



REQUEST FOR PROJECT/PROGRAMME FUNDING FROM THE ADAPTATION FUND

**An integrated approach to physical adaptation and community resilience in
Antigua and Barbuda's northwest McKinnon's watershed**

Submitted by the

**Department of Environment
Government of Antigua and Barbuda**

Accredited National Implementing Entity to the Adaptation Fund



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ADAPTATION FUND

PROJECT/PROGRAMME PROPOSAL TO THE ADAPTATION FUND

Project/Programme Category:	Program
Country:	Antigua and Barbuda
Sectors:	Coastal Infrastructure, Buildings and Environment, Livelihoods
Title Of Project/Programme:	An integrated approach to physical adaptation and community resilience in Antigua and Barbuda's northwest McKinnon's watershed
Type Of Implementing Entity:	National Implementing Entity
Implementing Entity:	Department of Environment Ministry of Health and The Environment
Executing Entity:	Department of Environment
Amount Requested:	US\$10m

Project Background and Context:

Geographical Context

Antigua and Barbuda is a twin-island state located in the eastern region of the Caribbean Sea (Figure 1). Most of the country's land area consists of two large islands – Antigua and Barbuda – with a number of smaller inhabited and uninhabited islands. The islands lie on a 3,400-km² sub-marine plateau and have an exclusive economic zone of approximately 110,071 km² – significantly larger than Antigua's landmass of 280 km². Antigua is fringed by 25 km² of coral reef on its north, east and south coasts, and by sandy beaches on the west coast, all of which are vital to the country's tourism and fisheries sectors. Barbuda is a flat coral island with an area of 161 km², predominantly consisting of limestone flats.

Antigua's topography is varied, comprising three distinct geological zones: i) a mountainous region of volcanic soils in the southwest; ii) central plains of clay-like soils stretching to the east; and iii) limestone hills in the north. The highest point of the island is Mount Obama at 402 m, located on the southwest corner of the island.



Figure 1. Geographical location of Antigua and Barbuda in the Caribbean¹

Socio-economic Context

Antigua and Barbuda's population is approximately 91,000 (2014)² and is anticipated to reach 115,000 by 2050³. In 2012, 70% of the population was classified as rural, with 30% as urban⁴, with a trend towards increasing urbanization. Antigua and Barbuda is considered to be an upper middle-income country by the World Bank, where ~14% of the population live on less than US\$7 per day⁵. This is the second lowest poverty level among English-speaking nations in the Caribbean.

Historically, Antigua and Barbuda had an agricultural economy of primarily sugar and rum – from 1632 to 1981 Antigua and Barbuda was a colony of England. In 1981, it gained independence but remained a member of the Commonwealth⁶. While historically agricultural, Antigua and Barbuda's current economy is based on a service industry, with tourism contributing approximately 60% to the GDP⁷. Consequently, the economy is largely reliant on foreign exchange through visiting tourists. The islands' many beaches and areas of high biodiversity are among its numerous attractions. Agriculture now contributes about 3% of GDP, mostly through the fisheries subsector⁸.

¹<http://www.unep.org/greeneconomy/AdvisoryServices/CaribbeanGreenEconomy/tabid/105702/language/en-US/Default.aspx> Accessed 28 December 2015.

² <https://www.cia.gov/library/publications/the-world-factbook/geos/ac.html> Accessed 04 June 2014.

³ United Nations, 2013. World Population Prospects. The 2012 Revision Volume 1: Comprehensive Tables.

⁴ <http://data.worldbank.org/country/antigua-and-barbuda> Accessed 10 June 2014.

⁵ Poverty Reduction and Human Development in the Caribbean: Addressing the Millennium Development Goals, Caribbean Development Bank - Special Development Fund (SDF) 7, July 2008.

⁶ https://www.princeton.edu/~achaney/tmve/wiki100k/docs/History_of_Antigua_and_Barbuda.html Accessed 19 May 2014.

⁷ Global Water Partnership Caribbean. (2013). The Post 2015 Water Thematic Consultation: Antigua and Barbuda.

⁸ Office of the Prime Minister, 2001. Antigua and Barbuda's Initial National Communication on Climate Change.

In 2009, Antigua's economy was severely affected by the global economic crisis. From 2009 to 2011, there was a steep decline in tourism arrivals, which severely impacted employment opportunities within the country's private sector and placed pressure on the Government to absorb the persons displaced within this sector. Antigua and Barbuda's GDP in 2013 was an estimated US\$1.1 billion with a growth rate of 1.7%⁹.

The economy and the international credit rating of the Government and the local credits options available to many citizens (especially those working in sectors vulnerable to hurricanes and drought) have been negatively impacted by over six hurricanes and three droughts in the past 15 years. Although the impact of extreme weather events is not carefully documented, the impact is felt on the ground and is causing severe hardship for the country. With limited financing options, Government authorities tend to rely on higher domestic financing (mostly government securities) and arrears, to recover from natural disasters and to withstand global downturns in tourism. At the end of 2014, Antigua and Barbuda's debt-to-GDP had increased to 98.7 percent of GDP¹⁰.

Adaptation measures for SIDS are expensive, with significant cost implications for both the Government and its citizens. Adaptation costs for many buildings and services, such as homes, churches, schools, clinics and hospitals, emergency response, supermarkets, and the Public Utility's desalination plants, are being borne by the Government and its citizens. The high cost of finance and limited access to financing for private citizens is becoming increasingly limited, resulting in higher levels of vulnerability. This affects all classes of citizens, both public and private, and especially marginalized groups.

Environment, Climate Change and Ecosystem-based Adaptation

The country has been experiencing extended severe drought beyond norms over the last century, and this is occurring at a detriment to the tourism-based economy. Whereas in the past water supply originated from rainfall accumulated in wells and surface water, this supply is insufficient to meet present day demands. In addition to the more frequent drought periods, sea level rise has resulted in the forced abandonment of wells in coastal areas due to salt-water intrusion¹¹. To cope with water shortages, five desalination plants have been installed on the island. In recent extended drought years, as much as 100% of the national water supply was sourced from reverse osmosis. The production of this water is electricity dependent and uses imported fuel. Fresh water and reliable energy are the foundation of the economy and the health care system, and this water-energy co-dependency has resulted in a double exposure to extreme weather events and fuel price volatility, heightening vulnerability at the national and community levels.

⁹ <https://www.cia.gov/library/publications/the-world-factbook/geos/ac.html> Accessed 9 June 2014.

¹⁰ IMF, 2015. IMF Executive Board Concludes the Third Post-Program Monitoring discussion for Antigua and Barbuda. No. 15/244, May 29. <https://www.imf.org/external/np/sec/pr/2015/pr15244.htm> Accessed April 9, 2016.

¹¹ Office of the Prime Minister. 2016. Antigua and Barbuda's Third National Communication on Climate Change.

Financing Concrete Adaptation

A priority adaptation measure for Antigua and Barbuda is to build resilience in the water and energy sectors. To address regular disruptions to their water supply, many homes and businesses have purchased small generators to function when grid electricity is unavailable. Many families however cannot afford these investments and remain vulnerable to both energy and water disruptions, which, when combined, significantly increase a family's vulnerability. After a storm, the electricity grid can be interrupted, depending on the magnitude of the event, for anywhere between 2 weeks (as experienced after Category 1 Hurricane Gonzalo in October 2014) to 3 months (following Category 4 Hurricane Luis in August 1994).

Given its small island developing state context, the “private sector” in Antigua and Barbuda includes homeowners, micro and small businesses, and other small-scale enterprises. A private sector assessment conducted by the Inter-American Development Bank (IADB) in 2013 found that access to finance was a critical challenge to private sector development. The report determined that:

Given the important role played by finance in the development process, the country's poor ranking in terms of access to credit represents a significant risk to private sector development and growth... Antigua and Barbuda has attempted to fill the credit void through the establishment of a national development bank, but the credit needs of the private sector significantly outstrip the available resources.¹²

The difference between the interest rate charged by banks on loans and the interest rate paid by banks on savings deposits – the “interest rate spread” – is 8 percentage points in Antigua and Barbuda, and is one of the widest among its comparator group of countries globally¹³.

The **problem that this project seeks to address** is that current financing needs for adaptation are not being met. The government is unable to meet needs for climate change adaptation measures – implementing the country's Intended Nationally Determined Contribution (INDC) adaptation targets alone are projected to cost \$20M USD per year for the next ten years¹⁴. As a result of a lack of financing, on-going adaptation efforts are not effectively protecting Antigua and Barbuda's vulnerable communities against predicted climate change impacts. The main problem is that the country's economy is not generating adequate resources for the Government to fund adaptation. The country is currently accessing an IMF program to assist with economic recovery, following the global downturn and the 12 major storms and hurricanes that hit Antigua and Barbuda between 1994 – 2014. Individual property owners are often forced to self-finance their own adaptation interventions as well as disaster recovery measures.

¹² IADB, 2013. Private Sector Assessment of Antigua and Barbuda, p. 15.

<http://www.caribank.org/uploads/2014/11/2014-Antigua-and-Barbuda-PSAR.pdf> Accessed 4 May 2016

¹³ IADB, 2013, p. 15.

¹⁴ Antigua and Barbuda's Intended Nationally Determined Contribution. Communicated to the UNFCCC on 15th October 2015. <http://bit.ly/1M40gsG> Accessed 7 April 2016.

Further, there are limited financing options available for individuals, communities and businesses to access funds to implement ecosystem maintenance or restoration in the face of climate change. If the community is prone to flooding, for example, a property's value will be reduced, and the risk to financing is high. Banks are therefore reluctant to lend to these customers, who are then further exposed to the impacts of climate change without financial means to carry out concrete adaptation measures. This failure to adapt to projected climate change impacts will continue to undermine the investments of government, donor organisations – including non-governmental organisations (NGOs) – and the private sector if ecosystems and infrastructure are unable to withstand extreme weather events.

The **proposed solution to the problem** is to promote the implementation of cost-effective adaptation measures by implementing adaptation in the environment and in the community, building both natural and social adaptive capacity at the same time. This can be achieved by: i) implementing adaptation in the watershed and waterways, such as climate resilient drainage systems; 2) a “soft” loan program for home and business owners for adaptation; 3) providing grants to the community and NGOs to get their buildings ready for climate change, where upgraded community buildings can serve as hurricane shelters, community cisterns as emergency water reserves, and learning centers to strengthen social capital; and 4) to provide the community with the skills and capacity they need to maintain the waterway by themselves, with assistance and in partnership with the Government of Antigua and Barbuda.

Microfinancing, credit unions, financial cooperatives and other inclusive financial systems have been successful in creating economic growth and reducing poverty for borrowers, while also offering financial and social incentives to lenders¹⁵. To date, microfinancing initiatives in the Caribbean have been mainly used to fund economic activities such as housing, farming and small manufacturing¹⁶.

Using such financing mechanisms to fund adaptation activities provides a novel approach to climate change adaptation in Antigua and Barbuda. Furthermore, innovative financing in addition to ecosystem-based adaptation can result in cost-effective adaptation interventions to improve climate resilience by securing multiple benefits for vulnerable communities and sectors¹⁷.

Significant barriers to achieving the implementation of adaptation targets identified Antigua and Barbuda's climate action plan (INDC) are: i) limited financial resources available within a SIDS small market and tax base; ii) insufficient historical demonstration to policy makers of the benefits of cost-effective adaptation interventions focused on ecosystems; and iii) few institutions and donors that are willing and technically capable of piloting a revolving loan funding mechanism.

¹⁵ Carlton *et al.* 2001. *Microfinance in Uganda*. Lechner, Reiter und Riesenfelder Sozialforschung OEG, Vienna.

¹⁶ Jamaica Observer. 2011. *Microfinance in the Caribbean*.

¹⁷ Nicholls *et al.* 2007. Ranking port cities with high exposure and vulnerability to climate extremes—exposure estimates. OECD Environmental Working Paper no. 1. OECD, Paris.

This proposed project will **overcome the above barriers** and document the results as best practices that can be used for all small island developing states. The Department's qualitative assessment of the private sector, including homeowners, through consultations and past experience, in addition to the quantitative assessments conducted by the IADB and others, demonstrate that the private sector has insufficient access to credit, forcing investments to be mainly self-financed. This evidence confidently suggests that the SIRF Fund initiative to improve concessional financing for adaptation interventions with sustainable development co-benefits will be met with a high demand on the northwest coast of Antigua – one of the areas experiencing growth and zoned as a key settlement expansion area.

Some preliminary indicators on project impacts include:

- 5 percent of homes are equipped with 2 weeks' worth of water stored on-site with filtration and pump equipment
- 5 percent of homes (approximately 200) benefit from the installation of hurricane shutters and rain water harvesting
- The number of persons requiring shelters during droughts is reduced by 50 percent, with priority for vulnerable populations including single mothers, older persons and children, particularly special needs children
- 5 percent of vulnerable homes and 30 percent of shelters have back up energy using renewable energy (for essential services including pumping water)
- McKinnon's waterway can withstand a 1 in 50-year extreme rainfall event
- Mosquito larvae in water bodies in the area are reduced by at least 30 percent
- 40 percent of the families and businesses are exposed to the public awareness knowledge products of the project
- Three community groups are trained in the management and maintenance of the adaptation interventions in the waterways
- Physical planning in local area is updated to reflect new findings of the IPCC AR5 report and regional climate modelling

Financing Adaptation in a "4 Degree world"

The private sector and communities are bearing the costs of climate variability by borrowing at high rates to meet adaptation needs for their businesses and homes. Local borrowing for the private sector can only take place if the value of the property can be held as collateral. Further, interest rates are at 8% and above. In many communities however, even at these high costs to individuals, community groups and businesses cannot access the needed capital since they do not qualify for loans. With the World Bank predicting a 4-degree world¹⁸ and the IPCC AR5 Chapter 29 report for small island states, Antigua and Barbuda's lack of access to grants or concessional loans to prepare for projected impacts spells disaster for its communities.

¹⁸ World Bank, 2012. *New Report Examines Risks of 4 Degree Hotter World by End of Century*. <http://bit.ly/1b5lwGy> Accessed April 9, 2016.

The recent economic decline as well as demands from other sectors such as health, education and debt servicing has made it almost impossible for Antigua and Barbuda to pay for the cost of adapting to climate change. This is particularly important when the need to adapt will require large amounts of accessible and predictable resources. The nature and size of the problem cannot be addressed with the current flow of donor resources, which, while important, lack predictability and impact.

In an effort to prepare for this adaptation financing gap, the country recently passed legislation that established the Sustainable Island Resource Financing Fund (SIRF Fund). The Fund is in its operationalization phase and with support from the GEF and a USD 15M concessional loan from Abu Dhabi Fund for Development (ADFD), the SIRF Fund will soon be making its first major investment in renewable energy for desalination. The SIRF Fund is also earmarked to receive 1.6M in funds to the revolving loan program from the GEF. Antigua and Barbuda's proposed Special Climate Change Fund (SCCF) project, "Building climate resilience through innovative financing mechanisms for climate change adaptation," will be a complementary source of support to this project.

The creation of the SIRF Fund is at the core of the Environmental Protection and Management Act (EPMA), being implemented by the Department of the Environment. The expenditures of the fund are guided by legislation, which specifies several windows. Each window, as it is developed, is guided by an advisory Board and enshrined in regulations. The regulations stipulate the purpose of the funds, disbursement requirements, management of the funds and governance. This is the process for establishing the Revolving Loan Adaptation window under this project.

Antigua and Barbuda, like the other islands of the Organization of Eastern Caribbean States (OECS), are signatories to the UNFCCC and related protocols, to which the Adaptation Fund is a supporting mechanism. All of these small islands struggle with the ability to finance adaptation programs. These gaps are not due to political will, incorrect priorities, nor poor land use practices – these funding gaps are due to severe macroeconomic realities faces by small island states.

Antigua and Barbuda is taking a step to implement its climate change program utilizing an integrated approach for the project, with a sustainable financial strategy as a complementary approach at the national level. The SIRF Fund, coupled with components supported by this project, is expected to generate a significant amount of new resources for adaptation while contributing positively to community resiliency as well as the overall macroeconomic situation confronting the country.

The Northwest Coast of Antigua – A Detailed Assessment

This project will focus its efforts on a high risk and populated watershed on the northwest coast of Antigua. The project purpose is to build an institutional and financial framework at the national level to meet AR5 climate projections, and the northwest watershed is well placed to provide lessons learned for the entire country.

The demonstration area forms part of one of Antigua's thirteen main watersheds, and a prominent feature of the landscape and hydrology is a 2-km² mangrove salt pond, McKinnon's pond. McKinnon's watershed consists of waterways that flow through the populated outskirts of St. John's, the capital, and drain into McKinnon's pond. The predominant land use on the northwest coast is residential, including urban and suburban settlements, and tourism dominates coastal uses along Dickenson and Runaway beaches. Industrial activities include the West Indies Oil and APUA power stations, and other small acreages of land are under vegetable farming, livestock, commercial activity, industry, public recreation and community facilities.¹⁹

The Northwest Coast's Settlement Expansion Plan

A comprehensive national land use and zoning plan was developed and approved by the Cabinet of Antigua and Barbuda in 2012²⁰. The primary goal of the plan was to present a forward-looking strategic, national spatial development framework addressing current development issues and providing a platform for private and public sector initiatives. The plan, which combined GIS-based quantitative data with participatory qualitative information, used five main development criteria for its final zoning recommendations: ecosystem integrity, enhanced livability, improved accessibility, economic development and engaging livelihoods, and efficient and effective governance.

The land use and zoning plan identified the northwest coast of Antigua as a "settlement expansion zone" using the five sustainable development criteria (Figure 2). The plan was developed and validated through extensive national consultations, and approved by the Cabinet of Antigua and Barbuda in 2012.

The northwest coast watershed area was first prioritize as a site for intervention during rigorous consultation processes while developing the national land use plan during the period of 2010 to 2012. The upper watershed is slated for rapid urban expansion, consistent with current trends where businesses are leaving the congested city center for the outskirts of town.

The area is densely populated and some districts are categorized as low-income or slum areas. These communities and families are more vulnerable to extreme weather events such as hurricanes and drought, and climate change impacts such as sea level rise²¹. The northwest coast of Antigua has a high degree of exposure to climate variability due to its physical features and low-income community; the northwest coast has been increasingly affected by extreme rainfall events causing flooding.

¹⁹ Ivor Jackson and Associated (2002). Local Area Plan for the Northwest Coast, p. 13

²⁰ Genivar, 2012. Sustainable Island Resources Zoning and Management Plan (SIRMZP) for Antigua and Barbuda. <http://www.environmentdivision.info/wp-content/uploads/2012/01/NPDP-SIRMZP-2012.pdf>

²¹ UN-HABITAT, 2011 in CARIBSAVE, 2012. Local Area Vulnerability Analysis for Antigua and Barbuda. http://www.environmentdivision.info/UserFiles/File/LVIA_Antigua_and_Barbuda_FINAL_8DEC15.pdf

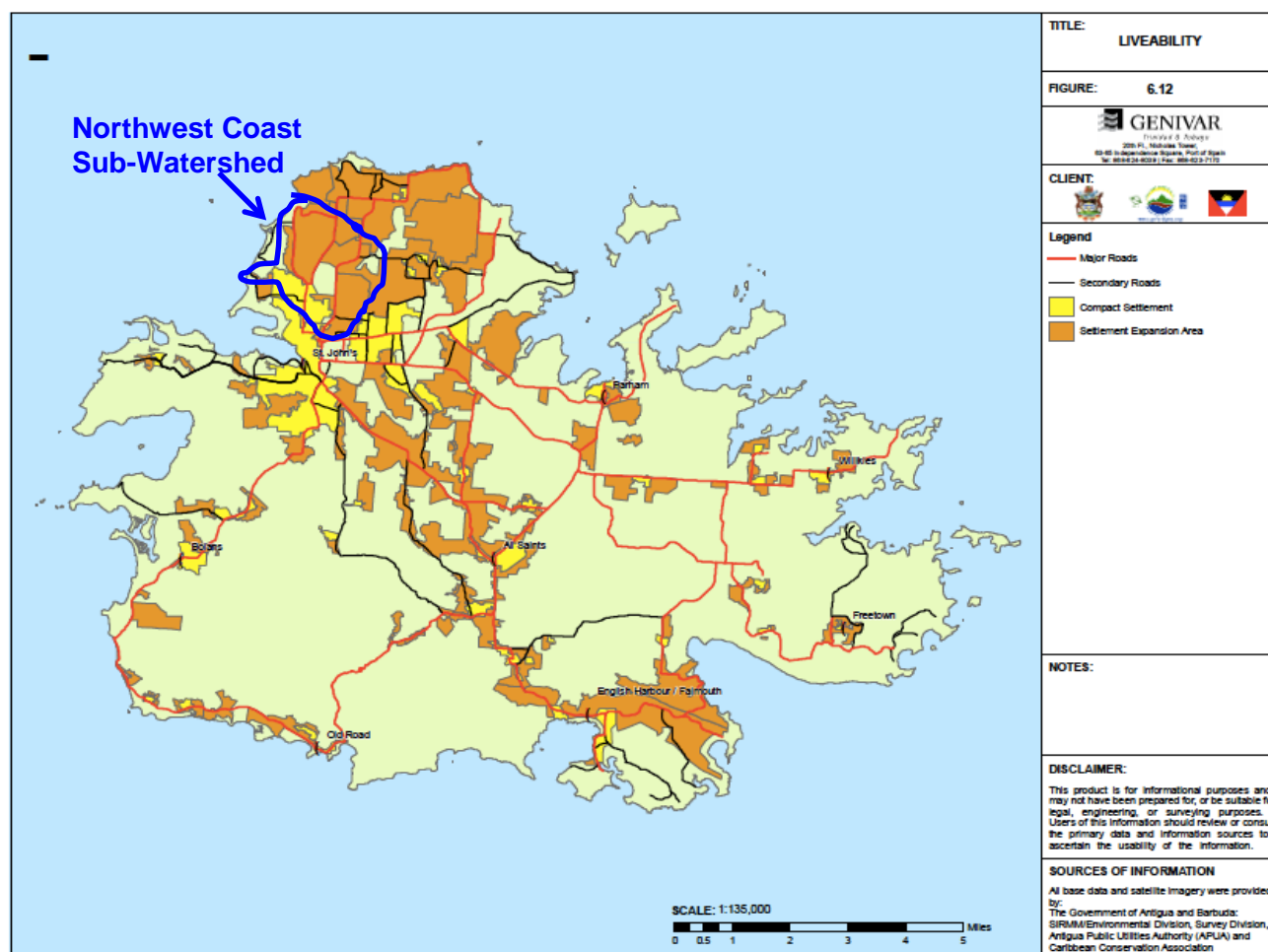


Figure 2. A “Liveability” index for Antigua identifying settlement expansion areas using social, economic and environmental criteria, with the northwest coast highlighted (SIRMZP 2012)

The project area is vulnerable to climate change, undergoing urban expansion, and supports low income and lower middle-income families. These conditions make it a suitable demonstration area for the Adaptation Fund and for national priorities. Without this project, urgent needs to implement adaptation measures cannot be met, and the area will remain increasingly vulnerable to climate impacts.

Climate Variability, Projected Impacts, and Adaptive Capacity

Historical Observations and Climate Projections for Antigua and Barbuda

Climate trends for which data is available and analyzed include temperature, rainfall extremes (both drought and high intensity downpours) and hurricanes. Results from the Hadley Centre PRECIS (Providing Regional Climates for Impact Studies) regional model are presented below. PRECIS has in recent years significantly improved the availability of downscaled climate projections on a 25 km resolution for the Caribbean region²². PRECIS results published by the Economic Commission for Latin America and

²² Taylor et al., 2007 and Stephenson et al., 2008 in IPCC AR5 WGII Chapter 29 (SIDS), p. 1628.

the Caribbean (ECLAC) projected the following for the Eastern Caribbean, including Antigua and Barbuda, using SRES A2 (higher emissions) and B2 (lower emissions) scenarios:

- ⑥ Between 1 and 4°C warmer by the end of the century
- ⑥ Average annual rainfall is projected to decrease by the end of the century
- ⑥ Rainfall variability is projected to increase, with more intense downpours and extended drought conditions
- ⑥ Hurricane intensity is likely to increase; increases in hurricane frequency are uncertain

Temperature

Maximum and minimum temperatures have increased over the past 30 years, and the warming trend is expected to continue. Trend analysis of average temperatures (1981 – 2013) by the Department of Meteorological Services indicates an increase of +0.6°C over the time period (Figure 3)²³.

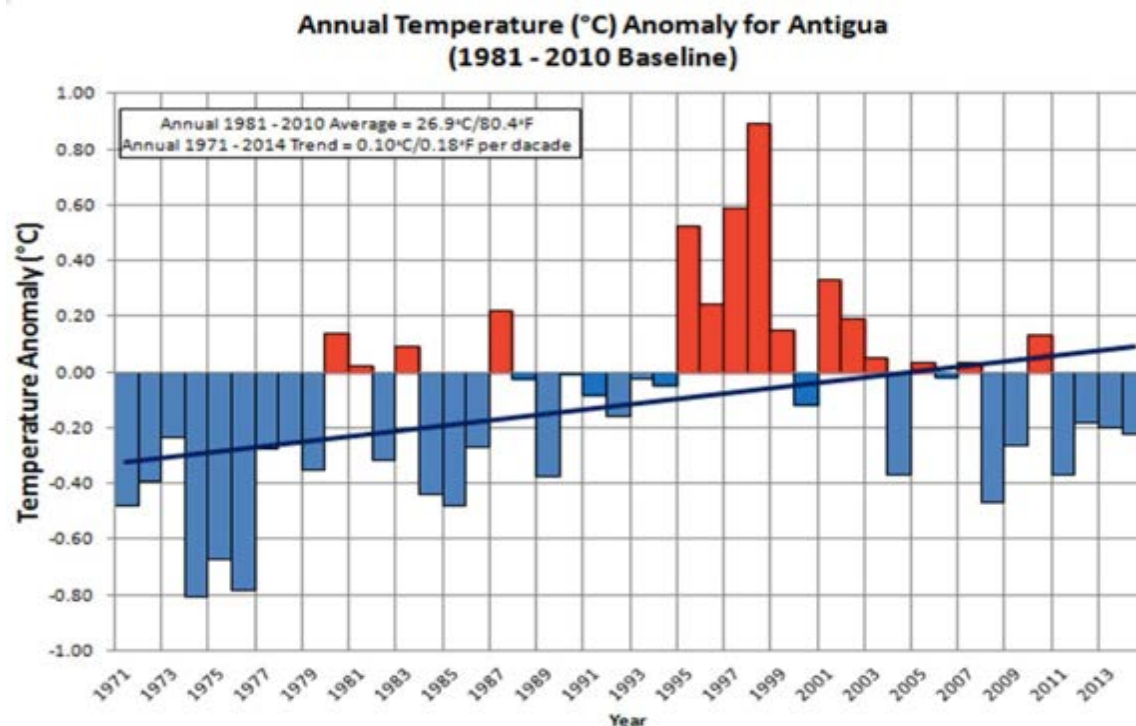


Figure 3. Annual Temperature Anomaly for Antigua (1981 – 2013) (Antigua Met Service)

The PRECIS regional model projects an increase in annual surface temperature over land on the order of 4.5°C for SRES A2 (high emissions) and 2.8°C for the SRES B2 (low emissions) scenarios, by 2100. There is general agreement across global and regional models in simulating future surface temperature changes²⁴ (Figure 4 below).

²³ UNFCCC, 2009. Antigua and Barbuda's Second National Communication on Climate Change, p. 22.

²⁴ ECLAC, 2010. Regional Climate Modeling in the Caribbean: The PRECIS-Caribbean Initiative. Economic Commission for Latin America and the Caribbean, April.

Higher Temperatures: Health impacts, Risks and Adaptations measures

Recent epidemics in Latin America and the Caribbean underscore the risks of higher temperatures to human health, as transmission rates of vector-borne viruses suggest an increase with higher temperatures. Epidemiological research has linked dengue fever transmission to temperature, where warmer temperatures can shorten incubation periods from 12 days at 30°C to only 7 days at 32 – 35°C²⁵. Decreasing the incubation periods by 5 days can lead to a threefold higher transmission rate of dengue²⁶. Moderately higher temperatures can also hasten larval stage development, leading to smaller mosquitoes that require more frequent blood meals – and temperature increases may also enhance metabolism, thus increasing the probability of dengue transmission to new hosts²⁷.

²⁵ Hales et al., 1996 and Focks et al 1995 in Chen, Anthony (2006). *The Threat of Dengue Fever in the Caribbean: Impacts and Adaptation*. Submitted to Assessments of Impacts and Adaptation to Climate Change (AIACC), Project No. SIS 06, University of the West Indies.

²⁶ Koopman et al., 1991 in Chen, Anthony, 2006. *The Threat of Dengue Fever in the Caribbean: Impacts and Adaptation*. Submitted to Assessments of Impacts and Adaptation to Climate Change (AIACC), Project No. SIS 06, University of the West Indies.

²⁷ McDonald, 1957 in Chen, Anthony (2006). *The Threat of Dengue Fever in the Caribbean: Impacts and Adaptation*. Submitted to Assessments of Impacts and Adaptation to Climate Change (AIACC), Project No. SIS 06, University of the West Indies.

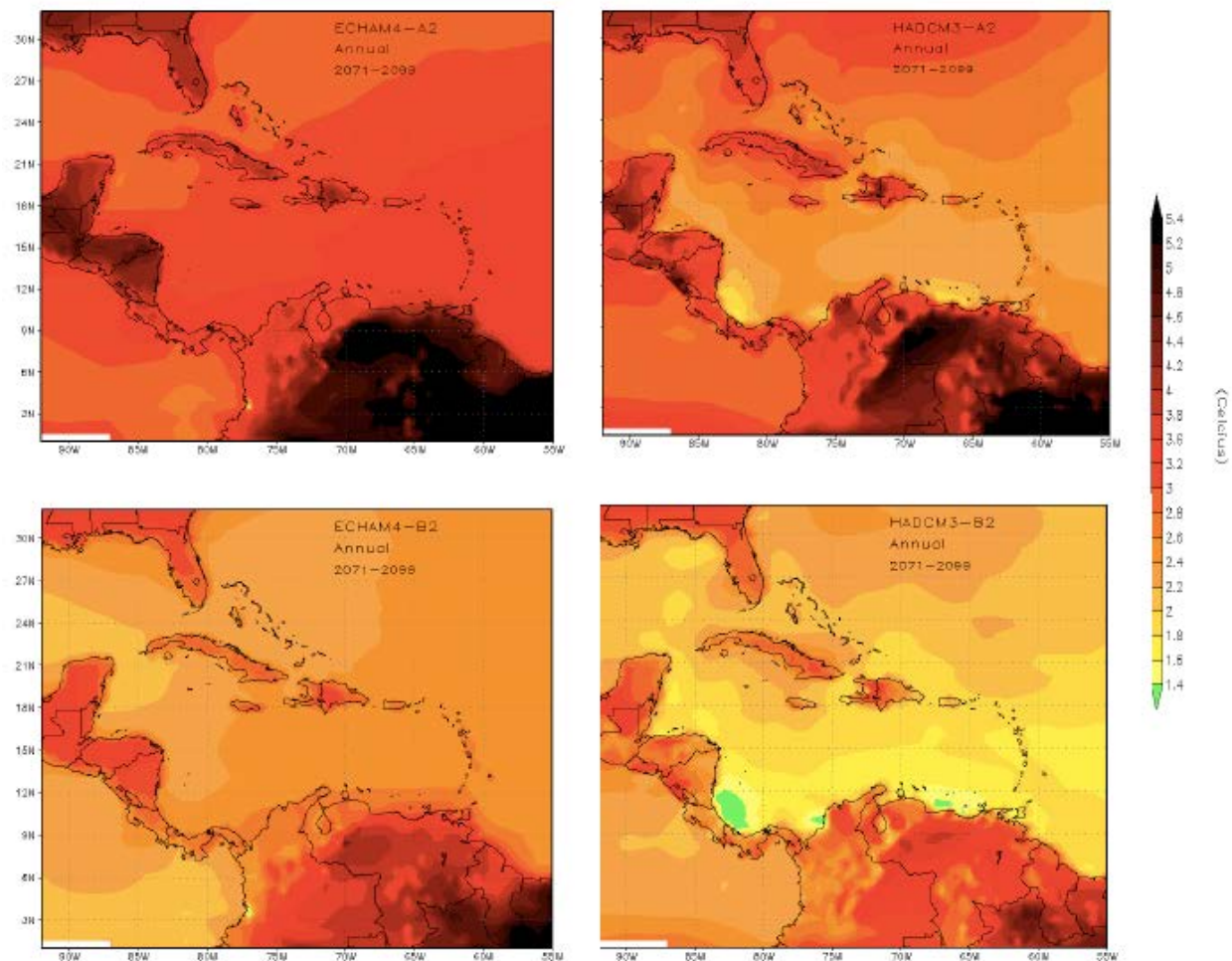


Figure 4. PRECIS regional climate model projected changes in the annual mean surface temperature for 2071-2099 (compared to 1961-1989) for high (top) and low emissions (bottom) scenarios for the Caribbean (ECLAC 2010)

Chikungunya – a viral disease transmitted to humans by infected mosquitoes – spread rapidly across the Caribbean in 2013 and 2014, including Antigua and Barbuda^{28 29}. The **Zika virus** has already spread to a number of Caribbean countries³⁰. In addition, the IPCC's Chapter 29 on small islands found that in the Caribbean, all of the essential malaria transmission conditions now exist based on trends in the last 10 years³¹.

In addition to increased risks of vector-borne epidemics, increases in minimum and maximum temperatures cause physical discomfort, contributing to mental and emotional stress, and are likely correlated with increases heat- and respiratory-related illnesses³². Increases in temperature may result in heat stress-related deaths among vulnerable

²⁸ In June 2014 there were 15 reported cases of chikungunya in Antigua and Barbuda.

²⁹ <http://www.hhrjournal.org/2014/07/01/chikungunya-climate-change-and-human-rights-2/>

³⁰ Center for Disease Control and Prevention: Zika Travel Information. <http://wwwnc.cdc.gov/travel/page/zika-information> Accessed April 9, 2016.

³¹ IPCC AR5 WGII Chapter 29 (SIDS), p. 1625.

³² Macpherson, C. et al, 2015. Caribbean Heat Threatens Health, Well-Being and the Future of Humanity. *Oxford Journals*, Vol. 8, Issue 2 (196-208)

groups such as the elderly and children. Increases in temperature have also been shown to result in lower economic productivity³³.

Current and projected health threats underscore the need for adaptation to address crosscutting health issues. **Component 1** of this project will upgrade the waterways leading into McKinnon's pond to enhance resilience to projected climate change impacts, including measures responsive to disease vectors. Mosquitos breed in stagnant water, and the technical engineering outputs under this component will include design-based vector (mosquito) control measures. For example, engineering solutions can improve waterway flows to prevent stagnation, coupled with an ecosystem-based adaptation, such as rehabilitating the proper functioning of ecosystems to support natural larval predators. Design solutions to combat mosquitos can reduce the need for more aggressive chemical-based control mechanism, such as malathion, an organophosphate insecticide that is the typical mosquito control method in Antigua.

The household revolving loans programme under **Component 2** will fund adaptation measures including best practices for controlling mosquito breeding in water storage tanks on private property – compliance with mosquito control standards will be established and made a requirement of the loan scheme. Similar measures for vector control will be available to community buildings under **Component 3**.

Rainfall

There are three major freshwater sources in Antigua and Barbuda: i) surface water; ii) groundwater, and iii) desalinated seawater. During wet years, approximately 70% of Antigua's daily water supply is obtained through seawater desalination. This amount can increase to 100% during dry years³⁴. Consequently, the water supply is largely dependent on electricity, which powers the country's five desalination plants.

Average annual rainfall in Antigua is 1000 mm. At present, Antigua is witnessing its worst drought in recorded history, with the 2015 rainfall total occurring once per 500 years. The current drought is over 32 months long, and to date, the record rainfall deficit of 1143 mm (45 in) exceeds the comparable drought of 1964-67 by 254 mm (10 in), or 29%. The country has missed out on approximately one year's worth of rainfall since the drought started. The current drought was caused by a number of climate actors, including an abundance of the dry and dusty Saharan air layer (SAL) from Africa, positive North Atlantic Oscillation (NAO), negative Tropical North Atlantic (TNA) Index and El Nino³⁵.

³³ Economist, 2014. *The cost of doing nothing*.

³⁴ Global Water Partnership Caribbean. 2013. The Post 2015 Water Thematic Consultation: Antigua and Barbuda.

³⁵ Destin, Dale, 2016. Antigua Met Service: Weather, climate & related info for smart decisions.

<https://anumetservice.wordpress.com/2016/03/25/the-worst-drought-on-record-for-antigua/> Accessed April 6, 2016.

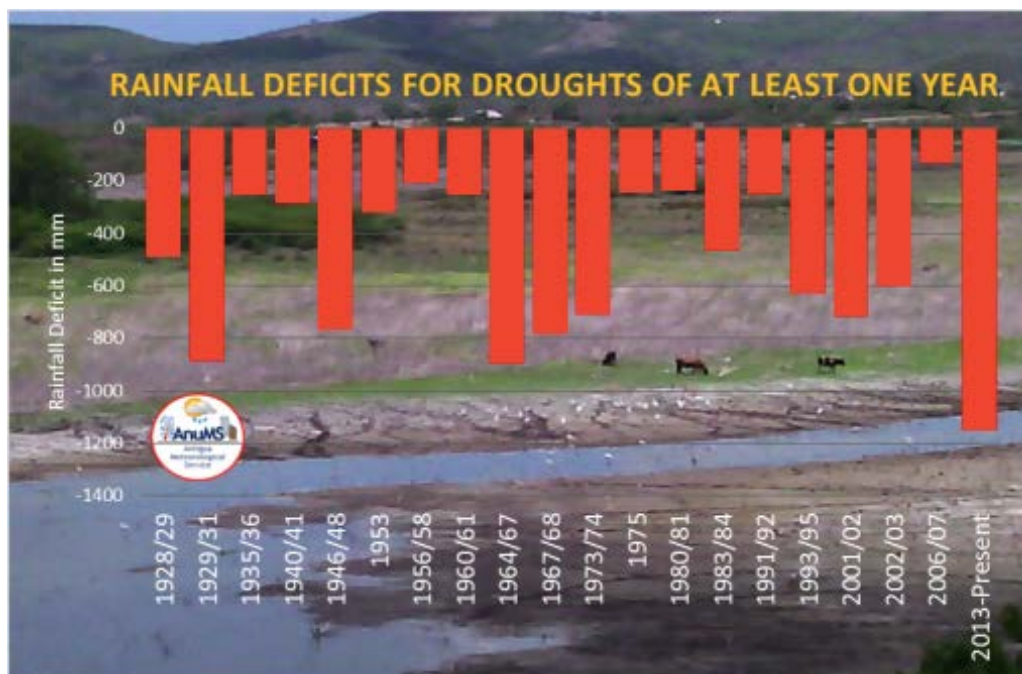


Figure 5. Rainfall deficit for 2013 – 2015 is the most extreme in Antigua’s recorded history (Antigua Met Service)

Since the drought started, the country has been completely out of surface water twice (relying 100% on desalination), with an aggregate duration of 14 months – from April to September 2014 and again from August 2015 to early 2016. The drought is estimated to have directly and indirectly cost the country an estimated hundreds of millions of dollars³⁶.

Climate projections generated with the downscaled PRECIS climate model indicate a general future trend to drier conditions in various areas of the Caribbean, including the Eastern Caribbean sub-region, where impacts are in the range of no change in annual rainfall to a decrease in annual mean rainfall by 50% (Figure 6).

Drought: Risks and Adaptations

Antigua and Barbuda, and other Caribbean islands, has good coverage of water infrastructure. However, the conundrum is that fresh water is not readily available, especially during drought (a community documentary on the impacts of drought is available here: <http://bit.ly/1YfVZ6F>).

³⁶ Destin, Dale, 2016. Antigua Met Service: Weather, climate & related info for smart decisions

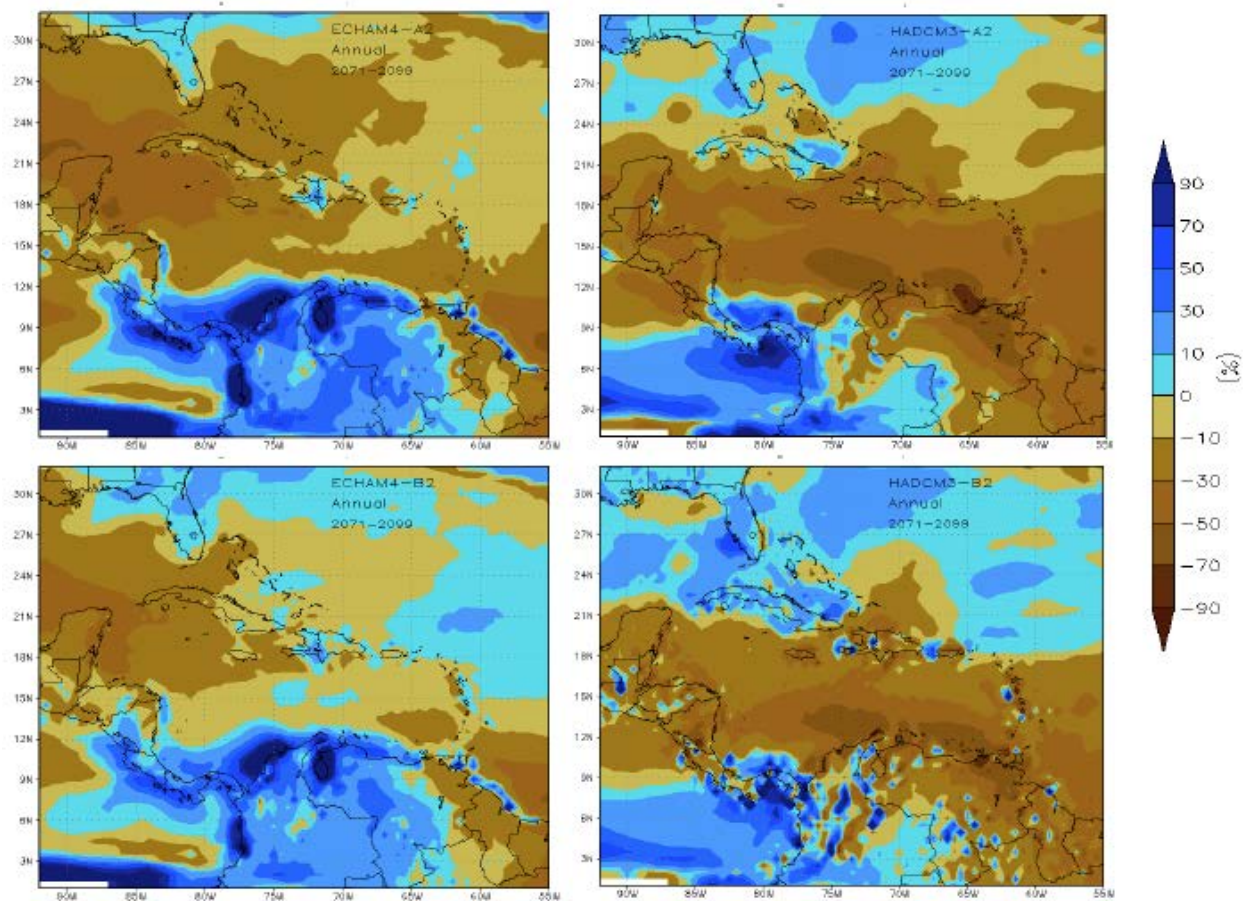


Figure 6. Annual mean changes in precipitation (%) for 2071 – 2099 as simulated by PRECIS for A2 (top – high) and B2 (bottom – low) emission scenarios (ECLAC 2010)

Drought leads to water shortages and poor sanitation practices at home, which can have detrimental health impacts. Recent changes in the epidemiology of leptospirosis – a potentially fatal bacterial disease that affects humans and animals³⁷ – have been detected, likely linked to factors in ambient temperature and changes in precipitation, and water availability³⁸.



Figure 7. A household in McKinnon's pond area with braces for rainwater harvesting but no guttering installed

The revolving loan facility under **Component 2** will support adaptation interventions at the household level in this project, to install rainwater harvesting infrastructure including rooftop gutters, cistern construction or water tank storage, domestic water filtration and treatment, in addition to water efficiency retrofits (toilets, sinks, shower heads,

³⁷ Centers for Disease Control and Prevention. <http://www.cdc.gov/leptospirosis/> Accessed April 5, 2016.

³⁸ Russell 2009 in IPCC AR5 WGII Chapter 29 (SIDS), p. 1624.

dishwashers, washing machines). Rainwater harvesting is required by national building codes, however households do not or cannot always comply in practice (e.g. Figure 7). This component will incentivize adaptation interventions to build resilience to drought at the household and community level.

Extreme Rainfall

Climate risk is not only associated with changes in mean values, but also (and perhaps more importantly) with changes in extremes. Due to the significant economic costs of flooding, increasingly studies across the Caribbean are focusing on projected rainfall extremes³⁹.

Observational data for extreme rainfall events in Antigua and Barbuda is an unfortunate data gap across both temporal and geographic space. Temporally, daily and hourly rainfall time series are required to model rainstorms, which are short term high-intensity events. Further, an Intensity-Duration-Frequency curve (IDF) for the probability that a given average rainfall intensity will occur, has not been calculated for Antigua and Barbuda, and catchment modeling has relied on IDF curves from other islands.



Figure 8. Flooding in the outskirts of St. John's following the passage of Hurricane Omar in 2008.

Geographically, the only long-term rain gauge station is at VC Bird International Airport, situated on Antigua's northeast coast and lowest rainfall belt – average annual rainfall in Antigua varies from ~125 cm per year in the southwest to ~60 cm per year in the east⁴⁰. On average, the rain gauge at VC Bird Airport receives half as much rainfall as other parts of the island. Insufficient geographic coverage of data collection is an issue for example where flash flooding has been recorded in the McKinnon's area whereas the VC Bird Airport rain gauge had not recorded any rainfall⁴¹.

Extreme Rainfall: Risks and Adaptations

Projections using the PRECIS regional climate model indicate that along with the risk of drying, there is a change of intense precipitation events to increase over the Eastern Caribbean – including extreme rainfall separate and apart from hurricanes and tropical

³⁹ ECLAC 2010: PRECIS regional climate model

⁴⁰ <http://www.sids2014.org/content/documents/17Antigua%20and%20Barbuda-National%20Report.pdf> Accessed 5 May 2014.

⁴¹ Flash flooding occurred on Antigua's northwest coast on 19 October 2015 <http://bit.ly/25NfBF9>

storms. The general trend is for intense and heavy rainfall events to be interspersed with longer relatively dry periods⁴².

The impact of floods is already becoming a critical concern for Antigua and Barbuda, especially around the low lying coastal capital of St. John's, Antigua, which is vulnerable to flooding and erosion⁴³. Building resilience to extreme rainfall events on Antigua's northwest coast settlement expansion area is a central outcome of this project, and is addressed under **Component 1**, with a large portion of this project's resources dedicated to concrete adaptation interventions described in detail below.

Hurricanes

Hydro-meteorological hazards pose perhaps the greatest risk to Antigua and Barbuda, and historic disaster records demonstrate that hurricanes and tropical storms are the highest-cost hazards in terms of loss of life and economic losses. Hurricane Luis (1995), one of the most devastating systems, resulted in a 17% decrease in tourist arrivals, left 7,000 people unemployed, 90% of buildings destroyed or damaged, and economic losses amounting to US \$128.35 million or 30.5% of GDP⁴⁴. It took three months to fully restore electricity, highlighting the need for resilient energy systems. Economic impacts of hurricanes and flooding, and resultant costs of adaptation, are proportionately extremely costly to small island states (Box 1).

In 2008, Hurricane Omar resulted in precipitation of 56.4 mm per hour at its peak⁴⁵, and flood water levels reached 4 to 12 feet in vulnerable parts of the island (Figure 8). As a result of Omar, 1,339 homes were flooded, and four homes located in close proximity to watercourses were washed away – in total, at least 5,088 persons suffered significance losses ⁴⁶. Similar flood

Box 1. Why is the cost of adaptation to climate change so high in small islands?

Source: Adapted from IPCC WGII AR5 – Chapter 29 (SIDS)

Adaptation to climate change that involves infrastructural works requires large up-front overhead costs, which in the case of small islands cannot be downscaled in proportion to the population's size. This is a major socioeconomic reality that confronts small islands, notwithstanding the benefits of adaptation.

Moreover, the relative impact of an extreme event such as a hurricane that can affect most of a small island's territory has a disproportionate impact on that state's gross domestic product, compared to a larger country where an individual event generally affects a small proportion of its total territory and its GDP. The result is relatively higher adaptation and disaster risk reduction costs per capita in countries with small populations and areas—especially those that are also geographically isolated, have a poor resource base, and have high transport costs.

⁴² ECLAC 2010: PRECIS regional climate model, p. 16

⁴³ Solomon et al, 2011 in CARIBSAVE National Vulnerability Impact Analysis for Antigua and Barbuda http://www.environmentdivision.info/UserFiles/File/NVIA_Antigua_and_Barbuda_FINAL_8DEC15.pdf

⁴⁴ Solomon et al, 2011 and Gores-Francis, 2013 in CARIBSAN National Vulnerability Impact Assessment

⁴⁵ Ho, B. 2008. *Agricultural losses amount to \$11M*. Antigua Sun.

⁴⁶ Antigua and Barbuda NODS, 2008 in CARIBSAVE National Vulnerability Impact Analysis, p. 45

conditions were experienced during Hurricane Earl in 2010.

Hurricanes: Risks and Adaptations

Climate models project that maximum wind speed of the strongest hurricanes is likely to increase between 5% (low scenario) and 15% (high scenario), which would increase loss of life and other economic losses⁴⁷. Model outputs are not confident regarding changes in the frequency of hurricanes due to climate change, however hurricanes that do form are expected to increase in intensity, and there is some consensus among models about this latter projection.

Project Objectives:

Main Objectives

An integrated approach to physical adaptation and community resilience in Antigua and Barbuda's northwest McKinnon's watershed seeks to reduce vulnerability of the community, by increasing the ability of the watershed to handle extreme rainfall, while increasing the resilience of the built environment simultaneously to cope with the multiple stressors of climate change. This integrated approach will ensure that the community as a whole will be able to withstand projected climate change impacts while the ecosystems can accommodate increased rainfall.

The three specific objectives of the project, which correspond to the three components elaborated below, are to:

1. Implement concrete adaptation actions that support natural and physical drainage systems along the 3 km urban and semi-urban waterways to meet projected climate change, in particular extreme hydro-meteorological events and disease vectors. These interventions will use a variety of approaches including ecosystem-based adaptation, such as wetland restoration to address disease vectors, and engineering solutions, such as drainage and retention ponds, to build resilience to climate impacts. These interventions, outlined in the 2001 local area plan, will be revised and updated through detailed engineering designs that reflect the latest climate change projections.
2. Disburse concessional loans through a revolving fund mechanism to vulnerable households to meet new adaptation guidelines and standards for built infrastructure to withstand extreme climate variability. These home interventions are to include water harvesting, hurricane shutters, mosquito screens, water storage, and other adaptation measures.
3. Support social adaptive capacity and local ownership of adaptation through community-awarded contracts and climate resilient community built infrastructure such as community centers, schools and clinics. This will include interventions to allow the buildings to withstand hurricanes and droughts.

