water bodies and ecosystems	Number of odor complaints from communities surrounding of the SCSTP and lift stations received per year	Survey in surrounding communities and plant employees. Environmental Protection Department (EPD) reports, Ministry of Health reports.	Number of current complaints to be provided	No change from baseline	0 complaints by 2029	SCSTP and SCWRRF fully upgraded and operational.
	Percentage of Water Quality Monitoring Analysis meeting regulatory requirements for wastewater discharge (BOD, COD, DO)	Laboratory Analysis reports. Environmental Protection Department reports	0%	0%	100%	SCSTP and SCWRRF fully upgraded and operational.
	Amount of wastewater discharged into marine environment	BWA Reports and flow meters data, Research, project documents, site visit, survey of plant employees.	An estimated 2.2 million m3 per year of wastewater discharged into marine environment.	No change from baseline	Less than 0.11 million m3 of treated wastewater discharged discharged into marine environment.	SCSTP and SCWRRF upgrades completed and distribution system in place.

E.6. Project/programme activities and deliverables

All project activities should be listed here with a description and sub-activities. Significant deliverables should be reflected in annex 5 implementation timetable. Add rows as needed. Please number the activities as shown below to indicate association of activities to the related outputs provided above in section E.5. Similarly, please number sub-activities as shown below to associate to the related activity.

Activities	Description	Sub-activities	Deliverables
Activity 1.1.1	New SCWRP to provide secondary and tertiary treatment for the liquid stream	1.1.1.1. Conducting Equipment Inventory Survey. 1.1.1.2. Elaboration of Project Design.	. -Equipment inventory. -Design documents. -Bidding documents. -1 Upgraded plant.

		1.1.1.3. Prepare tender package including the detailed drawings and specifications and bidding documents. 1.1.1.4. Execution of upgrades. 1.1.1.5. Elaboration of Manual for Maintenance and Operation.	-Maintenance and operation manuals.
Activity 1.1.2	Supervision	1.1.2.1. Supervision	-Supervision reports
Activity 1.2.1	Upgrade, refurbish, or replace equipment in the existing SCSTP, and commission of plant	1.2.1.1. Elaboration of Project Design. 1.2.1.2. Elaboration of Environmental Impact Assessment and Public Consultations. 1.2.1.3. Prepare tender package including the detailed drawings and specifications and bidding documents. 1.2.1.4. Construction of the SCWRRF. 1.2.1.5. Elaboration of Manual	--Design document for SCSTP. -1 Environmental Impact Assessment Report and Public Consultations Report. -Bidding documents. -1 New water reclamation facility constructed. -Maintenance and operation manuals
Activity 1.2.2	Supervision	1.2.2.1 Supervision	-Supervision reports
Activity 2.1.1	Installation of pipeline for irrigation, and a high-water mark catchment area	2.1.1.1. Elaboration of Pipeline Project Design. 2.1.1.2 Execution of works.	-Pipeline system design documentation. -25 km of Pipeline installed.
Activity 2.1.2	Supervision	2.1.2.1. Supervision	-Supervision reports.
Activity 2.2.1	Installation of water pipeline, injection and monitoring wells, and ancillary equipment for aquifer recharge	2.2.1.1. Elaboration of Pipeline Project Design. 2.2.1.2. Execution of works.	-Pipeline and well system design documentation. -1 Aquifer recharge system installed.
Activity 2.2.2	Supervision	2.2.2.1. Supervision	-Supervision reports.
Activity 3.1.1	Development and implementation of a Monitoring Plan for the NHCA	3.1.1.1. Development of baseline assessments	-1 Environmental assessment reports. -1 Flora and fauna assessment reports. -1 Soil and water quality reports.
Activity 3.1.2	Establishment of a formal environmental monitoring and reporting program	3.1.1.2. Development of a results-based Management Plan for Graeme Hall Swamp	- 1 Management Plan for Graeme Hall Swamp developed. - 1 Management Plan for Graeme Hall Swamp implemented.

		3.1.1.3. Implementation of a results-based Management Plan for Graeme Hall Swamp	
Activity 3.1.3	Management, monitoring and control activities during project life		MRV system
Activity 3.1.4	Support for inter-ministerial coordination and collaboration with the private sector and academia		Workshops/Meetings held, coordination reports
Activity 3.1.5	Repair, operation, and maintenance of hydraulic systems		Repair, operation, and maintenance evaluation report developed
Activity 3.1.6	Collection and analysis of samples gathered by various agencies during project life		Samples of MRV
Activity 3.2.1	PV Panels at the pumping station + BESS	3.2.1.1. Elaboration of Project Design. 3.2.1.2. Preparation of tender package and bidding documents. 3.2.1.3. Installation of PV panels + BESS.	- Design documents. - Bidding documents. - 7MW of PV panels + BESS installed.
Activity 4.1.1.	Development and implementation of Aquarating action plan for BWA	4.1.1.1.1. Elaboration of Governance improvement plan. 4.1.1.1.2. Elaboration of Training programs and documentation. 4.1.1.1.3. Elaboration of Updated organizational structure.	-Governance improvement plan. -Training programs and documentation. -Updated organizational structure.
Activity 4.1.2	Implementation and training of/for a Ground Water Modeling System (GMS) in BWA		
Activity 4.2.1	Development and implementation of an Institutional Gender and PwD Action Plan for BWA.	4.2.1.1. Elaboration of Gender and Action Plan documentation.	-1 Gender and action plan - 500 people trained for gender sensitivity. -Reports on the implementation of gender-related actions.
Activity 4.2.2	Formulation of an institutional gender policy to drive a partnership between BWA and UWI IGDS and	4.2.2.1. Formulate an institutional gender policy 4.2.2.2. Employ graduates from UWI IGDS (or M.S. and Ph.D. students)	- Partnership between BWA and UWI IGDS - 50% female and diverse employees trained

		4.2.2.3. Provide training offerings of the CIGAD	
Activity 4.2.3	Specific consultation on gender and diversity aspects	4.2.3.1. Map out key stakeholders 4.2.3.2. Conduct preliminary meetings to become familiar with existing social and gender issues 4.2.3.3. Consultation with key stakeholders on gender and diversity aspects 4.2.3.4. Develop and implement grievance redress mechanisms	-Consultations held with stakeholders -Grievance Redress Mechanism developed and implemented
Activity 4.2.4	Development and implementation of communication programs for public promotion of the project, the benefits of wastewater reuse and the construction of community support	4.2.4.1. Develop the communication program with a gender and diverse sensitive strategy. 4.2.4.2. Design and implement public awareness campaigns that highlight the gender and diversity dimensions of the project objectives.	- Communication programs developed - Public awareness campaigns conducted
Activity 4.2.5	Ensuring gender considerations are integrated into climate change adaptation and mitigation strategies	4.2.5.1. Promote research and initiatives that recognize and address the impacts of climate change on women and diverse groups, 4.2.5.2. Training sessions for BWA employees	- Report on gender considerations -50% of female staff members trained on gender and climate change
Activity 4.2.6	Increase of capabilities and leadership for the adoption of irrigation technologies, and to leverage the mechanisms available for access to water services	4.2.6.1. Deliver education programmes for farmers, particularly women.	- Education programmes delivered with the participation of female and male farmers
Activity 4.3.1	Design and implementation of a MRV system to track water and climate-related parameters	4.3.1.1. MRV system designing. 4.3.1.2. MRV system implementation.	-MRV system design. -MRV system implemented.
Activity 4.4.1	Systems design, integration, and implementation of planning and monitoring platform for BWA		

Activity 4.5.1	Design and implementation of awareness campaigns on water use and water conservation	4.5.1.1. Public awareness campaign materials designing. 4.5.1.2. Stakeholder engagement plans elaboration. 4.5.1.3. Elaboration of reports on the effectiveness of campaigns.	-Public awareness campaign materials. -Stakeholder engagement plans. -Reports on the effectiveness of campaigns.
Activity 4.6.1	Assessment of laboratory capacities of Government Analytical Service (GAS) and development of action plan	4.6.1.1 Assessment of GAS capacity 4.6.1.2. Development of action plan	-Action plan developed
Activity 4.6.2	Action Plan for the provision of equipment, supplies and training to GAS implemented	4.6.2.1 Execution of action plan	-Equipment inventory -Training programs and documentation
Activity 4.7.1	Assessment on technical support capacities of BADMC on sustainable agricultural practices and irrigation for small farmers	4.7.1.1 Assessment of BADMC capacity	- Technical support plan developed
Activity 4.7.2	Implementation of technical support action plan on sustainable agricultural practices (water use and conservation), extension, training	4.7.2.1 Execution of technical support plan	-Training programs and documentation

E.7. Monitoring, reporting and evaluation arrangements (max. 500 words, approximately 1 page)

Monitoring, Reporting and Evaluation System

The monitoring system for the project comprises various instruments, including Outcome Matrix (OM), Project Execution Plan (PEP), Annual Operating Plan (AOP), Procurement Plan (PP), Risk Matrices (RM), Progress Monitoring Reports (PMR), Bi-annual Progress Reports (BPR), Audited Financial Statements (AFS), Financial Intermediary Unaudited Statements (IFINA), terms of reference of consultancies, annual disbursement forecast, and Project Monitoring and Evaluation (PME). These tools are introduced and reviewed in the Project startup workshop and are regularly revisited throughout the project execution. Refer to Annex 11 for further details on the roles and responsibilities and the Monitoring, Reporting and Evaluation arrangements that will be utilized by the project.

In particular, activity 4.1.1.4.2 will finance the implementation of the MRV system. The implementation of a MRV system enhances data capture, recording, and tracking of indicators by establishing a structured framework. This system ensures accurate and consistent data collection through standardized methods and tools. It facilitates reliable recording by creating a centralized database for storing data. Additionally, the MRV system supports the tracking

of indicators by providing real-time monitoring and reporting capabilities, enabling stakeholders to assess progress, identify trends, and make informed decisions.

The **Project Executing Unit** is responsible for supervising and coordinating the MRE system.

The Bank conducts Administrative Missions or inspection visits, utilizing PMR to assess project performance.

Detailed characteristics of monitoring instruments, including OM, PEP, AOP, PP, RM, PMR, BPR, AFS, IFINA, terms of reference, forecasts, and PME, are outlined.

Roles and Responsibilities

The PEU, supported by Monitoring and Evaluation (MRE) specialists and technical specialists (biodiversity, environmental, social, and monitoring), monitors the project.

Technical specialists are responsible for the base record and monitoring process, supported by MRE specialists.

The outcomes of the monitoring process contribute to the Project Completion Report (PCR).

Project Completion Report and Evaluations

The Bank develops a PCR when project disbursements reach 95%, incorporating bi-annual progress reports, audited financial statements, and the outcome framework.

Intermediate process and final assessments, along with a cost-benefit ex post assessment, are planned at different stages of project funding.

The MRE specialist within the PEU identifies potential PEP deviations and supervises assessment activities.

Reporting and Impact Assessment

BWA must present reports to the IDB within 60 days after each semester, covering program activities, environmental and social safeguards, and achievement of indicators.

An impact assessment is planned at the project's end, measuring indicators related to water security and ecosystem protection. A budget of USD 295,000 is allocated for periodic and final Project evaluations.

F. RISK ASSESSMENT AND MANAGEMENT

F.1. Risk factors and mitigations measures (max. 3 pages)

This section provides a brief summary of the technical and operational risks of the SCWRP, with an emphasis on risks associated with project management and implementation.
In accordance with the IDB's Project Risk Management Framework, a comprehensive technical and operational risk assessment, including climate change risks, will be undertaken as a central element of the paradigm shift and sustainability of the investments. This study will include the necessary mitigation measures to address the identified risks.

Selected Risk Factor 1: Service Interruptions

Category	Probability	Impact
Technical and operational	Low	Low

Description

Wastewater treatment is an essential public service that should be consistently accessible. However, the implementation of new infrastructure for wastewater treatment comes with potential challenges, including interruptions during construction, the initiation of new procedures, and staff adaptation.

Mitigation Measure(s)

To ensure staff adaptation, BWA staff will actively participate in the planning of installation works right from the start and will be thoroughly consulted and involved throughout the implementation process. The suppliers responsible for the new facilities must not only install and initiate operations but also fine-tune the installations during the initial operating period. Additionally, the suppliers are required to provide training to BWA staff.
To minimize the disruption to the system, infrastructure enhancements will be carried out during periods of low flow in the system, such as outside the main tourist season and when rainfall is typically minimal. The system's inherent capacity will be leveraged to manage flows during planned disruptions, such as disconnecting and reconnecting pipes between sub-systems, ensuring the overall functionality of the system. Since the planned investments involve adding new modules to existing facilities, the expectation is that such disruptions will be infrequent.
In the rare event of unexpected disruptions, possibly stemming from external factors, resorting to ocean outfall of raw sewage may be considered as a last-resort solution. However, it is not anticipated that this measure will be necessary.
Further details on the facilities to be installed and their integration with existing facilities can be found in Annex 2.

Selected Risk Factor 2: Wastewater Treatment Overwhelming

Category	Probability	Impact
Technical and operational	Medium	Low

Description

The sewerage system in Barbados is designed to only convey wastewater nonetheless stormwater enters the sewerage system during episodes of high rainfall. Two main sources of stormwater entry have been identified: (1) manhole covers of the sewerage system are lifted by local neighbors to alleviate surface flooding; and (2) contrary to the building code, several larger residential buildings have connected downspouts to the sewerage connection.
Climate change forecasts indicate a reduction of rainfall of about 9% by 2050 compared to current rainfall. The incidence of severe storms with high rainfall events, however, is expected to increase. Such storms have the potential to overwhelm the wastewater treatment, as a result of surface run-off of rain entering the sewerage system.

Mitigation Measure(s)

The project includes the following activities to mitigate this risk:

(1) Identification of areas where excessively large inflows generate from and to notify non-compliant building owners of their violation of the building code with an instruction to remediate the situation; and
(2) restriction to the operating access to the manhole covers.
If ocean outfall of raw sewage occurs, the impacts are mitigated due to the fact that the concentration of waste is strongly reduced by the large volume of stormwater in the effluent.

Selected Risk Factor 3: Impacts on proposed BWRO plant (Wilcox Ridge/Providence)

Category	Probability	Impact
Technical and operational	Medium	Medium

Description

There is a proposed Brackish Water Reverse Osmosis (BWRO) plant being considered in the Wilcox Ridge/Providence area. The plant is planned to be supplied with water from the Christ Church aquifer, which will be recharged with reclaimed water.The groundwater contour map of the Christ Church Aquifer area prior to simulating the recharge of treated wastewater and BWRO withdrawals ("baseline")[34].

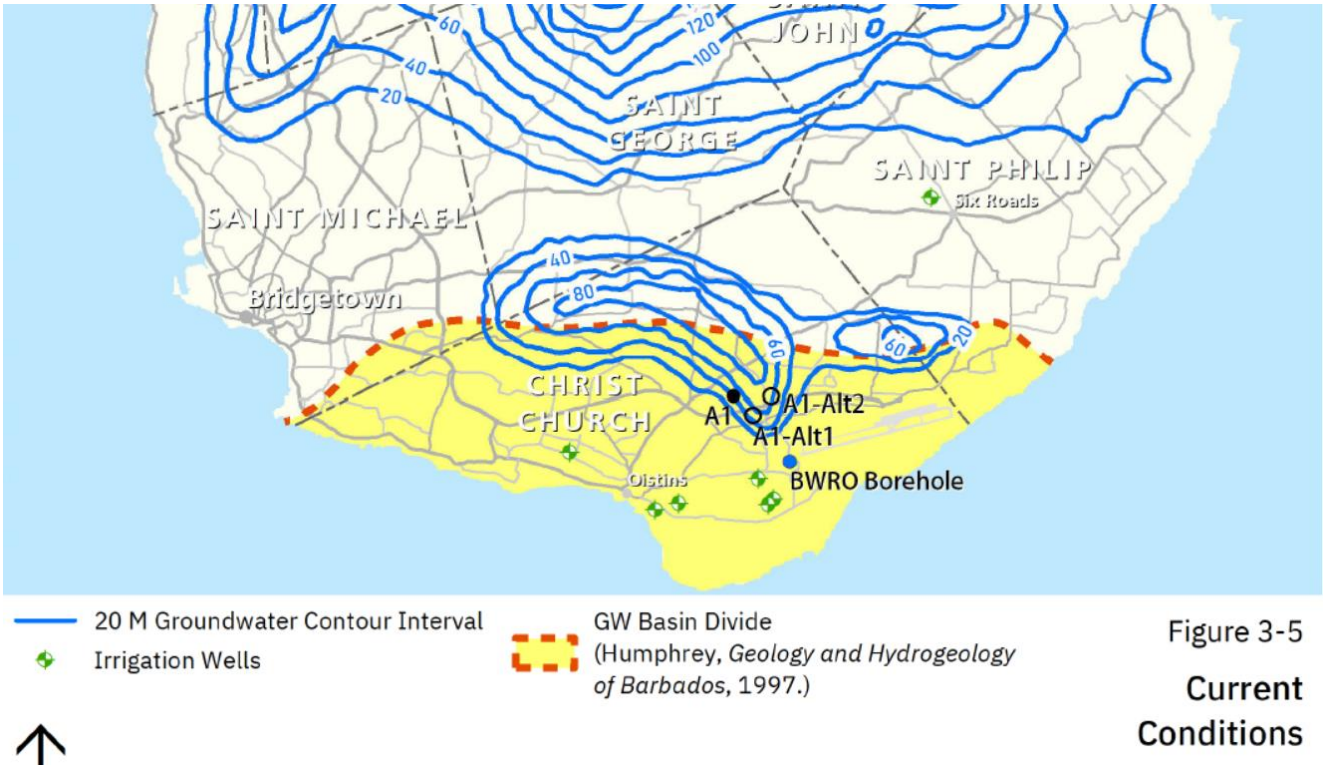

Figure 5. Groundwater contour map of the Christ Church Aquifer area, including alternative sites for BWRO and current irrigation wells.

According to the Groundwater Modeling conducted by AECOM on the Christ Church Aquifer, there is a notable probability of recharged water migrating to the plant. This has the potential to impact the quality of treated water as well as the operational efficiency of the BWRO.
The study also indicates that the combination of the treated wastewater recharge and BWRO withdrawals may also cause migration of the existing nitrate distribution. The interplay of recharge and withdrawal will alter the aquifer gradients, so both nitrate impact to the coastline and/or nitrate capture by BWRO are reasonably expected.

[34] Barbados Water Authority. 2021. Technical Memorandum. South Coast Wastewater Reclamation Project. Groundwater Modelling of Christ Church Aquifer. AECOM. https://barbadoswaterauthority.com/wp-content/uploads/2021/09/TechMemo-Christ_Church_GW_Model.pdf

Mitigation Measure(s)		
Please describe how the identified risk will be mitigated or managed. Do the mitigation measures lower the probability of risk occurring? If so, to what level? The effluent from the SCWRRF will be regularly tested to ensure compliance with regulations to guarantee the proper quality for recharge. The filtration zones for the treated wastewater will be selected on the basis of expert knowledge of the limestone formation in BWA and other relevant government agencies. It is recommended that the feasibility study for the BWRO (Brackish Water Reverse Osmosis) project includes a thorough analysis, encompassing detailed Groundwater Modelling (quantitative assessments, numerical modelling).		
Selected Risk Factor 4: Impacts of recharged water on adjacent potable aquifers		
Category	**Probability**	**Impact**
Technical and operational	Low	Low
Description		
Groundwater modelling conducted by AECOM indicates that reclaimed water recharged at location will not travel north and will not impact potable aquifers to the north, particularly if BWRO is pumping. The recharge location is definitively on the south side of the simulated groundwater divide and additional groundwater will not raise groundwater elevation enough to change that divide.		
Mitigation Measure(s)		
Regular monitoring of water quality of wells.		
Selected Risk Factor 5: Impacts of recharged water on downstream private wells currently used for irrigation		
Category	**Probability**	**Impact**
Technical and operational	Low	Low
Description		
As the treated water will attain the required quality standards for irrigation, it is anticipated to have a positive impact on existing wells currently used for irrigation. The recharge of the aquifer is expected to augment the reserves, ensuring a sustainable and reliable water source over time. However, if the water quality for aquifer recharge does not align with the mandated standards, it may have an adverse effect on groundwater resources.		
Mitigation Measure(s)		
The effluent from the SCWRRF will be regularly tested to ensure compliance with regulations to guarantee the proper quality for recharge. The filtration zones for the treated wastewater will be selected on the basis of expert knowledge of the limestone formation in BWA and other relevant government agencies.		
Selected Risk Factor 6: Institutional shortcomings / Governance issues		
Category	**Probability**	**Impact**
Governance	Medium	Low
Description		
Despite Barbados having a well-established regulatory system covering natural environments, built-up areas, economic activities (including tourism), infrastructure, and other sectors, the effectiveness of compliance and enforcement measures is not consistently high.		
Mitigation Measure(s)		
Regulatory deficiencies will be tackled by enhancing governance, strengthening managerial capabilities, and deploying effective monitoring tools to ensure the enforcement of regulations. Initiatives such as public awareness campaigns and stakeholder engagement will be implemented. However, achieving behavioural change, particularly in water usage and the proper use of sewerage systems among the public and government personnel, will be a gradual process. As the general population becomes more cognizant of the impact of climate change on Barbados, it is anticipated that the imprudent utilization of water and sewerage infrastructure will diminish over time.		

Selected Risk Factor 7: Poor Integration of Gender and ESS in Proposed Activities		
Category	**Probability**	**Impact**
Governance	Medium	Low
Description		
The deficiency in integrating gender, environmental, and social safeguard (ESS) considerations within the execution and oversight of the project presents a critical challenge. The oversight not only hampers the projects' effectiveness but also undermines their long-term sustainability. Without a robust incorporation of gender perspectives, there is a risk of perpetuating existing inequalities, while neglecting environmental and social safeguards may lead to adverse impacts on local communities and ecosystems.		
Mitigation Measure(s)		
The project underwent a thorough evaluation in accordance with both the GCF's environmental and social protection standards and the IDB Environmental and Social Performance Standards. This assessment, outlined in sections G.1 and G.2 along with pertinent annexes, identified potential risks and proposed corresponding mitigation measures. To address gender equality, a Gender Action Plan has been formulated and can be found in **Annex 8**. This plan will be actively implemented to integrate gender considerations into all project interventions. Additionally, an Environmental and Social Management Plan (ESMP) serves as a robust framework, ensuring that the project activities uphold environmental sustainability and do not adversely affect women or marginalized groups.		
Selected Risk Factor 8: Procurement Compromise		
Category	**Probability**	**Impact**
Prohibited practices	Low	Medium
Description		
Procurement process may be compromised by application of sanctioned entities to tenders.		
Mitigation Measure(s)		
Procurement of goods and services for the project will be monitored by IDB. Barbados is a participant in Financial Action Task Force (FATF) Caribbean Financial Action Task Force (CFATF). There are no United Nations Security Council (UNSC) sanction regimes currently under implementation for Barbados. In addition, no individual, entity or other group listed on the UNSC sanctions list, including the consolidated list, will be involved in any manner with the project or its activities, either as a counterparty, implementer or beneficiary.		
Selected Risk Factor 9: Currency fluctuation		
Category	**Probability**	**Impact**
Forex	Low	Medium
Description		
Currency fluctuations may impact the budget of the project.		
Mitigation Measure(s)		
All global services will be obtained in USD, eliminating any foreign exchange risks. The Barbadian Dollar is fixed to the USD at a constant rate of 1USD = 2BBD and has demonstrated stability for a minimum of 10 years. Consequently, locally sourced services also carry no exposure to currency exchange risks. Nevertheless, the procurement of goods for the SCSTPs upgrades and SCWRRF will undergo an international bidding process and could be susceptible to price variations if specified in a currency other than USD. The bidding documents will mandate that bidders provide quotes for the goods in both USD and the relevant local currency, if applicable. This ensures transparency for both parties by highlighting the impact of currency fluctuations.		

G. GCF POLICIES AND STANDARDS

G.1. Environmental and social risk assessment (max. 750 words, approximately 1.5 pages)

The project has an Environmental and Social Safeguards (ESS) category B rating, requiring a full Environmental and Social Impact Assessment (ESIA) and an associated Environmental and Social Management Plan (ESMP).

The ESIA evaluates the project's intervention areas and surroundings, defining immediate and outer zones of influence. Construction phase impacts include land drainage, disruption to existing structures, habitat disturbance, pollution, traffic congestion, and health and safety concerns, mitigated in the ESMP's Chapter 8.3. The operational phase is anticipated to bring positive impacts, addressing water management, irrigation, and climate resilience. Effective facility management, O&M plans, and monitoring programs will prevent negative impacts. The ESIA finds no permanent significant negative impacts, with suggested measures mitigating identified issues. The project positively impacts climate resilience, ecology, socioeconomics, water supply, and agriculture, contributing to regional development. It enhances climate resilience, food security, ecological quality, air quality, and reduces greenhouse gas emissions through renewable energy production.

The ESIA and ESMP are annexed to this document in **Annex 6** of this proposal. The ESMP follows the IDB's Environmental and Social Performance Standards (ESPS) and GCF's Environmental and Social Safeguard (ESS) standards.

Executing Entity capacity to implement the ESMP

BWA, as the promoter of the project and the governmental institution responsible for water supply and wastewater treatment in Barbados, as well as being an executing entity of the project, has a central role in the implementation of the ESMP and ensuring that all the enhancement and mitigation measures, and monitoring activities are communicated to and carried out by trained BWA staff or other competent authorities. The management of public concerns and external information requests also falls under the responsibility of BWA. Additionally, the BWA will be responsible for the approval of changes to the ESMP, as well as the approval and adoption of additional mitigation measures that were not foreseen during the ESIA and ESMP stages but that may be deemed necessary as the project progresses.

BWA shares some responsibilities with the Planning and Development Department and the Environmental Protection Department, the central government entities that coordinate and advise on all environmental issues, including ESIA procedures and requirements. Shared responsibilities include ensuring that the findings and recommendations of the ESIA are integrated in the overall project design, costing, cost-benefit analyses, project management and implementation arrangements. This will be accomplished by the revision of submitted documentation as well as periodical site visits and issuance of recommendations.

The IDB and GCF, will ensure that the implementation of the ESMP complies with their policies and guidelines.

Reporting on the implementation of the ESMP will be undertaken jointly by BWA and contractor, in compliance with IDB, GCF and national policies. The ESIA document for each Environmental and Safety Plan (Chapter 9) provides more details on the institutional arrangements related to safeguards monitoring and reporting.

Stakeholder consultations and grievance redress

Grievance redress is a critical component of this project for both the IDB and the GCF and it is intended that stakeholders will have a plethora of options to express grievances. It is known that projects having strong grievance redress mechanism are usually less exposed reputational risk, less disruptions and more importantly it increases in buy-in and ownerships for projects.

The BWA and the contractor will be responsible for receiving complaints and assisting in the resolution of grievances and concerns. The IDB in its ESPS outlines considerations for grievance redress and allows for all complaints, concerns, queries, and clarifications regarding projects/programs supported by the Centre to be filed with the Centre using their website. The project will be monitored to proactively address the risks identified during its development stages, particularly concerning activities that could disrupt communities.

This proposed project has been developed through extensive consultations involving all stakeholders, including government Agencies, NGOs, farmers, and other businesses. A full account of stakeholder consultations and a stakeholder management and engagement plan for the implementation of the project is included in the ESIA - Appendix 2.

Indigenous Peoples

Barbados has no Indigenous Peoples communities and the IDB and GCF Indigenous Peoples Policy therefore does not apply.

G.2. Gender assessment and action plan (max. 500 words, approximately 1 page)

The gender analysis underscores persistent gender disparities in Barbados. Key indicators reveal concerning trends, with 29.2% of women aged 20–24 experiencing early marriages, and adolescent birth rates at 49.7 per 1,000 women aged 15-19 in 2007, signaling an upward trend. Political representation remains skewed, as only 20% of parliamentary seats were held by women as of February 2021.

Efforts to combat gender discrimination in employment face gaps despite legislative measures like the Employment Rights Act of 2012 and the Employment Sexual Harassment (Prevention) Act of 2017. Challenges persist in women's access to assets, with a notable gender data gap, hindering SDG monitoring. Female-headed households encounter a higher poverty rate of 19.4%, while the agriculture sector remains predominantly male-dominated.

Vulnerability echoes in the tourism sector, where 85% of economically vulnerable workers are women, earning only 68% of their male counterparts. Violence against women is alarming, with a 38% increase in domestic violence reports during lockdowns, exposing inconsistent law enforcement.

Socio-economic indicators, including the Gender Climate Tracker App, highlight progress and gaps. Legal frameworks, particularly in addressing violence against women, show advancements (83.33% achievement). However, challenges persist in areas like employment and economic benefits (50% achievement). The app underscores women's vulnerability as a 'vulnerable group' in the National Determined Contributions (NDC) regarding climate change impacts.

To tackle these disparities, the proposed project aligns with the Global Environment Facility's gender policy. It aims to implement a comprehensive action plan and monitoring framework, emphasizing inclusivity, transparency, and targeted measures to enhance gender equality in Barbados.

