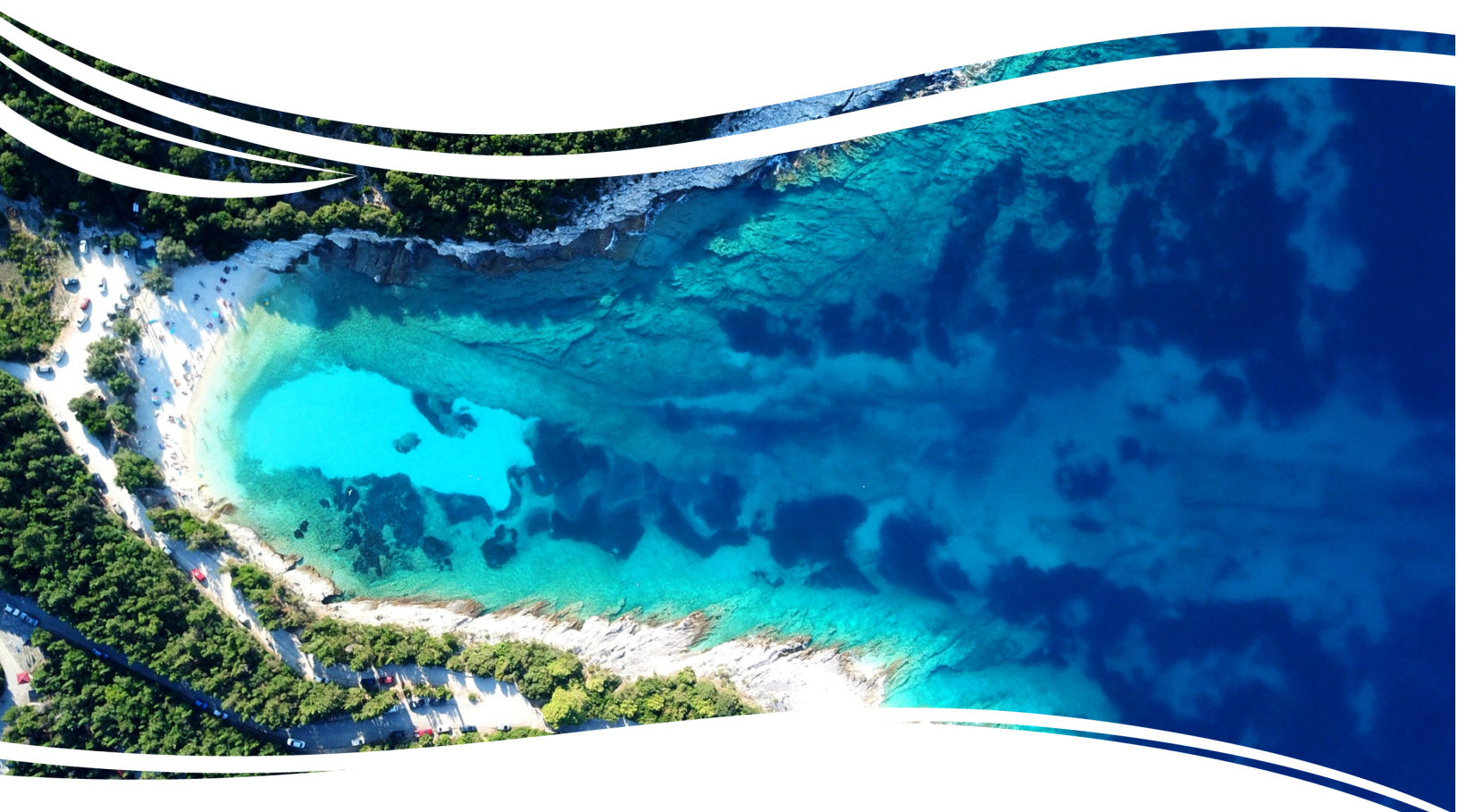




*Feasibility Assessment to Determine the Financial Opportunities for  
Establishing a Sustainable Environmental Protection Revolving Fund  
(SEPREF)/Alternative Funding Mechanism (AFM)*

*Barbados*



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## ***Executive Summary***

As a signatory to the Cartagena Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Area, Barbados takes its obligations to reduce land-based sources of marine pollution seriously. These sources include direct effluent discharges to the marine environment, surface water runoff and diffuse pollution through groundwater contaminated with domestic sewage, agricultural runoff and other effluents. Few properties are connected to wastewater treatment systems and most properties make use of either septic tanks, soak-aways, or pit latrines. The operation of these systems poses a potential threat to groundwater supplies and contribute to levels of nutrient loading especially in the more densely settled areas.

If Barbados is to fulfil its international obligations and at the same time preserve its environment, ways have to be found to improve wastewater management. Tackling sewage and wastewater discharges will be expensive and cannot be done by the State alone, the costs involved are too high. Therefore, means have to be found to encourage investment and to mobilise the private sector to play a greater role. In particular, this means enabling the mobilisation of financial resources and creating the conditions that require better wastewater management.

Over the last five years Barbados has made significant steps to put in place a regulatory regime that is conducive to requiring the implementation of wastewater systems in new developments. Although a regulatory demand is being created, if it is to succeed it has to be financed sustainably. The objective of this project is to examine the factors influencing the feasibility of establishing a viable and sustainable funding mechanism for implementing and supporting the better management of wastewater and wastewater

discharges in Barbados. It identifies the potential beneficiaries and examines the potential market and services of a Special Environmental Protection Revolving Fund.

Information has been gathered from a wide cross-section of stakeholders and interested parties; from financial institutions, regulatory agencies through to developers and wastewater systems operators. Based on information received an estimate has been made of the potential demand that such a fund may be called upon to meet, the services to be provided and the level of capitalisation that might be required. The level of capitalisation is dependent principally on the level and composition of demand, and the periods over which loans would have to be repaid.

Basic analysis indicates that the shorter the repayment period the more sustainable the fund. A proposed financing mechanism for wastewater projects, the "Barbados Wastewater Fund" (BWVF) is proposed. The Fund, which would incorporate a Special Environmental Protection Revolving Fund, a Credit Enhancement Fund and Special Savings Accounts, would receive funding from different sources. We propose that one of these sources would be a reformatted Garbage and Sewage Contribution levy. Channelling of the funds through the proposed financing mechanism is designed to cater for the diverse nature of the potential beneficiaries and with special arrangements for BWA. Other entities may also access financing from the BWVF through a revolving fund or through Special Savings Account that may be used as collateral for loans from the BWVF.

By structuring the financing arrangements in this manner it should be possible to provide incentives to the public and the private sector to enable them to meet the demand for better wastewater services created through the regulatory environment.

# ***1. Introduction***

This Report is the second project output, being the Feasibility Assessment to Determine the Financial Opportunities for Establishing a Sustainable Environmental Protection Revolving Fund (SEPREF)/Alternative Funding Mechanism (AFM). As such it builds on the first output the Governance Review which examined the current legal and regulatory environment which governs the wastewater sector; the requirements for the provision, operation and maintenance of facilities and services. That report also examined the range of potential interested parties and stakeholders together with the pertinent funding and financial arrangements pertaining to wastewater management.

In this Report the aim is to examine the factors influencing the feasibility and viability of establishing a viable and sustainable funding mechanism for implementing and supporting the better management of wastewater and wastewater discharges in Barbados. It examines the potential market and services of a SEPREF/AFM, based on stakeholder consultations, the options for the format of a SEPREF/AFM, and an indication of the level of capitalisation required. Lastly, suggestions are made as to the next steps to progress the establishment of a fund.

# ***2. Background***

According to the SDG 6 Data Portal maintained by UN Water (<https://sdg6data.org/country-or-area/Barbados>) 98% of Barbados' population has access to at least basic sanitation service (SDG 6.2.1a). However, only approximately 6% of all properties are connected to one of the two central sewage collection and treatment system. Whilst there are a few properties that are connected to package wastewater treatment systems, most properties make use of either septic tanks, soak-aways, or pit latrines. This is particularly so in the case of domestic properties. The operation of these systems poses a potential threat to groundwater supplies and contribute to levels of

nutrient loading especially in the more densely settled areas. Groundwater discharges onto coral reefs on the West Coast are generally higher in the wet season than in the dry season, and richer in nitrogen than in phosphorus (Lewis, 1987). Wellington (1999) found that nitrogen and phosphorous concentrations in the coastal waters were respectively twice and three times higher than at the pumping stations farther inland and upstream of densely populated areas. Elevated concentrations of nutrients in the coastal areas compared to inland pumping stations are likely due to the use of fertilizers and dense coastal settlements. Work by Baird (2017) concluded that groundwater fluxes contributed 85% of the offshore nutrient load. Surface water fluxes contribute 15% of nutrient flows but are different in character to the groundwater flows being episodic and associated with rainfall-run off events. Furthermore, the composition and concentration of the contaminants in surface flow events will be different. As such surface water fluxes may be thought of as point sources of pollution in contrast with groundwater fluxes being diffuse sources of pollution. Further evidence that coastal waters have been contaminated appears in a study conducted in 2003 that found that coral reefs have been impacted by eutrophication, an enrichment of water by nutrient salts, which has caused structural changes to the ecosystem off the Barbados coastline (Linton & Warner, 2003). Overall, high nutrient loading has adversely impacted the marine ecosystems around Barbados. The focus of this work is concerned with managing groundwater pollution.

The cost of installing or retrofitting wastewater treatment systems on properties capable of removing nutrients and other pollutants is high and developers often seek exemption from installing them in new developments. Where they are installed in existing developments, there is often limited maintenance and operators are inexperienced. In the case of individual properties using suck wells or septic tanks there is little reason to change especially as the cost of retrofitting is high for no perceived personal benefit. Indeed, without a strong regulatory ability to encourage or require upgrading there would be few pressures to alter the status quo<sup>1</sup>. The existing factors have contributed to the

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<sup>1</sup> The revisions to water zoning areas represents a potential ability to require changes in a limited range of circumstances.

degraded state of the marine environment from land-based sources. This intervention addresses the financial barriers that prevent or inhibit public and private entities from installing, operating, and managing wastewater treatment systems. It will do so by developing a framework that facilitates a strong supporting environment with mutually reinforcing legal, policy and institutional frameworks and the provision of affordable financing and accessible incentives.