⁴⁷ CARIBSAVE, 2015. National Vulnerability Impact Analysis for Antigua and Barbuda

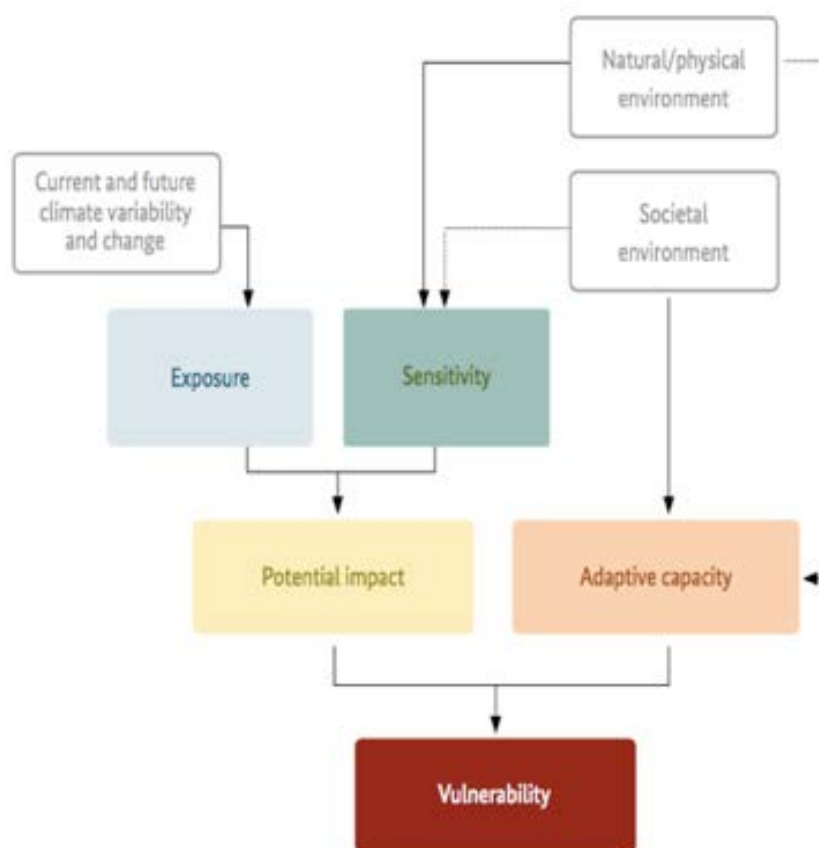


Figure 7. Visual representation: the objective of this project is to support natural and physical systems to reduce sensitivity, coupled with enhanced social adaptive capacity in the building sector, in order to reduce vulnerability in the core settlement area on Antigua's northwest coast. Source: adelphi/EURAC 2014

Project Components and Financing:

Table 1. Project components, results and budget

Project/Programme Components	Expected Concrete Outputs	Expected Outcomes	Amount (US\$)
1. Upgrade urban drainage and waterways to meet projected climate change impacts	1.1.1. Technical drawings taking into consideration past flooding events, AR5 projections, and designs that reduce the risks of vector-borne diseases 1.1.2. Restore and upgrade McKinnon's 3 km waterway to meet new adaptation requirements for flooding and vector control, taking into account ESS and gender considerations within the design	1.1 Increased ecosystem resilience of the McKinnon's waterway in response to climate change, extreme rainfall events, and disease vectors	\$3,550,960

2. Revolving Loans for homes in McKinnon's watershed to meet new adaptation guidelines established in the building code and physical plan	2.1.1. At least 10% of the homes in the target area, during the life of the project, have applied for loans for adaptation measures to meet new standards	2.1 Increased adaptive capacity of built infrastructure and communities to withstand extreme weather and climate variability	\$3,125,300
3. Adaptation mainstreaming and capacity building in NGOs and community groups to sustain project interventions	3.1.1. 30% of the community-based buildings in the areas have benefitted from grants to improve the resilience of their buildings 3.1.2. Three contracts are awarded to community groups/NGOs to maintain the adaptation interventions accomplished by the project	3.1. Improved ownership of adaptation and climate risk reduction to sustain and scale-up actions for transformative adaptation interventions at the national level	\$2,353,500
4. Project/Programme Execution cost			\$940,240
5. Total Project/Programme Cost			\$9,970,000
6. Project/Programme Cycle Management Fee charged by the Implementing Entity (if applicable)			None
Amount of Financing Requested			\$ 10,000,000*

*Includes Project Preparation Grant (\$30,000)

Projected Calendar:

Table 2. Milestones and expected completion dates

Milestones	Expected Dates
Start of Project/Programme Implementation	November 2016
Mid-term Review (if planned)	November 2018
Project/Programme Closing	June 2020
Terminal Evaluation	May 2020

PART II: PROJECT / PROGRAMME JUSTIFICATION

A. Project components

Climate sensitivity on the northwest coast is underpinned by urbanization dynamics and population growth, limited adaptive capacity at household, community and governance levels, underlying vulnerabilities including poverty, economic sensitivity to external factors, disruptions in basic services, health risks and gender inequalities.

In order to achieve the project objective, “to reduce vulnerability of the community, by increasing the ability of the watershed to handle extreme rainfall, while increasing the resilience of the built environment simultaneously to cope with the multiple stressors of climate change,” this project is structured to deliver concrete adaptation interventions with tangible outputs that will help transform the northwest coast of Antigua from an area with high exposure to climate variability and deteriorating ecosystems, into a pilot demonstration for resilient urban drainage, functioning ecosystem services, and strong social capital.

With the interventions rooted in Antigua and Barbuda’s three completed National Communications, the Intended Nationally Determined Contribution (INDC) and national development policies and plans, as discussed below, the project is in addition strongly aligned with the global development and climate change agenda. In particular, Sustainable Development Goal (SDG) 11: Making cities and human settlements inclusive, safe, resilient and sustainable.

The Department of Environment received accreditation to the Adaptation Fund as a National Implementing Entity (NIE) in October 2015. This project embodies a nationally driven process with maximum country ownership that, in the context of a small island developing state, has the potential for transformative climate-resilient development on a shorter timescale.

The project is built around three interrelated components, which highlight the importance of tangible and concrete action, innovative financing for adaptation, and local ownership and community resilience through hurricane and drought-resistant buildings.

1. Upgrade urban drainage and waterways to meet projected climate change impacts

Under this Component, appropriate adaptation interventions will be implemented in the McKinnon’s watershed. This component aims to increase physical resilience along 3-km of McKinnon’s waterway in response to climate change, extreme rainfall events, and disease vectors, taking into account urbanization trends that may magnify and reinforce the impacts of climate change. Concrete adaptation measures will be implemented

along the waterway and drainage infrastructure bisecting urban and suburban communities on the outskirts of St. John's, Antigua – an area that has historically suffered losses from both hurricanes and intense rainfall (Figure 9).

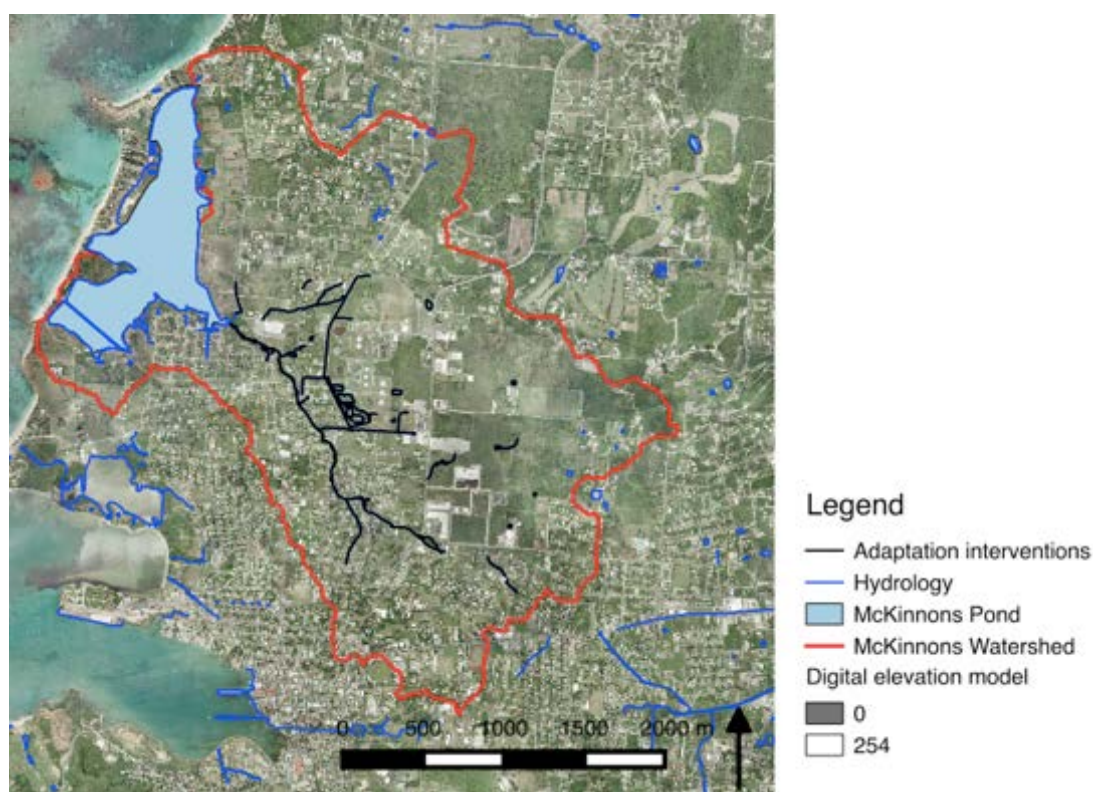


Figure 9. Map of McKinnon's watershed boundary on Antigua's northwest coast, delineating the 3 km waterways bisecting urban and semi-urban areas for adaptation interventions

A local area plan was developed for the northwest coast in 2001 and identified potential flood mitigation techniques, including settlement ponds and traps, flood drainage swales, drainage easements for 1 in 25 year storms or higher, restrictions on clearing trees, shrubs and under-story vegetation in drainage easements, and rehabilitation of vegetated buffers⁴⁸. During the project preparation stage of this project, a Technical Feasibility Study was conducted by Engineers without Borders, and interventions were validated and additional needs identified (Appendix 7). This Study will be used to finalize the draft TORs for the design and supervision contract (Appendix 13).

Output 1.1.1. Technical drawings taking into consideration past flooding events, AR5 projections, and designs that reduce the risks of vector-borne diseases

The first step in this component is to undertake hydrological assessments, analysis and hazard mapping, drawing from previous studies, baseline data, and documented areas of vulnerability, in order to validate existing plans for the area⁴⁹. This validation process will ensure that the waterway and drainage interventions meet climate resilient criteria

⁴⁸ Ivor Jackson & Associated, 2002. Local Area Plan for the Northwest Coast, Antigua.

⁴⁹ Ivor Jackson & Associated, 2002. Local Area Plan for the Northwest Coast, Antigua.

using the most recent scientific findings in the IPCC's AR5 as well as recent extreme weather events in the region. This information will be used to finalize the climate resilient Local Area Plan (LAP) for McKinnon's and the technical drawings will be the guidelines for implementing the LAP (Output 1.1.2). A comprehensive EIA using the Department of Environment's ESS policy will be conducted at this planning stage (TORs in Appendix 13 for the EIA Terms of Reference).

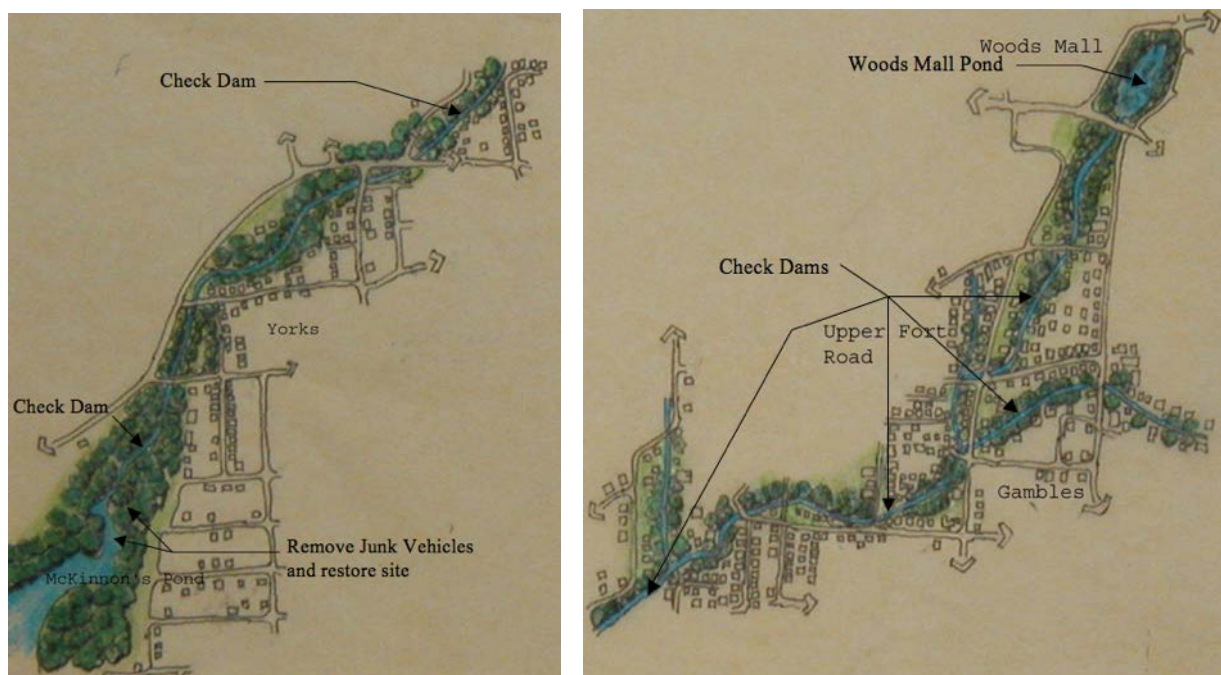


Figure 10. Drawings from Ivor Jackson's 2002 northwest coast local area plan from the waterway leading into McKinnon's pond (lower left) to Woods Pond (top right).

The technical design will recognize that this is a low-income area and that adaptation interventions should as much as possible be ecosystem-based, since these have been shown to be cost-effective with positive social and economic benefits. The technical drawings and assessments will be complemented by in-depth consultations in the communities of Lower Gambles/Yorks in the McKinnon's watershed, which is a requirement of the EIA process prior to implementation of any physical works. The community consultations will focus on identifying localised vulnerabilities and concrete adaptation options related to flooding and other climate change impacts. In addition, the consultations will form the basis for engagement with local communities to implement participatory M&E systems and to begin outlining opportunities for Component 3, awarding contracts to community groups/NGOs to maintain the adaptation interventions.

Output 1.1.2. Restore and upgrade 3 km of waterways to meet new adaptation requirements for flooding and vector control, taking into account ESS and gender considerations within the design



The adaptation works will support natural systems and physical hard engineering structures along the 3 km urban and semi-urban waterways to meet projected climate change, in particular extreme hydro-meteorological events and disease vectors.



Activities under this output include finalization of a watershed Local Area Physical Development Plan (LAP), contracting of a company to complete the detailed designs; conduct an Environmental Impact Assessment (EIA) and secure development planning approval; and supervise implementation (draft TORs in Appendix 13).


The Technical Feasibility Study assessed the interventions proposed in the 2001 Local Area Plan, and identified new activities that would be required. Concrete adaptation interventions for the waterway leading into McKinnon's Pond are outline in Table 3.

Table 3. Interventions to achieve climate resilient drainage along 3 km of waterways (Source: Engineers without Borders, Technical Feasibility Study, Appendix 7)


Problems Identified	Recommendation	Results to be Achieved
Gaps in data for full engineering analysis	Data on the level of the roads, bridges, water course side of the roads, house and land level, mainly in the flooding area	Once data is collected, finalize engineering plans. A design of corrective points could be finalized using SWMM 5.0.
Increased and modified storm flows in catchment due to land use change and rainfall variability in last 20 years	Proper buffers have not been enforced and maintained but consider: <ul style="list-style-type: none"> o Enforcing building regulations to set back from watercourses for all new applications o Enforcing sustainable development and low impact use as a policy of development. o Create upstream detention at crown land site to attenuate peak downstream storm flow discharge 	A steadier stream along the watershed and water run during and after the storms. A lower depth flow along the drainage network after tropical storm. Prevent flooding and increase safety for kids playing along the water.

	 <p><i>Proposed site for upstream detention pond. Aerial map depicting private property and crown land. Blue lines are the waterway; Red lines are private parcels</i></p>	
Evacuation structure of the McKinnon's pond is probably too small.	Proceed to a study to increase the capacity of the pond to evacuate up to 200 000,0 m ³ /h	This structure will prevent flood for a 50-year rainfall rain or a hurricane all the other structure are in the same size.
Some bridges over the water run have to be re-engineered. There is at least one bridge that can cause problems for a rain of 100mm in 6 hours.	<p>Modified the bridge to increase the drainage possibility. Or prepare a set-up for a pump able to be installed in a day for a week by year. This pump will be there only to help.</p>  <p><i>Bridge drainage capacity to be increased</i></p>	Help evacuation of water to the McKinnon's pond.
McKinnon's pond expands this area during flood event by the south on	Install dam and retention works at a controlled level to let the water level to be raised. Stable water levels will support wildlife and eco-tourism livelihoods, and	Prevent flooding under a controlled water level of the McKinnon's pond.

household development of York's.	<p>bioremediation.</p>  <p><i>McKinnon's pond was almost dry after an extended 3-year drought</i></p>	
Pipes crossing the waterway, which catch debris and contribute to flooding	<ul style="list-style-type: none"> - Remove the abandoned pipes (co-financing with applicable entities) - Continue discussions with West Indies Oil Company (WIOC) and APUA for solutions to move the pipes that are causing flooding - For other pipes that are in use, work with the owners to establish safe alternatives through public-private partnerships, such as the WIOC pay for the pipes to be moved and build a bridge, and the project pays for some of the restoration <p><i>Pipes crossing waterway are to be elevated</i></p>  <p><i>along with a bridge built (public-private partnership will be pursued with West Indies Oil Company)</i></p>	<p>Move pipes to permit restoration of the waterway, Reduced flooding as the pipes are blocking the waterway. Increase safety for kids who use the pipe as a bridge. Prevent an environmental impact if the pipe is carrying oil, wastewater or sea water!</p>
There is no water park, wet area or water structure to retain water on the	Install a dam or a structure to retain water near Wood Malls north of the road and another dam south of the road. And possibly one or two culvert of 300 mm	Retain a maximum volume of water for a period of 6 hours during a tropical

water run.	<p>across the water run to let cross the people, create a water retention site, but these structures will be no more than 500 mm and a large flow could pass over retaining only a blade of water.</p>  <p><i>Eroded infrastructure by Woods Pond</i></p>	<p>storm. To make sure that all the flow will not arrived immediately to the bridge near the pond</p>
Water run's slope and design are not constant	<p>There is a waterway identified for all the watershed, but slopes and form are not constant and not all the time consistent caused by development. Space and slopes both side of the water run have to be verified to evacuate the capacity for all the flow (in fact a large part have a good capacity).</p>	<p>Create a uniform waterway from the Mall to the pond.</p>
In many sites garbage was observed all along the catchment run.	<p>Remove the garbage and make sure that the waterway will stay clean of debris who can stop the water or could jam the flow (this could be done through issuing of a contact under Component 3)</p>	<p>No external debris will jam the flow</p>

	 <p><i>Component 3 will target public awareness about the flooding impacts of improper solid waste disposal</i></p>	
Trees and grass was cut and removed leaving place for erosion.	<p>Some trees and a full floor coverage of ideal grass species must be maintained on the water run, transforming it into an urban park.</p>  <p><i>Revegetation along bare areas of the watercourse to improve water quality and create attractive setting for residents to enjoy</i></p>	<p>Trees and adapted grass will:</p> <p>Prevent erosion, retain as much as possible water, be able to grow with roots into a wet area and able to use wastewater as sources of nutriment and by the way purified the environment.</p>
Wastewater is observed on the last part of the catchment and it's providing from overflow of septic tanks.	<p>It is recommended to implement a mandatory cleaning of septic tank each two years, to connect all the zone to a central sanitary sewage system, or to implement community septic systems, which would also encourage more compact development that allows for greater green spaces, lowering runoff coefficients.</p>	<p>Increase safety by taking away disease-carrying mosquitoes Decrease odors of rotten eggs, Using bioremediation to help sanitation</p>

	<p>Identify type of plant, grass or trees who can grow into this environment and can use the gray water as nutriment</p>  <p><i>Evidence of poor water quality; the condition and water quality of the waterway will impede the success of the adaptation interventions.</i></p>	
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Several “soft” policy and training activities under this project include incorporating new climate-resilient guidelines and standards into the Building Code for climate mainstreaming; and integrating the LAP into the implementation practices and work plan of the Development Control Authority (DCA). Training will be implemented using the guidance provided in Appendix 15, which is the CTCN-supported Workforce Development Strategy to Address Energy Priority Sectors in Antigua and Barbuda’s Nationally Determined Contribution. Further, the climate-resilient technical engineering drawings for the waterway (Output 1.1.1) will serve as a benchmark for adaptation in other waterways and watersheds across the island. The final activity under Component 1 is to prepare management and monitoring plans and train implementers in order to sustain and scale up project interventions and continue Component 1 interventions after the life of the project. Budgetary allocations for the policy interventions and training implementation under this project are minimal; the “soft” adaptation interventions will be supported by SCCF activities (Appendix 18).

2. Revolving Loans for homes in McKinnon’s watershed to meet new adaptation guidelines established in the building code and physical plan

Component 2 will strengthen buildings (homes and businesses) through small low interest loans for vulnerable homes, thereby incentivising compliance with the Building Code, which is currently under revision for climate resilience measures. The objective is to disburse low interest loans through the Sustainable Island Resource Framework Fund (SIRF Fund) Revolving Fund adaptation window. This loans program will be established and regulated by drafting regulations under the Finance Administration Act of 2006, Section 42 on “Special Funds,” which enables repayment into the revolving

loan program⁵⁰. The revolving loans program will also be vested into relevant institutional arrangements through the Special Fund regulations, which will be convened to oversee operationalization, disbursements and monitoring. This activity will be in part complemented by the activities of the GEF-funded SCCF project; draft regulations are available in Appendix 11. The regulations provide the framework of the activities to be funded, the management structure of the window, eligibility and priority for borrowing, environmental and social safeguards and reporting requirements.

Output 2.1.1. At least 5% of the homes in the target area, during the life of the project, have applied for loans for adaptation measures to meet new standards

There are approximately 5,000 buildings in the McKinnon's area, of which an estimated 4,000 are homes. The target under this output is that at least 5% of the homes in McKinnon's watershed area benefit from adaptation interventions – totaling approximately 200 vulnerable households. The revolving loan mechanism under the SIRF Fund will be capitalized with USD 3 M through this project (including management fees). With the available financing for small loans in total, the average loan size disbursement will be ~USD 14,550. The adaptation small loans will be disbursed over a period of 18 months. Lessons learned and best practices will be prepared and shared for the entire island, as well as regional and international entities. The lessons learnt will be used to extend the scope of the revolving funds to the entire island, and will be shared with other small island states.

This component's impact will improve access to adaptation financing for the private sector by designing and piloting a revolving loan program of the SIRF Fund business plan for the funding of adaptation interventions. These are designed for homes and small businesses particularly those that are located in areas designated as vulnerable sites by the local area plan process. This component's design is gender-responsive as micro, small and medium enterprises are noted as critical to the generation of economic activity and long-term stability, and women are considered to dominate this often-informal sector⁵¹. By reducing the vulnerability of this informal home and small business sector, and by tracking project interventions to ensure that benefits reach target populations, this project will support national gender equity goals.

The revolving loan program will also contribute to the community's awareness of adaptation and climate change impacts. This will be complemented and enhanced through the provision of training on accessing innovative financing for adaptation, which will be delivered by funding provided by the Government (Appendix 15). Passing regulations under the Finance Act to govern this program will further pave the way for scaling-up adaptation loans across the country.

This component will have three main activities:

⁵⁰ Finance Administration Act or 2006, Section 42. http://www.oas.org/juridico/PDFs/mesicic4_atg_fin_adm_act.pdf Accessed April 6, 2016

⁵¹ Huggins, T. 2014. Country Gender Assessment for Antigua and Barbuda. Prepared for the Caribbean Development Bank (CDBB). http://www.caribank.org/uploads/2014/12/CGA-AB-Vol-I- JUNE-2014_FINAL.pdf Accessed May 9th, 2016.

1. Establish the revolving loan program, which will include the legal and institutional arrangements. It is the intention to utilize the capacity and the expertise of the Ministry of Finance, which currently manages an initiative that provides small loans of 10 to 20K USD for education, among other activities, where the loans are repaid through automated salary deductions.
2. Finalization of the adaptation activities that will be funded by the program (see below for an indicative guide) and disbursing the loans
3. Monitoring and evaluation, including next steps for scaling up

The criteria to access the funds will be based on in-depth market research to assess: i) the nature of the market e.g. the profile of potential target borrowers, the size of the potential market, and the nature of demand (both financial and technical), and ii) in collaboration with the Ministry of Social Transformation and Human Resource Development, in particular the Gender Affairs Division, determine priority eligibility of participants.

Based on the team's experience and knowledge of the community, it is anticipated that the demand for low interest loan to address climate vulnerability will significantly exceed the funds available via the project. This is further explained in *Section H – The Consultative Process*.

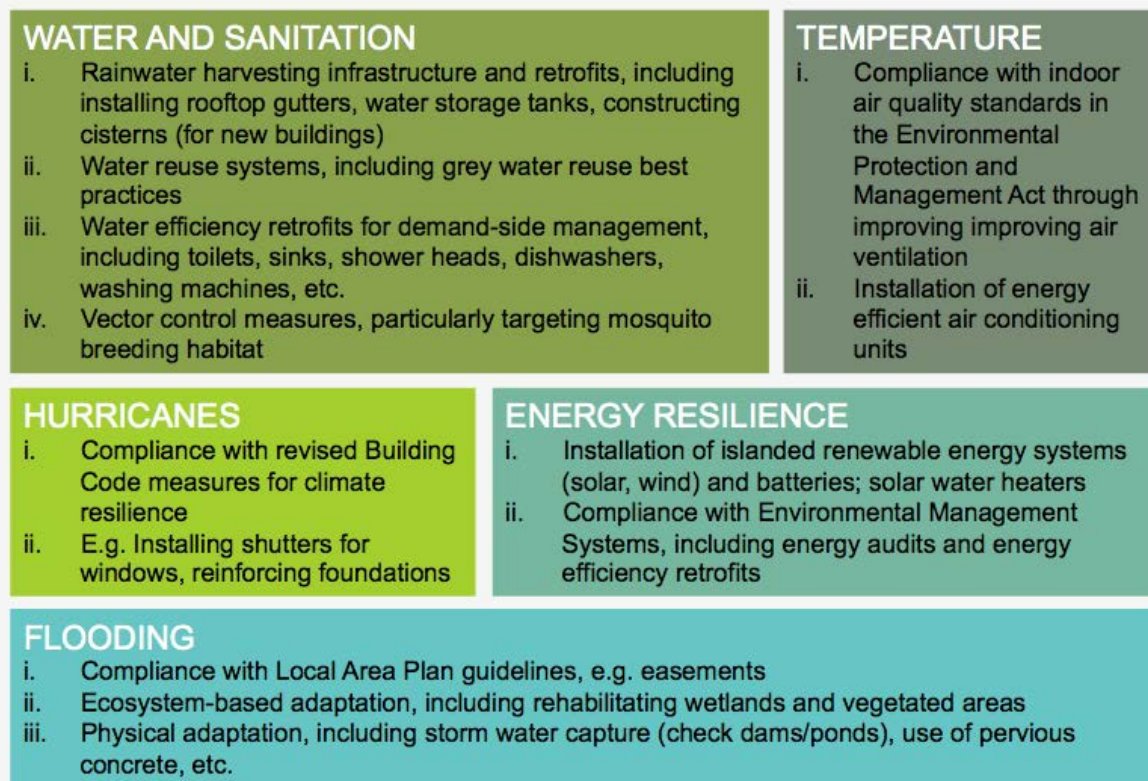


Figure 11. Indicative eligible adaptation activities in buildings to be funded through the revolving loans program as well as other sources of funding.

3. Adaptation mainstreaming and capacity building in NGOs and community groups to sustain project interventions

This component is designed to reduce risks associated with extreme weather by providing grants to NGOs and community groups for adaptation activities in buildings, including schools, churches, community centers, and community libraries, among others. The adaptation measures and activities utilize the same adaptation benefit/review criteria as Component 3, however this component is specifically targeted at enhancing social systems to build adaptive capacity. The management of this component, as with Component 2, will be guided by regulations. However, the NGO window of the SIRF Fund will program the grants. Guidelines for these grants will include guidelines for the establishment and/or formalization of shelters for both hurricanes and drought.

Output 3.1.1. 30% of the community-based buildings in the areas have benefitted from grants to improve the resilience of their buildings

During the project preparation stage, survey respondents identified the following community groups in the area (Appendix 4):

- Anglican Church
- CERT Members
- Community Watch Group
- Fort Road Community Shelter
- Grace Baptiste Church
- Grace Christian Church
- Jehovah Witness Church
- St Andrews Church, Nazarene
- St. Andrews Church
- St. Andrews Youth Group
- Steel Band Group
- Villa Adventist Church
- Yorks Community Group
- Yorks Community Shelter

Activities to achieve this output include selecting groups in the area that qualify for grants and providing training in fiduciary and financial management (particularly procurement) and technical training on adaptation, utilizing adaptation benefit/review criteria developed under Component 2 (Appendix 15). After entering into a MOU between the Department of Environment and the NGO funding mechanism of the SIRF Fund, which stipulates detailed funding guidelines, grants will be awarded and monitored as per the financial regulations.

Output 3.1.2. Three contracts are awarded to community groups/NGOs to maintain the adaptation interventions accomplished by the project

In addition to concrete adaptation in community buildings, this component will train community groups and NGOs to manage the waterway such that the upgrades achieved by the project are sustained and maintained. It is anticipated that if the community maintain the waterways, the community will reduce waste and other negative impacts on the waterway, thus prolonging the impact of the interventions. Activities to achieve this output include implementing a communications strategy for broad-based community education, awareness and mobilization of support, and developing three community contracts for the maintenance and monitoring of the impact of adaptation measures within the areas, as per the management plan delivered under Component 1.

In addition to the community groups listed under the previous section, technicians from supporting agencies identified the Princess Margaret School and the Men Against Negative Attitudes (MANA) Programme as potential recipients of the maintenance contracts. The final selection will be determined by a call for proposals to ensure a transparent and competitive award process.

Beyond the end of the project, the funding for the contracts will come from the SIRF Fund. The SIRF fund business model includes the provision of a water levy that will be used to protect and manage wetland and waterways such as the one within the project site. This is legal requirement and mandate of the Environmental Protection and Management Act (2015).

B. Benefits: economic, social (including gender), and environmental

Introduction

In the McKinnon's area, people's livelihoods are dependent on a range of small and medium enterprises (such as shop keeping, farming and fishing) and civil service professions (such as teaching, security and medicine). Some areas of the Yorks Community (in the vicinity of St. John's City) are categorized as slum areas, and these unplanned settlements are among the most vulnerable to extreme weather and climate events⁵². Therefore, as new adaptation standards are mainstreamed in building codes and other legislation, it is recognized that, to deliver transformative change on the ground, accessible and affordable financing must be available to help the most vulnerable from disproportionately bearing the impacts of climate change and being "left behind" in adaptation.

An environmental and social assessment was conducted by independent stakeholders during the project preparation stage, and the analysis of the project has concluded that it has overwhelming potential to improve the current situation of the community and the watershed area. The ways in which this will happen include: 1) reversal of the current

⁵² CARIBSAVE, 2015. Local Area Vulnerability Impact Analysis, p. 25

trend of degradation of the McKinnon's pond and its associated environs, 2) significant improvement in the resiliency of the community to recover from climate change impacts such as extreme weather events, 3) improvement of capacity of community organisations to assist in recovery from climate change impacts such as droughts, and 4) improvement in the landscape with the removal of solid waste as a co-benefit to the enhanced drainage systems.

The benefits of this project will be maximized by its integrated economic, social and environmental approach. The project's watershed or "landscape" methodology will benefit an estimated 4,700 households and businesses residing within the McKinnon's watershed boundary – this equates to approximately 14,100 persons to benefit from project interventions, or 15.6% of the population of Antigua and Barbuda.

Component 2 is anticipated to benefit approximately 200 families for the life of the project. It is expected that with lessons learnt the results will attract other donors to scale up the Adaptation Set-Aside of the SIRF Fund. It is expected that over 150 jobs will be created by this project in the area of construction.

Component 3 will benefit the entire community as they benefit from taking care of their waterway.

The project will have a positive impact on the entire country and the other nations in the Organization of Eastern Caribbean States (OECS) by assisting with the piloting of the draft climate-resilient building codes for the OECS.

Economic Benefits

Tangible economic benefits will be enjoyed by the beneficiary population through project interventions that will increase the waterway capacity from a 1 in 5-year rainfall event, to a targeted 1 in 50-year rainfall flooding event.

The Revolving Loan Facility – Adaptation Set-Aside will benefit 150 – 200 households and small businesses through the loan disbursement of the US\$3 M principal. In addition, the financial model suggests that US\$5.8 million in additional loans can be created without replenishment of the initial US\$3 million through the revolving loan structure over the financial model's 10 year projected period (Appendix 3).

Social Benefits

This project will provide financing to communities that have traditionally had difficulties accessing resources. As opposed to centralizing support for hurricane shelters, the structure of this project is to allow people to safely live in their homes that upgraded to be resilient to the impacts of climate change. These resilience measures includes the interventions at the home that will address drought and other extreme events – meaning that they can go to work, school and take care of families. The project is expected to positively impact people's wellbeing particularly that of women.

“Women participants from a focus group discussion held in the community shared the frustration with the poor drainage systems and highlighted how it affected their health, security and livelihood. Women from the focus groups described how they have had to negotiate the high levels of water to save their lives, such as the use of sticks and pipes to pull each other out of their homes. The flooding has impacted children’s access to school. Flooding also makes mobility difficult for both men and women.” – Gender Expert reporting on Focus Group Discussions held for the Adaptation Fund Project (Appendix 1)

The Ministry of Financing will underwrite the risk of the Revolving Loan Facility, which enables the Facility to offer unsecure loans and thereby securing access to credit by the most vulnerable communities, and vulnerable groups within communities. Local area vulnerability studies have suggested a high prevalence of female-headed households in the McKinnon’s area,⁵³ and women can encounter significant barriers to accessing credit in the island.

The *Aedes aegypti* mosquito which is the vector for Zika virus that is present in Antigua, as well as dengue fever, and Chikungunya, breeds preferentially in stagnant water especially water containing bacteria associated with the breakdown of organic matter such as dead leaves. Interventions in the waterway so there are fewer places where water can stagnate will ease this problem.

Since flooding is one of the most common hazards that affect the community on the northwest coast and women headed households are affected disproportionately, the re-engineering of the waterway will have a positive impact on the community particularly women who are at a greater risk of injury and death due to societal restrictions and gender roles.

Environmental Benefits

Component 1, will be designed to provide as natural as possible a design for the interventions in such a way that the community can be involved in the maintenance and care of the results of this intervention. Further the component will be designed to ensure that the plants used to secure the buffer/easement areas can be used for the community as food (such as mango trees are very good for stabilization of waterways) or for well-being and shade.

The specific interventions under Component 1 will have the following positive environmental benefits: i) reduced rates of run-off; ii) decreased soil erosion; and iii) regulated flow of water in waterways flowing through local communities. The project activities are ‘no regrets’ interventions because they will improve upon the baseline conditions regardless of the severity of expected climate change effects. Environmental benefits are derived from the project’s impact to improve functioning of watershed

⁵³ CARIBSAVE 2015. Local area Vulnerability Impact Analysis for Antigua and Barbuda

ecosystems and enhance the capacity of local communities to implement climate-resilient measures in these watersheds.

Environmental and Social Management Plan

The project will avoid or mitigate negative impacts, in compliance with the Environmental and Social Policy of the Adaptation Fund. The Environmental and Social Management Plan developed as part of the project preparation activities identified potentially negative side effects from project activities. These can be summarized as follows:

- 1) Pollution of the waterway during adaptation construction activities by inadequate disposal or storage of construction materials, waste removed from the waterway including vegetation;
- 2) Issues related to the targeting of loans to the vulnerable, recovery of loan amounts; and
- 3) Disproportionate exclusion of the most vulnerable, including women and the disabled.

However, the reviewers concluded that these impacts can be minimized or eliminated through adherence to the management plan. Measures are outlined in detail in Appendix 1, and include but are not limited to:

- Protection of the watershed by removing waste promptly or storing it to prevent its entry into the waterway.
- Inclusion of guidelines for disposal of waste when upgrades are being made for climate adaptations
- Monitoring of water quality at key stages of the project to ensure there is no deterioration of water quality
- Prompt re-vegetation of the banks of the water course to minimize erosion
- Instituting special arrangements for loan recovery including salary deductions and standing orders
- Deliberate targeting of vulnerable groups and training for inclusion of women at as many stages as possible⁵⁴.

Components 2 and 3 will require planning permission for each of the buildings to be affected by financial inputs. The planning permission process will determine the environmental and structural impacts of each activity. The review process at the planning office (the Development Control Authority) is to determine the environmental and structural impacts.

The legal mandate for the EIA is established under Section 23 of the Physical Planning Act of 2003⁵⁵ and Section 38 of the Environmental Protection and Management Act of 2015. These sections define an EIA as, “an analytical system of assessing or reviewing environmental, social and economic consequences that are likely to result from a

⁵⁴ Appendix 15 is the Workforce Training Strategy and the strategy actively encourages the participation women and under-represented groups in all sectors of the workforce.

⁵⁵ Physical Planning Act, 2003. Government of Antigua and Barbuda. <http://laws.gov.ag/acts/2003/a2003-6.pdf> Accessed May 3, 2016.

proposed development activity, beginning at the inception of the activity and ending at its completion or decommissioning.” The Department of Environment has the mandate to draft the Terms of Reference (TOR) for the EIA for the review of the Technical Advisory Committee. The TORs draw on its governing policies including ESS and gender considerations (Appendix 13 for EIA Terms of Reference).

C. Cost-effectiveness

The following compares the proposed components to viable alternatives to achieve the same impact, with a focus on economic comparisons to the extent possible.

Table 4. Scenario planning to demonstrate cost-effectiveness of the project

Viable alternatives	Assessment of alternatives (cost-effectiveness)
COMPONENT 1 – Upgrade Urban Drainage and Waterways	
Do Nothing	<p>If no interventions are taken, the communities surrounding the waterway as well as residents and businesses in low-lying areas will suffer from more intense and more frequent flooding. Infrastructure within 50 m of the targeted waterway leading into McKinnon’s Pond includes 424 buildings (22,000m² in total) and 7.25 km of roads. Damages to this infrastructure would continue to incur millions of dollars in damages following disasters. While the upfront cost here of “do nothing” is zero, <i>ad hoc</i> disaster response costs to flooding are estimated at least 10 M USD per Category 2 or higher hurricane for the property along the waterway alone.</p> <p>Additionally, doing nothing will also allow the vulnerabilities to communicable disease to persist and perhaps worsen. The communities surrounding the the waterways leading into McKinnon’s Swamp are some of the densest in Antigua. Further, the area is in proximity to one of the most active tourism, shopping and cultural zones further exposing large numbers who visit and transit to the area to diseases like zika, chikungunya and dengue.</p>
Construct concrete drains to channel water from and through the watershed and into the Pond	<p>It is the normal response for the Government to construct concrete drains for improving the waterway’s ability to manage the increased quantity of rainfall due to intensity and runoff trends. Construction of the concrete drains along the 3 km of waterways is estimated at 4 M USD and is therefore a more costly option compared to climate resilient urban drainage (approx. 3 M USD). In addition, this approach increases runoff into McKinnon’s</p>

	<p>Pond and would require regular dredging of the Pond every 5 – 7 years, which is approximately 1.5 M USD per dredging. Ecosystem-based resilient drainage is therefore significantly more cost effective.</p> <p>In addition, the concrete drain approach displaces ecosystem services of water filtration, biodiversity including critical wetland and bird habitat, and traditional uses of the waterways. Although these ecosystem services have not been valued to date, the produce tangible benefits to the community and local economy. This project aims to demonstrate the alternative ecosystem-based approach that the Public Works Department may consider for future waterways.</p> <p>Concrete drains are however easier to keep clean from solid waste and are therefore preferred option by the Public Work Department. The project will have to apply best practices in this regard.</p>
Increase application of chemicals used in spraying to control mosquito populations	<p>With the construction of hard surfaces there is the risk that the settlement of water will occur and provide a breeding place for vectors. This will have to be treated with chemicals, and Malathion is most commonly used in Antigua and Barbuda. Malathion affects the nervous system, and other health impacts have been linked to the chemical. An ecosystem approach uses native fish species and other predators within the waterway to control the vector populations.</p>
COMPONENT 2 – Revolving Loans for Adaptation	
Do Nothing	<p>Not including this small loans component in the project risks the project negatively impacting residents on the northwest coast of Antigua. Raising the profile of climate risks in the community through hazard mapping and climate projection forecasting can have negative impacts on community perceptions of their area and its safety, and can even result in lower property values or higher insurance rates. This can impact of the those property still making mortgage payments if banks become sensitized to the hazard information. “Do nothing” by eliminating this component of the project could undermine total project impacts and thus jeopardize future adaptation interventions and the political will for tackling climate change.</p>

An alternative to the Revolving Loan Facility is to award the US\$3 M in grants to homeowners	Approximately US\$5.8 million is created in cumulative impact without replenishment of the initial US\$3 million through the revolving loan structure. By allocating funding through a revolving structure, the Facility nearly triples the overall impact of the funding from US\$3 M to US\$8.8 M in total (Appendix 3 – Financial Model).
Construct shelters to meet category 5 hurricanes and flooding	<p>This alternative would fail to mitigate the damage inflicted under the “do nothing” approach, namely direct threats to over 400 homes and buildings. Instead, this intervention would improve emergency disaster response and provide shelter during emergencies. However, the provision of shelters does not combat slow onset events – for example the on going drought of 2015 has cost the government an estimated hundreds of millions of dollars.</p> <p>This scenario could also result in increased squatting or the establishment of illegal (unapproved) structures as people may find the direct costs of resilience measures too high, potentially resulting in increased damage during the passage of storms.</p> <p>Instead, by improving the infrastructure of people’s homes, this project will also reduce the risk to loss of life due to natural disasters, while also contributing to economic prosperity and improving quality of life enjoyed year-round, especially in the face of slow-onset climate impacts.</p>
The alternative to SIRF small loans for homeowners is to demand that the homeowners meet the requirement of the new Local Area Plan and the building codes at their own cost.	<p>This alternative would externalize the cost of compliance to the private sector and homeowners, however arguably this could result in indirect costs to the government in the form of welfare and increased social services to the area. In addition, this alternative has high political risks since this will marginalize most families within the area, especially low-income families.</p> <p>A further alternate to loans is the Government providing grants. This is not a viable option due to the Government’s high indebtedness.</p>
COMPONENT 3 - Capacity Building In NGOs And Community Groups	
Do Nothing	Eliminating the mainstreaming and capacity building interventions under this project is not a cost-effective option, as the benefits of the project would likely not be sustained beyond the life of project implementation. The

	Department of Environment recognizes the importance of building partnerships and sharing in missions and activities, and capacity building of implementing partners, including NGOs and community groups, is a critical sustainability element of this project.
The project can conduct the regular public awareness and hope that can change behaviour of the community and Government agencies	Although this is a common method to change behaviour, the current project activities will go a significant step further to ensure that the awareness program can speak to the issue of economic, health and other important sectors regarding the project area and impact.
The project could design a top down approach to address the problems within the community. The Government could be solely responsible for conducting M&E and sustaining project activities.	<p>With the Government being solely responsible, this will rely on Government resources being available, which may not consistently be the case. The community has a vested interest in ensuring that the area is maintained and cared for, since this will impact on the health and wellbeing of the community.</p> <p>By investing in community contracts to maintain project interventions under Component 3, the intervention worth USD 3 M under Component 1 will be maintained.</p>

D. Consistency with national & sub-national sustainable development strategies

The project is in compliance with key legislation and policies, namely the Physical Planning Act (2003), the national land use plan (gazetted in 2012), the INDC of 2015, the Third National Communication on Climate Change, and the National Environmental Management Strategy for Antigua and Barbuda.

National Communications to the UNFCCC

In line with UNFCCC requirements Antigua and Barbuda produced their initial (2001), second (2009), and third (2015) National Communications to the UNFCCC. The documents layout the national context in relation to adaptation and mitigation challenges across various sectors in the islands. The Third National communication recommends several adaptation options including: the protection of human settlements from increased intensity in precipitation events, which are at risk of flooding if drainage infrastructure is not upgraded or improved. In the water resources chapter, the authors state *“it is critical that engineers design post- runoff storm drains to equal the natural conditions at pre- development in a given watershed area”*⁵⁶ This is particularly relevant to the community of Yorks, which experiences persistent flooding during heavy rainfall. Furthermore communities must be made aware of potential climate impacts in order to promote co-operation with planning authorities and allow for local co-benefits to emerge.

⁵⁶ Government of Antigua and Barbuda, Second National Communication, pg. 261

Intended Nationally Determined Contributions (INDC) to the UNFCCC

Antigua and Barbuda communicated its Intended Nationally Determined Contributions (INDC) to the UNFCCC in October 2015. The INDC included climate action targets to which this project is aligned and will assist with implementation. Relevant targets are:

- By 2030, all buildings are improved and prepared for extreme climate events, including drought, flooding and hurricanes.
- By 2030, all waterways are protected to reduce the risks of flooding and health impacts.

Physical Planning Act (2003)

This Act controls the development of land; the protection of the natural environment; and building regulations. The Act requires a **National Physical Development Plan**, and includes provisions for development plans for “any specified part of Antigua and Barbuda” (Section 10), coined Local Area Plans (LAPs). The Act (2003) requires certain projects, prior to authorisation, to undertake an Environmental Impact Assessment (EIA). Additionally, this act will set policies and plans which will consider items such as: i) pollution; ii) safeguarding of water supplies water catchment areas and mineral resources; and iii) erosion, land slides and flooding⁵⁷.

Sustainable Island Resource Management Zoning Plan (SIRMZP 2012)

The SIRMZP is the National Physical Development Plan required by the Physical Planning Act of 2003. The SIRMZP arose out of extensive consultation through the Core Zoning Plan Committee comprising of various stakeholder interest groups including government departments, agencies and NGOs. The Plan includes a rigorous discussion of the current state of Antigua’s planning landscape, developments in the management and regulation of planning thus far and the priorities and guidelines for future implementation.

Environmental Protection and Management Act (EPMA) of 2015

The EPMA of 2015 is Antigua and Barbuda’s new overarching environmental legislation, which sets up effective environmental management administrative responsibilities, consolidates multilateral environmental agreements, and establishes a framework financial mechanism to implement the Act (the SIRF Fund).

Sustainable Island Resource Framework Fund (SIRF Fund)

The Government of Antigua and Barbuda is developing a national fund, the Sustainable Island Resource Framework (SIRF) Fund, to serve as the primary channel for environmental, climate mitigation and adaptation funding from international and domestic sources. Legislated through the EPMA of 2015, the SIRF Fund will provide the framework financial mechanism to implement the Act, and is the primary means for implementing Antigua and Barbuda’s ambitious climate action targets. By channeling environmental finance and technical assistance, the SIRF Fund will catalyze internal (protected areas visitor fees, a water levy, a carbon tax, and repayments) and external

⁵⁷ UNFCCC. (2009). Antigua and Barbuda's Second National Communication on Climate Change.

funding sources to enable the country to meet its climate and sustainability goals in a coordinated, systematic and cost-effective manner⁵⁸.

National Poverty Strategy

The National Poverty Reduction Strategy (NPRS)⁵⁹ in 2010 served as the strategic framework, which would guide the macroeconomic, structural and social policies and programs that would be pursued from 2011-2015. The idea was that the NPRS would provide the basis for National Economic and Social Transformation (NEST) Plan 2010-2014 by refining key strategies that are in place, identifying the gaps and supplementing the existing intervention with new ones⁶⁰. NEST is considered a more comprehensive approach to poverty reduction in Antigua and Barbuda, which was developed with the aim of economic rebalancing⁶¹.

National Medium-Term Development Strategy (2016 – 2020)

The Medium-Term Development Strategy, finalized in September 2015, represents strategies and actions to be undertaken by Antigua and Barbuda between 2016 and 2020, to move the country towards its long-term development goals. The strategic vision is, “A harmonious, prosperous and modern Antigua and Barbuda founded on the principles of sustainability and inclusive growth; where equality of opportunity, peace, and justice prevail for all citizens and residents”. The attainment of this vision is guided by a sustainable development approach, “To improve the quality of life for all Antiguan and Barbudans and their posterity”. The overarching goal will be attained on the basis of the following four Sustainable Development Dimensions:

1. Optimal Generation of National Wealth;
2. Enhanced Social Cohesion;
3. Improved Health of the Natural Environment and Sustained Historical and Cultural Assets; and
4. Enhanced Citizen Security.

Convention on the Elimination of all Forms of Discrimination Against Women (CEDAW)

The principal instrument for the protection of women's rights is CEDAW, which was adopted in 1979 by the General Assembly of the United Nations. Antigua and Barbuda ratified CEDAW in 1989 and signed the Optional Protocol in 1996. CEDAW ensures that women are given the opportunity to represent their governments at the international level and to participate in the work of international organizations; that women have equal rights to bank loans, mortgages and other forms of financial credit; and that women in rural areas can (i) participate in and benefit from rural development; (ii) participate in development planning at all levels; (iii) obtain training, education, and extension services; (iv) have access to agricultural credit and loans, marketing facilities

⁵⁸ The SIRF Fund's business strategy brief is available for download:
http://www.oas.org/en/sedi/dsd/Energy/SECBI/SIRF_BusinessConceptNote.pdf

⁵⁹ GOAB, 2011. Poverty Strategy Reduction Strategy

⁶⁰ GOAB, 2012. National Economic and Social Transformation (NEST) Plan

⁶¹ GOAB, 2012. National Economic and Social Transformation (NEST) Plan

and appropriate technology; and (v) are treated equally in land, agrarian reform, and land resettlement schemes.⁶²

E. Compliance with relevant national technical standards

In Antigua and Barbuda, any intervention in sensitive ecosystems that includes alteration or modification of wetlands requires an Environmental Impact Assessment (EIA) in accordance with Third Schedule of the Physical Planning Act of 2003. The Act further provides the timing and responsibilities of the various stakeholders throughout an EIA process. Additionally the work will be in line with the guidance provided in the national zoning plan of 2012 as well as the Environmental Management and Protection Act of 2015 (EPMA).

The EPMA's Part VI "Environmental Management and Monitoring", in Section 39, provides for Environmental Management Systems (EMS). This Section mandates that the Department promote the adoption and implementation of EMS, and that it assist the Bureau of Standards in this regard. The EMS will guide compliance with the objectives of the Environment Act, including compliance with permissible levels of pollution, protection of waterways, efficient use of resources, and other environmental principles established by the Act. In February 2016, the Department of Environment submitted a request to the Bureau of Standards to develop national EMS, and the development of EMS is currently underway.

In order to comply with relevant national technical standards, a development application for the project design will be shared with the Development Control Authority (DCA) by the National Implementing/Executing Agency – the Department of Environment. The Department of Environment is responsible for identifying Environmental and Social Safeguard (ESS) risks and recommending mitigation measures to the risks in the EIA. Technical staff at the Department of Environment are trained and qualified to direct safeguards in this process. The development approval process takes approximately 3 months, based on the Department's previous experience, and the EIA process takes an additional 3 months.

Technical standards for the interventions fall under the Public Works Department (PWD), however current standards are not climate-resilient. As such, the building code and infrastructure guidelines are in the process of being updated through the parallel Global Climate Change Alliance project (2014 – 2018). The Caribbean Examination Council (CXC) is also developing a course in Cape Green engineering course <http://www.cxc.org/cxc-launching-cape-green-engineering-syllabus/>.

The authorization/clearance for the project to be implemented is by Statutory instrument (see example from Official Gazette of 2004, Vol. XXIV, No. 43). During

⁶² Huggins, T. 2014. Country Gender Assessment for Antigua and Barbuda. Prepared for the Caribbean Development Bank (CBDB). http://www.caribank.org/uploads/2014/12/CGA-AB-Vol-I- JUNE-2014_FINAL.pdf Accessed May 9th, 2016.

project implementation, the Technical Advisory Committee (TAC) is responsible for ensuring the technical integrity of the project. The TAC assists with the preparation of TORs for consultancies as well as providing a technical assessment of bids when submitted. This body is comprised of technical officers from a cross-section of ministries and experts from private and non-governmental agencies.

The GIS and mapping components of this project will comply with GIS standards in the Environmental Information Management and Advisory System (EIMAS), a GIS-based database of environmental information in Antigua and Barbuda. Relevant technical standards include metadata, coordinate systems, accuracy and groundtruthing. Baseline data contained in the EIMAS will be a great benefit to this project, and GIS data developed through this project (including the hazard mapping and climate impact modeling in Component 1) will be integrated into the EIMAS to inform future decision-making.

F. Other funding sources

This project does not duplicate other efforts, however it is aligned with the Department of Environment's work programme and therefore complementary and parallel initiatives are underway. The Department of the Environment uses the same project management strategy and structure across all of its projects. This approach maximizes resources and ensures coordination of activities. Complementary initiatives with linkages and synergies to this project are summarized below.

The Government will however need other funding and resources to achieve resilience on the northwest coast. It is anticipated that these resources will be identified during the project planning stage and earmarked through a Cabinet decision.

The UNEP GEF project titled **Sustainable Pathways – Protected Areas and Renewable Energy** (SPPARE), was approved in December 2014 and will be implemented from January 2015 – December 2018. The project will enhance the financing and management of ecosystem services, through developing and operationalizing the **Sustainable Island Resource Framework Fund (SIRF Fund)**. The outcome of the SPPARE project includes the development of a business plan for the implementation of the financial plan and associated legislation – the Environmental Protection and Management Act of 2015. Moreover, the SPPARE project will establish the environmental management window of the SIRF Fund⁶³. The proposed AF project will use the adaptation window of the SIRF Fund to distribute and manage the revolving loans and grant financing, thus drawing on the knowledge base of and creating synergies with the SPPARE project.