The gender action plan proposes a multifaceted approach to address gender disparities and enhance inclusivity throughout the project. Key actions include:

Refinement of Gender Analysis:

- Conduct stakeholder mapping.
- Assess women's power access during project execution.
- Develop terms of reference with a gender equality clause.

Gender Action Plan Development:

- Create a gender plan in each project component.
- Identify constraints and opportunities through gender analysis.
- Integrate gender-responsive actions into project implementation.
- Establish gender performance indicators and sex-disaggregated targets.

Gender-Sensitive Monitoring and Evaluation (M&E) Framework:

- Develop gender indicators in the project results framework.
- Cover gender performance indicators and sex-disaggregated targets.
- Measure shifts in gender equality and women's empowerment.
- Utilize quantitative and qualitative indicators.

Project Responses:

- Monitor women's inclusion throughout implementation.
- Disaggregate beneficiary indicators.
- Identify specific activities based on the gender analysis to meet needs and address gaps.

The possible **indicators** for the project are the following:

Performance indicators

- Qualitative Assessment of Gender Power Access in the refined Gender Action Plan (# of women in key positions in each of the institutions involved)
- Terms of reference with gender equal opportunities / Total number of terms of reference.
- Number of women participating in the project's team / Total number of persons in the project's team.
- Number of contracted third parties with a gender policy / number of contracted third parties.
- Number of gender-sensitive workshops /Total

Results Indicators:

- Number of gender advocates relevant stakeholders participating in the project.
- Disaggregated data on women and men trained in the workshops.
- Number of climate actions registered with gender indicators.
- A section on gender-relevant lessons learned and best practices on progress reports and evaluations.

These actions align with the Global Environment Facility's gender policy, emphasizing transparency, stakeholder engagement, and the integration of gender considerations at every project phase. The overarching goal is to promote inclusivity, address gender-based inequalities, and empower women across diverse project aspects.

Full Gender Assessment and Action Plan is provided as **Annex 8**.

G.3. Financial management and procurement (max. 500 words, approximately 1 page)

The financial management, procurement, and disbursement mechanisms for the SCWRP will adhere strictly to the guidelines and policies established by the IDB and the GCF, ensuring alignment with the AMA and the FAA. This ensures a robust framework for the oversight, auditing, and financial integrity of the project.

Financial Management

The financial resources allocated from the GCF for the SCWRP will be managed within the framework of the GCF Trust Fund, hereby referred to as the 'GCF Account', established internally by the IDB. This

setup facilitates the transfer of GCF resources based on approved disbursement requests for sub-projects. Each disbursement request will trigger a corresponding commitment of GCF resources within the GCF Account, earmarked for specific sub-projects within the SCWRP.

Financial oversight, including the adherence to reporting requirements, will comply with IDB's policies and procedures, reflecting the stipulations of the AMA and FAA. This encompasses the full cycle of disbursement, reporting, monitoring, and evaluation, in accordance with the IDB's Financial Management Guidelines (OP-273-6). Such rigor ensures that the utilization of GCF resources remains within the scope of eligible activities under the SCWRP, fostering accountability and transparency throughout the project's lifespan.

Procurement

Procurement activities under the SCWRP will observe IDB's procurement policies, promoting efficiency, fairness, and competitiveness. This approach underscores the commitment to utilizing GCF resources judiciously, ensuring that procurement processes yield the best value for money while adhering to environmental and social safeguards. Special attention will be given to procurement risk assessment, with strategies in place to manage identified risks effectively, ensuring smooth project implementation.

The IDB, acting as the AE, will employ its procurement policies for the hiring of consultants and acquisition of services, requiring similar adherence from other entities involved in the project. This standardized procurement framework ensures consistency and quality across all components of the SCWRP.

Audit and Reporting

An external audit requirement will be imposed on the GCF Account, with the IDB committed to delivering annual assertion reports and audited financial statements to the GCF. These documents, prepared in line with IDB's established policies and accounting standards, offer a transparent view of the project's financial health and compliance.

G.4. Disclosure of funding proposal

Note: The Information Disclosure Policy (IDP) provides that the GCF will apply a presumption in favour of disclosure for all information and documents relating to the GCF and its funding activities. Under the IDP, project and programme funding proposals will be disclosed on the GCF website, simultaneous with the submission to the Board, subject to the redaction of any information that may not be disclosed pursuant to the IDP. Information provided in confidence is one of the exceptions, but this exception should not be applied broadly to an entire document if the document contains specific, segregable portions that can be disclosed without prejudice or harm.

Indicate below whether or not the funding proposal includes confidential information.

☐ No confidential information: The accredited entity confirms that the funding proposal, including its annexes, may be disclosed in full by the GCF, as no information is being provided in confidence.

☒ With confidential information: The accredited entity declares that the funding proposal, including its annexes, may not be disclosed in full by the GCF, as certain information is being provided in confidence. Accordingly, the accredited entity is providing to the Secretariat the following two copies of the funding proposal, including all annexes:

- full copy for internal use of the GCF in which the confidential portions are marked accordingly, together with an explanatory note regarding the said portions and the corresponding reason for confidentiality under the accredited entity's disclosure policy, and
- redacted copy for disclosure on the GCF website.

The funding proposal can only be processed upon receipt of the two copies above, if containing confidential information.

H. ANNEXES

H.1. Mandatory annexes

☒	Annex 1	NDA no-objection letter(s) **(template provided)**
☒	Annex 2	Feasibility study - and a market study, if applicable
☒	Annex 3	Economic and/or financial analyses in spreadsheet format
☒	Annex 4	Detailed budget plan **(template provided)**
☒	Annex 5	Implementation timetable including key project/programme milestones **(template provided)**
☒	Annex 6	E&S document corresponding to the E&S category (A, B or C; or I1, I2 or I3): **(ESS disclosure form provided)** ☒ Environmental and Social Impact Assessment (ESIA) or ☒ Environmental and Social Management Plan (ESMP) or ☐ Environmental and Social Management System (ESMS) ☐ Others (please specify – e.g. Resettlement Action Plan, Resettlement Policy Framework, Indigenous People's Plan, Land Acquisition Plan, etc.)
☒	Annex 7	Summary of consultations and stakeholder engagement plan
☒	Annex 8	Gender assessment and project/programme-level action plan **(template provided)**
☒	Annex 9	Legal due diligence (regulation, taxation and insurance)
☒	Annex 10	Procurement plan **(template provided)**
☒	Annex 11	Monitoring and evaluation plan **(template provided)**
☒	Annex 12	AE fee request **(template provided)**
☒	Annex 13	Co-financing commitment letter, if applicable **(template provided)**
☒	Annex 14	Term sheet including a detailed disbursement schedule and, if applicable, repayment schedule

H.2. Other annexes as applicable

☐	Annex 15	Evidence of internal approval **(template provided)**
☒	Annex 16	Map(s) indicating the location of proposed interventions
☐	Annex 17	Multi-country project/programme information **(template provided)**
☐	Annex 18	Appraisal, due diligence or evaluation report for proposals based on up-scaling or replicating a pilot project
☐	Annex 19	Procedures for controlling procurement by third parties or executing entities undertaking projects financed by the entity
☐	Annex 20	First level AML/CFT (KYC) assessment
☐	Annex 21	Operations manual (Operations and maintenance)
☒	Annex 22	Assessment of GHG emission reductions and their monitoring and reporting (for mitigation and cross cutting-projects)[35]
☐	Annex X	Other references

** Please note that a funding proposal will be considered complete only upon receipt of all the applicable supporting documents.*

[35] Annex 22 is mandatory for mitigation and cross-cutting projects.

No-objection letter issued by the national designated authority(ies) or focal point(s)

GOVERNMENT OF BARBADOS

Senator The Hon. Chad J. Blackman

Minister – Economic Affairs and Investment
Ministry of Finance, Economic Affairs and Investment
3rd Floor East Warrens Office Complex,
Warrens, St. Michael, Barbados, West Indies

Our Ref.: I051/1 Vol. I **Tel.:** (246) 535-1302/17

April 4, 2024

Ms. Mafalda Duarte
Executive Director
Green Climate Fund
175 Art-Center Daero
Yeonsu-gu, Incheon 22004
REPUBLIC OF KOREA

Dear Ms. Duarte,

Funding Proposal for the Green Climate Fund by the Inter-American Development Bank regarding Barbados Climate Resilient South Coast Water Reclamation Project

Dear Ms. Duarte,

We refer to the project titled Barbados Climate Resilient South Coast Water Reclamation Project in Barbados as included in the funding proposal submitted by Inter-American Development Bank to us on 26 March 2024.

The undersigned is the duly authorized representative of Senator the Hon. Chad Blackman, the National Designated Authority of Barbados.

Pursuant to GCF decision B.08/10, the content of which we acknowledge to have reviewed, we hereby communicate our no-objection to the project as included in the funding proposal.

By communicating our no-objection, it is implied that:

(a) The government of Barbados has no-objection to the project as included in the funding proposal;

(b) The project as included in the funding proposal is in conformity with the national priorities, strategies and plans of Barbados;

(c) In accordance with the GCF's environmental and social safeguards, the project as included in the funding proposal is in conformity with relevant national laws and regulations.

We also confirm that our national process for ascertaining no-objection to the project as included in the funding proposal has been duly followed.

We acknowledge that this letter will be made publicly available on the GCF website.

Yours sincerely,

SENATOR THE HON. CHAD J. BLACKMAN, LLB, LLM, ACI*Arb*
Minister
and National Designated Authority

Environmental and social safeguards report form pursuant to para. 17 of the IDP

Basic project or programme information	
Project or programme title	Barbados Climate Resilient South Coast Water Reclamation Project (SCWRP)
Existence of subproject(s) to be identified after GCF Board approval	No
Sector (public or private)	Public
Accredited entity	Inter-American Development Bank (IDB)
Environmental and social safeguards (ESS) category	Category B
Location – specific location(s) of project or target country or location(s) of programme	Barbados • Wastewater treatment plant upgrade and construction of new wastewater treatment plant, at the location of the current South Coast Water Treatment Plant (Christ Church, Barbados). • Irrigation pipeline: from South Coast Water Treatment Plant (Christ Church, Barbados) to River Plantation.
Environmental and Social Impact Assessment (ESIA) (if applicable)	
Date of disclosure on accredited entity's website	Thursday, September 19, 2024
Language(s) of disclosure	English
Explanation on language	English is the official language of Barbados
Link to disclosure	https://www.iadb.org/document.cfm?id=EZIDB0001137-1480958993-33
Other link(s)	Consultation Report: https://www.iadb.org/document.cfm?id=EZIDB0001137-1480958993-24
Remarks	An ESIA consistent with the requirements for a Category B project is contained in the "ESIA, ESMP and ESMS". Link includes a document that includes an Environmental and Social Management System (ESMS) to be implemented by the executing agency, which in turn includes an Environmental and Social Impact Assessment (ESIA) and Environmental and Social Management Plan (ESMP). The document was initially published on April 25, 2024 and an updated version, after stakeholder consultations, was published on June 12, 2024.
Environmental and Social Management Plan (ESMP) (if applicable)	
Date of disclosure on accredited entity's website	Thursday, September 19, 2024
Language(s) of disclosure	English
Explanation on language	English is the official language of Barbados
Link to disclosure	https://www.iadb.org/document.cfm?id=EZIDB0001137-1480958993-33
Other link(s)	N/A
Remarks	An ESMP consistent with the requirements for a Category B project is contained in the "ESIA, ESMP and ESMS". Link includes a document that includes an Environmental and

	Social Management System (ESMS) to be implemented by the executing agency, which in turn includes an Environmental and Social Impact Assessment (ESIA) and Environmental and Social Management Plan (ESMP). The document was initially published on April 25,2024 and an updated version, after stakeholder consultations, was published on June 12, 2024.
Environmental and Social Management System (ESMS) (if applicable)	
Date of disclosure on accredited entity's website	Thursday, September 19, 2024
Language(s) of disclosure	English
Explanation on language	English is the official language of Barbados
Link to disclosure	https://www.iadb.org/document.cfm?id=EZIDB0001137-1480958993-33
Other link(s)	N/A
Remarks	An ESMS consistent with the requirements for a Category B project is contained in the "ESIA, ESMP and ESMS". Link includes a document that includes an Environmental and Social Management System (ESMS) to be implemented by the executing agency, which in turn includes an Environmental and Social Impact Assessment (ESIA) and Environmental and Social Management Plan (ESMP). The document was initially published on April 25,2024 and an updated version, after stakeholder consultations, was published on June 12, 2024.
Any other relevant ESS reports, e.g. Resettlement Action Plan (RAP), Resettlement Policy Framework (RPF), Indigenous Peoples Plan (IPP), Indigenous Peoples Planning Framework (IPPF) (if applicable)	
Description of report/disclosure on accredited entity's website	N/A
Language(s) of disclosure	N/A
Explanation on language	N/A
Link to disclosure	N/A
Other link(s)	N/A
Remarks	N/A
Disclosure in locations convenient to affected peoples (stakeholders)	
Date	Saturday, May 11, 2024
Place	Consultation sessions with project stakeholders took place on May 9th at the Hawthorn Methodist Church (Rendezvous Hill, "Hathway" Barbados), and on May 11th at the Deighton Griffith Secondary School (Kingsland Main Road, Bridgetown, Christ Church Barbados). Each session included the presentation of project information including objectives, activities, environmental and social risks and impacts, their management measures and grievance mechanism.
Date of Board meeting in which the FP is intended to be considered	
Date of accredited entity's Board meeting	N/A

Date of GCF's Board meeting	Monday, October 21, 2024

Note: This form was prepared by the accredited entity stated above.

* Subsequent to the disclosure of the form to the Board and active observers on 21 September 2024, the following update has been made: the link to the Environmental and Social Impact Assessment (ESIA), Environmental and Social Management Plan (ESMP), and Environmental and Social Management System (ESMS), in which the ESIA, ESMP, and ESMS document had been made available, has been updated. The footnote 29 has been removed.

Secretariat's assessment of FP251

Proposal name:	Barbados Climate Resilient South Coast Water Reclamation Project (SCWRP)
Accredited entity:	Inter-American Development Bank (IDB)
Country:	Barbados
Project/programme size:	Medium

I. Overall assessment of the Secretariat

1. The funding proposal is presented to the Board for consideration with the following remarks:

Strengths	Points of caution
The project introduces a novel financing approach through debt-for-climate conversion (DfCC) underpinned by Inter-American Development Bank and European Investment Bank guarantees to support debt buy-back. This will create fiscal space for the Government of Barbados to invest in climate and water resilience measures.	Addressing concerns about the social acceptance of the use of wastewater and reclaimed water for irrigation will be key. Public perception and education will be essential to inform stakeholders about using reclaimed water for irrigation and to address common misconceptions. In addition, regulatory compliance is key to ensuring that the reclaimed water complies with all relevant regulations and standards.
Though not directly participating in the DfCC through a provision of guarantees, GCF will be financing the institutional arrangements and training required for the Barbados Water Authority (BWA) to deliver the required measurement, reporting and verification duties under DfCC, specifically (a) the use of proceeds from DfCC and (b) related water resilience commitments.	Efficient operations and maintenance will be crucial for the upgraded wastewater treatment plant's performance and sustainability. While the project will cover the initial operational assistance period, selecting the right technology and design for local conditions is essential for ensuring that BWA can eventually take full responsibility for ongoing operations and maintenance.
This project will result in a transformational shift in the Barbados water sector. It will generate and distribute reclaimed water via the upgraded plant and associated pipelines. It	Though the funding proposal indicates that utilizing sludge for agricultural purposes is the most favourable option, the project's

will also address the sector's very high (46 per cent) non-revenue water losses and implement other complementary resilience measures through key performance indicators and milestones established under the DfCC sustainability-linked loans framework.	sludge management strategy and road map for implementation are yet to be developed.

2. The Board may wish to consider approving this funding proposal in accordance with the term sheet agreed between the Secretariat and the accredited entity (AE), and, if considered appropriate, subject to the conditions set out in annex II to document GCF/B.40/02.

II. Summary of the Secretariat's assessment

2.1 Project background

3. Barbados is one of the world's most water-scarce countries, with water abstraction levels exceeding 100 per cent of sustainable aquifer yields during below-average rainfall periods. The country faces severe climate challenges, including significant water scarcity along with environmental degradation from inadequate wastewater treatment. Currently, raw sewage in the South Coast area is only screened and discharged into the ocean. In 2018, breakdowns and blockages at the ageing South Coast Sewage Treatment Plant resulted in raw sewage flooding the streets, including key tourism areas, posing environmental and health risks. Agriculture, a major water consumer, is heavily impacted by climate change, affecting crop production and food security. Additionally, high non-revenue water losses are about 46 per cent, further limiting water availability.

4. The goal of the Barbados Climate Resilient South Coast Water Reclamation Project (SCWRP) is to increase the water resilience of Barbados to climate change with a focus on improving water security, food sovereignty and environmental conditions via the holistic approach of upgrading the South Coast Sewage Treatment Plant.

5. The specific objective of the project is to improve water resilience. This will be done by increasing the availability of high-quality reclaimed water with energy-efficient technologies; efficiently delivering reclaimed water for agricultural irrigation and aquifer recharge; enhancing the ecological health and resilience of Graeme Hall Swamp, which is adjacent to the South Coast Sewage Treatment Plant; supporting biodiversity and ecosystem services; strengthening the institutional capacities of key sector institutions, such as the Barbados Water Authority (BWA); and promoting gender and social inclusivity for water resource management.

6. The key strategic value of the project is that it will introduce a novel financing approach through debt-for-climate conversion (DfCC) supported by guarantees from the Inter-American Development Bank (IDB) and the European Investment Bank (EIB) of USD 150 million each. This will create more fiscal space for the Government of Barbados without exacerbating its fiscal burden. GCF will participate in the DfCC by funding part of the institutional arrangements and training required for BWA to deliver the required measurement, reporting and verification duties under DfCC, specifically (a) the use of proceeds from DfCC and (b) related water resilience commitments.

7. The proposed funding for the project is USD 110 million, utilizing loan and grant instruments. The GCF contribution to the project is USD 70 million, consisting of USD 40 million in

grants and USD 30 million in loans. Parallel financing of around USD 101 million is also expected by the Government of Barbados to contribute to the functioning of the SCWRP and complementary resilience investments in the sector, such as provision of waterborne sanitation facilities and water reservoir rehabilitation.

8. The number of direct beneficiaries is 50,707 and the number of indirect beneficiaries is 231,293. Together these beneficiaries make up the whole population of Barbados. The mitigation co-benefit over the project's lifetime of 25 years is 66,430 tonnes of carbon dioxide equivalent (t CO_2 eq).

9. GCF categorizes the project as B (medium) for environmental and social safeguards.

2.2 Component-by-component analysis

10. The project is structured into four components:

(a) **Component 1**: Water Reclamation Infrastructure;

(b) **Component 2:** Reclaimed Water Reuse;

(c) **Component 3:** Climate Change and Biodiversity Opportunities; and

(d) **Component 4:** Institutional Strengthening.

Component 1: Water Reclamation Infrastructure (total cost: USD 63.4 million; GCF cost: USD 20 million in grants and USD 16 million in loans)

11. This component aims to produce high-quality reclaimed water to augment the amount of water available for non-potable uses and diversify water sources.

12. Activities under this component include designing and constructing the South Coast Water Reclamation and Re-use Facility (SCWRRF) and upgrading, refurbishing and replacing equipment in the existing South Coast Sewage Treatment Plant, which has served the southern part of the island with primary wastewater treatment (prior to marine disposal) since 2003.

Component 2: Reclaimed Water Reuse (total cost: USD 19.6 million; GCF cost: USD 18.5 million in grants)

13. The outcomes of components 1 and 2 are twofold. First, to increase the availability of high-quality reclaimed water for non-potable uses, reducing the dependence on potable water sources and enhancing water supply resilience (Outcome 1). Second, to enhance the efficient delivery of reclaimed water for agricultural irrigation and aquifer recharge, contributing to water security and sustainable agricultural practices (Outcome 2).

14. Activities under this component include installing pipelines for irrigation and a high-water mark catchment area, injection and monitoring wells, and ancillary equipment for aquifer recharge and supervision.

Component 3: Climate Change and Biodiversity Opportunities (total cost: USD 16 million; GCF cost: USD 14 million in loans)

15. The outcome of this component is improved ecological health and resilience of Graeme Hall Swamp, supporting biodiversity and ecosystem services, and reducing greenhouse gas (GHG) emissions.

16. The activities involve developing studies to enhance understanding of the swamp, implementing measures to restore mangrove ecosystems, improving ecosystem services relating to coastal protection and biodiversity conservation, and helping to reduce the impacts of pollution on water bodies and ecosystems. They also include designing and installing solar photovoltaic plant/panels and a battery energy storage system at the pumping station to mitigate GHG emissions resulting from the amplified energy consumption linked to the upgraded treatment plant.

Component 4: Institutional Strengthening (total cost: USD 1.5 million; GCF cost: USD 1.5 million in grants)

17. The outcome of component 4 is enhanced institutional capacity, public awareness, gender equality and social inclusion in water resource management.

18. The activities include institutional strengthening of BWA to enhance water resource management; increase operational efficiency; improve monitoring, reporting and verification; and promote gender equality and social inclusion. The activity also aims to enhance the institutional capacity of the natural habitat conservation areas to improve partnerships and compliance, so as to protect the adjacent swamp and build resilience to environment challenges.

Project management (total cost: USD 3.15 million; GCF cost: 0)

19. This component will finance project management expenses, including support for dedicated project execution staff, audits, project monitoring and evaluation, communication, and supervision and implementation of an environmental and social management plan. The component will also finance construction supervision services for the water reclamation infrastructure works.

III. Assessment of performance against investment criteria

20. The project consistently scores medium-high or high against GCF's investment criteria. A detailed assessment of the project's fit with GCF investment criteria is provided below.

3.1 Impact potential *Scale: High*

21. The number of direct beneficiaries is 50,707 (18 per cent of the population), including small- and medium-scale farmers. The number of indirect beneficiaries is 231,293. Together these beneficiaries make up the whole population of Barbados.

22. The project will strengthen the nation's water infrastructure and enhance the resilience of the water sector through the construction of treatment facilities, irrigation piping, and aquifer recharge systems, promoting responsible water management and alternative water sources.

23. In terms of adaptation impact, the project aims to assist the most vulnerable people and communities and to enhance food and water security by reducing the dependence on potable water sources and enhancing water supply resilience, given that the agricultural sector (which consumes over 68 per cent of the total water production of Barbados) is especially hit by weather variability, affecting food security island-wide. It also aims to facilitate the replenishment of depleted aquifers to preserve the robustness of groundwater resources.

24. Additionally, this project will reduce sanitation and environmental pollution caused by the increased frequency of extreme weather events, which risk overwhelming the existing sewage treatment facilities. In terms of adaptation impact, the project will also advance existing monitoring

practices to enhance the understanding of ecological dynamics within natural habitat conservation areas such as the Graeme Hall Swamp, which is adjacent to the South Coast Sewage Treatment Plant.

25. With regard to the mitigation co-benefit, the GHG mitigation is expected to be 66,430 t CO_2 eq. This will be achieved by installing solar photovoltaic plant/panels and a battery energy storage system to mitigate GHG emissions resulting from the amplified energy consumption linked to the upgraded treatment plant.

3.2 Paradigm shift *Scale: High*

26. This project represents a paradigm shift in water management, showcasing a transition from traditional wastewater treatment to advanced, sustainable practices. The approach not only reclaims and conserves valuable freshwater resources but also turns wastewater into an asset for agriculture and aquifer recharge, which helps in combating seawater intrusion into aquifers. The project's emphasis on community engagement, institutional strengthening and capacity-building ensures its sustainability and scalability.

27. The SCWRP demonstrates significant potential for scaling and replication to address the region's urgent need for sustainable water management through DfCC. It highlights innovative financial solutions that channel savings from the debt swap into new adaptation projects without imposing an additional fiscal burden.

3.3 Sustainable development potential *Scale: High*

28. The project will contribute to multiple Sustainable Development Goals (SDGs): SDG 3 (Good Health and Well-Being), SDG 5 (Gender Equality), SDG 6 (Clean Water and Sanitation), SDG 7 (Affordable and Clean Energy), SDG 9 (Industry, Innovation and Infrastructure), SDG 11 (Sustainable Cities and Communities), SDG 13 (Climate Action), SDG 14 (Life below Water) and SDG 15 (Life on Land).

29. The project expects to realize environmental co-benefits, economic co-benefits and gender-sensitive development benefits.

3.4 Needs of the recipient *Scale: High*

30. Given the high debt burden and fiscal constraints of Barbados, the project serves the dual purpose of addressing the country's debt sustainability while simultaneously financing climate and environmental solutions.

31. Barbados, a small island developing State, faces heightened vulnerability to climate change due to its geographical location, small size, concentrated coastal population and limited economic base reliant on natural resources. Of particular concern is the vulnerability of the agricultural sector, especially small-scale farmers. The adverse effects of climate change, such as drought and water scarcity, directly affect farmers' livelihoods. The implications extend beyond immediate agricultural concerns, impacting the overall economic stability of these communities. Recognizing climate change as a significant threat to growth and prosperity, the nation faces complex challenges that require urgent adaptation strategies to address environmental, social and economic vulnerabilities.

3.5 Country ownership *Scale: High*

32. No-objection letters have been issued by Barbados.

33. As mentioned, the project serves the dual purpose of addressing the country's debt burden while simultaneously financing climate and environmental solutions. The Government of Barbados has demonstrated robust commitment to the DfCC transaction and the SCWRP. Additionally, it has been actively advancing several other climate-resilient projects including its further commitments through parallel financing efforts.

34. This proposal has benefited from full-country ownership and engagement throughout the conceptualization of the transaction and project development stages. The objectives are aligned with the country's Roof to Reef programme, its nationally determined contributions and other long-term strategies. Moreover, strong country ownership is reflected in the whole-of-government engagement in the proposal's design and formulation, as various ministries and public authorities have been directly involved in research, data compilation and analysis, and design. Broad stakeholder engagement is also evident in the fact that communities and civil society organizations have been widely consulted and informed about the proposal's objectives and benefits for the population of Barbados.

35. The project is well aligned with the broader mitigation and adaptation objectives specified in the country's nationally determined contributions.

3.6 Efficiency and effectiveness *Scale: Medium to high*

36. The project cost is USD 110 million. The GCF contribution to the project is USD 70 million, which consists of USD 40 million in grants and USD 30 million in loans, resulting in a cost to GCF of USD 248 per beneficiary (both direct and indirect) and USD 1,054 per t CO_2. The rest will be co-financed by the AE (co-financing ratio 1:0.57). In addition, parallel financing totalling around USD 101 million is expected from the Government of Barbados to support the functioning of the SCWRP, including the provision of waterborne sanitation facilities and water reservoir rehabilitation.

37. Additionally, the project incorporates a USD 300 million DfCC mechanism guaranteed by the IDB and the EIB. This financial structure is expected to yield significant savings, which will be used to repay the investment loans from the IDB and GCF reimbursable funds. The excess savings will contribute to complementary resilience investments by the government. This project will address non-revenue water loss, as established in the sustainability-linked financing framework, and specific milestones and key performance indicators to be achieved by BWA which will be supported through a monitoring, reporting and verification framework as part of the funded activity.

38. An analysis of the project shows that it is economically viable as a whole. The main sources of quantifiable benefits are as follows:

(a) The increase in net income (valued at social prices) expected from having safe water for irrigation districts by increasing the year-round cultivated area;

(b) The increase in the availability of water for human consumption;

(c) The improvement in environmental quality; and

(d) A co-benefit of the project attributable to the reduction of GHGs due to the 7MW capacity solar plant that will be installed.

39. The results indicate that, without considering climate change (which could further reduce groundwater yield), the economic internal rate of return is 13.64 per cent, with a positive net present value of approximately USD 9.7 million.

40. The financial analysis was conducted by focusing on the project's financial costs (or cash outflows) as well as its financial revenues (or cash inflows) over a 30-year period. The analysis centres on the entity responsible for the project, namely BWA.

41. The analysis compared the project costs (capital expenditure and operation and maintenance costs) and financial costs with revenues from the agricultural reuse of reclaimed water (water sales and sewerage levy) as well as revenues from solar energy generation with battery storage (electricity sales revenue).

42. The results indicate that, under both scenarios (with and without the GCF grant), the project's net cash flow will be negative throughout the entire analysis period. Consequently, the financial internal rate of return cannot be computed (both before and after loan leveraging). Therefore, BWA will need to use its existing revenue sources to cover the operations and maintenance costs associated with the project investment. This underscores the necessity for concessionality to ensure the project generates and sustains the economic benefits mentioned above.