Over the last five years, there have been significant developments which will have a positive effect on the way in which sewage services and wastewater management are conducted. These include changes to regulation and control of planning and development through the revision of planning and development legislation, the introduction of legislation and regulations pertaining to water reuse and water quality, and improvements to the financial position of Barbados Water Authority (BWA) in respect of the provision of centralised wastewater services. Furthermore, the promulgation and enforcement of the Water Reuse Act along with the enforcement of the Marine Pollution Control Act and Regulations and the Barbados Water Authority Zoning Order can provide additional impetus to drive the demand for the installation and sustainable operation of wastewater systems across Barbados and not just in a few select areas. These positive developments address the governance arrangements. They need to be complemented by arrangements to facilitate the financing of wastewater infrastructure and management.

## **3. Purpose**

### **3.1 *Uses of the Fund***

The purpose of the SEPRF/AFM would be to:

- i. Empower households and businesses to realise their adaptation and mitigation contributions to climate change in the water sector;

- ii. Promote means and actions to eliminate or at the least reduce/minimise pollution of aquifers and coastal waters from wastewater discharges<sup>2</sup>; and
- iii. Build climate resilience in the water sector by facilitating the enhanced treatment of wastewater to reclaimed water standards.

Eligible uses of the fund would include:

- Financial assistance and support for the conception, design, installation, providing training and capacity building for the operation, maintenance and monitoring of sewerage/wastewater systems;
- Facilitate infrastructure for wastewater treatment and disposal to the required standards;
- Encourage and support wastewater reuse, in accordance with the National Water Reuse Policy;
- Equipment for servicing of septic tanks and other on-site pre-treatment facilities<sup>3</sup>;
- Infrastructure for wastewater disposal through emissaries subject to appropriate determination of its beneficial impact in coastal water quality;
- Wastewater systems may at the discretion of the fund include stormwater;
- Integrate small scale renewable energy systems into the wastewater management system;
- Increased water security through decentralised storage; and
- Other innovative adaptation and mitigation action that build greater resilience in the water sector of Barbados.

The systems would encompass the collection, treatment, use or reuse and disposal of wastewater in new and existing properties and developments.

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<sup>2</sup> Wastewater is understood to be the by-product of the use of drinking water by domestic or authorised commercial, industrial, and government users.

<sup>3</sup> This should include the transport of the sewage to a complying treatment facility.

In some instances it may be advantageous to extend/upgrade existing wastewater systems. In the case of such extensions the following would be considered as part of the decision-making process regarding eligibility:

- i. The systems include facilities for wastewater treatment and disposal, and that reuse would be an integral part of extension; and
- ii. The facilities will be operated and maintained by a licensed operator with proof of the financial sustainability of the provision of the service.

### *3.2 Beneficiaries*

The beneficiaries of the fund would include:

- Households including low-income households, vulnerable groups and communities,
- Community, social, sports, religious and third sector organisations,
- Private sector businesses,
- Government entities and statutory authorities.

The fund would determine the factors to be taken into consideration when determining the eligibility of a potential beneficiary, and the type and extent of support.

#### *3.2.1 Barbados Water Authority*

The Barbados Water Authority has experience in implementing projects to build/rehabilitate wastewater treatment facilities (WWTF) and in the operation of such facilities. This experience reduces the implementation and operational risks. BWA has a revenue stream provided by the Garbage and Sewage Contribution (GSC) of which it is empowered to use the Sewage part of the Contribution for wastewater infrastructure provision, operation and maintenance. Part of the Sewage Contribution might be used to repay loans or other lending institutions. Such payments can be used to reduce repayment risks.

### *3.2.2 Real estate developers*

Existing regulations require developers to provide, among other infrastructure, sewage collection, treatment and disposal works and comply with directives, policies and standards specified by the Planning and Development Department and other statutory bodies. The regulations provide means to require, regulate and control various aspects associated with the granting of planning permission and attachment of compliance conditions on developments. There conditions which require the provision of wastewater facilities, and there are also provisions in the form of legal agreement to address arrangements for the management and operation of such facilities.

However, developers often seek exemption from installing wastewater treatment facilities in new developments due to the high investment cost. At the same time practical obstacles to enforcement of sewerage regulations significantly have in the past reduced pressure on developers to secure appropriate operation and maintenance arrangements for the wastewater treatment facilities and ensure compliance with treatment and discharge standards.

Notwithstanding the above, the Groundwater Zoning Policy introduced in 1963, and revised in 1973, and the Water Protection and Land Use Zoning Policy (2020) define groundwater zones that were incorporated into the Draft Physical Development Plan (2017) and sets out that "...Mechanisms will be implemented to ensure proper operation and maintenance of sewerage systems". As in considering a developer's application, the location of a development would be considered with respect to Water Protection and Land Use Zoning Policy, the concerned authority has bearing on ensuring that appropriate operation and maintenance arrangements for the wastewater treatment facilities are in place for the proposed development.

Recent amendments to the Planning and Development (Amendment) Act (2020) have put in place arrangements to improve the conditions for this category of potential beneficiaries to be compelled to install wastewater treatment facilities and make arrangements for professional operation and maintenance of the same. A combination of

incentives and penalties could contribute towards these objectives. Among the incentives there could be the eligibility to access finance and support to access technical assistance for design and supervision of construction of wastewater treatment facilities. Among the other measures final approval to the development should be conditional on the execution of an operation and maintenance agreement between the developer and a licensed operator. This should include the identification of a viable source of funding for paying the operators fees, an eventual pollution control fee, as discussed below, a compliance fee and repayment of loans taken by the developer, if any. A certificate of compliance may also be conditional on compliance with treatment and discharge standards. Besides securing proper management of wastewater, these measures tend to reduce construction, compliance and repayment risks.

### *3.2.3 Existing developments/communities*

Where WWTF are already installed in existing developments, there is often limited maintenance and operators are inexperienced. These issues may lead to malfunctioning of the facilities. At this point, the usually high cost of retrofitting them to comply with discharge standards, coupled with the current low capacity of authorities to monitor compliance, reduces the motivation of developers, communities or administrators to act towards finding a solution to the pollution problem. This category of beneficiaries would also include entities that seek to implement treated wastewater reuse facilities.

Like the case of new developments, a combination of incentives and penalties could be used to create the right environment for positive action. Even though similar instruments and conditions may be put in place for this kind of entities, some penalties might be subject to forms of amelioration such as scheduling grace periods to allow those more vulnerable to avoid penalties while a solution is sought to bring them into compliance.

Where existing developments/communities decide to rehabilitated non-complying WWTFs the process should include securing an agreement with a licensed operator which, depending on the size of the facility (volume to be treated), may be a member of the community that receives adequate training and certification from the proper authority.

Communities lacking WWTFs may enter into an agreement with either BWA or an operator of a WWTF to provide facilities and for the management and operation of those facilities for their wastewater. In these cases, the community's network could be maintained as a condominium system (self-managed) or transferred to the operator, as agreed between the parties. In any event, regulatory authorities should provide consent for the scheme to be implemented, seeking to secure proper implementation, operation and maintenance and sustainability of the same. This is in line with the Water Protection and Land Use Zoning Policy and Groundwater Zoning Policy that: i) Mechanisms will be implemented to ensure proper operation and maintenance of sewerage systems; and ii) Low-cost systems as an alternative to septic tanks will be investigated for use (2020 Water Protection and Land Use Zoning Policy, p35).

These measures are proposed aiming at increasing motivation to implement pollution reduction initiatives that could demand funds from the BWWF with a reasonable risk level.

#### *3.2.4 Operators or managers of wastewater treatment facilities*

As described in previous subsections, to reduce operational and compliance risks, it is advisable that capable operators, who should obtain their licences from the appropriate regulatory authorities, be in charge of WWTFs. This should also ensure adequate communication with monitoring and control authorities and put the responsibility on these operators to comply with regulations, monitor the quality of effluents and report regularly to the authorities.

These operators should be able to identify rehabilitation, renovation or refurbishment needs for WWTFs requiring investments by the served communities, which could be financed by a funding facility. Operators may also be eligible to request small loan to hire engineering services for the design and supervision of works or for training their staff in new technologies to be implemented in their served communities.

Finally, these operators, once contracted to operate facilities to be built in a new development or by the management of a community's WWTF, should be an integral part of the discussions with the authorities in the process of getting the approval for the new

or refurbished facilities, as they will be responsible for the operation of the facilities and should be in agreement with the proposed scheme.

### *3.2.5 Septic tanks maintenance companies*

In certain cases, such as individual properties using suckwells or septic tanks there is little reason to change especially as there would be little perceived personal benefit. The cost of installing a household septic tank, which provides primary level of treatment, ranges between US\$5,000 and US\$9,000 (average US\$7,000) with emptying once every five years costing less than US\$200. The cost of retrofitting to tertiary treatment level could cost US\$15,000 or more depending on circumstances for a household. In other instances, for example social housing, low-cost, and affordable home developments there is a consistently high incidence of non-payment of rents and the capacity to afford investments required to install WWTFs are extremely limited. In these cases, the provision of regular septic tank emptying and maintenance services could be an acceptable interim solution. Household septic tanks should be emptied every 5 to 7 years whilst for commercial establishments such as hotels it would be more frequent. Costs vary between Bds\$225 - Bds\$260 per 1000 gallons; at the lower end for households and higher end for commercial. At some point it might be advantageous to implement a WWTF with professional management or connect the existing system to a sewerage network.

However, for setting up a scheme where septic tanks are regularly serviced, a sufficient number of registered and licensed septic trucks should be put and kept into operation and properly maintained and managed. Also registered and licensed septic tanks maintenance companies may apply for funding to buy or upgrade their equipment.

Operation of the scheme could be coordinated with BWA4 and EPD to ensure that objectives like keeping customers well served while reducing groundwater pollution are achieved. Payment to these companies should be sufficient to discharge their duties under the scheme and to pay back any loans.

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<sup>4</sup> BWA is not a regulatory body so its role and involvement would need to be clearly established.

## 4. Potential Demand

In estimating the potential demand, primary focus is placed on residential properties. This is not to discount the needs of the commercial, industrial, or agricultural sector though determining the scale of their potential needs is problematic. It is problematic because their needs would be determined by the scale of operation and type of enterprise. Furthermore, with the exception of the agricultural sector, developers of commercial and industrial enterprises are likely to have access to funding and so better able to finance the required wastewater infrastructure.