The **Special Climate Change Fund (SCCF)** project, "Building climate resilience through innovative financing mechanisms for climate change adaptation" (estimated 2016 – 2019) will develop a local area development plan for McKinnon's Pond, building

⁶³ The SIRF Fund's business strategy brief is available for download:
http://www.oas.org/en/sedi/dsd/Energy/SECBI/SIRF_BusinessConceptNote.pdf

on previous work and participatory processes. The project will implement physical interventions in the upper area of the McKinnon's watershed. The SCCF project will pilot cost-effective adaptation interventions – focused on ecosystems – through a contribution of household small loans window of the SIRF Fund, and the AF will replicate and scale-up on best practices under the SCCF project. In addition, the SCCF project will contribute to an enabling policy environment by delivering a draft National Climate Change Adaptation Policy and Implementation Strategy as well as updating the National Environmental Management Strategy to incorporate climate change resilience. Finally, local and regional education and awareness is a cross-cutting component that will magnify impact and lessons learned.

The **Global Climate Change Alliance (GCCA) Project** on Climate Change Adaptation and Sustainable Land Management in the Eastern Caribbean will implement: 1) Effective and sustainable land management frameworks and practices, and 2) Specific physical adaptation pilot projects in relevant areas or sectors. The first component is the main source of complementarity, as the framework includes undertaking a stakeholder dialogue and developing a National Climate Change Policy, Strategy and Action Plan. The project will also deliver base maps to determine land capability (including geotechnical, hazard maps) and support land use planning, as well as development and approval of a revised National Building Code and Ordinance. For the second objective, the Project will co-finance physical interventions in the Cashew Hill area, in the St. John's watershed (approx. US\$1 million).

In addition, it is expected that there will be some projects funded through the **GEF Small Grants Program (SGP)** to be implemented in the project site in the near future. During the implementation of the proposed SCCF project, there will be close coordination between it and the proponents of any GEF SGP initiatives to ensure complementarity between activities.

A delegation from the Commonwealth Secretariat visited Antigua and Barbuda in June 2016 to share information about the **Climate Finance Access Hub**, an initiative that will build capacity through the placement of long-term expertise in countries to assist in accessing climate finance. The Commonwealth is able to provide required technical assistance that will strengthen and support the DoE's initiatives to scale-up access to climate financing, supporting Component 2 of this project (Appendix 11).

UNEP is providing legal technical support to the Department of Environment to revise the Environmental Protection and Management Act (2015) and to develop comprehensive regulations for the Act.

G. Learning and knowledge management to capture and disseminate lessons learned

The Department of Environment (DOE) is implementing a Knowledge and Information Management System (KIMS) with the responsibility of maintaining an up-to-date inventory of information on all ongoing activities. The base of the KIMS relies heavily on

the Information Communications and Technology (ICT) infrastructure that resides at the DOE. This System, along with its infrastructure, allows the Department to comply with Part IX of the Environmental Protection and Management Act (2015), which calls for the storage of “all documents produced, collected or submitted to the Department”. This present project will utilize the KIMS, and associated components, to capture and disseminate lessons learned.

The DOE manages an environmental Geographic Information Systems (GIS) database – Environmental Information Management and Advisory System (EIMAS), a functional comprehensive environmental data repository. This database consists mainly of shapefiles, feature classes, database tables and raster layers. The methodology utilized to capture and record field data involves a combination of Global Positioning System (GPS), Unmanned Aircraft System (UAS), digitization and ground-truthing. Under this project, a GIS tracking tool will be used to capture the adaptation activities and report on the learning and knowledge management. The Environmental Information Management and Advisory System Data Management Protocol, included in Appendix 14, details an inventory of existing GIS data, the knowledge and information management procedures, as well as access and sharing provisions through the template data sharing agreements.

Primarily, GPS technology will be used to capture data in the field under this project. A data dictionary has been created to facilitate capturing of data on locations of households and community shelters (Figures 12 & 13). This data dictionary will be uploaded to the Trimble Juno 5 series GPS handheld devices that will be used by the Community Based Assessors (CBA) out in the field. Prior to field surveys, these CBAs will be trained in the use of the GPS devices and conduct mock mapping exercises. Training has already taken place with several CBAs to enable spatial mapping of the household surveys conducted for the social market research field component, as demonstrated in Figure 15 below and in Appendix 4.

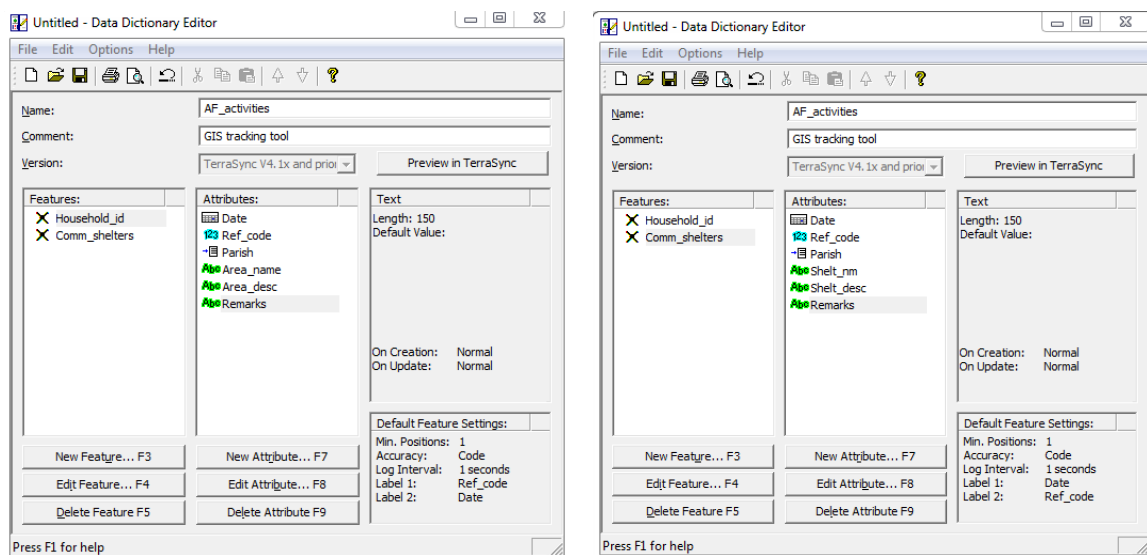


Figure 12. Data dictionary for AF GIS Tracking Tool

The data dictionary captures two specific types of features, namely households and community shelters. The former collects attribute information on date, reference code, parish, name of area, area description and general remarks. The latter will collect attribute information on date, reference code, parish, name of shelter, shelter description and general remarks. Each household and community shelter will have a unique reference code. This data, once downloaded from the GPS devices, will be stored in a feature class format.

The CBAs will also be collecting qualitative information from the households and community shelters. This information will be transferred and stored in an access database, created with specifications relevant to the information collected. In addition, each entry in the database will have a unique reference code that will coincide with the reference codes established during the GPS tracking exercise. GIS will allow for the entries in the feature class to be linked to the access database, thereby transferring all relevant data to the GIS. Analysis and querying of this data will then be conducted.

The final output of this component will be the ability to conduct spatial analysis and create maps that can be included in periodic reports. This will contribute to the monitoring and reporting by tracking progress, and will strengthen the scientific foundation of the learning and knowledge management under this project. Sensitive information will be protected in accordance with the Manual on Revolving Loans in Appendix 9 and the EIMAS Data Management Protocol in Appendix 14.



Figure 13. Data dictionary displayed on the Trimble Juno GPS device

Using this data-driven approach, the project will produce informative visual knowledge products that will be used in communicating and sharing knowledge to promote

ecosystem-based adaptation approaches and innovative approaches to adaptation in Antigua and Barbuda, across the Caribbean, and with small island developing states globally.

The mediums for communicating these outputs include:

- The Department's website is managed by a dedicated officer, who is also fluent in English, Spanish and French. The website is in English, and lessons learned can be adapted and communicated to other regions
- The Department has an active Facebook page, twitter account, and other media, including regular TV and radio interviews
- The Department will be using the Botanical Gardens as a centrally located place in St. John's to show case projects and programs, including activities under this AF project
- The AF project will utilize project briefs and power-point presentations targeted at the Ministerial level and Cabinet, to communicate lessons learned for decision-makers
- The Department works closely with the GEF small grants program and its national network to extend the project activities and outputs of the project. The NGOs and community groups are empowered through projects with workshops and sub-contracts for project implementation. Component 3 will use three sub-contracts to NGOs/community groups to implement the project, building on the successful model of the GEF SGP.
- As the national focal point for climate change and other MEAs, the Department travels to the Climate Change meetings and are available to showcase this project at side events. For example, at COP21 in Paris December 2015, a representative from the Department presented at the Adaptation Fund's showcasing event. To develop content to support such engagement, one video and monthly photo blogs of project activities will be developed for sharing with an international audience. This will be done in partnership with an NGO.

H. The consultative process

The northwest watershed has been recognized as a priority for adaptation since 2010, when it was identified and prioritized during consultations for national land use plan. In 2014, the CARIBSAVE Partnership conducted a Local Area Vulnerability Analysis for three watersheds in Antigua and Barbuda, including the northwest coast watershed, and in 2015 consultations were held to validate findings and recommendations, and prioritize future interventions⁶⁴.

The methodological approach for the local vulnerability assessment included qualitative and quantitative techniques to develop a holistic framework to improve knowledge and understanding of the conditions of local vulnerability to climate change and livelihoods in the three study sites – this project's Yorks/McKinnon's area, in addition to Cashew Hill

⁶⁴ For the in depth methodology and results, the LVIA report is available online:
http://www.environmentdivision.info/UserFiles/File/LVIA_Antigua_and_Barbuda_FINAL_8DEC15.pdf

and West Palm Beach. A quantitative baseline household survey was combined with focus group discussions to provide robust data required to assess vulnerability⁶⁵.

The household survey adopted a random sampling design. Community-based assessors (CBAs), specially trained for this task, compiled a detailed list of all households in the study areas. From these lists, interview participants were randomly selected with a 90 percent confidence interval sample size. A total of 159 households were sampled across the three areas (60 in Cashew Hill; **51 households in Yorks/McKinnon's** and 48 in West Palm Beach/Jolly Harbour)⁶⁶.

Although the design and structure of the household survey facilitated the acquisition of some qualitative data (e.g. respondents were asked about their attitudes and perceptions of the pertinent hazards), most of the qualitative data was collected using a focus group discussion and community mapping exercise (Figure 14), which are participatory vulnerability assessment tools tried and tested in adaptation literature⁶⁷.

During the participatory exercises in Yorks and McKinnon's, participants identified the following climate change adaptation priorities for the area:

- Increased access to portable water
- Improvements in governance
- Increased activities that foster sensitization of environmental issues
- Improved drainage through incorporating ecosystem-based adaptation

These priorities were presented at a stakeholder consultation, where the participants used the guiding principles for community adaptation planning (decentralized bottom-up planning; multi-actor involvement; focus on local vulnerability and adaptation; local level ownership; decentralized financial flow and implementation; ensuring low risk and high impact; mainstreaming adaptation into development; integrated planning and delivery) to develop an implementation framework for one of these priorities. The participants selected ***improved drainage through incorporating ecosystem-based adaptation*** as the priority activity for implementation.

In the social science survey on climate change awareness in Yorks, one of the McKinnon's communities, under the REGATTA project, which was conducted using a representative random sampling method, 96% of respondents responded "yes" to the question, *Do you think climate change is real?* Over eighty per cent stated that they see the effects of climate change. Most respondents had heard about climate change through the radio, followed by TV and social media. This baseline Knowledge, Attitudes and Practices (KAP) information demonstrates that the community is aware of the issue of climate change, and indicates that this AF project will be well received in the community, building on the extensive foundational consultative work that has already taken place in the area over the past two years.

⁶⁵ CARIBSAVE, 2015. LVIA, p. 13

⁶⁶ CARIBSAVE, 2015. LVIA, p. 15

⁶⁷ CARIBSAVE, 2015. LVIA, p. 15

Community Map of Yorks and McKinnons, Antigua

Vulnerability



Figure 14. Results of the participatory mapping exercise conducted in McKinnon's area during data collection for the local area vulnerability assessment (CARIBSAVE 2015)

The consultative process for the micro loans component of the project (Component 2) was initiated at the national level through consultations on the SIRF Fund and its legislation, and through consultations and the inception meeting of the SCCF project, which includes a small allocation for loans (see Section F for a description on the SIRF Fund). The McKinnon's area and specifically Friar's Hill Road is one of the SCCF's pilot sites, and therefore community members have been sensitized to the small loans window for adaptation, and were also consulted on adaptation interventions along the waterway. The innovative financing approach of the SIRF Fund featured heavily in the Parliamentary Consultation on the Environmental Protection and Management Act, which took place on 9 April 2015. Since the passage of the Act in October 2015, the Department of Environment has been sensitizing the public to the upcoming small loans feature of the SIRF Fund.

An informed assumption was made during this Adaptation Fund initial project concept phase that there is significant demand for unsecured, low-interest (2 – 4%) loans for adaptation interventions in the communities of Yorks, Yorks New Extension,

McKinnon's, and Gambles to access at the household/small business level. A market research study was designed and implemented by the Department of Environment during the project preparation phase (Appendix 4). The objective of the research was to collect quantitative data to assess the demand for adaptation loans, and to inform the design of the Revolving Loan Facility for Adaptation.

The research surveyed 178 persons (8% of the target population); households in close proximity to the waterway were targeted (Figure 15). Two community consultations with focus group discussions were held within the project area on 20th June and 5th July 2016 in the Yorks Community Center (Appendix 2). The project concept was made available on the Department of Environment's website⁶⁸, along with a powerpoint presentation that summarized the project components and interventions.

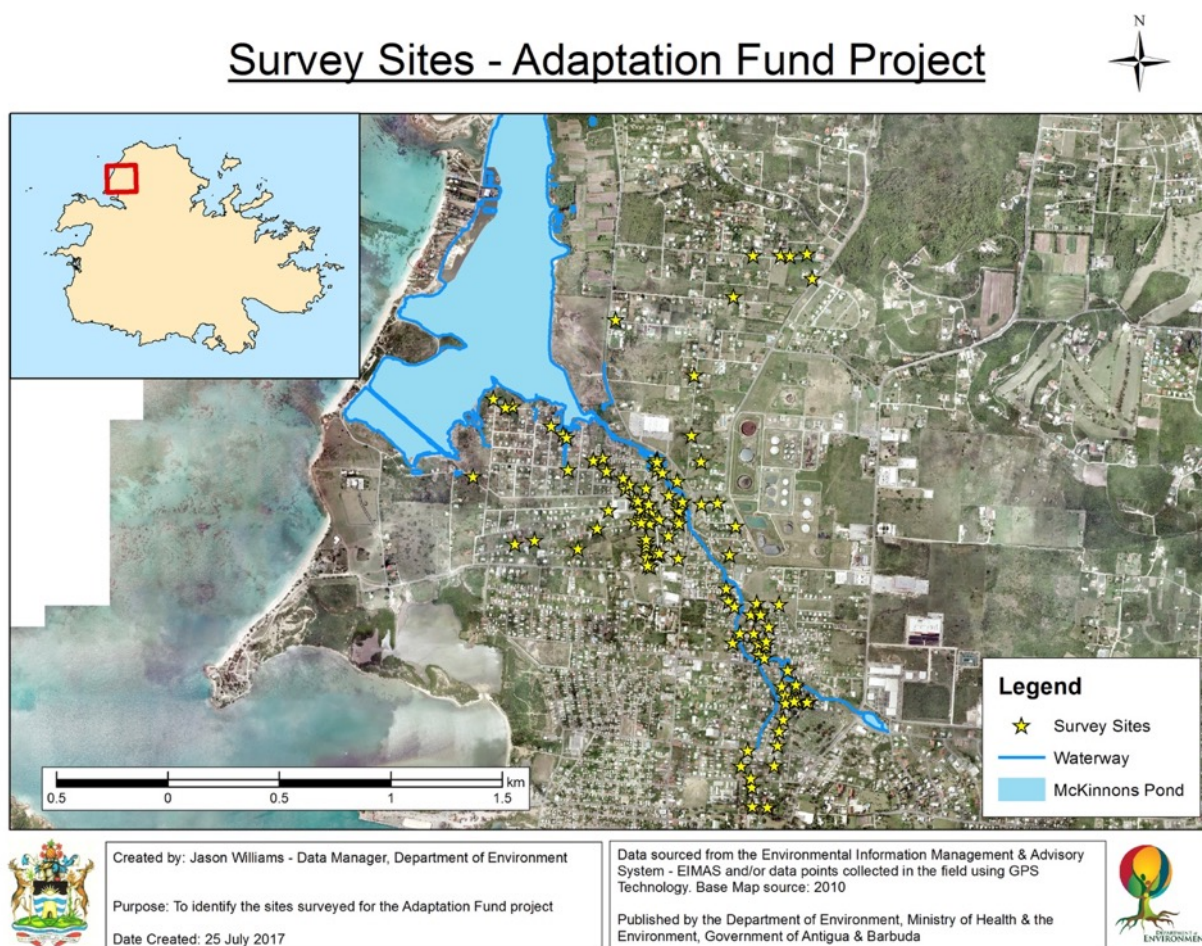


Figure 15. Spatial distribution of household and small business surveys conducted in the project site along McKinnon's waterway

Survey respondents were 62% female and 38% male. Age distribution indicated that 42% of respondents were over 50 years of age; 32% were between 35 and 50 years,

⁶⁸ Website of the Department of Environment, 2016. Adaptation Fund Project. Accessed 25th July 2016. <http://www.environmentdivision.info/news.php/news/187/group/16>

28% were 25 to 35 years, and 6% were 18 to 25 years. A total of 25% of survey respondents were civil servants employed by the Government of Antigua and Barbuda.

Results indicated that there is sufficient demand to pilot the Revolving Loan Facility for adaptation. The research indicates that 38% of the population is interested in loans for adaptation. Since the target population was estimated at 2,500, the number of households interested in accessing the loans is approximately 950. Assuming that 82% are homeowners, as demonstrated by the research, and conservatively that the landlords of the remaining properties are not interested in loans, then the number of households both interested and eligible will be approximately 780 households. The target number of loans under the Adaptation Fund pilot is 150 – 200 loans, indicating that the pilot should be oversubscribed, and supporting the original hypothesis of the Department of Environment.

Adaptation priorities were consistently spread across sectors. Survey responses indicate that priorities are evenly distributed across hurricane resiliency measures, energy interventions (renewables and efficiency), and water technologies (for more information on the survey results, refer to Appendix 4).

In summary, this project is the result of a series of consultations that began in 2014 and have culminated with the social market research on the demand for loans in July 2016. The table below summarizes key consultative outcomes, and the ways in which these findings have been iteratively integrated into the project design.

Table 5. Summary of key feedback from community consultations and how this feedback has been reflected in the project design

Source	Feedback from Community Consultations	Incorporation into Project Design
National stakeholder workshop, 2010	Northwest watershed recognized as a priority for adaptation and increasingly prone to flooding	Selection of northwest watershed as one of three priority sites to conduct a vulnerability assessment
CARIBSAVE 2016	Selection of <i>improved drainage through incorporating ecosystem-based adaptation</i> as the priority activity for implementation by the northwest community	Adaptation Fund project to address flooding problems (Component 1)
Social Market Research (Appendix 4)	Concern about the size of the loan; a resident in the focus group indicated that they might want a loan under US\$5,000	Loans under US\$5,000 will be eligible under the Revolving Loan Facility for Adaptation
Minutes of Community Consultations (Appendix 2)	Anxiety over landlords borrowing concessional loans and then raising rent as a result of increased property value	Concessionality of loans must be passed down to renters Inclusion of rent control provisions in the Loan agreements with landlords that rent out their properties

		Complaints mechanism managed by the DOE where residents could report issues to investigate and act as mediator
Minutes of Community Consultations	Some residents were concerned about the safeguards that are in place to ensure that their homes will be climate resilient. They expressed that even if they take the loans, their homes might still be susceptible to threats such as flooding and they will be stuck with a loan.	A technical assessment was developed and will form part of the loan approval process to ensure that adaptation actions meet technical criteria and to validate the adaptation actions (Technical Assessment Form on page 75 of Appendix 9)
Minutes of Community Consultations	Concern about the selection committee that would be used to approve loan applications	A manual was developed to clarify processes and increase transparency of the loan decision-making process Information including social safeguards will be uploaded to the Adaptation Fund page of the DOE's website

I. Full cost of adaptation reasoning

The current and predicted effects of climate change will continue to have multiple negative effects on human health, economic development and ecosystems functioning in Antigua and Barbuda. The proposed Adaptation Fund project will increase the resilience of local communities and sectors to climate change on the northwest coast of Antigua. This will be achieved through strengthening the climate resilience of activities implemented by ongoing baseline projects.

Component 1. Upgrade urban drainage and waterways to meet projected climate change impacts

Baseline

The primary watercourse that drains into McKinnon's Pond forms part of a drainage basin for the larger northwest watershed in Antigua. Hydrological characteristics of these basins and projected climate change impacts have not been adequately addressed and incorporated into works, building construction, and other land use practices over the years. The result is that core infrastructure and people's homes on Antigua's northwest coast are exposed to climate variability. Prosperity has already been eroded due to past extreme events, which further undermines adaptive capacity in a negative reinforcing loop of vulnerability. Compounding this problem, there is little

proof of concept available for nationally-appropriate adaptation interventions to inform replication and upscaling strategies.

Additionality

Concrete adaptation interventions in the watercourse will use methods and designs of Sustainable Urban Drainage Systems, which are considered a low cost and environmentally complementary drainage solution, and complementary to the objectives of maintaining ecosystem services. SUDS are appropriate in the context of McKinnon's watershed as the system design has a sequential approach to the various stages of the natural hydrological cycle in order to achieve effective management of storm water runoff quality, quantity and the associated amenity and biodiversity of the urban drainage system. Thus, the interventions in restoring and upgrading the Upper Fort Road-to-Yorks drainage system will focus on quality, quantity and ecosystem services. Low cost interventions include the use of filtering soil and re-establishing natural vegetation in high runoff areas, particularly on slopes, and establishing a 'Green belt' along the primary watercourse will prevent further degradation. Upgrading the watercourse through restoration and flood prevention measures will contribute to the resilience of the community's infrastructure to projected climate change impacts.

Component 2. Revolving Loans for homes in McKinnon's watershed to meet new adaptation guidelines established in the building code and physical plan

Baseline

The status quo is that, currently, the flow of international funding into Antigua and Barbuda is insufficient to finance climate change adaptation interventions at a national scale. Additionally, there are limited financial resources available within the country's small tax and market base to provide necessary investments in local-level adaptation. Consequently, vulnerable households are ill-prepared to adapt to the predicted effects of climate change such as increased flooding and storm damage.

Given the low levels of household income in Antigua and Barbuda, financial institutions are generally unwilling to provide funding to low-income households for adaptation. Interventions such as reducing vulnerability of buildings to climate change are too costly for many households to implement without additional financing. However, these households are often considered by financial institutions to be "unbankable" as they are at risk of defaulting on loans. In addition, the high interest rates on loans mean that poor households are unable to service loan repayments. Consequently, such households are unable to implement the requisite adaptation interventions and remain vulnerable to climate change.

Additionality

The Adaptation Fund project will address these shortfalls by establishing the adaptation window of the SIF Fund. Innovative financing mechanisms will be piloted in consultation with national and regional financial institutions to overcome barriers to accessing financing. Successful applicants – particularly vulnerable households – will have access to funding for necessary adaptation interventions. The additionality of this

component focuses on reducing vulnerability of households to the predicted effects of climate change, particularly flooding and drought. Interventions will be aimed at improving household resilience to these climate impacts and the criteria for approval of applications for loans will be defined at the project-planning phase. These criteria will include: i) eligibility of households based on income and other socio-economic indicators; and ii) adaptation benefits of the proposed interventions.

An operational and financial framework has been drafted (Appendix 9) and will be approved and implemented under this project to manage the disbursements of the small loans through a Revolving Fund for adaptation under the SIRF Fund. Lessons from various sources will optimize the efficacy of the loan disbursement structure. To initiate these demonstrations, workshops and outreach activities have been conducted and will be continued to introduce potential applicants to the adaptation loans framework as well as eligibility criteria and application procedures. Participants will include potential applications from the private sector as well as members of local communities that are vulnerable to the expected effects of climate change

Component 3. Adaptation mainstreaming and capacity building in NGOs and community groups to sustain project interventions

Baseline

The communities in the northwest coast watershed are aware of the problems, partly as a result of the Vulnerability Assessments that have taken place, and data has shown that there is a high degree of awareness and sensitivity to climate variability and climate change impacts. The community consultations strongly reinforced this understanding, as members talked passionately and at length about the climate-related problems they are facing and the solutions they would like to see. In fact, the situation is risk community members becoming disillusioned with the process as a “talk shop” (Appendix 1). However, at present, community members and the private sector on their own do not have the capacity, financial support, or technical support to tackle the problems, nor is it their sole responsibility. A coordinated and comprehensive approach to climate change adaptation is necessary to change the steady erosion of the environment and human wellbeing.

Additionality

The mainstreaming of climate change into local area development plans would be significantly delayed, and economic sectors and local communities would remain much more vulnerable to the current and predicted effects of climate change. Importantly, the Adaptation Fund project builds a foundation of climate awareness for government and private sector technicians – such as engineers, planners and urban designers – and their technical capacity to plan and implement adaptation interventions, which is presently insufficient for integrating climate change adaptation into local-level planning. Improving the resilience of 30% of the community-based buildings in the area will build social capital for adaptive capacity, in addition to the three contracts to be awarded to community groups/NGOs to maintain the adaptation interventions accomplished by the

project. By demonstrating concrete adaptation actions on the ground, and promoting community ownership in implementation, monitoring and evaluation, this project will build critical capacity to enable up-scaling of adaptation well beyond the life of the project, so that in the future problems that are identified can be spearheaded by communities. Consequently, the Adaptation Fund project is contributing to mainstreaming of climate change and adaptation into development planning processes and legal procedures. This will systematically build climate resilience in the activities of key planning and implementation agencies.

J. Sustainability of the project

The project's integrated approach of environmental management, social empowerment and poverty alleviate position the project for continued implementation and sustainability.

The urban drainage interventions under Component 1 will be sustained by integrating the Local Area Plan (LAP) into the implementation practices of the Development Control Authority, as the authority responsible for planning, and the Central Board of Health, as the authority responsible for public health interventions. The Department of Environment will continue to manage and promote lessons learned from the drainage interventions through the Watershed and Wetlands Management Committee, established under Section 45 of the Environmental Protection and Management Act of 2015, which has a responsibility for developing management plans and providing technical guidance in critical watershed and wetland areas. A budget line of \$30,000 has been allocated under Component 1 for the integration of this component into the implementation practices and work plans for the various agencies.

The project's sustainability feature under Component 2 is the revolving loan program, which will continue to function beyond the life of the project through soft loan repayments and continued disbursements through the SIRF Fund loans for adaptation window. Replenishments to the revolving fund are being negotiated by the Department of Environment, such as through the use of a water levy to be earmarked for watershed and waterway rehabilitation. Depending on the success of this demonstration project, the Government may also be willing to contribute funds to the climate adaptation revolving loan scheme directly.

For the community grants awarded under Component 3 for maintaining interventions and for resilience in community buildings, this is an innovative approach and the project will be demonstrating the benefits of empowering local communities to implement and maintain adaptation as the primary beneficiaries. The project's consultative approach, which builds on a strong foundation of participatory engagement, supports the sustainability of interventions beyond the duration of the project by ensuring that the long term needs of climate vulnerable local communities and sectors are prioritized. Working with the community by awarding contracts to maintain the waterway is expected to generate ownership and care of the upgrades. Financially, this initiative will be sustained through NGO allocations of the SIRF Fund resources. A floor of 15% of all

SIRF Fund financing is to be allocated to NGOs and community groups, per SIRF Fund operating procedures. The interventions under Component 3 will be maintained and replicated in other areas through the sustainable financing mechanism of the Department.

Finally, through participatory monitoring and evaluation, the area and its residence will appreciate the reduction of the impacts of extreme weather and vectors, and education programs will be used to demonstrate to the community the progress achieved through the project and sustain interventions. By awarding a community contract for M&E under Component 3, this will facilitate uptake and replication of lessons learned among community groups and continued project development and implementation of adaptation solutions to problems faced on the ground.

K. Environmental and social impacts and risks

Impacts are summarized below, and additional detail on the Adaptation Fund ESP areas is provided in Appendix 1 – Environmental and Social Assessment and Management Plan, including Gender Analysis. During project implementation, the physical planning department will review the mitigation measures, and the Cabinet of Antigua and Barbuda will ultimately approve the implementation plan. The Department will be bound through this legal and policy process to meet the requirements and recommendations of the risk assessment during project implementation.

The Department's complaint mechanism is established such that if the risk mitigation measures are not adhered to, the community can submit complaints (including anonymously) through various means, including an online form, through email submission, or by calling or visiting the office. The Department of Environment is bound to act on any complaints it receives, and has established policies and procedures for its responses.

Table 4. Environmental and social impact and risk assessment*

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
<i>Compliance with the Law</i>	The project is in compliance with relevant national laws.	
<i>Access and Equity</i>	The project is subject to the Department's stringent procurement rules.	A potential risk includes ensuring equity to direct beneficiaries of micro-loans. The project will develop access and selection criteria aligned with the GEF's ESS framework. Further modalities for selection will be developed, including "blind review" where the

		<p>reviewer does not know the identity of the applicant.</p> <p>The loan facility may be over subscribed and some community members may not get access. This may cause come disgruntlement.</p>
<i>Marginalized and Vulnerable Groups</i>	The project seeks to address vulnerable and marginalized populations through micro-loans to vulnerable households.	<p>Vulnerable groups may be unable to pay back the small loans.</p> <p>There may be some downsides to the climate risk awareness activities of the project, as the local area plans will identify zones that are most vulnerable. This may result in the devaluation of the homes and if there is still a mortgage on the homes, this may have an impact on bank lending. The project is designed to identify the vulnerability of the homes and to assist homeowners to get access to financing.</p>
<i>Human Rights</i>	The Department of Environment has a demonstrated track record of protecting and promoting human rights, and an online complaints mechanism is available to the public. Further, the SIRF Fund operational manual is developing an Exceptional/Disputed Cases Resolution Mechanism.	
<i>Gender Equity and Women's Empowerment</i>		<p>Local area vulnerability studies have suggested a high prevalence of female-headed households in the McKinnon's area.⁶⁹ The small loans program will explore tailored programs for vulnerable women, for example lower loan payments and interest rates. Further, the M&E framework includes gender-disaggregated indicators.</p> <p>The specific indicators for Gender are not fully known at this time. However, it is widely known that women find it difficult to access credit in vulnerable areas. If given</p>

⁶⁹ CARIBSAVE 2015. Local area Vulnerability Impact Analysis for Antigua and Barbuda

		<p>an opportunity, women generally will access financing to protect their homes and families. The indicator specific and impact indicators will be determine during the PP phase.</p> <p>The project partners will include Community development and gender affairs will be participating in the project design and implementation. Further there will be non-gender specific consultations with the community. This will ensure that all gender is considered and the project design is informed by the needs of each member of the community.</p>
<i>Core Labour Rights</i>	The project will be implemented in compliance with legislation including the Labour Code.	<p>The project will ensure that RFPs and the eventual selection of the contractors will include an assessment of good labour practices as a criterion for selection.</p> <p>The project will not envisage the need to import labour to the island. The project size is considered too small for this to be necessary.</p> <p>The Government policy is to be gender neutral in the hiring of contractors for all projects and programs. The project will select contractors via the Technical advisory Committee which consists of a balance of men and women.</p>
<i>Indigenous Peoples</i>	N/A as Antigua and Barbuda does not have indigenous populations as defined by the UN.	
<i>Involuntary Resettlement</i>	There will be no involuntary resettlement under this project.	<p>Structures on private land may need to be moved, however this will have to be done with the signed consent and cost of the the property owner. These owners will be allow to borrow funds to move their homes if they so desire.</p> <p>Property owners along the waterway may object to the repair of the stream if they believe their</p>

		property boundaries are being infringed on.
<i>Protection of Natural Habitats</i>	The project aims to rehabilitate and protect natural habitats	Work on the roadway may cause temporary unintended siltation of the pond
<i>Conservation of Biological Diversity</i>	The project will include habitat and species protection, restoration, and monitoring activities consistent with country's NBSAP.	
<i>Climate Change</i>	Through ecosystem-based adaptation and climate resilient drainage, the project will address climate change impacts and where possible mitigate emissions.	Household resilience measures (e.g. AC units) may increase electricity demand, leading to increased carbon emissions. RE systems will offset emissions
<i>Pollution Prevention and Resource Efficiency</i>	The project targets resource efficiency and pollution prevention through a monitoring programme and habitat restoration, as well as incentivizing implementation of EMS and the EPMA's pollution standards.	Works in the waterway may temporarily cause pollutants reach previously unaffected areas of the community.
<i>Public Health</i>	The project will improve public health through water quality improvements, monitoring in communities at high risk to health hazards, and design-oriented mosquito control strategies	Waterway works may increase mosquito habitats, which carry vector-borne diseases.
<i>Physical and Cultural Heritage</i>	The project includes activities to restore and protect natural habitat. No cultural heritage sites are located in the project vicinity.	
<i>Lands and Soil Conservation</i>	The project will protect critical habitat and through mitigating flood risk will promote soil conservation.	

PART III: IMPLEMENTATION ARRANGEMENTS

A. Implementation Arrangements

The Department of Environment is the National Implementing Entity (NIE) and the Executing Entity. The Department was accredited as a NIE to the Adaptation Fund in 2015. The Department is currently staffed with eleven technical officers and just over



Figure 16. Stakeholder Analysis highlights supporting and neutral actors; no detractors are identified.

Key: Green (supporter); Orange (neutral actor); Red (detractor)

fourteen administrative officers. All technical officers are trained at the Bachelors level and over half of the officers have attained postgraduate training in subjects ranging from engineering to environmental management and law. All of the officers are experienced in project development, public consultation, are familiar with the other agencies and have developed relationships with their peers in other government agencies, NGOs, and communities.

The Department of Environment is a coordinating entity that has established and maintained a strong inter-agency and cross-sectoral management framework. The three primary structures, as illustrated in Figure 13, are: 1) the Project Management Unit (PMU), 2) the Technical Advisory Committee (TAC), and 3) the Project Management Committee (PMC), summarized below.

While the Department has streamlined arrangements for project management, the approach is flexible and tailored to the specific needs of each project. The **Directorate of Gender Affairs**, which was established during the participation of the country in the international initiatives of the 1970s and 1980s, and has come to be seen as a critical institution in the thrust towards gender equity in the society. The **Community Development Division** sits on the TAC and has been engaged during the project development process.

These key partners are familiar with the challenges faced by the McKinnon's community, associated climate risks, and the adaptation interventions prioritized through the consultations and addressed under this project.

A stakeholder analysis is shown in Figure 13. The most important stakeholders are the community members. The analysis also highlights the importance of cooperation between different government departments.

Table 5. Institutional arrangements for project management and supervision

Name	Purpose and composition	Meeting frequency
Project Management Unit (PMU)	The PMU consists primarily of Department of Environment staff, including project manager, project coordinator, administrative assistants and other technical staff working on the project, to coordinate and implement day-to-day activities.	The PMU works together on a daily basis, and meets monthly with the Project Manager.
Technical Advisory Committee (TAC)	The TAC is the source of technical expertise and support for the PMU. The TAC provides technical guidance to projects, shares institutional knowledge, and assists with developing TORs and other project needs. The TAC has 21 members (17 governmental, 3 civil society, and 1 private sector coalition representative). The PMU provides secretarial support to the TAC.	The TAC meets monthly for the first year, and with a plan to meet on a quarterly basis with additional meetings as needed.
Project Management Committee (PMC)	The PMC acts as an advisory body to the project providing budget accountability, project guidance, policy input and support. The PMC ensures project alignment to national priorities.	The PMC meets quarterly and accounts signatories meet monthly.

The Department has extensive project development and implementation experience. The expertise located within the other government agencies is available to the Department via the office of the Permanent Secretary, the TAC and or through direct informal consultations during project concept and development.

The selection of consultancies/companies is the responsibility of the PMC. The PMC is a high level cross-sectorial committee comprising of lead policy makers and heads of departments. It consists of the Permanent Secretary of the Ministry of Agriculture, Lands, Housing & the Environment (Chairman), the Principle Assistant Secretary of this Ministry, the donor agency Focal Point, a representative of the Budget Office at the Ministry of Finance, the Chief Environment Officer and a secretary. The function of the PMC is to focus mainly on procurement, institutional arrangements and financial management of the project.

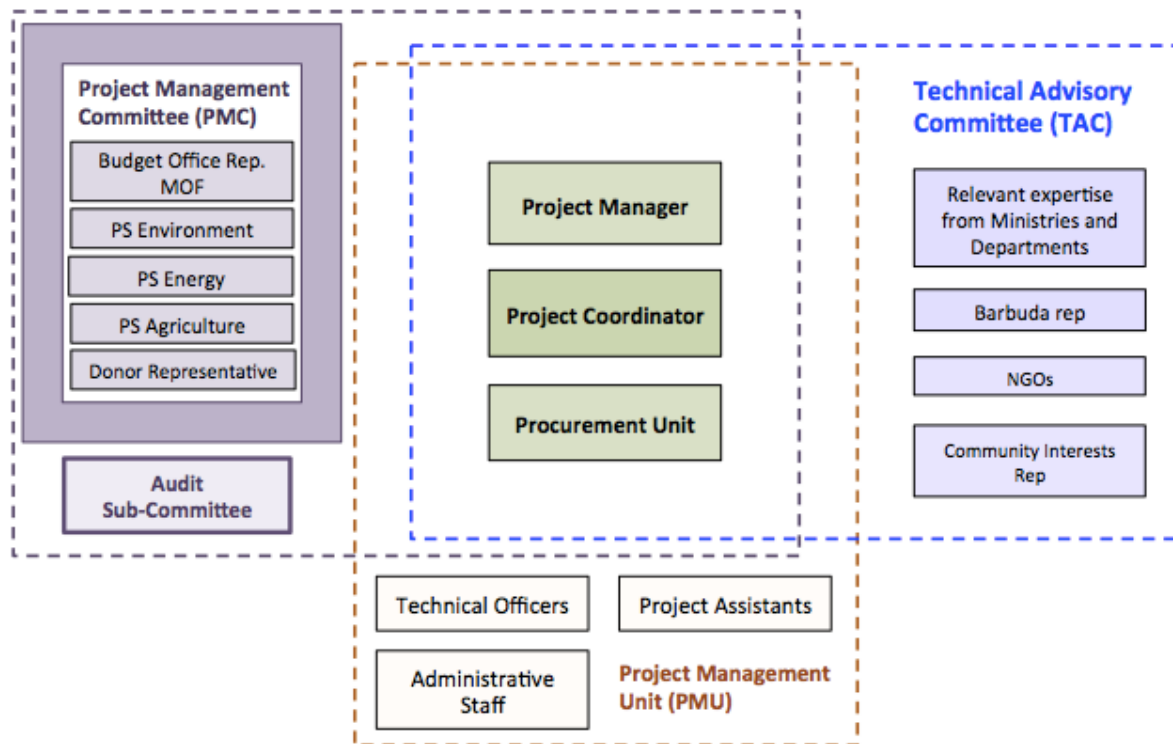


Figure 17. Diagram of the NIE's project management structure

The Procurement Officer or the Project Manager may, depending on the size and type of procurement, prepare a procurement report, which is reviewed by the Project Manager. Once the report has been reviewed, it is submitted to the PMC in order to make a deliberation. If there is a disagreement between the Project Manager and the Procurement Officer on a specific recommendation, this is resolved at the level of the PMC.

B. Financial and project risk management

Detailed financial risk management for the Revolving Loan Facility Adaptation Set-Aside is included in Table 1 in Appendix 3.

Table 6. Screening for Financial and Project Risk Management

Type	Risk	Risk Management	Ranking
Financial	One borrower risk consideration is that these unsecured loans will fund household items and services that may not provide immediate and unambiguous economic impact to the borrowers, despite the clear environmental and resilience benefit. If people do not recognize the worth, the inclination to default over time is likely to become higher.	Tangible economic risk is mitigated to a degree because of the recent electricity outages and water shortages, so that borrowers place a higher value on these interventions. A communications strategy about the economic benefits of adaptation would be a complementary activity to the Fund's pilot. An additional mitigation against this is to have the product or service sellers guarantee repairs or provide meaningful warranties covering the investment during the term of the loan.	Low to Medium
Financial	<p>Raising the profile of climate risks in the community through hazard mapping and climate projection forecasting could negatively impact community perceptions of their area and its safety, could result in lower property values and/or higher insurance rates if banks are sensitized to the hazard information.</p> <p>Homeowners may not be in a position to repay the loans. Thus jeopardize the sustainability of the program;</p>	<p>Mitigate identified climate hazards through concrete adaptation interventions, and disburse \$3M USD in small loans for concrete adaptation interventions at the household level to incentivize compliance with climate resilience standards.</p> <p>The mitigation measures are not known as yet. This will be determined during the PP phase. The intention however is to as much as possible use direct salary deductions for repayments. This is normal way to make payments on homes in Antigua and Barbuda.</p>	Medium to high

	<p>The funds available may not be adequate and thus create and political risk.</p>	<p>The aim would be to give priority to those properties that will be impacted by the vulnerability assessments, changes in the building codes and the land use plan. The project may identify stranded assets. Priority will also be given to persons who will find it challenging to move to a shelter. These are single families with special needs individuals and elderly. Further priority can be developed with the input of the Ministry of Finance the Community and others. Finally, the SIRF Fund is seeking additional funding through other donors. The Fund aims to have 10M USD per year in the revolving loan fund. This is the amount estimated to be needed to get all of the 50,000 properties in Antigua and Barbuda ready for the impacts of climate by 2022.</p>	
Financial	<p>Scope creep is a risk to this project given so many agencies and NGOs each with their priorities. At the end of the consultation exercise there are normally more projects and activities than budget. The process of rationalizing this must be carefully handled and is normally left to the Minister and or Permanent Secretary based on the advice of the Director of the Department. This process can be very difficult and can result in agencies not supporting the project if their preferences are not chosen.</p>	<p>The Department will draw on its long-term relationships with agencies to build trust and compromise. In instances where the Department may not be able to mitigate scope creep, it may ask the Cabinet to agree at the appropriate time on project scope.</p> <p>The use of the Cabinet early in the project is important since project scope has significant budget and project impact implications.</p>	High

Financial	The project may not receive the funds on time, or there may be a slow disbursement of funds, which can have a significant impact on implementation and co-financing availability.	Request a large upfront disbursement from the Adaptation Fund (40%) to ensure synergy with Cabinet decisions, the PSIP process, and ongoing projects that could provide temporary relief for slow disbursement. The Department of Environment tries to ensure that there is at least a 5% contingency fund within its core government budget for such situations.	Medium
Financial	Disputes in the decision-making process, e.g. TAC may not agree on the selection of the consultant and/or service provider; TAC may disagree on technical way forward; the Project Manager may disagree with the TAC's technical analysis and project strategy; and the PMC disagrees with the Project Manager and/or the TAC	Include contract resolution procedures within contracts – most contracts are written to include an arbitration clause. The Ministry sanctions the contracts prepared by the Department. Any arbitration is the responsibility of the Attorney General Office. Negotiation – The Project Manager and or Coordinator is usually the first line of conflict resolution. In the experience of the Department, most conflicts encountered have been resolved at this level.	Medium

Financial	Disputes during contract execution, e.g. the quality of the work is assessed to be inadequate, or regarding issues related to budget and completion time of work	Mediation and Conciliation - If the Project Manager and or Coordinator cannot resolve the conflict, the matter is forwarded to the Project Management Committee and/or the office of the Permanent Secretary for mediation. Most conflicts that have reached this level are normally related to interagency differences of opinions. Generally when the Permanent Secretary rules on an issue the conflicting parties normally abide by the decision. Litigation - In the event of litigation this is handled by the office of the Attorney General. This level is normally reached for contract disputes and or as a result of the implementation of a project.	Low
Financial	The costs of implementing adaptation may be higher than expected.	The Department has identified maximum complementarity with existing and upcoming opportunities, including the SCCF project, Commonwealth support and technical assistance available to the DOE via UNEP, among others. The Department will also secure technical capacity support for monitoring, procurement and financial reporting in order to determine spending levels versus achievement against the results framework. Where necessary and when in doubt, the Department consults the Legal Affairs department.	Medium
Financial	Adaptation interventions are insufficient and underestimate the impacts of climate change. Climate impacts are already being experienced much sooner than anticipated.	The climate risk assessments completed for Antigua and Barbuda employ different climate scenarios. The project will use the higher risk scenarios for planning and to calculate costing	Low/ Medium

		for adaptation interventions.	
Institutional	Policymakers prioritize economic benefits over sustainable and resilient ecosystems	The project has policy backing, and will build on complementary climate change policy initiatives through the regional GCCA project. The consultative processes led by CARIBSAVE have also secured local community buy-in and ongoing awareness targeted at high-level political representatives has been demonstrating the risks of flooding to economic investments.	Low
Institutional	Institutions have limited capacity to fully implement the project	Design the project to align with work plans of core staff in the respective agencies, bolstered through the PSIP process. The Project also aims to build capacity in key institutions – the Environment Department, Public Works, and the DCA.	Medium

C. Environmental and social risk management

The project is a Category B according to the Environmental and Social Safeguards guidelines – the project could have minor environmental or social impacts, including potential gender impacts. These have been assessed and an Environmental and Social Risk Management Plan has been developed and is presented here (Appendix 1). A technical feasibility study was also completed during the project preparation stage (Appendix 7).

Table 7. Environmental and Social Risk Management Plan for Component 1

Risk	Mitigation Measures	Time	Responsibility	Monitoring and Reporting
Pollution of McKinnon's Pond and the watercourse by construction debris including soil, vegetation, solid waste during re-engineering of watercourse	Timely removal of cleared debris (same day depending on volume for resource efficiency)	Throughout construction	Site supervisor	Daily by the Site supervisor
	Designate area for storage of this waste as it is excavated. Storage of construction debris including vegetation in a manner which prevents its entry into the waterway.	Daily	All personnel under the direction of the Site supervisor	Reporting by DAS after testing of adequate number of samples or if tests reveal any result which may have significant impact on project activities
			Site supervisor	
	Schedule work during periods of low rainfall	As possible	Department of Analytical Services	Monitoring by the Analytical Services lab based on time frame given for water quality testing
	Water quality monitoring – develop a monitoring plan by the Department of Analytical Services and strict adherence to the plan.	As indicated in the water quality monitoring plan.		
Clearing of vegetation from waterways and banks of the	Limit clearing to only what is required for construction work within a certain time period. Cost/benefit analysis of clearing large parts of the waterway and then having to redo it because the vegetation has grown back before work	Throughout	Site supervisor	Weekly and maintain records

waterway exposing soil and resulting in erosion	<p>can begin. For resource efficiency, the entire waterway should not be cleared unless work on it is to begin within reasonable timeframe.</p> <p>Replant banks of water course with recommended vegetation as soon as feasible (see appendix 2)</p>	Throughout	DoE	
Inadequate planting material	<p>Ensure supply beforehand by growing in the DoE nursery or source locally</p> <p>Use only native or naturalized species</p> <p>Control invasive species during project activities</p>	Before project start	DoE	As it occurs
Availability of water for maintenance of vegetative buffer	Choose plants that are drought tolerant and require minimum care (see appendix 2)	Before project start	DoE	Monthly and retain records
Increase in vectors such as mosquitoes and vector borne diseases which would impact community members, particularly women, among childbearing age who are vulnerable to ZIKA virus from the mosquitos	<p>Choose designs which minimize vectors using ecosystem-based integrated mosquito abatement strategies</p> <p>Bio-remediation (predatory fish)</p>	<p>Before project start</p> <p>Monthly after retention ponds constructed or after heavy rain event.</p>	<p>DoE - engineer</p> <p>DoE with Central Board of Health</p>	<p>After 6 months and maintain records</p> <p>After every water treatment event to the DoE</p>
Resistance of property owners	Public consultation and education	Before start of project and	DoE	After every consultation

<p>(e.g. drainage easements, movement of structures on their property)</p> <p>The waterway runs across private land and as such there might be issues with access to property, maintenance and reluctance by individuals who are not the legal property owners.</p>	<p>Stakeholder involvement specifically in the choice of intervention. Use Henderson Simon who is a respected engineer in his community and has with associates begun the redesign of the waterways</p> <p>Incentives such as reduced insurance, property tax</p> <p>Assess the waterways and consult with property owners to ensure that no property will be left worse off</p>	during project		and retain records
Sedimentation of retention ponds	Maintenance by periodic cleaning after checking level of sedimentation	Checks every 6 months after construction and after any major rain event	DoE	After every check and maintain records
Growth of invasive plants such as <i>Typha</i> spp and water hyacinths	Periodic mechanical removal to keep them to less than 10% of the pond or waterway	During project and after	DoE Contracted Community groups	Record as part of maintenance and maintain records
Location of check dams, retention ponds	<p>Soil percolation tests to determine the best location of the dams</p> <p>Siting on public land where possible</p>	Before start of project	DoE	As it occurs and maintain records

Release of rodents into the community during clearing of derelict vehicles from the waterway.	Rodent extermination before removal of vehicles	During component 1	CBH, DoE	After extermination by CBH to the DoE and maintain records
Pollution of waterway and McKinnon's pond by rodenticide during rat extermination	Use least toxic method that is effective; consult with local experts (e.g. EAG field officers).		CBH, DoE	Record what is used and test water quality before and after event and maintain records
Increased water velocity in areas of the waterway that are covered in concrete	Use pervious surfaces so more of the water will permeate to the soil	During engineering designs for project interventions	Site supervisor, DoE	After any heavy rain event by DoE and maintain records
Men might dominate management committees	<p>Ensure that guidelines are put in place to include women in the design and upgrade of the waterways</p> <p>Companies and partners with less than 30% (critical mass) of women in leadership roles in their organization should require internal gender assessments with targets for advancing gender equality before awarded participation</p>	Before and during project	DoE	Set gender indicators and benchmarks

Table 8. Environmental and Social Risk Management Plan for Component 2

Risk	Mitigation Measures	Time	Responsibility	Monitoring and Reporting
Pollution of McKinnon's Pond and the watercourse by construction debris including soil, vegetation, solid waste during re-engineering of watercourse	Timely removal of cleared debris (same day depending on volume for resource efficiency)	Throughout construction	Site supervisor	Daily by the Site supervisor
	Designate area for storage of this waste as it is excavated. Storage of construction debris including vegetation in a manner which prevents its entry into the waterway.	Daily	All personnel under the direction of the Site supervisor	Reporting by DAS after testing of adequate number of samples or if tests reveal any result which may have significant impact on project activities
			Site supervisor	
	Schedule work during periods of low rainfall	As possible	Department of Analytical Services	Monitoring by the Analytical Services lab based on time frame given for water quality testing
	Water quality monitoring – develop a monitoring plan by the Department of Analytical Services and strict adherence to the plan.	As indicated in the water quality monitoring plan.		
Clearing of vegetation from waterways and banks of the waterway exposing soil and resulting in erosion	Limit clearing to only what is required for construction work within a certain time period. Cost/benefit analysis of clearing large parts of the waterway and then having to redo it because the vegetation has grown back before work can begin. For resource efficiency, the entire waterway should not be cleared unless work on it is to begin within reasonable timeframe.	Throughout	Site supervisor	Weekly and maintain records

	Replant banks of water course with recommended vegetation as soon as feasible (see appendix 2)	Throughout	DoE	
Inadequate planting material	Ensure supply beforehand by growing in the DoE nursery or source locally Use only native or naturalized species Control invasive species during project activities	Before project start	DoE	As it occurs
Availability of water for maintenance of vegetative buffer	Choose plants that are drought tolerant and require minimum care (see appendix 2)	Before project start	DoE	Monthly and retain records
Increase in vectors such as mosquitoes and vector borne diseases which would impact community members, particularly women, among childbearing age who are vulnerable to ZIKA virus from the mosquitos	Choose designs which minimize vectors using ecosystem-based integrated mosquito abatement strategies Bio-remediation (predatory fish)	Before project start Monthly after retention ponds constructed or after heavy rain event.	DoE - engineer DoE with Central Board of Health	After 6 months and maintain records After every water treatment event to the DoE
Resistance of property owners (e.g. drainage easements, movement of structures on their property)	Public consultation and education Stakeholder involvement specifically in the choice of intervention. Use Henderson Simon who is a respected engineer in his community and has with associates begun the redesign of the waterways	Before start of project and during project	DoE	After every consultation and retain records

The waterway runs across private land and as such there might be issues with access to property, maintenance and reluctance by individuals who are not the legal property owners.	Incentives such as reduced insurance, property tax			
	Assess the waterways and consult with property owners to ensure that no property will be left worse off			
Sedimentation of retention ponds	Maintenance by periodic cleaning after checking level of sedimentation	Checks every 6 months after construction and after any major rain event	DoE	After every check and maintain records
Growth of invasive plants such as <i>Typha</i> spp and water hyacinths	Periodic mechanical removal to keep them to less than 10% of the pond or waterway	During project and after	DoE Contracted Community groups	Record as part of maintenance and maintain records
Location of check dams, retention ponds	Soil percolation tests to determine the best location of the dams Siting on public land where possible	Before start of project	DoE	As it occurs and maintain records
Release of rodents into the community during clearing of derelict vehicles from the waterway.	Rodent extermination before removal of vehicles	During component 1	CBH, DoE	After extermination by CBH to the DoE and maintain records

Pollution of waterway and McKinnon's pond by rodenticide during rat extermination	Use least toxic method that is effective; consult with local experts (e.g. EAG field officers).		CBH, DoE	Record what is used and test water quality before and after event and maintain records
Increased water velocity in areas of the waterway that are covered in concrete	Use pervious surfaces so more of the water will permeate to the soil	During engineering designs for project interventions	Site supervisor, DoE	After any heavy rain event by DoE and maintain records
Men might dominate management committees	<p>Ensure that guidelines are put in place to include women in the design and upgrade of the waterways</p> <p>Companies and partners with less than 30% (critical mass) of women in leadership roles in their organization should require internal gender assessments with targets for advancing gender equality before awarded participation</p>	Before and during project	DoE	Set gender indicators and benchmarks

Table 9. Environmental and Social Risk Management Plan for Component 3

Issue	Mitigation Measures	Time	Responsibility	Monitoring and Reporting
Limited capacity to accept grants and carry out maintenance work	With the aid of the Community Development Division and other agencies, these groups can be organized and trained in financial management and technical training on adaptation, utilizing adaptation benefit/review criteria developed under Component 2 so that they will be considered for these contracts once the project begins.	During component 1	DoE	End of training and maintain records
	Implementing a communications strategy for broad-based community education, awareness and mobilization of support	Before and during project	DoE	On-going and maintain records
No organized community groups	Work with the Government's Community Development Division and partner with the Directorate of Gender Affairs to establish a community gender and environment network and other agencies to support the establishment of more long-term sustainable community groups.	Before start of project	DoE in consultation with Community Development Division	At project start to inform activities. Maintain records
Vulnerable groups might not participate due to low literacy levels, confidence and historical marginalization	Assist community groups with capacity building (linked to the financial management training) on inclusive and participatory frameworks and equality and human rights guiding principles as govern their operation.	Throughout project implementation	ABSTEP	Attendance sheets Participant surveys of workshop/training
Systemic gender roles and norms might act as a	Women's groups should be supported to establish themselves, and empowered to participate through capacity building and knowledge sharing to implement adaptation strategies.	Before start of project	DoE, Directorate of Gender Affairs	Monthly and maintain records.

barrier to women's participation and inclusion	Provide gender training to all established community groups in collaboration with the Directorate of gender Affairs so that the community can understand the importance of gender responsive climate adaptation actions.			
	Partner with the Directorate of Gender Affairs to establish a community gender and environment network which can then be used to access community grants.			
	Women's Groups and Men-led groups with a critical mass of female members should be similarly considered for grants.			
Security of new infrastructure	Increase community ownership to safeguard infrastructure. Assist in the organization of community watch groups. Insurance against theft	During training for component 3	DoE	Every six months and maintain records of any damage or theft

In addition to the above, an environmental impact assessment (EIA) as required under national law will be developed during project implementation once the technical drawings for Component 1 are drafted. The Department of Environment will maintain the "Risk Register" in Appendix 12 to track and evaluate risk management throughout project implementation.