IV. Assessment of consistency with GCF safeguards and policies

4.1 Environmental and social safeguards

43. Project overview. The project aims to enhance the resilience of Barbados to climate change by increasing water security, promoting food sovereignty and improving environmental conditions through a comprehensive upgrade of the South Coast Sewage Treatment Plant. Among the environmental and social co-benefits include the reduced pollution to water bodies and ecosystems. It enhances air and water quality by promoting efficient use and reuse of water resources, energy-efficient technologies, and renewable energy sources. It also aims to protect and conserve the biodiversity of a wetland habitat like the Graeme Hall Swamp. The reduced exposure to air pollutants and access to better water quality contribute to improved environmental health and enhanced community well-being.

44. Environmental and social (E&S) risk category and safeguards instrument. The project falls under category B of the GCF environmental and social risk categorization system. This is confirmed by the Secretariat and that this is risk category is within the AE's accreditation level. The project is essentially an environmental mitigation intervention, hence its environmental impacts are mostly positive with limited environmental and social risks. The inherent risks of using recycled wastewater for aquifer recharge and irrigation (i.e. underground water contamination, accelerated dissolution of limestone aquifer, and crop/food contamination) have been greatly reduced by the adoption of several key design features including, principally, the upgrading of the wastewater treatment to achieve tertiary-quality wastewater, and further treatments such as subjecting reclaimed water to a reverse osmosis process. The project involves construction and operation of facilities in a relatively limited area. The types and capacities of the key component facilities of the project have been specified and their proposed sites have been identified. Hence, an environmental and social impact assessment (ESIA) with an environmental and social management plan (ESMP) is prepared for this project.

45. Compliance with GCF's environmental and social safeguards (ESS) standards. The discussion below describes how the project complies with the standards.

46. **ESS1 (Assessment and Management of Environmental and Social Risks and Impacts).** The project includes the construction of the SCWRRF with an average dry weather flow of 9,000 m3/day including all process units and ancillary facilities and the upgrade of the existing SCSTP. It will also include the installation of up to 25 km pipeline for transporting reclaimed water for irrigation of approximately 160 hectares at River Plantation along the old trainline. An aquifer recharge infrastructure will be constructed and will consist 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. A 7 MW solar photovoltaic plant and associated energy storage capacity will be co-located with the existing 3MW solar energy systems facilities located at BWA's central pumping stations. The project will likewise include the development of baseline assessments of the Graeme Hall Swamp to develop and identify priority interventions for the management of the swamp, which is considered as Ramsar site.

47. An ESIA/ESMP was initially conducted in 2021 which was updated in 2024 to align with the AE's Environmental and Social Policy Framework (ESPF). The assessed main E&S risks and impacts of the project during the construction phase (as regard SCSTP refurbishment, construction of the SCWRRF, pipeline and of the photovoltaic plant) include soil erosion, noise and dust pollution, water effluents and waste generation as well as occupational and community health and safety risks (e.g. vehicular traffic). The pipeline construction could also potentially have permanent and temporary impacts on private property and livelihoods (e.g. residential, business owners and agriculture). During operation, the facilities are expected to generate liquid and solid waste and affect community health and safety. The project has developed an ESMP and is supplemented by an environmental and action plan (ESAP) for the EE and/or its contractors to review and update the ESIA/ESMP and prepare the relevant plans once the final project design is completed and before the start of construction activities.

48. **ESS2 (Labor and Working Conditions).** The AE will apply its ESPS 2 (Labor and Working Conditions) standard to the project which fosters constructive worker-employer relationship, fair hiring process, fair treatment of workers and provision of safe and healthy working conditions. The ESIA has provided background information about the existing labor laws in the country and assessed that the current country labor laws and policies are generally aligned with international standards. Despite the general compliance of the labor and working conditions at the SCSTP with the country's regulations the ESIA has assessed that there is a risk of violation of the ESS2 (ESPS 2) with regards to contractors. To address potential issues in labor and working conditions, the ESMP includes various management plans that addresses general labor management, code of conduct for workers, worker health and safety, prevention and mitigation of forced labor and child labor risks in its supply chain, gender equality, grievance redress, and emergency response.

49. **ESS3 (Resource Efficiency and Pollution Prevention).** The project will positively contribute to the water and energy resource availability and use efficiency. Water use efficiency is increased by recovering and recycling wastewater for non-potable uses while energy efficiency is improved with the construction and operation of the 7 MW Solar Power Plant and the use of energy efficient equipment. In terms of pollution, the project is expected to generate noise and dust during construction. Minor erosion and sedimentation are also expected due to excavation of pipeline trenches and foundations of facilities, and the drilling of groundwater recharge and monitoring wells. During operations, soil in farms irrigated with reclaimed water might show elevated levels of pollutants. Groundwater quality could also change due to injection of reclaimed water to the aquifer. The ESMP discussed the mitigation measures and plans for the project risks and/or

impacts which will be further developed in detail by the EE and the contractor focused on drainage, pest, noise, air and water quality, solid and liquid waste, and aquifer management and monitoring. The selected contractor for the water treatment plant will also be required to prepare effluent management plans following WHO, US EPA and FAO standards. The project will likewise develop an operation and management plan including on emergency preparedness and response.

50. **ESS4 (Community Health, Safety and Security).** Communities near the project will be exposed to safety hazards during the construction phase including influx of workers, risks of accidents and exposure to harmful substances. During the operations phase, they can also be exposed to risks associated with possible infrastructure failure due to natural disasters (e.g., earthquakes, tsunamis, and hurricanes) or accidents resulting in catastrophic release of raw or inadequately treated sewage. The ESIA has assessed the impacts of construction and operation on the safety and mobility (i.e., obstruction, restriction of access, safety risks), nuisance and health (i.e., exposure to odor, noise, dust, diseases) of the communities. These impacts, although likely to occur, have a magnitude of low to moderate which can be readily brought down to manageable levels with standard mitigation measures in the ESMP. The infrastructure failure due to natural hazards will be mitigated with appropriate measures and integrated in the project design including features such as drainage improvements, installation of back-up generator, and provision of emergency outfall, among others.

51. **ESS5 (Land Acquisition and Involuntary Resettlement).** The upgrade of SCSTP will not acquire new land as it will be undertaken on its existing location. The construction of the new SCWRRF will reportedly take place on government-owned land adjacent to the existing SCSTP and no physical or economic displacement is expected to occur. The 7MW solar plant will be located on a vacant land in Belle Plantation, adjacent to an existing 3MW solar plant located at BWA's central pumping stations, hence no physical or economic displacement is likewise anticipated. However, the ESIA has assessed potential economic displacement impacts on the areas around the pipelines for reclaimed water (pipeline to the aquifer recharge in Christ Church and pipeline to the agricultural irrigation area in River Plantation) on vendors, residents, businesses and agricultural farmers. While the ESMP includes a "Plan to address damage to property and infrastructure and enable continuity of business and public services" which seem to address damages and losses that will be caused by the contractor during the construction activities, this will need to be re-assessed during project implementation to ensure that no adverse impacts happen. Should economic displacement be found to occur once the final project design is completed, the EE is expected to develop a Livelihood Restoration Plan.

52. **ESS6 (Biodiversity Conservation and Sustainable Management of Living Natural Resources).** The project areas generally fall within urban and agricultural areas and as such, its impact on terrestrial biodiversity will be limited. The pipelines will be laid out mostly along the road and the recharge and monitoring wells will be located mostly on agricultural lots. The solar power plant and the catchment pond will be built in old plantation areas. However, the existing SCSTP is located at the edge of Graeme Hall Swamp (GHS), a 33-hectare brackish wetland close to the shoreline and is considered a wetland of international importance being a designated a Ramsar site. The GHS is comprised of mangroves, grasslands, shrublands, woodlands, and sedges. GHS is the last remaining area in the country with natural vegetation which support diverse flora and fauna. As part of component 3 of the project which includes conservation measures for biodiversity protection at the GHS, a critical habitat assessment will be conducted, and a biodiversity action plan will be developed to manage the identified direct and indirect impacts on the wetland from the project including its surroundings.

53. **GCF Indigenous Peoples Policy and ESS 7: Indigenous Peoples:** The AE confirmed that no Indigenous Peoples live in the project area, nor will any Indigenous Peoples be affected by the project's activities.

54. **ESS8 (Cultural Heritage).** The ESIA has assessed that the project area contains cultural and heritage assets. There is therefore a risk that the project may undertake activities that are in the vicinity of a cultural heritage site and cause disturbance or restrict access to, or a possibility of archaeological finds during excavation works for structure foundations and pipeline trenches. The ESMP has outlined a comprehensive Heritage Management Plan which involves, among other measures, documentation and inventory of heritage sites, artifacts, and resources, traffic management measures, and open channel of communication with the National Conservation Commission and the Future Center Trust to preserve cultural/heritage assets in keeping with the National Conservation Commission Act. The ESMP also included the adoption of a chance find procedure during construction and excavation works.

55. **Sexual exploitation, abuse and harassment (SEAH) safeguarding:** The AE identified the risk of SEAH resulting from its funded companies' business activities as the project involves extensive community collaboration, which poses risks associated with SEAH. The AE is aligned to implement measures that promote gender equality and prevent, address and eliminate SEAH. It will improve its internal SEAH training and address gender-based risk management needs during project execution. In the event of SEAH occurrences, the AE will adhere to SEAH provisions for disclosing information about its response, involving stakeholders, and adopting a survivor-centred and gender-responsive approach to SEAH-specific complaints. The organization also needs to clarify the process for survivors' reintegration. The SEAH safeguards incorporated by the AE as part of the project's environmental and social management system are considered to comply with the SEAH provisions of the revised GCF Environmental and Social Policy.

56. Implementation Arrangements. A Project Executing Unit (PEU) will be established in the Project Management Office (PMO) of the Barbados Water Authority (BWA) to provide the needed capacities for the implementation of the project. The PEU will be responsible for the overall implementation of the project through the coordination of BWA across its organization. This would include the implementation of the various management plans outlined in the ESMP, including stakeholder engagements. Key personnel in the PEU will include an Environmental Specialist and a Social Management and Public Relations Specialist. The ESMP details the roles and responsibilities of different agencies and units involved in executing and monitoring the plans. Specific training and awareness needs for stakeholders, workers, and staff pertinent to the implementation of the individual management and monitoring plans have been identified.

57. Stakeholder Engagement. A Stakeholder Engagement Plan (SEP) has been prepared which include stakeholder analysis and mapping and communication and engagement strategies. It details the actions required to undertake a series of consultations with key stakeholders during the project preparation phase as well as the actions the BWA and its contractor will need to undertake to engage with the identified stakeholders that were included in public and informal consultations throughout the project implementation phase. Consultations and dialogues with potentially affected communities were part of the ESIA strategy to collect baseline information, raise awareness of the public about the project and its latest design, and highlight potential impacts through stakeholder concerns and reactions. These engagements included virtual consultations, on the ground interviews in communities, informal dialogues. Among those consulted were legislators, representatives of government agencies, representative from business sectors, including individual companies in the manufacturing and services sectors, workers, non-government associations,

plantation owners and farmers and residents in the proposed facility sites and along the proposed pipeline routes.

58. Grievance Redress Mechanism. The ESMP describes the Grievance Redress Mechanism for the project which will be available to the local communities, workers, and other stakeholders at the project sites. The mechanism will be put in place prior to the start of the construction and may be adapted for use by BWA during the operations phase. Under the system, complaints may be raised formally or informally at the project sites to the contractor or the project coordinator who will then attempt to resolve the complaint. A Grievance Collection Form and the Grievance Monitoring Form have been developed for the purpose of logging and tracking the status of the complaints. Complaints that cannot be resolved at the project sites will be referred to an authority to be identified by the EE.

4.2 Gender policy

59. The AE has provided a gender analysis and action plan and therefore complies with the GCF Gender Policy.

60. The gender analysis was conducted through a desk review. During the project inception phase, a gender expert will conduct targeted stakeholder consultations which will provide an up-to-date picture of the gender context in Barbados. The findings will be integrated into the project's gender action plan (GAP) and will include further analysis of and updates on the gender-related challenges, gaps, root causes and recommendations to be included in the GAP.

61. The current GAP for the SCWRP addresses several significant challenges that women face, particularly in accessing resources and participating in decision-making processes. The gender assessment highlights the increased vulnerability of women to climate change impacts, as they are often responsible for managing household water needs, which are becoming more difficult to meet due to droughts and water shortages. Women, especially those in rural areas, struggle with limited access to land, credit and financial support, which hinders their involvement in agriculture and other economic activities. Additionally, women are underrepresented in leadership roles within key institutions, limiting their influence over policies that directly affect their lives. Furthermore, the plan recognizes the risks of gender-based violence that women face, particularly when accessing water from unsafe locations.

62. To address these challenges, the GAP outlines several interventions, including capacity-building and leadership training for women, promoting gender-inclusive policies within institutions, and improving women's access to essential resources. The plan also includes specific measures to protect women from gender-based violence, such as implementing safety protocols and establishing grievance mechanisms. Importantly, the GAP supports women farmers by improving their access to water for irrigation and providing training on sustainable farming practices. A monitoring and evaluation framework is also included to track progress on gender equality objectives and ensure the effectiveness of the interventions.

63. The GAP defines activities, indicators, and targets for women's participation and benefit with corresponding timelines, budget and gender expertise. As mentioned above, the AE will be conducting a more in-depth gender analysis in the first year of the project which will include stakeholder consultations and may result in refinements to the existing GAP. Any additional resource and cost implications are expected to be covered by BWA and we expect that sufficient budget will be allocated to ensure the project responds to and addresses identified gender issues.

4.3 Risks

64. Overall project assessment is low risk.

65. **Accredited entity/executing entity capability to implement the project (medium risk)**: The AE, IDB, has an extensive track record in implementing projects and programmes to reduce poverty and increase economic growth in Latin America and Caribbean and has eight approved projects with GCF. IDB has highest credit rating Aaa/AAA (stable) by Moody's and S&P Global Ratings respectively.

66. The Government of Barbados, through the executing entity (BWA), may have insufficient capacity to implement the activities of the project. Specifically, BWA may not have enough capacity and resources to implement the activities, which could incur additional cost, delay project completion or cause quality issues, leading to difficulty in achieving the project objectives. As mitigation measures, the project design embeds technical assistance with developing the capacity of BWA, and the Secretariat will monitor the implementation.

67. **Project-specific execution risks (low risk):** Concerning the fiscal constraints of the Government of Barbados, public debt remains high, having reached 119 per cent by the end of FY 2022/23. Thus, the government has limited fiscal headroom to meet operations and maintenance requirements and to meet its commitment on co-financing and parallel financing. This may result in deterioration of infrastructure, compromising the operational efficiency of the plant and diminishing the climate impact. The Secretariat is reassured that technical assistance funded by GCF will support capacity development for technologies and operations and maintenance, and that the government will continue its fiscal consolidation and maintain its goal of steady reduction of the ratio of its debt to gross domestic product to 60 per cent by 2035-2036 according to S&P Global Ratings.

4.3.1. Compliance risk (medium risk)

68. The project activities include the design and construction of the SCWRRF and the upgrading of the existing South Coast Sewage Treatment Plant. Generally, construction presents a higher risk of money laundering/terrorist financing (ML/TF) and prohibited practices. However, the AE confirmed that the project's financial management, procurement, and disbursement will adhere to IDB and GCF policies and guidelines in alignment with the AMA and FAA, thus providing an oversight mechanism to safeguard the financial integrity of the project.

69. The EE will be the Government of Barbados, through the Barbados Water Authority (BWA), which is a statutory body of the Barbados government. A Project Executing Unit will be established in the BWA's Project Management Office and will provide dedicated project management, monitoring, and controls.

70. Based on the related risks of certain project activities, the oversight by the AE and other controls to be part of project implementation, Compliance risk is determined to be medium.

4.4 Fiduciary

71. IDB will be the AE for this project and will conduct overall project oversight. The EE will be the Government of Barbados, acting through BWA for the implementation of the project's activities.

72. The IDB is yet to submit the project's operational manual, which will detail the project's operational procedures and its roles and responsibilities. The policies and procedures to be applied for the execution of administrative, financial and operational activities will be outlined in the operational manual, and will be based on the IDB policies and procedures. The EE will be responsible for preparing and submitting to the AE the audited financial statements of the project, duly audited annually by an independent auditor.

73. The EE will be the Government of Barbados, acting through BWA for the implementation of the project's activities. A project executing unit will be established in the project management office of BWA. The office will mainly be responsible for managing all of the BWA investment programmes and projects financed by international funding institutions, including coordination, management, administration, financial management, procurement, and planning and monitoring.

74. The submitted budget includes a budget for contingencies for unexpected risks, which are essential for this infrastructure project. The allocated contingencies are carved out solely from the co-financing by the AE at nearly 16%, i.e. out of USD 40 million co-financing by the AE, USD 6.35 million allocated for contingency. For better alignment of interests, oversight and management of unexpected risks, the Accredited Entity has been requested by the GCF Secretariat to provide further information regarding the potential scenarios that may trigger the use of contingencies in the Project budget, including the process for BWA to request, access and use the contingency funds. Relevant provisions for informing GCF on the use of contingencies will be mutually agreed between the parties prior to execution of the FAA.

75. The project includes significant co-financing from GCF and the AE, which enhances its overall financial viability. To ensure GCF funds are used efficiently and leverage further investments in water and climate resilience, as well as an uninterrupted implementation, it is recommended as a condition for the approval to include in the Funded Activity Agreement (FAA) a co-financing ratio as a condition precedent for disbursements, excluding the first disbursement.

76. For efficient utilization of GCF concessional financing, and on understanding all activities to be implemented in parallel, it is recommended to clarify in the Term Sheet and FAA a condition for disbursements in relation to Component 1,2 and 3 to be based on the utilization of previously disbursed GCF funds on the basis of these being committed against legally executed contracts in place.

4.5 Results monitoring and reporting

77. This adaptation project aims to strengthen climate change resilience in the water sector of Barbados by upgrading the South Coast Sewage Treatment Plant. The project focuses on improving water supply reliability, reducing the impact of treated effluent on marine life and coral reefs, and supporting food security and rural livelihoods by using reclaimed water for irrigation in smallholder farming areas. The project will reach and increase the adaptive capacity of 282,000 beneficiaries, out of which 50,707 are direct, and 231,293 are indirect. The ex ante estimation approach for adaptation is attached in annex 22 of the funding proposal and is in accordance with the applicable guidelines, meeting the GCF requirements.

78. The theory of change adequately explains how the results chain will cascade from the goal statement of the project to the proposed activities and also identifies the linkages between outputs, barriers and risks.

79. Section E.3 of the logical framework has been designed with relevant details, including the inclusion of solid means of verification and reporting on the appropriate core and supplementary indicators for both mitigation and adaptation and for the targeted result areas as per the GCF integrated results management framework. The project will also result in mitigation co-benefits (66,430 t CO_2 eq over the lifespan of 25 years) and reduced pollution impact on water bodies and ecosystems, which is listed as a co-benefit and will be monitored through the co-benefit indicators provided in funding proposal section E.5.

80. Annex 5 (implementation timetable) has been provided in a format allowing tracking of implementation progress and milestones at the output and activity level. The monitoring and evaluation plan in annex 11 of the funding proposal has been found to follow the appropriate requirements as it includes the entire list of the logical framework indicators while ensuring consistency between the data/sources and set means of verification. The provided monitoring and evaluation budget is generally aligned with the requirements of the Evaluation Policy for the GCF.

4.6 Legal assessment

81. The Accreditation Master Agreement was signed with the Accredited Entity on 29 August 2017, and became effective on 30 March 2018, which was amended and restated pursuant to a first amendment and restatement agreement dated 16 April 2024, and which became effective on 17 May 2024 (the "**AMA**").

82. The Accredited Entity has not provided a legal opinion/certificate confirming that it has obtained all internal approvals and it has the capacity and authority to implement the project.

83. The proposed project will be implemented in Barbados. The GCF has signed a bilateral agreement on privileges and immunities with Barbados which became effective on 9 May 2019.

84. To address the matters raised in this section, it is recommended that any approval by the Board is made subject to the following conditions:

(a) Submission by the Accredited Entity to the Fund of a certificate or legal opinion, in form and substance satisfactory to the GCF Secretariat, within 120 days after Board approval, confirming that the Accredited Entity has obtained all final internal approvals needed by it and has the capacity and authority to implement the proposed project;

(b) Signature of the funded activity agreement in a form and substance satisfactory to the GCF Secretariat within 180 days from the date of Board approval, or the date the Accredited Entity has provided a certificate or legal opinion confirming that it has obtained all final internal approvals, whichever is later; and

(c) Completion of the legal due diligence to the satisfaction of the GCF Secretariat.

Independent Technical Advisory Panel's review of FP251

Proposal name:	Barbados Climate Resilient South Coast Water Reclamation Project (SCWRP)
Accredited entity:	Inter-American Development Bank (IDB)
Country:	Barbados
Project/programme size:	Medium

I. Assessment of the independent Technical Advisory Panel

1. The Barbados Climate Resilient South Coast Water Reclamation Project (SCWRP) aims to increase the resilience of Barbados to water scarcity and the impacts of climate change through water reclamation and management initiatives. The project is a collaboration between the Government of Barbados and IDB, with funding support from GCF.

2. Key points:

(a) **Project title:** Barbados Climate Resilient South Coast Water Reclamation Project (SCWRP);

(b) **Country:** Barbados;

(c) **Accredited entity:** Inter-American Development Bank (IDB);

(d) **Funding request**: USD 70 million (grant: USD 40 million; loan: USD 30 million);

(e) **Co-financing**: Total financing of USD 110 million;

(f) **Implementation period:** 5 years; and

(g) **Project lifespan**: 25 years.

3. Project summary:

(a) Barbados is one of the world's most water-scarce countries, with significant reliance on groundwater, and is highly vulnerable to the impacts of climate change, such as droughts and sea-level rise. This proposed project aims to address water scarcity and environmental pollution by upgrading the South Coast Sewage Treatment Plant (SCSTP) to a modern water-resource recovery facility, enabling the reuse of wastewater for irrigation and aquifer recharge, thereby improving water security, food sovereignty, and environmental protection.

4. Key components of the project:

(a) **Component 1: Reclaimed water supply system development**

(i) **Goal:** Upgrade the SCSTP to a modern water-resource recovery facility to treat wastewater for non-potable uses, such as agricultural irrigation and aquifer recharge;

(ii) **Activities:**

(1) Installation of advanced wastewater treatment systems;

(2) Expansion of water-reclamation infrastructure to reduce reliance on potable water sources; and

(3) Improvement of irrigation systems to support local agriculture and smallholder farmers;

(b) **Component 2: Water supply resiliency enhancement:**

(i) **Goal:** Increase water security by diversifying the water supply through the use of reclaimed wastewater;

(ii) **Activities**:

(1) Reuse of treated wastewater to recharge aquifers and provide irrigation;

(2) Implementation of measures to protect groundwater from saltwater intrusion and the impacts of droughts; and

(3) Reduce water shortages by using reclaimed water for agricultural purposes.

(c) **Component 3: Ecosystem restoration and protection:**

(i) **Goal:** Improve the ecological health and resilience of the "the Graeme Hall Nature Sanctuary"?

(ii) a key natural heritage site affected by untreated effluent from the SCSTP; and

(iii) **Activities:**

(1) Conduct biodiversity studies to monitor and restore wetland ecosystems;

(2) Mitigate pollution and improve water quality in the Graeme Hall Sanctuary; and

(3) Enhance environmental conservation and ecosystem services.

(d) **Component 4: Institutional strengthening and capacity-building:**

(i) **Goal:** Strengthen the institutional capacity of the Barbados Water Authority (BWA) and other key sector institutions to manage the sustainability of water resources; and

(ii) **Activities:**

(1) Improve governance and project management within BWA;

(2) Implement a gender and social inclusion plan;

(3) Install monitoring and reporting systems to track the progress of water-reclamation efforts and climate resilience; and

(4) Enhance public awareness and stakeholder engagement regarding water reuse and conservation.

5. Expected outcomes:

(a) Increased availability of high-quality reclaimed water for agricultural irrigation and aquifer recharge;

(b) Reduced pressure on potable water sources and enhanced water security;

(c) Improved environmental health of the Graeme Hall Swamp and surrounding ecosystems;

(d) Strengthened institutional capacity for sustainable water management in Barbados; and

(e) Promotion of gender equality and social inclusion in water-resource management.

6. Co-benefits:

(a) **Climate change mitigation:** The project aims to reduce greenhouse gas emissions by using renewable energy sources (e.g. solar photovoltaic (PV) and battery storage systems) to power water reclamation facilities; and

(b) **Reduced pollution:** By improving wastewater treatment, the project will reduce contamination of marine and wetland ecosystems, improving water quality for communities and the environment.

7. Financing structure:

(a) The project will benefit from a debt-for-climate conversion (DfCC), a financing mechanism through which Barbados will repurchase sovereign debt using savings from the interest differential of a new sustainability linked loan (SLL) supported by IDB and the European Investment Bank (EIB); and

(b) Excess savings from the DfCC will fund additional climate-resilience measures, such as infrastructure investments and environmental conservation efforts.

8. This project reflects the commitment of Barbados to addressing water scarcity, improving environmental sustainability, and enhancing its resilience to climate change through innovative financing and infrastructure development.

1.1 Impact potential *Scale: High*

9. The SCWRP directly addresses two major climate challenges: water scarcity and the adverse effects of climate change, specifically droughts and sea-level rise. Barbados, as one of the most water-scarce countries globally, faces increasing risks to its freshwater supplies due to climate change. This project's impact potential is significant due to its focus on:

(a) **Water security:** The project will increase the availability of reclaimed water, reducing the stress on other raw water sources. This improves the availability of water for agricultural use, particularly for smallholder farmers who are most vulnerable to water shortages;

(b) **Greenhouse gas emission reductions:** By integrating solar energy systems and reducing the reliance on fossil-fuel-driven water treatment, the project contributes to the country's climate mitigation goals. Moreover, the solar energy systems installed at the water-reclamation facility will reduce emissions, a co-benefit alongside the adaptation focus; and

(c) **Scale of beneficiaries:** The project targets over 50,000 direct beneficiaries and over 230,000 indirect beneficiaries, a significant portion of the island's population. The adaptation benefits include improving the resilience of vulnerable communities to the impacts of climate change.

10. The focus on ecosystem restoration (Graeme Hall Swamp and Graeme Hall Sanctuary) and the reduction of untreated wastewater discharge into marine environments further amplify the environmental impact. The project offers solutions that are essential for both immediate adaptation needs and long-term climate resilience.

1.2 Paradigm shift potential *Scale: High*

11. The paradigm shift potential is a critical strength of this project. Barbados is leading the way in using wastewater reclamation as a solution to both water scarcity and climate resilience. Key aspects include:

(a) **Innovation:** The project introduces wastewater treatment technologies, enabling the use of reclaimed water for non-potable purposes such as agricultural irrigation and aquifer recharge. This reduces pressure on other water sources and serves as a model for other regions and sectors. The integration of solar PV systems with battery storage for powering water-reclamation infrastructure is also an innovative approach that combines climate adaptation with mitigation, to the extent that the energy generated by the PV systems helps reduce the use of fossil fuels;

(b) **Scalability and replication:** The successful implementation of this project will serve as a blueprint for other small island developing States (SIDS) facing similar water challenges. The comprehensive water-management framework, supported by financial innovations such as the DfCC, can be replicated across different sectors and countries, particularly in climate-vulnerable regions; and

(c) **Long-term transformation:** The project represents a sustained focus and continued systemic change in the approach of Barbados to wastewater management, seeking to expand the collection of wastewater and to create alternative sources, thus moving from reliance on limited freshwater sources towards a circular water economy that includes wastewater reuse and aquifer protection. This shift would have been even more powerful with a sustained focus also on efficient use and reduced leakage of treated water from distribution systems. Nonetheless, by reducing dependence on freshwater sources and introducing reuse technologies, the project sets the stage for future investments in similar climate-resilient infrastructure.

12. The financial model of the DfCC, backed by guarantees from international financial institutions (IDB and EIB), provides a model for how countries can finance climate resilience while addressing sovereign debt challenges.

1.3 Sustainable development potential *Scale: High*

13. The proposed project aligns with several key pillars of sustainable development, delivering significant environmental, social, and economic co-benefits:

(a) **Environmental co-benefits:** The project will lead to improved ecosystem health in the Graeme Hall Swamp and surrounding wetlands by reducing the inflow of untreated wastewater. This protects biodiversity in a critical Ramsar site and mitigates marine pollution, which is vital for the health of the marine ecosystems of Barbados;

(b) **Social co-benefits:** The project supports smallholder farmers by ensuring year-round access to irrigation, thus improving food security. This is especially important given that Barbados is prone to droughts, which negatively impact agriculture;

(c) **Economic co-benefits:** The project will generate economic benefits by improving the operational efficiency of BWA through energy savings (from the use of solar PV) and potentially reduced water losses if BWA engages in leakage detection and repair. The use of reclaimed water for agriculture also supports rural livelihoods, enhancing the resilience of small farmers. Additionally, the installation of solar power reduces energy costs, contributing to long-term financial sustainability; and

(d) **Climate mitigation co-benefits:** By deploying renewable energy and reducing the carbon footprint of water-treatment processes, the project contributes to the efforts of Barbados to meet its climate mitigation targets. Furthermore, improved wastewater treatment will reduce methane emissions from improperly managed sewage.