### 4.1 Residential Demand

As of the 2010 Population and Housing Census of Barbados<sup>5</sup> (Barbados Statistical Service, 2013) there were 94,173 residential properties of which 78,936 (84%) were occupied at the time of the census count. Of the occupied properties only 4% were connected to either the Bridgetown or South Coast Sewage Treatment Plants. The rest relied on other forms of wastewater collection treatment and disposal; 87% were not connected to a sewer - the majority probably do not have septic tanks but discharge directly to suckwells particularly in the existing Groundwater Zones 3, 4 and 5. In Groundwater Zones 1 and 2, septic tanks have been required. The remainder 9% used other forms of disposal such as pit latrines. These figures will have changed as the housing stock has increased since then but the overall picture of the vast majority not being connected to a centralised collection, treatment and disposal system would not have changed. Further determination of access to sanitation would require a geospatial analysis of census data.

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<sup>5</sup> This is the most recent available survey.

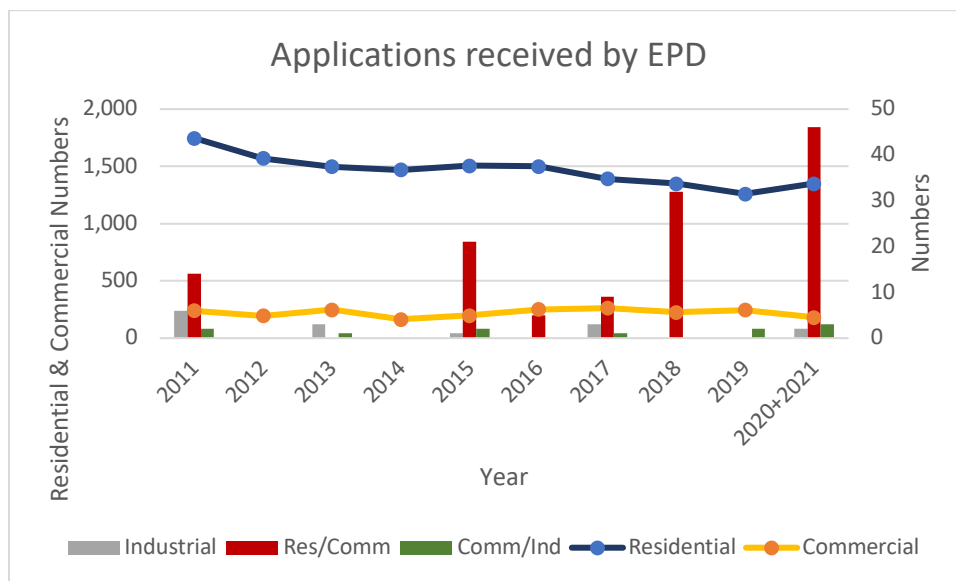
The Annual Report of the Environmental Protection Department (EPD) provides figures on the number of planning applications received by the Building Control Section since 2011, see Table 1 see also Figure 1.

*Table 1: Annual number of planning applications received by EPD's Building Control Section*

Year	Residential	Commercial	Industrial	Residential /Commercial	Commercial/ Industrial
<b>2011</b>	1747	241	6	14	2
<b>2012</b>	1962				
<b>2013</b>	1498	248	3		1
<b>2014</b>	1469	165			
<b>2015</b>	1505	198	1	21	2
<b>2016</b>	1500	251		5	
<b>2017</b>	1391	262	3	9	1
<b>2018</b>	1348	227		32	
<b>2019</b>	1260	246			2
<b>2020+</b>	1348	181	2	46	3
<b>2021</b>					
<b>Total</b>	14636	2215	15	127	11
<b>Avg.</b>	1330	201	1.3	12	1

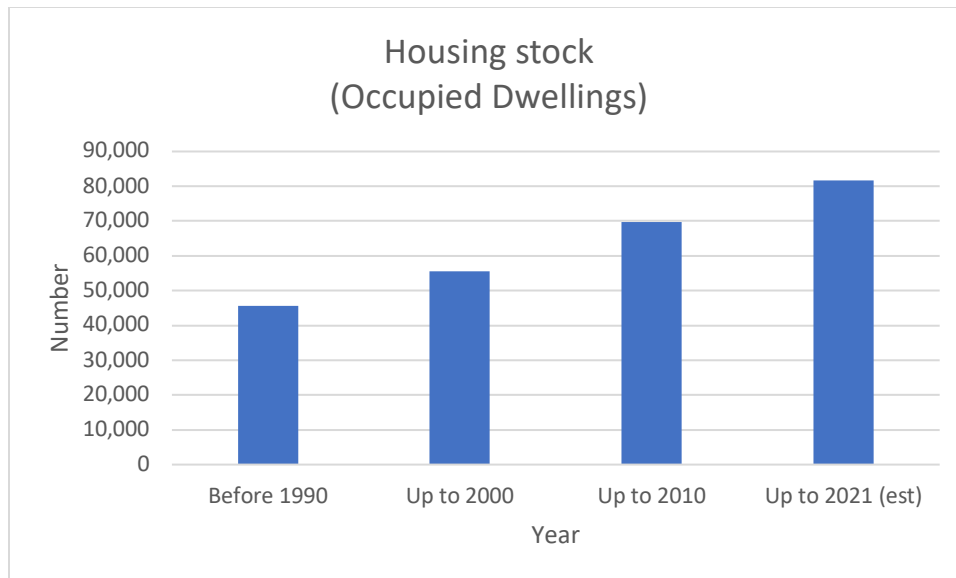
Note: For 2012 only a total figure was given. Applications in 2020 & 2021 would have been impacted by the COVID-19 pandemic.

According to EPD, approximately 80% of residential applications are given approval. Figures regarding the actual number of completion certificates issued each year as well as a breakdown of number of residential units in each application was requested of the Planning and Development Department but to date the information has not been provided. Thus it is likely that the figures given in Table 1 represent a lower bound estimate of the annual number of residential properties. The annual number of residential applications received by EPD over the last decade has exhibited a small downward trend, see Figure 1. Commercial applications appear to vary between 200 and 250 per year. In Figure 1 the residential and commercial applications are shown on the left hand axis whilst the rest are on the right hand axis.



*Figure 1: Annual applications received by EPD*

The changes in residential building stock, compiled from the 2010 Population and Housing Census combined with EPD's data, is shown in Figure 2.

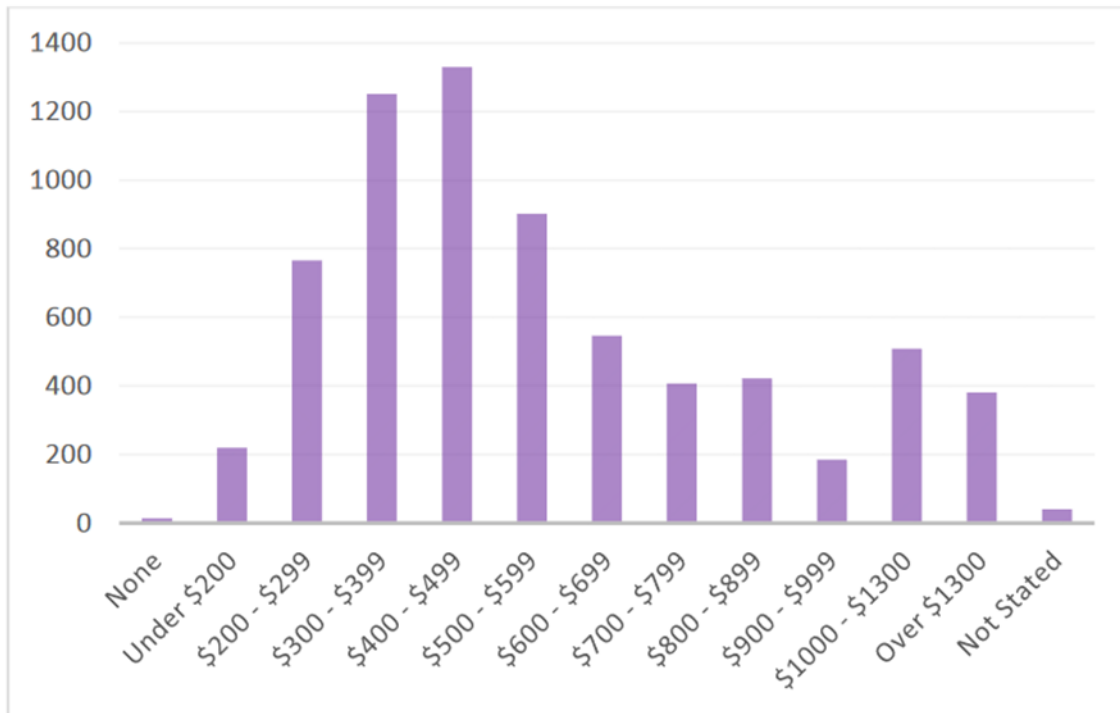


*Figure 2: Change in housing stock*

Using the figures presented above, as of 2021 the housing stock comprised approximately 80,000 properties. This figure can be compared to BWA’s customer base of approximately 113,000, which includes not just residential customers but also commercial, hotels, statutory bodies, government institutions, Bridgetown Port and agricultural customers. So the figure of 80,000 is considered reasonable. From the 80,000 would have to be subtracted approximately 2,700 residential properties that are connected to either the Bridgetown or South Coast Sewage Treatment Plants, leaving 77,300 residential properties. This could be taken as the minmax figure of the number of properties that might benefit from the retrofitting of upgraded wastewater treatment facilities. This figure is impracticable for several reasons, including; the feasibility of retrofitting, the willingness of property owners to consider retrofitting, and ability to afford retrofitting.

In terms of affordability, in 2020 the average household income has been reported as being Bds\$61,000 but the median was Bds\$49,500, before tax. A 2015 study (Griffith, Moore, & Thompson, 2015) included a figure showing the distribution weekly income, Figure 3. The message from this, it is suggested, is that affordability will be an issue for at least 50% of households. A former Governor of the Central Bank of Barbados, Dr.

DeLisle Worrell in 2015 indicated that some 80% of the working population earned less than Bds\$50,000.



Source: Barbados Statistical Service

Figure 3: Distribution of weekly income

Assume that only 20% of households might be able to consider affording retrofitting. Further, apply that 20% to the 77,300 properties. Thus it could be imputed that the potential number of properties that might be retrofitted would be a maximum of 15,400. For the rest, some form of financial support/assistance would be required.