A comprehensive risk management strategy is an integral part of the project, and budget lines are dedicated for Monitoring and Evaluation (M&E) – including through the awarding of a community contract to support transparency and accountability – to ensure that the necessary resources are allocated to execute the M&E framework. The project's comprehensive M&E framework will meet and exceed GEF's Agency Minimum Standards on Environmental and Social Safeguards as defined in Policy PL/SD/03, and drawing on the Department's safeguards formalized under the Accreditation process.

D. Monitoring and evaluation arrangements

Indicators for the results based monitoring framework have been developed below. The

Proposed Performance Criteria/Standard for Component 1 – Environmental and Social Risk Management:

1. Minimize clearing of vegetation from the banks of the water course, and revegetate cleared areas using recommended species.
2. Minimize pollution of the water course and McKinnon's Pond by construction debris and other pollutants including oils from equipment, pesticides
3. A decrease in vector populations (rodents and mosquitoes) as a result of project interventions.
4. Improvement in quality of the water in the water course and in McKinnon's Pond; water quality within prescribed EPMA standards
5. Decrease in flooding risk as a result of interventions.
6. At least 90% of property owners sign waterway easements to facilitate drainage interventions.
7. Equal participation of men and women in design and upgrade of waterways; participation and involvement of vulnerable populations.

Proposed Performance Criteria/Standard for Component 2 – Environmental and Social Risk Management:

1. Five (5) % of homes in the target area access loans.
2. Loan repayment (target to be determined by financial analysis)
3. All successful loan applicants chosen in a fair and equitable manner
4. A locally relevant vulnerability index is developed and used to track impacts of loan interventions
5. Loans are not used for any activities that result in net release of greenhouse gases or activities that contribute to climate change by the release of greenhouse gases
6. Minimal increase in rent for tenants
7. Equal representation of men and women, and vulnerable groups, who access the loans
8. Balance of men and women on the loan decision-making committees

Performance Criteria/Standard for Component 3 – Environmental and Social Risk Management:

1. Capacity building of members of three community groups to successfully apply for and receive loans for upgrade of community structures to improve resilience of their buildings
2. Upgrade of 30% of community buildings benefit from concrete resilience measures
3. Grants awarded to three community groups to sustain project interventions
4. Contracted community groups meet on a regular basis and carry out maintenance activities

Monitoring of benefits and effectiveness of the project's ecosystem-based measures will be maintained beyond the life of the project through aligning this project's indicators with indicators in Antigua and Barbuda's Medium-term Development Strategy for 2016 – 2020. Indicators in the strategy that are relevant to this project include:

- Local Area Development Plans on the level of watershed units as required by the National Physical Development Plan
- Incidence of unplanned development
- Ground and surface water quality – level of coliforms
- Incidence of water- borne disease, and other diseases related to poor sanitation

Given the nature of the project, the Department of Environment will contract the services of a M&E Coordinator to be responsible for the data collection, compilation, and monitoring and reporting of the project, as well as operational support and additional assistance in the design and implementation throughout the project, adjusting project outcomes and activities according to a changing context. It is important to remain flexible to and learn from inevitable unforeseen changes in the operational landscape using an adaptive management approach.

Reporting will take place on a quarterly and annual basis in accordance with Adaptation Fund standards. The monitoring and reporting plan involves an iterative approach to collecting data and improving the project design. The project will commence following and inception workshop with local and national stakeholders, the Environment Department team and the CARIBSAVE team assigning and clarifying the project purpose, project roles and responsibilities, and addressing any outstanding barriers to implementation.

Following the start of the project, two reports will document the progress of the project: the annual project performance report will be prepared by the implementation team, shared with the Adaptation Project Board and submitted to the Donor; and the Mid-term report will focus on the overall momentum of the project, financial and time efficiency, risk management and whether the project is responsive and adaptive to the barriers and challenges faced along the way. Finally, the project will conclude following an independent final annual evaluation and outstanding outputs have been produced and queries addressed. The final evaluation will reflect on all previous evaluation and site visits conducted reporting the success of the project in terms of achieving the objectives set out at the inception of the project.

Table 10. Budgeted M&E plan

M&E Activity	Frequency	Responsibility	Cost (USD)
Project Inception Workshop	At start of project	PMU, TAC	5,000
Inception Report	At start of project	Project Manager/Project Coordinator and the PMU	None
Measurement of project indicators (outcome, progress and performance indicators) including baseline data collection	At start of project	PMU	64,040
Project Progress Report	Twice per year (January and July)	PMU, with review and approval of the TAC and the PMU	None
Annual Project Report including field visits and workshops	Annually	PMU, TAC, M&E Coordinator	10,000
Project Management Committee (PMC) meetings	Quarterly	PMC (PMU serves as the Secretariat)	6,000
Technical Advisory Committee (TAC) meetings	Quarterly	TAC (PMU serves as the Secretariat)	6,000
Mid-term independent evaluation	At project mid-point	M&E Coordinator	18,000
Terminal Independent Project Evaluation	End of project	M&E Coordinator, TAC, PMU	25,000
Publication of Lessons Learnt and other project documents	End of project	Project Manager, Project Coordinator and PMU	8,000
Total			US\$142,040

E. Results Framework

Components	Objectives/Outcome	Outputs	Indicator	Baseline	Target	Verification
1. Upgrade urban drainage and waterways to meet projected climate change impacts	1.2 Increased ecosystem resilience of the McKinnon's waterway in response to climate change, extreme rainfall events, and disease vectors	<p>1.1.1. Technical drawings taking into consideration past flooding events, AR5 projections, and designs that reduce the risks of vector-borne diseases</p> <p>1.1.2. Restore and upgrade McKinnon's 3 km waterway to meet new adaptation requirements for flooding and vector control, taking into account ESS and gender considerations within the design</p>	<p># meters of climate-resilient drainage installed</p> <p>Climate-resilient Local Area Plan</p> <p>% Improvement in water quality (nutrients, pollution levels and contaminants reduced)</p> <p>% change in mosquito larvae in water bodies in the area</p> <p>(Gender and ESS indicators to be identified)</p>	<p>No local adaptation plan in existence</p> <p>No flood capacity analysis available</p> <p>Regular flooding during heavy rainfall events</p> <p>Check dam not currently in existence</p> <p>Climate resilient drainage adaptation measures not demonstrated</p>	<p>The McKinnon's waterway can withstand a 1 in 25 year extreme rainfall event</p> <p>Water quality standards meet criteria set in the Environmental Protection and Management Act of 2015</p> <p>Mosquito larvae in water bodies in the area are reduced by at least 30 percent</p> <p>Risk for ESS including gender impacts identified and all mitigated measures agreed and implemented</p>	<p>Water quality testing before and after project</p> <p>Visual observation of flooding during rainfall events, Project reports, land permits</p> <p>Results of flood mitigation climate modeling analysis</p> <p>Health data from local clinics</p> <p>Indicators identified and tracked by consultants.</p>
2. Revolving Loans for homes in McKinnon's watershed to meet new adaptation guidelines established in the building code and physical plan	2.1 Increased adaptive capacity of built infrastructure and communities to withstand extreme weather and climate variability	2.1.1. At least 5% of the homes in the target area, during the life of the project, have applied for loans for adaptation measures to meet new standards	<p># of micro-loans disbursed</p> <p>% households with off-grid RE systems</p> <p>% households in compliance with new climate resilient building code measures</p> <p># of climate-related damage incidents</p>	<p>Low adherence to/ implementation of climate resilient guidelines and planning requirements</p> <p>Building codes not uniformly followed</p> <p>Vulnerable community members are unable to access</p>	<p>5% of homes are equipped with 2 weeks worth of water stored on-site with filtration and pump equipment</p> <p>5% of homes benefit from the installation of hurricane shutters and rain water harvesting</p> <p>50% reduction in the number of persons requiring shelters during droughts, with priority</p>	<p>Project report</p> <p>Loan agreements signed</p> <p>Visual observation and project documents</p> <p>Monitoring and Evaluation</p>

			reported	<p>“soft” loans for adaptation</p> <p>Historical instances of damage to community property and households</p> <p>No ecosystem based adaptation measures demonstrated</p>	<p>for vulnerable populations (single mothers, older persons, children, special needs children)</p> <p>5% of homes have back-up RE (for essential services including pumping water)</p> <p>50% of the homes identified are from the most vulnerable groups.</p>	
3: Adaptation mainstream and capacity building in NGOs and community groups to sustain project interventions	3.1. Improved ownership of adaptation and climate risk reduction to sustain and scale-up actions for transformative adaptation interventions at the national level	<p>3.1.1. 30% of the community-based buildings in the areas have benefitted from grants to improve the resilience of their buildings</p> <p>3.1.2. Three contracts are awarded to community groups/NGOs to maintain the adaptation interventions accomplished by the project</p>	<p>% of community buildings receiving support for climate resilience measures</p> <p># community contracts awarded for project implementation activities</p> <p># of McKinnon’s watershed community members attending/ completing training</p> <p># guidelines published and disseminated</p> <p># of presentations conducted</p>	<p>No community contracts for waterway maintenance</p> <p>Community-based shelters do not meet safety and climate resilience guidelines</p> <p>No media products relating to Local Area Plan or knowledge products available</p>	<p>30% of community-based buildings benefit from grants to improve their resilience</p> <p>30% of A&B’s population is exposed to the project’s public awareness material</p> <p>3 community groups are trained in the management and maintenance of adaptation interventions</p> <p>50 copies of McKinnon’s waterway environmental management guidelines produced/ disseminated and available in easy to understand language, and using pictures.</p> <p>At least 3 presentations and workshops to stakeholders by the department and by NGOs to the community with funding provided by the Department.</p>	<p>Meeting minutes/record, Project documents</p> <p>MOUs between the Government and community groups/NGOs</p> <p>Contracts between the Government and community groups/NGOs</p> <p>Visual Observation, Project documents</p>

F. Alignment with the Adaptation Fund's Results Framework

Project Objective(s) ⁷⁰	Project Objective Indicator(s)	Fund Outcome	Fund Outcome Indicator	Grant Amount (USD)
<p>An integrated approach to physical adaptation and community resilience in Antigua and Barbuda's northwest McKinnon's watershed seeks to reduce vulnerability of the community, by increasing the ability of the watershed to handle extreme rainfall, while increasing the resilience of the built environment simultaneously. This integrated approach will ensure that the community as a whole will be able to withstand projected climate change impacts.</p>	<p>1) 3 km of urban and semi-urban waterways meet projected climate change, in particular extreme hydro-meteorological events and disease vectors</p> <p>2) \$3M is disbursed in soft revolving loans to vulnerable households to meet new adaptation guidelines and standards for built infrastructure to withstand extreme climate variability</p> <p>3) 30% of community infrastructure in target area is resilient to climate change and 3 community contracts are awarded for project implementation</p>	<p>Assist developing-country Parties to the Kyoto Protocol that are particularly vulnerable to the adverse effects of climate change in meeting the costs of concrete adaptation projects and programmes in order to implement climate-resilient measures.</p> <p>Outcome 4: Increased adaptive capacity within relevant development and natural resource sectors</p>	4.2. Physical infrastructure improved to withstand climate change and variability-induced stress	<u>10M</u>
Project Outcome(s)	Project Outcome Indicator(s)	Fund Output	Fund Output Indicator	Grant Amount (USD)
1.1 Increased ecosystem resilience of the McKinnon's waterway in response to climate change, extreme rainfall events, and disease vectors	<p># meters of climate-resilient drainage installed</p> <p>Climate-resilient Local Area Plan</p> <p>% Improvement in water quality (nutrients, pollution levels and contaminants reduced)</p> <p>% change in mosquito larvae in water bodies in the area</p>	4.1. Development sectors' services responsive to evolving needs from changing and variable climate	4.1.1. No. and type of health or social infrastructure developed or modified to respond to new conditions resulting from climate variability and change (by type)	<u>\$3,550,960</u>

⁷⁰ The AF utilized OECD/DAC terminology for its results framework. Project proponents may use different terminology but the overall principle should still apply

2.1 Increased adaptive capacity of built infrastructure and communities to withstand extreme weather and climate variability	# of micro-loans disbursed % households with off-grid RE systems % households in compliance with new climate resilient building code measures # of climate-related damage incidents reported	6.1 Percentage of households and communities having more secure access to livelihood assets	6.1.1. Number and type of adaptation assets (physical capital, natural capital) created in support of individual or community livelihood strategies	<u>\$3,125,300</u>
3.1 Improved ownership of adaptation and climate risk reduction to sustain and scale-up actions for transformative adaptation interventions at the national level	% of community buildings receiving support for climate resilience measures # community contracts awarded for project implementation activities # of McKinnon's watershed community members attending/ completing training # guidelines published and disseminated # of presentations conducted	3.2. Modification in behavior of targeted population	3.1.1 Number and type of risk reduction actions or strategies introduced at local level	<u>\$2,353,500</u>

G. Detailed Budget

ACTIVITY	Budget USD	Budget Notes
Component 1. Upgrade urban drainage and waterways to meet projected climate change impacts		
<i>Outcome 1.1. Increased ecosystem resilience of the McKinnon's waterway in response to climate change, extreme rainfall events, and disease vectors</i>		
Output 1.1.1. Technical drawings taking into consideration past flooding events, AR5 projections, and designs that reduce the risks of vector-borne diseases	\$423,600	
Develop an island-wide drainage code with appropriate IDF and DDF curves development	\$42,000	Hydraulic Engineer 20 days @ \$1,200 Statistical Analysis & Hydrology 10 days @ \$1,200 Process Engineer 5 days @ \$1,200
Climate impact modelling to inform local area physical development planning, including modelling of sea level rise, flooding, hurricane, drought and temperature projections under AR5 climate scenarios, and projected development trends	\$72,000	Climatologist 30 days @ \$1,200 GIS expert 20 days @ \$1,200 Human geographer 10 days @ \$1,200
Revise the Building Code with climate resilience measures and submit to Attorney General for approval and Gazetting and signing by the Minister; assist in the development of the CXC CAPE course on Green Buildings using applied examples	\$45,000	Engineer 10 days @ \$1,200 Architect 15 days @ \$1,200 Climate Adaptation Specialist 10 days @ \$1,200 Legal consultant 2 days @ \$1,500
Topographical survey data of McKinnon's watershed basin for hydrological and hydraulic models	\$25,000	Based on similar data collection consultancy for Cashew Hill (1:50,000 Topographical Maps for 3,400 feet of watercourses) @ \$25,000, including land ownership information
Technical designs for flood mitigation measures in the waterway	\$140,000	Detailed engineering designs based on past experience with engineering firm for works in Cashew

Hill under GCCA project @ Euro 119,000

Consultations on planning and designs	\$15,000	At least 3 consultations at \$5,000 each
Enter into waterway easement agreements with applicable landowners	\$45,000	Legal fees 30 days @ \$1,500 per day
Conduct the EIAs and other studies required for approval;		Environmental and Social Impact Specialist 28 days @ \$1,200 per day
Apply for Physical planning to DCA	\$39,600	Development planner 5 days @ \$1,200 per day
Output 1.1.2. Restore and upgrade McKinnon's 3 km waterway to meet new adaptation requirements for flooding and vector control, taking into account ESS and gender considerations within the design	\$3,127,360	
Contract for Supervision of the Works	\$75,000	Engineer design specialist 75 days @ \$1000 per day
Waterway preparation works - removing debris blockages (solid waste and pipes, etc)	\$500,000	Excavation inclusive of carting away materials to an approved site and repurposing where possible (500 cubic meters at \$20); with WIOC and APUA develop and implement solutions for pipes and other hazards @ \$490,000

		Indicative costs of:
		- 1,700 m of hillslope channeling @ US\$ 175 per metre;
		- 250 cubic metres of road drainage storage @ US\$ 150 per cubic metre;
		- 35,250 cubic metres of earthworks for check dams @ US\$ 20 per cubic metre;
		- 1,751 m of diversion channels @ US\$ 300 per metre;
		- 5,501 cubic metres of retention ponds @ US\$ 60 per cubic metre;
		- 1,500 feet of covered canals @ US\$ 130 per foot;
		- 1,500 feet of swale @ US\$ 35 per foot;
		- 1,500 feet of pedestrian walkways @ US\$ 35 per foot
		- Insurance securities and bonds @ \$30,000;
		Environmental mitigation and compliance and health and safety @ \$20,000
		- Provision for dewatering during drainage works for contract @ \$40,000; Contingency @10%
Construction of flood prevention infrastructure - improving major and minor watercourse drainage, relocating natural watercourse barriers/reintegrating natural watercourses with sustainable urban drainage methods	\$2,405,360	
		Construction of expanded channel downstream of watercourse confluence with shall wetlands to facilitate water quality improvement and natural mosquito control through fish reintroductions 1,300 square meters @ \$100
Vector control using ecosystem-based rehabilitation methods	\$130,000	
		Urban Planner 30 days @ \$1,000 per day
		GIS expert 10 days @\$1,200 per day
		Legal consultant 10 days @ \$1,500 per day
		Botanist/Landscaper 5 days @ \$1,000 per day
Development of Local Area Physical development plan and submission for approval and implementation	\$62,000	
		Development of communications material; Training for DCA and Public Works (details for mainstreaming into practices to be finalized as LAP is developed)
Integration of the LAP into the implementation practices of the DCA and Public Works Dept (to give legal effect to the policies and measures being implemented by the project)	\$30,000	

Component 1 Subtotal \$3,550,960

Component 2. Revolving Loans for homes in McKinnon's watershed to meet new adaptation guidelines established in the building code and physical plan

Outcome 2.1 Increased adaptive capacity of built infrastructure and communities to withstand extreme weather and climate variability

Output 2.1.1. At least 10% of the homes in the target area, during the life of the project, have applied for loans for adaptation measures to meet new standards

\$3,125,300

Develop Access database to track loan disbursements and repayments; develop MRV systems

\$24,000

Database expert 20 days @ \$1,200 per day

Prepare regulations under the Finance Act to regulate the Revolving Loan program

\$15,000

Legal consultant 10 days @ \$1,500 per day

The Revolving Loan program vested into the relevant institutional arrangements, which are convened to oversee disbursement and monitoring

\$20,000

Training on adaptation for relevant personnel; convening of the Loan Board and the Technical Evaluation Committee (TEC) for adaptation; approval of manuals, forms and processes and training on operations

Disburse loans for adaptation interventions for eligible households that will be impacted by flooding within the watershed

\$3,000,000

Approximately 200 loans averaging US\$15,000 per loan

Design and implement a monitoring, reporting and verification system for the loan program

\$28,800

Financial expert 20 days @ \$1,200 per day
Engineer 4 days @ \$1,200 per day

Prepare and share best practices for entire island

\$37,500

Communications expert 25 days @ \$500 per day
Graphic design specialist 15 days @ \$1,000 per day
Video production \$10,000

Component 2 Subtotal \$3,125,300

Component 3. Adaptation mainstreaming and capacity building in NGOs and community groups to sustain project interventions

Outcome 3.1. Improved ownership of adaptation and climate risk reduction to sustain and scale-up actions for transformative adaptation interventions at the national level

Output 3.1.1. 50% of the community-based buildings in the areas have benefitted from grants to improve the resilience of their buildings

\$1,571,000

Identify groups in the area that qualify for grants and provide training in fiduciary and financial management, and technical training on adaptation

\$20,000

Community Liaison 15 days @ \$1,000 per day
Adaptation Specialist 5 days @ \$1,000 per day

Enter into a MOU with a relevant entity to process and manage the community grants

\$15,000

Legal consultant 9 days @ \$1,500 per day;
Consultations \$1,500

Engineering assessments of the community shelters; designs of engineering measures

\$36,000

Engineer 5 days @ \$1,200
Architect (Resilience specialist) 15 days @ 1,200
Renewable Energy specialist 5 days @ \$1,200
Disaster and Community Liaison Specialist 5 days @ \$1,200

Disburse grants to communities and NGOs for adaptation and resilience measures in community buildings using adaptation criteria

\$1,500,000

Grants will be provided to at least 5 community buildings for approximately US\$300,000 each

Output 3.1.3. Three contracts are awarded to community groups/NGOs to maintain the adaptation interventions

\$782,500

Develop a comprehensive communications plan for broadbased community education, awareness and mobilization of support

\$32,500

Communications expert 25 days @ \$500 per day
Community Liaison 15 days @ \$1,000 per day
Adaptation Specialist 5 days @ \$1,000 per day

Award a community contract to implement the communications plan and disseminate information nationally, regionally and internationally

\$150,000

Community contract award for \$150,000 (terms of reference to be developed bending initial project outputs)

Award community contract(s) to maintain the sustainable urban planning and drainage interventions, working with the Central Board of Health and the Development Control Authority	\$300,000	Community contract award for \$300,000 (terms of reference to be developed bending initial project outputs)
Award a community contract to for M&E of adaptation measures, data collection and consultations	\$300,000	Community contract award for \$300,000 (terms of reference to be developed bending initial project outputs)
Component 3 Subtotal \$2,353,500		
NIE Project Execution costs *max 9.5% of total budget)	\$940,240	
Project Manager	\$67,200	Project Manager 48 months @ US\$ 1,400 per month
Project Coordinator	\$120,000	Project Coordinator 48 months @ US\$ 2,500 per month
Loan Officer and Program Officer for Component 2	\$260,000	Loan Officer (US\$35,000/year) and Program Officer (US\$30,000/year) for 4 years
Administrative support	\$165,000	Three persons, each at 4 years @ US\$ 13,750 per annum
Finance and Procurement Officer	\$40,000	4 years @ US\$ 10,000 per annum
Project vehicle	\$75,000	One electric vehicle @ US\$ 75,000
Maintenance of office facilities	\$5,000	Maintenance of office and facilities for 4 years @ US\$ 1,250 per annum
Office administration and consumables	\$12,000	Office consumables 4 years @ US\$ 3,000 per annum
Audit	\$54,000	4 annual audits @ US\$ 13,500 per audit

M&E budget as reflected in the project document:

- Project Inception Report @ \$5,000
- Measurement of project indicators and baseline data @ \$64,040
- Annual Project Report including field visits and workshops @ \$10,000
- Project Management Committee meetings @ \$6,000
- Technical Advisory Committee meetings @ \$6,000
- Mid-term independent evaluation @ \$18,000
- Terminal Independent evaluation @ \$30,000
- Publication of lessons learned and project documents @ \$8,000

Monitoring and Evaluation

\$142,040

PROJECT TOTAL		\$9,970,000
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H. Disbursement schedule with milestones

Table 11. Disbursement milestones

Milestones	Timeline	Disbursement Percentage
Project Inception*	2016	40%
Mid-term Review	2017	45%
Project/Programme Closing	2019	10%
Terminal Evaluation	2020	5%

*Note: the frontloading of disbursements is to accommodate the need for upfront disbursements of the adaptation loans under Component 2.

PART IV: ENDORSEMENT BY GOVERNMENT AND CERTIFICATION BY THE IMPLEMENTING ENTITY


%

A. Record of endorsement on behalf of the government Provide the name and position of the government official and indicate date of endorsement. If this is a regional project/programme, list the endorsing officials all the participating countries. The endorsement letter(s) should be attached as an annex to the project/programme proposal. Please attach the endorsement letter(s) with this template; add as many participating governments if a regional project/programme: %

%

Ambassador Diann Black-Layne	Date: July 25, 2016
------------------------------	---------------------

B. Implementing Entity Certification Provide the name and signature of the Implementing Entity Coordinator and the date of signature. Provide also the project/programme contact person's name, telephone number and email address %

<p>I certify that this proposal has been prepared in accordance with guidelines provided by the Adaptation Fund Board, and prevailing National Development and Adaptation Plans (National Communications to the UNFCCC, INDC, National Physical Development Plan, National Biodiversity and Action Plan) and subject to the approval by the Adaptation Fund Board, commit to implementing the project/programme in compliance with the Environmental and Social Policy of the Adaptation Fund and on the understanding that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this project/programme.</p>	
 Ambassador Diann Black-Layne Implementing Entity Coordinator	
Date: July 25, 2016	Tel. and email: +1 (268) 462-4625

|||||

⁶. Each Party shall designate and communicate to the secretariat the authority that will endorse on behalf of the national government the projects and programmes proposed by the implementing entities.

Project Contact Person:

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Adaptation Fund project development by the Department of Environment
Antigua and Barbuda

INDEX OF APPENDICES

Appendix #	Document Title	Description
1.	Environmental and Social Assessment and Management Plan, including Gender Analysis	An analysis of the environmental and social impacts, including gender, and the management plan, including detailed guidelines for conducting consultations during project implementation
2.	Community Consultation Minutes	Includes attendance sheets and the slides of the presentation delivered at the consultation
3.	Financial Analysis: SRF Fund Revolving Loan Facility for Adaptation	A financial model was developed to assess the cumulative impact of the \$3 M Adaptation grant to the Revolving Loan Facility, and to model the extent to which money can be recycled through the recycling structure over an extended payback period
4.	Social Market Research on Demand for Low Interest Unsecured Loans for Adaptation on the Northwest Coast of Antigua	This market research investigated the assumption during the project concept stage that there would be demand for loans; the research surveyed 178 households in the project site
5.	Adaptation Options in Buildings: Information Packet	This is (draft) guidance that has been developed for home and business owners to better understand options for concrete adaptation in buildings that can be financed through the Revolving Loan programme.
6.	Community Center Checklist	This checklist will be used by the Technical Evaluation Committee to assess the community buildings that will receive grants for resilience under Component 3
7.	Technical Feasibility Study	A Technical Feasibility Study was conducted by Engineers without

		Borders mainly focusing on the waterway adaptation interventions
8.	Cashew Hill – Draft Technical Analysis and Design Report	This is an example of a technical analysis and design report that has been prepared for a vulnerable community in Antigua, Cashew Hill, under a Global Climate Change Alliance (GCCA) project. This report has been included as an appendix to demonstrate the level of detail that will be provided upon approval of the project, as a first step in the implementation process
9.	Manual on the Processing of Grants and Revolving Loans	This manual provides the entire set of guidelines, procedures, and terms for the revolving loan program – see pages 51 – 81 on Detailed Procedures
10.	Risk Register	A risk register that will be updated and evaluated throughout the life of the project.
11.	Draft Regulations of the SIRF Fund	Provided to demonstrate the legal basis for the SIRF Fund grants and loans. Regulations specific to the Adaptation Set-Aside of the SIRF Fund window are being developed by the SCCF project and legal assistance that has been secured from UNEP. Appendix 16 is a Fund managed by the Ministry of Finance, which will be a model for the Adaptation Set-Aside of the SIRF Fund.
12.	Letters of Endorsement	Project endorsement letter from the NDA; A letter from the Commonwealth recognizing Antigua and Barbuda's contribution to advancing climate finance
13.	Terms of Reference for Project Implementation	Terms of Reference are provided for: Project Manager; Project Coordinator; Loan Officer of the SIRF Fund; EIA; Project Management Committee (PMC); Technical Evaluation Committee (Loans TEC); Loan Board

		serving the Revolving Loan Facility; and the Terminal Evaluation
14.	Environmental Information Management and Advisory System Data Management Protocol	The Department of Environment's data management protocol, with template data sharing agreements and an inventory of existing GIS data. This is the basis of the knowledge and information management portion of the project.
15.	Workforce Development Strategy to Address Energy Priority Sectors in Antigua and Barbuda's Nationally Determined Contribution	Developed by the CTCN, this workforce training strategy provides a national guideline for skills and capacity building to be provided under Component 3 and throughout project implementation
16.	National Student Loan Fund (NSLF)	The NSLF is a revolving fund managed by the Ministry of Finance and has been a successful Fund that establishes a precedent for the Revolving Loan Fund for Adaptation
17.	Draft Revolving Loan Agreement	The Loan Agreement will be revised and added to the Manual on the Processing of Grants and Revolving Loans (Appendix 9)
18.	Logframe of Antigua and Barbuda's project submitted to the Special Climate Change Fund (SCCF)	The Department of Environment is the implementing agency for both the SCCF and Adaptation Fund projects. The SCCF intervention logframe is included here to demonstrate the complementarity between the projects – the SCCF project will focus on “soft” adaptation interventions, including the vulnerability assessments; the policies, strategies and plans; technical training; and knowledge and lessons learned. The Adaptation Fund allocation is prioritized for financing the concrete adaptation interventions along McKinnon's waterway, operationalizing the Revolving Loan Facility for Adaptation, and contracting community groups to sustain interventions.

Environmental and Social/Gender Impact Assessment and Management Plan

**An integrated approach to physical adaptation and community resilience in
Antigua and Barbuda's northwest McKinnon's watershed**

Farmala Jacobs, Andrea Otto , Joseph Prosper

7/1/2016

**Prepared for the Department of Environment
Ministry of Health and the Environment
Government of Antigua and Barbuda**

Acronyms and Abbreviations

ABSTEP	Antigua and Barbuda Skills Training and Empowerment Programme
CBD	United Nations Convention on Biological Diversity
CEDAW	Convention on the Elimination of forms of Discrimination Against Women
CGA	Country Gender Assessment
CPA	Country Poverty Assessment
CSW	Commission on the Status of Women 2008
DoE	Department of the Environment
DGA	Directorate of Gender Affairs
EPMA	Environmental Protection and Management Act 2015
FAO	Food and Agriculture Organisation
FIA	Freedom of Information Act 2003
GCF	Green Climate Fund
IBA	Important Bird Area
INDC	Intended Nationally Determined Contributions
IPCC	Intergovernmental Panel on Climate Change
IWCAM	Integrated Watershed and Coastal Areas Management
LBS Protocol	Protocol Concerning Pollution from Land Based Sources and Activities
MDG	Millennium Development Goals
NAP	National Adaptation Policy
NBSAP	National Biodiversity Strategy and Action Plan
NGO	Non-governmental Organisations
PPA	Physical Planning Act 2003
Rio+20	UN Conference on Sustainable Development
SDG	Sustainable Development Goals
SIRMZP	Sustainable Island Resource Management Zoning Plan
UNFCCC	United Nations Framework Convention on Climate Change

Definitions¹

Adaption to climate change: All initiatives and measures to reduce the vulnerability of natural and human systems to the actual or expected impacts of climate change (IPCC 2007: 1). The adjustment of natural or human systems in response to actual or expected climatic conditions or their impacts to mitigate harmful effects or exploit beneficial opportunities. Adaptation is also understood as the efforts by social groups, individuals and countries to adapt to the current and potential impacts of climate change.

Climate change: Slow variations of climate characteristics in a given location over time. Climate change may cause significant damage:

Community groups - means a group defined as a community group within the meaning of the Friendly Societies Act Cap. 184 ; as well as institutions such as churches, sports groups and schools.

Ecosystem services means the benefits gained by humans from the services provided by the natural environment in the areas of provision, regulation and support;

Environmental impact: Refers to the set of qualitative, quantitative and functional changes in the environment caused by a project, process, method, one or more organizations and one or more products from design to "end of life".

Gender² refers to the social attributes and opportunities associated with being male and female and the relationships between women and men and girls and boys, as well as the relations between women and those between men. These attributes, opportunities and relationships are socially constructed and are learned through socialization processes.

Gender differentiated vulnerability to climate change impacts³ – Gender is one of many components of vulnerability to climatic change. Changes in the climate affect genders differently, magnifying existing gender inequality. Both women and men are affected by and vulnerable to climate change but women often bear more of the burden. This higher vulnerability is mostly not due to biological or physical differences, but is formed by the social, institutional and legal context.

Gender-sensitive approaches and tools for understanding and assessing impacts, vulnerability and adaptation to climate change refer to methodologies and practices applied to ensure that both men and women's concerns, aspirations, opportunities and capacities are taken into account in all climate change adaptation activities, including assessments, planning, implementation, monitoring and evaluation and technology development.

¹ Unless otherwise specified, definitions are taken from the Environmental Protection and Management Act 2014
² (<http://www.un.org/womenwatch/osagi/conceptsanddefinitions.htm>) (accessed 25 July 2016).

³ International Union for Conservation of Nature (IUCN), The Environment and Gender Index (EGI). 2013 Pilot (Washington, D.C., IUCN). Available at <<https://portals.iucn.org/library/sites/library/files/documents/Rep-2013-008.pdf>>.

Gender-disaggregated data are data that are collected and analyzed separately for both men and women, boys and girls.

Greenhouse gas means a greenhouse gas as defined in the United Nations Framework Convention on Climate Change which states that “Greenhouse gases” mean those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and re-emit infrared radiation;

Pollutant includes any dredged spoil, solid or liquid waste, incinerator residue, sewage, garbage, sewage sludge, chemical waste, hazardous waste, biological material, radioactive materials, heat, wrecked or discarded equipment, oil and oil residue, rock, sand and industrial, municipal or agricultural waste and other such substances which causes pollution of the environment;

Pollution means the introduction, either directly or indirectly, of substances or energy into the environment, which results in deleterious effects such as harm to living resources and marine life, hazards to human health, hindrance to marine activities including fishing and other legitimate uses of the sea, impairment of quality for use of water, air or soil, reduction of amenities or the creation of a nuisance and includes the release or deposit of any pollutant or waste onto land or into the air or water;

Resilience: In ecology, resilience is the ability of an ecosystem to recover its functions after a disturbance. Applied to human systems, factors that build resilience may include diversification of resources and agricultural production systems, disaster management systems, insurance schemes, food and monetary reserves or wise infrastructure investments, etc.

Vulnerability: The impact level where humans and/or natural systems are sensitive to or unable to cope with the adverse effects of climate change. It depends on the magnitude of the variation in climate, exposure, sensitivity and adaptive capacity.

Waste includes any matter prescribed to be waste and any matter, whether liquid, solid, gaseous or radioactive, which is discharged, emitted, or deposited in the environment in such volume, composition or manner as to cause an adverse effect;

Watershed means an area of land where all of the water that is under it or drains off and into a larger body of water such as a river, river system, the sea or a pond;

Wildlife includes all forms of flora and fauna, including any animal, vertebrate or invertebrate, birds mammals, reptiles, amphibian, crustacean and arthropods and their eggs and young thereof, shoots, or seeds but does not include domestic animals.

List of Photographs and Illustrations

Photograph or Illustration	Page
Figure 2. Topographic Zones of Antigua	17
Figure 3. Watersheds of Antigua	20
Figure 4. The course of two tributaries of the waterway in Upper Fort Road	21
Figure 5. Overgrown Wood's Pond due to prolonged drought.	21
Figure 6. Showing distance of a dwelling house (left) and a fence (right) to the water course.	22
Figure 7. pollution at the junction where the watercourse empties into the McKinnon's Pond	26
Figure 9. Drains near Junkyard Cocks and First Choice Supermarket	24
Figure 11. Stakeholder Analysis	36
Figure 12. McKinnon's Pond in July 2014, app. 15% water remaining	25

List of Tables

Table Title	Page
Table 1. Project components, results and budget	10
Table 2 Results for water quality testing along watercourse including Woods Pond and McKinnon's Pond	27
Table 3. Number of pit latrines in each community	28
Table 4. Stakeholder inputs	32
Table 5. Relative proportions of migrants and renters in the target communities.	40
Table 6. Summary of expected impacts of upgrade for urban drainage and waterways to meet projected climate change impacts	48
Table 7. Summary of Impacts for Component 3	56
Table 8. Risk Analysis table (from Adaptation Fund Proposal)	59
Table 9. Management plan for component 1	64
Table 10. Management plan for component 2	68
Table 11. Management plan for component 3	74
Table 12. Suggested Timeline for Community Consultations	80

	TABLE OF CONTENTS	Page No.
	Acronyms and Abbreviations	2
	Definitions	3
	List of Tables	5
	List of Photos and Illustrations	5
1	Executive Summary	7
 PART 1 ENVIRONMENTAL, SOCIO-ECONOMIC AND GENDER ASSESSMENT		
2	Scope and Methodology	9
3	Project Description	10
4	Policy, Legal and Administrative Framework	12
	4.1 Legislation	12
	4.2 Agreements, Treaties and Conventions	13
	4.3 Policies	15
5	Environmental and Social/Gender Assessment and Analysis	
	5.1 Environment Conditions	
	5.1.1 Geography and Geology	17
	5.1.2 Climate	18
	5.1.3 Hydrology and Drainage	19
	5.2 Socio-Economic Conditions	27
6	Stakeholder Consultations	31
7	Environmental and Social/Gender Impacts	
	7.1 Compliance with Social and Environmental Policies	35
	7.2 Analysis of Potential Risks by Project Component	
	7.2.1 Component 1	46
	7.2.2 Component 2	51
	7.1.3 Component 3	54
 PART II ENVIRONMENTAL AND SOCIAL/ GENDER MANAGEMENT PLAN		
8	Environmental and Social/Gender Management Plan	57
	8.1 Management Structure and Responsibility	57
	8.2 Public Consultation and Environmental and Social Disclosure	57
	8.3 Water Quality Monitoring	58
	8.4 Performance Criteria	58
	8.5 Environmental Procedures and Site Specific Activity	58
	8.6 Risk Analysis Table	59
	8.7 Management Plan by Component	
	8.7.1 Component 1	63
	8.7.2 Component 2	66
	8.7.3 Component 3	74
	8.8 Framework for Community Consultation	77
	Bibliography	83
	Appendix 1	85
	Appendix 2	88

1. EXECUTIVE SUMMARY

Antigua is part of the nation of Antigua and Barbuda, a small island developing state which is especially vulnerable to the effects of climate change. The McKinnon's watershed is one of thirteen on the island. The communities within it have been disproportionately affected by flooding events which has resulted in significant loss of and damage to physical possessions, loss of income due to inability to get to work, damage to homes and business infrastructure. The residents are especially vulnerable to the extreme weather events which are forecasted to increase in intensity due to climate change; vulnerability is high because incomes are low and there is very limited affordable financing options for adaptation to climate change. In addition, an important ecological area, the McKinnon's Pond, has suffered pollution, extreme drought, and degradation, which have negatively impacted its biodiversity and the residential areas around it. At present the watershed and its resident communities have very limited capacity to recover in the event of an extreme weather event such as a hurricane or flooding.

To reverse these trends of social and ecological vulnerability, the project proposes implementation of cost-effective adaptation measures in the environment and in the community, building both natural and social adaptive capacity at the same time. Specifically the waterways of the watershed will be modified with climate resilient drainage, the implementation of a 'soft' loan programme for home and business owners for adaptation of their structures, the provision of grants to community organisations and NGOs to ready their buildings for climate change and the imparting of skills and capacity needed for these organisations to maintain the waterway.

An analysis of the project has shown that it has overwhelming potential to improve the current situation of the community and the watershed area. The ways in which this will happen include 1) reversal of the current trend of degradation of the McKinnon's pond and its associated environs, 2) significant improvement in the resiliency of the community to recover from climate change impacts such as extreme weather events, 3) improvement of capacity of community organisations to assist in recovery from climate change impacts such as droughts, and 4) improvement in the landscape with the removal of anthropogenic waste as a co-benefit to the enhanced drainage systems.

There are also potentially negative side effects from project activities. These can be summarised as follows:

- 1) Pollution of the waterway during construction activities by inadequate disposal or storage of construction materials, waste removed from the waterway including vegetation;
- 2) Issues related to the targeting of loans to the vulnerable, recovery of loan amounts; and

3) Disproportionate exclusion of the most vulnerable, including women and the disabled.

However these impacts can be eliminated or minimized with an adequate management plan. Measures include but are not limited to:

- Protection of the watershed by removing waste promptly or storing it to prevent its entry into the waterway.
- Inclusion of guidelines for disposal of waste when upgrades are being made for climate adaptations
- Monitoring of water quality at key stages of the project to ensure there is no deterioration of water quality
- Prompt re-vegetation of the banks of the water course to minimize erosion
- Choosing designs for engineering the banks of the waterway which reduce erosion
- Instituting special arrangements for loan recovery including salary deductions and standing orders
- Deliberate targeting of vulnerable groups and training for inclusion of women at as many stages as possible.

2. SCOPE AND METHODOLOGY

The project targets a high risk and populated watershed on the northwest coast of Antigua – the McKinnon’s pond watershed. The watershed includes four communities: Yorks and its New Extension; Lower Gambles; Upper Road and its New Extension and McKinnon’s. The purpose of the project is to increase the resilience of communities and ecosystems on the northwest coast of Antigua to meet climate projections of more extreme flooding, drought and hurricanes. The socio-economic, demographic and environmental characteristics of the northwest watershed were all considerations in choosing this area for the project.

This Environmental and Social Assessment and Management Plan aims to ensure that project interventions are designed in accordance with the Environmental and Social Policy of the Adaptation Fund, policies of the Department of the Environment, laws of Antigua and Barbuda, and principles of human rights, gender equality, women’s empowerment, and environmental sustainability.

Project interventions were assessed for gender responsiveness and consistency with the needs of the most vulnerable populations in the target area. The methodology included a literature review, meetings with technical staff of the Government of Antigua and Barbuda, six (6) days of field work, two community consultations, and unstructured interviews with key informants.

The output of the analysis is an Environmental, Social and Gender Risk Management Plan across the three components of the project, which identifies practical implementation steps that will avoid, minimize, and mitigate where possible, potential environmental and social harms.

3. PROJECT DESCRIPTION

The project, titled “*An integrated approach to physical adaptation and community resilience in Antigua and Barbuda’s northwest McKinnon’s watershed*” aims to reduce the vulnerability of communities in the McKinnon’s watershed area. The community will therefore be able to cope with extreme rainfall events, prolonged droughts and stronger storms as well as other projected effects of climate change. Table 1 below gives a summary of the project components and expected outcomes.

Table 1: Project components, results and budget ⁴

Project/Programme Components	Expected Concrete Outputs	Expected Outcomes
1. Upgrade urban drainage and waterways to meet projected climate change impacts (~3.5 M USD)	<p>1.1.1. Technical drawings taking into consideration past flooding events, AR5 projections, and designs that reduce the risks of vector-borne diseases</p> <p>1.1.2. Restore and upgrade McKinnon’s 3 km waterway to meet new adaptation requirements for flooding and vector control, taking into account ESS and gender considerations within the design</p>	1.1 Increased ecosystem resilience of the McKinnon’s waterway in response to climate change, extreme rainfall events, and disease vectors
2. Revolving Loans for homes in McKinnon’s watershed to meet new adaptation guidelines established in the building code and physical plan (~3.1 M USD)	2.1.1. At least 10% of the homes in the target area, during the life of the project, have applied for loans for adaptation measures to meet new standards	2.1 Increased adaptive capacity of built infrastructure and communities to withstand extreme weather and climate variability

⁴ Department of the Environment, (2016). **An integrated approach to physical adaptation and community resilience in Antigua and Barbuda’s northwest McKinnon’s watershed**

3. Adaptation mainstreaming and capacity building in NGOs and community groups to sustain project interventions (~2.3 M USD)	<p>3.1.1. 30% of the community-based buildings in the areas have benefitted from grants to improve the resilience of their buildings</p> <p>3.1.2. Three contracts are awarded to community groups/NGOs to maintain the adaptation interventions accomplished by the project</p>	3.1. Improved ownership of adaptation and climate risk reduction to sustain and scale-up actions for transformative adaptation interventions at the national level
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The three components are encapsulated in the following specific objectives:

1. Implement concrete adaptation actions that support natural and physical systems along the 3 km urban and semi-urban waterways to meet projected climate change, in particular extreme hydro-meteorological events and disease vectors⁵
2. Disburse concessional revolving loans to vulnerable households to meet new adaptation guidelines and standards for built infrastructure to withstand extreme climate variability
3. Support social adaptive capacity and local ownership of adaptation through climate resilient community infrastructure and community-owned project implementation

4. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

4.1 Legislation

The following laws are pertinent to the proposed project.

4.1.1 Environmental Protection and Management Act (2015)

The Act is defined and described: “To provide for sustainable environmental protection and management, to establish effective allocation of administrative responsibilities for environment management, the undertaking and coordination of environmental management, and related activities, the incorporation of international treaty obligations with respect to the environment into national and law related matters. To establish and consolidate in one legal regime the

⁵Department of the Environment, (2016). **An integrated approach to physical adaptation and community resilience in Antigua and Barbuda’s northwest McKinnon’s watershed**

Implementation of the Multilateral Environmental Agreements and to provide the framework financial mechanism to implement the Act.”

Specific to this project, the Act provides for preventative and remedial measures for mitigation of all forms of environmental degradation. The Act allows for public participation in and transparency of the decision-making process regarding environmental protection. The multilateral agreements referred to are listed in Schedule VIII of the Act and are subsequently addressed in section 4.2.

4.1.2 Physical Planning Act, 2003

The Third Schedule of the Physical Planning requires an Environmental Impact Assessment (EIA) for any intervention in ecosystems including alterations to wetlands. The waterways in the proposed area empty into the McKinnon’s pond which is a major wetland of international importance. This Act controls the development of land; the protection of the natural environment; and building regulations. It legislates for a National Development plan and Local Area Plans for particular parts of Antigua and Barbuda.

Importantly the Act requires the approval of the Development Control Authority for any material changes to land or buildings including but not limited to, extension of the structure, alterations to the roof, installation of toilet facilities.

4.1.3 Freedom of Information Act 2004

The FOI Act gives effect to those parts of the Constitution that grants rights to receive and disseminate information. It promotes maximum disclosure of information and requests the creation of an Information Officer for every Public Authority. Important as well for the project is the provision which requires that the Public Authority make available on an annual basis “ the content of all decisions and policies it has adopted which affect the public, along with the reasons for them, any authoritative interpretations of them, and any important background material; and **(h)** any mechanisms or procedures by which members of the public may make representations or otherwise influence the formulation of policy or the exercise of powers by that public authority.” (Freedom of Information Act, 2004)

4.1.4 Childcare and Protection Act 2003

This Act passed in 2004 provides for the establishment of a Child Protection Agency, licensing of childcare agencies, and speaks to other matters relating to the safety, care and protection of children. The Act defines a child as someone not having reached the age of 18 years or a person who has attained this age but due to a disability is certified as in need of care and protection by the relevant agent. The act governs the maintenance of standards for childcare facilities including the child’s home and reporting of abuse or neglect of children.

4.1.5 National Youth Policy, 2007

The National Youth Policy of Antigua and Barbuda envisions a nation of peace and abundance, where all citizens work together to support each other and to build strong communities and a thriving economy. The empowerment of youth is seen as inseparable to the vision. The Policy identifies some issues and factors that are critical to youth empowerment and focuses on eight key areas such as strengthening social environments, education and training, employment and sustainable livelihoods, health, participation and empowerment, care and protection, crime, violence and rehabilitation and gender equality and gender relations. Sustainable livelihood includes ensuring that youth is mainstreamed in environmental and climate actions.

4.2 Agreements, Treaties and Conventions⁶

The following Multilateral Agreements apply to this project:

4.2.1 United Nations Framework Convention on Climate Change (UNFCCC), 1992

This convention, which entered into force in 1994, provides a framework for intergovernmental efforts to deal with climate change and its effects. The governments meet and share data on greenhouse gas emissions, national policies and best practices. The convention allows for the development and implementation of strategies for tackling emissions and the challenges of expected impacts and provides for financial and technical assistance for developing countries. Each country formulates its Intended Nationally Determined Contributions (INDC) to the UNFCCC. Antigua and Barbuda had two climate action targets that will be directly addressed by the is project. The first indicates that by 2030, all buildings are to be improved and prepared for extreme climate events, including drought, flooding and hurricanes. In the second target, the country aims to protect all waterways to reduce the risks of flooding and health impacts by 2030.

The UNFCCC aims for gender balance in bodies established pursuant to the Convention and the Kyoto Protocol, in order to improve women's participation and inform more effective climate change policy that addresses the needs of women and men equally. The UNFCCC calls for the national adaptation plan (NAP) process to be gender-sensitive, and calls on the Green Climate Fund (GCF) to promote environmental, social, economic, and development co-benefits and take a gender-sensitive approach.

⁶ All taken from the International Union for Conservation of Nature (IUCN), The Environment and Gender Index (EGI). 2013 Pilot (Washington, D.C., IUCN). Available at <<https://portals.iucn.org/library/sites/library/files/documents/Rep-2013-008.pdf>>.

4.2.2 United Nations Convention on Biological Diversity (CBD), 1992

The convention deals with biodiversity and all direct and indirect facets of its role in development. The major goal is the conservation and sustainable use of biodiversity. Antigua and Barbuda has submitted a National and Strategic Biodiversity Action Plan covering the full scope of the CBD.

The CBD promotes women's knowledge and practices in the conservation and sustainable use of biological diversity in the agricultural sector. It also promotes gender-specific ways in which to document and preserve women's knowledge of biological diversity, calls for gender balance in various bodies, and points to the gender and cultural impacts of tourism.

4.2.3 Convention on the Elimination of all Forms of Discrimination Against Women (CEDAW)

The principal instrument for the protection of women's rights is CEDAW, which was adopted in 1979 by the General Assembly of the United Nations. Antigua and Barbuda ratified CEDAW in 1989 and signed the Optional Protocol in 1996. CEDAW ensures that women are given the opportunity to represent their governments at the international level and to participate in the work of international organizations; that women have equal rights to bank loans, mortgages and other forms of financial credit; and that women in rural areas can (i) participate in and benefit from rural development; (ii) participate in development planning at all levels; (iii) obtain training, education, and extension services; (iv) have access to agricultural credit and loans, marketing facilities and appropriate technology; and (v) are treated equally in land, agrarian reform, and land resettlement schemes.

4.2.4 Beijing Declaration and Platform for Action from the Fourth World Conference on Women

The documents called for the active involvement of women in environmental decision making at all levels, the integration of gender concerns and perspectives in policies and program for sustainable development, and the strengthening or establishment of mechanisms at the national, regional and international levels to assess the impact of development and environmental policies on women.