14. Regarding gender, the project has an output (4.2), which indicates that “Equal participation of women and Persons with Disabilities within BWA achieved” but the activities – mostly the formulation of inclusivity and diversity plans – would not seem sufficient to achieve

"equal" participation. Excluding component 4, however, the proposed project puts little or no thought to whether BWA may help reduce gender inequality or address the concerns of women and girls.

15. The integration of ecosystem restoration, renewable energy, and wastewater reuse positions this project as a multifaceted solution that addresses environmental degradation, water scarcity, and economic resilience.

1.4 Needs of the recipient *Scale: High*

16. Barbados, like many SIDS, is particularly vulnerable to climate change. The country faces challenges such as rising sea levels, saltwater intrusion into aquifers, and prolonged droughts, which jeopardize water security. The needs of the recipient are clear:

(a) **High vulnerability:** The limited freshwater resource of Barbados makes it highly reliant on groundwater and seasonal rainfall, and one of the most water-scarce countries in the world. The project directly addresses this vulnerability by increasing water availability through reclamation and reuse, thereby potentially reducing the risks posed by water shortages and saltwater intrusion.

(b) **Economic constraints:** With high levels of public debt and reliance on tourism, Barbados has limited fiscal space to invest in large-scale infrastructure projects. The DfCC is an innovative financial mechanism that alleviates some of these constraints by creating fiscal space through reduced debt-servicing costs, enabling investments in climate resilience; and

(c) **Vulnerable populations:** Smallholder farmers, women, and low-income households are among those most vulnerable to climate impacts. The project's focus on providing reliable irrigation for agriculture and reducing water supply interruptions benefits these groups directly.

17. The project addresses the core climate adaptation needs of Barbados, while simultaneously promoting economic sustainability through innovative financing and operational efficiency.

1.5 Country ownership *Scale: High*

18. The project demonstrates a strong alignment with the national climate strategies and priorities of Barbados, showing clear country ownership:

(a) **Alignment with national climate strategies:** The project supports the objectives of the nationally determined contribution of Barbados under the Paris Agreement, particularly its goals related to water security and renewable energy. The SCWRP aligns with the country's Roofs to Reefs Programme, which integrates climate adaptation and sustainable development;

(b) **Government and institutional support:** BWA, a statutory body responsible for water management in the country, plays a central role in implementing the project. The Government of Barbados has shown strong support for the project, as it is a critical component of its long-term water security and climate-resilience strategies; and

(c) **Stakeholder engagement:** The project includes extensive consultations with relevant stakeholders, including the private sector, civil society, and local communities. This ensures that the project is not only responsive to national priorities but also reflective of the needs and concerns of the local population.

19. The high level of institutional engagement and policy coherence further demonstrates the project's alignment with national development goals and the country's climate change adaptation framework.

1.6 Efficiency and effectiveness *Scale: Medium to high*

20. The financing structure of the SCWRP is innovative and revolves around a **DfCC** model. This mechanism provides Barbados with the fiscal space to invest in climate-resilient infrastructure by repurchasing its sovereign debt, supported by guarantees from IDB and EIB.

21. Key elements of the financing structure:

(a) **Debt-for-climate conversion:**

(i) **What it is:** The DfCC is a financial transaction in which Barbados repurchases or retires portions of its sovereign debt and replaces it with a new **SLL** or **sustainability linked bond (SLB)**. The savings derived from the interest rate differential between the repurchased debt and the new SLL/SLB create fiscal space, which will be used to finance climate-resilient infrastructure, such as the SCWRP; and

(ii) **Why it matters:** This transaction reduces the overall debt-servicing costs for Barbados, freeing up resources that are directed towards climate adaptation and mitigation projects, thereby enhancing the country's climate resilience and sustainability;

(b) **Role of IDB and EIB as guarantors:**

(i) IDB and EIB provide **guarantees** of **USD 150 million each**, which are central to the success of the DfCC. These guarantees improve the creditworthiness of Barbados and reduce the risk for investors in the new sovereign debt, thus securing favourable terms for the loan or bond;

(ii) **Guarantees:** These guarantees serve as a form of risk mitigation for the investors purchasing the new SLL or SLB. In the event of a default, IDB and EIB would step in to fulfill the payment obligations, ensuring that the investors are paid back. This substantially lowers the interest rate Barbados would otherwise have to pay on its new debt, thereby generating significant savings; and

(iii) The involvement of IDB and EIB, both AAA-rated institutions, reassures investors and allows Barbados to access lower-cost debt than it could on its own, further increasing the savings derived from the debt swap;

(c) **SLB or SLL**:

(i) Barbados will issue a new SLB or SLL to replace the retired sovereign debt. These instruments are linked to specific sustainability goals, in this case, climate resilience and water security. The country's progress towards meeting these goals will be monitored and reported, with the terms of the loan or bond (such as interest rates) potentially tied to the achievement of these targets; and

(ii) **Key terms of the new debt:**

(1) **Amount:** USD 150 million backed by IDB and EIB guarantees;

(2) **Interest rate:** The debt is expected to have an interest rate of around 3.25 per cent, significantly lower than the 8 per cent Barbados would

have paid for long-term local currency debt without these guarantees; and

(3) **Maturity:** The new debt will have an average maturity of 13 years, with a final maturity of 18–20 years, including pandemic and climate-resilience clauses that allow for grace periods in case of a shock;

(d) **Fiscal savings and reinvestment**:

(i) The savings generated from the lower-interest payments on the SLB/SLL (compared to the retired sovereign debt) will be allocated to an **independent account** specifically set up for financing climate-resilience measures;

(ii) **Use of excess savings:** Any savings after debt service will be used to fund investments in climate resilience, including:

(1) Expansion of reclaimed water pipelines to agricultural and groundwater recharge areas;

(2) Construction of groundwater recharge facilities;

(3) Installation of solar panels and battery storage facilities;

(4) Environmental conservation projects, such as improving the Graeme Hall Swamp; and

(5) Non-revenue water interventions, such as reducing water losses from leaky infrastructure;

(iii) **Monitoring and verification:**

(1) The project includes a robust system of **measurement, reporting, and verification (MRV)** to ensure that the proceeds of the DfCC and related water-resilience commitments are used as intended. BWA will implement these MRV duties, with support from GCF, to track:

a. The use of reclaimed water;

b. Progress in reducing water losses;

c. Achievements in renewable energy deployment and pollution reduction; and

d. Overall adherence to the sustainability linked targets set for the SLB/SLL; and

(iv) **Risk mitigation:**

(1) **Investor confidence:** By involving IDB and EIB, Barbados significantly reduces the risk perceived by investors, which makes the SLL/SLB more attractive and accessible at favourable terms; and

(2) **Pandemic and climate clauses:** The inclusion of **pandemic and climate-resilience clauses** in the debt terms allows for automatic grace periods in case of economic or environmental shocks, providing Barbados with the flexibility to manage unforeseen challenges without jeopardizing its debt obligations; and

(e) The financing structure of the SCWRP, through the innovative DfCC mechanism, enables Barbados to simultaneously reduce its sovereign debt burden and secure long-term funding for critical climate-resilient infrastructure projects. The guarantees provided by IDB and EIB play a crucial role in lowering the cost of debt and unlocking the fiscal space needed for investment in sustainable water management and environmental

conservation, thus creating a model for other SIDS to tackle climate challenges while managing high levels of debt.

22. The financial and operational structure of the project is designed to ensure cost-effectiveness and long-term sustainability:

(a) **Innovative financing through debt-for-climate conversion:** The DfCC allows Barbados to address its debt challenges while simultaneously investing in climate-resilient infrastructure. By leveraging guarantees from IDB and EIB, Barbados is able to secure favourable terms for the new debt, reducing overall financing costs and freeing up resources for climate investments. This financial structure is highly effective in addressing both fiscal and climate challenges;

(b) **Co-financing and leverage:** The project includes significant co-financing from GCF and IDB, which enhances its overall financial viability. The co-financing ratio ensures that GCF funds are used efficiently, with the potential to leverage further investments in water and climate resilience; and

(c) **Cost-effectiveness of outcomes:** The use of solar PV for powering water-reclamation facilities and the focus on reducing water losses (non-revenue water) enhance the financial sustainability of BWA. The project aims to reduce operational costs through energy savings and improved water-management practices, ensuring long-term benefits even after project completion.

23. By incorporating a mix of adaptation and mitigation strategies and ensuring financial and operational efficiency, the project demonstrates potential for long-term success.

24. Effectiveness is generally reduced by two factors:

(a) **The low connection/sewage collection rate:** With only 3 per cent of toilets connected to sewers, the wastewater fraction that the project seeks to treat is indeed a “fraction”. There are plans to expand the sewage network to increase the number of households to be served by the SCSTP.

25. Moreover, in the question-and-answer session with the iTAP, BWA mentioned that there are also plans to collect and treat a greater share of the septic tank sludge. It should be noted that this will take time, and that the SCSTP can only be expected to treat a small share of the faecal sludge and sewage generated on Barbados. This puts into question the effectiveness of investing in a treatment plant as a way of reducing pollution from municipal sources; and

(a) **High levels of non-revenue water:** Long-term adaptation also requires greater care for conservation of both natural water sources and treated water, with high levels of leaks and pipe bursts; expensively treated potable water continues to be lost through the distribution network. Water-loss reduction may be a more direct way of improving water security than wastewater reuse.

II. Overall remarks from the independent Technical Advisory Panel

26. The project demonstrates alignment with the GCF investment framework criteria. It also demonstrates high or medium-to-high impact potential, paradigm shift potential, and sustainable development benefits. The Funding Proposal’s innovative financing model, addressing both sovereign debt and climate resilience, makes it a standout example of how SIDS can simultaneously tackle fiscal and climate challenges.

27. This is one of the most innovative and replicable Funding Proposals the iTAP has seen in the public sector. It attempts to achieve three different worthy goals which are interrelated: it aims to both deal with the climate issues in the country, but also crowds in private-sector investors *at scale* through the risk absorption capacity of multilateral development banks, and

tackles the financial sustainability of indebted countries allowing governments fiscal space to tackle climate issues as well as other important developmental issues such as health and education. Each of the actors/institutions in the structure is best placed to tackle the risks allocated to it and as such the project bears huge potential for replicability and scale in most countries.

28. However, it is worth highlighting some risks. While the SCWRP presents an innovative and impactful approach to addressing water scarcity and climate change, the project also faces notable complexities, particularly from institutional and timeline perspectives. Below are some highlights of the risk for both the Accredited Entity and the Executing Entities, including the Government of Barbados to bear in mind: implementation will be key:

29. The **institutional complexity** of this project is significant, as it involves multiple stakeholders, each with distinct roles, challenges, and capabilities. These include BWA, the Government of Barbados, international development banks (IDB, EIB), and other local stakeholders, such as smallholder farmers and civil society organizations. Managing these diverse stakeholders requires seamless coordination and presents a number of potential challenges:

(a) **BWA capacity:**

(i) **Capacity gaps:** BWA has been identified as needing significant institutional strengthening, particularly in terms of governance, technical expertise, and operational management. The project includes a component specifically aimed at improving the capacity of BWA to manage the water-reclamation infrastructure, but this raises questions about whether such capacity-building efforts can be achieved quickly enough to meet the project's ambitious goals, especially since only a small share of the budget is used to address this; and

(ii) **Operational efficiency:** BWA has a history of shifting from preventative to emergency maintenance – noted in the project documentation – indicates systemic issues in the institution's operational approach. Transforming BWA into a well-governed, efficiently run utility will require more than just technical upgrades; it will need a shift in organizational culture, something that is notoriously difficult to achieve within a short project timeline. Changes in this area also require a type of determination and political will that goes well beyond what can be achieved or addressed by an externally funded project.

(b) **Government and policy alignment:**

(i) **Policy coherence:** The project aligns with the nationally determined contribution of Barbados and the Roofs to Reefs Programme, but aligning various ministries (Ministry of Agriculture, Ministry of Environment, and Ministry of Finance) to work together on integrated water-resource management may prove challenging. Coordination across these bodies, each with potentially different priorities, adds to the institutional complexity; and

(ii) **Regulatory changes:** For the water-reclamation facility to function effectively, new regulatory frameworks will likely need to be introduced (e.g. for wastewater reuse and water-pricing reforms). Institutional inertia or delays in passing necessary regulations could slow the project's progress, particularly around the use of reclaimed water and the management of aquifers;

(c) **DfCC:**

(i) **International financial institutions:** The involvement of IDB and EIB as guarantors adds a layer of financial complexity. While these institutions bring expertise and credibility, managing the relationship between these banks and local institutions could pose challenges, especially if there are delays in decision-

making or differences in risk assessments. Additionally, the success of the Sustainability Linked Loans (SLL) is contingent upon international investor confidence, and external factors such as global financial market conditions could influence the success of the debt swap;

(d) **Timeline challenges:**

(i) The timeline for this project, set at 5 years for implementation with expected outcomes over a 25-year lifespan, is ambitious given the complexities involved. Several potential bottlenecks could challenge the timely execution of the project;

(e) **Coordination and implementation delays:**

(i) **Institutional readiness:** Given the capacity-building needs of BWA, it is uncertain whether it will be fully equipped to manage the new systems and infrastructure by the end of the five-year period. Delays in training, governance reform, and the establishment of efficient operational practices could slow the project's progress, particularly if BWA struggles to attract and retain qualified technical staff; and

(ii) **Multi-stakeholder involvement:** The project requires the active participation of multiple stakeholders, including local farmers, community groups, and various government ministries. Ensuring that these actors are engaged, aligned, and ready to implement components on time will be a significant challenge. Any misalignment or delays in stakeholder engagement could lead to cascading effects, delaying the roll-out of critical project activities;

(f) **Infrastructure and technical risks:**

(i) **Wastewater treatment facility upgrades:** The technical upgrades to the SCSTP are extensive, involving the installation of advanced treatment technologies, the construction of new infrastructure, and the integration of solar-power systems. These are technologically complex and large-scale construction efforts, which are highly susceptible to delays due to unforeseen circumstances (e.g. supply chain disruptions, contractor issues, technical failures). The risk of cost overruns or delays in procurement, construction, or technology deployment is substantial; and

(ii) **Solar power and battery storage integration:** Integrating solar PV systems with battery storage at wastewater treatment facilities is a relatively new approach for Barbados. The procurement of cutting-edge technology and the management of technical risks related to energy storage may further delay the project if there are issues with system integration or performance;

(g) **Regulatory and legislative timelines:**

(i) **Legislative delays:** For the project to be fully effective, new regulatory frameworks for the use of reclaimed water and water-pricing reform are required. However, the timing of these regulatory changes may not align with the project's implementation schedule. The legislative process can be slow, and any delays in passing necessary laws or regulations could hinder the ability to scale up water-reclamation efforts; and

(ii) **Public acceptance and behaviour change:** Public education campaigns and behaviour-change initiatives related to the use of reclaimed water are critical for the success of this project. However, changing public perceptions and securing acceptance for using treated wastewater in agriculture could take time, especially given the cultural and psychological barriers associated with

wastewater reuse. If the public does not accept the reclaimed water, the project's ability to achieve its intended outcomes could be compromised;

(h) **Monitoring and evaluation challenges:**

(i) **MRV systems:** The MRV system is crucial for tracking progress on key deliverables such as water reclamation, solar energy deployment, and ecological restoration. However, developing a robust MRV system requires technical expertise and coordination across multiple agencies. Ensuring that data collection and reporting systems are operational within the project's timeline will be a challenge, particularly if institutional capacity-building lags behind; and

(i) **Financial and economic risks:** The DfCC is a groundbreaking financing model, but it is not without its complexities:

(i) **Economic volatility:** The success of the DfCC depends on favourable international financial conditions and continued investor confidence. If global interest rates rise or Barbados faces economic shocks (e.g. downturns in tourism or external debt crises), the cost savings generated by the debt swap could diminish, undermining the fiscal space needed to invest in climate-resilience measures; and

(ii) **Sustainability of financial savings:** While the project anticipates using the fiscal savings from the DfCC to fund additional investments, there is a risk that these savings may not materialize as planned due to cost overruns or unforeseen financial pressures. If the excess savings are insufficient, Barbados could face challenges in scaling up its water-resilience efforts.

30. Despite some of the risks highlighted, the iTAP recommends that the Board approve this funding proposal.

Response from the accredited entity to the independent Technical Advisory Panel's assessment (FP251)

Proposal name:	Barbados Climate Resilient South Coast Water Reclamation Project (SCWRP)
Accredited entity:	Inter-American Development Bank (IDB)
Country:	Barbados
Project/programme size:	Medium

Impact potential
The project's holistic approach, as it addresses water scarcity and climate change, as well as broader environmental and development challenges, was a crucial driver in the project design. As a highly vulnerable country, Barbados will invest in a key sector, prioritized by a set of different methodologies, which also allows them to strengthen their climate planning capacities. Finally, the beneficiaries remain the main social aspect to consider as the country builds a just transition and human-based climate strategy.
Paradigm shift potential
The project has inspired other initiatives currently under design. It allows Small Island Developing States (SIDS) to build their financial and physical resilience while accessing concessional resources, given the innovative approach under which these projects are designed. Furthermore, the project had a specific adaptation focus; nonetheless, as pointed out, it considered the value added of mainstreaming mitigation opportunities to enhance the project's climate-proofing.
Sustainable development potential
A consultant specializing in Gender and Diversity (G&D) will conduct a comprehensive gender assessment and develop a G&D Action Plan for the Barbados Water Authority (BWA) during the first year of implementation. The consultant will also recruit and train a G&D Focal Point within BWA, who will become part of the BWA staff. This Focal Point, a G&D specialist, will ensure gender mainstreaming and social inclusion, oversee stakeholder activities, and report on progress related to gender and diversity. Additional staff may be assigned as needed to support the G&D specialist. The project aims to identify gaps and barriers that limit the equal participation of women and diverse populations—defined by the IDB to include people with disabilities—at the technical, operational, and administrative levels within BWA. It will also develop an internal policy promoting the participation of people with disabilities within the organization. Additionally, the project will design and deliver training programs in technical and soft skills specifically for women and diverse groups and provide opportunities for these individuals to engage in internships and mentoring programs.

Moreover, the project will also prepare and implement communication initiatives to promote its objectives and the benefits of wastewater reuse and to build community support, particularly targeting women and individuals with disabilities.

Consultations will involve the public and private sectors, NGOs, and civil society organizations to ensure diverse inputs and participation. A grievance redress mechanism will be developed and implemented to address incidents of harassment and gender-based violence.

Several targets in the Gender Action Plan include a goal of 50% representation for women and diverse groups. Key results related to gender and diversity will be monitored through the Monitoring and Evaluation Plan, with assistance from the M&E specialist. They will be assessed during mid-term and final evaluations.

Needs of the recipient

Barbados is a small developing island in the Caribbean with a population of 281,635 inhabitants and a Gross Domestic Product (GDP) of US$21,442 per capita. Facing critical climate change and fiscal challenges have been the main considerations in the design of this project, which allows for an alignment of all their needs and priorities. Therefore, the project advances the efforts of the Government of Barbados in attaining water resilience, debt equilibrium, and increased climate finance to increase their capacities.

Country ownership

The project was identified by the Government of Barbados as a priority and considered to be a fundamental component of the Debt for Climate Conversion. The different stakeholders involved and the capacities being built will allow Barbados to pursue key climate commitments (NDC, R2RP, etc.) as they enable the country to operationalize its climate targets and maintain a sustainable debt management approach.

Efficiency and effectiveness

The two main issues raised are considered as follows:

- The preliminary treatment plant services 2,900 properties on the south coast (approximately 48,825 inhabitants), and the population served is expected to grow to about 52,000 inhabitants. The GOB is actively planning to extend the sewer network, with Excess Savings being considered a new funding source for constructing the new connections.
- The reduction of non-revenue water (NRW) is also a priority of the portfolio investment of the GOB and BWA. The focus area is currently being considered a complementary investment next year with the IDB, as we all consider addressing water loss in the network critical to building resilience. Investment in this sector is also considered for eligible expenses under Excess Savings. BWA estimates the potential loss of revenue from NRW to be US$43M/year and prioritizes tackling this challenge for financial viability, water supply reliability, and resilience strengthening.

Overall remarks from the independent Technical Advisory Panel: Recommendations shared by iTAP are aligned to the risks already identified:

- **BWA Capacity:** the IDB will build upon the existing efforts and experience with BWA as an executing agency, including the implementation of the AquaRating action plan, which will be critical to apply a comprehensive and impartial evaluation of the utilities' performance based on indicators, best practices and reliable information.

- **Government and policy alignment/ Regulation:** the enabling environment is fundamental to ensure a successful and sustainable implementation. The Water Reuse Bill started the key pillars for an institutional framework that will be operationalized through this investment. Additional resources have been allocated for awareness campaigns and public ownership.
- **Debt for Climate Conversion (DfCC):** The complexity is also part of the collaboration needed by MDBs to coordinate their efforts. It has been central in all negotiations and our commitment to a successful transaction outcome. The DfCC requires a diverse team of experts to guarantee a successful outcome.
- **Timeline, Coordination & implementation delays:** BWA will receive the support of a broader set of stakeholders and be guided by a Project Operations Manual (POM), with development led by the IDB. Furthermore, a Project Steering Committee (PSC) will provide a strategic oversight framework and facilitate coordination. The BWA will chair the PSC, and participating institutions will include the PMO, MEFI, MAFS, BADMC, and MENB. Additionally, BWA will be supported by a team of experts contracted specifically for a Project Execution Unit, which will provide specialized support in project management, procurement, environmental and social management, financial management, etc.
- **Infrastructure & technical risks:** Delays and cost overruns were forecasted in the design of infrastructural works (e.g. contingencies, procurement modality, advanced procurement, etc.). Regarding the PV farm and BESS sub-components, the IDB Group will support BWA, given IDB's experience and extensive support to the local renewable energy sector.
- **M&E challenges:** Component 4 and specific additional technical cooperation will design the MRV to encompass all the tracking required under the investment loan and DfCC, including specific institutional capacity-building activities.

Gender documentation for FP251

August 2024

BARBADOS CLIMATE RESILIENT SOUTH COAST WATER RECLAMATION PROJECT

Annex 8: GENDER ASSESMENT
&
GENDER ACTION PLAN

Contents

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Acronyms and Abbreviations

ACRONYM/ABBREVIATION	DEFINITION
BGIS	Barbados Government Information Service
BWA	Barbados Water Authority
BPfA	Beijing Platform for Action
CARICOM	Caribbean Community
CARIWN	Caribbean Water Institute
CCCCC	Caribbean Community Climate Change Centre
CEDAW	Convention on the elimination of all forms of Discrimination against Women
CGA	Country Gender Assessment
CRF	Caribbean Resilience Facility
CRWSP	Climate-Resilient Water Safety Planning
DRM	Disaster Response Management
ECLAC	Economic Commission for Latin America and the Caribbean
EIA	Environmental Impact Assessment
EPD	Environmental Protection Department
ESIA	Environmental and Social Impact Assessment
FCIU	Family Conflict Intervention Unit
GAF	Gender Analysis Framework
GAP	Gender Action Plan
GEI	Gender Equality Indicators
GOB	Government of Barbados
GWP	Global Water Partnership
IDB	International Development Bank
IGDS	Institute of Gender Development Studies
IPR	Indirect Potable Reuse
IUCN	International Union for Conservation of Nature
KII	Key Informant Interview
LGBTQ+	Lesbian, Gay, Bisexual, Transgender, Queer and/or Questioning, Intersex, and Asexual and/or Ally
MCO	Multi-Country Office
MFEI	Ministry of Finance, Economic Affairs and Investment, Barbados
MHH	Men Headed Households
MOU	Memorandum of Understanding
NGO	Non-Government Organizations
PMO	Prime Minister's Office
SAMOA	SIDS Accelerated Modalities of Action
SDG	Sustainable Development Goal
SIA	Social Impact Assessment
SGBV	Sexual and Gender Based Violence
SIDS	Small Island Developing States
STEM	Science, Technology, Engineering, and Mathematics
TOR	Terms of Reference
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
UNFCCC	United Nations Framework Convention on Climate Change
UN-MCO	United Nations Managed Care Organization
UN-WMCO	United Nations Women Multiple Country Office
UN-SDG	United Nations Sustainable Development Goal
UWI	University of the West Indies
UWI-IGDS	University of the West Indies- Institute of Gender and DevelopmentStudies
WHH	Women Headed Household

1 Executive Summary

The main scope and rationale of the present Gender Assessment is to provide expert advice to the staff of the Prime Minister's Office (PMO) in Barbados and Barbados Water Authority (BWA), regarding the potential gender sensitivity issues associated with Barbados Climate Resilient South Coast Water Reclamation Project (SCWRP). It aims to provide information that would influence the adoption of policies necessary to ensure the implementation of specific gender equality mainstreaming actions.

Barbados has made commendable strides in human development, yet despite these achievements, persistent gender inequalities remain. While significant progress has been made in advancing gender equality, there are still areas marked by disparities.

The issue of gender equality continues to be high on the development agenda in Barbados. Notably, there is a commendable increase in women achieving higher levels of education. However, these educational gains do not always translate into equal socio-economic representation. A notable gender gap persists, with a higher proportion of women than men found in the lower socio-economic bracket. The multifaceted nature of gender dynamics in Barbados requires a comprehensive approach in different levels, such as education, labor market participation, representation in leadership roles, and access to economic opportunities. This will allow the understanding of gender disparities, facilitating the development of targeted policies and initiatives.

This report endeavors to assess the gender sensitivity aspects associated with the Barbados Water Resilience Project, aiming to provide essential insights for shaping policies that ensure equal opportunities for men, women, and various vulnerable groups. The focus includes the poor, elderly, people with disabilities (PwD), LGBTQ+ individuals, etc., fostering their active participation in the project. Emphasizing the need for policies countering gender-based discrimination and promoting inclusivity in the workforce and stakeholder engagement, the report underscores addressing specific needs and concerns related to water management impacts on different genders. Integration of gender equality considerations throughout the project seeks to establish a more inclusive and sustainable approach to water reclamation, contributing to social equity, overall success, and resilience of the initiative.

The South Coast Water Reclamation Project (SCWRP) in Barbados is an initiative that address climate change impacts on water resources and ecosystems. The project's general objective is to increase Barbados' water resilience to climate change with a focus on increasing water security, food sovereignty and improvement of environmental conditions linked to the comprehensive approach of upgrading the South Coast Water Treatment Plant. Specific objectives include improving water supply resiliency by increasing the availability of potable water through the reuse of reclaimed wastewater for agricultural irrigation; Reducing water insecurity through reuse of reclaimed water to recharge aquifers; Strengthening key sector institutions such as the Barbados Water Authority (BWA) and the Natural Habitat Conservation Areas (NHCA) to enhance water resource management, operational efficiency, monitoring, reporting and verification (MRV) and gender mainstreaming considerations.

Structured into four components, the project involves water reclamation infrastructure, reclaimed water reuse, ecosystem restoration, and institutional strengthening.

The Gender Analysis and Gender Action Plan serve as a baseline for gender-responsive action and inclusion within Barbados' Water Sector. The assessment includes a literature review, secondary data review, and analysis of gendered indicators baseline. The methodology involves screening, data collection, gender assessment, and mainstreaming gender in the project cycle. Limitations include

constraints in deeper gendered analysis due to non-disaggregated data and a lack of primary source information. Future consultation processes are recommended for a more detailed analysis of gender-related issues during the project's life.

The assessment plan delves into the international conventions, protocols, and agreements related to gender equality that the Government of Barbados (GOB) has ratified. The analysis covers crucial frameworks like the Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW), the Beijing Platform for Action, the Sustainable Development Goals (SDGs), and the Convention on Biological Diversity (CBD). International institutions such as the United Nations (UN), International Financial Institutions (IFIs), Green Climate Fund (GCF), Global Environment Facility (GEF), and the United Nations Environment Programme (UNEP) play significant roles in shaping and implementing water reclamation projects in the Caribbean with a focus on gender equality.

At the regional level, institutions like the Caribbean Community (CARICOM) Regional Secretariat, the Inter-American Development Bank (IDB), the Economic Commission for Latin America and the Caribbean (ECLAC), the Global Water Partnership-Caribbean (GWP-Caribbean), and the Caribbean Community Climate Change Centre (CCCCC) contribute to gender-related projects. The regional context highlights CARICOM's Gender Equality Strategy, ECLAC's Gender Equality Plan, and GWP-Caribbean's project databases as valuable resources. The Country Gender Assessment (CGA) outlines strategies relevant to the Barbados South Coast Water Reclamation Project, emphasizing research, training, and collaboration with academic institutions like the University of the West Indies (UWI).

Barbados has enacted various policies and legislations to address gender equality concerns. Key national initiatives include the National Sustainable Development Policy, the Draft National Gender Equality Policy, and the National Climate Change Policy. Recent legislative acts such as the Employment (Prevention of Discrimination) Act and the Employment Sexual Harassment (Prevention) Act provide legal frameworks to combat discrimination and harassment. Public institutions like the Barbados Poverty Alleviation Bureau, the Bureau of Gender Affairs, and the Environmental Projection Department contribute to gender equality initiatives.