Looking at the potential future demand, we might assume an annual average number of residential applications of 1,330, of which 80% would be successful. Thus, conservatively, there could be a residential demand of approximately 1,000 per year. Again, not all application would need assistance, as the applicants would be in a financial position to afford the additional cost. Furthermore there would be applications which are or would be in sewerred areas, in which case they are legally required to connect to the public sewer

system<sup>6</sup>. As reported in the Governance Report (Deliverable #2), the Government of Barbados has signalled its intention to have built 10,000 new homes over the next 5 to 10 years<sup>7</sup>. HOPE Inc, a government-owned entity created to facilitate the delivery of the 10,000 homes, have indicated that they envisage building between 500 - 700 per year. The balance i.e. 300 -500 per year, would be provided by other entities.

Based on this information, it would seem reasonable to assume that the demand for some form of support for both the retrofitting of existing properties and the inclusion for new properties of wastewater systems might be taken as between 1,000 and 1,500 properties per year. This assumption is based on the premise that all new builds would be required, through the Planning and Development Department, to have wastewater systems irrespective of which groundwater zone they were located in.

## *4.2 Commercial and Industrial Demand*

As shown in Table 1 the average annual number of commercial applications is 201. A simplifying assumption would be that all would be outside the areas served by the existing centralised sewerage system. It has been argued that commercial developments, by their nature, would tend to be better financed than say residential developments. However, this does not necessarily mean that such developments would not be amenable to having access to funds for the installation of wastewater systems, which would be required as part of granting planning permissions. Therefore, it is proposed that the annual demand could be set at 25% of the average annual number i.e. 50 developments per year.

Industrial and hotel developments are assumed not to require any financial assistance.

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<sup>6</sup> Numbers to be determined.

<sup>7</sup> The scheme is only open to households with a maximum income of Bds\$8,000 per month.

### *4.3 Barbados Water Authority*

The financial position of BWA has improved since the introduction of the Garbage and Sewage Contribution levy, producing an assured income stream which has been utilised to improve BWA's wastewater management operations. Since 2018 when GSC first introduced, it has contributed additional revenue of approximately Bds\$21 million per year. This would enable BWA to undertake the planning of new wastewater infrastructure, for example the sewerage of Bellevue Gap and Chapman Lane, at an estimated cost of US\$22.317 million, should it be agreed to use funds generated by the GSC for these purposes. Furthermore, the Prime Minister in the 2022 Budget indicated the intention to use the GSC to "secure a new evergreen loan facility without a Government guarantee" with a cap of Bds\$50 million. This will enable BWA to secure a mix of financing including commercial borrowing and concessionary development financing to enable it to service US\$25 million of loans. With the exception of the West Coast Sewage Master Plan, costed at between US\$314 and US\$380 million (2008 US\$), there is no information on further planned sewerage systems. That said, the Reduce, Reuse and Recycle for Climate Resilience Wastewater Systems in Barbados (3R-CREW) project documentation does suggest that further decentralised/localised sewerage systems interventions could be contemplated; mention was made for example of the possibility of introducing decentralised systems on the West Coast

Furthermore, BWA have indicated in meetings that they would be interested in accessing concessionary financing vehicles such as an AFM as a means of leveraging access to other funding sources. It is assumed therefore that BWA could be included as one of the parties likely to be interested in accessing the AFM. To what extent it is unclear.

## ***5. Administrative Options of a SEPREF/AFM***

In Section 9 of the Governance Review, the possible range of administrative options were identified, and their relative merits and practicalities discussed. Subsequently the views of potential stakeholders and interested parties were solicited to get a better sense of which administrative options might be preferred and the type of services that might be offered. This was undertaken through the holding of two stakeholder workshops and an on-line survey.

### ***5.1 Workshop 1***

The first Workshop, held on 6 July targeted Ministries and government agencies, developers, engineers, and architects as well as public and private wastewater service providers. There was a good degree of consensus from the meeting regarding what were regarded as critical implementation aspects. These included:

- The success or failure of any system that promotes wastewater services and management stands or fall on whether there will be strong and financially sound arrangements for the management and operation of installed wastewater systems,
- There must be clear and consistent regulatory requirements for the installation of wastewater systems, which are universally enforced and for which there are meaningful penalties for non-compliance,
- Wastewater systems need to be supported by a robust licensing regime with proper monitoring and regulation of their performance.

It was observed by engineers who work on behalf of developers that financing would not be an issue for 'higher end' developers, if there was a clear requirement that wastewater systems had to be installed then developers would comply.

With respect to the type of administrative arrangement a fund might adopt there was consensus that it should not be a fund administered by a Ministry or government agency due to the perceived lack of transparency and was also perceived as being open to political interests.

## 5.2 Workshop 2

The second Workshop was held on 28 July with the purpose of determining the level of interest among the financial sector in participating in an Alternative Revolving Fund to support the introduction of wastewater management systems and services. Invited to the Workshop were stakeholders from the Ministry of Finance, Economic Affairs and Investment, financial regulatory bodies including the Central Bank, financial services providers including Banks and Credit Unions, and fund managers.

- The significant points raised during discussions included:
- There is a lot of liquidity in the financial system and many financial service providers are looking at ways to leverage that.
- There is interest on the part of financial institutions in a revolving fund mechanism including investment, under the right conditions such as securing a reasonable return on investment,
- There appears to be sufficient potential demand to support the development of a revolving fund,
- The possibility of there being a regional revolving fund or this being part of a regional fund was raised, given that Caribbean countries are facing similar issues and are also signed on to the Cartagena Convention,

- The Ministry of Finance Economic Affairs and Investment would like to see significant private sector involvement and favours a public-private partnership arrangement,
- The Financial Services Commission and the Corporate Affairs and Intellectual Property Office need to be consulted with irrespective of the administrative arrangements.

### 5.3 Survey

Following on from the two workshops a survey questionnaire was developed in conjunction with EPD and sent out to over 60 key informants. A copy of the questionnaire is given in Appendix 1. The following is a summary of the responses received.

Question	Responses
<b>What institution(s) you think would be best suited to offer or administer a Revolving Financing Mechanism</b>	There was a split between a Public-Private Partnership arrangement or a Green Investment Bank, with a preference for a PPP arrangement. There was significant consensus that neither a registered company or a statutory authority/government ministry were suitable vehicles.
<b>Institution interested in investing in a fund</b>	There was significant interest in investing in a revolving fund among the respondents, but very little interest in managing a fund.
<b>Do you have concerns regarding the setting up and operation of a Revolving Financing Mechanism for supporting wastewater management</b>	<p>I believe it is necessary however I do worry about the level of red tape or bureaucracy that may be added if it is not kept simple</p> <p>I think it can be very useful and would complement products offerings from other entities.</p> <p>I think that once the required regulations are put in place, potential buyers will look for the options. These options should be seen as concessionary</p>

Question	Responses
<p><b>What sort of further information if any would you like to have that would help you decide if you would be interested in a participating</b></p>	<p>with a give back. For example a customers would get a tax credit for buying and maintaining within regulatory standards effluent discharge regardless of location. This would include training of staff, effluent reuse etc.</p> <p>A Revolving Financing Mechanism for supporting wastewater management is necessary. It may be best for the government to have a regulatory role and to have the private sector share some of the investment. Some financial and technical assistance from development partners (e.g. IDB) may also be helpful to assist in the initial work required to establish the mechanism.</p> <p>Relevant details regarding the mechanism, such as structure, governance arrangements etc</p> <p>What are the accountability/audit/record keeping mechanisms to be set up in relation to the revolving financing mechanism for supporting wastewater management?</p> <p>Take a page out of the book of the renewable energy policies and incorporate them for water/ wastewater reuse and for proper disposal methods policy as incentives for persons to participate whether a homeowner or a large hotel. Homeowners on coastal areas should be encouraged to participate and should require a license before building. The homeowner could then claim back from their annual tax return a credit of up to 10K per year for 2 years.</p>

Question	Responses
	<p>We tried back in 2000 to get Barclays to look at financing but because the industry was not regulated no one took on our proposal.</p> <p>Any examples (with some detail) from other countries in the region of how a revolving financing mechanism for supporting wastewater management is working</p> <p>Best practices and latest proven technologies</p>

## 5.4 Summary

Emerging from the above interactions with stakeholders and interested parties are the following take-away points:

- The necessary conditions and regulatory drivers are being put in place to create a market demand for the installation and operation of wastewater systems for new developments,
- There is interest on the part of banks and other financial institutions in investing in an alternative financing mechanism,
- Regarding the administrative options for the setting up of an alternative funding mechanism there is preference for it to be at arm’s length from government and for it to be established as a form of public-private partnership,
- A strong and effective regulatory environment is needed to ensure the proper functioning of systems, their management and cost recovery.

## 6. Services provided by SEPREF/AFM

In addition to providing finance, the question of what other services an AFM might provide was considered by soliciting the views of stakeholders and interested parties. The main services which they fund was expected to provide included capital investment, loans and

working capital, and grants which would be its core functions. It is envisaged that loans would be a mixed portfolio of concessionary, preferential and commercial lending. The criteria and size of loans to be provided were not discussed as these matters were considered to be details to be addressed at a later stage of development.

The range of additional services that there was the greatest interest in were capacity building and supporting training, grants, support for feasibility assessments and proposal developments, and the installation of monitoring infrastructure. These were followed by supporting workshops - part of training and capacity building, and certification. Of less interest were supporting internships and exchanges.

## ***7. Financing Needs and Capitalisation***

### ***7.1 Financing Needs***

The SEPREF/AFM is intended to cover the costs associated with the installation of wastewater systems as well as funding other activities identified in the section above. The cost of installation of a wastewater system depends on the scale of the system to be implemented whether it be at the household or the community level. In addition to these costs there would be the cost of operating the fund itself, in terms of personnel employed, office accommodation, insurances at the like. What is provided in this section is a preliminary estimation of the level of financial outgoings from the fund.

Information on the cost of installing and operating wastewater systems has been obtained from a variety of sources including other CReW+ projects, EPD and wastewater service providers. The estimated cost of installing a household septic tank system is between US\$3,500 and US\$9,000 depending on the size of the tank and whether it is

prefabricated or constructed. Septic tank systems though provide only primary level of treatment system. Under the 2020 Water Protection and Land Zoning Policy there is a presumption that all new developments will have a septic tank. Assuming that a prefabricated tank is installed the average cost for an individual household can be taken as US\$4,000. To this cost has to be added the cost of installing a tile bed. For calculation purposes an amount of US\$5,000 for an individual household is assumed. A higher standard of treatment can be provided by the inclusion of an aerator system though this adds to the cost.

For developments of high housing density that produce wastewater flows greater than 37m<sup>3</sup>/day there is a presumption that they will be required to have a sewerage system. This is equivalent to approximately 100 housing units. A septic tank system for such a development is estimated to cost US\$25,000 including the tile bed.