4.2.5 Commission on the Status of Women

The 52nd session of the Commission on the Status of Women (2008) identified gender perspectives on climate change as its key emerging issue. The Commission on the Status of Women urged governments to integrate a gender perspective in the design, implementation, monitoring and evaluation and reporting of national environmental policies, strengthen mechanisms and provide adequate resources to ensure women's full and equal participation in decision making at all levels on environmental issues, in particular on strategies related to climate change and the lives of women and girls.

4.2.6 United Nations Conference on Sustainable Development (Rio+20) outcome document

Rio+20 affirms that green economy policies in the context of sustainable development and poverty eradication should enhance the welfare of women, mobilize their full potential and ensure the equal contribution of both women and men.

"The Future We Want" was adopted in Rio de Janeiro in June 2012.

It resolves to unlock the potential of women as drivers of sustainable development, including through the repeal of discriminatory laws and the removal of formal barriers. It also commits to actively promote the collection, analysis and use of gender sensitive indicators and sex-disaggregated data.

4.2.7 Millennium Development Goals (MDGs)

The Declaration assures equal rights and opportunities for women and men; promotes gender equality and the empowerment of women as effective ways to combat poverty, hunger and disease, and to stimulate development that is truly sustainable; and ensures that the benefits of new technologies, especially information and communication technologies are available to all.

4.2.8 Sustainable Development Goals (SDGs)

Achieve gender equality and empower all women and girls. *SDG number 5*

4.2.9 Lima Climate Change Conference 2014⁷

The outcome of the Lima Work Programme on Gender states that the role of women is key to the response to climate change, and needs to be strengthened. *Lima Work Programme on*

⁷ <<http://newsroom.unfccc.int/lima/lima-call-for-climate-action-puts-world-on-track-to-paris-2015/#downloads>>

Gender The Parties agreed on a Lima Work Programme on Gender to advance gender balance and promote gender sensitivity in developing and implementing climate policy.

4.3 National Policies

4.3.1 *Sustainable Island Resource Management Zoning Plan (SIRMZP 2012)*. The Physical Planning Act of 2003 describes the intention for a Development Plan for any part of Antigua and Barbuda. The SIRMZP was commissioned with this in mind and approved in 2012. This land use and zoning plan presents a development framework which labels the northwest coast of Antigua as a “settlement expansion zone”. The target area is inside this zone.

4.3.2 *National Poverty Strategy 2011-2015* has as one of its strategies, “Building Resilience through Environmental Sustainability – by making disaster risk reduction a feature of the planning process in the light of the high environmental risks that the country faces from hurricanes, earthquakes, and now sea rise, as a result of global warming. “

4.3.3 *National Biodiversity Strategy and Action Plan*. Target 8 of the action plan calls for a 20% reduction of the pollution in demonstration areas, including from excess nutrients, bringing it to levels that are not detrimental to ecosystem function and biodiversity. The McKinnon’s watershed is identified as one such area and as a biodiversity hotspot with pollution from land-based sources.

5. ENVIRONMENTAL AND SOCIAL ASSESSMENT AND GENDER ANALYSIS

5.1 ENVIRONMENTAL CONDITIONS

5.1.1 *Geography and Geology of the northwest coast*

The topography of Antigua consists of gently undulating hills, the highest of which is Mount Obama (402 m). There are three geological regions which run northwest to southeast (see figure 2).

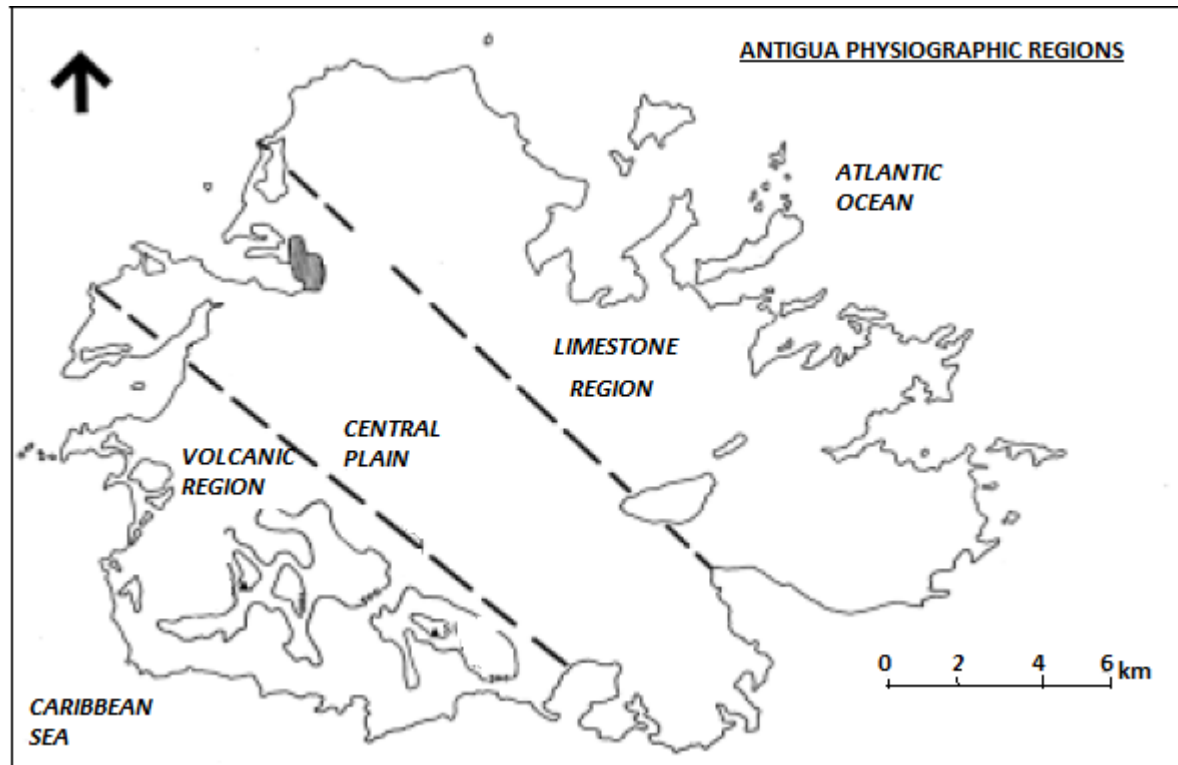


Figure 2. Topographic Zones of Antigua (adapted from National Action Plan)

The McKinnons watershed area forms part of the clayey central plains. The kaolinitic clays that are present have limited permeability which prolongs the rate of water absorption and exacerbates flooding. The soils of the area are a mixture of class III, IV and V as regards soil capability. The soils along the eastern edge of the McKinnon's pond are class III which means that they can be cultivated using moderate to intensive conservation and management practices. The soils are classified as Ottos Clay, Gunthorpes clay, Clare Hall clay loam and Fitches clay with mangrove soils around the McKinnon's Pond.) Class IV and class V soils have limited potential for cultivation unless there is extensive use of manual labour. The soils are shallow in depth and are limited by salinity near the pond and mechanical impediment.

5.1.2 Climate on the Northwest Coast

The position of Antigua at latitude 17° N and with open ocean stretching uninterruptedly to the east, accounts for the main features of the climate. Antigua lies between the permanent low pressure zone of the Inter-tropical Convergence and the semi permanent, subtropical high pressure cell of the middle North Atlantic. Hence Antigua is under the influence of the easterly trade winds throughout the year. The seasonal rhythm of climate is caused by the alternating dominance of the high and low pressure zones, which themselves migrate in response to annual shifts of the sun to the north and south; but the day to day weather is complicated by the smaller scale atmospheric disturbances such as waves in the upper trades, upper cold fronts moving both from the east and the west, and tropical revolving storms.

The disturbed weather and heavy rainfall of the wet season is attributed mainly to waves in the upper trades and to the proximity of the high level western Atlantic polar trough. These waves move over Antigua at intervals of about five days and give rise to trough of low pressure and much active convection. The frequency of storms increases as the wet season advances until it reaches a peak in August September. Antigua and Barbuda also lies in the heart of the Atlantic hurricane belt, where cyclones and hurricanes occur throughout August, September and October. Heavy rainfall associated with cyclones and hurricanes contributes significantly to wet season rainfall totals. A mean annual temperature of 27°C (80°F) is maintained, with a range of about 10°F, from a maximum in August, to a minimum in January. Mean annual temperature in Antigua has increased by around 0.6°C since 1960, at an average rate of 0.13°C per decade. There is insufficient daily observational data to identify trends in daily temperature extremes. Normally the “dry” season lasts from January to April and the “wet” season from August to November, with June, July and December as transitional months. Atmospheric conditions over Antigua are dominated by stable, dry air; the trades are strong and constant and occasionally cold fronts, usually from the west where they are associated with outbursts of polar air over North America, disturb the succession of dry, hot days.

The driest areas, with less than 40 inches (990 mm) mean annual rainfall, includes the peninsulas, the offshore islands of the east coast north of Willoughby Bay. Rainfall increases westward across the island until in the south western region it exceeds 50 inches. The wet season occurs through May to October, during which the island receives around 150 - 250 mm per month.

The climatic features of Antigua are year round high temperatures, steady easterly trade winds and a defined wet and dry season. The temperature extremes of 34 °C and 15°C have been

recorded but the average is 29°C. The traditional dry season is from January to March-April when less than 20% of rainfall takes place. The height of the wet season is from August to November. However rainfall is variable and fairly unpredictable. There is variation in rainfall between different parts of the island. The McKinnon's watershed is within the driest areas receiving on average 40 inches of rain per year. Rainfall occurs most often in short intense showers in Antigua as a whole. Vegetation in the McKinnon's water shed covers less than 25% of the land area while the McKinnon's Pond and Wood's Pond account for about 20% between them. Combined with this, the high temperatures and steady winds result in much evapo-transpiration. At present Antigua is enduring the most severe drought on record there being an accumulated deficit of an entire year's worth of rainfall since the beginning of the drought in 2013. The last 32 months (July 2013 to February 2016) have been the driest ever for that period on record⁸. The drought is expected to continue into the second half of 2016. The implications of this is continued heavy reliance on potable water generated by desalting or reverse osmosis. The surface water which used to contribute approximately 30% of the potable water is exhausted and will not be replenished unless there is significant rainfall. Communities in Antigua including the watershed, therefore must rely on intermittent water supply from the government or personal storage arrangements such as tanks and cisterns.

5.1.3 Hydrology and Drainage of the Target Area

The targeted area is one of Antigua's thirteen main watersheds (see fig 3). Water flows from the elevated areas of the watershed (Clare Hall ridge, Friars Hill and other surrounding hills) along the slope of the land and into the Woods pond. There was once a

⁸ Destin, 2016, Antigua Met Services accessed 19/07/2016

https://anumetservice.wordpress.com/2016/03/25/the-worst-drought-on-record-for-antigua/?blogsub=confirming#blog_subscription-2

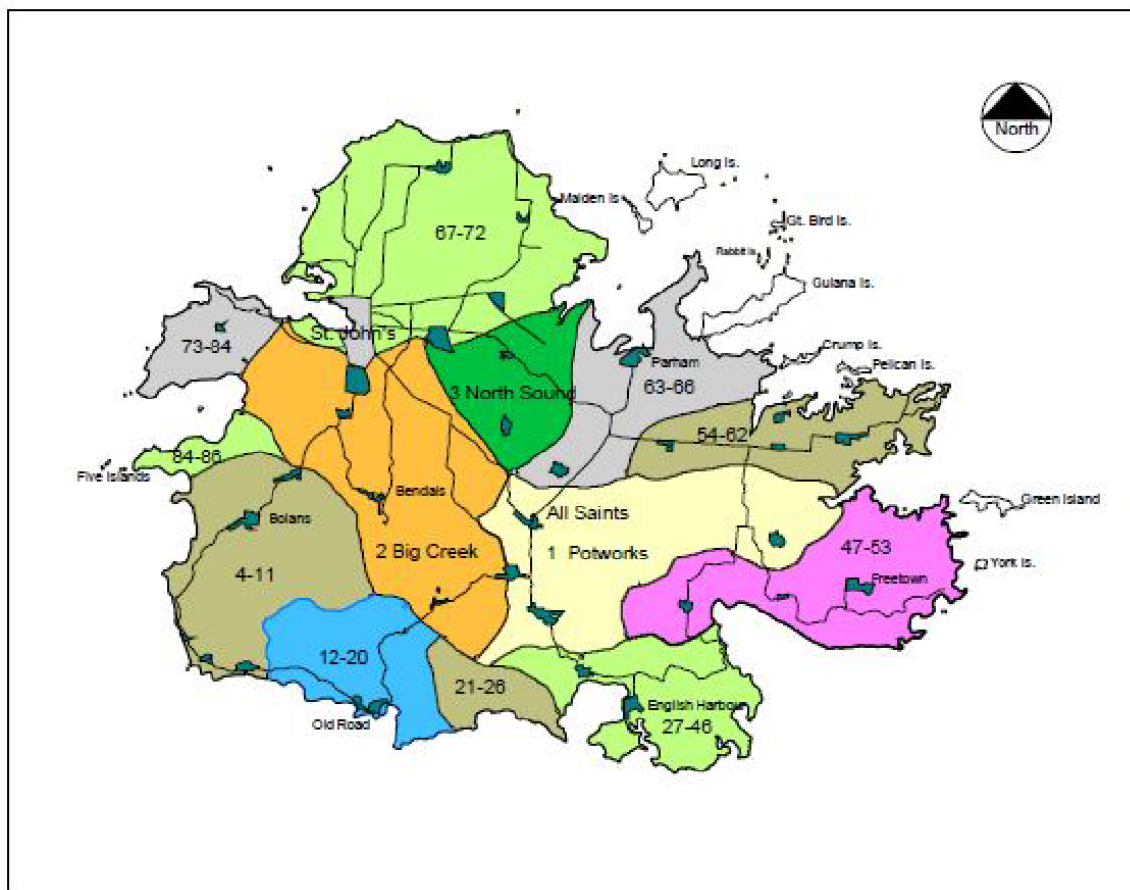


Figure 3 Watersheds of Antigua (source Department of the Environment)

series of ponds that functioned to store excess water and reduce its velocity before the water reached the Woods Pond. From the Wood's pond, overflow passes into major and minor waterways which travel through the villages of Lower Gambles, Yorks, McKinnon's and Upper Fort Road communities until they empty into the 2-km² McKinnon's Pond (see fig 4). The Woods pond has been severely contaminated in the past (*Enterococci: TNTC – too numerous to count*⁹, LBS standard 35 per 100ml single sample). At present the Woods Pond is choked with invasive cattails, water hyacinths and other large shrubs and trees as well as solid debris which have much reduced its storage capacity and made it less able to cope with climate variability including extreme rainfall (see fig 5).

⁹ Analytical Services, GOAB 2008, standard is for a single sample



Fig 5 Overgrown Wood's Pond due to prolonged drought.

A large portion of this vegetation was able to establish itself as the prolonged drought reduced the water level of the pond. The adjacent Wood's Mall concrete parking lot and outlet road flood easily and retain this flood water for unacceptable lengths of time. The flooding also extends into the surrounding communities and along the Friars' Hill road. Extreme drought conditions and extreme rainfall have adversely affected hydrological patterns and negatively impacted the flood mitigation functions of the Woods and McKinnon's Ponds.



Fig 4 The course of two tributaries of the waterway in Upper Fort Road

Homes in all areas are built near the watercourse, some with distances of less than 2 m to the edge (see figure 6). Some fences are built on the edge of the watercourse's bank. The watercourse passes through yards some of which have pit latrines. Many homes have their wastewater and effluent from their septic systems empty directly into the watercourse. Testing of the water in the Woods pond has revealed higher than acceptable levels of pollutants. The rainfall that occurred periodically before the drought, resulted in flushing of the watercourse preventing accumulation of the pollutants. However, the run-off made its way into the ecologically sensitive McKinnon's Pond, taking the pollutants with it. When there is little or no rainfall any wastewater and other pollutants become trapped in various places along the watercourse resulting in a spike in pollutants.



Fig 6 Showing distance of a dwelling house (left) and a fence (right) to the water course.

Solid waste pollution of the watercourse ranges from plastics to large appliances to construction debris. In addition, large portions of the waterways are under vegetation especially the cattails and water hyacinths, invasive species mentioned earlier. The prolonged drought has also given less water tolerant plants and other species an opportunity to colonise the waterways.

In the Upper Fort Road and New Extension communities, approximately 50% of roads are in a state of disrepair or were never surfaced. There are many cul de sacs as the roads that necessarily end at the watercourse. Most of the gutters along the roads are shallow (less than 12 cm in depth) and inadequate for handling the projected rainfall variability. Positively where the watercourse flows near the York's basketball court, there is a large, well-made bridge which allows the road to cross. Lower Gambles also has several side roads which end at the watercourse and the drains are shallow in many instances. Along the Anchorage road in McKinnon's community, there are drains which are blocked by vegetation. The circular allowances for driveways and similar structures are narrow and easily blocked, making them inaccessible during flooding and a safety hazard.

Ninety percent of the roads in the Yorks area are in sound state and some consideration has been given to the large volume of water that passes through the community because of its location on the flood plains of the watershed. This can be seen in the depth of the gutters (many are more than 30 cm deep) which have been constructed at the road sides. Most roads have one drain deeper by several inches than the drain on the other side. Several bridges of varying designs span the waterways at various points. Large bridges of varying diameters allow roads to cross the water way. However, some bridges have one to three circular openings (fig 9) which makes it easier for debris to become trapped and accumulate leading to partial blockage of the drain. The bottleneck created exacerbates flooding events as water cannot drain away quickly enough to prevent flooding. Residents also have makeshift wooden bridges some of which consist of single planks of wood of various widths and strengths that allow them to cross the water course and shorten the distance to their destinations. This therefore means that women and children may use this pathway more frequently to go to school, to access bus routes or to go to small community shops. Many homes are near the ground some with 1 foot of clearance or less between the house and the ground. Residents have reported placing furniture on blocks to reduce water damage from flooding.



Fig 9 Drains near Cocks Junkyard and First Choice Supermarket

At the end of the watercourse where it empties into McKinnons, are piles of junk cars which are infested with rats. Solid waste such as plastic bottles, plastic bags, Styrofoam containers and other trash have become trapped amongst the cars and along the waterway (see figure 7).

Some drains are cleared by authorities who use backhoes and other heavy duty equipment as well as workers with handheld equipment to clear the watercourse. However, vegetation on the banks of the water course are also removed leaving the soil bare and vulnerable to soil erosion from running water. Added to this is the practice of sometimes leaving the cleared debris at the side of the water course so it is then washed down into it when it rains.

THE MCKINNON'S POND

A prominent feature of the landscape and hydrology is an 80 hectare mangrove salt pond, McKinnon's pond. The pond is a brackish water ecosystem as it is fed by the watershed and at one time had regular inflows of sea water. The McKinnon's pond was initially a mangrove-lined lagoon, until a road built along the western and northern seaward side, severely restricted its connection to the sea except for a small culvert that allows a small amount of water exchange. This effectively increased the water levels and killed the majority of the mangroves. Most of the shoreline became open but some regeneration has taken place in some areas. Small stands of degraded mangroves remain on the southern and western (seaward) edges. A man-made causeway (accommodating fuel lines from a facility 3 km offshore to the storage area of an oil refinery) runs through the pond, isolating the southernmost section from the main body of water.

The McKinnon's Pond is listed in Schedule XII of the Environmental Management and Protection Act 2015, as an Important Wetland as it is a habitat, wetland, shrubland, important bird nesting area and for water catchment to control flooding. McKinnon's Pond is an Important Birding Area (IBA) for Antigua and Barbuda. Its year round population of Brown pelicans *Pelecanus occidentalis* and seasonal populations of Least terns (*Sterna antillarum*) are regionally significant. Large numbers of Laughing Gull (*Larus atricilla*) congregate at the pond every year as it is a major feeding ground while they nest on the offshore islands. Threatened regional endemics such as the Vulnerable West Indian Whistling-duck *Dendrocygna arborea* are documented to breed and habituate at the pond (see appendix for complete list of birds that have been seen at the pond). The extended drought of the last 3 years has emphasized the importance of this habitat as it is the only major catchment that still entertains birds (see figure 12)



Figure 12. McKinnon's Pond in July 2014, approximately 15% water remaining

There is extensive resort development on the coastal side and adjacent to the pond, as well as private homes. Although the pond has completely dried out at least twice since the start of the drought in 2013, its location at the lowest point of the watershed, means that even small rain events can significantly increase its water level. The poor drainage of the waterways that feed it have diminished the already sparse volumes of water that it is able to collect during the drought.



Fig 7 Pollution at the junction where the watercourse empties into the McKinnon's Pond

Water Quality

Schedule IV of the EPMA describes guidelines for the quality and treatment of coastal waters, fresh waters and ground water. Samples of water from along the waterway including the two ponds described in this document were tested in 2008 as part of the IWCAM project. The findings have yielded results indicative of a high level of pollution (see table 2). The standards of the Land-Based Sources of Pollution to the Marine Environment (LBS) protocol and standards taken from the EPMA that are applicable based on the methodology used for the sampling is also included in the table. As can be observed there are at various points along the waterway, with much higher than desired results for nitrates, phosphates, ammonia and *Enterococci*. The source of these is most likely untreated human sewage, animal waste and for those areas downstream of farms, fertilizers. Ammonia is directly toxic to freshwater organisms while the nitrates and phosphates can lead to algal blooms. The depletion of dissolved oxygen by the large concentrations of algae is further compounded by an increase in organic material attracting large numbers of aerobic bacteria which also deplete oxygen.

Table 2 Results for water quality testing along watercourse including Woods Pond and McKinnon's Pond

Point Description	Point id	Indicator		
		Nitrates (1.5mg/l) ^	Phosphates (0.2mg/l) ^	Enterococci (60/100ml) ^
Entrance to Woods Pond	A1	69.2	14.9	TNTC*
Exit from Woods Pond	A2	56.5	18.3	TNTC*
The Junkyard Cocks Drain	C2	30.4	14.9	39000
Eastern Side of the McKinnons Pond	D	20.7	0.46	18
Northern side of the McKinnons Pond	E2	33	0.37	1100

N.B. all measurements made between May and October 2008 and represent the highest result for that indicator.

*TNTC – too numerous to count

^Standards applicable to class 2 waters

5.2 SOCIO-ECONOMIC CONDITIONS AND ANALYSIS

Over the past 25 to 30 years, the Antiguan economy has transitioned from a mainly agrarian prospect to tourism and its related services. Tourism accounts for almost 60% of GDP and 40% of investment. Tourism as the primary driver of the economy means that the country is extremely vulnerable to forces such as natural disasters, economic downturns, terrorism, fear of contagion, and competition from other less expensive countries which have a similar mix or tourist offerings.

All the areas in the watershed are heavily residential with few businesses. Businesses that have been established here for more than 15 years include an automobile junkyard, the West Indies Oil Company and KFC which sells fast food. The Friars Hill road which runs north from St. John's City into the upper regions of the watershed has seen expansion as a business district following a trend in which businesses have opted to leave the congestion of St. John's City. Besides the Wood's Mall which has two banks, shoes stores, restaurants, pharmacy and doctor's offices, in recent years there have been the addition of the Village Walk and Royal Palm Place commercial centers each hosting a similar mix of business. The Epicurean, which is the largest supermarket on the island, Global Commerce Bank, Courts and Digicel as well as a 6 screen Cinema are also recent additions. The second largest supermarket on the island is on the Anchorage road in the McKinnon's community.

The residents of the McKinnon's watershed generate income mainly as civil servants (teachers, nurses, police, messengers and clerks. There is a significant number of security guards (private security firms), workers in the tourism service industry, a very small number of farmers and

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McKinnon's watershed

fishermen. There are also small businesses such as village shops, small car washes and a few hairdressers.

Antigua and Barbuda's relatively low crime rate, and its status as one of the more economically successful countries in the sub-region, makes it very attractive to migrants from the OECS and wider CARICOM and the Dominican Republic. The communities in the watershed have a large migrant population mainly from Jamaica, Guyana and a much smaller number from the Dominican Republic. Many migrants, in the drive for cheap housing occupy areas close to St. John's city. This is true of the areas in the target area of this project.

Some areas of the Yorks Community are categorized as slum areas. Yorks New extension is listed as a key area where squatting takes place¹⁰. The escalation is due in part to large influx of migrants, absentee landowners, unavailability of traditionally cheaper Crown land, and escalating prices for private land. Structures are often not built to relevant standards and with DCA approval. Pit Latrines are found in three of the four communities (see table 2). There are some instances in which residents are obtaining utilities illegally and some have no running water on the premises. The illegal acquisition of water highlights insecurities in the access to clean drinking water, water for preparing meals, and water for cleaning clothing, bathing, and other life essentials. The task of securing and maintaining these basic subsistence needs are traditionally female-led, underscoring the deeply embedded challenges to women, and by extension their families, without appropriate access to this resource. These areas are nearer the water course and are therefore more vulnerable to extreme weather events such as hurricanes and drought, and climate change impacts such as sea level rise.

Table 3 Number of pit latrines in each community (Field Work)

Communities	No. of pit latrines
Fort Road	389
Lower Gambles (road north of Public cemetery)	53
Yorks	8
McKinnon's	0

¹⁰GENIVAR, 2012, Sustainable island Resource Management and Zoning Plan for Antigua and Barbuda
ESIA - An integrated approach to physical adaptation and community resilience in Antigua and Barbuda's northwest
McKinnon's watershed

TOTAL	450
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The communities in the watershed fall into three political constituencies. Fort Road and Lower Gambles are in the City East constituency. Upper Gambles is in Rural East. Yorks village and McKinnons are in rural north constituency. The general attitude of residents is that politicians are generally uninterested in constituents and any attempts to improve their welfare. There is also an unfortunate association in the minds of many residents between political interest and the availability of funds which can be diverted. Long-term, stable and transparent community engagement throughout the life of the project will be important.

Gender-specific Socio-economic Analysis

There are significant differences in vulnerability and exposure that are as a result of non-climatic factors and systemic, multidimensional forms of inequalities such as discrimination on the basis of gender. This is often due to systemic, institutionalized and culturally based forms of inequality, which UN Women explains as “the equal rights, responsibilities and opportunities of women and men and girls and boys.” Thus, gender inequality has led to differentiated vulnerability, given that gender dynamics in the society contribute to shaping the power, roles and resources that are available to men and women. Gender considerations are analyzed here in the context of the project, with identified risks and proposed avoidance and mitigation actions are proposed in the management plan.

Although both boys and men are affected by climate change, women bear more of the burden, which is due to biological or physical differences, but is formed by the social, institutional and legal context, which reinforces differences in women and men. These differences are seen in the productive and social-reproductive roles and responsibilities, differential access to productive resources, including land, credit and employment, and women’s limited participation in political decision-making both at the community and governmental levels.

As it relates to adaptation, gender refers to how the socio-political relations between men and women affect the planning and implementation of adaptation actions, access to resources, the ways in which climate change impacts and adaptation measures differentially affect men and women, and the ways in which men and women contribute differently to adaptation actions.

The Country Gender Assessment (CGA, 2015)¹¹ analysis for Antigua and Barbuda forms the backdrop for situating gender equality in Antigua and Barbuda. The report reveals that of the population of persons surveyed for the 2001 Census, 13,872 males declared that they were the head of household, while 10,666 females declared that they were the head. More men consider themselves to be heads of household than women, and subsequently more women consider themselves to be the spouses or partners of male heads of household. Female headed households tend to experience greater negative impacts than male headed households even with climate change adaptation practices, therefore, they would be worse off without adaptation. The three components of project will be instrumental in improving the lives of everyone in the community particularly female-headed households.

The UN Women Office for the Caribbean has produced research that reveals that women's limited access to and control over the means of production – land and credit in particular; act as hurdles, which make them and their families more vulnerable to poverty¹². Additionally, a 1997 study conducted by the Food and Agriculture Organization of the United Nations (FAO) found that women were less likely to have any landholdings, and when they did have land, the mean value of men's holdings was almost three times the mean value of women's holdings¹³. UN Women's more current reporting (2008-9) substantiates these findings, underscoring women's persistently low land ownership, undermining their voices in "claiming property that they have traditionally used"¹⁴. Feminist Eudine Barriteau argues that women's holding of the least amount of access to property and resources continues to characterize the Caribbean female condition¹⁵. However, there is lack of data on who owns land in Antigua and Barbuda, since the Ministry of Lands and Agriculture does not maintain sex-disaggregated data on land ownership. Additionally, there is lack of data from local banks on women and men's access to credit and their use of that credit. Despite the limited collection of sex-disaggregated data, it is critical for an effective response to climate change for a disaggregated analysis to provide insights to improve policies and strategies. The Department of Environment has developed a draft gender policy and will be undertaking gender capacity building and training to ensure that

¹¹ CDB Country Gender Assessment, Vol 1. (2014) prepared by Tamara Huggins, Rawwida Baksh and Associates, June, 2014

¹² UN Women Advocacy Brief: Strengthening Women's Economic Security and Rights. Accessed from: http://www.unifemcar.org/ge_iss.cfm?SubID=168&link_1

¹³ <http://sta.uwi.edu/conferences/11/landtenure/documents/JulianaJohan-BoodramGenderPovertyLandRightsPowerpoint.pdf>

¹⁴ UNIFEM, "Who Answers to Women? Gender & Accountability: Progress of the World's Women 2008-9. Accessed from: http://www.unifem.org/progress/2008/media/POWW08_Report_Full_Text.pdf

¹⁵ Barriteau, Eudine. The Political Economy of Gender in the Twentieth-century Caribbean. Palgrave 2001

all policies and programs and adaptation strategies are gender responsive to benefit both men and women equally.

In order to mitigate potentially negative impacts during project implementation, gender inequalities have been factored into the analysis and management plan. The 2014 Beijing Platform for Action report for Antigua and Barbuda¹⁶ highlighted challenges to achieving gender equality nationally which includes issues such as social security not catering to women in unpaid sectors who end up working all of their lives, but cannot be cared for in their old age due to limited savings and the absence of adequate resources through government pension schemes. As such, elderly women within the community who have contributed to the care economy would be more vulnerable and at risk.

Further, the last Country Poverty Assessment¹⁷ conducted highlighted women, single mother and elderly as vulnerable groups. However, through consultations and focus groups held by the Directorate of Gender Affairs throughout the Beijing Platform Review Process, members of this community participated which comprised of single mothers, unemployed and underemployed women. The women who participated demonstrated frustrations with the quest to access markets and credit. Women expressed frustration stating: “I cannot go to the bank for a loan because they want title deed and I don’t have that.” Participants from the focus group discussions expressed that it was very difficult to access loans from the bank that as a result had to use other methods to access funding a part from going to the bank, which includes “box hands” which are less secure and through other easily accessible lending agencies with a higher interest rate. Therefore, the adaptation project recognizes the challenges individuals face particularly women in accessing credit. The project has a component that was designed to benefit vulnerable groups which offers unsecured and low interest loans which will assist the community with adapting to climate change.

6. STAKEHOLDER CONSULTATIONS

The methodology and collection instruments are described in detail in Annex... The main aim was to gauge interest in Component 2 of the proposal which deals with loans to property owners for upgrades and improvements to combat climate change impacts such as flooding, severe hurricanes and extended droughts. Table 4 summarises the results from both focus groups.

¹⁶ Bayne, Lebrechtta (2014). "Report: Government of Antigua and Barbuda Beijing Platform for Action Report.

¹⁷ Country Poverty Assessment, Main Report, p. xxiv.

Table 4. Stakeholder inputs and responsive project design

Stakeholder Input and Concerns	Options for incorporating into Project Design
Anxiety over landlords borrowing concessional loans and then raising rent as a result of increased property value; this could lead to greater vulnerability of the persons that the project is seeking to support. Persons with disabilities were mentioned as living in especially challenging environments	<p>Awareness and framing that the concessions from loans must be passed down to the renters</p> <p>Consider rent control provisions in the Loan agreements with landlords who rent out their properties</p> <p>Recourse: if a landlord breaks this agreement and raises the rent, then the landlord could be liable for fees or settlement</p> <p>The DOE should have a complaints mechanism where residents could report issues for the DOE to investigate and act as mediator</p>
Concern that the resident's cost of living would increase after taking out a loan for adaptation	Analyze the cost of living pre- and post-adaptation actions, where post-loan is a more expensive cost of living, propose cost reduction measures and notify the loan applicant
Concern about the size of the loan; a resident in the focus group indicated that they might want a loan under US\$5,000	<p>DOE should consider approving loans for less than US\$5,000 and just keeping the upward limit of US\$75,000</p> <p>The DOE should consider the possibility of people applying for a larger number of smaller loans, and develop management to accommodate this portfolio breakdown</p>
A focus group participant was concerned about not being eligible for the revolving loan because he could easily access a loan at the bank because of his income	The DOE should clarify eligibility criteria and have easily understandable prints/handouts at future workshops and consultations
Several focus group participants said that some poor people would not be able to pay back the loan, no matter how concessional; however, they were very vulnerable and still needed the adaptation for their homes	<p>For individuals that cannot take on a loan, consider incorporating a number of the most vulnerable households into the community grants component under Component 3</p> <p>One of the Component 3 community grants could</p>

	<p>be to help the most poor and vulnerable improve their homes, provided that criteria are developed and agreed by the community at large so it is clear why these people are getting grants instead of loans (this could be an important community enhancement exercise)</p>
<p>In the focus groups, people identified that flooding was the main problem and that they would like for their homes to be raised off the ground</p>	<p>The DOE's engineers are looking into the feasibility of this as an adaptation intervention option and safety/regulatory concerns</p> <p>The DOE should look into insurance or liability risks of the activities that it funds</p>
<p>Community members were very interested in solar energy and requested more information</p>	<p>The DOE should hold a special meeting on renewable energy, or couple a presentation on solar power at the next community consultation</p> <p>Future community consultations should be more technically focused on the proposed adaptation interventions, costs, and requirements for implementation</p> <p>The DOE should put together an information package with more detailed information about the main adaptation interventions</p>
<p>Concern about the selection committee that would be used to approve loan applications to ensure that there will be fairness.</p>	<p>Loan applicants identified only by number to those who approve the loans</p>
<p>Current waterway cleaning practices leave a lot of debris along the side of the waterway that gets washed in during heavy rain, exacerbating flooding</p>	<p>Works in the waterway need clear guidelines for disposing of waste material</p>
<p>Some residents were concerned about the safe guards that are in place to ensure that their homes will be climate resilient. They expressed that even if they take the loans, their homes might still be susceptible to threats such as flooding and they will be stuck with a loan.</p>	<p>Technical engineering assessments</p> <p>In addition to adaptation criteria, the DOE as part of its due diligence process should conduct a "tangible benefits test" to assess the benefits of financing before costs are passed on to third parties such as renters, or to assess if the loan will create benefits that are tangibly enjoyed by the loan recipients. This could be for example an analysis of the cost of living pre- and post-borrowing of the adaptation loan. Furthermore, loan and program officers should be kept updated on products or services that are valued and conversely, those which are not.</p>
<p>Some residents indicated that they did not want to</p>	<p>The DOE should consider flexibility in the loans to</p>

invest in their home; a limited number of residents stated that they would not want a loan because they wanted to move out of the flooding zone, one woman had been trying to move since 2008	assist people in situations where they only want to move homes and not stay in a high risk flooding zone
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Approaches that are geared towards climate change adaptation require a multi-disciplinary, multi-sector strategy. The multi-sectoral model calls for holistic inter-organisational and inter-agency efforts across multiple sectors. Gender and the environmental impacts are crosscutting issues that require a partnership approach. Therefore, the consultation process included a diverse group of stakeholders whose input was included in the design of the project. The consultations demonstrated a participatory approach with key presentations and space for stakeholder engagement and input that informed the design of the various components of the project. Project information was disseminated through various media, including notices, leaflets, announcements in community forums, and picture-based texts (to serve those who cannot read). Also, meetings had good facilitation led by members of the Department of Environment so that everyone had adequate explanation of project goals, etc., and the project team was responsive and open to adapting their plans and activities as required when information emerges from community members. The participatory approach increased community buy in and ownership for sustainability of the project efforts. Throughout the community consultation process the project team used local community champions to assist with disseminating information and also with organizing consultations and meetings. The consultation process also promoted and protected human rights and gender equality principles as outlined in the Adaption Fund Gender Policy. This was evident through the hosting of meetings with access for persons with disabilities, it created spaces for both men and women to participate in community consultations and focus group sessions and the project team partnered with the Directorate of Gender Affairs to ensure that the plans and implementation are gender sensitive.

7. ENVIRONMENTAL AND SOCIAL/GENDER IMPACTS

7.1 Compliance with Social and Environmental Policies

Compliance with the Law

The following project activities will require permits and permission from the Development Control Authority (DCA) in consultation with the Public Works Department who are responsible for the maintenance of waterways.

- The digging and construction of the check dams and sedimentation ponds require that plans be submitted to the DCA.
- Percolation tests at appropriate intervals especially for the proposed location of the ponds must be completed before submitting plans to the DCA.
- Clearing of vegetation from drains and embankments, removal of solid waste and other debris from the waterway will require soil erosion mitigation measures as well as coordination with public works and Central Board of Health.
- For removal of the junk cars at the end of the watercourse as it empties into McKinnon's Pond will require consultation with the property owner and CBH.

Where proposed locations for retention ponds are on private property, permission must be obtained from the owner and addition of a waterway/drainage easement to the property deed. This may lower property value and there may be resistance from the owner. Future permission will have to be granted to personnel to access the property for maintenance of the check dams and retention ponds. As possible and appropriate, the DOE should locate major interventions on public land.

Any material change in the structure and use of buildings require technical drawings which must be submitted to the DCA for approval. This includes extension of buildings, changing of roofs, addition of toilet facilities, movement of buildings, digging of cisterns. The cost for review is approximately US 18 cents per square foot. The DOE could consider a grant component to the loan, or if possible the DCA could provide in-kind review of the plans under this project, so that loan financing goes to fund concrete adaptation projects as much as possible.

Upgrades to buildings for use as shelters, will need DCA approval. There is also a need to consult with NODS to ensure proposed upgrades will meet the desired criteria needed for the building to become a shelter.

Access and Equity

The geographical area that will be directly affected by the project includes all of the York's community including that section known as Old Runway and New Extension, all of Upper Fort Road and Fort Road New Extension, Lower Gambles and McKinnon's. The benefits of the project should include:

- Improved water quality
- Upgrade of waterway to deal with a one in twenty-five year flood event.

- Improved sanitation.
- Upgrade of homes to deal with the impacts of climate change including increased likelihood of hurricanes, temperature rise, extreme flooding events, droughts.
- Contracts to community groups to maintain waterways.
- Grants to community groups to upgrade facilities to act as shelters, water harvesting and storage for community use.

A stakeholder analysis is shown in figure 11 below. The most important stakeholders are the community members. The analysis also highlights the importance of cooperation between different government departments.

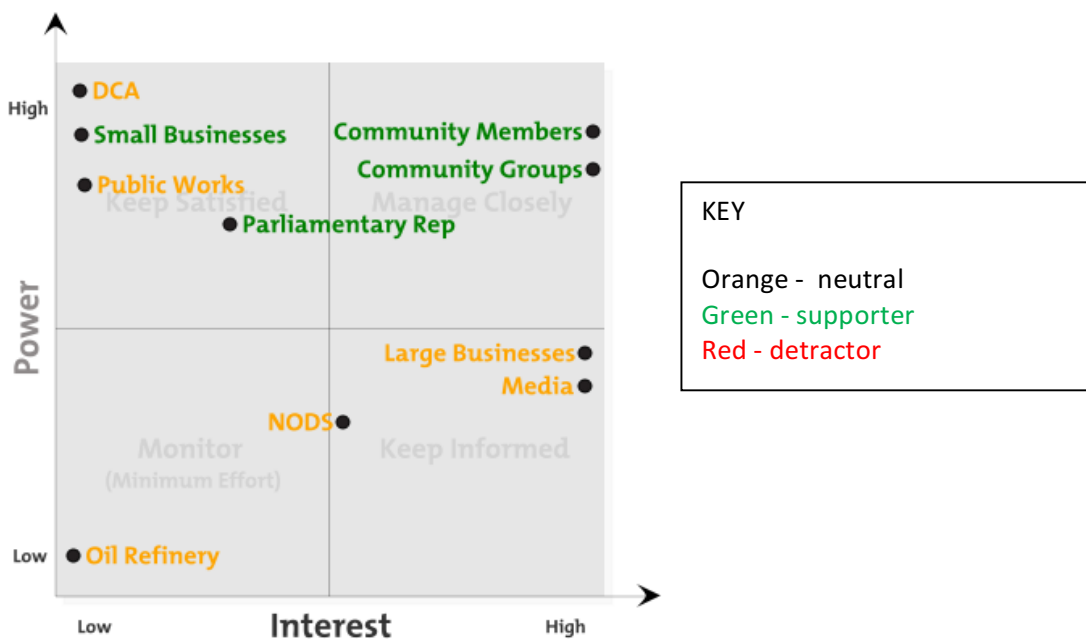


Figure 11. Stakeholder Analysis highlights supporting and neutral actors; no detractors are identified (Source: Andrea Otto)

Potential beneficiaries of the project include all members of the communities in the target area, including private residents and businesses. Specifically, community groups will benefit from training in financial management, improved infrastructure and assistance with their mandates to aid members of the community by providing shelters and water storage as needed.

The potential rivals for the loans for home improvement include the commercial banks, credit unions and short term loan agencies such as FastCash and Axcel financing. The loans provided by these entities are all at a higher interest rate than that offered by the project. In addition

loans provided by banks and credit unions require security in the form of property and/or cash. There is a Government programme which allows employees to obtain interest free loans in the form of a salary advance. If the major target for the loan programme is the Government worker, then there could be potential competition.

The marginalized or vulnerable groups in the communities include the disabled, single mothers who are heads of households, the elderly including those who on a fixed income (pension), small children and migrants of questionable immigration status and their children.

Although climate change activities such as flooding affect everyone in its proximity it also results in gender-differentiated impacts. Vulnerable groups such as women, children, persons with disabilities and the elderly bear more burdens and costs. Therefore, it is important to assess women's responsibilities pre, during and post flood. Women participants from a focus group discussion held in the community shared the frustration with the poor drainage systems and highlighted how it affected their health, security and livelihood. Women from the focus groups described how they have had to negotiate the high levels of water to save their lives, such as the use of sticks and pipes to pull each other out of their homes. The flooding has impacted children's access to school. Flooding also makes mobility difficult for both men and women. In addition to this, both men and women complained in the focus group discussions that it was difficult to travel around in the community when there was water everywhere. Women feared being drowned themselves and their family members. The lack of mobility can mean a decrease in economic empowerment for vulnerable groups, particularly women.

Often, with poor drainage systems, it is usually followed by an equally poor health and hygiene as is demonstrated in this report, as a result such conditions have caused many economic and social losses due to unsolved situations. Participants of the focus group within the community spoke about losing values such as their beds, refrigerators and stoves during floods. The upgrade of the drainage systems therefore, would reduce the high levels of flooding in the community, which would put women at ease from the preparation and post flood impact. Also, during flooding, women in the focus groups expressed less privacy especially when they are placed in limited shelters. During the focus group discussions women expressed that they often felt unsafe and unsecure. A poor drainage system and flood prone community can also be linked to domestic violence. During flood, both men and women in a relationship could be limited from producing or earning more as they could which can lead to tensions between them. Also, loss of household valuables could lead to tensions and a struggle between couples in determining who is responsible for replacing the items, which can result in violence. Also, the pressure of alcohol and other substances from the stress of flood activities among men can lead to violence. Domestic violence limits women's power in decision making and social

participation regarding preparation, response and reconstruction. Thus, the upgrade of the drainage system would mean that the water would flow more freely with less back-up and floods which would improve the lives of the vulnerable groups within the community and the overall lives of families and women and men.

Most of the groups described in this section do not qualify for a bank loan because of the size or instability of their income. Migrants are especially vulnerable as they seek housing that is cheap or affordable, and feel they cannot complain if there is an issue with housing. The search for affordable housing may also explain the congregation of migrant groups in certain communities. Their homes are also more likely to need the upgrades offered by the project and live nearer the water course. They are unlikely to own the home they occupy.

There is a high propensity to employ women in domestic work care giving roles, and services, including administrative and secretarial services, which characterizes the principle available employment options for women in the sector. Men are largely found in management and supervisory roles, landscaping, and construction, which all tend to be better paid, yet requiring no higher educational attainment. Further as discussed in the CGA (2015)¹⁸ female workers in the sector are further made vulnerable by labour issues that are particularly gendered: sexual harassment; forced labour; inflexible working hours; low wages; fatigue; victimization; unfair dismissals; and health. Although the Labour Code speaks to the majority of these issues, sexual harassment remains a significant issue not covered through legislation in Antigua and Barbuda. Forced labour and sexual exploitation are further recognized as growing areas of concern.

The women are more likely to be preyed upon by unscrupulous landlords who may ignore their complaints of poor living conditions and threaten to have them deported. These groups are also less likely to have access to transport to go to the hurricane shelter which is several miles away in another community. The disabled are often cared for by a relative or friend who has a low paying job.

The project will contribute to better sanitation by the upgrade of the watercourse. However, the measures of component 1 will need the interventions of component 2 to obtain the desired outcome. Sufficient numbers of property owners must subscribe to component 2 and opt to improve how sewage is dealt with. Not only will there be an improvement in the infrastructure, but the measures taken to improve water quality will benefit the communities on a whole.

This project is expected to improve access to energy. At the end of the project, the groups listed above should have improved access to cheaper solar power for powering their homes. This will

¹⁸ CDB Country Gender Assessment, Vol 1. (2014) prepared by Tamara Huggins, Rawwida Baksh and Associates, June, 2014

decrease their dependence on fossil-fuel generated electricity from the APUA power grid and at the same time decrease utility bills.

This project will not negatively impact access to education, safe and decent working conditions or land rights.

The project components ensure that fair treatment for men and women, boys and girls. It recognizes as enshrined in the adaptation-relevant gender policy the need for differential treatment that is fair and positively addresses systemic gender biases and discrimination due to gender roles and norms. The components target vulnerable groups such as women and children with a key focus on achieving gender equality as an end goal. Therefore, the project will provide equal access for both men and women. However, since women, particularly single parent mothers are more vulnerable the project will ensure that provisions are put in place for vulnerable groups to benefit from project activities.

Coherence with other government projects and programmes

There are policies in place to enhance access and equity for some of these groups. The **School Uniform Grant Programme of 2004** and the **School Meals Programme of 2006** benefit all students including those who attend private school. The GOAB has also established two free public pre-schools for those parents who cannot afford to send their children to what was until now a wholly private endeavour. There is also a **Student Loan Programme** established in 2008 for those who wish to attend tertiary institutions. The **Government Work Experience Programme** and the **One Stop Employment Center** have also been set up to assist the jobless and young people.

For the elderly, disabled and disadvantaged, cash transfer programmes such as the **PDV People's Benefit** and **Senior Citizens Utility Programmes** (2009) are social safeguards which have been implemented. The **Board of Guardians' Grant to Individuals** programme and the **Gender Affairs Over 80** programme also provide relief to vulnerable groups.

Up until 2009, the government subsidized diesel, gasoline and propane. Propane gas tanks are the major source of energy for cooking. As a result of the loss of this subsidy the price of the propane gas moved from US \$8 to \$12. The price of getting potable water is also subsidized by the government, however an increase in water prices due to a tariff is anticipated in 2016/2017. Those households who have no access to water in their homes can use public standpipes for which there is no charge.

All residents have unrestricted access to primary healthcare provided by the government through community clinics (both nurses and doctors are available free of cost), Mount St. John Medical Center and the Medical Benefits Scheme, which provides medication for some common illnesses free of cost. The latter two need registration for a Medical Benefits Card and ESIA - An integrated approach to physical adaptation and community resilience in Antigua and Barbuda's northwest McKinnon's watershed

there is a fee for some hospital procedures if the patient does not have a card. This project is not expected in anyway to alter or reduce access to healthcare.

Marginalized and Vulnerable Groups

The project targets marginalized groups who are affected and will ensure that there is no further disproportionate impact on these groups. Therefore, the impact of each project activity, output and outcome will be assessed to consider the impact on the vulnerable groups within the community.

Marginalised and vulnerable groups present in the target area include women and girls, the disabled, single mothers who are heads of households, the elderly including those who on a fixed income (pension), small children and migrants (especially those of questionable immigration status) and their children. Table 4 shows the relative proportions of some of these groups. Further, the presence of a number of brothels in the community should highlight the vulnerabilities of women engaged in sex work. Additionally, women who engage in transactional sex work to better secure the means of their subsistence should also be considered as a vulnerable group.

Table 5 Relative proportions of migrants and renters in the target communities.

Community	% migrant	% renting
Fort Road	72	62
Lower Gambles (road north of Public cemetery)	59	64
Yorks	36	24
McKinnon's	3	8
TOTAL		

Source: Field Work

The specific vulnerabilities of these groups were described in access and equity.

Human Rights

Antigua and Barbuda, in addition to the Convention on the Elimination of All Forms of Racial Discrimination, has ratified three of the core United Nations human rights treaties, namely the Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment, the Convention on the Elimination of All Forms of Discrimination Against Women, and the Convention on the Rights of the Child and its Optional Protocol on the sale of children, child prostitution and child pornography.

Antigua and Barbuda has no national human rights institution set up in accordance with the Principles relating to the status of national institutions for the promotion and protection of human rights (the Paris Principles, General Assembly resolution 48/134, annex). The country has established the Office of the Ombudsman and created a Legal Aid Clinic to assist the poor and underprivileged in gaining access to courts. Migrants have been offered a route to citizenship by forgiving the gaps in their residency that prevented them from regularizing their status.

All project activities have been developed and will be implemented within the International and National Human Rights Framework. The project activities will ensure that the rights and freedom of all is protected. The project has also adopted a rights-based approach, grounded in international principles and frameworks.

Gender Equality and Women's Empowerment

The project activities need to ensure that it promotes a fair and equal access of men and women, and should take into consideration differential impact. The project should also promote equal participation in decision-making processes by assuring women representation in key decision making processes and a balance of representation in various project forums and activities. A gender analysis was also conducted on each project component to ensure that the needs and realities of men and women are taken into consideration with further recommendations for mainstreaming gender.

Core Labour Rights

Antigua and Barbuda has ratified 8 of 8 fundamental conventions, 3 of 4 governance conventions and 18 of 127 technical conventions making a total of 29 ILO conventions (see appendix for full list).

No child labour or forced labour is expected to result from this project.

Indigenous Peoples

No United Nations body has adopted an official definition of the term ‘indigenous people’. However the definition most commonly referred to is, “Indigenous communities, peoples and nations are those which, having a historical continuity with pre-invasion and pre-colonial societies that developed on their territories, consider themselves distinct from other sectors of the societies now prevailing on those territories, or parts of them. They form at present non-dominant sectors of society and are determined to preserve, develop and transmit to future generations their ancestral territories, and their ethnic identity, as the basis of their continued existence as peoples, in accordance with their own cultural patterns, social institutions and legal system.”

There are no indigenous peoples in Antigua and Barbuda and hence no indigenous people which will be impacted by this project.

Involuntary Resettlement

There are several instances in which dwellings and fences have not been built with the minimum setback distance from the watercourse as required by the DCA. There are also buildings which may be dwellings, washrooms, sheds or buildings for other purposes that have not been built with DCA approval.

The project’s approach is incentive-based compliance through the loans under Component 2, and awareness raising across all components of the interconnectivity of actions along the waterway, and resultant benefits for community members and the local economy.

For waterway works on private land, the Department of Environment will consult and obtain the signed consent of property owners through easements, following the process through which roads and public areas are established and maintained. Easement rights to waterways and public good areas are well documented in Commonwealth law.

The project will not result in involuntary resettlement. No livelihoods or businesses are expected to be negatively affected by this project.

Protection of Natural Habitats/ Conservation of Biological Diversity

The McKinnon’s Pond is the major natural resource that must be preserved under this project. It is an important habitat for both resident and migratory waterbirds including vulnerable species such as the West Indian Whistling Duck (*Dendrocygna arborea*) and Brown Pelicans (*Pelecanus occidentalis*). The watercourse ultimately empties into this pond bringing water of questionable quality. In the present extended drought, the pond is the only recourse for waterbirds as all other open water sources are dry. The pond itself provides the ecosystem

service of storing water and reducing its velocity and level of sedimentation before the water enters the sea.

The vulnerability of the pond is well documented and has been described in earlier sections of this report. The pond has been negatively affected by various factors over the years. The construction of the road to the west and north effectively reduced the natural connection between the pond and the sea. Many mangroves died and the characteristics of the pond were altered. The pond has received discharged oil, domestic grey water and septic effluent as well as solid waste in the form of plastics, appliances and junk cars. Some mangroves have been deliberately removed and the pond has been dredged. There have been several instances of large numbers of fish dying in the pond, the last one being in 2015. The causes of these fish kills have been due to reduced freshwater recharge (drought), depleted levels of oxygen, high water temperatures, discharge of potentially toxic elements and untreated sewage among others.