The Barbados Water Authority (BWA) operates under the Barbados Water Authority Act and the BWA (Sewerage Regulations), since 1980. The organizational structure analysis reveals gender disparities in roles, with men dominating technical and operational positions, while women are more prevalent in administrative and managerial roles. The BWA Board of Directors exhibits a gender imbalance, with 62% male representation. The organization lacks a formal, written Gender Equality Strategy, but unwritten practices and legislation provide some safeguards. The ongoing Gender Sensitivity Training program, facilitated by the University of the West Indies Institute of Gender and Development Studies (UWI-IGDS) under the WSRN Project, aims to enhance employees' understanding of gender sensitivity issues within the BWA.

Getting into the sociodemographic gender analysis, Barbados' population in 2021 stood at 281,200, with a balanced gender distribution—48.1% men and 51.9% women. Maternal mortality ratio remains stable at 39, below the regional average, indicating positive maternal health outcomes. Adolescent fertility rates, while stable since 2010, are higher than the income group average, suggesting a need for initiatives in sexual education and reproductive health. Barbados excels in education with a 99% completion rate for girls and 104.3% for boys in lower secondary school. Adult literacy rates are high for all genders, showcasing the country's commitment to fostering literacy regardless of gender. Attending to labor force, as of 2022, women's labor force participation is 58%, showing a decline since 1990. Despite this, Barbados has a relatively narrow gender gap in labor force participation compared to global trends. Vulnerable employment for women increased since 1991, emphasizing the need for

targeted interventions to enhance job security. The employment analysis indicates that there is a 6.84% gap in the labor force participation rate, favoring men. Gender-based wage differentials persist, with women earning 71.20% of men's salary and 88% of their average estimated income. Women's representation in the industrial sector is 24.59%, contrasting with 70.87% in the services sector, indicating sector-specific gender imbalances. Finally, attending to gender equality in National Parliament and Management, in 2022, women hold 26.7% of seats in the national parliament, indicating progress but falling below the high-income country average. Efforts to address barriers and promote gender-sensitive policies are crucial. Women's participation in ownership and top managerial positions in firms remains below desired levels, requiring targeted initiatives for improvement.

Barbados has made significant strides in various aspects of gender equality, including education and management positions. However, challenges persist in labor force participation, wage equality, and political representation. Ongoing initiatives, research, and targeted interventions are essential for furthering gender equality in Barbados, contributing to a more inclusive and equitable society.

Gender Equality Indicators (GEIs) are crucial for tracking progress towards Sustainable Development Goal 5 (SDG 5). CARICOM has adopted a regional list of thirty-three GEIs. The gender analysis applied some CARICOM GEIs adopted by the Government of Barbados (GOB). Barbados has a gender gap of 76.9%, ranking 31st globally. Despite disparities, improvements are noted compared to previous years.

This assessment emphasizes a broad view of gender equality, including LGBTQ+ rights. A national LGBTQ+ Survey highlights persistent discrimination, recommending awareness initiatives and policy reforms. Attending to Sexual and Gender-Based Violence (SGBV), studies reveal a 27% prevalence of violence against adult women, and SGBV given principally on domestic level. Recommendations include addressing violence risks in infrastructure projects.

Climate change impacts in Barbados, exacerbated by gender inequalities, affect women disproportionately[1]. Strategies involve acknowledging women's roles and contributions in climate change responses. The GFDRR and CRF findings underline gender gaps in health services, education, economic opportunities, and social protection during disasters. Violence against women increases, requiring a gender-inclusive approach.

Finally, the assessment analyzes gender in water sanitation programs and infrastructure. Lack of sex-disaggregated data poses challenges in understanding water sector impacts. Affordable reclaimed water availability can aid women in caregiving roles, but data gaps hinder evidence-based actions. The project addresses water scarcity, benefiting women who are disproportionately affected. Some challenges include financial barriers and unpaid work, although the project offers health and economic benefits, especially for women.

[1] **https://www.un.org/en/chronicle/article/womenin-shadow-climate-change**

2 Introduction

The purpose of this report is to present a Gender Assessment and Gender Action Plan in relation to the Barbados Climate Resilient South Coast Water Reclamation Project.

Conceptually, gender refers the socially and culturally constructed roles, behaviors, activities, expectations, and attributes that a particular society considers appropriate for individuals, encompassing not only men and women, but also LGBTQ+ persons. This concept extends beyond mere identification of attributes to include the opportunities associated with specific groups. The social definitions of femininity and masculinity vary across cultures and have evolved over time. Gender serves as a socio-cultural expression of characteristics and roles that are associated with certain groups of people with reference to their sex and sexuality.

Gender assessment involves the systematic analysis and evaluation of roles, responsibilities, opportunities, and challenges to ensure meaningful participation of beneficiaries throughout the project lifecycle. This includes needs assessment, design, decision-making, access to opportunities, implementation, and monitoring and evaluation of program and project processes.

The primary aim of a gender assessment is to understand and address the impact of gender norms, expectations, and power dynamics on individuals and groups. This entails examining social, cultural, economic, and political factors contributing to gender disparities and inequalities. The assessment strives to identify the specific needs, experiences, and contributions of women, men, and LGBTQ+ individuals.

Recognizing that gender equality and the empowerment of women are integral to the Sustainable Development Goals (SDGs), this report emphasizes the collective, organizational, and programmatic effort required across all levels and stakeholders. Achieving gender equality is essential for realizing the rights and potential of all individuals.

The gender assessment identifies major gender gaps within available data, emphasizing the need for further research in various areas such as forestry and local farmers' cooperation. Special attention is given to the overwhelming involvement of rural women as contributing family workers (as farmers in Barbados are beneficiaries of this Project). The report aims to assist project staff and stakeholders in effectively addressing gender-based discrepancies, particularly in facilitating the empowerment of rural women within the project's activities.

A gender analysis is a useful tool to identify points of intervention in a project cycle at which existing or potential disparities in gender impacts can be compensated for or eliminated. Gender analysis is a methodology that describes the existing gender relations in a particular environment, ranging from within households, or firms, to a larger scale of community, ethnic group, or nation. It involves collecting and analyzing sex-disaggregated data and other qualitative and quantitative information. The analysis involves the process of organizing and interpreting, in a systematic way, information about gender relations to make clear the importance of gender differences for achieving development objectives.

2.1 Objectives and Associated Outcomes

This report aims to evaluate the gender sensitivity aspects associated with the Project. It seeks to provide information crucial for shaping policies that guarantee equal opportunities for men, women, and diverse groups, including PwD, LGBTQ+ individuals, the poor, elderly among others, fostering their participation in the project.

Moreover, the report emphasizes the need for policies and practices that actively counteract gender-based discrimination and promote inclusivity within the workforce and stakeholder engagement.

The project should also acknowledge the varying impacts of water management on different genders and make efforts to address specific needs and concerns. This involves ensuring access to culturally sensitive, safe, and accessible sanitation facilities for all individuals, regardless of gender.

By integrating gender equality considerations throughout the project, the overarching goal is to establish a more inclusive and sustainable approach to water reclamation. This approach aims to enhance social equity, contributing to the overall success and resilience of the initiative.

2.2 Project Background

The Barbados water resilience project is a comprehensive initiative designed to mitigate the impacts of climate change on water resources and ecosystems. The general objective of the operation is to increase Barbados' water resilience to climate change with a focus on increasing water security, food sovereignty and improvement of environmental conditions linked to the comprehensive approach of upgrading the South Coast Water Treatment Plant.

The specific objectives of the Project are to:

- Improve water supply resiliency by increasing the availability of potable water through the reuse of reclaimed wastewater for agricultural irrigation;
- Reduce water insecurity through reuse of reclaimed water to recharge aquifers;
- Strengthen key sector institutions such as the Barbados Water Authority (BWA) and the Natural Habitat Conservation Areas (NHCA) to enhance water resource management, operational efficiency, monitoring, reporting and verification (MRV) and gender mainstreaming considerations.

The project is structured into four distinct components, each serving specific objectives:

1. **Component 1. Water Reclamation Infrastructure:** 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 m3/day under a Design Build EPC/Turnkey modality and O&M for an initial period of 2 years, including climate change considerations. 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 the aim to reduce GHG emissions and considerations for circular economy and energy production. 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

SCWRRF and the design and installation of the odor control system. Consideration will be given to the use of energy efficient equipment and Smart Water Infrastructure Technologies.

2. **Component 2. Reclaimed Water Reuse:** This component will finance:

   Sub-component 2.1. Agriculture Reuse of Reclaimed Water Pipeline ($ 14.28 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 ("Trailway") and ancillary equipment, and a high-water mark catchment area to allow the irrigation pipeline to be gravity fed.

   Sub-component 2.2. Aquifer Recharge Infrastructure ($ 5.32 Million) consisting of the installation of 4 km water pipeline, 5 injection wells, 6 exploratory boreholes, 3 abstraction boreholes and pump stations, 3 monitoring wells and ancillary equipment for aquifer recharge, with due considerations of resiliency and adaptation to climate change measures as well as low carbon emissions.

3. **Component 3. Climate change and biodiversity opportunities: This component will finance:**

   Sub-component 3.1. Graeme Hall Swamp Conservation ($ 2 Million) supports development and implementation of a Monitoring Plan for the Natural Heritage Conservations Area (NHCA): biodiversity, hydrogeology, soils, general use and community engagement. This plan will guide development of the Integrated Management Plan for NHCA.

   Sub-component 3.2. Solar energy generation with battery storage ($14 million) consisting of estimated 7 MW of solar photovoltaic panels and associated energy storage capacity on lands owned by the BWA, increasing the resilience of the BWA pumping stations by allowing continued operation in case of a power outage, and mitigating the additional carbon footprint of the upgraded wastewater treatment facilities.

4. **Component 4. Institutional Strengthening:** This component will finance institutional strengthening of the executing structure, including 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 Barbados Water Authority (BWA) to improve governance, efficiency, and sustainable management of water resources. Potential 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; (iii) Supporting the execution of FTC's regulatory functions in the water and sewerage sector; (iv) Implementing robust monitoring 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; (vii) Implementation of robust public health and safety measures, including appropriate signage, education programs, and guidelines for the safe use of reclaimed water.

Component 1 aims **to produce high-quality reclaimed water for non-potable uses**. This component also aims to **prevent contamination** of the surrounding swamp by improving treatment capacity and reducing pollution risks, potentially benefiting coral reefs.

Component 2 focuses on constructing infrastructure for reclaimed water reuse, agricultural irrigation and aquifer recharge, **reducing water insecurity and enhancing water supply resilience**. This component aims to reduce reliance on potable water for irrigation and safeguard aquifers against saline intrusion.

The Christ Church aquifer is predominantly used for agricultural irrigation water abstractions in the Silver Hill and Gibbon's Boggs farming districts. 450 small farmers in 162 hectares (400 acres) in this area currently utilize abstracted groundwater and piped water from the BWA potable water supply network to irrigate crops. Recharging the aquifer with reclaimed water will result in the availability of more groundwater for abstraction as the project can supplement 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. 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. However, except for registered farmers connected to the BWA water supply network, it is difficult to quantify the additional distributed back yard gardening demand. The Project will extend a pipeline from Lowlands directly to River Plantation, where 140 hectares (347 acres) of land are leased by the Ministry of Agriculture for crop production. Along this pipeline route, direct irrigation will also become available for area farmers.

Regarding **Component 3**, it includes conservation measures for biodiversity protection in the National Heritage Conservation Area (NHCA) of Graeme Hall Watershed, and the implementation of solar energy generation with battery storage. Conservation efforts aim to enhance ecosystem resilience and reduce pollution, while solar energy generation supports water sector resilience and mitigates greenhouse gas emissions.

The NHCA is a 33-hectare site featuring the island's sole freshwater mangrove wetland. Serving as the primary floodplain for the watershed, it collects surface runoff from surrounding agricultural and residential areas. However, the wetland's ecological integrity has been compromised by the malfunctioning sluice gate since 2006, leading to drainage issues during heavy rainfall events and exacerbating pollution accumulation. This pollution, stemming from various upstream sources, poses significant threats like eutrophication and toxin introduction, further deteriorating the ecosystem. Additionally, the swamp faces risk of contamination from untreated effluent discharged via the Bisecting Canal, emphasizing the urgent need for restoration efforts.

Finally, **Component 4** addresses institutional strengthening to improve governance, efficiency, and sustainable management of water resources. Activities include enhancing managerial capacity, promoting inclusivity through a Gender and Action Plan, implementing monitoring systems, regulating groundwater use, and conducting public awareness campaigns. This component also contributes to ecosystem restoration and pollution reduction by ensuring proper operation of facilities and harmonious coexistence with the swamp ecosystem.

2.3 Methodology

The Gender Analysis and Gender Action Plan seeks to provide a baseline for gender responsive action and inclusion within the Water Sector of Barbados. The Assessment and analysis will be used to inform the scale up and/or enhancement of gender-responsive interventions that seeks to address the identified gaps for achieving gender equality.

The assessment included a desk review of available secondary data from Barbados and the wider Caribbean, aiming to assess the gender perceptions of water restoration, and to analyze available data to determine a gendered indicators baseline. The main activities conducted can be summarized as it follows:

- **Literature Review**: This stage included literature review including existing international, regional, and national frameworks for gender equality and the extent to which national water management legislation, policies and procedures included these agreed international and regional gender equality considerations and commitments. Among the conducted review, the analysis of the Gender Assessment and Gender Action Plan of the project 'The R's (Reduce, Reuse and Recycle) for Climate Resilience Wastewater Systems in Barbados' stands out. During this stage, the review sought to identify relatable regional and international gender indicators that the project can contribute to.
- **Secondary data review**: Data collected from secondary sources include several reports, on the findings of case studies related to gender and research papers on various aspects of gender relations, water reclamation and climate change. These include but are not limited to: GOB Records on Social, Political and Economic and Climate Change Issues; Understanding Unequal Relations of Gender in the Caribbean; Barbados Agriculture Sectoron Gender, Climate Change and Water o Barbados Fisheries Sector on Gender, Climate Change and Water Additionally, the secondary data review analyzed data as it relates to regional and national response to climate change.

Table 1 –Gender Analysis Methodology

No	Component	Description
1	Screening	Categorization of gender dimensions of the Project goals to identify areas for in-depth analysis.
2	Data Collection	Collection of information regarding gender considerations, water sector policies and climate change scenarios in Barbados.
3	Gender Assessment	Analysis of data to determine gendered needs of the water infrastructure and services sector.
4	MainstreamingGender in the Project Cycle	Recommend actions align with Project goals and stakeholder genderedneeds.

2.3.1 Limitations

The gender analysis process had several constraints that limited the extent of the data collection and analysis process.

- The review of secondary data was constrained from deeper gendered analysis as most data on usagecollected was not disaggregated. Additionally, it was not possible to identify vulnerable groups including, LGBTQ+ people and persons with disabilities from the available data.
- Significant consultation processes have not yet been conducted, and no primary source of information was obtained to analyze in greater detail the underlying gender issues in the operational area of the project. This step, to be conducted in the future, will allow for a more detailed analysis of the strategies needed to ensure that the entire project life considers gender-related issues.

3 Legislative, Regulatory, and institutional Frameworks

3.1 International Framework

This Gender Assessment analyses the international frameworks and institutions governing the administration of conventions, protocols, and agreements related to gender equality. The Government of Barbados (GOB) has ratified and adhered to several pertinent gender equality conventions and protocols, as outlined below. These agreements are enforced by the BWA, emphasizing the commitment to fostering gender equality in tandem with water management initiatives.

- Convention on the Elimination of All Forms of Discrimination Against Women (1979): Require signatory governments to take action to promote and protect the rights of women by including the principle of equality in legislation and operationalizing it in their country. Article 14 pays special attention to discrimination against rural women, and to ensure their access to rural benefits.

- Beijing Platform forAction (1995): The platform encourages governments to collect data on the impact of environmental degradation on women, as well as develop gender- sensitive databases. The Declaration calls for ensuring that women's priorities are included in public investment programs for economic infrastructure, such as water and sanitation.

- The Sustainable Development Goals (SDG) (2015); Calls for sex-disaggregated data, and gender-sensitive databases and promotes the empowerment of women and gender equality regarding land ownership, resource stewardship, education, and employment issues. Water and sanitation, like gender equality, are human right issues that the GOB has a responsibility to enforce for the advancement of the society. By enforcing these rights, communities, and vulnerable groups, which comprise a larger percentage of women and girls, will benefit from opportunities that facilitate stronger and less biased decision-making. Gender equality promotes basic human rights and is therefore foundational for achieving the other SDGs1. The principle of leaving no one behind requires gender transformative water and sanitation programmes. SDG-5 Includes:
    - 5.5 Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision making in political, economic, and public life;
    - 5.b Enhance the use of enabling technology, in particular information and communications technology, to promote the empowerment of women and;
    - 5.c Adopt and strengthen sound policies and enforceable legislation for the promotion of gender equality and the empowerment of all women and girls at all levels.

- The Convention on Biological Diversity (CBD-1993): has adopted a Gender Plan of Action and update it for the period 2015-2020. It requires countries to implement integrated actions to enhance the monitoring framework and indicator system for gender mainstreaming at national level.
- The Convention on the Rights of Persons with Disabilities (UN, 2006) was ratified in 2013. The Convention articulates its mission to foster, safeguard, and facilitate the complete and equitable enjoyment of all human rights and fundamental freedoms for all Persons with Disabilities and to encourage reverence for their inherent dignity.

There are also several international institutions involved in the design and implementation of Water Reclamation projects in the Caribbean emphasizing the importance of integrating gender equality considerations, such as:

1. United Nations (UN): Tasked with executing the Sustainable Development Goal 5 agenda, the UN places a central focus on "Empowering Women and Promoting Gender Equality."
2. International Financial Institutions (IFIs): Organizations like the World Bank, mandated to safeguard the global environment and facilitate environmentally sustainable economic development among member nations.
3. Green Climate Fund (GCF) and Global Environment Facility (GEF): These institutions are entrusted with supporting international projects, offering new and additional grants, and concessional funding for approved projects. Their mission involves assisting developing countries in implementing climate change adaptation and mitigation measures, the Caribbean Community Climate Change Centre (CCCCC), collaborating with the GCF and providing project management services, follows a mandate that underscores the necessity of gender-related analyses in climate change projects across the Caribbean.
4. United Nations Environment Programme (UNEP): Operating within the UN system, UNEP is mandated to coordinate responses to various environmental issues. Its programs span sustainable development, climate change, disaster management, conflict resolution, ecosystem management, and environmental governance.

3.2 Regional Framework

At the regional level there are several institutions with policy and legal mandates to address gender equality issues relating to water projects being implemented on behalf of Caribbean member states. Brief details of the current work of regional institutions that is relevant to this Project follow.

The Gender Agenda promoted by the Inter-American Development Bank (IDB) holds significant relevance in addressing gender-related challenges in the Latin American region. The IDB has implemented specific policies, such as the Gender Equality Policy and the Gender and Diversity Action Plan, aimed at systematically integrating gender perspectives into its operations. These measures focus on aspects like women's economic empowerment, improved access to education and healthcare, and the prevention of gender-based violence. By incorporating these policies, the IDB seeks to contribute to reducing gender disparities and fostering a more inclusive and equitable environment in Latin America, thereby promoting sustainable development and social progress.

The Caribbean Community (CARICOM) Regional Secretariat plays a crucial role in implementing regional plan, programs, and projects for the benefit of member states. In March 2019, the Secretariat, in collaboration with the UN-MCO, formulated a Regional Gender Equality Strategy aimed at expediting the effective implementation of key priority actions that member countries committed to after the BPfA conference. This strategy is tailored to support nations that have yet to fully enact the Beijing Declaration, encompassing facets such as women's economic empowerment and freedom from violence. In 2015, the CARICOM Secretariat also devised and endorsed the adoption of a Gender Equality Indicators model by member states, intended for gauging progress in gender equality. This model encompasses the status of women, men, and LGBTQ+ persons, along with a strategy for measuring these indicators at both regional and national levels.

As part of its mandate, the Economic Commission for Latin America and the Caribbean (ECLAC) has developed a model Gender Equality Plan intended for implementation by member countries in Latin America and the Caribbean. According to ECLAC, the plan has been customized and adopted by most countries in the region, but Barbados is not listed as one of the countries with such a plan or policy.

GWP-Caribbean also has a mandate to implement gender-related projects in the Caribbean. The institution undertakes regional case studies and maintains project databases which member states are given full access to. Barbados is a member of the GWP-Caribbean, and as such has access to databases and case studies of GWP projects in the water sector. This partnership represents another opportunity for the BWA to access specific information that includes gender mainstreaming recommendations related to the water sector.

The CCCCC has a mandate to implement climate change projects requiring gender related analysis in the Caribbean. In keeping with its mandate, the CCCCC has adopted a Climate Change Framework, which includes a Gender Policy for the coordination of the Caribbean's response to climate change, which involves working on effective solutions and projects to combat environmental impacts and global warming.

The Country Gender Assessment (CGA) proposed certain strategies that are relevant to this Project, such as it requires Barbados to engage in research aimed at generating disaggregated data. This research is crucial for the effective implementation of programs designed to empower men, women, and LGBTQ+ individuals, addressing prevalent social issues such as poverty alleviation, challenging gender stereotypes, and enhancing resilience to environmental disasters. Additionally, Barbados is expected to engage in training stakeholders through workshops to increase the capacity of women in the leadership of government department and the wastewater sector.

Finally, the UWI is entrusted with the responsibility of leading training and research initiatives in the Caribbean region. To fulfil its mandate, UWI established CERMES based at UWI Cave Hill, Campus in Barbados with the capacity to undertake studies focusing on areas such as gender and climate change, as well as disaster risk management in the Caribbean. CERMES possesses the capability to delve into studies aimed at integrating gender concerns in water infrastructure projects in Barbados. Furthermore, UWI has established the IGDS which conducts regular programs on gender, climate change and disaster risk reduction. The UWI IGDS recruit students to pursue post-graduate research in the fields of water (Isaacs, 2017) and collaborates with the BWA to implement gender sensitivity training for BWA employees.

Given Barbados' membership in all the underlined regional institutions, the BWA has access to the CARICOM list of GEIs, the Gender Equality strategy, and the UN ECLAC Model Gender Equality Plan. Additionally, the BWA can leverage case study reports and project data from GWP-Caribbean, while benefiting from the support provided by CCCCC on climate change adaptation and mitigation.

3.3 National Framework

Barbados lacks a national gender framework. Strengthening national gender mechanisms and planning agencies is crucial for effective leadership in developing and implementing gender policies. This involves allocating sufficient budgets, enhancing human resources and staffing, providing gender-responsive training, appointing Gender Focal Points in all relevant bodies, and fostering support from a vibrant civil society.

Various institutions with explicit policy and legal mandates are dedicated to addressing gender equality concerns. The Government of Barbados (GOB) has proactively undertaken multiple measures to enhance the framework governing water policy, legislative instruments, and institutional arrangements. A detailed description of national initiatives pertinent to this project follows.

- **National Sustainable Development Policy**: In 2004, the GOB adopted a National Sustainable Development Policy to guide decisions and actions at all levels in the country.
- **Draft National Gender Equality Policy**: Although the GOB has a revised Draft National Gender Equality Policy, it is yet to be approved by the Cabinetof Ministers and tabled in parliament for discussion and endorsement. While this Policy is not endorsed, Barbados has been recognized as making steps to improve legislation that fosters increased equality.
- **National Climate Change Policy:** The Government of Barbados approved a National Climate Change Policy in 2012. The country's Intended Nationally Determined Contribution (now known as NDC) as communicated to the United Nations Framework Convention on Climate Change in 2015, lists 6 national plans and strategies for which climate change adaptation would be incorporated. These include:
    - Medium Term Growth and Development Strategy 2013 – 2020;
    - Physical Development Plan;
    - White Paper on the Development of Tourism in Barbados and National Adaptation Strategy to Address Climate Change in the Tourism Sector in Barbados;
    - Coastal Zone Management Plan;
    - Storm Water Management Plan;
    - Other sectoral plans including for agriculture, fisheries, water and health.

  While the Climate Change Policy makes mention of gender issues, there was limited presentation of strategies for mainstreaming gender in relevant sectoral climate change interventions. The Policy however states that that vulnerable groups, including women and young men, should be targeted and participate in action to address environmental threats and damage.
- **Disabilities Act of 1992:** Is the primary legislation addressing people with disability rights in Barbados. This act prohibits discrimination against people with disabilities in areas such as employment, education, and access to goods and services. Furthermore, the legislation established a National Disabilities Unit tasked with executing policies and initiatives aimed at advancing disability rights and inclusion. Nonetheless, Barbados faces shortcomings in disability legislation, notably the absence of laws mandating accessibility in public buildings or public transport. This lack of regulation creates significant barriers for people with disabilities.

In 2020, the Government of Barbados enacted the **Employment (Prevention of Discrimination) Act, 2020**[4]. This Act prevents discrimination in an employment context in over fifteen (15) areas. Including sexual orientation, gender, family responsibility, age, and physical features. The Act prevents discrimination in recruitment and selection; even where these functions are executed by recruitment agencies. The Act identifies that an act of discrimination can occur, "directly or indirectly, whether intentionally or not, makes a distinction, creates an exclusion or shows a preference, the intent or effect of which is to subject the other person to any disadvantage, restriction or other detriment." The Act also identifies an act of discriminationmay occur where "the person, directly or indirectly, whether

intentionally or not, subjects the other person to anydisadvantage, restriction or other detriment" in identified circumstances. This legislation has identified a tribunal where complaints of discrimination can be made.

In 2017, The Government of Barbados enacted the **Employment Sexual Harassment (Prevention) Act, 2017**[7].The Act makes provision for the protection of employees in both the public sector and private sector from sexualharassment at their workplace; provides a framework for the reporting of sexual harassment cases by employeesand a method of resolving such cases; establishes a procedure for the hearing and determination of matters relatedto sexual harassment; and provide for related matters.

Barbados has several public institutionswith mandates that have a direct impact on gender equality issues relating to the water sector. They areas follows:

1. The Barbados Poverty Alleviation Bureau and the Office of the Director of Poverty established in 1998 with a responsibility to examine and report on the living conditions of the poor and vulnerable;

2. The Bureau of Gender Affairs, Ministry of Youth, and Family and Sports responsible for monitoring and evaluating gender equality policies, plans, and programs of government. The Bureau is responsiblefor the integration of gender in all national development policies and programs to achieve gender equity and equality.;

3. The Environmental Projection Department (EPD), has completed a wastewater reuse policy to facilitatethe treatment of wastewater for reuse in drip irrigation, toilet flushing, decentralized sanitation systems including septic tanks, sewage packaged plants and suck- wells; and

4. The Nacional Disabilities Unit, a government agency that is responsible for implementing policies and programs to promote disability rights and inclusion in Barbados. There are also two non-governmental organizations: The Barbados Council for the Disabled, and The Barbados Association of Persons with disabilities.

The above-mentioned institutions collaborate with each other to bring greater synergy between gender equality and wastewater issues. Overall data collected from government records indicates that the GOB has made some progress on social, political, and economic issues relating to gender equality. However, during the implementation of the Projectit is necessary that the BWA ensures compliance with provisions of relevant conventions, policies, agreements, and laws. Where there are gaps identified, BWA needs to lobby the government authorities to make the appropriate improvements.

3.4 Institutional Framework – Barbados Water Authority

In October 1980, the GOB enacted the Barbados Water Authority Act as the primary legal instrument. BWA is the entity in Barbados charged with supplying the island with potable water as well as the provision of wastewater treatment and disposal services. The Act is accompanied by the BWA (Sewerage Regulations), 1980, (S.I. No. 151 of 1980), to regulate sewage, effluent wastewater, discharge, water charges, authorization, permit, equipment, and inspection; including the sewerage treatment plants, packaged plants of hotels and businesses, or household's sceptic tanks and suck-wells.

The BWA has a mandate to deliver satisfactory water and wastewater services to the citizens of Barbados, and in line with this, it is responsible for implementing gender equality policies. In the

context of delivering waste services, the BWA must maintain an appropriate organizational structure for utility oversight, establish a system for data collection and analysis, and manage wastewater treatment facilities.

To ensure the successful execution of the project, it is necessary to address diverse gender equality issues, with specific details outlined within the framework of water services offered by the Barbados Water Authority (BWA). This includes the need to integrate gender-responsive strategies into the planning, implementation, and monitoring of the project's initiatives, which should include equitable opportunities for both men and women in employment, decision-making processes, and community involvement associated with water services. The effective implementation of the project requires addressing various gender equality issues.

3.4.1 Organizational structure analysis

The organizational structure of the Barbados Water Authority (BWA) encompasses various functional departments, including Finance, Human Resources, and Customer Service. As of November 2023, the BWA employed 746 individuals, with 74% being men and 26% women.

In general terms, female participation in BWA is greater than at the regional and global levels. A study published by the World Bank (2019) states that in Latin America and the Caribbean, women represent only 19.7% of the workforce in the water sector, while globally, that percentage drops to 17.7%. However, female participation in BWA has not yet reached parity.