The estimated cost of a nature-based or conventional system treating water to tertiary level for a household system is estimated to be between US\$15-20,000 based on information obtained. A nature-based wastewater treatment system to be installed in Grenada which is designed to treat up to 20m<sup>3</sup>/day (~50 housing units) is estimated to cost US\$150,000. An alternative cost estimate for 50 housing units also using a Nature-based solution (NBS) was quoted as US\$120,000. And, for a development of 150 units the cost provided was US\$250,000 for a conventional tertiary treatment system.

The cost information is summarised below.

*Table 2: Estimated costs of treatment systems (US\$)*

	<b>Individual</b>	<b>50 Units</b>	<b>100 Units</b>	<b>150 Units</b>
Septic tank-total cost	5,000	21,000	30,000	40,000
Septic tank -unit cost	5,000	420	300	266
Septic tank + AIRR System tertiary treatment	8,000	115,000	215,000	320,000

	Individual	50 Units	100 Units	150 Units
Septic tank + AIRR System tertiary treatment unit cost	8,000	2,300	2,150	2,100
Tertiary treatment (NBS)-total cost	15,000	120,000		200,000
Tertiary treatment (NBS)-unit cost	15,000	2,400		1,330

## 7.2 Capitalisation

In order to investigate the level of capitalisation that might be required a simplified financial analysis has been prepared, using an Excel spreadsheet. The factors included in the analysis include the following for outgoings and income.

The mix of potential applications per year to a revolving fund broken down by:

- Number of existing properties applying for retrofitting at a cost of US\$15,000 per property,
- Number of new property applications at a cost of US\$15,000 per property
- New developments of up to 50 properties at a cost of US\$120,000 per development
- New developments of up to 150 properties at a cost of US\$200,000 per development
- Commercial/Industrial properties at a cost of US\$50,000 per development.

Annual costs comprising salaries, accommodation, other running costs, grants and support. These were estimated at US\$500,000 per year inclusive of an amount of US\$200,000 for grants and other forms of support. These together with the above constituted the estimated annual outgoings from the fund.

The income generated by the fund was taken as being from two sources. First, the repayment of loans to applicants. As a baseline it was estimated that the interest rate would be 4% and these would be redeemed over 10 years. The second income stream was interest on accumulated capital, using an interest rate of 5%.

A 15-year period of analysis was used for the calculations. The table below illustrates the impact of different assumption of the demand on a revolving fund would have on the level of capitalisation. The level of capitalisation is the amount required to ensure that there are sufficient funds to meet the demand.

*Table 3: Estimated Capitalisation comparison*

Demand mix		Capitalisation	
Category	Number	Amount @ 10 year repayment period	Amount @ 5 year repayment period
<b>Retrofitting</b>	250	US\$71 million	US\$42 million
<b>New properties</b>	500		
<b>New 50 unit developments</b>	2		
<b>New 150 unit developments</b>	4		
<b>Commercial</b>	50		
<b>Retrofitting</b>	250	US\$66 million	US\$39 million
<b>New properties</b>	500		
<b>New 50 unit developments</b>			
<b>New 150 unit developments</b>			

Demand mix		Capitalisation	
Category	Number	Amount @ 10 year repayment period	Amount @ 5 year repayment period
<b>Commercial</b>	50		
<b>Retrofitting</b>	0	US\$9 million	US\$6 million
<b>New properties</b>	0		
<b>New 50 unit developments</b>	2		
<b>New 150 unit developments</b>	4		
<b>Commercial</b>	0		
<b>Retrofitting</b>	100	US\$20 million	US\$15 million
<b>New properties</b>	100		
<b>New 50 unit developments</b>	2		
<b>New 150 unit developments</b>	4		
<b>Commercial</b>	10		
<b>Retrofitting</b>	100	US\$25 million	US\$15 million
<b>New properties</b>	100		
<b>New 50 unit developments</b>	8		
<b>New 150 unit developments</b>	2		
<b>Commercial</b>	10		

The results in Table 3 illustrate several salient points. Firstly, the amount of capitalisation determines how many applications that can be considered. Secondly, the mix of applications has a significant impact on the number of properties that can be supported. Individual properties are more expensive to support than multi-unit developments.

Thirdly, the loan repayment period has a big impact on the level of capitalisation. A shorter repayment period significantly reduces the capitalisation requirement as the repayment income is higher, offsetting the growth in the lending portfolio and allows for a faster accumulation of capital. The faster accumulation of funds also means that there can be an earlier increase in the amount available for disbursement - though this facet was not explored.

The above analysis assumes the provision of grants and other service support of US\$200,000 per year. If this were to be increased to say US\$ 2 million per year then the required capitalisation would have to increase. For example in the first example, capitalisation would have to increase from US\$71 million to US\$78 million for a 10 year repayment period and from US\$42 million to US\$50 million for a five year repayment period.

The above is a relatively simplistic analysis which will need to be deepened and expanded to provide a more complete picture. However, that will require further engagement with prospective beneficiaries as well as the relevant Ministries to ensure that it addresses the country's needs. It does provide a first order estimate.

### *7.3 Operation and Maintenance Costs*

A basic estimation has been made as to what the cost of installing and operating a wastewater treatment facility might be for the various categories of users, in other words what would be paid. The cost estimation has been made based on the per unit cost of repayment of a loan, the per unit operation and maintenance costs based on a percentage of the capital cost, and a management fee. On this basis, as indicative only, the cost for an individual property owner is estimated at US\$350 per month dropping to US\$70 per month after repayment for a 5-year loan period. For a 50 unit development the corresponding monthly amounts would be US\$90 dropping to US\$50 after repayment, and for a 150 unit development the corresponding monthly amounts would be US\$65 and US\$40 respectively.

It is clear that individual property owners would not proceed with this kind of solution due to its extremely high cost. Thus, for this kind of users the focus should be in promoting their connection to a communal or centralised wastewater collection, treatment and disposal system. These systems could either be conventional or “condominial”, which requires community collaboration and is usually less expensive to build and operate.

## **8. Barbados Wastewater Fund**

### **8.1 Introduction**

In this section we consider the broader framework within which the wastewater sector might be supported financially, building on existing instruments. In this respect therefore, we include the Barbados Water Authority as well as the other potential beneficiaries identified in Section 3 to present an integrated approach to supporting the sector. Given the diverse challenges and range of scale of facilities that would be required, from large centralised wastewater treatment and reuse facilities to septic tanks, a financing system would have to be flexible enough to cater for the differing needs and demands. In the following sections we propose such an arrangement which incorporates a SEPREF/AFM as one component of an overall mechanism, which for simplicity we refer to as the Barbados Wastewater Fund (BW WF).

It is proposed that BWA would be served through a Credit Enhancement Facility which would receive a portion of the proceedings from the Garbage and Sewage Contribution (GSC) levy as well as contributions from the National Government. These contributions would be deposited into a “Reserve Account” that will cover any shortfall in payments of amortisation of loans taken by BWA from the financial institution managing the BW WF. This mechanism is proposed so the GSC funds can be leveraged, providing more resources to BWA to implement larger projects.

For other beneficiaries that would be implementing smaller projects, the proposal is to have a “Revolving Fund” (SEPREF/AFM) receiving inflow payments from the same sources

as the Credit Enhancement Facility, internally generated funds and eventual contributions from philanthropic entities and development financial institutions.

Entities would also be able to open Special Savings Accounts at the financial institution administering the BWWF and use them either as collateral for loans from the SEPREF/AFM or as a cash reserve to cover payments to a contractor following a payment schedule.

## *8.2 Funding Sources*

Several potential sources of funding have been identified and are discussed in following subsections. Some potential sources are proposed to be part of a fund accessible to any eligible beneficiary while others are more in the nature of proprietary funds that may grant the contributing party access to additional funds once certain conditions have been met. Alternatively they may serve as a savings account for the beneficiary to use the funds any time after a date agreed between the fund administrator and the beneficiary. The proposed sources of funding are:

- Contributions by the National Government
- Contributions by developers/communities and septic tanks maintenance companies
- Garbage and sewage contribution
- Contributions from development and philanthropic entities
- Internally generated funds

### *8.2.1 Contributions by the National Government*

Even though the government is committed to reducing and eventually eliminating its contribution from the Consolidated Fund to BWA, as the latter improves the efficiency of its operations, a portion of the savings may be contributed to the BWWF. Given that BWA may benefit from the BWWF an arrangement could be made such that efficiency gains may be rewarded by contributions equivalent to a certain percentage of the savings. These contributions may be kept into a special account within the BWWF to be used by BWA. This partial roll back of efficiency savings may serve as an incentive for BWA to

press-on with its efforts to improve efficiency while creating a dedicated flow of funds for BWA with the sole purpose of securing financing for wastewater management as well as targeting groundwater pollution reduction.

The government may also decide to make contributions to the fund that would be accessible to all eligible beneficiaries in a similar way as the United States Federal and State Governments contribute to the State Water Revolving Funds, creating a stable flow of funds that would allow the BWRF to leverage its funds at a certain point in time.

### *8.2.2 Contributions by developers/communities and septic tanks maintenance companies*

Communities and developers may make contributions towards Special Savings Accounts that may benefit from a special interest rate, if more detailed analysis shows this is possible. Alternatively, it may grant the account holder access to funds from the BWRF management institution once the Special Savings Account reaches a certain level of capitalisation, covering a pre-agreed portion of the investment the account holder plans to do.

### *8.2.3 The Garbage and Sewage Contribution*

The GSC is structured as a flat tax, although differentiated by category of user (“Domestic” and “Other”), and there is little to no justification provided for the amount being charged to users or explanation on how the proceeds will be employed (reference is made to the BWA Act Cap. 274A, which describes the general functions of BWA).

The following information on GSC was provided by BWA on income from the Sewage Levy portion of the GSC, amounts are in Barbados Dollars. Whilst there is no split between Domestic and Non-Domestic, based on an assumption of domestic connections the domestic contribution would be approximately Bds\$9,494,000. Based on the information provided it appears that an annual average income of Bds\$22 million is generated and available to BWA.

*Table 4: BWA Income from Sewage Levy portion of the Garbage and Sewage Contribution Levy*

Dates	08/2018-03/2019	04/2019-03/2020	04/2020-03/2021	04/2021-03/2022	04/2022-12/2022
Revenue	15,324,111	25,072,613	21,964,402	22,840,336	17,067,984
Payments	10,854,504	23,836,051	20,926,476	21,975,558	16,869,942

Even though the GSC allows BWA to finance some capital works after covering operation and maintenance expenses, it does not provide any certainty on the amount that would be available for funding investments in wastewater treatment facilities. There is also no specific funding to cater for the servicing of septic tanks of users that are paying the GSC and no funding for the pollution control functions that EPD carries out.