The biodiversity in the area targeted by this project are mainly concentrated in the McKinnon's Pond. There are large numbers of waterbirds who feed in the waters of the watercourse and several which live along its banks. The McKinnon's Pond is an important habitat for thousands of birds both resident and migratory. Shorebirds pass through the habitat in immense numbers during the spring and fall migration. The extended drought of the last three years have dried all other major water bodies, increasing the importance of the pond as a habitat. Vulnerable species which habitually use the pond include the West Indian Whistling Duck, *Dendrocygna arborea*¹⁹, listed as vulnerable and the near threatened Piping Plover (*Charadrius melodus*) (Appendix 1 has a complete list of bird species which use McKinnon's Pond). Relatedly, the pond is used heavily in ecotourism as a birding area, as it is easily accessible, offers a large variety of birds and has birds year round. There is some recreational fishing which takes place in the pond. Some white and black mangroves as well as Buttonwood mangrove trees are still present in some areas of the pond and along the edges of the watercourse where it enters the pond.

This project's interventions along the waterway could negatively impact McKinnon's Pond due to the real possibility of construction debris making its way into the watercourse and then into the pond. However, by properly managing these risks, the project will significantly benefit the ecosystem health of McKinnon's Pond by reducing the input of wastewater, septic effluent and other potentially toxic substances from the communities along the waterway, and by increasing the freshwater recharge through improved drainage.

¹⁹ (The IUCN Red List of Threatened Species. Version 2016-1. <www.iucnredlist.org>.

Climate Change Risks

This project does not fall into any of the sectors listed as requiring a calculation of greenhouse gasses emissions. However, in Component 2, some applicants may opt for air conditioning units to combat rising temperatures. The increase in demand for air conditioning units has been linked to increased levels of HFCs (hydroflourocabons) which have been developed to replace CFCs and HCFCs as refrigerants. HFCs are greenhouse gases and some home owners may out of necessity choose more affordable units which are less likely to be well made. The number of households likely to fall into this category is expected to be quite small as many consider air-conditioning a luxury. Revolving loans supporting solar energy will offset any potential emissions increases as there will be less dependence on fossil-fuel generated energy. In conducting Technical Assessments, the Department of Environment can recommend energy efficiency and renewable energy interventions to offset potential emissions; these would also decrease the resident's electricity bill.

Pollution Prevention and Resource Efficiency

Clearing of vegetation from the waterway, removal of solid waste, mixing of concrete, digging of retention ponds, construction in the upgrade of homes will all generate varying amounts of pollution as fossil fuels will be used to power equipment directly or indirectly (electricity generated by fossil fuels). There is also the possibility that construction debris and other forms of waste generated by the activities of the project may find its way into the water course and eventually pollute the McKinnon's Pond. Excavation debris from the retention ponds are also a potential source of pollution for the waterway.

The project requires an EIA which will describe strategies to minimize waste and pollution production from project activities, considering applicable local, national and international regulations regarding any waste and pollution generation or minimization of resource use.

Public Health

Health is more complex than the absence of disease. It is the result of interactions between individual characteristics and factors of the environment. Initial screening of the project reveals the potential for physical, mental and emotional health impacts whether positive or negative.

The water course runs through the communities, often within two meters of some dwellings, therefore the quality of water is of paramount importance. There is evidence that the water quality is affected by septic effluent, direct input of domestic grey water, human waste from pit latrines when flooding occurs, solid waste including plastics, paper, Styrofoam and large

appliances, the dumping of dead animals, oils and other waste from car repair and other activities. In addition, the areas of the watercourse, where water stagnates creates ideal breeding environments for disease vectors such as mosquitoes. This includes the *Aedes aegypti* which is a known carrier for diseases such as Dengue, Chikungunya, Zika and yellow fever, all of which have been positively confirmed in the Caribbean. The first three have been confirmed in Antigua although no data exists for the prevalence of Dengue or Chikungunya in the watershed area. This may be due to practices in the collection of data, under-reporting of illness and very good primary healthcare.

In screening this project's suitability for an Health Impact Assessment, it was determined that conducting the exercise would be of value and should be undertaken. However, the time constraints of this consultation makes such an exercise unlikely to be completed in time to influence decision making before the submission of the proposal. It is strongly recommended that the HIA be done and submitted at a later date, if this is permissible as it is likely to impact decisions or at the very least that its results be used during the detailed planning of the project.

Additional support and interventions should be provided to those who are in need of it particularly women who have had a history of negotiating land use or whose property will be impacted in some way due to the re-engineering of the waterway and those who have agreed to relocate.

Physical and Cultural Heritage

There are no Physical heritage sites in the project area and no cultural heritage properties that may be impacted by it.

Lands and Soil Conservation

The soils in the area were described in section 5.1.1. The soils are generally limited for agricultural purposes but are adequate for building. There are no particular lands which are fragile and would be lost or degraded by the activities of this project. Lands are expected to be preserved from erosion due to vegetation loss and/or rapid movement of water by the activities of the project.

7.2 Analysis of Potential Risks by Project Component

7.2.1 Component 1. Upgrade urban drainage and waterways to meet projected climate change impacts

Impact on the Natural Environment

Clearing of vegetation will certainly be necessary during re-engineered construction of the waterways and the retention ponds. Vegetation will need to be removed from large portions of the waterway to restore water flow and allow for casting of the concrete in those areas of the waterway to be paved. The vegetation along the length of the waterway does not contain any rare or vulnerable species. Construction of the retention ponds will also require clearing of vegetation. All the vegetation is secondary shrub growth and does not include any vulnerable or threatened species. Care must be taken that the vegetation is removed as promptly as possible so it is not washed back into the waterway. There is also the threat of construction debris/pollutants washing into the waterway and being carried to the McKinnon's pond during construction.

Re-vegetation of the sides of the waterway and creation of a buffer zone may result in the introduction of plant species which may out compete native plants, require extensive tending including watering. This is of special concern considering the scarcity of water. Also consider that some native plants grow very tall and become top heavy especially during the fruit bearing stage. They therefore need sufficient room for proper root development to support them. Inadequate plant source material for replanting along the banks is also a consideration. The soil on the banks of the watercourse must not be left exposed to potential erosion especially from water which may carry the soil into the waterway. Thought must also be given to the available land space for future expansion of the plants as some dwellings are within a very short distance to the water way.

Water quality may be affected by disposal of debris including large solid waste from the water course. The water way has solid waste pollutants including plastic bottles, cans, furniture and large appliances and at the entrance to McKinnon's pond, derelict vehicles. The solid waste must be stored appropriately and removed quickly to avoid its re-entry into the waterway. Before the derelict cars can be removed, the rats must be exterminated to prevent them entering the surrounding community. Construction activity may also generate solid and liquid waste such as oil from equipment which may pollute the watercourse.

Increase in vectors as there are now more areas with still water. The new check dams and retention ponds may retain water for several days in a major flooding event as the water may take too long to permeate the soil. With the expected increase in temperature as a result of climate change, this is adequate time for mosquito breeding to occur and this may exacerbate the vector problem and contribute to potential disease outbreaks. There is no baseline information of the prevalence of the various species of mosquito pests. The *Aedes aegypti* mosquito which is the vector for Zika, dengue fever, Chikungunya breeds preferentially in stagnant water especially water containing bacteria associated with the breakdown of organic

matter such as dead leaves. Simply fixing the waterway so there are fewer places where water can stagnate will ease this problem.

Intervention creates additional issues such as greater velocity of water and increased flooding in areas towards the ends of the waterway. This may occur if for example the entire waterway is paved with concrete.

Social Impacts

Conflicts with residents (especially squatters) who have ignored restrictions on minimum separation distances for buildings and the watercourse. Relocation of fences or buildings some of which are on the very edge of the waterway. There may be some resistance by residents and the issue of who will pay for moving/replacing the fence or dwelling may be broached.

Resistance of property owners to some mitigation measures (e.g. drainage easements, planting of trees, location of swales and constructed wetlands, restrictions on clearing of vegetation).

Insufficient buy-in from residents. In discussions with residents, there has been an overwhelming sense that this project is either political in nature and/or another in a series of “look-sees” that has made no significant difference to the issues with the pond.

Table 6. Summary of expected impacts of upgrade for urban drainage and waterways to meet projected climate change impacts.

Proposed Interventions	Potential Impacts
Re-engineering of waterways to prevent flooding in urban areas	<p>Increase flow velocities and reduce aquatic weed growth</p> <p>Reduced flooding</p> <p>Waste material from clearing the waterway could be a negative impact if not properly disposed of</p>
Settlement ponds and traps	<p>Reduction in flooding</p> <p>Improvement in water quality.</p> <p>Retention ponds can potentially become breeding grounds for mosquitoes leading to an increase in vector-borne diseases</p>

	<p>such as Zika and Dengue</p> <p>Pollution from non-point offsite sources which may lead to algal blooms and be a health hazard</p> <p>Rapid spread of the invasive <i>Typha</i> sp (cattails) which may reduce storage capacity.</p> <p>Silting</p> <p>Resistance from property owners</p>
Constructed wetlands	<p>If improperly designed and implemented, expose the odor of the waste stream</p> <p>Vulnerable to changes in climatic conditions and temperature, their substrates are easily saturated and plugged, they are readily affected by plant species, they often occupy large areas, and there are other problems including irrational management, non-standard design, and a single function of ecological service.</p>
Flood drainage swales	
Drainage easements for 1 in 25 year storms	<p>May affect property value (decrease in value).</p> <p>May limit the way the homeowners use their land.</p> <p>Issues of responsibility for maintenance if it is a physical structure such as a culvert</p> <p>Damage to the home foundation or other structure such as a paved driveway.</p> <p>The easement cannot be lifted from the deed unless there are special circumstances, and it will be associated with the deed even when it is transferred or sold.</p>
Restrictions on clearing trees, shrubs	Reduction in velocity of water flow

and under-story vegetation	<p>Binding and stabilization of soil</p> <p>In some places the waterway passes through private property and it may be difficult to control clearing of vegetation. Also some properties are extremely small and the buffer zone may cover too large a portion of the property</p>
Rehabilitation of vegetative buffers	<p>Reduction in velocity of water flow</p> <p>Binding and stabilization of soil</p>
Establishment of buffer zones around waterways to prevent building in flood risk zones	<p>Some buildings so close to waterway that they are already in the buffer zone. Where squatting occurs, participants may be reluctant to alter structures and draw attention to themselves.</p> <p>Some lots border the waterway and the buffer zone may take up a large portion of small lots.</p>
Bio-remediation to improve water quality and prevent disease vectors	Reduction in pest populations
Clearing of blocked waterways to prevent flooding.	Free flow of water leading to reduction in flooding
Incorporating new climate-resilient guidelines and standards into the Building Code as necessary for climate mainstreaming	Time constraints as upgrades to guidelines tend to take a long time
Integrating the LAP into the implementation	Time constraints

practices and work
plan of the
Development Control
Authority (DCA)

Train implementers in order to sustain and scale up project interventions and continue Component 1 interventions after the life of the project

Capacity building

Gender Impacts

Since flooding is one of the most common hazards that affect this community and women headed households are affected disproportionately the re-engineering of the waterway will have a positive impact on the community particularly women who are at a greater risk of injury and death due to societal restrictions and gender roles. In addition to this however, women are typically absent from the forum where Disaster Risk Reduction decisions or planning is made, therefore when priorities are established; the interests of women are often poorly represented. One potential risk of the re-engineering process is that men could dominate the process and the decision-making.

The retention ponds that can become the breeding grounds for mosquitoes and other insects identified above which can increase vector-borne diseases such as Dengue and Zika would impact, women and children disproportionately. Pregnant women and women among childbearing age would be more vulnerable to the Zika virus. Since there are currently no vaccines to protect against the infection according to the world Health Organization, the establishment of the retentions ponds would have to ensure that there are measures in place to reduce any possible health impact.

The activities presented for component one should be effective in achieving its objective. It is imperative that proper planning take place beforehand however, and steps are outlined in the Management Plan. The literature suggests that the soil of the area is heavy clay which is inimical to good drainage and may limit the effectiveness of the retention ponds. The paving of the waterway however, will reduce one of the major problems with the water which is the

tendency for it to become blocked by opportunistic vegetation. The concrete will however increase the velocity of water as it passes through the communities.

2. Revolving Loans for homes in McKinnon's watershed to meet new adaptation guidelines established in the building code and physical plan

Environmental Impacts

The offer of loans has no direct impact on the physical environment. However, the interventions which the loans may be used for may have some impacts. An environmental impact assessment is not strictly speaking necessary for these interventions but there are some proposed activities that may have some environmental impact. This is limited to disposal of waste generated by project activities such as improper disposal of old appliances, construction debris, the generation of greenhouse gases by air conditioning units and the purchase of new appliances without consideration for energy efficiency.

Social Impacts

1. The most vulnerable are also the ones who cannot access the loans because they are unemployed and likely unable to repay. Even though the loans are aimed at the most vulnerable, in actuality there will be persons who simply cannot qualify because they are not home owners. Ownership of a home is an expensive venture which many of the most vulnerable cannot afford even with a mortgage. Squatters or persons who have built structures without DCA approval will not be eligible to access loans. Further they may have no legal claim to the land or to the dwelling or have no proof of ownership. Even though the loans are unsecured, some proof of home ownership must be a requirement to obtain the loan. On the other side of the coin, the project area does have a significant number of people (51%) who do own their homes, according to initial survey results. Women could be at a disadvantage since they normally occupy the lower paying jobs, have less education and literacy and control over resources and assets. Since the revolving loans will only be offered to property owners' women will be impacted since they traditionally do not have ownership to land and property.

Non-resident homeowners who are land-lords, may not appreciate the urgency of the situation and may be reluctant to access the loans. The residents of the homes are not the property owners and therefore unable to make improvements. Some landlords have several houses which are being rented in the area which must be considered when they apply for loans.

Perceived inequity in approval and disbursement of loans especially if there is oversubscription. It is important that applicants to the loan process gain a perception of that process as fair and

equitable and all instances of favouritism, nepotism and political interference, and other similar practices be nonexistent. A patina such as this may discourage others from seeking the relief of the loan and result in under-subscription. This may be true particularly among women. Men, rightful property owners who are head of households may be able to apply for the loans on behalf of the household and make decisions that further exclude the voice of women.

Recovery of loan amounts. It must be borne in mind that the project, by its very deliberate targeting of marginalized, vulnerable groups sets itself with a higher than normal chance of defaults on loan payments. This has implications for the amount of money available for the present and future cycles of the loan and may directly impact its success. The consultations revealed that residents were concerned about whether they would still be required to repay the loan if the object of the loan was damaged or inoperable.

Added costs. Any substantial alterations in homes and properties require application for approval by the DCA. There is a cost attached of 18 cents US per square foot. Added to this is the cost to obtain technical drawings of the proposed alterations and before this of hiring an engineer or builder to assess the upgrades the property needs. There is also the potential cost of home insurance which should be a condition of the loan once it exceeds a certain amount.

The most vulnerable are excluded by other circumstances. It is important to be wary of individuals who would normally, with no issue, qualify for a bank loan or be able to upgrade their homes out of pocket, who may apply and be accepted for the project's loans to the exclusion (as funds are limited) of someone who has no other recourse.

Increase in rent as a result of improvement in infrastructure. The Rent Restriction Act (1947) allows for the landlord to increase the rent after any expenditure on substantial improvements and structural alterations to the dwelling. There is no rent control board as provided for by the Act. The Act does limit any rent increase to not more than 8% per annum of the amount expended or 20% of standard rent. In any case, upgrades may have the undesirable effect of increasing the expense of the renter.

Under-subscription. Variations and instability in climate means that there are long periods during which there is no flooding (such as the present drought), hurricanes or other potentially damaging weather events. Thus residents develop a false sense of security disbelieving that there is likely to be any extreme weather event in the future. This may negatively impact the willingness of residents to take precautionary measures.

Gender Impacts

During the focus group discussion participants have expressed that they do not have enough information on the loan process and stated that they need more information to determine interest. Also, participants are nervous about accessing loans if there are no safety measures in place for damage of items.

The CGA (2015)²⁰ revealed that Antigua and Barbuda's Labour Statistics Division calculates the unemployed labour force using the categories of: those persons who looked for work, and those persons who wanted work. Through this calculation, no measure of persons who participate solely in "Home Duties", or unpaid labour in the home, is accounted for. This is further emphasized by the definition of the "economically inactive population", as referenced in the 2001 Census. Persons considered "economically inactive" are those engaged in Home Duties, e.g., "housewives, and others engaged in cooking, cleaning, and child rearing", and who do not receive monetary pay for such activities. Women are over- represented in this category and are thus largely not counted as contributors to the economy. Among those who are deemed "economically active", women have a higher unemployment rate than men, and remain unemployed for longer periods. Thus, Women who contribute to the care economy, which is unpaid work, persons living with disability and other vulnerable groups expressed during focus group discussions that they will be further marginalized due to their inability to repay loans and have suggested that grants might be a more effective strategy. However, participants have also expressed that the loans are more attractive and accessible in theory than that of other lending institutions.

Although, the revolving nature of the loans to ensure that persons benefit in the future some possible risks that might emerge includes: persons who are in need of the loans might not have the capacity to re-pay, thus the most vulnerable might not be able to access the loans, community members, particularly women might not be able to provide evidence of land ownership, business members, landlords and other members of the community might be seen as more attractive and better positioned to repay loans, men who are head of households might exclude the voice of women in adaptation decision making, persons might have to negotiate competing priorities to access loans and vulnerable groups might be fearful to apply for loans due to perceived stigma.

Also, women dominate positions and sectors that are precarious, lower paying and/or less secure, and largely reinforce stereotypical gender roles of domesticity and the provision of care.

²⁰ CDB Country Gender Assessment, Vol 1. (2014) prepared by Tamara Huggins, Rawwida Baksh and Associates, June, 2014

Of the eighteen (18) business types/categories listed to account for employed persons by industry group in the 2001 Census, women's participation exceeds men in: wholesale/retail trade (53%); hotels and restaurants (59.9%); public administration (51.9%); education (75%); health and social work (82.6%); other community, social and personal services (56.4%); and private house work with employed persons (82.3%). Where women and men are employed within the same occupational class, women's earnings are on average lower than men.²¹ Further, statistics reveal men are far greater represented in the sectors that contributed the highest percentage to GDP (Construction, Transportation and Communication), and within those targeted for economic development (Agriculture and Fisheries). While women are the majority of workers in the hotel and restaurant and services sectors of tourism, their main occupancy of employment in the lower echelons, and the vulnerability of the sector to external market shocks has challenged economic opportunities, leaving women vulnerable and open to exploitation. Although, women are more dominant in Government Services and Financial and Business Services they fill the positions that are lower paid²². Overall, women maintain a higher unemployment rate to men, and remain unemployed for longer periods, once they fall into the category of "economically inactive"²³ It therefore means that the loans that are offered must have gender sensitive criteria for selection and must also strive to achieve gender equity and equality.

3. Adaptation mainstreaming and capacity building in NGOs and community groups to sustain project interventions

Environmental Impacts

There are no foreseeable impacts or risks to the environment associated with this component.

Social Impacts

Capacity of community groups to access grants for upgrade of community buildings and maintenance of upgrades to the waterway. Consultations in the target communities revealed that there were very few community groups that were functioning. In the Upper Fort Road area, there is a steelpan group (Superstars) but they have not been in operation for some time. There is a football group, Rockersville and informal basketball associations. The Yorks area has

²¹ FOCAL. The Caribbean Single Market and Economy (CSME): The Case for Tracking Impacts on Women and Men. May 2006; 10

²² Osoba, Ermina. "Women in Management and Decision-Making Processes in Antigua and Barbuda: A Statistical Analysis. 2005

²³ FOCAL. The Caribbean Single Market and Economy (CSME): The Case for Tracking Impacts on Women and Men

the Yorks Community Group. No groups were identified in Lower Gambles or McKinnon's. At present the Yorks community group is the most organized. There are however two churches including the Villa Seventh-Day Adventist Church, Iglesias and the Kingdom Hall of Jehovah's Witnesses. There is a secondary school in the Lower Gambles Community.

Fair allocation and access to community resources e.g. water, by all residents without discrimination is important. Community groups have members and are led by individuals whose mandate it is to look after the welfare of the members. Someone must be responsible and have final say in the use of assets owned or controlled by the group. The possibility exists that some community members may be subject to discrimination based on their status as a member of the group or the community as a whole or discrimination based on the conscious or unconscious prejudices of those in charge. The major challenge is that all these groups do not have the provision of this type of community service as their primary focus and so training must address this as well as preparation for maintenance of the waterway.

Establishment of particular buildings as official shelters or for other interventions such as water harvesting and storage. The officially designated hurricane shelter for the communities in the target area is the Cedar Grove primary school which is several miles away outside the watershed. The Jehovah Witnesses church in Lower Gambles is also a designated shelter but for residents also outside the watershed. In canvassing the communities, only the Yorks Community center and Princess Margaret school are available and established as possible conversion/upgrade as shelters. However, use of schools is not advised as the dual purpose of serving as a shelter can impede the quick recovery and return to daily life-post-disaster, when the school is occupied as emergency shelter. A privately owned building may need to be sought and converted for use as a shelter. The community groups may make inadequate assessments of infrastructural upgrades needed.

Security of new infrastructure e.g. water tanks and water pumps is a potential risk. Members of the community or outside of the community may damage, or misappropriate assets acquired under this project for personal use.

Gender Impacts

The Country Gender Assessment²⁴ also highlighted key international agreements that promote increased women's participation in decision-making processes. Article 21 of the Universal Declaration of Human Rights recognizes the right of every person to take part in decision

²⁴ CDB Country Gender Assessment, Vol 1. (2014) prepared by Tamara Huggins, Rawwida Baksh and Associates, June, 2014

making in his or her country. The Beijing Platform for Action (BPfA) outlines concrete measures to ensure women's equal access to, and full participation in power structures, and to increase women's capacity to participate in decision-making and leadership. In particular, the BPfA proposes that legislative and decision-making bodies should constitute at least thirty (30) percent of women's representation (Section 182). This 30 percent minimum has come to be known as the 'critical mass' for women's representation in politics and decision-making.

Critical mass theory recognizes that establishing and maintaining a more balanced representation of women and men in leadership fulfils a tri-fold purpose: women's rights to equal participation in decision-making processes and political life is better fulfilled; women's access to positions of leadership becomes self-sustaining and promotes further progression; and the ideas and perspectives of women are better integrated into the decision-making processes that affect their lives.

Further, CEDAW provides a basis for realizing equality between women and men in leadership through ensuring women's equal access to, and equal opportunities in, political and public life. States parties' signatories to CEDAW agree to take all appropriate measures to overcome historical discrimination against women and obstacles to women's participation in decision-making processes (Article 8)²⁵. As such, men and women should be fully involved in disaster management activities and decision-making.

Component project three provides an opportunity for community members to sustain the adaptation efforts. Women should be seen as equal partners in the mitigation process, who bring unique skills and creativity to climate change adaptation measures. A potential risk of this community is that systemic gender roles and norms might act as a barrier to women's participation and inclusion in community initiatives to adapt to climate change. Also, other vulnerable groups might feel excluded from community efforts due to historical marginalization. Men and women from diverse groups should have the opportunity to participate actively in the planning, design, construction, and maintenance of mitigation works so that together they can work on community based early warning systems to ensure procedures are sensitive to both female and male needs, including privacy, security and adequate protection of valuable assets. While possible potential risks for community shelters might include security, accessibility and lack of women's participation in disaster preparedness decision-making and interventions.

²⁵ CEDAW Committee. General Recommendations. Accessed at:
<http://www.un.org/womenwatch/daw/cedaw/recommendations/recomm.htm>

Table 7. Summary of Impacts for Component 3

Proposed Interventions	Possible impacts/Issues
<i>Three contracts are awarded to community groups/NGOs to maintain the adaptation interventions accomplished by the project</i>	Very limited capacity to receive grants. At present there is only one, established functioning community group (Yorks Community Group) which is not registered. Insufficient buy-in from the community groups
<i>30% of the community-based buildings in the areas have benefitted from grants to improve the resilience of their buildings</i>	Few community buildings except for the community center in Yorks

8 ENVIRONMENTAL AND SOCIAL/GENDER MANAGEMENT PLAN

8.1 Management Structure and Responsibilities

The Department of the Environment as the implementing and executing agency has ultimate responsibility for the project. It is responsible for:

1. the implementation of the environmental and social management plan.
2. the provision of guidance or contracting persons to provide guidance in following the mitigating measures while the activities of the project are being carried out.
3. environmental monitoring and reporting.
4. ensuring compliance with the ESMP by any contractors or site supervisors.
5. where unforeseen factors occur, reviewing and updating the ESMP to minimize any environmental or social impacts.
6. organizing and hosting public or other forms of consultation with stakeholders as needed during project execution.

The site supervisor may be the contractor supervising or performing the activities of the project or the Department of the Environment or one of its agents such as the project manager, that are on-site to observe the project activity. The site supervisor is responsible for:

1. ensuring that the tenets of the ESMP are implemented and adhered to during operations.
2. recording and reporting to the DoE any contravention or non-compliance as they occur and any factors which may have led to it.

3. completing a compliance report.
4. recording and reporting any complaints that are made with respect to the activities of the project.
5. recording and reporting as soon as possible, any incident that causes or has the potential to cause material or serious environmental harm.

8.2 Public Consultation and Environmental and Social Disclosure

Public consultation and disclosure is to be an integral part of the project implementation. Following the guidelines outlined below and in accordance with adaptation fund policies, the contents of the ESIA shall be made available to the public and the public will have the opportunity to express their opinions on the contents of the ESIA or on any part of the project that may affect them.

Grievance Mechanism

During consultations and at any reasonable time during the implementation of the project if there are any complaints or issues, the following will be recorded:

- a) time, date and nature of enquiry, complaint or concern;
- b) type of communication (e.g. telephone, letter, personal contact);
- c) name, contact address and contact number;
- d) response and investigation undertaken as a result of the enquiry, complaint or concern; and
- e) actions taken and name of the person taking action.

The complainant will be informed in a timely manner about the progress of investigating and resolving their complaints.

A complaints register should be kept and updated throughout the life of the project.

The DoE is ultimately responsible for recording and dealing with complaints.

8.3 Water Quality Monitoring

The project is expected to reduce the influx of grey water (source of phosphates and nitrates), septic effluent (source of ammonia and enterococci) and other contaminants along the watercourse and in the McKinnon's Pond. The quality of water along the watercourse and in the McKinnon's pond is therefore a major environmental indicator of the success of the project interventions. A water-quality monitoring programme is to be developed for the project. It is outlined in an attached annex.

8.4 Performance Criteria

For each component of the project, there is a set of minimum criteria based on environmental and social indicators which should be met. These criteria are described below, before the tables detailing the management plans for each component.

8.5 Environmental Procedures and Site and Activity-Specific Work Plans/Instructions

The DoE in consultation with the contractor or site supervisor will devise a site or activity-specific description and checklist for all construction activities to ensure the minimizing of any environmental hazards. The contractor or site supervisor is required to follow and complete the checklist on a daily or weekly basis and submit it to the DoE for revision. The DoE will follow-up and make necessary adjustments.

8.6

Table 8 Risk Analysis table

Type	Risk	Risk Management	Ranking
Financial	<p>Raising the profile of climate risks in the community through hazard mapping and climate projection forecasting could negatively impact community perceptions of their area and its safety, could result in lower property values and/or higher insurance rates if banks are sensitized to the hazard information.</p> <p>Homeowners may not be in a position to repay the loans. Thus jeopardize the sustainability of the program;</p> <p>The funds available may not be adequate and thus create and political risk.</p>	<p>Mitigate identified climate hazards through concrete adaptation interventions, and disburse \$3M USD in small loans for concrete adaptation interventions at the household level to incentivize compliance with climate resilience standards.</p> <p>The mitigation measures are not known as yet. This will be determined during the PP phase. The intention however is to as much as possible use direct salary deductions for repayments. This is normal way to make payments on homes in Antigua and Barbuda. The aim would be to give priority to those properties that will be impacted by the vulnerability assessments, changes in the building codes and the land use plan. The project may identify stranded assets. Priority will also be given to persons who will find it challenging to move to a shelter. These are single families with special needs individuals and elderly. Further priority can be developed with the input of the Ministry of Finance the Community and others. Finally, the SIRQ Fund is seeking additional funding through other donors. The Fund aims to have 10M USD per year in the revolving loan fund. This is the amount estimated to be needed to get all of the 50,000 properties in Antigua and Barbuda ready for the impacts of climate by 2022.</p>	Medium to high

Financial	Scope creep is a risk to this project given so many agencies and NGOs each with their priorities. At the end of the consultation exercise there are normally more projects and activities than budget. The process of rationalizing this must be carefully handled and is normally left to the Minister and or Permanent Secretary based on the advice of the Director of the Department. This process can be very difficult and can result in agencies not supporting the project if their preferences are not chosen.	<p>The Department will draw on its long-term relationships with agencies to build trust and compromise. In instances where the Department may not be able to mitigate scope creep, it may ask the Cabinet to agree at the appropriate time on project scope.</p> <p>The use of the Cabinet early in the project is important since project scope has significant budget and project impact implications.</p>	High
Financial	The project may not receive the funds on time, or there may be a slow disbursement of funds, which can have a significant impact on implementation and co-financing availability.	Request a large upfront disbursement from the Adaptation Fund (40%) to ensure synergy with Cabinet decisions, the PSIP process, and ongoing projects that could provide temporary relief for slow disbursement. The Department of Environment tries to ensure that there is at least a 5% contingency fund within its core government budget for such situations.	Medium
Financial	Disputes in the decision-making process, e.g. TAC may not agree on the selection of the consultant and/or service provider; TAC may disagree on technical way forward; the Project Manager may disagree with the TAC's technical analysis and project strategy; and the PMC disagrees with the Project Manager and/or the TAC	<p>Include contract resolution procedures within contracts – most contracts are written to include an arbitration clause. The Ministry sanctions the contracts prepared by the Department. Any arbitration is the responsibility of the Attorney General Office.</p> <p>Negotiation – The Project Manager and or Coordinator is usually the first line of conflict resolution. In the experience of the Department, most conflicts encountered have been resolved at this level.</p>	Medium

Financial	Disputes during contract execution, e.g. the quality of the work is assessed to be inadequate, or regarding issues related to budget and completion time of work	<p>Mediation and Conciliation - If the Project Manager and or Coordinator cannot resolve the conflict, the matter is forwarded to the Project Management Committee and/or the office of the Permanent Secretary for mediation. Most conflicts that have reached this level are normally related to interagency differences of opinions. Generally when the Permanent Secretary rules on an issue the conflicting parties normally abide by the decision.</p> <p>Litigation - In the event of litigation this is handled by the office of the Attorney General. This level is normally reached for contract disputes and or as a result of the implementation of a project.</p>	Low
Financial	The costs of implementing adaptation may be higher than expected.	<p>The Department has identified maximum complementarity with existing and upcoming opportunities, including the SCCF project, which will deliver baseline data on similar interventions. The Department will also secure technical capacity support for monitoring, procurement and financial reporting in order to determine spending levels versus achievement against the results framework.</p> <p>Where necessary and when in doubt, the Department consults the Legal Affairs department.</p>	Medium
Financial	Adaptation interventions are insufficient and underestimate the impacts of climate change. Climate impacts are already being experienced much sooner than anticipated.	The climate risk assessments completed for Antigua and Barbuda employ different climate scenarios. The project will use the higher risk scenarios for planning and to calculate costing for adaptation interventions.	Low/ Medium

Environmental	Extreme climatic events and climate variability affect the confidence of local community members to embrace adaptation measures	The project will incorporate weather conditions – extreme rainfall, storm events and extreme drought – that can sometimes overwhelm ecosystem rehabilitation projects into planning and operational contingencies.	Medium
Environmental	Impervious surfaces introduced by the project increase runoff and results in soil erosion and negatively impacts downstream water quality	Use ecosystem-based approaches, such as revegetating areas, to maximize the co-benefits of ecosystem services	Low
Social including gender	The project does not benefit its target vulnerable populations, including female headed households	Undertake a participatory Social Risk Assessment and develop a Management Plan at the project preparation stage; ensure compliance with recommended measures throughout project implementation	Medium
Social including gender	The project does not achieve its gender balance in community leadership and empowerment	From the project preparation phase, identify community leaders with good gender knowledge and culture practices, and cultivate relationships for project implementation; monitor workshop and consultation participation; track gender disaggregated indicators as well as the SDGs	Low
Institutional	Policymakers prioritize economic benefits over sustainable and resilient ecosystems	The project has policy backing, and will build on complementary climate change policy initiatives through the regional GCCA project. The consultative processes led by CARIBSAVE have also secured local community buy-in and ongoing awareness targeted at high-level political representatives has been demonstrating the risks of flooding to economic investments.	Low

Institutional	Institutions have limited capacity to fully implement the project	Design the project to align with work plans of core staff in the respective agencies, bolstered through the PSIP process. The Project also aims to build capacity in key institutions – the Environment Department, Public Works, and the DCA.	Medium
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8.7

8.7.1 Component 1. Upgrade urban drainage and waterways to meet projected climate change impacts

Performance Criteria/Standard

1. Minimize clearing of vegetation from the banks of the water course, and revegetate cleared areas using recommended species.
2. Minimize pollution of the water course and McKinnon's Pond by construction debris and other pollutants including oils from equipment, pesticides
3. A decrease in vector populations (rodents and mosquitoes) as a result of project interventions.
4. Improvement in quality of the water in the water course and in McKinnon's Pond; water quality within prescribed EPMA standards
5. Decrease in flooding risk as a result of interventions.
6. At least 90% of property owners sign waterway easements to facilitate drainage interventions.
7. Equal participation of men and women in design and upgrade of waterways; participation and involvement of vulnerable populations.

Table 9. Management Plan for Component 1

Risk	Mitigation Measures	Time	Responsibility	Monitoring and Reporting
Pollution of McKinnon's Pond and the watercourse by construction debris including soil, vegetation, solid waste during re-engineering of watercourse	Timely removal of cleared debris (same day depending on volume for resource efficiency)	Throughout construction	Site supervisor	Daily by the Site supervisor
	Designate area for storage of this waste as it is excavated. Storage of construction debris including vegetation in a manner which prevents its entry into the waterway.	Daily	All personnel under the direction of the Site supervisor	Reporting by DAS after testing of adequate number of samples or if tests reveal any result which may have significant impact on project activities
	Schedule work during periods of low rainfall	As possible	Site supervisor	
	Water quality monitoring – develop a monitoring plan by the Department of Analytical Services and strict adherence to the plan.	As indicated in the water quality monitoring plan.	Department of Analytical Services	Monitoring by the Analytical Services lab based on time frame given for water quality testing
Clearing of vegetation from waterways and banks of the waterway exposing soil and resulting in erosion	Limit clearing to only what is required for construction work within a certain time period. Cost/benefit analysis of clearing large parts of the waterway and then having to redo it because the vegetation has grown back before work can begin. For resource efficiency, the entire waterway should not be cleared unless work on it is to begin within reasonable timeframe.	Throughout	Site supervisor	Weekly and maintain records

	Replant banks of water course with recommended vegetation as soon as feasible (see appendix 2)	Throughout	DoE	
Inadequate planting material	Ensure supply beforehand by growing in the DoE nursery or source locally	Before project start	DoE	As it occurs
	Use only native or naturalized species			
	Control invasive species during project activities			
Availability of water for maintenance of vegetative buffer	Choose plants that are drought tolerant and require minimum care (see appendix 2)	Before project start	DoE	Monthly and retain records
Increase in vectors such as mosquitoes and vector borne diseases which would impact community members, particularly women, among childbearing age who are vulnerable to ZIKA virus from the mosquitos	Choose designs which minimize vectors using ecosystem-based integrated mosquito abatement strategies	Before project start	DoE - engineer	After 6 months and maintain records
	Bio-remediation (predatory fish)	Monthly after retention ponds constructed or after heavy rain event.	DoE with Central Board of Health	After every water treatment event to the DoE
Resistance of property owners (e.g. drainage)	Public consultation and education	Before start of project and during project	DoE	After every consultation and retain records
	Stakeholder involvement specifically in the choice of			

easements, movement of structures on their property)	intervention. Use Henderson Simon who is a respected engineer in his community and has with associates begun the redesign of the waterways				
The waterway runs across private land and as such there might be issues with access to property, maintenance and reluctance by individuals who are not the legal property owners.	Incentives such as reduced insurance, property tax Assess the waterways and consult with property owners to ensure that no property will be left worse off				
Sedimentation of retention ponds	Maintenance by periodic cleaning after checking level of sedimentation	Checks every 6 months after construction and after any major rain event	DoE		After every check and maintain records
Growth of invasive plants such as <i>Typha</i> spp and water hyacinths	Periodic mechanical removal to keep them to less than 10% of the pond or waterway	During project and after	DoE Contracted Community groups		Record as part of maintenance and maintain records
Location of check dams, retention ponds	Soil percolation tests to determine the best location of the dams Siting on public land where possible	Before start of project	DoE		As it occurs and maintain records
Release of rodents	Rodent extermination before removal of vehicles	During	CBH, DoE		After extermination by

into the community during clearing of derelict vehicles from the waterway.		component 1		CBH to the DoE and maintain records
Pollution of waterway and McKinnon's pond by rodenticide during rat extermination	Use least toxic method that is effective; consult with local experts (e.g. EAG field officers).		CBH, DoE	Record what is used and test water quality before and after event and maintain records
Increased water velocity in areas of the waterway that are covered in concrete	Use pervious surfaces so more of the water will permeate to the soil	During engineering designs for project interventions	Site supervisor, DoE	After any heavy rain event by DoE and maintain records
Men might dominate management committees	Ensure that guidelines are put in place to include women in the design and upgrade of the waterways Companies and partners with less than 30% (critical mass) of women in leadership roles in their organization should require internal gender assessments with targets for advancing gender equality before awarded participation	Before and during project	DoE	Set gender indicators and benchmarks

8.7.2 Component 2. Revolving Loans for homes in McKinnon's watershed to meet new adaptation guidelines established in the building code and physical plan

Performance Criteria

1. Five (5) % of homes in the target area access loans.
2. Loan repayment (target to be determined by financial analysis)
3. All successful loan applicants chosen in a fair and equitable manner
4. A locally relevant vulnerability index is developed and used to track impacts of loan interventions
5. Loans are not used for any activities that result in net release of greenhouse gases or activities that contribute to climate change by the release of greenhouse gases
6. Minimal increase in rent for tenants
7. Equal representation of men and women, and vulnerable groups, who access the loans
8. Balance of men and women on the loan decision-making committees

Table 10. Management Plan for Component 2

Issue	Mitigation	Timing	Responsibility	Frequency of Monitoring and Reporting
Impartial and equitable access to loans	Loan applicants identified by number not name when application is reviewed	Throughout the loan process	DoE	Monthly and maintain records
	Proper and inclusive criteria for selection of beneficiaries			

The eligibility criteria should take gender roles and inequalities into consideration and should ensure that women have an equal opportunity to benefit from the loans, and acknowledge the evidence of higher repayment rates among adult females. Therefore, at least 40% of the loans in the pilot phrase should be reserved for vulnerable persons within the community such as single mothers, persons with disability and the elderly with a specific promotion strategy aimed at encouraging female applications

Loan administration body should ensure confidentiality and non-discrimination of individuals who access the loans. A rights based and client centered approach should be used to ensure respect and confidentiality for all who apply and those who are selected

Gender training of relevant loans personnel

Transparency in decision-making	Relevant information is clearly communicated and easily accessible	Throughout the loan process	DoE; Loan Officer	Monthly reports
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processes	through various means (including non-written video production of loans information)			
	Loan information uploaded on the DoE's website	One month prior to loan application opens		
	Key offices (e.g. Community Development Division, Directorate of Gender Affairs) is briefed on loans and has relevant application material	Prior to loan announcement and throughout process		
The most vulnerable might not be able to access the loans	Loans require no security Low interest loans	Throughout the loan process	DoE	Monthly and maintain records
Loan recovery	Salary deductions Standing orders at banks or credit unions Special Request to be approved by the authorizing committee for over the counter payments.	Throughout the life of the loan	DoE	Monthly and maintain records
Interventions contributing to climate change	Assess the interventions of individual property owners to ensure they will not contribute to pollution, gas emissions which may contribute to climate change.	During loan application process	DoE – engineer	Monthly and maintain records

	Offer information (in form of pamphlet or as part of the application form) as to what activities can be covered by the loan			
	Include guidelines for waste disposal			
No income so unable to access loan (e.g. the disabled)	Limited number of grants under Component 3 of the project to disabled individuals or those proven most vulnerable	Ongoing in Communications	DoE in consultation with ABAPD	As it occurs and maintain records
Dis-interest by non-resident landlords	Public Consultation and education Incentives for accessing loans such as reduction in property tax	Before and during loan programme	DoE	After each consultation and maintain records
Loans could put applicants in a worse state if there is damage to the items that the loan was used to purchase	Implement an insurance system for loans over a particular amount through partnership through state owned insurance agency. A credit/savings mechanism should be strongly considered to complement the loan scheme, enabling beneficiaries to build savings during and following the repayment of loans	Prior and during loan application process	DoE	As it occurs and maintain records
Increase in rent as a result of upgrades	Include restrictions on rent increase outside of that prescribed by law, as part of the loan agreement. DoE should provide support to landlords to adopt their own mitigation measures.	Throughout the loan process	DoE	Monthly and maintain records

Large Business owners might appear more attractive based on their capacity to repay loans	DoE should provide support to large business owners to adopt their own adaptation measures	Throughout the Loan Process	DoE	Conduct checks to ensure that adaptation measures have been implemented.
Underestimation by property owners of the cost of the upgrades	Qualified person must assess certain upgrades and produce technical drawings before loan processing Establish locally relevant cost estimate system	Start of loan application process	Property Owner	Monthly and maintain records
Vulnerable groups might be more inclined to take the loans for other competing priorities	Loan to be released in tranches with each subsequent drawdown contingent on proof of completion of previous interventions through inspection or receipts. Beneficiaries should be given information on the guidelines that cover the loan adaptation measures and be advised on the significance and long term impact on their livelihood, their communities and nationally	Throughout loan process	DoE	Monthly and maintain records

Low participation by vulnerable groups due to fear of stigma and a history of bad credit	<p>Highlight the loan as unsecured and important to deal with the coming effects of climate change</p> <p>Consultations</p> <p>Accessibility of loan staff to community members</p>	Before start of and during component 2	DoE	Monthly and maintain records
Some (including women) who are most in need might not have proof of ownership of property and might not be eligible	<p>Women or persons whose lack of property ownership acts, as a barrier to access loans should be referred to the government's Legal Aid to seek legal assistance and encouraged to re-apply.</p> <p>Loans should be available for upgrades that do not involve alterations to the physical of structure, e.g. upgrade of appliances to energy efficient models.</p>	During component 2	DoE, Legal AID	Biannually and maintain records

8.7.3 Component 3. Adaptation mainstreaming and capacity building in NGOs and community groups to sustain project interventions

Performance Criteria

1. Capacity building of members of three community groups to successfully apply for and receive loans for upgrade of community structures to improve resilience of their buildings
2. Upgrade of 30% of community buildings benefit from concrete resilience measures
3. Grants awarded to three community groups to sustain project interventions
4. Contracted community groups meet on a regular basis and carry out maintenance activities

Table 11. Management Plan for Component 3

Issue	Mitigation Measures	Time	Responsibility	Monitoring and Reporting
Limited capacity to accept grants and carry out maintenance work	With the aid of the Community Development Division and other agencies, these groups can be organized and trained in financial management and technical training on adaptation, utilizing adaptation benefit/review criteria developed under Component 2 so that they will be considered for these contracts once the project begins.	During component 1	DoE	End of training and maintain records
	Implementing a communications strategy for broad-based community education, awareness and mobilization of support	Before and during project	DoE	On-going and maintain records
No organized community groups	Work with the Government's Community Development Division and partner with the Directorate of Gender Affairs to establish a community gender and environment network and other agencies to support the establishment of more long-term sustainable community groups.	Before start of project	DoE in consultation with Community Development Division	At project start to inform activities. Maintain records
Vulnerable	Assist community groups with capacity building (linked to the	Throughout	ABSTEP	Attendance sheets

groups might not participate due to low literacy levels, confidence and historical marginalization	financial management training) on inclusive and participatory frameworks and equality and human rights guiding principles as govern their operation.	project implementation		Participant surveys of workshop/training
Systemic gender roles and norms might act as a barrier to women's participation and inclusion	<p>Women's groups should be supported to establish themselves, and empowered to participate through capacity building and knowledge sharing to implement adaptation strategies.</p> <p>Provide gender training to all established community groups in collaboration with the Directorate of gender Affairs so that the community can understand the importance of gender responsive climate adaptation actions.</p> <p>Partner with the Directorate of Gender Affairs to establish a community gender and environment network which can then be used to access community grants.</p> <p>Women's Groups and Men-led groups with a critical mass of female members should be similarly considered for grants.</p>	Before start of project	DoE, Directorate of Gender Affairs	Monthly and maintain records.
Security of new infrastructure	<p>Increase community ownership to safeguard infrastructure.</p> <p>Assist in the organization of community watch groups.</p> <p>Insurance against theft</p>	During training for component 3	DoE	Every six months and maintain records of any damage or theft

8.8 Framework for Community Consultations during Adaptation Fund project implementation

Community resistance to redevelopment projects can slow them down or prematurely kill them. On the other side of the coin, fear of opposition can push development efforts away before they even get started. Winning over skeptical residents can appear a daunting task, but it is one worth making, and early and consistent stakeholder engagement is a critical component of project success. The value of door-to-door efforts is especially important to give residents a feeling of individual inclusion. Consultation meetings should be held in each community as many residents in prior consultations expressed reluctance to journey out of their communities with one Upper Road resident stating “Yorks and Upper Fort Road a two different places.” This is reflected in the attendance sheets at the consultations held at the Yorks Community centre at which more than 90 % of attendants were from that area. If there is no community center available then, consider using a church or even a basketball court. It is also important that the project not be seen to be overly affiliated with any political group as partisan politics can affect participation. A clear articulation of guidelines is important in achieving community support.

Recommended Consultation Guidelines

The exact nature, number and timing of the consultations should remain flexible based on the progress of the project. The following are simple guidelines for the consultation process.

1. Commit to considering the results of the consultation in the decision-making process. Consultations should only be done if there is a reasonable chance that they will affect the outcome of a decision. Consultations should not be undertaken to convince stakeholders that a particular course of action is the right one.

- a. The consultation plan should be approved before starting the consultations.
- b. Consultations should be planned thoroughly with considerations of the key decisions for which input is sought, the methods to be used to obtain this input, the resources needed, identification of participants, schedules and plans for evaluation of the consultation.

2. Evaluate the consultations throughout the process and at the conclusion based on the objectives established in the consultation plan.

- a. The participants must be allowed to participate in evaluation of the consultation process.
- b. Evaluation methods should be identified when the consultations are being planned.
- c. Allow flexibility in the evaluation process and revise as necessary to ensure the evaluations are yielding the desired data.
- d. At the end of the consultations, a thorough examination of the process should take place to ensure that the correct participants were targeted and appropriately consulted. Examine attendance registers for gender ratios, origin (addresses) of the participants et cetera.

3. Time the consultations to ensure that the desired participants have time to familiarize themselves with the information and prepare their response and participate in the consultation process.

- a. During project planning, determine the objectives of the consultations so plans can be put in place to ensure that they can be achieved within the timeframe available.
- b. Consider time of day and time of year when planning the consultations to ensure that the target audience will most likely be available. Evenings will likely attract the most attendees as it is after work for most people. Also, timings should be adapted to men's and women's working schedules, transportation options, and care-giving roles and responsibilities, including the provision of care spaces and/or child-minding services with snacks for children, as to ensure the reduction in barriers to participation.
- c. Allot sufficient time for participants to familiarize themselves with the information requiring input. Allot sufficient time for responses that are useful and valid. Do not pack too much information in a short period and consider tackling issues at separate consultations depending on their nature.

4. Inclusiveness allows the consultations to involve the appropriate range of groups or individuals that have a stake in the decisions to be made.

- a. Gather information before the consultation to gauge the likely positions and interests of the participants.
- b. Take reasonable steps to identify and attract all potentially affected individuals. Consider the characteristics of the area as having a significant portion of low income individuals and the fact that heads of households will likely be at work in daylight hours, have limited internet access or may be averse to moving too far a distance outside of their respective communities. Use varied means of informing participants e.g. flyers, door-to-door, use of mobile public address systems, word of mouth etc.

- c. When selecting participants for specific consultations, consider their knowledge of the decisions that will require their input, their interest in providing and exchanging information.
- d. In the case of community groups and other civil service organizations, deliberate efforts must be made to officially contact them so as to get feedback at the desired detail/knowledge.
- e. In this instance, based on previous consultations it is advisable to have community consultations in each of the communities instead of repeatedly the same location in only one community.

5. Accessibility to the information and the consultation process is paramount. Take reasonable steps to determine how the targeted participants want to be consulted and provide easily understandable adequate information.

- a. During the planning for consultations, gauge the level of understanding of the stakeholders.
- b. Find out how the participants would like to be consulted.
- c. Plan the consultations depending on preferences and suitability.
- d. Consider how to provide information in an accessible form, e.g. hard copies, websites, email attachments and how feedback can be provided. For example it makes little sense to make information available on a website if there is limited access in the community to the internet.
- e. Documentation and background materials are provided at the earliest possible time.
- f. Always include contact information for consultation personnel.

6. Clarity allows participants to clearly comprehend the objectives of the consultation and the information they need to consider when making their input.

- a. Make reasonable efforts to use simple language without technical jargon that is unfamiliar to the lay person. Technical or lengthy reports can be summarized and still made available in their extended forms.
- b. Determine the necessity for translations for those for whom English is a second language.

7. Accountability refers to the roles and responsibilities during the consultation process.

- a. Define the roles and responsibilities of all involved beforehand.

8. Transparency requires that the consultations be documented and the outcomes distributed appropriately in a timely fashion.

- a. Document the following:
 - Input that is given at key decision points
 - statements of the decisions taken
 - a list of participants

- the issues on which the consultation was based
- a summary of views, important comments, criticisms and suggestions
- specific responses to significant issues

9. Co-ordination encompasses the sharing of the viewpoints, perspectives and comments on consultations considering the impact of other parts of the project or other projects or other departments.

- Involve communications staff in consultation and use their expertise to guide in selection of appropriate communication materials especially if the impact of the decisions made have the potential to generate controversy.
- Press releases and other communication products that are of interest to other government agencies should be shared with them in advance of release to allow them appropriate preparation of response.

10. Gender training or gender awareness-raising should take place within the community to aim to increase men and women's sensitivity and understanding of deeply-embedded gender issues. It is ideal to identify leaders in the community and to raise their awareness of gender (and how including it can benefit the whole community) so that they can act as local ambassadors, including established leaders in faith-based organisations, where the National Gender Machinery has established partnerships on gender issues.

Table 12. Suggested Timeline for Community Consultations

	Frequency	Responsibility	Purpose	Suggested Outputs
1	Before Project start As needed or every 3 months thereafter	DoE	Gathering baseline socio-economic information Distill any impacts of interventions such as clearing of the waterway, release of rats into community, Construction waste	Baseline data Assessment of impact of project activities and plan for mitigation
2	Before Project Start	DoE	Refining of loan programme to target desired customers	Inclusive, effective loan product

	Individual consultations i.e. gathering of responses to loan programme as often as possible, e.g. using a short questionnaire or evaluation on loan application	DoE	Ensuring loan programme is proceeding without undue hardship to applicants	Refining of the loan programme where possible, to reduce unnecessary burden
3	During implementation of component 1 and 2 – geared to community groups to design training programme according to needs	DoE	Assess capacity building needs and design of useful training programme for accepting grants and carrying out maintenance	Training programme tailored to the needs of the project and the community.
	After administration of training programme	DoE	To determine participants reactions and improve programme if necessary	Assessment of training event
	6 months after community groups begin maintenance activities and every 6 months thereafter	DoE	Determine level of participation and effectiveness of training programme	Assessment of training programme effectiveness for project purposes

Bibliography

- Ahmad, N. (1984) "Land capability of Antigua and Barbuda", Government of Antigua and Barbuda and Organization of American States
- BirdLife International. 2012. *Charadrius melodus*. The IUCN Red List of Threatened Species 2012: e.T22693811A38760515. <http://dx.doi.org/10.2305/IUCN.UK.2012-1.RLTS.T22693811A38760515.en>. Downloaded on **10 July 2016**.
- Caribbean Conservation Association (1991) Antigua and Barbuda Country Environmental Profile.
- Caribbean Catastrophe Risk Insurance Facility (2010) Enhancing the climate risk and adaptation fact base for the Caribbean; Cayman Islands: Caribbean Catastrophe Risk Insurance Facility
- CEDAW Committee. General Recommendations. Accessed at: <http://www.un.org/womenwatch/daw/cedaw/recommendations/recomm.htm>
- Destin, Dale, 2016. Antigua Met Service: Weather, climate & related info for smart decisions. <https://anumetservice.wordpress.com/2016/03/25/the-worst-drought-on-record-for-antigua/> Accessed April 6, 2016.
- Global Water Partnership Caribbean. (2013). The Post 2015 Water Thematic Consultation: Antigua and Barbuda.
- Government of Antigua and Barbuda (2015) Laws of Antigua and Barbuda: environmental protection and management act 2015; St. John, Antigua and Barbuda: Government of Antigua and Barbuda
- Government of Antigua and Barbuda (2003) Laws of Antigua and Barbuda: physical planning act 2003; St. John, Antigua and Barbuda: Government of Antigua and Barbuda
- Government of Antigua and Barbuda (2004) Laws of Antigua and Barbuda: freedom of information act 2004; St. John, Antigua and Barbuda: Government of Antigua and Barbuda
- GENIVAR. (2011). Sustainable Island Resource Management Zoning Plan for Antigua and Barbuda (including Redonda). St. John, Antigua and Barbuda: The Government of Antigua and Barbuda.
- Government of Antigua and Barbuda (2015) Antigua & Barbuda's 2015-2020 national action plan: combatting desertification, land degradation & drought; St. John, Antigua and Barbuda: The Government of Antigua and Barbuda
- Government of Antigua and Barbuda. (2013). National Biodiversity Strategy and Action Plan. St. John, Antigua and Barbuda: Government of Antigua and Barbuda (GOAB).
- Government of Antigua and Barbuda. (2014). Antigua and Barbuda 2011 population and housing Census book of statistical tables 1, St. John, Antigua and Barbuda: The Government of Antigua and Barbuda.