Table 2 – Composition – BWA organizational structure (BWA, 2023)

CATEGORY	TOTAL	%	MALE	%	FEMALE	%
Technical	66	9%	50	76%	16	24%
Operational	509	68%	470	92%	39	8%
Administrative	153	21%	22	14%	131	86%
Managerial	18	2%	8	44%	10	56%
Total	746	100%	550	74%	196	26%

Examining the overall staff distribution at the Barbados Water Authority (BWA), roles can be categorized as follows: 9% technical, 68% operational, 21% administrative, and 2% managerial. When analyzing this distribution based on gender, a notable pattern emerges: Most male staff members are engaged in operational roles, constituting 68%, following operational roles, a significant portion of male staff holds administrative positions, accounting for 21%. For female staff, the predominant role is administrative, with 86% of women occupying administrative positions and the second most common role for females is managerial, encompassing 56% of women in leadership positions.

This analysis highlights gender-based variations in the distribution of staff roles at the BWA. Operational roles are more predominant among male staff, while administrative roles are more common among female staff. Additionally, a notable proportion of female employees hold managerial positions within the organization.

The organization maintains an unwritten policy that influences staff training, deployment, compensation, and mobility. The BWA's commitment to addressing gender equality issues is reinforced by its unionized workforce, with provisions outlined in the collective agreement. Understanding these patterns is crucial for fostering gender equality and promoting diversity across different levels of the organizational hierarchy.

Despite gender imbalances, the perception of BWA as an equal opportunity employer remains consistent. However, institutional cultural biases that may perpetuate inequality need attention. Strategies such as gender sensitivity training, encouraging women in STEM fields, and promoting women in leadership roles could contribute to shifting cultural dynamics over time.

Women's participation in prominent decision-making spaces provides an opportunity not only for equality of representation but equality of decision-making outcomes. Analyzing the composition of the BWA Board of Directors (BWA, 2023), the thirteen-member BWA Board of Directors, appointed by the Ministry of Transport, Works, and Water Resources, reflects a gender imbalance, with 62% of the board of directors being male while only 38% female.

Table 3 – Composition – BWA Board of Directors (BWA, 2023)

Stakeholder	Total	Male	Female
BWA Board of Directors	13	8 (62%)	5 (38%)

There are only five women on the board, with three serving as the chairperson. The underrepresentation of women in leadership roles highlights the need to enhance women's participation in decision-making spaces, particularly within the context of water governance. Gender diversity in decision-making bodies is essential for promoting inclusive and effective outcomes, aligning with the principles advocated by the Beijing Platform for Action. Addressing the gender imbalance on the BWA Board of Directors is not only crucial for meeting gender equality goals but also for ensuring a more comprehensive and diverse perspective in the formulation of policies and decisions related to water infrastructure. This aligns with broader global initiatives, such as Sustainable Development Goals (SDGs) 5 and 6, which emphasize gender equality and clean water and sanitation as interconnected objectives.

Gender Institutional Diagnosis (2017)

In 2017, a gender institutional diagnosis was conducted at BWA2. Different social methodologies were used to collect data. Focus groups were formed, comprising 12 individuals from public utilities3 and 4 individuals from academia4. The group was asked questions aimed at gathering feedback on strategies to enhance the utility's climate resilience, clarifying knowledge gaps regarding the rationale for integrating gender perspectives/considerations into the development of water infrastructure projects and identifying opportunities to enhance gender equity in the distribution of benefits from proposed activities. Survey of Social Media Platforms. The social media platforms of Facebook and Twitter were

[2] Isaacs, Wainella; Prouty, Christine and Trotz, Maya (2017). *Gender Analysis for a Water Sector Resilience Nexus for Sustainability in Barbados*. GCF Documentation. Barbados| CCCCC | GCF/B.19/22/Rev.02.

[3] Barbados Water Authority: Pipes Replacement Project Manager, Water Quality Technician, Safety and Health Officer, Financial Controller, General Manager of Utility, Customer Service Supervisor, Administrative Assistant, Utility Board Members.

[4] Academia: University of the West Indies: Institute for Gender & Development Studies.

surveyed for general population views and perceptions on the quality of services provided to the public by the BWA. Additionally, news articles and/or exchange of comments provided context on the issues related to water provision and opportunities for improvement of this service. In this review, two parishes – St. John and St. Joseph were highlighted as areas of special concern due to extended and frequent water interruptions.

The results of these activities and the opportunities identified to promote gender equality (both in the operation of BWA and in the implementation of its programs) are shown in Table 4.

Table 4. Data collected during the focus group and some activities proposed on the Gender Analysis for a Water Sector Resilience Nexus for Sustainability in Barbados (Maya, 2017, GCF Document).

Data collected	Activities proposed
Focus Group	
University of the West Indies Institute of Gender and Development Studies (UWI IGDS) The UWI IGDS Cave Hill Unit has staff with expertise in the areas of gender, sexuality, human rights, gender-based violence, Caribbean men and masculinities, and Caribbean feminism. The areas of gender and climate change are lesser explored topics by this department. In 2015, they included a 3-hour workshop called "Women and Water for the first time in their Caribbean Institute for Gender and Development (CIGAD) biennial summer program. An environmental engineering professor from the University of South Florida taught this workshop. Faculty at the UWI IGDS sister Unit at the Mona Campus in Jamaica have already delivered gender, climate change, and disaster risk reduction training to 92 undergraduates in the region and are available to guide and mentor to increase competency in Barbados. Proposed activities to integrate the Cavehill campus IGDS program with EWN-SCI include expansion of CIGAD to include additional seminars on women and water that are open to non-CIGAD program participants, production of educational materials on the rationale and context for recognizing and incorporating gender perspectives in development projects, and recruitment of M.S. and Ph.D. students to pursue research that directly support EWN-SCI project goals. The group also recommended targeting its CIGAD graduates (11 institutes have been held to date) to train them on EWN-SCI topics that would be applicable to the communities where they live, and for which they can become champions for sustainable water infrastructure.	✓ Formulate institutional gender policy & partner with UWI IGDS to build capacity on gender and infrastructure in Barbados. ✓ Produce educational materials on the rationale for the inclusion of gender perspectives as smart economics in water sector development projects, and recruit M.S. and Ph.D. students for the UWI IGDS to pursue research that directly support EWN-SCI project goals.
Barbados Water Authority - Mains Replacement For the proposed mains replacement, the group discussed	

potential deficiencies in the criteria for the selection of priority mains for replacement. Currently, the number and frequency of bursts are the criteria used. It was suggested that social factors such as the number of persons impacted, presence of schools, clinics, and elderly care facilities as well as demographics of affected customer homes e.g., gender and age should also factor into the criteria for mains replacement. The Customer Service department indicated that an upgrade of their management information system will allow them to capture such demographics and share this information with other departments. This discussion expanded the focus groups traditional considerations of gender dimensions as quota requirements, to the larger scope of responsibility of the utility to its customers and gendered impacts of service provision.	✓ Include social factors such as gender impacts and the presence of vulnerable groups in the criteria for prioritizing operation and maintenance activities like pipe replacement.
- Internal Revolving Fund to support Household Rainwater Harvesting and Household Residential Recharge The current water crisis in Barbados due to the prolonged periods of no rainfall raised the many challenges faced by the BWA and country, and opportunities for innovative and sustainable solutions that would require decentralized approaches. Since 1996, buildings over a certain size have been required to install rainwater tanks, however, there is no requirement that the tanks be used. Given the high cost of electricity in Barbados many people do not install pumps required to access the rainwater and some argue that the tanks end up breeding mosquitoes. Architectural designs do not take advantage of gravity fed systems and plumbing for uses like flushing toilets is not popular and some believe it is illegal. Given the potential for rainwater harvesting to offset water needs from the BWA and therefore its pumping costs, this was seen as a useful thing to encourage households to do. Similarly, with the increase of impervious areas in built environments, options to encourage rainwater recharge (e.g., rain gardens) were discussed, especially for households with little space for rainwater tanks/cisterns. The team agreed that demonstration sites for public education need to be located on BWA properties, however, they recognized the importance of highlighting existing champions throughout Barbados. Partnering with the engineers and plumbers to create manuals etc. and publicize the options was recommended by the group.	✓ Explore the potential of decentralized projects like rainwater harvesting in increasing customer resiliency during water supply shortages and natural emergency situations.
Survey of Social Media Commentary	
For the past year, many communities in Barbados particularly in the parishes of St. Joseph and St. John have experienced extended water interruptions. As reported in different online	✓ Develop clear communication policies (inclusive of a social media

and print media some persons have not received running water in their taps for almost a year. Barbados has a 97% potable water coverage and so these interruptions are unprecedented, and many persons in the population were not prepared to respond to this situation. Groups such as Pledge Water Barbados and Weekend Water Warriors have emerged in the wake of this crisis and have taken the lead in providing relief to these communities in the form of bottled water delivery. The situation is exacerbated as persons lament the fact that they continue to receive a bill although they have not received water. There are many reports of women's inability to cook and subsequent diet substitution with dry foods, inability to wash and clean their households and rash development on babies and young children. Reduced productivity at work due to stress from waking up at infrequent hours to gather water from standpipes when possible was another concern. Current BWA relief efforts including provision of community tanks and water trucks are viewed as inadequate particularly for the elderly who may not have someone to collect water in receptacles for them. Businesses such as hair salons and food places have also experienced economic burden as these sectors are highly water reliant.	presence) on information dissemination and follow-up to address stakeholder concerns.

Considering all this data, an institutional gender policy must be proposed to drive a partnership between BWA and UWI IGDS for conducting gender and infrastructure training in Barbados. Based on the findings of the diagnosis, this activity may consider the following recommendations: (i) Consider employing graduates from UWI IGDS Campus Mona in Jamaica (or M.S. and Ph.D. students) so they can support the gender objectives of the project through their research work. These personnel could also assist in producing educational materials for use in training sessions to promote the recognition and incorporation of gender and inclusion perspectives in development projects. (ii) Expand the training offerings of CIGAD by incorporating gender and infrastructure courses into the curriculum (water and sanitation, solid waste, energy, and transportation, among others). The aim would be to educate personnel sensitized to gender issues, equality, and inclusion, capable of integrating these concepts into the design of development programs and projects, as well as proposing programs to promote the participation of women and persons with disabilities (PWD) in decision-making spaces.

3.4.2 BWA Gender Equality Strategy

The BWA currently lacks a formal, written Gender Equality Strategy. However, the organization adheres to unwritten practices that promote non-discrimination and equal pay for equal work. Unionization has played a role in supporting these practices.

Although the organization does not have a clearly defined Gender Equality Strategy, the ongoing project presents an opportunity to document policies related to non-discrimination. Upgrades to Standard Operating Procedures (SOPs) can be utilized as a platform to formalize and articulate the organization's commitment to gender equality.

It is noteworthy that the Employment (Prevention) of Discrimination Act of 2020 is applicable to the BWA. This legislation extends to various aspects, including recruitment, and establishes a framework

for addressing complaints through a tribunal in cases where the BWA violates anti-discrimination laws. This legal framework provides a formal avenue for addressing instances of discrimination within the organization.

Finally, it is crucial to highlight certain instruments and procedures aimed at safeguarding against potential gender inequities within the institution under analysis. Firstly, the BWA enforces the Employment of Women (Maternity Leave) as per CHAPTER 345A. In its act, sanctioned on July 19th, 1976. This legislation is designed to provide maternity leave to female employees and ensure the protection of their employment during such periods. Maternity leave, according to the act, spans a minimum of twelve weeks and is structured to allow the employee flexibility, including a period of up to six weeks before the expected date of confinement and a subsequent period of not less than six weeks from the date of confinement.

Furthermore, the BWA has implemented a specific Sexual Harassment Policy to address potential instances of gender-based violence within the institution. This policy is applicable to all categories of employees, contractors, and other third parties operating within BWA workplaces, irrespective of their gender, sexual orientation, role, status, or other protected attributes. The policy comprehensively examines various forms of sexual harassment, including physical, verbal, and non-verbal, establishing the rights of employees, confidentiality terms, and systematic mechanisms for managing such situations. These proactive measures underscore the institution's commitment to fostering a workplace environment free from gender-based inequities and promoting a culture of respect and inclusivity.

3.4.3 BWA Gender Sensitivity Training

With Support from the Water Sector Resilience Nexus for Sustainability in Barbados (WSRN) Project, The BWA undertook a Gender Sensitivity Training which stated in October 2020, and was facilitated by UWI-IGDS. The programme was designed to train 500 BWA employees to helpthem develop a better understanding of gender sensitivity issues within the Authority. The programme contained several modules of video presentations and three case studies which included gender components on water and wastewater issues, fish processing and farming topics. It also included a component on the water and energy nexus and covered areas like drought management, rainwater harvesting and increased water storage. The programme was designed to redress the personal and urgent relations of gender.

Participation in trainings is encouraged, but not made mandatory for staff. Trainings have had varying degrees of success in terms of participation. Incentives for attending training often results in increased attendance.

Training for gender equality can be a transformative process that provide knowledge, techniques, and tools to develop skills and changes in attitudes and behaviors. However, the effectiveness of these programmes is often a result of a continuous and long-term process that requires commitment of all parties. Similarly, as posited by the European Institute for Gender Equality, if implemented systematically gender training facilitates more efficient actions and a positive change in attitudes. Likewise, there are certain categories of employee, depending on job functions, who should be mandatorily trained in relevant areas of gender sensitivity.

4 Gender Analysis

4.1 Sociodemographic Gender Analysis

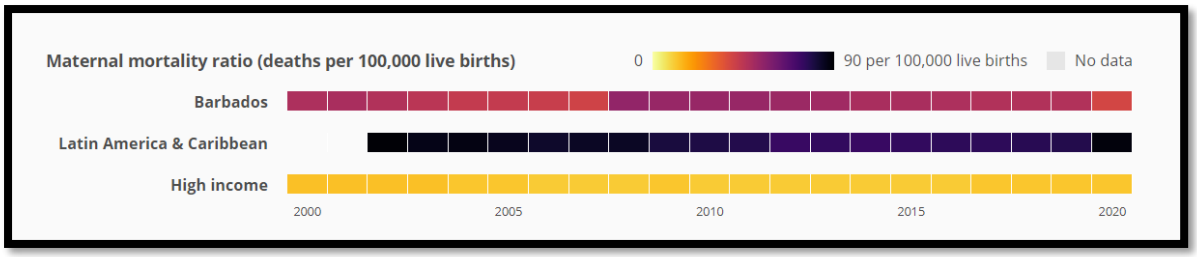
This section is destined to provide data or details related to the social and demographic characteristics of Barbados population based on gender. This information provides insights into the distribution, composition, and dynamics of a society with respect to gender. It encompasses various factors, including age, education, employment, income, marital status, and other social indicators, analyzed in the context of gender differences.

4.1.1 According to World Bank information, in 2021, Barbados had a total population number of 281.200. The gender distribution is relatively balanced, as men account for approximately 48.1% of the population (129,241), and women, 51.9% (139,551). Barbados does not have a racially or ethnically diverse population. The population of the country is predominantly afro descendant (92.4%) or mixed (3.1%); 2.7% of the population is white and 1.3% South Asian. The remaining 0.4% of the population includes East Asians (0.1%) and Middle Easterners (0.1%) [5] . The government does not consider systemic racial or ethnic discrimination to be a problem in the country.[6] Regarding youth, in 2016, youth (aged 15-24) made up 13.5% of Barbados' population. Maternity and mortality rate.

According to the Gender Data Portal of the World Bank, the maternal mortality ratio in Barbados has exhibited a stable trend over the past two decades, hovering around the value of 39. The maternal mortality ratio is a key indicator, representing the number of women who lose their lives due to pregnancy-related causes while pregnant or within 42 days of pregnancy termination, per 100,000 live births (Figure 1).

Barbados' maternal mortality ratio of 39 reflects a relatively low figure, notably below the regional average. This statistic underscores the country's comparatively favorable maternal health outcomes in comparison to its regional counterparts.

While the stagnant nature of the maternal mortality ratio may indicate a level of stability in maternal health outcomes, ongoing efforts to monitor and improve maternal healthcare are essential. Continuous attention to maternal health policies, healthcare infrastructure, and accessibility to quality healthcare services can contribute to sustaining and further enhancing positive maternal health outcomes in Barbados.



[5] Barbados Integrated Government – www.gov.bb/visit-Barbados/demographics
[6] 2022 Country Reports on Human Rights Practices: Barbados – US Department of State

Figure 1 – Maternal mortality ratio (deaths per 100.000 live births) (The World Bank. Gender Data Portal).

In 2021, the data reveals that 42 out of every 1,000 girls aged 15-19 in Barbados experienced childbirth. This adolescent fertility rate has exhibited stability since 2010, indicating a consistent trend over the past decade. Notably, the 2021 rate is higher than the average rate observed within its income group. (Figure 2)

The adolescent fertility rate is a critical indicator reflecting the number of births among girls aged 15-19 per 1,000 individuals in that age group. While the stability in the rate may suggest a consistent trend, the higher-than-average rate within its income group warrants attention. Initiatives related to sexual education, reproductive health services, and broader socio-economic factors influencing adolescent fertility.

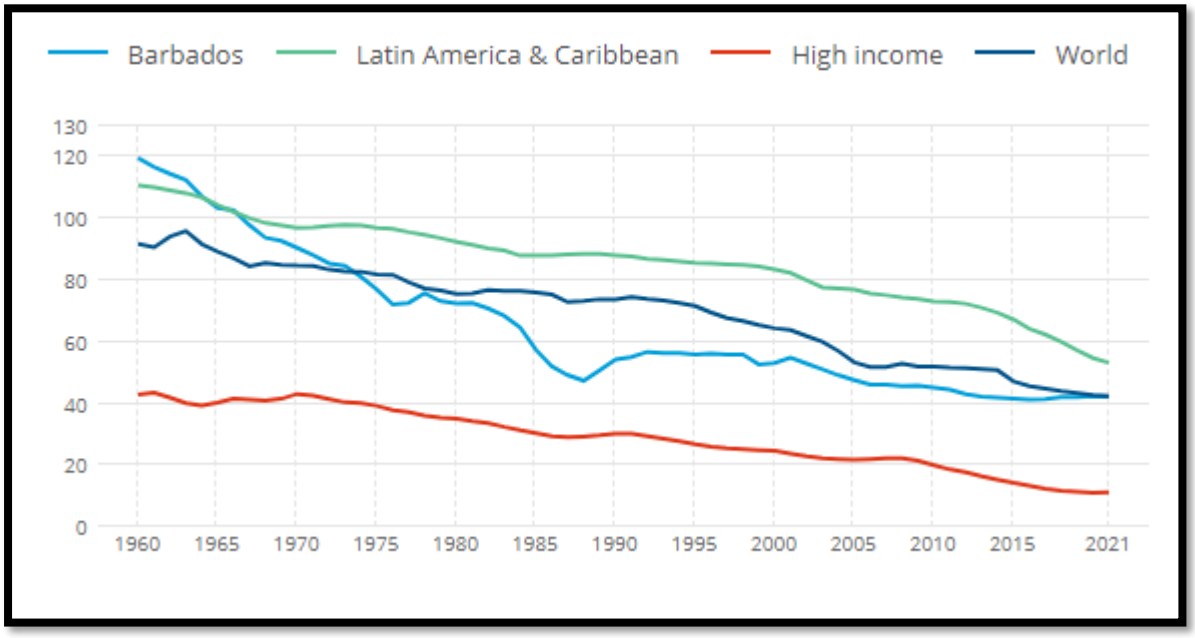


Figure 2 – Adolescent fertility rate (births per 1,000 women ages 15-19) (The World Bank. Gender Data Portal)

4.1.2 Education

The lower secondary education completion rate serves as a crucial indicator, measuring the proportion of students who have finished the final grade of lower secondary education, irrespective of their age upon completion. The high rates for both girls and boys in Barbados indicates the nation's commitment to providing accessible and inclusive education, contributing to widespread educational attainment and potentially fostering positive socio-economic outcomes.

As of the latest available data in 2022, the educational landscape in Barbados reflects a notable achievement, with a reported completion rate of 87,5% for girls and 87,1% for boys in lower secondary school (Figure 3).

Figure 3 – Lower secondary completion rate, by sex (% of relevant age group) (The World Bank. Gender Data Portal).

Analyzing adult literacy in Barbados, Figure 4 exhibits remarkable parity between women and men as of 2014. The literacy rates for all genders are exceptionally high. The adult literacy rate, which measures the percentage of individuals aged 15 and above capable of both reading and comprehending a brief, straightforward statement about their daily lives, underscores the country's commitment to fostering widespread literacy regardless of gender.

Figure 4 – Adult Literacy rate, by sex (% of people ages 15 and above) (The World Bank. Gender Data Portal).

4.1.3 Labor force

As of 2022, the labor force participation landscape in Barbados reveals distinctive gender dynamics. Figure 5 below shows the labor force participation rate, which stands among females stands at 58%, while their male counterparts exhibit a participation rate of 64.2%. This metric represents the proportion of the population aged 15 and older actively involved in economic activities.

Notably, the data indicates a longitudinal trend, revealing a decline in female labor force participation since 1990. This temporal dimension prompts a deeper exploration into the socio-economic factors and policy dynamics that may have influenced the shifting patterns in women's engagement in the workforce over the years.

In comparison to global trends, particularly within the high-income group, Barbados stands out for demonstrating a relatively narrower gender gap in labor force participation.

Analyzing this phenomenon within the broader context of gender equality and economic development, there exists an opportunity for Barbados to delve into the underlying factors contributing to the observed trends. Policies aimed at addressing barriers to female labor force participation and promoting equitable opportunities could play a pivotal role in shaping the future trajectory of gender dynamics in the workforce. Ongoing research and targeted interventions may further illuminate the intricacies of these trends, ultimately contributing to a more nuanced understanding of the evolving role of women in Barbados' labor market.

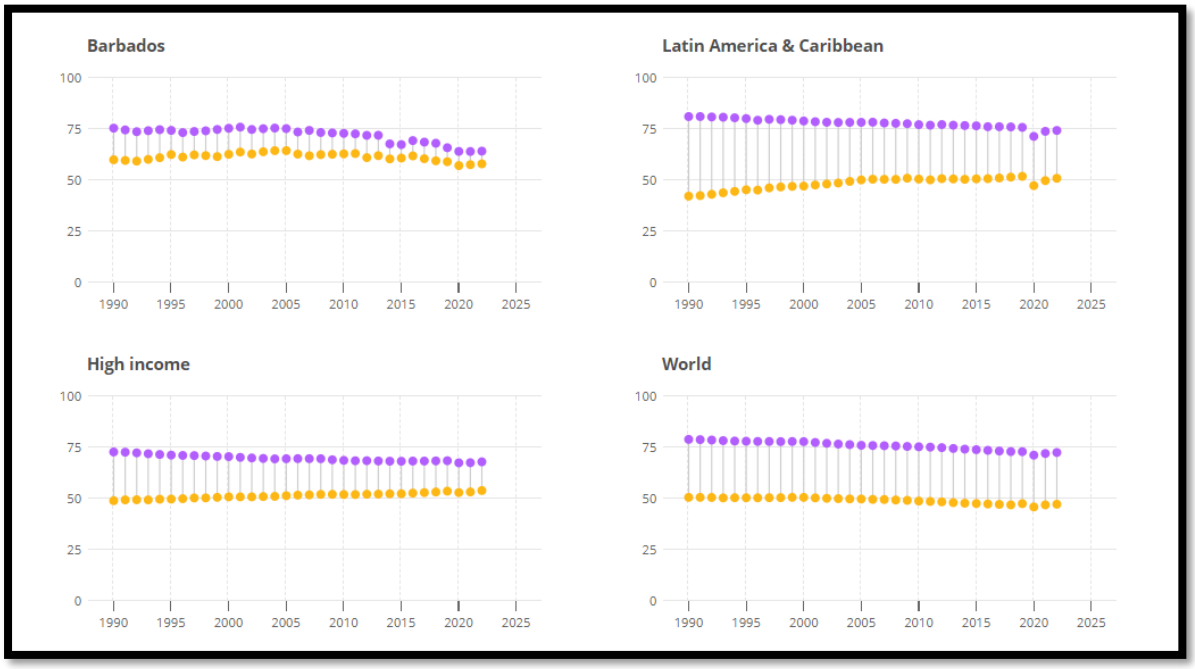


Figure 5 – Labor force participation rate, by sex (The World Bank. Gender Data Portal).

Since 1991, the scenario of vulnerable employment for females in Barbados has exhibited a concerning trend, witnessing a deterioration over time. Workers categorized under vulnerable employment face a higher likelihood of lacking formal work arrangements, social protection, and safety nets, thereby rendering them more susceptible to economic shocks and poverty.

In the specific context of Barbados in 2021, Figure 6 shows the prevalence of vulnerable employment among women, notably recorded at 12.7%, while among men, it stands at 24.6%. These figures underscore the urgent need for a nuanced examination of the factors contributing to the heightened vulnerability of employment for women, necessitating strategic interventions to enhance job security and socio-economic safeguards.

It is imperative to recognize the broader regional context, as Barbados compares favorably in terms of vulnerable employment rates when juxtaposed with the Latin America & Caribbean average. The lower rates of vulnerable employment for both men and women in Barbados signal a positive aspect, yet addressing the gender disparity within this vulnerable employment bracket remains crucial.

Efforts to delve into the root causes of this vulnerability, such as exploring economic structures, social policies, and gender-specific challenges, can pave the way for targeted initiatives. By implementing measures to enhance job security, social protections, and equitable opportunities, Barbados can work towards mitigating the impact of vulnerable employment, particularly among its female workforce, fostering a more resilient and inclusive labor market.

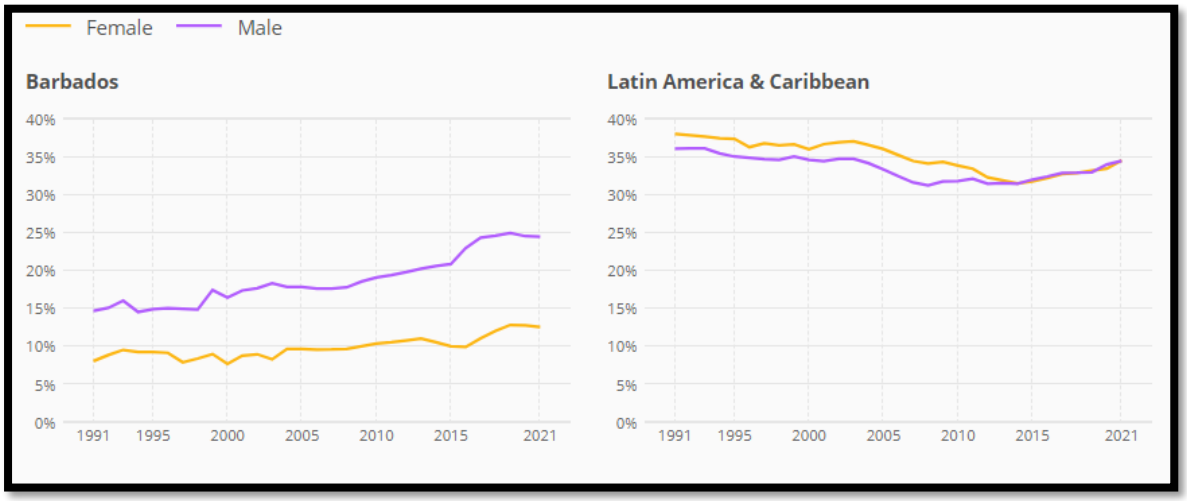


Figure 6 – Vulnerable employment, by sex (% of total employment) (The World Bank. Gender Data Portal)

4.1.4 Poverty

According to the CGA (2016), female-headed households in Barbados are more likely to experience poverty compared to male-headed households. Approximately 47.5% of all households are led by women, and these households have a poverty rate of 19.4%, whereas male-headed households have a poverty rate of 11.5%. Poor female-headed households also face a higher dependency ratio, with 74.8% of non-earners per household, compared to 68.6% in poor male-headed households and 49.9% in the total population.

It is worth noting that women without property or the means to pay rent are effectively homeless, though they often find housing with relatives or friends. The government has implemented targeted poverty-alleviation programs, such as the Community Development and Social Empowerment (CODASE) program, led by the Advisor on Poverty Alleviation and the Millennium Development Goals in the Office of the Prime Minister. Additionally, to address women's economic empowerment as a poverty-alleviation strategy, the BGA provides technical support to the Women Entrepreneurs of Barbados, a non-governmental organization for women micro-entrepreneurs, in collaboration with the Office of the Advisor on Poverty Alleviation and the MDGs. The Labor Force Participation Rate for women stands at 58%, (2022) slightly trailing behind the rate for men, which is recorded at 64.2%. This delineates a discernible gap in favor of men, emphasizing the existing.