It is understood that there are discussions about reforming/revising the GSC, so the comments made here should be seen as contributions to the discussion. After computing the funds required to cover efficient operation and maintenance costs of the wastewater activities carried out by BWA, a determination could be made as to what amount would be required to:

Pay for a regular servicing of septic tanks and other on-site wastewater treatment or pre-treatment facilities, like grease traps; and

Fund the operations of a pollution monitoring and control office that will enforce the corresponding regulations.

After these determinations are made, the remainder of the proceeding of the GSC could be contributed towards the BWWF, with a portion going into BWA's Special Account within the BWWF, while the remaining portion would be deposited into the Revolving Fund Account described below.

The allocation of funds to specific categories of expenditures would provide certainty to the different parties, allowing them to confidently discharge their duties while, in the case

of BWA, creating the conditions for a potential leverage of funds through a credit enhancement scheme.

It is recognised that the Sewage Levy component of the GSC could be an important source of contributory finance for the BWf and would certainly ensure the sustainability of the fund. However, it should not be taken as a given that the GSC would be used for these purposes. This would have to be subject to discussion and agreement. But on the other hand its use as a contributory source to a revolving fund has already been mooted by the Prime Minister in the 2021 Budget Speech. As will be discussed below, GSC contributions could be limited to the Credit Enhancement Facility within the BWf. Furthermore, attention is drawn to the fact that the calculation of the required capitalisation, does not make any assumptions that there would be a contribution from the GSC. Other sources of finance, as discussed below may offset the need to utilise GSC

#### *8.2.4 Contributions from development and philanthropic entities*

Different stakeholders may obtain contributions in the form of grants or concessional financing to increase the funding of the BWf. The contributing party may have specific preferences as to how to channel their funding, although it is advised that, as much as possible, funds from this kind of contributor be held in the Revolving Fund Account.

#### *8.2.5 Internally generated funds*

The administrators of the BWf may seek to generate revenue from different sources as they see fit and permitted by laws and regulations. Typical sources of internally generated funds are:

Interest revenue from loans made to beneficiaries,

Revenue generated by the sale of financial instruments, generally bonds, secured by the regular flows from sources like, in this case, a portion of the GSC and the portion of the efficiency savings contributed by the national government, and

Return on investments made following the guidelines and regulations governing the BWWF activities.

### *8.2.6 Other sources*

There are potentially others sources of income resulting from fines and charges levied under the Water Reuse Act and the Marine Pollution Control Act and Regulations. There are precedents for using the like, for example under regulations governing solid waste. However, the use of any funds resulting from the imposition of fines and charges to support wastewater management would require the enactment of regulations governing the payment and use of the funds. It may be noted that hypothecating funds in this manner is not usually popular with ministries of finance.

## *8.3 Barbados Wastewater Fund Accounts*

### *8.3.1 Credit Enhancement Fund*

This account would be funded by government contributions and a portion of the proceedings of the GSC and is intended for the exclusive use by BWA to finance wastewater schemes.

Given that the kind of projects to be supported by this account and that the sources of funding are somewhat guaranteed and should have limited variability over time, particularly to the downside, it is possible to conceive of the use of this predictable revenue stream as security to establish a credit enhancement facility allowing for the leveraging of the contributions in a similar way as the K-factor revenues are used in Jamaica.

Arrangements may be made with the commercial bank managing the BWWF to deposit the proceedings of both contributions into a Reserve Account that would cover any shortfall in repaying loans taken from this commercial bank. In the Jamaican experience it was possible to get a four to one leverage of the funds deposited by the National Water Corporation, so it could be expected that a similar arrangement, even at a lower leverage

ratio, would cover any reduction in the monies currently available to BWA for financing of capital works<sup>8</sup> and probably increase that amount.

Efforts should be made to secure the participation of more than one commercial financial institution in a competitive process to select the administrator of the BWWF and the prospective establishment of this kind of scheme may be an incentive for them to participate, as this will provide an opportunity to make low risk loans to BWA, thus securing a source of interest revenue for the BWWF administrator.

### *8.3.2 SEPREF/AFM Account (Revolving Fund)*

This account would receive contributions from the GSC and from the government, internally generated funds and eventual contributions from philanthropic entities and development financial institutions. Loans from the revolving fund account would be granted to those applicants whose projects are approved by an assessment committee, demonstrating repayment capacity, contributing to pollution reduction objectives improving wastewater management and wastewater reuse, and complying with other fiduciary requirements.

Borrowers from this account could be developers, communities, operators or managers of wastewater treatment facilities and septic tanks maintenance companies. They may borrow directly from this account or complementing funds from the Special Savings Accounts described in the following subsection. Borrowers will have to provide required guarantee instruments. It might be possible to use the amounts in the Special Savings Account as collateral for loans if finding a satisfactory guarantee instruments proves to be difficult or too expensive for the prospective borrower.

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<sup>8</sup> The potential reductions to the funds available to BWA from the GSC are related to the other uses proposed for some portions of the GSC like funding of the pollution monitoring and control entity, payments to septic tanks maintenance companies and the contribution to the revolving fund within the BWWF.

### *8.3.3 Special Savings Accounts*

Beneficiaries of this kind of accounts, which would be the same groups as for the SEPREF/AFM Account, would be able to contribute funds regularly to an account opened in their name at the financial institution acting as administrator of the BWWF. These beneficiaries would agree with the administrator a timeframe to make contributions and to achieve a certain capitalisation of the account that will be equal to an agreed portion of the total investment to be made by the beneficiary. Once the final date of this timeframe is achieved, beneficiaries may start drawing from these funds, for instance, to make payments to a contractor while they continue making regular contributions to the account following a schedule of contributions and payments that would keep a positive cash balance in the account) or may use the funds in the account as collateral for a loan from the revolving fund. At this point, the beneficiary will start repaying the loan while using the collateral to cover any shortfall in any repayment of the loan in a similar way as described for the Credit Enhancement Fund above.

## *8.4 Relationship between BWWF Components*

This subsection aims at explaining the different flows of funds that would feed into the proposed financing mechanism and how the beneficiaries may draw funds from it. Three configuration options are put forward for consideration. The difference between the three options is in whether there is allocation of funding to pollution monitoring and control and to septic tank servicing companies. .

At the left top corner the Garbage and Sewage Contribution (GSC) is represented by a multicoloured block representing the different existing and proposed components of the GSC. The component allocated to garbage collection and disposal (orange block) which is transferred to the Sanitation Service Authority by BWA. BWA is responsible for billing and collection of the GSC. No further consideration will be given to the garbage collection and disposal part in this report.

### 8.4.1 Option 1 Full Configuration

This option includes the financing from the Sewage Levy of the GSC of enhanced pollution control and monitoring as well as support to septic tank service providers. In the case of the pollution control and monitoring this would be carried out by EPD hence there would be a transfer of funds for this function. The funds would be used to increase the resources and capacity of EPD to regulate all wastewater treatment plants and service providers (public and private sector). The funds would also be used to support septic tank service providers and would entail an arrangement between the service providers, BWA and EPD to ensure that the service provided contributes to improved wastewater management. Figure 4 below shows the different entities and the flows that may take place between them.

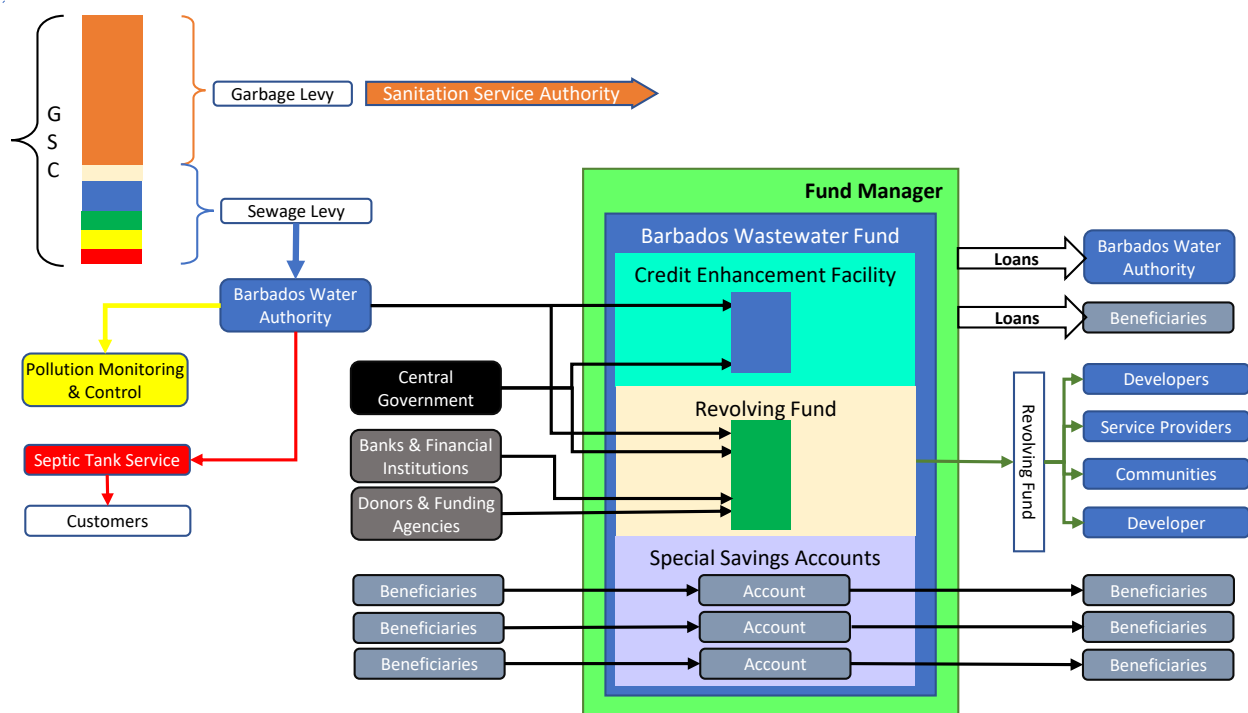


Figure 4 - Flows of funds related to the BWWF - Option 1

The funds corresponding to the “Sewage” part of the GSC would be divided in five portions. BWA would retain the funds allocated to cover its operation and maintenance expenses

(light yellow block). Then, BWA will transfer to the Pollution Monitoring and Control Unit the funds allocated to that function (bright yellow block).