- Government of Antigua and Barbuda. (2009). Antigua and Barbuda's Second National Communication on Climate Change. St. John, Antigua and Barbuda: Government of Antigua and Barbuda.
- Horwith, B and Lindsay, K. (1997) *"A biodiversity profile: Antigua – Barbuda – Redonda"*; Eastern Caribbean biodiversity Programme: Biodiversity publication #3". Island Resources Foundation
- Huggins, T. 2014. Country Gender Assessment for Antigua and Barbuda. Prepared for the Caribbean Development Bank (CBDB). <http://www.caribank.org/uploads/2014/12/CGA-AB-Vol-I- JUNE-2014 FINAL.pdf> Accessed June 25th , 2016.
- International Union for Conservation of Nature (IUCN), The Environment and Gender Index (EGI). 2013 Pilot (Washington, D.C., IUCN). Available at <<https://portals.iucn.org/library/sites/library/files/documents/Rep-2013-008.pdf>>.
- IUCN Red List of Threatened Species. Version 2016-1. <www.iucnredlist.org>. Downloaded on **10 July 2016**),
- Ivor Jackson and Associates. (2002). Northwest Coast Local Area Plan Antigua. St. John, Antigua and Barbuda: Ivor Jackson and Associates.
- KAIRI consultants Ltd (2007) Living conditions in Antigua and Barbuda: poverty in a services economy in transition;
- Organisation of American States (1992) *"Natural resources assessment: application, and projects for the agricultural sector of Antigua and Barbuda"*; Washington D.C.: OAS, Department Regional Development
- Osoba, Ermina. "Women in Management and Decision-Making Processes in Antigua and Barbuda: A Statistical Analysis. 2005
- Secretariat of the Convention on Biological Diversity (2005). Handbook of the Convention on Biological Diversity Including its Cartagena Protocol on Biosafety, 3rd edition, (Montreal, Canada) accessed
- UN Department of Economic and Social Affairs (2011). *The World's Women 2010: Trends and Statistics*, p. 170. Accessed at: http://unstats.un.org/unsd/demographic/products/Worldswomen/WW_full%20report_col or.pdf
- UN-HABITAT, 2011 in CARIBSAVE, 2012. Local Area Vulnerability Analysis for Antigua and Barbuda. [http://www.environmentdivision.info/UserFiles/File/LVIA_Antigua_and_Barbuda_FINAL_8 DEC15.pdf](http://www.environmentdivision.info/UserFiles/File/LVIA_Antigua_and_Barbuda_FINAL_8_DEC15.pdf)
- UN Women Advocacy Brief: Strengthening Women's Economic Security and Rights. Accessed from: http://www.unifemcar.org/ge_iss.cfm?SubID=168&link_1

United Nations (1999), Protocol concerning pollution from land-based sources and activities to the convention for the protection and development of the marine environment of the wider Caribbean region.

United Nations (2007) Concluding observations of the committee on the elimination of racial discrimination, Antigua and Barbuda; International Convention On the Elimination Of all Forms of Racial Discrimination

UNIFEM (2010). *Who Answers to Women? Gender & Accountability: Progress of the World's Women 2008-2009*. Accessed at http://www.unifem.org/progress/2008/media/POWW08_Report_Full_Text.pdf

Wege, David and Anadon, Veronica ed. (2011). Important bird areas in the Caribbean: key conservation sites; Cambridge, Birdlife International

World Bank (2011) Antigua and Barbuda social protection assessment

BirdLife International. 2012. *Charadrius melodus*. The IUCN Red List of Threatened Species 2012: e.T22693811A38760515. <http://dx.doi.org/10.2305/IUCN.UK.2012-1.RLTS.T22693811A38760515.en>. Downloaded on **10 July 2016**.

Appendix 1. Bird species present in McKinnon's Pond and/or waterway

Scientific Name	Common Name
<i>Pelecanus occidentalis</i>	Brown Pelican
<i>Fregata magnifens</i>	Magnificent Frigate Bird
<i>Ardea alba</i>	Great White Egret
<i>Ardea cinerea</i>	Gray Heron
<i>Ardea Herodias</i>	Great Blue Heron
<i>Bubulcus ibis</i>	Cattle Egret
<i>Butorides virescens</i>	Green Heron
<i>Egretta caerulea</i>	Little Blue Heron
<i>Egretta garzetta</i>	Little Egret
<i>Egretta thula</i>	Snowy Egret
<i>Egretta tricolor</i>	Tri-coloured Heron
<i>Nycticorax nycticorax</i>	Black crowned Night Heron
<i>Nyctanassa violacea</i>	Yellow crowned Night Heron
<i>Plegadis falcinellus</i>	Glossy Ibis
<i>Falco columbarius</i>	Merlin
<i>Falco peregrines</i>	Peregrine Falcon
<i>Charadrius semipalmatus</i>	Semipalmated Plover
<i>Pluvialis dominica</i>	American Golden Plover
<i>Pluvialis squatarola</i>	Black-bellied Plover
<i>Charadrius wilsonia</i>	Wilson's Plover

<i>Pandion haliaetus</i>	Osprey
<i>Catoptrophorus semipalmatus</i>	Willet
<i>Limnodromus griseus</i>	Short billed Dowitcher
<i>Limnodromus scolopaceus</i>	Long billed Dowitcher
<i>Numenius phaeopus</i>	Whimbrel
<i>Tringa flavipes</i>	Lesser Yellowlegs
<i>Tringa melanoleuca</i>	Greater Yellowlegs
<i>Tringa solitaria</i>	Solitary Sandpiper
<i>Tryngites subruficollis</i>	Buff breasted Sandpiper
<i>Actitis macularia</i>	Spotted Sandpiper
<i>Arenaria interpres</i>	Ruddy Turnstone
<i>Calidris alba</i>	Sanderling
<i>Calidris bairdii</i>	Baird's Sandpiper
<i>Calidris canutus</i>	Red Knot
<i>Calidris fuscicollis</i>	White rumped Sandpiper
<i>Calidris himantopus</i>	Stilt sandpiper
<i>Calidris mauri</i>	Western Sandpiper
<i>Calidris melanotos</i>	Pectoral Sandpiper
<i>Calidris minutilla</i>	Least Sandpiper
<i>Calidris pusilla</i>	Semipalmated Sandpiper
<i>Larus atricilla</i>	Laughing gull
<i>Larus fuscus</i>	Lesser Black backed Gull
<i>Larus marinus</i>	Great Black backed Gull
<i>Sterna antillarum</i>	Least Tern
<i>Sterna maxima</i>	Royal Tern
<i>Sterna sandvicensis</i>	Sandwich Tern
<i>Anas americana</i>	American Wigeon
<i>Anas bahamensis</i>	White Cheek Pintail
<i>Anas discors</i>	Blue winged Teal
<i>Aythya affinis</i>	Lesser Scaups
<i>Dendrocygna arborea</i>	West Indian Whistling Duck
<i>Anas clypeata</i>	Northern Shoveler
<i>Anas acuta</i>	Northern Pintail
<i>Oxyura jamaicensis</i>	Ruddy Duck
<i>Anas carolinensis</i>	Green-winged Teal

<i>Dendrocygna autumnalis</i>	Black-bellied Whistling Duck
<i>Podilymbus podiceps</i>	Pied-bill Grebes
<i>Himantopus mexicanus</i>	Black necked Stilts

Appendix 2. Adaptation Fund - Rehabilitation of Water Way in York's/McKinnon's Area

Given the diverse conditions surrounding the waterway from point to point, a mixture of fruit trees and native forest trees are recommended below. In the areas where houses are situated closely to the waterway, fruit trees such as mangoes, cashew and almond would be excellent as they have become naturalised. This would serve a two-fold function, providing fruits to the said individuals as well as soil retention and shade for that area. The areas that will be identified for breakways and ponds, flowers such as the ones listed below could be used.

Table 13. Flora species recommended for revegetation activities along the waterway leading into McKinnon's Pond***

*****Draft species list, to be completed and vetted by botanist during project implementation**

Common name	Purpose/Characteristics	Can the plant be grown in the DoE Nursery (Y/N) (to be completed by DOE)
<i>Flowers/ Shrubs</i>		
Bougainvillea	Cultivated not naturalized, not eaten by grazing animals	
Ixora	Cultivated not naturalized, not eaten by grazing animals	
Thryallis	Cultivated not naturalized	
Bridal Bouquet	Cultivated not naturalized	
Oleander	Cultivated not naturalized, not eaten by grazing animals	
Arboricola	Cultivated not naturalized	
Green Island Ficus	Cultivated not naturalized, not eaten by grazing animals	

<i>Forest/Fruit Trees</i>		
Lignum Vitae	Provides shade and flowers it also have strong rooting and bark that can manage wet or dry weather , regional endemic	
Moringa Trees	Attracts birds and wildlife	
Almond	Attract birds and wildlife	Yes
Mango	Asian origin, naturalized fruit tree, drought tolerant	Yes
West Indian Mahogany	Regional endemic, drought tolerant and resilient	Yes
Flamboyant	Cultivated but not naturalized, Drought tolerant	
Whitewood	Drought tolerant and resilient Neo-tropical	
White Cedar	Regional endemic, attractive, hardy drought resistant, compact so needs minimum trimming	
Cashew	Neo-tropical, fruit tree	
Sugar-apple	Neotropical medium-sized tree, most likely native, drought tolerant	Yes
Cinnamon	Neo-tropical, drought and salt tolerant and can exist in a wide range of environments, very attractive	
West Indian Cherry	Native, fruit tree, drought tolerant, medium sized, resilient	
<i>Grasses</i>		
Common grass	For binding soil and filtering debris	

Appendix 2. Minutes of the community consultations and focus group discussions

Adaptation Fund Project

Department of Environment

Consultations were announced through: word of mouth; radio interviews; community columns in daily circulation newspapers; social media; and using focal points in the community.



Figure 1. Example of poster distributed to announce the community consultation; screenshot of the Directorate of Gender Affairs sharing the poster on the facebook page

ADAPTATION FUND MEETING MINUTES – June 20th 2016

The meeting of the Adaptation Fund was duly called and held on June 20th 2016 at the Yorks Community Centre at 6:00PM to 7:30PM.

Present:

DoE Staff

- Arica Hill
- Lia Nicholson

- Itajah Simon
- Ruth Spencer
- Sasha gay Middleton

Consultants

- Farmala Jacobs, Gender Specialist
- Andrea Otto, Environmental and Social Safeguards
- Bernard-Marie Gagnier, Engineer

Community Members

- Attendance sheet in Annex 1

Proceedings

1. Welcome remarks, introduction to staff and consultants, goals for the consultation and overview of the Adaptation Fund project.
2. Summary of components 1-3 of the project.

Component 1: Flood modeling and drainage along 3 km of waterway.

- Improving the drainage from Woods Corner to Mckinnons corner. Assessing ways these ponds can retain more water, evaluating drainage issues, installing pipes and bigger tunnels.
- Engineers will evaluate ponds, the drainage systems and waterways that are in place in order to utilize the best methods, materials and designs to repair them.
- Assess individual homes that may need proper water catchments, gutters, repairs to the home and more to be climate change resilient.
- Between now and next week, engineers will assess the costs to repair the waterways.
- The flooding is caused due to clogged drains by soil and debris. It is suggested that planting more trees in high run off areas and informing residents to refrain from disposing waste (garbage) in the drain will facilitate a proper drainage system and reduce flooding. Once these preventative measures are put in place, it will increase the resilience of the homes and community shelters during climate change impacts.

Component 2: Micro-loans for adaptation at the household level

- Project is US\$10M in total and focuses on the Mckinnons/Yorks area as the pilot approach, since these areas experience great amount of flooding. Once the pilot is successful, there is potential for it to be replicated in other communities.
- For 20 years countries have been negotiating about Climate Change. The developed countries such as the USA and European Union donated money into a fund called the Adaptation Fund, so vulnerable countries like Antigua and Barbuda are able to access it. Additionally, once accredited to the Adaptation Fund, it is a mechanism that would allow a

National Implementing Entity to receive money directly, as opposed to going through other agencies to receive the funds.

- All 3 components have been allocated US\$3M.
- The project includes a revolving loan: Individuals apply for the loan to repair their homes etc and once they repay the money, another call for proposals will be made to award someone else the loan.
- The loan is 2% to 4% interest rate (cheaper than the average bank). The lowest loan disbursement will range from US\$5,000.00 to US\$75,000.00. The average loan will be around US\$20,000.00 for about 150 households.
- Repayment is 5 to 10 years plan

Eligibility

- It is earmarked for activities for climate change
- Recipients of the loan must own the home they are repairing.
- Individuals may access the loans for storage tanks, guttering along the roofs, leaked toilets and any other energy efficient appliance once they can demonstrate it is reducing water or electricity consumption.
- Adaptation for storms to include solar panels, batteries and energy efficient appliances

Resident from the Yorks area complained about flooding. Since the bridge was built, the drainage system was blocked by debris. Dumping of old home appliances was found in the waterways. They stated that government should have a trench leading through the salt pond. Under the bridge there is an overflow of water that would go to the sea. The road beside the Sand Haven area also experiences flooding and a bridge should have been built in that area to facilitate the flow of water. He suggested a catchment should be installed at least 50ft-100ft before the bridge; then under the bridge there should be separators to catch the debris and the overflow will go to the sea. The main bridge in the Yorks area also needs a Separator to prevent bush or dirt from clogging the system.

Another resident shared when it rains, she experiences 18 inches of water in her home. Additionally, when authorities clean the area with excavators and backhoes; piles of soil and debris are put on the side of the road or in the waterway itself. Rain, therefore, washes the soil and debris into the waterway, which prevents the water from flowing properly. The resident stated that due to heavy rainfall and flooding, she is forced to put their furniture on blocks and cannot walk in her home during a storm without getting wet.

Another resident stated that every time authorities remove trees, flooding increases. He further indicated that acacia (colloquially called cassie) trees have stabilized the waterways before, and that the removal of trees undermines the work that they do.

Another resident living at Dry Hill, the lowest part in Yorks, also experiences flooding and the resident expressed that she needs proper fencing or a retention wall to prevent water from coming into the yard.

Component 3: Community grants, contracts for sustaining interventions, and community engagement plan

- For this project, people with common goals and priorities are needed for the project to have a great impact. Individuals who reside in the area should network with each other to share common concerns.
- 1 to 3 group contracts will be awarded which will focus on the management of the interventions, specifically to facilitate the process (coordinating meetings, keep records of what is done and what needs to be done, who will do it etc).
- Requirements of a community group: They must be registered legally and have a bank account.
- A section of the project looks at developing community shelters in the Yorks area since the only community shelter for Yorks is at the Cedar Grove Primary School. Residents can identify buildings that may be used as community shelters within the area, and that the project can approach for this purpose.

3. Farmala Jacobs Focus Group discussion:

1. Would you be interested in taking out a low-interest loan to do any of the following on your home:

- a. Investing of solar panels/energy efficiency/backup battery storage
- b. Guttering and water storage tanks
- c. Installation of hurricane shutters and improving roof systems (clips and screws)
- d. Air conditioning
- e. Mosquito screening
- f. Waste water treatment

A few residents stated they are interested in taking a loan for their home for all of the above; in addition to raising their houses, repair the side of the home that is mostly affected by rain, and flooring. However, some residents agreed that they cannot afford a loan and prefers to stay in a shelter.

Homes for some of the disabled persons are in bad conditions and they are not working to repay a loan.

Residents were concerned about the safe guards that are in place to ensure that their homes will be climate resilient. They expressed that even if they take the loans, their homes are still susceptible to threats such as flooding and they will be stuck with a loan. The DoE Representative reassured that these concerns have been thoroughly thought out from a gender perspective (needs of a man and a woman) and it is advised that residents can share their concerns to DoE before accepting the loans.

2. How much would you take out a loan for? USD\$5,000 to USD\$25,0000

The residents unanimously agreed that consultation is needed in order for them to answer this question.

3. Do you think you would qualify for a bank loan for this same amount of money?

Some residents stated they might not qualify for a bank loan because of their age and it requires a certain amount of collateral. They also stated because they are unemployed or retired, banks would not be lenient to lend them any money. One lady said in order to gain a loan from the bank, one of her children would be the one to sign for the loan.

They collectively agreed that their chances however to gain access to the Adaptation Fund loan would be better because there are no age restrictions and the interest rate and payback period is better than that of a bank.

Andrea Otto's Focus Group discussion:

Would you be interested in taking out a low-interest loan? If so, how much would you take out a loan for?

A male farmer in McKinnons area said he would be interested in a loan for solar and water storage. He thinks he would take a loan out for EC\$12 – 15 K. He added that he has already raised the house up, but there are some stability issues, so he would want to access a loan to make sure that the house is still secure. A woman said she would also want a loan for solar energy and water storage, and estimated she would access a loan for EC\$10 – 15 K. A woman who lives on Fort Road said she would like to access a loan to acquire solar panels and for guttering on her roof to harvest rainwater. Her yard also floods regularly, so she would like to build a barrier wall so that the water does not come into her yard, but runs off into a neighbor's yard. Another woman said she would like to access a loan for EC\$10K for shutters and other hurricane measures. One of the women said that he husband puts oil into the stagnant water to stop the mosquitoes from breeding.

Another resident indicated that she would not apply for a loan to fix her home since it would not be a worthwhile investment. She has taken some measures to buy topsoil and boulders to raise the ground, but it has not helped. She would probably need to raise the house, but she does not think that would help, because when it floods, oil, mud, and feces come into her property and home, and get on clothes, furniture and the washing machine. Centipedes also infest her house, although mosquitoes are not that bad. Her son is suffering from asthma attacks because of the conditions. She has lived there since 2006, and since 2008 she has been trying to move to another location, so she does not want to put any more work into the property. She even has some materials, but is not doing anything with them.

Another woman had a similar experience, she said that people's feces come into her yard when it does not rain for a while and then it floods, and when the waterway is backed up. Even if she raised the foundations of her home, she would probably still suffer from the same problems. If the engineers could figure out a solution, she might be willing to borrow money to fix the problem, but she is not inclined to invest in her home.

Do you think you would qualify for a bank loan for this same amount of money?

The male farmer from McKinnons said that he would not be able to access bank money because of the ongoing drought, which is causing his crops to suffer and reducing his income. The bank needs a good record of crops, so he is not able to access credit right now.

A woman from McKinnons said that she has considered going to the bank, but the rates are too high. Another woman said that she is not working; she is a single female and the head of the household, so she would not be able to get bank loans.

One woman asked where the money for this project is coming from. A representative from the DoE explained about the Adaptation Fund, since the woman had come late and missed the presentation. The Department staff member explained that the loans would be 2 – 4 % interest rates, and that for example for an EC\$13,000 loan, the payback would be about \$200 per month. The woman was skeptical about why we were not issuing grants, saying that it sounds like the project is trying to put people in debt. The Department explained that it is a completely voluntary programme, that it is for people who are interested in the loans, and that the first Component is to help everyone by addressing the flooding, and the third Component is to build up community support. The Department staff explained the Revolving Fund, where, if the project gave grants, only 150 households would benefit. This way, many more households can benefit over time, and it is a model that will hopefully be expanded to be available for many more households in the island. Several of the participants said it was a well-designed project, and that it was really needed in the community very urgently.

Closure

Meeting ended at 8:25 P.M. by A. Hill

Minutes submitted by: Sasha gay Middleton and Lia Nicholson

Annex 1. Attendance sheet from Yorks Community consultation 22nd June 2016



Component 2 Adaptation Fund Consultation
20 June 2016
Yorks Community Centre

	NAME	VILLAGE	TEL NO	EMAIL ADDRESS
1	Nicole D. MARTIN	mckinnons	268 7641126	nicoledmartin@gmail.com
2	Heidi Skerrett	Dry Hill - Yorks	268-764-5128	skerretth@hotmail.com
3	Jeanne T. League	yorks	268-784-5535	
4	Calvin Richards	york's	268-771-1105	
5	Cynthia Bulega			
6	Limley Athanaze	yorks village	785-4142	
7	Elaine Neo-Perry	" "	734-5858	
8	Michael Santiago	yorks Village	724-4672	adical692@gmail.com
9	Philippe Stalker	" "	770 0547	
10	Althea George	york's Village	779-0515 462-674	
11	Paul France	york's Village	784-5678	paullfrance202@hotmail.com
12	Josina France	york's Village	776-5131/786-0652	josinafrance@hotmail.com
13	Angela Srouce	york's Village	721-0563	
14	Roxan & Miriam Thomas	york's Village	717-1483/788-4961	twillsr@gmail.com
15	Lolita Edwards	yorks Village	460 4868	duxie@hotmail.com

Rasta
guy *

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ADAPTATION FUND COMMUNITY CONSULTATION MINUTES

Yorks Community Centre

July 5, 2016

The meeting of the Adaptation Fund was duly called and held on 5 July 2016 at the Yorks Community Centre at 6:00PM to 7:30PM.

Present:

DoE Staff

- Andrea Otto
- Arica Hill
- Delamine Andrew-Williams
- Farmala Jacobs
- Helena Jeffery Brown
- Itajah Simon
- Nneka Nicholas
- Sashagay Middleton
- Jason Williams

Consultants

- Farmala Jacobs
- Andrea Otto

Community Members

Attendance sheet in Annex 1 below.

Agenda

- A. Welcome Remarks, introduction to staff and consultants, goals for the consultation and overview of the Adaptation Fund project by Arica Hill
- B. Component 1: Flood modeling and drainage along 3 km of waterway by Itajah Simmons
- C. Component 2: Micro-loans for adaptation at the household level by Arica Hill
- D. Component 3: Community grants, contracts for sustaining interventions, and community engagement plan by Helena Jeffery Brown
- E. Q & A
- F. Focus Group Discussion

Proceedings

A. Welcome remarks, introduction to staff and consultants, goals for the consultation, overview of the Adaptation Fund project

- Component 1: Upgrade waterways and drainage system

- Component 2: Offering low interest and unsecured loans to get individuals' homes climate ready
- Component 3: Repair community shelters
- Community members' feedback is very important in this project and they are encouraged to indicate whether or not they are interested in securing the loans, approximately how much they are willing to borrow and indicate appropriate structures within the community that can be considered as shelters.

B. Component 1: Flood modeling and drainage along 3 km of waterway

- Upgrading the drainage system and waterways within the Yorks Community which starts from the Woods pond. The focus is to upgrade waterways to manage the run offs, as a means of reducing the flood risks the area currently faces. The Woods pond is filled with debris and needs to be cleaned to ensure better flow of water.
- An Engineer from Canada along with the DoE Engineer conducted surveys in the area to evaluate some of the homes, since it was recognized that individuals who reside near the drainage experience flooding. From this assessment, majority of the homeowners stated their main issue is flooding and they would like for their homes to be raised off the ground. Therefore, Engineers will assess the cost for raising their homes.
- The Department is considering creating retention ponds and widening the waterways to solve flooding issues. Engineers will evaluate and determine the best place to create two (2) to three (3) retention ponds in the area.
- Some of the culverts in the area are round and narrow. For that reason, when the area experiences heavy rainfall, debris gets trapped in the culverts. As a result, DoE Engineers will determine how plausible it is to build square culverts to facilitate water flow.
- An Engineer, Mr. Henderson Simon who also lives in the area, stated that he has done surveys and assessments of the area and is currently putting together the cost and design of the culverts. He offered to share this information to the DoE Engineer.

C. Component 2: Micro-loans for adaptation at the household level

- Revolving loan for household adaptation. A revolving loan is the process by which individuals borrow and repay their loan, in order for other community members to benefit from the loan.
- This revolving loan is unsecured with low interest rates of 2% to 4%. DoE offers low percent interest rates to enable individuals to comfortably repay the loan.
- This loan will be available to 5% of the homes in the target area and the range of the loan is EC\$13,000 to EC\$200,000 with a five (5) to (10) years payment plan.

- Eligibility of the revolving loan: Property owners in the Gambles, Yorks, New Extension and McKinnon's area and they must illustrate that their homes need improvement to cope with climate change.
- Climate change: For household adaptation to increasing temperature, individuals can purchase AC for their homes or adjust their roof structure to facilitate the flow of air.
- More extreme rainfall variability: This means the country will experience heavy and low rainfall. Household adaptation measures for rainfall variability include the installation of proper water catchment systems such as tanks and low flush toilets to utilize less water.
- Threats to health because of increasingly hot temperatures. Mosquitos tend to breed more often in warm like temperatures which increase the chances of individuals contracting viruses like Zika, Chikungunya, and more. Persons can install screens and gauze to reduce/prevent mosquitos from entering their homes. Additionally, Guppy fishes and tadpoles can be placed in cisterns to eat mosquitos.
- More hurricanes: To prepare for hurricanes, hurricane clips or hurricane shutters can be installed as well as solar panels with battery power to reduce the cost of electricity and be used as backup in case of power outage.
- Significant flooding: Household adaptation for flooding includes, changing parking structures by partially paving the parkway with half concrete and half grass; so the water can be absorbed by the grass which in turn reduces flooding. Individuals can also put a structure in place to deviate water to runoff into the retention pond or their plants.
- Community member indicated that another consideration could be the installation of drip irrigation systems to water plants.
- Another community member stated that a bridge needs to be built at the Runaway area and the canal needs to be cleaned.

D. Component 3: Community grants, contracts for sustaining interventions, and community engagement plan

- The Department will work with community groups and NGOs to build their capacity.
- A maximum of three (3) community groups will be contracted to enable them to locate adequate buildings for the community shelters, maintain the shelters identified, and maintain the waterways and water catchments in the event of hurricanes and droughts. The groups will be given grants to improve and upgrade these shelters.
- The groups will be given administrative and technical training in order for them to produce accurate reports and efficiently manage/maintain the waterways, water catchment and shelters.
- Beyond the project, individuals will be able to access funding through the SIF Fund to continue their work in order to maintain the waterways, community shelters and water catchments.

E. Q & A

A community member inquired about the repayment amount and period of the loans. The DoE representative stated that a 2% loan of EC\$13,584.00 over a 10 year period will amount to a monthly payment of EC\$125.00.

F. Andrea Otto Focus Group Discussion

Guiding questions for Focus Group discussions:

- 4. Would you be interested in taking out a low-interest loan to do any of the following on your home:**
 - a. Investing of solar panels/energy efficiency/backup battery storage-Yes majority**
 - b. Guttering and water storage tanks**
 - c. Installation of hurricane shutters and improving roof systems (clips and screws)**
 - d. Air conditioning**
 - e. Mosquito screening**
 - f. Waste water treatment**

Many of the community members indicated interest in the loan. Most of them were interested in investing in solar panels. One individual shared that a friend of his installed solar panel and his electricity bill significantly reduced. He currently pays EC\$27.00 per month as opposed to EC\$400.00-\$500.00 per month. He further suggested community members should be more knowledgeable about solar panels and renewable energy. A presentation from a DoE Engineer on renewable energy at the next consultation meeting would be helpful. This presentation should outline the specifics of the solar panels such as estimated prices/costs, how long the panels take to install, the cons and pros of solar panels and more.

Another individual is interested to access the loan to raise her home. She expressed when there is heavy rainfall; her home is flooded by at least 12 to 15 inches of water. She would purchase blocks and place it inside her home as a foot rest to prevent the water from touching her. The last major flooding she experienced was in 2009.

5. How much would you take out a loan for?

Individuals indicated EC\$13,000.00, 50,000.00 and 70,000.00. One individual expressed his concerns about the loan amount. He stated DoE should consider offering a lower amount than US\$5000.00 in loan, in the event individuals do not require all that money.

6. Do you think you would qualify for a bank loan for this same amount of money?

One individual stated that he would be qualified for a bank loan. He stated that he has a stable job with adequate income. However, if somewhere else is offering a lower interest rate loan then this would be a good opportunity. He was concerned that because he can easily access a loan at the bank because of his income, he might not be eligible for the revolving loan. The DoE representative stated that he would still be considered for the loan; however, preference will be

given towards low income earners who have difficulties accessing a bank loan. This loan is unsecured with a low interest rate and longer payback period to accommodate low income earners to repay the loan comfortably.

Other individuals expressed that they would not be qualified for a bank loan because of their age and their low income.

G. Farmala Jacobs Focus Group Discussions

Guiding questions for Focus Group discussions:

- 1. Would you be interested in taking out a low-interest loan to do any of the following on your home:**
 - a. Investing of solar panels/energy efficiency/backup battery storage-Yes majority**
 - b. Guttering and water storage tanks**
 - c. Installation of hurricane shutters and improving roof systems (clips and screws)**
 - d. Air conditioning**
 - e. Mosquito screening**
 - f. Waste water treatment**

The answers varied among individuals in this focus groups. Many persons however identified that they would most likely use the loan to finance the placement of shutters on their windows. One individual stated that he would be most interested in a cistern with ponds for storage that he could also use to irrigate his crops in his agricultural plot nearby his land. A female resident identified that she would be interested in improving her roof along with water storage tanks. Several persons also indicated interest in solar panels to reduce their electricity bills. Only one person expressed interest in raising his house as his plot is prone to flooding during semi-heavy rainfall events. One resident indicated that she would use the loans to place screens on her house to prevent against mosquitoes and the diseases that they would carry. This person expressed specific concern about the Zika virus.

2. How much would you take out given your current capacity?

The individuals in the focus group were unwilling to state the amount they would take out. They indicated that they would have to assess the amount of funding that would be required for the various projects to improve their homes before they could commit to a loan amount.

One female individual indicated that she is still very skeptical about the loan program. She expressed that her concern lay in the fact that the payout of the loan is determined by the amount that is paid back into the revolving fund given that there were many poor and indigent persons in the community who need the household adaptation but could not afford the payments. She was also concerned about the selection committee that would be used to approve loan applications.

3. Would you be more willing to go to the bank to access the loan?

Individuals in this group indicated that it would not be likely that they would be granted a loan at the bank due to their lower income in some instances and in other instances that they already have loans at their banks. One person asked if they could use the funds from the revolving fund to pay back their loans at the bank which would be eating into their capacity to make improvements on their homes. It was indicated that this was not possible.

4. Do you think that the information brought before you addresses important priority areas? Why

The residents were impressed with the fact that the project addresses problems that have been plaguing their communities for several years such as flooding during extreme rainfall events. This flooding also results in standing pools of water which encourages the breeding of mosquitoes. They also were pleased with the fact that the project will be addressing remedying the gut line that flows through their community.

5. Any other questions or concerns?

One individual raised concerns that a majority of the persons in the area in their opinion rent their homes rather than own them outright thus disqualifying them from accessing these funds. They also expressed concern about the fact that landlords could access these funds and improve their rented properties and subsequently increase the rent. This would lead to further increased vulnerability for persons who are considered low-income earning individuals.

Closure

Meeting ended at 7:30 P.M. by A. Hill

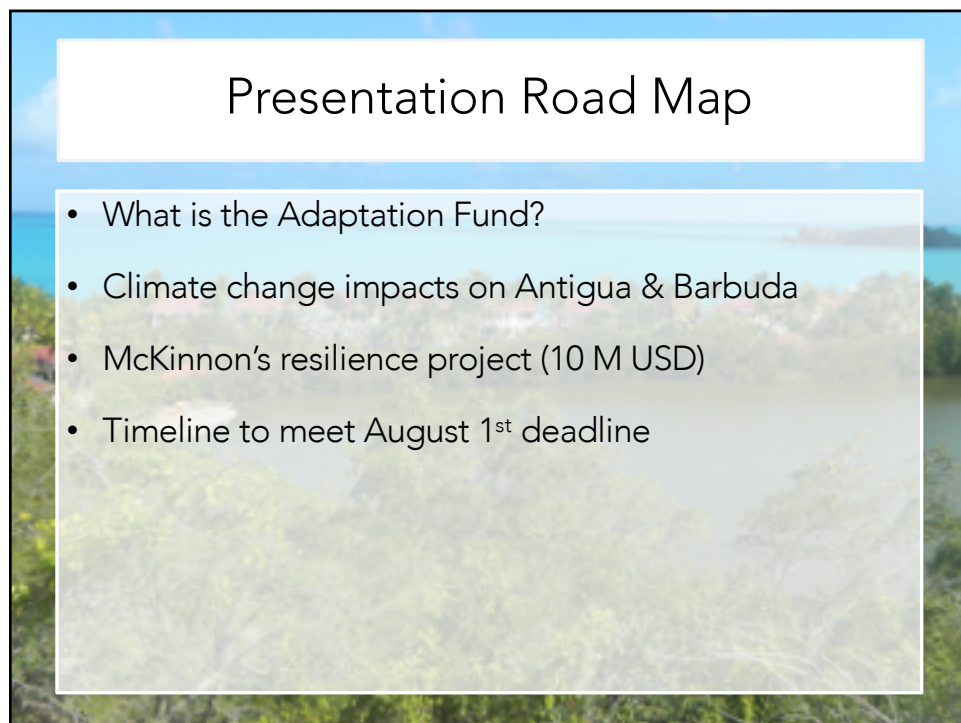
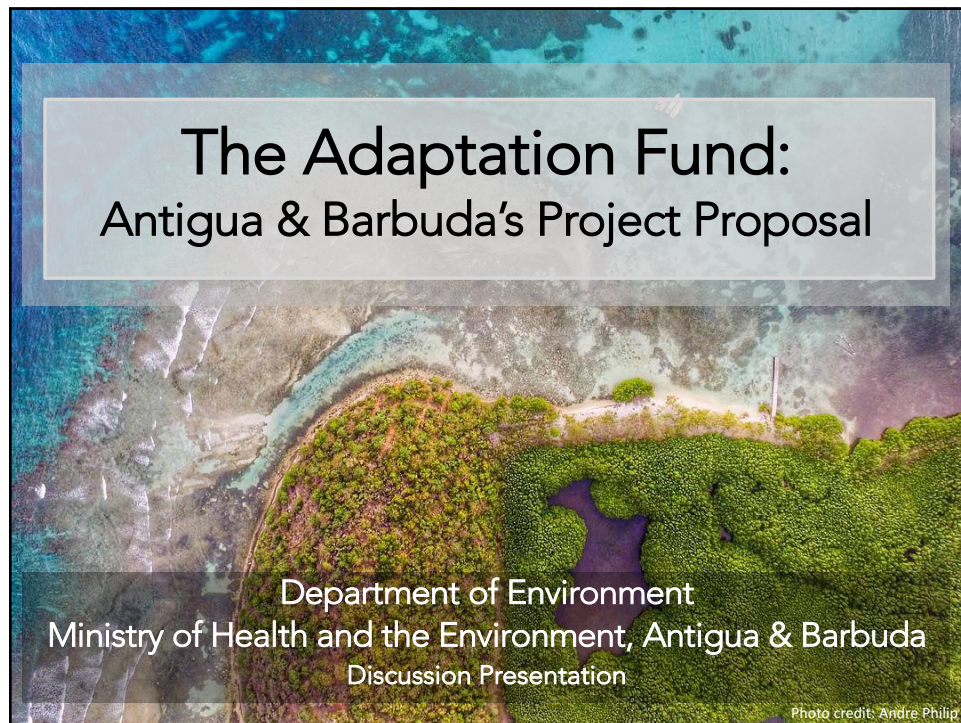
Minutes submitted by: Sashagay Middleton and Nneka Nicholas



5th July 2016, 6pm

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Annex 1. Presentation delivered at the Community Consultations by the staff of the DoE



What is the Adaptation Fund?

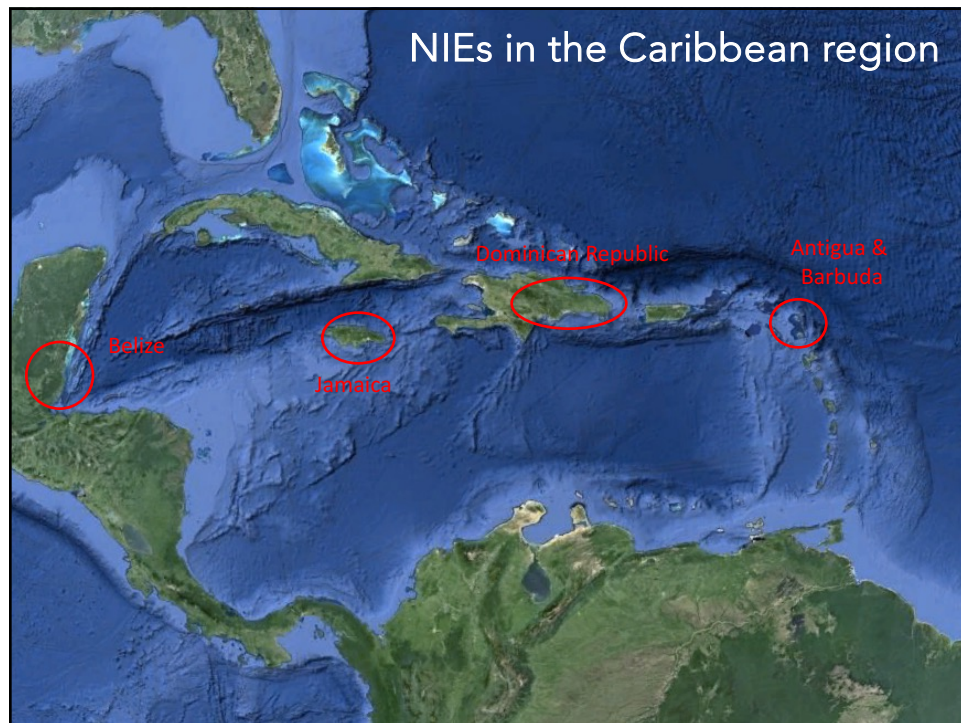
Helps developing countries build resilience and adapt to climate change



ADAPTATION FUND

Since 2010, the Fund has committed US\$338 M to support 52 concrete, localized climate adaptation and resilience projects in 46 countries.

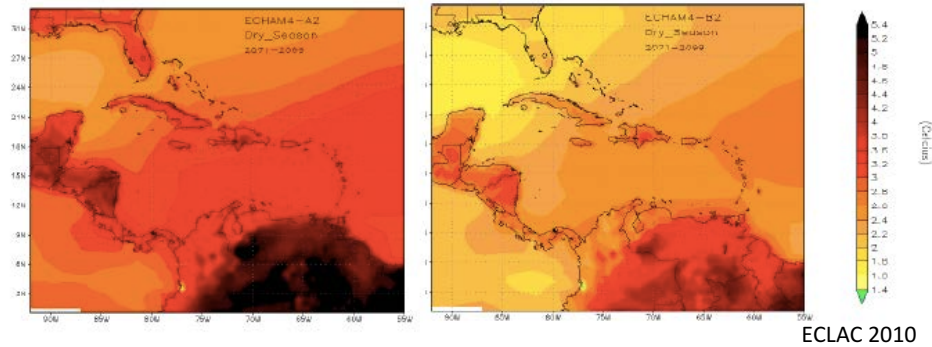




CLIMATE CHANGE: ECONOMIC AND SOCIAL IMPACTS

- Threats to People's Health
- A Threat to Our Economy

The Caribbean could be 3°C warmer by 2070



- 2015 was the world's hottest year on record
- Driest year for Antigua and much of the region

National impacts of warmer temps.

- Chronic illness
- Disease vectors
 - 2013 Chikungunya Virus: within 6 months, 5,294 cases confirmed and 180,000 suspected
 - 2016: Zika Virus
 - Others: Dengue fever, Yellow fever



Vector-borne illnesses are linked to temperature

REGION	TOTAL	El Niño & +1	La Nina	Neutral
Caribbean	8	7	-	1
T & T	8	6	-	2
Barbados	6	5	-	1
Jamaica	5	4	-	1
Belize	4	3	1	

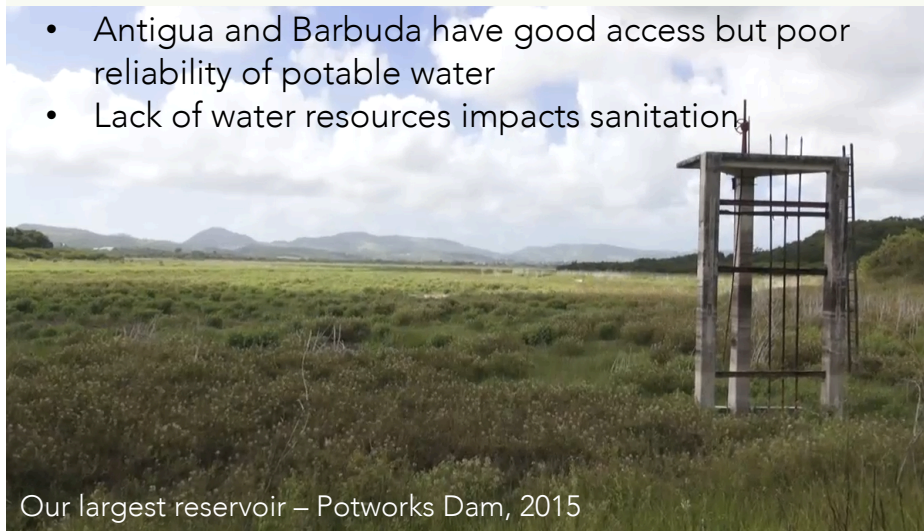
Dengue outbreaks in the Caribbean between 1980 - 2002 (Chen, 2002)



- Higher temperatures during El Niño years are linked to dengue outbreaks
- *Dengue incubates for 12 days at 30°C and 7 days at 32 – 35°C*

More extreme rainfall variability

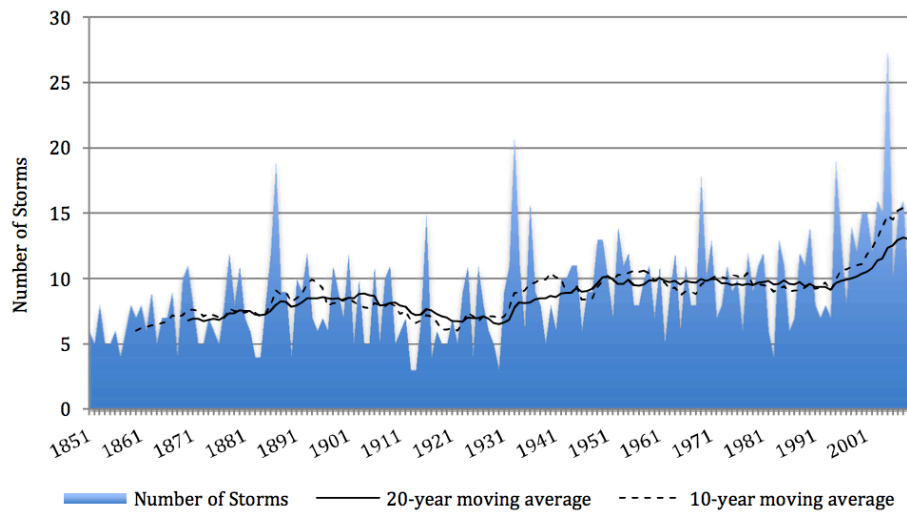
- Antigua and Barbuda have good access but poor reliability of potable water
- Lack of water resources impacts sanitation



Our largest reservoir – Potworks Dam, 2015

More frequent storms:

Number of Atlantic storms from 1851 to 2010 (ECLAC 2013)

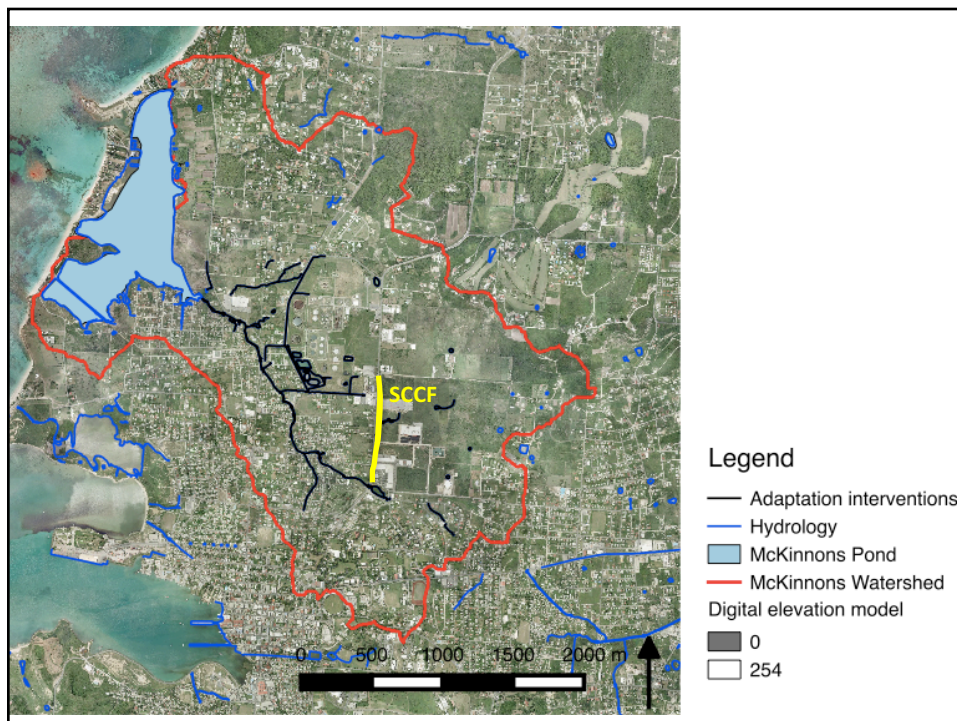


Flooding: a growing problem



Adaptation Project Development

Photo credit: Andre Philip



Project Components

1. The Waterway

- Technical drawings for a 1 in 50 year flood / AR5
- Restore and upgrade 3 km of waterways (adaptation)
- USD 3.5 M



Adaptation Fund Project Demo Site Yorks and McKinnon's Area



Created by:
Jason Williams - Data Manager, Department of Environment
Purpose: Demo site analysis for the Adaptation Fund Project
Date Created: 24 May 2016

Data sourced from the Environmental Information Management & Advisory System - EIMAS and/or data points collected in the field.
Base Map source: Aerial Imagery 2010
Published by the Department of Environment, Ministry of Health & the Environment, Government of Antigua & Barbuda



Project Components



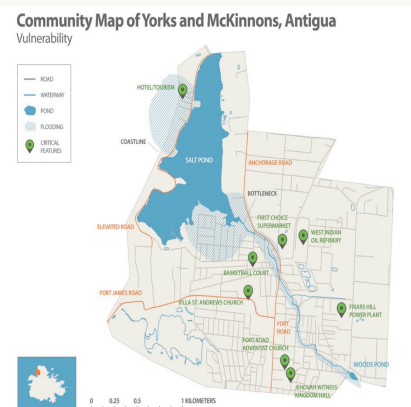
2. Revolving Loans

- 5% of homes in the target area have applied for adaptation loans
- USD 3.1 M

Project Components

3. Capacity Building

- 30% of community buildings benefit from grants for resilience
- 3 contracts awarded to community groups/NGOs to maintain adaptation interventions
- USD 2.3 M



WATER AND SANITATION

- i. Rainwater harvesting infrastructure and retrofits, including installing rooftop gutters, water storage tanks, constructing cisterns (for new buildings)
- ii. Water reuse systems, including grey water reuse best practices
- iii. Water efficiency retrofits for demand-side management, including toilets, sinks, shower heads, dishwashers, washing machines, etc.
- iv. Vector control measures, particularly targeting mosquito breeding habitat

TEMPERATURE

- i. Improving indoor air quality standards to meet standards in the Environmental Protection and Management Act, e.g. improving indoor air ventilation
- ii. Installation of energy efficient air conditioning units

HURRICANES

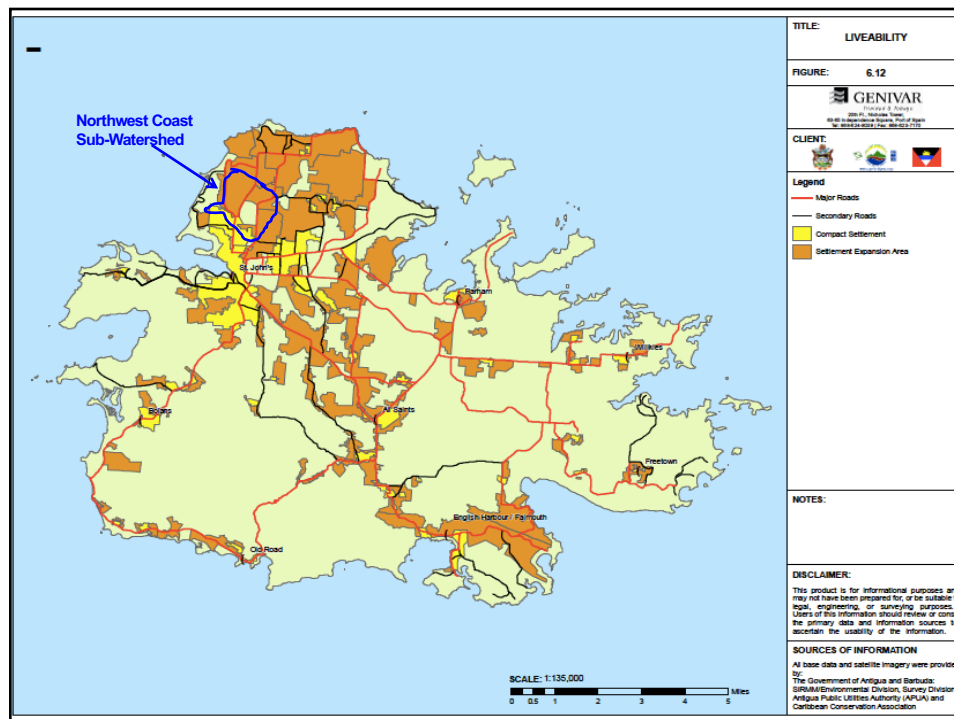
- i. Compliance with revised Building Code measures for climate resilience
- ii. Installing shutters for windows, reinforcing foundations, etc.

ENERGY RESILIENCE

- i. Installation of islanded renewable energy systems (solar, wind) and batteries; solar water heaters
- ii. Compliance with Environmental Management Systems, including energy audits and energy efficiency retrofits

FLOODING

- i. Compliance with Local Area Plan guidelines, e.g. easements
- ii. Ecosystem-based adaptation, including rehabilitating wetlands and vegetated areas
- iii. Physical adaptation, including storm water capture (check dams/ponds), use of pervious concrete, etc.



Next Steps

- Partnering with the Directorate of Gender Affairs
- Hiring consultants to conduct:
 - Technical Feasibility Study
 - Environmental and Social Assessment & Plan
- ***Submit full project document 1st August!***

Timeline

- 6 June: Hire Consultant(s)
- 10 June: Present project work plan to the Technical Advisory Committee (TAC)
- 13 June: First draft of Technical Feasibility Study is due (circulate for comments)
- 19 – 26 June: McKinnon's/Yorks/Gambles community consultations
- 27 June: Final Technical Feasibility Study
- 4 July: First draft of Environmental and Social Assessment and Management Plan is due (circulate for comments)
- 11 July: Final draft of Environmental and Social Assessment and Management Plan
- 25 July: First draft of Full Project Document is due
- 1 August: Full Project Document is submitted to the Adaptation Fund

Focus Group Discussion Questions

- Do you suffer from flooding, drought, or hurricane impacts?
- Would you be interested in taking out a low-interest loan to do any of the following on your home or business:
 - Investing of solar panels/energy efficiency/backup battery storage
 - Guttering and water storage tanks
 - Installation of hurricane shutters and improving roof systems
 - Air conditioning
 - Mosquito screening
- How much would you take out a loan for?
- Do you think you would qualify for a bank loan for this same amount?