4.1.5 Employment

The Labor Force Participation Rate for women stands at 58%, (2022) slightly trailing behind the rate for men, which is recorded at 64.2%. This delineates a discernible gap in favor of men, emphasizing the existing gender disparity in workforce engagement. Delving further into wage equality, it is evident that women earn 71.20% of the salary earned by their male counterparts for similar work. Furthermore, when considering the average estimated income, women's earnings amount to 88% of that of men. These statistics underscore the presence of gender-based wage differentials and emphasize the need for concerted efforts to address and rectify these disparities in the workforce.

In the industrial sector, the representation of women stands at 24.59% compared to the total positions held by men. Conversely, within the services sector, women make up a higher proportion, accounting for 70.87% of the workforce. This disparity underscores the varying levels of gender representation across different sectors, emphasizing the need for targeted efforts to address and rectify imbalances, promoting greater gender equality in the workplace.

In general, more men are employed in the formal economy as information technologists, technicians, professionals such as engineers and occupy top managers or chief executive. Most of these jobs require long hours of specialized training, they are also more competitive, require high level of knowledge and skills and they are generally more secured and are high paying jobs. (Allen, 2016)

The UNWOMEN's 2017 gender analysis of employment in six CARICOM countries, including Barbados, provided valuable insights into the distribution of women's employment across various standardized occupations. Utilizing the International Labor Organization's (ILO) International Standard Classification of Occupations (ISCO) definition, which characterizes occupations as "a set of tasks and duties performed, or meant to be performed, by one person, including for an employer or in self-employment," the analysis aimed to assess the representation of women in different occupational categories.

Specifically, the analysis highlighted that, compared to women, men in Barbados are more likely to be employed in the agricultural sector. However, it is noteworthy that the gender disparity observed in Barbados is comparatively less stark than in some other CARICOM countries like Jamaica and Guyana. This insight suggests that while there may still be gender imbalances in the distribution of employment in certain sectors, the situation in Barbados appears to be more balanced than in some regional counterparts.

With respect to household management, most poor households are headed by women, and therefore women stand to benefit from any treatment in wastewater and increase in the quantities of non-potable water, if it is within their ability to pay for it. Women are usually the ones who spend longer hours doing unpaid domestic work such as cooking, gardening, collecting, and storing water for domestic use, caring for children and the elderly, and the animals (Bobb, 2019)

The findings underscore the importance of continued monitoring and analysis of gender-related employment patterns to inform targeted interventions and policies aimed at achieving greater gender equality in the workforce. By understanding the nuances of occupational distribution, policymakers and stakeholders can develop strategies to address any existing disparities and create more inclusive opportunities for women across diverse sectors of the economy.

Regarding youth, in 2016, 26% of youth were unemployed and 29% were not in education, employment or training (NEET). Male youth had a higher NEET rate at 32% than females (26%). In

2022, the youth unemployment rate was estimated to be 24.5%, with higher rates of unemployment among male youth (27.7%) than female youth (20.8%)[7].

4.1.5.1 Agriculture Sector

Barbados is classified as a 'water scarce' country, and with agricultural activities reliant on water availability for irrigation, smallholder farmers suffer long dry periods and drought. Thus, it increasingly difficult for smallholder farmers to manage crop planting cycles, pests and diseases. For livestock farmers, increased air temperature and high humidity are often causes sited for depletion of livestock. Tropical storms and rising sea levels are also damaging crops and property[8].

The agriculture sector exhibits a clear gender disparity, with men dominating the workforce. Labor force statistics highlight the significant imbalance in the participation of men and women. This unequal involvement is connected to gender-based inequalities, particularly in access to crucial resources such as land and credit within the sector. These disparities pose obstacles that render women and their families more susceptible to poverty.

In the Agriculture Sector, farming holds more significance for many women in the Caribbean than just a job. Women often engage in subsistence agriculture to support their families, while men are more inclined toward cash crop production. Notably, Barbados CGA indicates that a considerable number of small subsistence plots and the smallest farms in Barbados are owned by women. On the contrary, larger farms are predominantly owned by men, constituting close to 80% of all farms in Barbados (79.7%). It is crucial to highlight the role of the Association of Women in Agriculture as a pivotal stakeholder for this project.

The limited ownership of resources, such as land and formal work documentation, which could serve as collateral, creates barriers for women to access credit for agricultural purposes and other productive activities. Some women depend on male relatives with collateral to apply on their behalf, while others, particularly unmarried women, face challenges in accessing credit. Facilities designed to assist farmers in obtaining credit for enhancing irrigation or utilizing reclaimed water should be cognizant of these barriers that women often encounter when seeking formal financial support to upgrade their agricultural production.

4.1.5.2 Fisheries Sector

A case study conducted by the Gender in Fisheries Team and UWI Centre for Resource Management and Environmental Studies, as part of the 2014 Barbados Green Economy Scoping Study for the Government of Barbados (GOB), highlighted the significance of the fishing sector as a major water user. Any alterations in water quantity and quality could significantly impact the activities and value chain within the fisheries sector. Gender-related findings indicate that men typically dominate the harvest sector in Caribbean small-scale fisheries, whereas women play crucial roles in the post-harvest sector, including fish processing and trade, as well as in ancillary activities such as financing.

[7] Policy Brief. Gender Inequality and Climate Change and Disaster Risk in Barbados, UN Women ad United Nations Trust Fund for Human Security, July 2023.
[8] Policy Brief. Gender Inequality and Climate Change and Disaster Risk in Barbados, UN Women ad United Nations Trust Fund for Human Security, July 2023.

4.1.6 Gender equality in national parliament

As of 2022, women hold 26.7% of the seats in the national parliament in Barbados. (Figure 7) This metric, known as women in parliaments, signifies the percentage of parliamentary seats in a single or lower chamber that are occupied by women. Over the years, there has been a notable upward trajectory in the proportion of parliamentary seats held by women in Barbados, indicating progress in women's political representation.

Comparatively, despite the positive trend, the current rate falls below the average observed in high-income countries. This highlights both the advancements made and the continued challenges in achieving gender parity in political leadership within the specific context of Barbados. Analyzing factors contributing to this gap and exploring strategies to further enhance women's participation in political decision-making processes can be pivotal for fostering inclusive governance and strengthening democracy in the country. Ongoing efforts to address barriers and promote gender-sensitive policies may contribute to closing the gender representation gap in Barbados' national parliament.

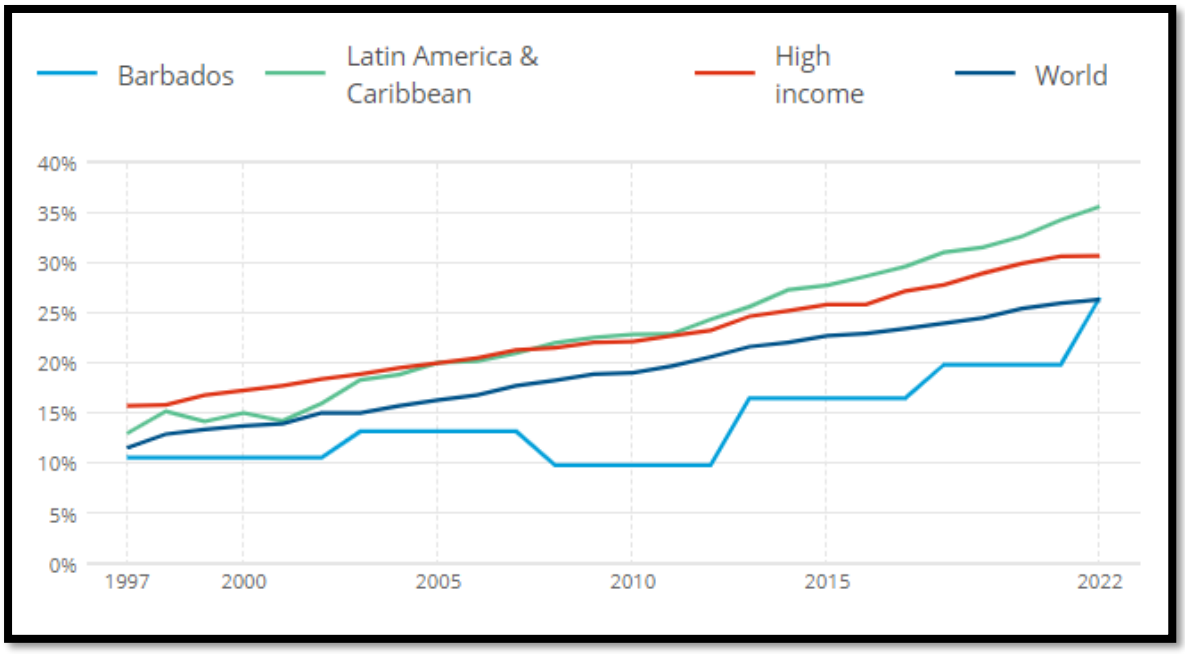


Figure 7 – Seats held by women in national parliaments, female (%) (The World Bank. Gender Data Portal).

Data regarding the involvement of women in the voting process, information obtained from the Report on the Barbados General Election, 2013- 2018, is presented in tables 4, 5 and 6.

Table 4 – Women Registered Voters over four national elections

Year	Number of Women Registered Voters	Number of Male Registered Voters	Proportion of Women Registered Voters	Total Registered Voters
2003	115,789	104,034	52,6%	220,093
2008	123,348	123,348	52,4%	235,510
2013	129,903	119,121	52,1%	249,024
2018	134,750	124,151	52,0%	258,901

Table 5 – Trends in voter turnout of women in national elections (2013-2018)

Year	Number of Women who voted	Proportion of Women who voted
2013	85,565	66%
2018	86,425	64%

Table 6 – Trends in women candidates over the past four national elections

Year	Number of Women	Proportion of Women
2003	9	14,5%
2008	10	14,5%
2013	12	17,6%
2018	37	27,6%

From the gathered information, it can be inferred that women registered to vote represent slightly more than half of the electorate. However, their participation in the total voting turnout was 66% in 2013 and 64% in 2018. In this regard, female participation at the time of voting is higher. Nevertheless, upon analyzing female candidates (Table 6), it is evident that while the participation of women in occupying positions has been increasing over the years, it was a quarter of the total candidates in 2018 and, as previously noted, 26.7% in 2022.

Table 7 – Select decision making positions by sex for 2021.

Positions	Total	Male		Female	
		No	%	No	%
Elected Members of Parliament	30	23	77%	7	23%
Members of Cabinet	26	19	73%	7	27%
Senators	21	13	62%	8	38%
Permanent Secretaries (2020)	27	8	30%	19	70%
Judges of High Court	14	7	50%	7	50%
Magistrates*	10	5	50%	5	50%
Judges of Appeal	5	3	60%	2	40%

Table 7 shows the decision-making positions by sex for 2021. A clear gender inequality is observed in political and executive roles, with a higher male representation in parliament, the cabinet, and the senate. However, in the judiciary, gender distribution is more balanced, especially among high court judges and magistrates. Only in the realm of permanent secretaries, women have a significantly higher presence compared to other positions analyzed. 70% of permanent secretaries are women, while 30% are men.

4.1.7 Gender equality in senior and middle management

A critical metric gauging autonomy in decision-making, women's participation currently hovers below the 26% mark, as reported by the World Economic Forum in 2023. Additionally, the data reveals that only 43.50% of firms boast female participation in ownership, underscoring the existing gender gap in the entrepreneurial landscape. Furthermore, a mere 25.40% of firms have women occupying top managerial positions, shedding light on the underrepresentation of women in key leadership roles within organizations. These highlight the pressing need for targeted initiatives to enhance women's involvement and leadership across various sectors, fostering a more inclusive and equitable landscape.

Finally, in 2019, women accounted for a noteworthy 47.7% of the workforce employed in senior and middle management positions in Barbados. This substantial representation places the female share of employment in this category within the highest quintile among all countries for which data is available.

This data underscores Barbados' commendable achievement in fostering gender diversity within the higher echelons of organizational management. The notable percentage of women in senior and middle management positions signifies progress in breaking down traditional gender barriers in the professional sphere.

As Barbados continues to outperform on the global scale in terms of gender representation in managerial roles, it sets a positive example for promoting inclusive workplace practices and women's empowerment. Ongoing initiatives and policies that support gender diversity in leadership positions can further solidify Barbados' standing as a beacon of progress in the realm of professional gender equality.

4.2 Gender equality indicators

Gender Equality Indicators refer to sixteen measures adopted by the United Nations to track progress made by member states towards achieving the goals of SDG 5. CARICOM has adopted a regional list comprisingthirty-three GEIs. This gender analysis applied some of the gender equality indicators adopted by the GOB from the CARICOM list of GEIs, as specified in table 8 below.

Table 8 – National list of Gender Equality Indicators Applied by category.

No	Category	CARICOM	CARICOM/NATIONAL INDICATOR
1	Economic Activity	Indicator 1 Indicator 8 Indicator 10 Indicator 11	• More of the persons in poverty are women • 15.7% of Barbados population lives in poverty • Poor women 21%, Poor men 13.96% Extreme poorwomen: 4.7%, Extreme poor men: 2.7% (Beuermann, 2017)
2	Education	Indicator 14	Barbados Population statistics: • 90.68% completed tertiary education • 93.4% completed primary education • 89.5% and 87.6% females and males respectively with at least secondary education (Allen et al. 2016) More women, 40 years and under have university education 50% of emigrants as against 30% of locals have university
3	Public Participation	Indicator 2 Indicator 29	Parliament has 30 seats. Women including the Prime Minister, holding 6 seats or 20% compared to 24 seats or 80% held by men.[12]
		Indicator 30	Head of State: Governor General is a woman.
		Indicator 31	The Cabinet comprises nineteen (19) or (73%) men and seven (7) or 27% women[13]

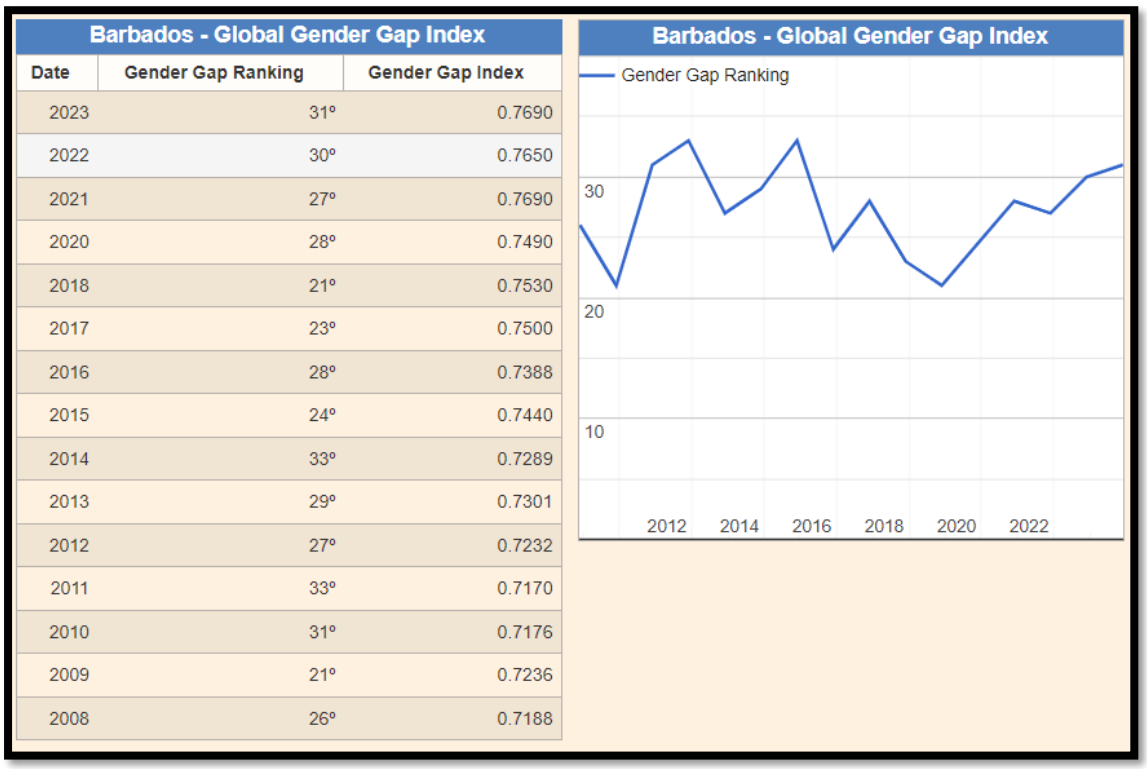
The Global Gender Gap Index from the World Economic Forum was first introduced in 2006 to measure the extent of the gap between women and men in terms of health, education, economy, and political indicators. It is used to understand the extent to which resources and opportunities are distributed fairly between men and women in the 142 countries it analyzes, allowing for comparisons.

In the latest report, Iceland is in first place, followed by Finland and Norway, which are the countries with the smallest gender differences. At the bottom of the ranking are Afghanistan, the country with the largest gender gap, followed by Pakistan and the Democratic Republic of the Congo.

Specifically, the Gender Gap Index analyzes the following areas:

- Economic participation and opportunity: salaries, participation, and highly skilled employment
- Education: access to basic and higher education levels
- Political participation: representation in decision-making structures
- Health and survival: life expectancy and male-female ratio

Barbados has a gender gap of 76.9%. With this percentage, Barbados ranks 31st in the global ranking out of 146 countries (Figure 8). The differences between men and women are not significant when compared to the rest of the analyzed countries. In Barbados, the disparities between men and women have decreased compared to the previous year, as seen in the following figure.



Barbados - Global Gender Gap Index

Date	Gender Gap Ranking	Gender Gap Index
2023	31º	0.7690
2022	30º	0.7650
2021	27º	0.7690
2020	28º	0.7490
2018	21º	0.7530
2017	23º	0.7500
2016	28º	0.7388
2015	24º	0.7440
2014	33º	0.7289
2013	29º	0.7301
2012	27º	0.7232
2011	33º	0.7170
2010	31º	0.7176
2009	21º	0.7236
2008	26º	0.7188

Figure 8 – Barbados global gender gap index (2008-2023). (Source: Country Economy Portal Data, 2023)

4.3 Gender Equality and Diversity

This report examines gender equality from a broad perspective which embraces the human rights of all citizens in Barbados.

It addresses equality among men, women, and the LGBTQ+ community, and diverse population groups including PwD to avoid discrimination in the society regardless of gender identity and diversity. It is important to address gender equality from this perspective to bring parity between genders and persons of LGBTQ+ orientation thereby, respecting their rights as humans. The ILO has taken initiatives to address issues relating to women and LGBTQ+ on the sex-based discrimination by advancing the rights of low-waged women and families of the LGBTQ+ community. Much has been achieved in terms of human rights of women and people of LGBTQ+ community. Also, a case can be made for the inclusion of women and social minorities in the gender equality debate. Johnson (2019) argues that gender equality, gender management, and gender mainstreaming approaches often neglect most problems encountered by individuals from the LGBTQ+ community and women of color. Achieving gender equality requires a framework that incorporates vulnerable groups, such as LGBTQ+, into projects without discrimination.

In that line of thought, in May 2023, USAID, in collaboration with UWI and UNDP, conducted a national LGBTQ+ Survey. The National LGBTQ+ Survey, including qualitative components like interviews and desk research, highlights persistent social exclusion, stigmatization, and discrimination experienced by some LGBTQ+ individuals in Barbados. The survey focuses on eight thematic areas: Citizen Security, Education, Employment, Health, Housing, Violence, Justice, and Political Participation. Results indicate discrimination in workplaces and educational institutions, with respondents often concealing their sexual orientation and gender identity to avoid discrimination. The study reveals instances of violence, impacting mental health, with high rates of suicidal ideation.

The report emphasizes the influence of intersecting identities, socio-economic status, and support systems on individuals' experiences of exclusion. While recognizing socio-legal changes, the study recommends ongoing collaboration between LGBTQ+ organizations, research institutions, and development partners for updated and reliable data. Specific recommendations include sensitization activities for teachers, policies against bullying, comprehensive sexuality education, workplace harassment prevention policies, legal reforms, and inclusive housing initiatives. Health-related suggestions involve ongoing sensitization for healthcare providers, mental health support teams in schools, and training for medical students on LGBTQ+ issues.

Additionally, the report identifies the need for further research on intersex people, transgender individuals, and elderly LGBTQ+ individuals. The recommendations aim to enhance inclusivity, raise awareness, and address legal and policy gaps, fostering a more tolerant and supportive environment for the LGBTQ+ community in Barbados.

A significant percentage of gay and lesbian adults face some form of discrimination especially on the job although it is argued that there has been progress over the last two decades legally. However, the LGBTQ+ community still experience gender bias in Barbados. For example, LGBTQ+ persons currently do not have the same rights as non- LGBTQ+ people. Intimate acts performed by LGBTQ+ persons in Barbados are still considered to be illegal and there is a penalty where the maximum sentence is life imprisonment although it is not enforced. The Barbados Today Newspaper, (2014) reported that stigma and discrimination manifest in various forms, including property damage, ostracism, and verbal abuse from both strangers and family members. It encompasses unjustifiable denial of employment and housing, as well as rejection and abandonment by family, friends, and society at large.

Every effort is made to advance the cause of all vulnerable groups of all genders, to avoid any form of discrimination and ensure that everyone’s needs are adequately addressed in the Project cycle.

4.4 Sexual and Gender Based Violence

Studies conducted by the Bureau of Gender Affairs/Caribbean Development Research Services in 2009, reveal that there is a 27% prevalence of violence among adult women in the region. Patriarchal gender norms are frequently used to justify acts of violence against women who deviate from societal expectations within the confines of the private, domestic sphere. These norms reinforce male dominance over the bodies of women and girls, claiming entitlement to sexual gratification and providing a rationale for sexual violence. Furthermore, a study on interpersonal violence in three Caribbean countries—Barbados, Jamaica, and Trinidad and Tobago—underscored that violent acts are predominantly committed by a partner within a relationship (59.0% on male victims and 66.7% on female victims). Notably, the study found that violence levels decreased with the age of victims, falling from 72.4% among 15–18-year-olds to 67.3% among 27–30-year-olds. Incidents of physical violence and sexual coercion also decreased with age. Reported physical violence decrease from 66.2% among the 15–18-yearolds to 49.0% among the 27–30-year-old, while reported sexual coercion fell from 60.328% among the 15–18-year-olds to 50.1% among the 27–30-year-olds.

For Barbados, of survey respondents 50.0% of women compared to 44.7% of men revealed experience of physical aggression within an intimate partner relationship. Similarly, 52.8% of women and 39.6% of men reported sexual coercion in Barbados. Reports of Domestic Violence across the Organization of Eastern Caribbean States increased during the COVID-19 lockdown. The UN Women identifies that Barbados, in particular, experienced an approximately 38 per cent increase in reported cases of domestic violence, many of which were intimate partner violence.

While Gender-Based Violence is more prevalent in intimate partner settings, it is also notably present in public spaces. However, there is limited information and no comprehensive study on Sexual and Gender-Based Violence in the workplace in the Caribbean, specifically in Barbados. The International Finance Corporation (IFC) highlights that 30%-50% of women in Latin America and the Caribbean have experienced sexual harassment at work. On a positive note, Barbados, along with Belize and the Bahamas, has specific legislation addressing sexual harassment.

The Family Conflict Intervention Unit (FCIU) of the Barbados Police Service operates with a commitment to confidentiality while engaging with both perpetrators and victims of domestic violence, as well as the broader community, to raise awareness about the issue. The FCIU has observed that the issuance of emergency protection orders and warnings to perpetrators has contributed to an increased perception of the issue's seriousness. The following table presents specific statistics gathered by the FCIU concerning victims and perpetrators of domestic violence, with a focus on the year 2020:

Table 9 – Woman aged 15-49 Subjected to Physical Violence (July 202-Juli 2021)

Type of physical violence	Number
Women aged 15-49 years subjected to physical violence by an intimate partner	138
Women aged 15-49 years subjected to physical violence by other	37
Women aged 15-49 years subjected to sexual violence by an intimate partner	6
Women aged 15-49 years subjected to sexual violence by other	5

Table 10 – Relationship status within domestic violence reported cases.

Month	Husband/ Wife	Boyfriend /Girlfriend	Separated	Same Sex	Relative	Total
January	1	11	16	1	• 6	35
February	3	7	11	0	8	29
March	2	7	11	0	4	24
April	1	4	5	0	12	22
May	2	17	10	0	21	50
June	2	1	6	0	10	19
July	2	11	10	0	21	44
August	5	9	13	1	18	46
September	1	4	11	0	12	28
October	3	66	10	0	14	33
November	22	10	13	0	13	38
December	1	9	8	0	16	34
Total	25	96	124	2	155	402

Table 11 – Sex of Suspected Aggressors within domestic violence reported cases.

Month	Male	Female	Total
January	32	2	34
February	28	1	29
March	24	0	24
April	19	3	22
May	46	3	49
June	18	1	19
July	39	5	44
August	41	5	46
September	24	4	28
October	30	3	33

Month	Male	Female	Total
November	25	3	28
December	28	5	33
Total	354	35	389

Table 12 – Sex of Suspected Victims within domestic violence reported cases.

Month	Male	Female	Total
January	2	33	25
February	3	27	30
March	1	23	24
April	3	19	22
May	11	41	52
June	15	36	51
July	13	31	44
August	10	36	46
September	9	20	29
October	7	26	33
November	8	30	38
December	8	24	32
Total	90	346	436

The data presented in Tables 11 and 12 indicates that women are predominantly affected by gender-based violence, while men are identified as the primary perpetrators of such acts. Recognizing the importance of involving men and boys in the effort against gender-based violence, the Bureau of Gender Affairs has implemented a Masculinity program. One aspect of this program involves collaboration with young males from secondary schools across the island. In recent years, the Bureau conducted workshops addressing gender-based violence and its connection to masculinity. These workshops included students from the Lester Vaughn Secondary School, the Parkinson Memorial Secondary School, and, most recently in 2021, students from the Princess Margaret Secondary School via a virtual platform.

The Government of Barbados aims not only to address the victims of gender-based and domestic violence but also provides support and counseling for perpetrators through the Partnership for Peace

program. Launched in 2012 within the Ministry of Social Care, this psycho-educational program exposes perpetrators to various topics with the goal of promoting non-violent behavior. Since its initiation, around 120 males have participated in the program, with many expressing positive outcomes. The program has now been transferred to the Bureau of Gender Affairs, where ongoing efforts are being made to commence the first cohort of applicants in the coming months.

Additionally, the Government of Barbados has taken steps to combat gender-based violence by establishing a National Committee on Gender-Based Violence. This committee comprises several government and non-governmental agencies with a mandate to develop a national action plan against gender-based violence.

Efforts to address gender-based violence in the workplace have also been initiated. The Ministry of Labor, Social Security, and the Third Sector launched the gender-based violence in the workplace initiative.

In addition to the Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW), Barbados has ratified key international and regional human rights instruments related to gender equality, including the Inter-American Convention on the Prevention, Punishment, and Eradication of Violence against Women. Amendments to domestic violence laws in 2016 expanded powers to the police, revised definitions of domestic violence forms, and addressed electronic means to perpetuate violence. The Employment Sexual Harassment (Prevention) Act, passed in 2017, provides a platform for complaints about workplace harassment.

The prevalence of violence against women, especially young women and girls, necessitates a cautious approach in implementing community-based interventions under the Project. The Barbados Water Authority (BWA) acknowledges the potential risks arising from infrastructure works within communities. This projects, while bringing social transformation, may exacerbate existing risks of Sexual and Gender-Based Violence (SGBV). Addressing SGBV, including exploitation and harassment, in infrastructure projects is crucial, as construction sites can become spaces where female workers, individuals with diverse gender identities, and those living or working in the vicinity may be victimized. Preventing SGBV is essential to ensure the well-being of vulnerable groups in the project vicinity. If left unaddressed, sexual and gender-based violence can easily be overlooked. Women working in traditionally male-dominated contexts, isolated workspaces, or occupations where they constitute a small minority may face an increased risk of SGBV.

4.5 Gender Equality and Climate Change

Barbados, like most Caribbean countries, has a high risk of vulnerability. Most of the population is concentrated within an urban corridor that lies within 2 km of the shore and below 25 meters in elevation. The areas of high population density, critical infrastructure and supporting industries are particularly at-risk and vulnerable to storm surges, sea level rise, increased tropical storm and hurricane intensity, as well as flooding and drought. Climate models project a warmer and drier Caribbean, leading to potential water scarcity. The most vulnerable are low-income families who have fewer choices in the housing market and are more likely to live in environmental danger zones. Vulnerable groups impacted by climate and disaster risks in the country include working class men and women, youth, single mothers, adolescent mother, the elderly and persons with disabilities.

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Research consistently emphasizes the disproportionate vulnerability of women to climate change effects, especially in rural areas where dependence on local natural resources is high. Recognizing women as both vulnerable to climate change and effective agents of change in mitigation and adaptation is crucial to plan Gender-sensitive strategies are to address environmental and humanitarian crises induced by climate change.

Numerous studies support the assertion that gender inequity exacerbates the impacts of climate change. Involving more women and LGBTQ+ persons in climate change responses is seen as pivotal to global efforts. Gender and diversity inequalities traduce to limited adaptation abilities, affecting access to services, decision-making, and asset control.