It is proposed that BWA will organise a septic tank maintenance service enrolling Septic Tanks Servicing companies that will provide regular service to customers and get paid by BWA (red block), after controlling for the number of services provided or volume of sewage retrieved from septic tanks.

The remaining funds would be transferred to the bank administering the BWWF. A first amount would be transferred to the Credit Enhancement Facility within the BWWF (blue block) to be kept in a reserve account as guarantee for loans taken from the financial institution managing the BWFF (note that these loans are not made by the BWWF, but by the financing institution managing it). The final transfer (dark green block) is made by BWA to the SEPREF/AFM (Revolving Fund) as source of funding for future loans made by the BWWF, as it is described below.

The central government would also contribute to these two components of the BWWF, the Credit Enhancement Facility (blue block) and the Revolving Fund (dark green block). It is proposed that these contributions would be funded by a portion of the savings derived from efficiency gains achieved by BWA, but the government may conceive other mechanisms to fund this contributions, if this idea is adopted.

There may be contributions by philanthropic or development entities to the BWWF as well as financing from local financial institutions such as commercial banks and credit unions. In the scheme it is assumed that these contributions will add to the Revolving Fund component of the BWWF to increase the lendable funds to entities different than BWA, as the needs for support is widespread beyond the reach of BWA wastewater collection networks.

Continuing with the upper portion of the diagram, this shows that BWA would be able to take loans from the fund manager managing the BWWF using the Reserve Account within the BWWF as guarantee, thus leveraging those funds. Once BWA takes a loan, the transfers made to the BWWF by BWA (first blue block) will be first applied to pay the

corresponding loan amortisation instalment and any remaining amount would accrue into the Reserve Account.

Any entity aiming at implementing an eligible project could approach the BWWF and apply for a loan from the Revolving Fund. These entities will have to repay the loans received making the funds paid back, including interest available for new loans.

Special Savings Accounts would be opened by entities willing to start building capital towards the implementation of an eligible project. It is envisaged that these accounts could be used in two different ways, but in any case, an agreement should be reached between the two parties as to the amount to be considered as the “threshold amount” that would allow for the beneficiary to start using the accrued funds in one of the two ways described below. As the beneficiaries may find ways to accelerate their contributions into the Special Savings Accounts making it difficult for the bank to anticipate the time the funds will sit in the account, a minimum retaining period would be set as well to give more predictability to the flow of funds into and out of each account. A minimum monthly contribution could also be a condition of this kind of accounts.

Once the conditions for availability are fulfilled, the beneficiary may opt to take a loan from the bank offering the savings as collateral or start drawing from the account to make payments to a contractor following a deposits and payments schedule agreed with the BWWF and the contractor. It can be noted in the diagram that “Beneficiaries” (grey block) is shown at the top right under BWA as a borrower from the fund replicating the credit enhancement approach used by BWA, while the lower right portion of the diagram shows the other beneficiaries drawing from their Special Savings Accounts to pay contractors and suppliers.

#### *8.4.2 Option 2: Support for Pollution Control and Monitoring Only*

In this option, no funding support would be provided for septic tank service providers. Thus more funds would be available to support the other activities, as this could save

approximately US\$600,000 per year<sup>9</sup>. All other arrangements described above would remain the same including funding pollution control and monitoring as for Option 1. The arrangement and flow of funds are shown in Figure 5. The red block which indicated the funds for the septic tank service providers has been removed.

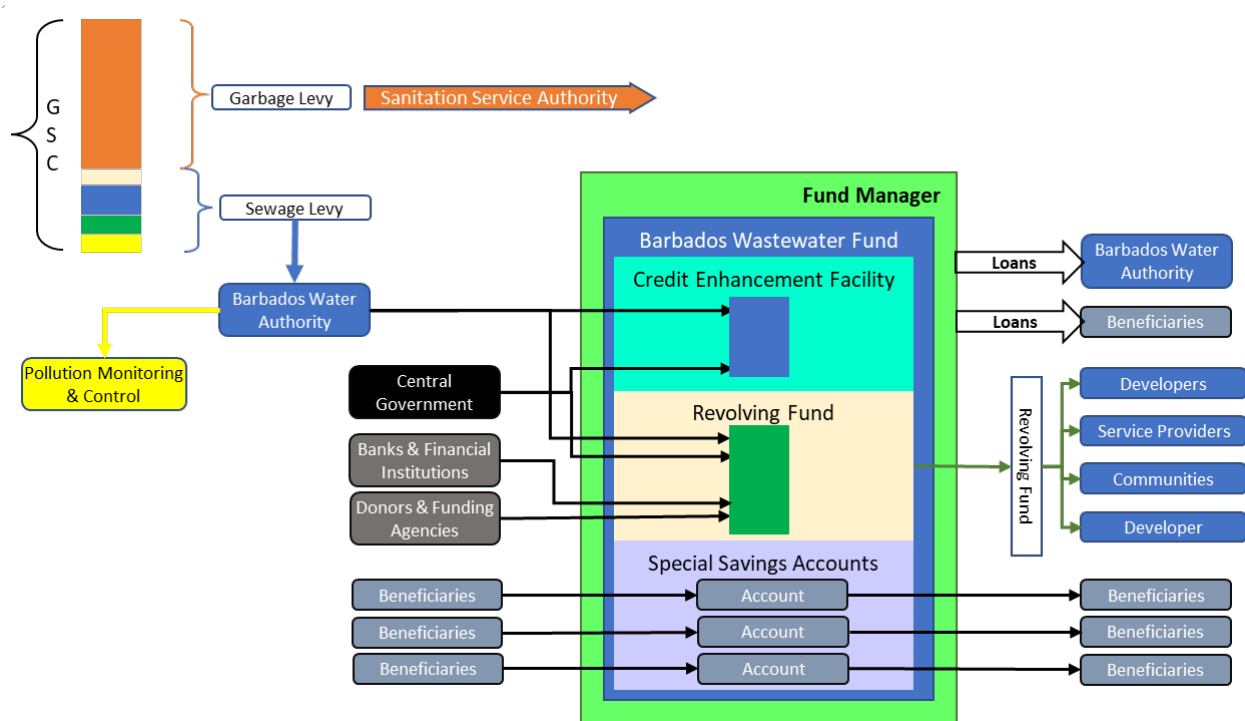


Figure 5: Flows of funds related to the BWWF - Option 2

### 8.4.3 Option 3: All Funding to BWWF

In this option there is no funding for support to septic tank service providers or for additional support to enhance pollution control and monitoring. All funds would go towards the BWWF, as shown in Figure 6. All other arrangements for the flow of funds remain as described in section 8.4.1 as Option 1. The red and bright yellow blocks which indicated the funds for the septic tank service providers and for pollution control and monitoring have been removed.

<sup>9</sup> This is based on a housing stock not connected to a sewer of 70,000. It assumes a 5 year emptying cycle, and that 25% of properties have a septic tank. Emptying costs are US\$200/1000 gallons. This is a first order estimate for indicative purposes only.

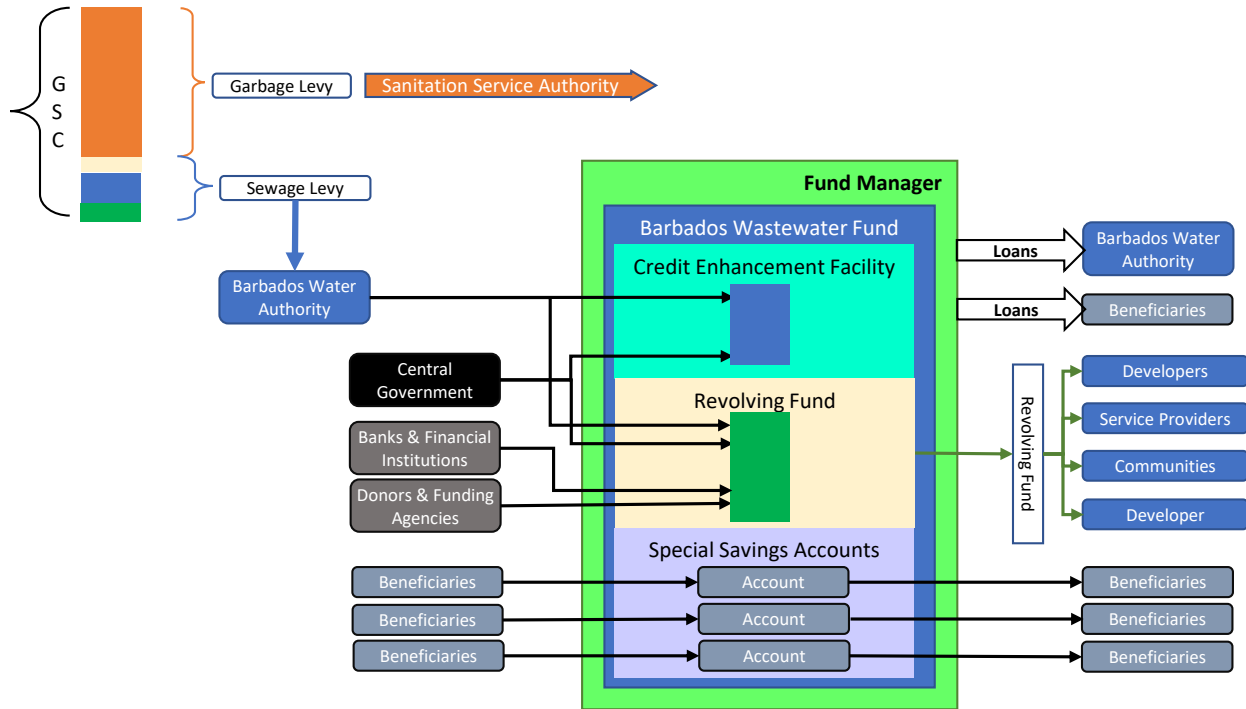


Figure 6: Flows of funds related to the BWWF - Option 3

### 8.5 Double Charging

One of the challenges facing the operation of the BWWF is the issue of double charging. The GSC is levied on all BWA customers for the stated use “towards the operational costs of the sewage system maintained by the Authority”. So in other words instead of only those connected to a public sewer being charged, everyone gets charged irrespective of whether they benefit from the provision of the wastewater system or not. Those who are not connected yet who make use of a wastewater service, be it a septic tank or a decentralised or package treatment plant have to pay an additional fee for that service. Put simply, they are being charged twice.

By creating a regulation-driven market for the provision of wastewater services in new developments, the numbers who would incur the additional financial burden for enjoying the wastewater service will increase. They would incur additional outgoings through property management arrangements to cover the cost of installation and operation. The perceived inequity of the situation is likely to become a source of discontent. Whilst new developments may have little choice, most existing properties would avoid paying twice

by electing not to install wastewater systems, even if there was low cost financing available. The issue is therefore how to reconcile the collection of the Sewage Levy with a drive to increase wastewater coverage while not financially penalising those not connected to a public sewer.

One way would be to make BWA responsible, either directly or indirectly, for rolling out wastewater services to every consumer and community across Barbados. BWA would neither have the organisational capacity or access to the level of financial resources to do this within a reasonable timescale. An alternative but perhaps more challenging alternative would be to discourage new developments on greenfield sites outside of Greater Bridgetown. Instead, developments in areas which BWA's existing sewage collection systems could be extended to such as Greater Bridgetown and areas in Christ Church which could be connected to the South Coast Plant could be encouraged. This would be a policy decision, which could be achieved through amendments to the planning system. New development residents would therefore not be subject to double charging whilst BWA would be drawing on the Credit Enhancement Facility. Eventually, this could be expanded to take in the West Coast as well.

For those individuals and developments that would fall outside of the expanded sewage collection areas there remains the issue of double charging. Under these circumstances some financial compensatory mechanism would need to be put in place that would alleviate this hurdle. Options might include tax rebates or reduced water bills. However, all measures would have downsides. This report cannot resolve this issue and does suggest that this matter needs further detailed consideration to assess the financial and economic opportunities.

## 9. Needs Assessment

### 9.1 Administrative Needs

Whilst the administrative needs are contingent on the actual format of revolving fund there are matters that need to be addressed irrespective of the format.

The format of the fund will have to be agreed upon by the potential stakeholders. These include relevant government Ministries, such as the Office of the Prime Minister, Ministry of Finance Economic Affairs and Investment, Ministry of Environment and National Beautification, Green and Blue Economy, and Ministry of Transport Works and Water Resources, potential investors in the fund, the Central Bank and the Financial Services Commission would have to be brought together. This would involve a series of meetings to agree on the salient details concerning the fund, its purpose, and its management. Matters such as the source of funds; the primary uses of the fund e.g. for loans, grants, technical and financial advice, and training; what entities can apply; staffing levels and expertise; the composition of advisory and approvals boards; powers duties and responsibilities of the fund's officers; application and disbursement procedures, corporate and social responsibility reporting, and accountability and transparency arrangements would have to be developed and agreed upon.

Once agreed upon formal application could then proceed to establish the legal existence and identity of the fund through registration and incorporation under existing legislation and to ensure compliance with the various international financial controls.

The development of what can be called the Terms of Reference for the fund covering the above would require the input of a management consultant to manage and coordinate the process.

### 9.2 Financial Needs

Sections 7.2 and 7.3 provide a preliminary insight into some of the financial considerations affecting the operation of the fund. There are important decisions that need to be made,

agreement on the level of capitalisation of the fund, the source of funds, scheduling of contributions and the actual format of the fund itself - how it operates. Answering these questions will be an outcome of a process of engagement with potential funding financial institutions and detailed financial modelling, taking the various financial instruments available into consideration. This would enable matters such as the size of the fund, the size of loans and grants, interest rates, capital investment portfolio and strategies, risk and default management strategies.

These matters can be incorporated into the remit of the management consultants. A model for this exists in the development of the Caribbean Water Utilities Insurance Company which was initiated by IDB Invest and made use of the services of a management consultant.

### *9.3 Technical Needs*

Whilst the purpose is primarily to fund the improvement of wastewater management through the provision of infrastructure and its management this must be complemented by ensuring that it is the most appropriate infrastructure and management that is being supported. This calls for the ability to set standards, appraise proposals and offer constructive advice on proposed technological solutions, ensure the competence of operators, have in place robust monitoring mechanisms, identify deficiencies, and have regulations that sanctions failure of compliance.

In respect to this later point, it is proposed that there should be discussions regarding what actions might be taken in the event of persistent operational failures or financial failure. Whilst it might be argued that BWA could be 'the operator of last resort' the matter needs to be examined to ensure that this position is not abused.

With respect to the other technical points, most are or can be covered under existing legislation and in particular through the Planning and Development (Amendment) Act 2020 which established the Design and Engineering and Environmental Impact Assessment Committees. Both committees can establish ad hoc committees which can co-opt expertise as necessary to address particular matters of concern. Consideration

could be given to the development of further regulations that would specifically address matters such as the licensing of plant and operators, inspection regimes, training and qualification requirements, monitoring and reporting requirements, and measures to address non-compliance (These are issues that were investigated in the first CReW project).

During the course of this consultancy, engineers and operators have pointed out the deficiencies, as they see them, of the present system. Paraphrasing these concerns, they are a lack of consistency in application appraisals and the monitoring and regulation of operators. Addressing the points put forward above would go a long way to meeting these concerns.

The major assumption in all of this is that the Government of Barbados is serious in putting in place and implementing regulatory requirements that underpin the development of a market for the provision of wastewater infrastructure and its management for new planning and development applications and encouraging and supporting its uptake in existing properties and developments.

## ***10. Other Considerations***

### ***10.1 Pollution control fees***

Enforcing pollution control regulations is a critical first step to inducing polluters to act and reduce or fully eliminate the causes of pollution. However, with limited funding, authorities face challenges in exercising effective regulation. If these regulatory functions could be better resourced, then it becomes easier to exercise monitoring control and enforcement actions.

As this pollution come from dispersed and varied sources and all of the population and the environment are affected by it, it is logical to think that all sections of the population should contribute to resolving the problem. Given that the GSC is charged to almost all

water users and that water services coverage is quite large, it is proposed that a portion of the GSC could be used to support the pollution monitoring, control and enforcement activities.

## *10.2 Banking sector*

Our research shows that private sector credit continues to contract, with liquidity in the banking sector increasing. Banks have highlighted the limited opportunities for bankable projects, which, coupled with trending up deposits, have buoyed liquidity and pushed down the loan-to-deposit ratio.

A scheme like the one proposed in this report allows for leveraging GSC and other contributions to the BWWF by loans from the bank in charge of the Fund creating an attractive opportunity for reversing the downward trend in the loan-to-deposit ratio. This, in turn, should also increase the interest of banks in submitting proposals to manage the BWWF. More competition in the selection process may lead to lower cost to the BWWF as management fee.

# **11. Conclusions**

Inadequate management of sewage and wastewater effluent discharges have been contributing to increased nutrient loadings of groundwater and nutrient flows into the marine environment. If Barbados is to address these causes and at the same time meet the international obligations including the control of land-based sources of marine pollution, then action will have to be taken. The envisaged actions include the upgrading of wastewater management systems by the public sector and the private sector, putting infrastructure and management systems in place to achieve this. Achieving this will require significant financing and it cannot be expected that this will all be undertaken by the public sector. The private sector bears some of the responsibility and therefore must be part of the solution, which includes mobilising funds and adopting best wastewater management practices.

This cannot be achieved without having in place the requisite regulatory drivers requiring the installation and operation of wastewater systems a requirement in new developments and providing incentives for existing properties. Fortunately, Barbados has been developing and putting into place the necessary regulatory drivers that are serving to create a market for wastewater management services. What is needed now is to develop financing mechanisms that can support and ameliorate the financial burden of their provision.

This report has demonstrated that, as stated, the necessary regulatory market drivers are in place or if not soon will be. It has identified the potential beneficiaries and provided an estimate of potential demand over a 10-year period. Based on this a calculation has been made of the level of capitalisation that would be required. This analysis demonstrates that capitalisation is sensitive to two main factors, being the level of annual demand for financing and decisions on the period of loans. An initial capitalisation of US\$20 million could be considered, based on the analyses.

In order to meet the financing needs an administrative structure for a proposed Barbados Wastewater Fund (BWVF) has been put forward. Broadly this would consist of a Credit Enhancement Facility, a SEPRF/AFM (revolving fund), and Special Savings Accounts. Together these would provide an effective set of financial instruments that would sustainably support Integrated Wastewater Management in Barbados. The structure proposed is based on similar instruments.

This report provides a prospective structure as to how Barbados might go about putting in place the conditions to support improved wastewater management. As the Needs Assessment points out, this is just a starting point and much more groundwork needs to be done. However, there is sufficient evidence to suggest that there is a need and there are the means to address the need. Indeed, if Barbados is to achieve its sustainable development, it has to tackle the issue of wastewater.

# Appendix 1: Survey Questionnaire

1. Question 1: We want your opinion as to what institution(s) you think would be best suited to offer or administer a **Revolving Financing Mechanism**

Mark only one oval per row.

	Very suitable	Suitable	Unsuitable	Very Unsuitable	Don't Know
<b>Cooperatives and Credit Unions</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Registered company</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Public-Private partnership e.g. Enterprise Growth Fund</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Statutory Authority or Ministry</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Green Investment Bank</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Other</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

2. If 'Other' can you please expand.

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3. Question 2: Now we would like to hear whether or not your institution might be interested in either investing in a fund or would consider offering its own financial product that would support wastewater management - both with suitable support.

*Mark only one oval per row.*

	Very Likely	Likely	Unlikely	Not interested	Don't Know
<b>Invest in a revolving fund</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Manage a revolving fund</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Offer own financial product</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4. Question 3: Are there other services or products that might be 'wrapped up' with or included in a revolving fund loan or grant? These might be:

Mark only one oval per row.

	Yes	No	Maybe
<b>Capacity Building e.g.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
◦ <b>Training</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
◦ <b>Certification</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
◦ <b>Internships</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Grants e.g.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
◦ <b>Feasibility and other studies e.g. proposal development and applications</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
◦ <b>Exchanges, conference and workshop</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

5. If you answered 'Other' above, can you share your suggestions.

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6. Question 4: Do you have concerns regarding the setting up and operation of a Revolving Financing Mechanism for supporting wastewater management. For example, do you think it is necessary or not? \*

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7. Question 5: What sort of further information if any would you like to have that would help you decide if you would be interested in a participating in any way in a revolving financing mechanism for supporting wastewater management?

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**About you and your Organisation**

We would like to have some background information on you and/or your organisation.

8. What is the name of your business or institution? \*

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9. What is the nature of your business or institution? \*

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