Women are further limited by gender norms, roles, and biases across the ecology of Caribbean countries. For women, their role as caregivers and homemakers can be challenged by effects of climate change on availability of food and water and fuel scarcity. These may force women to spend more time trying to access these resources and thereby affects their expected roles as homemakers and breadwinners. Such challenges increase stress and tension within the home and can subsequently lead to manifestations of gender-based violence. Loss of income and resources due to climatic events may also lead to sexual and domestic violence against partners or children.

Climatic events exert profound and enduring impacts on the impoverished and vulnerable segments of society, those least equipped to withstand the severe consequences. The Economic Commission for Latin America and the Caribbean (ECLAC) has issued technical reports highlighting the environmental vulnerability of Caribbean Small Island Developing States (SIDS), with a specific focus on Barbados. ECLAC's stance asserts that vulnerability is, to a certain extent, shaped by gender dynamics.

Barbadian strategies aimed at tackling climate change recognize the imperative to assist the poor and disadvantaged, individuals lacking adequate resources or safeguards against climate-induced shocks. However, these strategies fall short of explicitly outlining measures to systematically and sectorally advance gender equality concerning climate change issues.

Poverty data specific to Barbados underscores a notable gender dimension, with a higher percentage of women being both represented and impacted within the impoverished and vulnerable groups. The Caribbean Development Bank's Gender Assessment Report for Barbados reveals a substantial poverty rate among female-headed households, with 19.4% falling below the poverty line. In comparison, 11.5% of male-headed households and 15% of all households experience poverty, as documented in the report by Baksh & Associates (2016). This data emphasizes the disproportionate economic challenges faced by women in Barbados, particularly those heading households.

The IUCN believes that it is possible to strengthen climate action by promoting gender equality. They argue that since women and men have different experiences with climate change, persistent gender inequalities worldwide will hinder communities' ability to adapt. The IUCN suggests that acknowledging and appreciating women's vital contributions in roles like decision-makers, stakeholders, educators, caregivers, and experts can lead to effective and long-lasting solutions to climate change. They also point out that women have been at the forefront, leading the way towards fairer and more sustainable approaches to climate challenges.

Gender Assessment of the 3R-CReWs project (2022) mentions some effects of climate change on gender issues in the Caribbean, as shown in Figure 9.

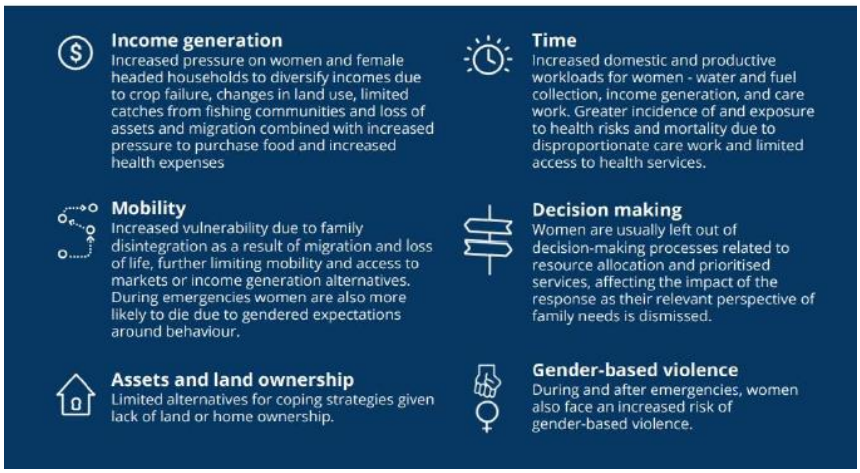

Figure 9 – Gendered Impact of Climate Change in the Caribbean. (Gender Assessment 3R-CReWs, 2022)

4.5.1 Gender Responsive Disaster Preparedness and Recovery in the Caribbean

The Global Facility for Disaster Reduction and Recovery (GFDRR) of the World Bank, in collaboration with the Caribbean Resilience Facility (CRF), conducted a comprehensive desk review on Gender Responsive Disaster Preparedness and Recovery in the Caribbean. The primary findings of this review are as follows:

- Women in the CRF countries encounter diverse gaps in accessing health services, social protection, vocational and technical education, productive resources, economic opportunities, and avenues for voice and agency. These disparities are intricately linked to their heightened vulnerability to disasters and climate change hazards.
- While indicators for educational attainment, measured in terms of the number of years of education, are nearly identical for men and women in CRF countries, a notable gender gap persists in technical and vocational programs. This gap could impede women from enhancing their access to income-earning opportunities, especially in the recovery and reconstruction phases in post-disaster settings.
- Substantial evidence indicates that in resource-poor nations, women become more susceptible to reproductive and sexual health problems during disasters. This underscores the imperative to incorporate women's health as a critical component of disaster relief programs.
- An examination of social indicators in CRF countries reveals various gender gaps in social protection, rendering women more vulnerable to disaster impacts due to their inferior safety nets compared to men.
- Women's domestic responsibilities and their primary role in ensuring their families' well-being restrict their economic opportunities and intensify burdens imposed on them in disaster situations.
- Higher unemployment rates, limited access to economic opportunities, lower wages, vulnerable employment, and inadequate social support systems for domestic workers contribute to women's restricted access to safety nets compared to men, exacerbating their vulnerability in disaster situations.
- Although precise statistics on the number of women in Disaster Risk Management (DRM) and climate change-related decision-making positions are unavailable, a general trend, based on

the representation of women in national parliaments and ministerial/managerial positions, indicates significant gender gaps in decision-making roles.

- Country reports from CRF countries provide evidence of persistent violence due to insufficient protection measures for Gender-Based Violence (GBV) victims, limited responsive care, treatment, psychosocial support, and other essential services. Importantly, this trend intensifies during disasters and in post-disaster settings.
- There is a prevailing lack of focus on analyzing the vulnerability and capacity of men and boys, coupled with limited efforts to effectively engage them as allies in achieving gender equality in disaster preparedness and recovery.

4.6 Water Reclamation and Gender

4.6.1 Gender and access to water

When access to water is limited or nonexistent, women are the main ones in charge of looking for it and bringing it home (72% women and girls compared to 28% men and boys worldwide), both for family consumption and to fulfill their obligations, housework, and care[9]. A case study conducted by Bobb (2019) outlines the difficulties faced by individuals of different genders in accessing clean water. The study emphasizes that access to water is crucial for overall quality of life and has distinct impacts on men and women. The case specifically focuses on Wendy, a 34-year-old married mother of two residing in St. John, Barbados. Wendy's household, for a significant portion of the year, consists only of her and her two children, as her husband, Bernard, works abroad in the farm labor program, contributing financially to the household.

In essence, the case study (Bobb, 2019) reveals that Wendy dedicates a minimum of thirty-two hours per week to paid work and twice that amount to unpaid domestic responsibilities, including cooking, washing, gardening, childcare, and managing animals, as well as fetching and storing water for domestic use. In contrast, men spend around forty hours a week on paid work but invest significantly less time in unpaid domestic chores. While this case study may not fully represent the situation across all of Barbados, it does underscore a prevalent pattern in the country. Several studies in Barbados have indicated that women, often single parents, engage in income-generating activities in both formal and informal sectors, while also shouldering most unpaid caregiving responsibilities.

Moreover, worldwide, about 300 million women and girls menstruate daily. The lack of access to a clean and safe toilet affects the proper management of menstruation, limiting the participation of adolescents and girls in educational and social spaces. Statistics in LAC indicate that the educational levels completed by girls at the primary and secondary levels are related to access to piped water, hygienic services, and sewage. This situation is even more difficult when it comes to people with disabilities since it deepens their isolation and the situation of poverty.Analyzing non potable water generation, distribution and re-use, the overall implication of the available body of work suggests that sustainable aquifer yields could decrease by around 50% by 2050. Approximately 57 Mm3/yr is extracted from groundwater resources for domestic potable water distribution and an estimated 11

[99] Monje. Andrea; Nunez, Anamaria y Subuza, Dolores (2016), *¿Tiene genero el agua?* Inter-American Development Bank.

Mm3/yr is extracted for agricultural irrigation. The exact amount of water extracted by agriculture is much higher as most points of extraction are un-metered private wells.

A study on Non-Potable Water Generation, Distribution and Re-use: Analysis of Alternatives, which was published in May 2021. The study identified that wastewater that is not safe for drinking but can be recycled or reclaimed for specific non-potable purposes. The study examined three forms of non-potable water namely; a) stormwater which is water from precipitation such as rain; b) greywater which is wastewater generated in households or office buildings from sinks, showers, baths, washing machines or dishwashers. It is easy to treat and reuse greywater for the purposes of flushing toilets, landscaping, crop irrigation and other non-potable uses; and c) blackwater which is wastewater generated from toilets and contains pathogens such as feces, urine water and toilet paper from flushed toilets. The paper identified at least three ways to tackle the issue of water scarcity such as; a) increase water rates, to encourage less water wastage; b) offer subsidies to deprived and vulnerable groups of the society; and c) promote collaboration between public and private sectors to develop innovative public-private partnership project models for the generation of water.

The present project should increase the water supply and consequently minimize the negative impact of climate change on women and vulnerable groups with respect to social and economic issues. Therefore, Women and other vulnerable groups stand to benefit from the recycling and reuse of reclaimed water because this will be contributing to a reduction in water scarcity and make more quantities of water available to women as the larger consumers of water domestically.

While the potential benefit to women and vulnerable groups is noted, it is also important to note the financial, informational, and unpaid work barriers that may impede women heads of households and women led enterprises, including those in agriculture from benefiting equally from access to reclaimed water. Strategies, Operational plans and policies must equally consider these barriers to sustained access to services by vulnerable groups.

Although water reclamation is not always at the top of the agenda when discussing gender issues, women are more likely to be affected by lack of water treatment, reuse, and poor management than men because they are more in direct contact with food, feces, childcare, and healthcare.

4.6.2 Sex- disaggregated data of water and sanitation

The water sector faces additional gender-related challenges, particularly concerning the lack of adequate sex-disaggregated data. This deficiency is observed both nationally and internationally, highlighting a significant gap in sex-specific data related to water and sanitation. The Beijing Declaration, dating back to 1995, urged international organizations, NGOs, and the private sector to establish "gender-sensitive databases, information, and monitoring systems" to understand the impact of environmental degradation on women, including issues like unsustainable production, consumption patterns, drought, poor water quality, global warming, desertification, and sea-level rise. This absence of data results in service delivery gaps and hinders the achievement of equitable access to water and sanitation services.

This data gap became apparent during the development of the Gender Assessment. Based on the roles played by men and women and the resources available to them, the analysis suggests that, within the domestic sphere, the availability of affordable reclaimed wastewater could benefit women in fulfilling their caregiving roles. It might also alleviate the burden of their dual responsibilities as both breadwinners and caregivers. However, the scarcity of research and data specific to the wastewater

sector, especially the lack of sex-disaggregated data, poses a challenge in presenting robust evidence-based actions.

4.6.3 Social implications of enhancing Water Systems

The project is poised to bring about numerous positive impacts on society, particularly in enhancing health conditions, with a focus on benefiting women and other vulnerable groups. By offering farmers the opportunity to utilize nutrient-rich reclaimed water as fertilizer for irrigation, operational costs for farmers of all genders could be significantly reduced. Additionally, if the reclaimed water is employed to replenish the aquifer, it would contribute to enhanced water reliability for the entire population, thereby benefiting businesses, residents, and tourists alike. This strategic use of reclaimed water offers farmers a more dependable water source, especially crucial during periods of drought when well water levels are often adversely affected.

Beyond these environmental advantages, the project carries substantial social benefits, including the generation of short-term employment opportunities during the preparatory and construction phases. Furthermore, it provides a platform for the integration of gender considerations across all adaptation and mitigation initiatives, fostering long-term partnerships among stakeholders. The initiative also presents an opportunity for enhancing capacity building and research to inform climate action, alongside training opportunities for employees of the Barbados Water Authority (BWA). Women stand to gain significant inclusion in the project's implementation, addressing issues of particular concern to them.

To maximize the positive impact, it is recommended to engage in proactive public education efforts, such as inviting schools and other community groups to visit the project site and gain firsthand knowledge of its positive activities. It is imperative to ensure that the project is conducted without discrimination, and effective communication strategies should be implemented to counteract potential negative media coverage that could adversely affect project outcomes.

5 Gender Action Plan

5.1 Introduction

Based on the results of the assessment, the Gender Action Plan presented in this section identifies gender-sensitive actions which shall be adopted and mainstreamed when the activities included in the funding proposal are implemented. Specific indicators to measure and follow-up on these actions are also proposed.

The Barbados Water Resilience Project is an initiative poised to enhance the nation's water security, mitigate climate change impacts, and fortify environmental and public health conditions. In line with the project's overarching objectives, this Gender Action Plan is a strategic framework designed to ensure that the benefits and outcomes of the project are inclusive, equitable, and responsive to the diverse needs of all individuals within the community.

Recognizing that gender equality and social inclusion are pivotal for sustainable development, this plan addresses the multifaceted dimensions of gender and diversity throughout the project's components. The project is examined through a gender lens to amplify positive impacts, foster inclusivity, and empower marginalized groups. Through this approach, the plan seeks to elevate women's participation, address gender disparities, and create an enabling environment for marginalized groups, thereby contributing to the resilience and sustainability of the Barbados Water Resilience Project.

By emphasizing gender-responsive and social inclusion policies, inclusive practices, and targeted initiatives, this Gender Action Plan is positioned to drive transformative change. It aligns with global sustainable development goals, regional frameworks, and Barbados' national policies to forge a path towards a more equitable and resilient water management system. This Gender Action Plan sets the stage for an integrated approach to mainstream gender and diversity considerations at every stage of the project, ensuring that the benefits of water reclamation are realized by all members of the community.

5.2 GAP Expected Impact

The goal of this Gender Action Plan is to enhance gender equality and social inclusion throughout the components of the Barbados Water Resilience Project, contributing to increased water resilience, improved environmental conditions, and strengthened sector institutions. Additionally, this Plan seeks to improve the quality of life for the general population and vulnerable residents, especially women and diverse population groups of Barbados.

5.3 Outcomes

The expected outcome of the GAP is to achieve gender-responsive, socially equitable, and sustainable water resource management in Barbados, with a focus on promoting equal opportunities, reducing water insecurity, and enhancing environmental and public health conditions.

The expected outcomes are divided by project stage and program component, as described below.

Each of the outcomes assigned to the components is related to an output, specified in the table that follows, section 6.4.

5.3.1 Project Stages

5.3.1.1 Project Initiation Stage

- Mainstreaming gender and diversity analysis is made.
- Goals, assumptions, priorities, roles and responsibilities, schedule, deadlines, and risks of the Project are analyzed within a gender and diversity perspective.
- Specific gender and diversity consultations ensure that key stakeholders, including representative groups of women and diverse groups .
- The team in charge of project planning is gender-balanced and considers social inclusion.

5.3.1.2 Implementation Stage

- Gender equality and social inclusion in the management and governance structures are promoted.
- Sensitive stakeholder consultations are made. Women's groups and other diverse groups actively participate in consultations.
- Consultations keep stakeholders engaged, ensure ongoing communication, address concerns, and assess the project's effectiveness and impacts.
- The hiring of personnel is conducted with a gender and diversity perspective.
- Gender sensitivity training is delivered.

5.3.1.3 Monitoring and Evaluation Stage

- Gender and social inclusion sensitivity practices of the Project are overseen, guided and coordinated by a gender and diversity focal point with support of the M&E Specialist, ensuring that the project has a gender and diversity perspective and enhance gender equality, women's empowerment, and social inclusion.

5.3.1.4 Project Closure Stage

- Men and women equally participated in project-related training programs.
- Men and woman have equally access to and benefits from reclaimed water resources.

5.3.2 Project Components

5.3.2.1 Water Reclamation Infrastructure

- Successful construction and operation of New South Coast Water Reclamation and Re-Use Facility (SCWRRF).
- Upgrade of Existing South Coast Sewage Treatment Plant (SCSTP)
- Environmental standards and energy- efficient technologies incorporation.

Outputs: 1, 2, 3, 5

5.3.2.2 Reclaimed Water Reuse

- Agriculture Reuse of Reclaimed Water Pipeline
- Aquifer Recharge Infrastructure finished
- Enhanced water reuse for agriculture, reducing water insecurity and promoting aquifer recharge with low carbon emissions.

Outputs: 1, 2, 3, 5

5.3.2.3 Graeme Hall Swamp Conservation

- Environmental Studies and Monitoring Plan Implementation
- Improved environmental conditions and biodiversity protection in the Swamp area.

Outputs: 1, 2, 3, 4

5.3.2.4 Institutional Strengthening

- Governance and Managerial Capacity Improved
- Institutional Gender and Action Plan Implemented

Outputs: 1, 2, 3, 4, 6

5.4 Outputs, Activities, Indicators and Targets, Timeline, Responsibilities, and Estimated Cost

ACTIVITIES	INDICATORS AND TARGETS	TIMELINE	RESPONSI-BILITIES	COST
1. Develop and implement a Gender and Diversity Assessment and Action Plan for BWA				
Develop and implement a Gender and Diversity Assessment and Action Plan for BWA to promote the equal participation of women, men, and diverse populations including PwD, at all levels of the organization[10]	Gender and Diversity Assessment and Action Plan developed (Y/N) **Target**: Y Internal policy aimed at promoting the participation of PwD within the institution approved (Y/N) **Target**: Y Number of staff members that participate in capacity building activities and internship programs (disaggregated by sex and diverse groups) **Target**: 50% female and diverse employees trained Number of new staff and consultants	Complete by Year 1[11] (Gender and Diversity Assessment and Action Plan) At the end of the project (for all other indicators)	BWA, Gender and Diversity Focal Point, Consultant	50,000
a) Hire a consultant to conduct the Gender Assessment and design the Action Plan, and recruit and train a gender and diversity focal point[12] within BWA to follow up the implementation of the Action Plan				
b) Conduct a diagnosis of gaps and barriers that could be limiting the equal participation of women and diverse populations at the technical, operational, and administrative levels within BWA				
c) Conduct a diagnosis of opportunities including gender and diversity perspectives, for the attraction, hiring, and retention of personnel and promotion of professional development at a technical, operational, and administrative level within the institution[13]				
d) Ensure alignment of project activities with international, regional, and national gender and social inclusion frameworks				
e) Develop an internal policy aimed at promoting the participation of PwD within the institution				
f) Design and implementation of a leadership training program aimed specifically at women and diverse groups that includes mentoring plans and development of leadership and team management skills,				

[10] The development of the gender assessment during the first year of implementation will include activities such as: (i) analyzing and addressing the barriers that could be limiting the equal participation of women and men at the technical, operational, and administrative levels within BWA; (ii) identifying opportunities to include women and persons with disabilities and other marginalized groups in attracting, hiring, retaining personnel, and promoting professional development within the institution. To conduct this activity, the Focused Gender and Disability (G&D) Analysis tool from **AquaRating®**, developed by the IDB will be applied; (iii) identifying training needs specifically targeted at women and marginalized groups.; (iv) analyzing the participation and roles of women and underrepresented groups within BWA; (v) assessing the extent to which the concepts of universal accessibility are being met at BWA headquarters.

[11] The Gender and Diversity Assessment and Action Plan is expected to be finalized by the end of the first year. On semi-annual basis, the implementation of the Action Plan will be monitored.

[12] A consultant specializing in Gender and Diversity will conduct a comprehensive gender assessment and develop a Gender Action Plan for BWA during the first year of implementation. The consultant will also recruit and train a Gender and Diversity Focal Point within BWA, who will become part of the BWA staff. This Focal Point, a G&D specialist, will ensure gender mainstreaming, oversee stakeholder-related activities, and report on gender and diversity progress. Additional staff may be assigned if needed within BWA to provide support to the G&D specialist. Key results related to gender and diversity will be also monitored through the Monitoring and Evaluation Plan - with support of the M&E Specialist - and assessed during the mid-term and final evaluations.

[13] To carry out this activity, the **AquaRating®** Gender and Disability Focused Analysis tool could be used, developed by the IDB to support this type of study.

to increase participation in the decision-making[14]	hired. (disaggregated by sex and diverse groups) **Target**: 40% female and diverse employees hired Number of women in managerial, technical, and operational positions **Target**: Increase in 20% the women's participation in technical, operational, and managerial positions			
g) Develop and implement internship programs for women and diverse groups				
h) Promote of gender parity in leadership, technical, and operational positions				
i) Design and develop a gender sensitivity training program for employees of the BWA				
j) Promote the participation of BWA employees in forums and initiatives addressing gender equality and diversity in water management organized by national and international institutions				
k) Provide training on gender-sensitive and inclusion approaches to project staff, fostering an understanding of the differential impacts of water management on women and diverse groups				
l) Follow up the implementation of the Gender and Diversity Action Plan				
m) Regularly update and expand training to include emerging gender and diversity concerns and best practices.				
2. Formulate an institutional gender policy to drive a partnership between BWA and UWI IGDS and expand the training offering[15]				
Formulate an institutional gender policy to drive a partnership between BWA and the University of the West Indies, Institute for Gender and Development Studies (UWI IGDS) for conducting gender and infrastructure training in Barbados	Partnership between BWA and UWI IGDS approved (Y/N) **Target**: Y Number of staff members that participate in capacity building activities (disaggregated by sex and diverse groups) **Target**: 50% female and diverse employees trained	Complete by Year 1 (Partnership between BWA and UWI IGDS) By the end of the Project (for all other indicators)	BWA, Gender and Diversity Focal Point, Consultant	10,000
a) Employ graduates from UWI IGDS (or M.S. and Ph.D. students) to support the gender objectives of the project through their research work				
b) Provide training offerings of the Caribbean Institute in Gender and Development (CIGAD) by incorporating gender and infrastructure courses into the curriculum (water and sanitation, solid waste, energy, and transportation, among others)				
3. Conduct specific consultations on gender and diversity aspects				

[14] The Project will seek to increase women's voices by encouraging their participation at decision-making, ensuring they have the technical competence to contribute meaningfully to decision making and are empowered to do so. The Project will also aim for parity in the number of individuals trained where women will be strongly encouraged to participate in the technical and leadership training programs thereby addressing the decision-making gap for women. Gender sensitivity training programs will be designed and delivered as well.

[15] This activity may consider the following: (i) consider employing graduates from UWI IGDS (or M.S. and Ph.D. students) so they can support the gender objectives of the project through their research work. These personnel could also assist in producing educational materials for use in training sessions to promote the recognition and incorporation of gender and inclusion perspectives in development projects; (ii) expand the training offerings of CIGAD by incorporating gender and infrastructure courses into the curriculum (water and sanitation, solid waste, energy, and transportation, among others). The aim would be to educate personnel sensitized to gender issues, equality, and inclusion, capable of integrating these concepts into the design of development programs and projects, as well as proposing programs to promote the participation of women and persons with disabilities (PwD) in decision-making spaces.

Conduct specific consultations on gender and diversity, so that the rights of women and men and the different knowledge, needs, roles, and interests of women, men, and diverse groups are recognized and addressed[16]	Number of consultations held with stakeholders **Target**: 2 per year Number of males and females participating in the meetings **Target**: 50% females Grievance Redress Mechanism implemented (Y/N) **Target**: Y	Complete by the end of the project Complete by Year 1 (GRM)	BWA, Gender and Diversity Focal Point, Consultant	10,000
a) Develop a gender-sensitive mapping of actors, including representatives from the public and private sector, NGOs, and Civil Society Organizations including representatives of women, LGBTQ+, PwD, and local communities.				
b) Conduct preliminary meetings with key stakeholders to become familiar with the existing social and gender issues in the project's area of influence. This includes Collaboration with local NGOs and community leaders for grassroots feedback.				
c) Convene gender-informed stakeholder consultations to inform and solicit input from key actors.				
d) Develop and implement a grievance redress mechanism with a gender and diversity focus to address cases of harassment and gender-based violence				
4. Develop and implement communication programs for public promotion of the project, the benefits of wastewater reuse and the construction of community support				
Develop and implement communication programs for public promotion of the project, the benefits of wastewater reuse, and the construction of community support, with considerations of gender and diversity, especially people with disabilities	Communication programs developed (Y/N) **Target**: Y Number of public awareness campaigns made **Target**: 3	Complete by the end of the project	BWA, Gender and Diversity Focal Point, Consultant	15,000
a) Develop the communication program with a gender-sensitive strategy.				
b) Design and implement public awareness campaigns that highlight the gender and diversity dimensions of the project objectives.				

[16] Specific consultations to address gender and diversity aspects are planned throughout the entire project life. During the first year of implementation, key stakeholders committed to gender and social inclusion will be consulted as part of the comprehensive gender assessment and action plan for BWA. Any updates to the Gender Action Plan based on these consultations will be submitted within this first year. Additional consultations will be conducted continuously to keep stakeholders engaged, ensure ongoing communication, address concerns, and assess the project's effectiveness and impacts. During consultations, a gender and disability approach will be integrated through the following measures: (i) identifying and engaging organizations from the public and private sectors, NGOs, and/or CSOs committed to gender and social inclusion to participate in activities and events; (ii) conducting consultations at convenient times and on appropriate days to ensure the participation of women and people with disabilities, taking into account the time women dedicate to domestic and caregiving duties; (iii) ensuring that meeting spaces are accessible; (iv) registering event attendees with data disaggregated by gender and disability status; and (v) incorporating any additional measures deemed necessary to ensure effective participation.

5. Ensure gender considerations are integrated into climate change adaptation and mitigation strategies				
Implement gender and diversity considerations into climate change adaptation and mitigation strategies within the Barbados Water Resilience Project	Report on gender considerations regarding climate-change adaptation **Target**: 1 report Number of staff members that participate in training activities (disaggregated by sex and diverse groups) **Target**: 50% female	Complete by Year 1 Complete by the end of the project	BWA, Consultant BWA, Gender and Diversity Focal Point, Consultant	22,000
a) Promote research and initiatives that recognize and address the disproportionate impacts of climate change on women, with specific focus on gender disparities. Analyze how climate change impacts may disproportionately affect men and women, considering factors such as access to water resources, vulnerability to extreme weather events, and adaptation capacity				
b) Training sessions for BWA employees focused on understanding the intersectionality of gender and climate change, emphasizing the differential impacts on men and women.				
6. Other activities				
Undertake education programs targeting farmers, particularly women, to enhance capabilities and leadership for the adoption of irrigation technologies, and to leverage the mechanisms available for access to water services	Number of education programs **Target**: 4 Ratio of female to male farmers participating in education program (2:3)	Complete by the end of the project	BWA, Consultant BWA, Gender and Diversity Focal Point, Consultant	8,000

5.5 Monitoring and Evaluation

The success of the Gender Action Plan within the Barbados South Coast Water Reclamation Project hinges on a robust Monitoring and Evaluation (M&E) framework that systematically tracks progress, measures impacts, and identifies areas for improvement. The processes are designed to be dynamic, responsive, and participatory, ensuring that gender inclusivity remains a core focus throughout the project's lifecycle.

Regularly assess the Gender Action Plan's progress through gender-sensitive indicators, stakeholder feedback, and periodic reviews. Adjust based on lessons learned and emerging gender and diversity considerations to ensure the continued effectiveness of the plan.

A gender and diversity focal point will oversee, guide, and coordinate the gender action plan to ensure its successful implementation [17]. The gender and diversity focal point will be responsible for monitoring, evaluation, and reporting with the support of the M&E Specialist:

1. **Gender sensitive indicators:** Analyze the gender sensitive indicators that are included in the gender action plan to gauge the effectiveness of gender mainstreaming efforts. Focus also on diverse groups, especially on People with Disabilities.
2. **Stakeholder feedback mechanisms**: Analyze feedback to identify specific challenges and opportunities for improvement.
3. **Periodic gender and diversity reviews**: Conduct periodic reviews specifically dedicated to assessing the gender and diversity dimensions of the project. These reviews should evaluate the implementation of gender-specific initiatives, the effectiveness of policies, and the overall responsiveness of project activities to gender and diversity considerations. Integrate lessons learned from these reviews into adaptive management strategies.
4. **Adaptive management strategies**: Utilize findings to inform adaptive management strategies that respond to emerging gender considerations. Implement timely adjustments to project activities, policies, and interventions based on lessons learned and evolving gender and diversity dynamics. This adaptive approach ensures that the Gender Action Plan remains relevant, effective, and capable of addressing evolving challenges.
5. **Reporting and transparency**: Regularly report on the progress of gender inclusivity and social inclusion efforts through transparent and accessible channels. Disseminate information on gender-specific achievements, challenges, and future plans to keep stakeholders informed. Ensure that reporting mechanisms are tailored to reach diverse audiences, considering variations in literacy levels and communication preferences.

By intertwining gender-sensitive and diversity indicators, stakeholder feedback mechanisms, periodic reviews, adaptive management strategies, and transparent reporting, the framework becomes a dynamic tool for ensuring the sustained success of the Gender Action Plan within the Barbados Water Resilience Project. This approach guarantees that gender inclusivity and social inclusion is not only a priority but a continually evolving and improving aspect of the project's impact on the community.

[17] Additional staff may be assigned if needed within BWA to provide support to the G&D specialist.

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