Thank You

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Photo credit: Andre Philip

Financial Analysis

SIRF Fund Revolving Loan Facility for Adaptation



Marcel Logan J.D., M.B.A.
Consultant

Produced for the Department of Environment
Antigua and Barbuda

25th July 2016

Executive Summary

Antigua and Barbuda is a country exposed to climate change where the cost of adaptation is being borne by the private sector and the government. While there are recognized constraints on credit access in Antigua and Barbuda (IDB, 2013), to meet the high costs of adaptation, individuals and businesses need access to affordable capital.

The Environmental Protection and Management Act (2015), as part of its social safeguard mitigation strategy, is to provide low cost loans to the private sector and individuals to allow them to manage the cost of sound environmental practices in their business and homes. This is being done through the Sustainable Island Resource Framework Fund (SIRF Fund), which is piloting a US\$3 million Revolving Loan Facility under its Private Sector Window for climate change adaptation. This initial US\$3 million pilot project is referred to in this report as the “Revolving Fund”, or “Fund”. The Revolving Fund will be the first feature of the SIRF Fund to be implemented with a grant for adaptation from the Special Climate Change Fund of the Global Environmental Facility and the Adaptation Fund.

The Revolving Fund has a debt structure that is primarily driven by the creation of new loans by the recycling of the principal repayments of initial loans through amortization – this loan process is also known as the “revolver”. Utilizing its revolver structure, the Fund also achieves its triple bottom line of heightened economic value, social benefit and environmental impact through discretionary loan forgiveness¹ and payment flexibility to certain categories of borrowers for whom loan repayment, even at concessionary rates may be difficult, instead of pursuing legal recourse against such defaulted borrowers. It is strongly recommended that this strategy be supported by a strong collections platform

¹ The process for loan forgiveness or write-offs will be developed within the context of the overall portfolio for the Revolving Fund (both pre and post-pilot) and is subject to the approval of the Ministry of Finance which is underwriting the risks of the Revolving Fund.

that communicates and reinforces the value of the loans and the interventions that they facilitate, in order to achieve desired low default rates.

Given the relationship-based community lending approach of the Revolving Fund's pilot, it is important to understand the credit context and risks that the Fund will face in order to achieve a resilient and impactful loan portfolio in this pilot project.

The analysis presented here considers the impact of the Revolving Fund's initial capitalization of US\$3 million to facilitate unsecured lending primarily to individuals, as well as possibly to small and medium enterprises (SMEs). The proposed delivery mechanism is through loans ranging from US\$5,000 to US\$75,000 at concessional rates between 2 and 4%. This focus is on individual and SME lending rather than traditional group-based microfinance lending where the borrowers are joint-and-severally liable for debt.

This document assesses the Revolving Fund's first pilot and considers borrower and portfolio risks, providing guidance and recommendations for the Loan Board and Technical Evaluation Committee on mechanics, credit assessment and portfolio strategies.

Financial Model of the Revolving Loan Facility and Adaptation Set-Aside

Capital Sources for the Revolving Fund

The Revolving Fund will initially be financed by donor funding from international environmental funds, and projects to capitalize the Revolving Fund that are being submitted to the Special Climate Change Fund (SCCF) and the Adaptation Fund. The initial pilot funding package is US\$3 million from the Adaptation Fund and US\$1.8 million from the SCCF, which will be "set-aside" for adaptation, with mitigation co-benefits.

Based on the results of the pilot activities, it is expected that funding streams will increase and will be diversified, including funding from the Government and other sources for upscaling from the community to the national level (Meister Consultants Group, 2016).

Impact of the Adaptation Fund Set-Aside of the Revolving Fund

- The financial model suggests that approximately US\$5.8 million in additional loans can be created without replenishment of the initial US\$3 million through the revolving loan structure over the financial model's 10 year projected period.
- An average sum of US\$645,000 is projected to be annually originated through revolving loan disbursement, primarily using principal repayments and other cash surplus, and assuming average loan terms of 5 years. See annex for sensitivities around the revolver's impact.

- Due to modeled net write-offs of 2.5% of the gross portfolio annually, an average of US\$78,000 is expected to be lost due to defaulted loans. These accumulated write offs total US\$774,000 over the projected years.²

Key Drivers in the Adaptation Pilot Analysis

- The model loan portfolio initially assumes six loan categories divided by size of loans.
- The loans are all assumed to amortize, this is where repayments of both interest and principal are made in tandem and the principal balance outstanding decreases as the loan matures. Terms of the loans are averaged at 5 years.
- The initial interest rates have a weighted average of 3.1%.
- The revolving loans, which begin to be repaid in the second year, are driven by the use of cash returned from principal repayments and other cash sources, with a residual amount held in cash balances. They assume a 5 year term and an interest rate of 3%.
- Net loan write-offs are assumed at 2.5% annually, and the gross portfolio decreases by 2.5% on average annually (2% - 3% is the target portfolio attrition rate).
- The model is most sensitive to the following parameters: 1) Interest rate charged; 2) Write off rates; and 3) Term (duration) of loans.

² Write-off process to be determined by the Ministry of Finance

Model Drivers and Assumptions

Total Cash Available for Loans	\$3,000,000
Total Cash Used for Loans	\$3,000,000

Initial Year 1 Loan Distribution

Loan Category	Loan Sizes	Projected Number of Loans	Loan Term in Years	Interest Rate	Fees	Max Number of Loans per category
Loan Category 1	\$5,000	130	5.00	3%	0%	600
Loan Category 2	\$10,000	60	5.00	3%	0%	300
Loan Category 3	\$20,000	30	5.00	3%	0%	150
Loan Category 4	\$35,000	15	5.00	3%	0%	86
Loan Category 5	\$50,000	5	5.00	3%	0%	60
Loan Category 6	\$75,000	5	5.00	4%	0%	40
Weighted Averages	\$12,245	245	5.00	3.1%		

Annual Expenses

Program Officer	\$30,000
Loan Officer	\$35,000
Total Salary Expenses	\$65,000
Promotion/Marketing	\$10,000
Annual Expenses Inflation adjustment	1.50%
Miscellaneous	
Interest on Cash in Bank	1.50%

Core Strategies for the Revolving Loan Facility

Funding and Upscaling

The Revolving Fund is structured to access financing from grants and through domestic sources. Based on initial parameters, the portfolio will likely be operating in “run-off”, or slow depletion, pending sources of capital infusion. This is due to the concessionary loan rates of 3% charged by the Revolving Fund that will not likely cover the program costs and expected loan default rates.

There are primarily two directions to grow the Revolving Fund portfolio:

1) Raise capital through debt, grant or equity capital injections.

- **Debt:** Any debt taken on by the Revolving Fund will require interest payments that are less than the rate being charged by the Fund to its borrowers. Otherwise, the shortfall of interest payments owed by the Fund will accelerate the erosion of its existing capital base from which it makes loans. Therefore, replenishment of the Fund through debt financing is limited to concessionary capital sources.

- *Equity*: It may be challenging to attract private sector equity investors for the Revolving Fund given the low return on investment due to the Fund's concessionary financing terms. However, after a few years of track-record, it could be possible to attract pools of sustainable or "impact investing" funds, if the Revolving Fund represented "best in class" credit and operations management and potentially raised the debt pricing high enough to provide a reasonable rate of return on patient capital.
- *Replenishment efforts*: In the near to medium term (3-5 years out), efforts to receive outside funding should be focused on concessionary debt and grant capital if the Revolving Fund is to maintain its mission in facilitating below-market loans. The Department of Environment has identified possible replenishment from domestic sources including pollution charges as provided for in its Act, revenue from renewable energy investments through long-term Power Purchase Agreements and protected areas visitors fees, among others (Meister Consultants Group, 2016).

2) Organic growth through the Revolving Fund's interest income and principal repayments

- *Organic Growth is Impeded by Concessionary Funding*: The conservative view of the Fund's business model suggests that an unsecured, concessionary debt fund targeted at vulnerable populations will likely not be increasing its capital base through interest income returns.
- Due to a) concessionary debt interest rates averaging 3%, b) estimated net loan write-offs at 2.5% of the gross portfolio, and c) additional balance sheet allowances built to protect against write-offs, there is an annual deficit rather than profit in the model and this contracts the portfolio at a rate of 2.5% annually.
- Note that cash can be "released" from the loan allowances if there is strong credit performance in the portfolio, and the excess cash held as provisions against potential write-offs may be released to be used to originate more loans.

Leveraging Government Support

Identifying government support is a key means to broaden stakeholder buy-in and drive more resources towards the pilot project. Three potential avenues to facilitate this are identified below.

- ***Government and/or Private Sector Natural Shock Guarantee*** – The Revolving Fund should have comfort that at the time of a natural shock, it can aggressively "kick-in" with flexible payment structures and funding to the community. It may be advisable to partner with the government or financial institutions to assess the feasibility of embedding a guarantee structure protecting against defaults due to a natural shock. This could be achieved by using an additional upfront fee for this feature added to the disbursement costs borne by the borrower.

With this structure in place, the Revolving Fund can focus on managing day-to-day credit risk, and the financial structure of the Fund itself will be resilient to the same natural shocks that it is funding adaption to protect against.

- **Tax Support** – This is worth exploring as meaningful tax relief would reduce disbursal needs and incentivize individuals to borrow.
- **Broader Support** – The SIRF Fund business model identifies several avenues of domestic revenue, which could be (partially) allocated to the Revolving Fund to support household and business adaptation. Sources include the environmental levy, the water levy, cash transfer programs from the sale of electricity, and debt-for-nature and climate adaptation swaps. These sources would secure a sustainable line of financing to replenish the Fund.

Sourcing of Products and Services and Bulk Purchases by the Fund

While this approach can support cost savings, it should be noted that this may create additional depreciation and inventory costs on the accounts of the Revolving Fund, and also siphon cash from loan origination. Ideally, the Fund’s primary role is not to be a middle-man to supply inventory to demand for climate adaptation goods and services, but to catalyze such demand by providing credit.

That said, preemptively discussing with supplier stakeholders in order to assess the market is a good measure to ensure adequate stocks as well as raise awareness of stockpile concerns. Strategically, there may be some components that the Fund could obtain in bulk as a central supplier to target borrowers once robust demand has been identified.

Revolving Fund “guarantee” to loans by private banking institutions

This would arise when a bank lends to the target population (who they would not normally lend to) on the condition that the Fund will pay for any default in the repayments – the Fund would therefore serve as a “guarantor” to previously un-bankable persons.

While this has been floated as an idea for the Revolving Fund, this is not a recommended approach for the pilot for several reasons. Firstly, it is risky to hand over decision-making for granting loans to banks. Private banks lending to individuals may inadequately assess credit risk because their own money is not at stake. This creates a moral hazard with inappropriate incentives where the bank captures the interest income, but places all the credit risk on the Fund.

Secondly, allowing people to borrow from third-party banks with these loans secured by the Revolving Loan Facility would displace the Fund from an active role in assessing borrowers. This would make the Fund a passive capital source, which prevents it from gaining critical in-house credit risk and assessment capabilities for scaling up going-forward.

Furthermore, third-party banks may also have biases in assessing creditworthiness for the target borrowers, and it is this bias against the target population that the Fund is attempting to mitigate.

In practical terms, if the Fund wishes to prioritize a hands-on approach, it should minimize its exposure as a guarantor for a third-party bank. Where partnerships with banks are being considered, lines of responsibility and authority for credit assessment and final loan disbursement should be carefully delineated.

Certification or rating of contractors for Revolving Fund financing

It is critical to ensure that the use of funds match intended focus. One way to do so is to pay out loans directly to pre-approved developers, service-providers and facilitators of adaptation projects. Like bulk purchases this strategy can lower costs, but it should also be noted that by locking borrowers in, this can incentivize providers to raise the price, unless the Fund can secure favorable treatment beforehand.

Additionally, the Fund may want to be inclusive when providing these preferences, but this inclusiveness should be weighed against the importance of ensuring that services and products are done properly. Therefore, if services are provided more cheaply from non-recommended contractors, some guarantee of performance could be considered to be included into higher-value service and product arrangements.

One solution could be for the Fund and the borrowers to utilize an existing platform and databases that provide ratings and reviews for local contractors. This would facilitate transparency in pricing and assessing reliability through a peer review system. KnowYourPros is one such option (KnowYourPros, 2015).

Technical Reviews of Proposed Projects

For higher-value loans, such as over US\$20,000, working directly with engineers and contractors that audit and pre-approve loan requests for projects will mitigate risks relating to verifying funding uses, and ensure that the services and products are appropriately priced and suited to the project. However this strategy could cause bureaucratic and timing friction and may not “scale”, and therefore audit services should be focused on the higher-value loan requests.

Guidance for the Revolving Fund

Determining Interest Rates for Borrowers

In considering the applicable interest rates, the politics, stakeholder optics and mission strategy of the pilot are important factors to weigh. Thoughts for setting interest rates are outlined below.

- ***Flat Rate Pricing:*** Identical pricing of loans across the board is easy to use, transparent and gives clarity to the borrower and management team. Given that the risk profiles of clients are likely to be very subjective in assessment, this blanket approach should be seriously considered for the Revolving Fund pilot.
- ***Risk-Based Pricing:*** This is based on pricing loans where the more risky a borrower is, the higher their interest rate. Risk determination is based on factors such as income, their current cost of living, existing debt, term of loan, type of product or serviced being financed, and how much of the borrower’s own funding is being spent on the proposed intervention. This pricing strategy resembles the traditional bank approach, but the range of proposed concessionary finance rates is so low (between 2-4%) that the use of this approach may yield a false sense of risk analysis and precision.
- ***Reverse-Risk Based Pricing:*** This is effectively a means of assessing who the strongest borrowers are with the lowest risk and charging them the higher rates, in order to subsidize those whose capacity is less robust. Effectively this is an “arbitrage” between high and low risk borrowers that prices its interest rates to fulfil its vulnerable population intervention mandate.
- ***Tiered Pricing based on Size of Loan:*** Larger loans that require independent auditing for the proposed projects could use the additional interest rate to cover the costs of such audits.

Apart from interest rates, there are also other levers to structure needed loan products (although these loans products should not be overly complex). These other levers include: term of loan, amounts disbursed, flexible payment options and so on.

Managing Borrower Risks

Risky Borrower Overview

The overarching perspective here is that flexibly allocating money to risky borrowers could enhance the repayment of those in the community who identify their own loans as underwriting the benefits of others less fortunate in their community, and make everyone a stakeholder. The key here would be funding easy fixes for risky borrowers that tackle low hanging fruit and that are not “capital intensive”. This encompasses the “quasi-grant” approach of the Revolving Fund.

- *Squatters/Owners of Dwellings Beyond Viable Improvement:* Consider working with government to provide Revolving Fund financing through an affordable home mortgage package in connection with government relocation. The Revolving Fund could also explore alternate approaches, such as bulk purchases of mobile items that are not fixed to the semi-permanent homes such as solar chargers.
- *Renters/Landlords:* It’s clear that the Revolving Fund pilot should avoid catalyzing rental increases. However, if the credit availability is attractive, by banning rental increases after disbursement, it could create perverse incentives such as landlords raising rent ahead of taking the loan, so tenants are forced indirectly to pay more in rent, before the benefits are received.

Tangible Economic Value Risk

One borrower risk consideration is that these unsecured loans will fund household items and services that may not provide immediate and unambiguous economic impact to the borrowers, despite the clear environmental and resilience benefit. If people do not recognize the worth, the inclination to default over time is likely to become higher.

Tangible economic risk is mitigated to a degree because of the recent electricity outages and water shortages, so that borrowers place a higher value on these interventions. That said, consistent communication of the benefits of the financed interventions will be helpful especially in situations where the intervention is not mandated by law. A communications strategy about the economic benefits of adaptation would be a complementary activity to the Fund’s pilot.

An additional mitigation against this is to have the product or service sellers guarantee repairs or provide meaningful warranties covering the investment during the term of the loan. For example, if a borrower takes a loan for a solar unit with repayment over ten years, the Fund could provide free services when/if the solar unit malfunctions for the life of the loan.

Strategies for Managing Portfolio Risks of the Revolving Fund Pilot

In addition to borrower credit metrics, the Revolving Fund pilot may also consider assessing the portfolio along the qualitative metrics below that will help to identify risk, concentration and provide indications for new directions. The following are recommendations for managing portfolio risk:

- *Decentralize Borrower Concentration Risk:* No borrower should owe more than 2% of the gross capital allocated for loans, without special review by a Credit Committee, the Ministry of Finance or designated authority. The maximum loan amount outlined for this pilot is US\$75,000 which is 2.5% of the loan allocation, and obtaining collateral in addition to direct salary deductions for any loan requests exceeding this amount should be considered, along with other strategies determined by the Ministry of Finance.
- *Shorter Loan Terms (when possible):* The loan duration drives the principal repayment timing – Shorter loan terms will facilitate more cash inflows that allow greater revolver disbursal capacity, and increases the overall impact of the Fund pilot. Up to a certain point as well, shorter terms reduces risk of default because of less exposure to episodic impacts to people's salary and job status. However this is counterbalanced by the borrower's ability to service heavier debt payments resulting from a shorter repayment timeline. An average portfolio loan term of 5 years is currently modeled - See sensitivity schedule and borrower analysis in annex for further details.
- *Diversifying Products and Services Financed by the Loan:* Certain products financed by the loan will be sensitive to natural shocks such as hurricanes, and in the event that there are mass damage to them, disruption in loan payments can be expected. Keeping track on the use of funds and frequent reviews of the portfolio should be able to quantify this exposure, and obtaining guarantees or insurance structures for the Fund, in addition to product and service warranties as discussed above will mitigate this portfolio risk.

Recommendations for a financial risk management plan

Table 1 below summarizes key elements of a risk and operations management plan for the Fund pilot (Adapted from Idama, 2014).

Recommended Action	Rationale/Explanation
Principal Repayment through Amortization	<p>The amortized structure allows repayment comprising both principal and interest that prevents the need for disruptive lump-sum payments at the loan's maturity.</p>
Electronic Transfers and Cash Management	<p>Payments will be made at banks only; the Fund will not collect any cash. The Revolving Fund's internal officers will carefully monitor repayment inflows from the loans and cash outflows (from draw-downs, loan origination, and operational expenses) on a day to day basis. To minimize cash handling risks, the Fund will avoid holding of cash and will identify a partner financial institution to execute the cash disbursal.</p>
Resilient Data Collection and Management Systems	<p>The Revolving Fund will seek best in practice systems utilizing internal accounting software from known sources such as CGAP and will also source assistance from local commercial financing institutions for their knowledge of best practices. The Fund will work with the Ministry of Finance and other experts to establish robust cross-checking mechanisms for managing data and cashflows.</p>
Trained Loan and Program Officers	<p>The Ministry of Finance already has trained personnel in place whose expertise can be sourced. To supplement this if necessary, the Fund will send its loan officers and other responsible and overseeing personnel to trainings and roundtables that target microfinance and SME lending facilities. In addition to strengthening internal capacity-building, this will also build bridges with other institutions that the Fund may align with and learn from, and with whom it may share its own knowledge base.</p>
Community Relationship-Building	<p>Loan officers or applicable program officials should visit their clients regularly in order to understand the challenges of their households and businesses. By direct interaction they will learn and understand the value clients place on the loans and can guide future clients from this experience. In the absence of collateral, building a</p>

<p>Good Communications and Transparency in Operations</p>	<p>presence in the community and prioritizing stakeholder buy-in is critical. The loan manual will outline how the relationship will be built.</p>
<p>Third Party Borrower Verification</p>	<p>Transparency in operations will be important to foster buy-in. A communications strategy should be developed, complementary to the community relationship-building activities recommended above. The SIRF Fund will publish its information at the Parliament and on its website; details around the Fund's portfolio and the borrowers will be confidential.</p>
<p>Tangible Benefits Test</p>	<p>The information supplied by borrowers will be cross-checked. One of the benefits of this pilot is executing it in a self-enclosed community, and the surveys already have gone considerable distance in identifying and verifying borrower interest and payback capacity. Requiring additional character references and related diligence will further support these applications once loans are requested.</p>
<p>Product Standardization</p>	<p>A "tangible benefits" test to assess the benefits of financing before costs are passed on to third parties such as renters, or to assess if the loan will create benefits that are tangibly enjoyed by the loan recipients. This could be for example an analysis of the cost of living pre- and post-borrowing of the adaptation loan. Furthermore, loan and program officers should be kept updated on products or services that are valued and conversely, those which are not.</p>
<p>Regular Reporting & External and Internal Audits</p>	<p>To the extent possible, the Revolving Fund should offer loans that are standardized along the lines of interest rates, terms and repayment schedules. This will allow the loan portfolio to be easily evaluated, managed, audited and monitored.</p>
<p>Disbursements Primarily made through Direct Deposit and Collections made through Automatic Wage Deduction</p>	<p>The Revolving Fund's pilot portfolio performance will be regularly monitored and assessed for various performance metrics required to track vital progress indicators. Furthermore, the Fund will also be audited annually. TORs for the audits are included within the Annex of the Audit Plan. The Audit Plan and checklist are attached to the Operational Manual of the Department.</p> <p>When possible, loan disbursements will primarily be made through direct deposit to borrower's bank accounts in order to establish robust and digital verification mechanisms from the start. The loan repayment will be done through a standing order in place with the borrower's employer that allows automatic deduction at the source</p>

	of income. This is a common microfinance repayment structure that mitigates non-payment.
Cross-checking Expenditure	The Fund will have methods in place to cross-check the expenditure of its disbursed loans. Program officers will spot check the borrower's home or business after disbursement and recommended or specified vendors of products and services may be used to verify in order to avoid loan diversion.
Loan and Program Officer Code of Conduct	Loan and program officers will be under a code of conduct that will seek to remove conflicts of interest and avoid potentially negative optics surrounding the program.
Building a Robust Borrower Records and Credit History	The Fund pilot will establish systems to track customer repayment and then seek to deploy this data for private sector partners for future credit creation and other services for the target population based on this data. In developing statistically defensible credit information, this will drive positive externalities for both the community and the private sector seeking to do business with them
Borrower Concentration	No more than 3% of the Fund should be loaned to any one borrower. However, the Loan Board or SIRF Fund General Board can approve exceptions to provisions in the risk management plan with review by the SIRF Fund Investment Committee.

Conclusion

The SIRF Fund Revolving Loan pilot will create impact and is a value-added and cost-effective alternative to disbursing funding for adaptation through grants at the household and business level.

For next steps in the operationalization of the Revolving Fund pilot, it is recommended that the Department of Environment undertake the following:

1) *Detailed Credit Assessment and Loan Management Guide*: This document would guide the disbursal process and highlight proposed credit analysis for individuals and business borrowers. It should also give close consideration to the handling of distressed and defaulted borrowers, outlining the approach towards loan forgiveness, debt restructuring, write-off policies and flexible payback periods.

2) *Source Skilled Credit Human Resources*: Procure experienced Loan Officer/s who can manage the assessment and disbursal process. This is especially important for this initial pilot phase. The loan officer should ideally be someone from the financial sector with credit evaluation experience. Given the

unsecured nature of these loans and the vulnerable borrower population, this is a critical role in supporting a successful Fund pilot.

3) *Alliances*: Join groups such as the Caribbean Microfinance Alliance in order to network and learn best practices and connect with potential human resource talent.

4) *Prepare materials*: Internal operating and process flow documents, loan contracts, marketing materials, schedules for standard repayments and so forth.

Bibliography

- Adamu Idama, A. A. (2014). *Credit Risk Portfolio Management in Microfinance Banks: Conceptual and Practical Insights* (Vol. 2). Horizon Research Publishing: Universal Journal of Applied Science: <http://www.hrpub.org/download/20141001/UJAS2-12902580.pdf>
- Caribbean Microfinance Alliance. (n.d.). *MFI Performance Report 2013*. Kingston, Jamaica: Caribbean Microfinance Capacity-Building Project (CARIB-CAP II): <http://caribbeanmicrofinancealliance.com/media/docs/23.pdf>
- Polyana DaCosta. (July, 2011). *Why debt to income matters in mortgages*: <http://www.bankrate.com/finance/mortgages/why-debt-to-income-matters-in-mortgages-1.aspx>
- Inter-American Development Bank (IDB) (2013). *Private Sector Assessment of Antigua and Barbuda*: <http://www.caribank.org/uploads/2014/11/2014-Antigua-and-Barbuda-PSAR.pdf>
- John M. Chapman and Associates. (1940). *Commercial Banks and Consumer Instalment Credit* <http://www.nber.org/chapters/c4732.pdf>
- KnowYourPros. (2015, January 1). *Antigua and Barbuda: Jobs and Services*. Retrieved from KnowYourPros: http://www.knowyourpros.com/antigua_and_barbuda_en_360cms.htm
- Meister Consultants Group. (2016, March 1). *Investing in Antigua and Barbuda: Capitalization Rationale for the Sustainable Island Resource Framework (SIRF) Fund*. Retrieved from Department of Environment: http://www.oas.org/en/sedi/dsd/Energy/SECBI/SIRF_BusinessConceptNote.pdf
- Microfinance Information Exchange (MIX). (2015, June). *Microfinance Market Trends in Latin America and the Caribbean*: <https://www.themix.org/publications/mix-microfinance-world/2015/07/latin-american-and-caribbean-microfinance-market-trends>
- Tony Sheldon & Consultative Group to Assist the Poorest (CGAP). (1998, November). *Business Planning and Financial Modeling for Microfinance Institutions, A Handbook*: http://pdf.usaid.gov/pdf_docs/Pnacj064.pdf
- Artha Yantra. (September, 2013). *7 ratios which will reveal your current financial health*: <http://profit.ndtv.com/news/your-money/article-7-ratios-which-will-reveal-your-current-financial-health-327196>

Annex 1. Draft Credit Assessment Guide for the Revolving Fund Pilot

Based on a survey of best practices for assessing borrower risk in personal lending, a draft summary credit assessment guide is presented below. This can be amended and adopted by the Loan Board to guide loan decision-making.

The traditional credit evaluation framework to assess borrower risks is the “**4 C’s of Credit**”:

Character – This emphasizes the good reputation of the individual in assessing the likelihood, responsibility and willingness to repay. The use of personal references here can play a significant role in verifying the borrower’s standing.

Capacity – This references the availability and stability of the borrower’s job, income and cashflows to service the debt payments. This is a critical part of the evaluation for the Fund due to its unsecured nature. Any previous record of successful borrowing done would also help to assess capacity.

Capital – This seeks to assess the capital and assets owned by the debtor, as well as existing liabilities. The presence of cash savings, ownership of a car, property or financial assets indicate potential means to pay the debt, however given that the debt is unsecured, these items cannot be held as collateral and instead merely suggest potential financial capacity. The borrower’s existing debt and its terms (repayment amounts and timing) must also be carefully assessed as well.

Conditions – This assesses the macro conditions that affect the borrower’s ability to repay. Macroeconomic factors such as national inflation, unemployment, devaluation and market interest rates are all forces that can materially impact external conditions. Economic shifts in specific sectors that are critical to Antigua such as tourism and agriculture should also be considered.

In addition to these factors, other criteria impacting repayment ability include the following (Adapted from John M. Chapman and Associates, 1940):

Occupation of Borrowers: It is important to understand the profile, stability and tenure of the borrower's job, and assess the borrower’s employer or their own business if they are self-employed. The employment status as recorded in the survey indicates that 38% of the sample population is unemployed, which is significant, especially since Antigua’s unemployment rate is 10% (based on a 2011 estimate). This suggests that 1) the number of borrowers who qualify for automatic wage deductions are limited (especially considering those who are self-employed); and, 2) capacity to repay could be significantly impaired in this pilot. Although much of these individuals may have alternate sources of income, uncertainty regarding the stability of such income to service debt implies that flexible repayment options could be a frequent situation for borrowers in this pilot. Seasonality of jobs and income must be considered particularly for borrowers working in tourism and agriculture.

Employment Tenure: The length of employment (in addition to the nature of the occupation) is a strong indicator of the future duration and stability of income. Given that much of the personal loans issued will likely be for a long duration (5 years and over), assessing income stability is important.

Stability of Residence: This indicates roots in the community, and to a certain degree is a proxy for income and job stability. The survey has indicated that prospective borrower population comprises 73% home-owners, while 19% are renters. This indicates that a majority of potential borrowers have roots in the community and also highlights an existing capital base in the form of property.

Age: Typically risk of default is expected to decrease as borrowers age. The relationship between age and borrower risk however interacts and correlates closely with other factors such as income, job tenure and occupation. It is noted that the prospective pilot population is primarily older as 77% are over 35 years old, with 44% of the respondents over 50 years old. Due care must be made in loans made in the 18-35 year old age range, which comprises 23% of the surveyed population.

Gender: Pilot information suggests that the potential borrower population is 62% women. While this point is often debated, it has been found that in the global microfinance sector, women tend to be better borrowers than men with stronger likelihood of repayment. It will be important to track gender repayment in the Fund's pilot in order to assess both this and any other gendered effects from the Revolving Fund.

Number of Dependents: This suggests how much the income must be "spread" to provide support for dependents, and is relevant for evaluating capacity for repayment.

Relevant Financial Ratios for Assessing Borrower Risk

Financial ratios are "rules of thumb" to evaluate potential borrowers, and are quantitative guides that supplement the qualitative assessment outlined above. In evaluating the ratios presented below, the requested loan size and/or its repayment amounts are included in the calculations of debt and expenses to assess post-disbursal positioning. Income should also be after-tax income to the extent applicable as well. Loan assessment should also look at borrower's optional expenses as possible discretionary sources of extra cash when reasonable.

Debt to Income Ratio: This ratio highlights the relative amount of income required to pay all debts, obligations and household expenses. This includes credit card bills, auto loans, child support, student loans plus mortgage payments and other housing expenses, as well as utilities bills, internet/phone bills, groceries and other expenses.

$$\text{Debt to Income Ratio} = (\text{Monthly Debt} + \text{Expenses} + \text{Obligations}) / \text{Monthly after-tax Income}$$

Banks usually use a 35% - 50% ratio here – meaning that income should generally be at least twice the sum of all debt and expenses, for personal loans and mortgages. Beyond this amount is high risk and should require mitigating factors such as existing asset base, cash savings or other identifiable resources, such as reducible expenses. Given the population and the fund's mandate, this may be relaxed

somewhat, but above 65% is very risky and mitigation such as extending the term or reducing the amount of the loan in order to reduce the ratio may be necessary.

Savings Ratio: This ratio gauges the percentage of surplus income saved after expenses and this highlights the borrower's vulnerability to income shocks due to reduced income or unexpected expenses.

$$\text{Savings Ratio} = ((\text{Monthly Income}) - (\text{Monthly Debt} + \text{Expenses} + \text{Obligations})) / \text{Monthly Income}$$

A savings ratio of less than 20% indicates risk to income shocks and merits a closer look at the borrower's ability to manage/trim their expenses and service the debt.

Net worth and Solvency Ratio: This ratio establishes the net worth of the borrower as a fraction of their overall asset base. Establishing that a borrower has positive net worth suggests that they could sell their assets at a surplus to cover their liabilities and avoid default in the event of an income shock. Debt calculated here does not include recurring expenses like utility bills because are generally not "firm" debt obligations.

Special attention should be made in identifying if borrowers have, and are up to date on payments for, pre-existing secured loans that utilize critical personal assets as collateral that could lead them to losing their home, or car in a default situation.

Negative net worth indicates insolvency and vulnerability to income shocks that prevent borrowers from covering debt obligations. This would require close look at the stability of their income in servicing the debt.

$$(i) \text{ Net Worth} = \text{Total Assets} - \text{Total Debt}$$

$$(ii) \text{ Solvency Ratio} = \text{Net Worth} / \text{Total Assets}$$

Borrower and Loan Profile

Based on Table 1's prospective amortized repayment terms (using 3% interest), and Table 2's compiled data from the household surveys, the Fund can expect that its portfolio composition will be driven strongly by smaller loan amounts of US\$5,000 – US\$10,000 primarily using longer-term loans in the 5-10 year range. This reflects the limited borrower cashflow strength that requires longer terms of loan amortization to service the debt. Longer loan terms will reduce the expected loan origination amounts from the Revolver.

Table 1. Amortized repayment terms

Loan Amount	Five Year Term		Seven Year Term		Ten Year Term	
	Monthly	Annual	Monthly	Annual	Monthly	Annual
\$5,000	\$90	\$1,078	\$66	\$793	\$48	\$579
\$10,000	\$180	\$2,156	\$132	\$1,586	\$97	\$1,159
\$15,000	\$270	\$3,234	\$198	\$2,378	\$145	\$1,738
\$25,000	\$449	\$5,391	\$330	\$3,964	\$241	\$2,897
\$50,000	\$898	\$10,781	\$661	\$7,928	\$483	\$5,794
\$75,000	\$1,348	\$16,172	\$991	\$11,892	\$724	\$8,691

Table 2. Household survey data

Monthly USD Household Income	Population
\$0 - \$550	54%
\$550 - \$950	18%
\$950 - \$1,300	13%
\$1,300 - \$1,700	9
\$1,700 and over	6%

Monthly USD Savings Range	Population
\$0 - \$75	62%
\$75 - \$150	16%
\$150 - \$300	9%
\$300 and over	13%

Proposed Loan Size (Approximated)	Population
\$5,000 - \$20,000	83%
\$20,000 - \$40,000	6%
\$40,000 - \$60,000	7%
\$60,000 - \$75,000	4%

Annex 2. Key Model Output and Notes

Notes on the Financial Model

- *Balance Sheet:* Reserves increase over time as a buffer against write-downs.
- *Balance Sheet:* Write-offs have been conservatively modeled based on regional benchmarks in the microfinance space.
- *Balance Sheet:* Portfolio contraction over time reflects net outflows of cash due to write-down assumptions, which are net against modest cash-generation from the concessionary rate interest income. This slow erosion of initial grant capital at a rate of 2.5% suggests that well-controlled loan disbursements can significantly extend the funding.
- *Revolving loan debt origination:* This is driven by the use of cash returned from principal repayments and other cash sources, with a residual amount held in cash balances. The revolving loans begin in the second year. The model suggests that an average of US\$645,000 can be originated from the revolving structure annually over the projected period, assuming average revolver repayment of 5 years.
- *Income Statement/Balance Sheet:* The equity line item reflects an accumulated deficit due to income statement losses due to concessionary debt rates and non-cash loan provision losses. Loan provision items on the income statement are derived from an estimation of expected losses.
- *Income statement:* Operating profit is the line item that is most closely related to the “profit” line on a cash-centric basis. Further down on the income statement, items such as depreciation, reserve allowances, and loan provisions are not directly cash-based, but related items such as write-downs which appear on the cash-flow statement do reflect actual losses.
- *Write-Off Ratio:* This is modeled at 3.00%, but due to write off loan recoveries at 0.50%, the net write-offs modeled are 2.50%.

Financial Model Output

*Comparison Indicators utilize CMFA comparable entities (Caribbean Microfinance Alliance)

Table 1. This data highlights projected portfolio performance indicators and comparable information. Definitions on the portfolio quality indicators follow.

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Portfolio Quality Indicators										
Loan Loss Reserve Ratio	1.50%	2.78%	4.34%	5.93%	7.57%	9.25%	10.99%	12.80%	14.66%	16.61%
Loan Write-Off Ratio	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%
Portfolio at Risk	na	na	na	na	na	na	na	na	na	na
Profitability Indicators										
Return on Total Assets	-2.93%	-3.48%	-3.65%	-3.84%	-4.05%	-4.29%	-4.51%	-4.75%	-5.01%	-5.31%
Yield on Portfolio	3.57%	3.20%	3.21%	3.24%	3.27%	3.28%	3.34%	3.40%	3.48%	3.56%
Productivity Indicators										
Operating Expense Ratio	3.08%	2.67%	2.77%	2.87%	2.98%	3.10%	3.22%	3.36%	3.51%	3.67%
Growth Indicators										
Gross Portfolio at end of Period	2,436,848	2,849,814	2,792,941	2,733,933	2,672,733	2,609,283	2,543,034	2,475,241	2,405,878	2,334,921
Gross Portfolio Growth	-	16.95%	-2.00%	-2.11%	-2.24%	-2.37%	-2.54%	-2.67%	-2.80%	-2.95%
Revolving Loan Origination	-	993,962	741,328	866,706	996,010	471,097	455,607	440,814	425,686	410,218
Accumulated Revolving Loan Origination		993,962	1,735,290	2,601,996	3,598,006	4,069,103	4,524,710	4,965,523	5,391,209	5,801,427
Loan Amounts written-off Annually	73,105	85,494	83,788	82,018	80,182	78,279	76,291	74,257	72,176	70,048
Accumulated Write offs		158,600	169,283	251,301	331,483	482,867	559,158	633,415	705,591	775,639

Select Comparison Indicators	Revolving Fund Projected Average	CMFA Average (Dec. 2013)	CMFA Median (Dec. 2013)
Portfolio Quality Indicators			
Loan Write-Off Ratio	3.00%	1.90%	0.80%
Portfolio at Risk	na	15.20%	11.10%
Average Loan Balance (USD)	na	3,444	3,132
Profitability Indicators			
Return on Total Assets	-4.18%	0.90%	1.00%
Yield on Portfolio	3.35%	25.10%	14.40%
Productivity Indicators			
Operating Expense Ratio	3.12%	20.60%	12.30%
Growth Indicators			
Avg. Gross Portfolio	2,585,463	20,590,000	12,550,000
Gross Portfolio Growth	-2.46%	12.60%	14.00%

Portfolio Quality Indicator Glossary:

Loan Loss Reserve Ratio: The loan loss reserve ratio measures the balance sheet relationship between the loan loss allowances (or reserves) accrued on the balance sheet and the gross portfolio outstanding. Loan loss reserve decisions are based on the Fund's view of future default rates, and should reflect the maximum amount of potentially defaulted loans. The reserves on the balance sheet accumulate from the annual provision for bad loans on the income statement, but this cash in practice can be "released" as the Loan Loss Reserve Ratio exceeds the expected write-off rate (which is modeled as 2.5% here).

$$\text{Loan Loss Reserve Ratio} = \text{Allowances for Loan Losses} / \text{Gross Loans}$$

Loan Write-Off ratio: This measures the relationship between the loan write-offs and the gross portfolio outstanding. Write off decisions are based on the Fund's view of the likelihood of collection primarily due to how long loans remain unpaid, among other factors. The write-off decision is an internal financial action and does not forgive the debtor, as legal claims can still be pursued. This is modeled as higher than the comparable entities in order to be conservative, and ultimate performance here will be based on the Fund's credit management.

$$\text{Loan Write-Off Ratio} = \text{Loan Write-Offs} / \text{Gross Loans}$$

Operating Expense Ratio: This measures operating expenses (excluding loan loss provision) as a percentage of the gross loan portfolio. This is lower compared to comparables because of the Fund's low staff salaries, marketing costs, and the absence of operating expenses such as utilities, rent and senior management and administration being charged to the Fund.

$$\text{Operating Expense Ratio} = \text{Total Operating Expenses} / \text{Gross Loan Portfolio}$$

Return on Total Assets: This measures the return on the overall asset base and demonstrates the Fund's performance in allocating its capital. This number is negative for the Fund due to the concessionary interest rates not being able to cover expenses and loan loss provisioning.

$$\text{Return on Total Assets} = \text{Net Income (Loss)} / \text{Total Assets}$$

Yield on Portfolio: This measures interest income (revenue) generated by the loan portfolio as a ratio to the net loans outstanding. This exceeds the modeled interest rate of 3.00% because of the impact of loan loss allowances decreasing the gross loans in the net loan calculation. This is lower than comparables because of the Fund's concessionary interest rates.

$$\text{Yield on Portfolio} = \text{Interest Income} / \text{Net Loan Portfolio}$$

Table 2. Projected Balance Sheet

<u>REVOLVING FUND PROJECTED BALANCE SHEET</u>	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Current Assets										
Cash & Bank Balances	512,967	43,126	40,992	38,800	36,550	33,750	32,207	30,638	29,042	27,420
Long Term Assets										
Initial Loans Outstanding	2,436,848	1,855,852	1,256,443	638,029	-	-	-	-	-	-
Revolver Loans	-	993,962	1,536,498	2,095,904	2,672,733	2,609,283	2,543,034	2,475,241	2,405,878	2,334,921
Gross Loans	2,436,848	2,849,814	2,792,941	2,733,933	2,672,733	2,609,283	2,543,034	2,475,241	2,405,878	2,334,921
Allowances for Loan Losses	(36,553)	(79,300)	(121,194)	(162,203)	(202,294)	(241,433)	(279,579)	(316,707)	(352,796)	(387,819)
Net Loans	2,400,295	2,770,515	2,671,747	2,571,730	2,470,439	2,367,850	2,263,455	2,158,533	2,053,083	1,947,101
Total Assets	2,913,262	2,813,641	2,712,739	2,610,530	2,506,989	2,401,600	2,295,662	2,189,171	2,082,125	1,974,522
Long Term Liabilities										
Loans Owed	-	-	-	-	-	-	-	-	-	-
Total Liabilities	-	-	-	-	-	-	-	-	-	-
Equity										
Initial Grant Capital	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000
Retained Earnings/(Accumulated Deficit)	(86,738)	(186,359)	(287,261)	(389,470)	(493,011)	(598,400)	(704,338)	(810,829)	(917,875)	(1,025,478)
Total Equity	2,913,262	2,813,641	2,712,739	2,610,530	2,506,989	2,401,600	2,295,662	2,189,171	2,082,125	1,974,522
Total Liabilities & Equity	2,913,262	2,813,641	2,712,739	2,610,530	2,506,989	2,401,600	2,295,662	2,189,171	2,082,125	1,974,522

Table 3. Projected Income Statement
Revolving Fund Projected Income Statement

<u>USD</u>	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Revenue										
Loan Interest Income #1	17,827	14,106	10,272	6,322	2,251					
Loan Interest Income #2	16,456	13,021	9,482	5,836	2,078					
Loan Interest Income #3	16,456	13,021	9,482	5,836	2,078					
Loan Interest Income #4	14,399	11,393	8,297	5,106	1,818					
Loan Interest Income #5	6,857	5,425	3,951	2,431	866					
Loan Interest Income #6	13,742	10,925	7,994	4,943	1,768					
Revolver Loan Interest Income	-	14,909	37,957	54,486	71,530	79,230	77,285	75,274	73,217	71,112
Gross Loan Interest Income	85,736	82,802	87,435	84,960	82,389	79,230	77,285	75,274	73,217	71,112
Cash in Bank Interest Income		7,695	647	615	582	548	506	483	460	436
Interest Expense	-	-	-	-	-	-	-	-	-	-
Net Interest Income	85,736	90,496	88,082	85,575	82,971	79,779	77,791	75,757	73,676	71,548
Fee Income	-	-	-	-	-	-	-	-	-	-
Expenses										
Staff Salaries	(65,000)	(65,975)	(66,965)	(67,969)	(68,989)	(70,023)	(71,074)	(72,140)	(73,222)	(74,320)
Marketing Expenses	(10,000)	(10,150)	(10,302)	(10,457)	(10,614)	(10,773)	(10,934)	(11,098)	(11,265)	(11,434)
Total Costs	(75,000)	(76,125)	(77,267)	(78,426)	(79,602)	(80,796)	(82,008)	(83,238)	(84,487)	(85,754)
Operating Profit before non-cash items	10,736	14,371	10,815	7,149	3,369	(1,018)	(4,217)	(7,481)	(10,811)	(14,207)
Depreciation	-	-	-	-	-	-	-	-	-	-
Initial Reserve Allowance	(97,474)									
Provisions for Bad Loans	-	(113,993)	(111,718)	(109,357)	(106,909)	(104,371)	(101,721)	(99,010)	(96,235)	(93,397)
Net Profit	(86,738)	(99,621)	(100,902)	(102,208)	(103,541)	(105,389)	(105,939)	(106,491)	(107,046)	(107,603)

Table 4. Projected Cash Flow Statement

REVOLVING FUND CASH FLOW STATEMENT

Cash flows from Operating Activities	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Net profit (loss)	(86,738)	(99,621)	(100,902)	(102,208)	(103,541)	(105,389)	(105,939)	(106,491)	(107,046)	(107,603)
<i>Operating activity and asset adjustments to reconcile net income to net cash</i>										
Depreciation and amortization	-	-	-	-	-	-	-	-	-	-
Loan Loss Reserve	97,474	-	-	-	-	-	-	-	-	-
Provision for Loan Losses	-	113,993	111,718	109,357	106,909	104,371	101,721	99,010	96,235	93,397
Disbursement of Initial Loans	(3,000,000)	-	-	-	-	-	-	-	-	-
Principal Repayments of Initial Loans	563,152	580,995	599,409	618,414	638,029	-	-	-	-	-
Loan Write-offs	(73,105)	(85,494)	(83,788)	(82,018)	(80,182)	(78,279)	(76,291)	(74,257)	(72,176)	(70,048)
Loan Recoveries	12,184	14,249	13,965	13,670	13,364	13,046	12,715	12,376	12,029	11,675
Net Cash Position Before Revolver:	(2,487,033)	524,122	540,401	557,215	574,579	(66,250)	(67,793)	(69,362)	(70,958)	(72,580)
Revolver Loans Disbursements	-	(993,962)	(741,328)	(866,706)	(996,010)	(471,097)	(455,607)	(440,814)	(425,686)	(410,218)
Revolver Principal Repayments	-	-	198,792	307,300	419,181	534,547	521,857	508,607	495,048	481,176
Net cash provided (used) by operating activities	(2,487,033)	(469,841)	(2,134)	(2,191)	(2,250)	(2,800)	(1,543)	(1,569)	(1,595)	(1,622)
Cash used in investing activities										
Purchase of fixed assets	-	-	-	-	-	-	-	-	-	-
Net cash provided (used) by investing activities	-	-	-	-	-	-	-	-	-	-
Cash used in financing activities										
Proceeds from Fund's borrowing	-	-	-	-	-	-	-	-	-	-
Fund's repayments of borrowing	-	-	-	-	-	-	-	-	-	-
Additional capital investments (grants, equity, etc.)	-	-	-	-	-	-	-	-	-	-
Net cash provided (used) by financing activities	-	-	-	-	-	-	-	-	-	-
NET INCREASE (DECREASE) IN CASH AND CASH EQUIVALENTS	(2,487,033)	(469,841)	(2,134)	(2,191)	(2,250)	(2,800)	(1,543)	(1,569)	(1,595)	(1,622)
Cash and cash equivalents at beginning of period	3,000,000	512,967	43,126	40,992	38,800	36,550	33,750	32,207	30,638	29,042
CASH AND CASH EQUIVALENTS AT END OF PERIOD	512,967	43,126	40,992	38,800	36,550	33,750	32,207	30,638	29,042	27,420

Table 5. Primary Model Drivers for Initial Disbursement in Year 1

Model Drivers and Assumptions

Total Cash Available for Loans	\$3,000,000
Total Cash Used for Loans	\$3,000,000

Initial Year 1 Loan Distribution

Loan Category	Loan Sizes	Projected Number of Loans	Loan Term in Years	Interest Rate	Fees	Max Number of Loans per category
Loan Category 1	\$5,000	130	5.00	3%	0%	600
Loan Category 2	\$10,000	60	5.00	3%	0%	300
Loan Category 3	\$20,000	30	5.00	3%	0%	150
Loan Category 4	\$35,000	15	5.00	3%	0%	86
Loan Category 5	\$50,000	5	5.00	3%	0%	60
Loan Category 6	\$75,000	5	5.00	4%	0%	40
Weighted Averages	\$12,245	245	5.00	3.1%		

Annual Expenses

Program Officer	\$30,000
Loan Officer	\$35,000
Total Salary Expenses	\$65,000
Promotion/Marketing	\$10,000
Annual Expenses Inflation adjustment	1.50%
<i>Miscellaneous</i>	
Interest on Cash in Bank	1.50%

Table 6. Credit Risk and Revolver Loan Assumptions

Credit Risk Assumptions

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Beginning Allowance for Loan Losses:	97,474	36,553	79,300	121,194	162,203	202,294	241,433	279,579	316,707	352,796
Provision for Credit Losses:	-	113,993	111,718	109,357	106,909	104,371	101,721	99,010	96,235	93,397
Total Write-Offs:	(73,105)	(85,494)	(83,788)	(82,018)	(80,182)	(78,279)	(76,291)	(74,257)	(72,176)	(70,048)
Total Recoveries:	12,184	14,249	13,965	13,670	13,364	13,046	12,715	12,376	12,029	11,675
Ending Allowance for Loan Losses:	36,553	79,300	121,194	162,203	202,294	241,433	279,579	316,707	352,796	387,819
Initial Reserve	4%									
Provision for CLs % Gross Loans:	0.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%
Write-Offs % Gross Loans:	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%
Recoveries % Gross Loans:	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%

Revolving Loan Structure w/ Cash Sweep

Revolver Interest Rate	3.00% Annually
Minimum Cash Surplus	100,000 US
Revolver Principal Payback	5 Years

Revolver Cashflows

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Cash and cash equivalents at beginning of period		512,967	43,126	40,992	38,800	36,550	33,750	32,207	30,638	29,042
Cash Available for Revolver		1,093,962	841,328	966,706	1,096,010	571,097	555,607	540,814	525,686	510,218
Minimum Cash in Bank		100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Revolver Debt Creation		993,962	741,328	866,706	996,010	471,097	455,607	440,814	425,686	410,218
Revolver Debt Portfolio	-	993,962	1,536,498	2,095,904	2,672,733	2,609,283	2,543,034	2,475,241	2,405,878	2,334,921
Revolver Interest Income		14,909	37,957	54,486	71,530	79,230	77,285	75,274	73,217	71,112
Revolver Principal Payback			198,792	307,300	419,181	534,547	521,857	508,607	495,048	481,176

Table 7. Sensitivity analysis showing debt service payments (principal and fixed 3% interest) over different terms and loan amounts:

	Two Year Term		Three Year Term		Five Year Term		Seven Year Term		Ten Year Term	
Loan Amount	Monthly	Annual	Monthly	Annual	Monthly	Annual	Monthly	Annual	Monthly	Annual
5,000	\$215	\$2,579	\$145	\$1,745	\$90	\$1,078	\$66	\$793	\$48	\$579
10,000	\$430	\$5,158	\$291	\$3,490	\$180	\$2,156	\$132	\$1,586	\$97	\$1,159
15,000	\$645	\$7,737	\$436	\$5,235	\$270	\$3,234	\$198	\$2,378	\$145	\$1,738
25,000	\$1,075	\$12,894	\$727	\$8,724	\$449	\$5,391	\$330	\$3,964	\$241	\$2,897
50,000	\$2,149	\$25,789	\$1,454	\$17,449	\$898	\$10,781	\$661	\$7,928	\$483	\$5,794
75,000	\$3,224	\$38,683	\$2,181	\$26,173	\$1,348	\$16,172	\$991	\$11,892	\$724	\$8,691

Table 8. Sensitivity analysis showing varying amounts of revolving loans originated over 9 years, adjusting for 1) Write-offs (as a % of gross loan portfolio); and 2) Length of loan term in years for the entire loan portfolio:

WRITE-OFFS

	1.50%	2.00%	2.50%	3.00%	3.50%	4.00%	4.50%	5.00%	5.50%
2	\$13,593,596	\$13,239,662	\$12,895,536	\$12,560,957	\$12,235,670	\$11,919,425	\$11,611,979	\$11,313,095	\$11,022,543
3	\$9,588,303	\$9,301,908	\$9,024,065	\$8,754,530	\$8,493,066	\$8,239,442	\$7,993,433	\$7,754,820	\$7,523,387
4	\$7,520,151	\$7,270,099	\$7,027,880	\$6,793,263	\$6,566,022	\$6,345,938	\$6,132,796	\$5,926,389	\$5,726,514
5	\$6,256,827	\$6,029,399	\$5,809,345	\$5,596,442	\$5,390,471	\$5,191,220	\$4,998,483	\$4,812,059	\$4,631,754
6	\$5,404,245	\$5,192,241	\$4,987,293	\$4,789,182	\$4,597,696	\$4,412,628	\$4,233,778	\$4,060,950	\$3,893,955
7	\$4,789,443	\$4,588,624	\$4,394,626	\$4,207,237	\$4,026,247	\$3,851,455	\$3,682,664	\$3,519,682	\$3,362,323
8	\$4,324,598	\$4,132,259	\$3,946,564	\$3,767,303	\$3,594,269	\$3,427,264	\$3,266,094	\$3,110,571	\$2,960,511
9	\$3,960,384	\$3,774,699	\$3,595,518	\$3,422,631	\$3,255,837	\$3,094,938	\$2,939,744	\$2,790,068	\$2,645,730
10	\$3,666,358	\$3,486,031	\$3,312,094	\$3,144,340	\$2,982,569	\$2,826,586	\$2,676,201	\$2,531,232	\$2,391,500

**DURATION IN
YEARS**

Disclaimer

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Social Market Research on Demand for Low Interest Unsecured Loans for Adaptation on the Northwest Coast of Antigua

Prepared by the Department of Environment

For the Adaptation Fund Project

An Integrated Approach to Physical Adaptation and Community Resilience in Antigua and Barbuda's Northwest McKinnon's Watershed

24th July 2016

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I. Introduction

Given the important role played by finance in the development process, the country's poor ranking in terms of access to credit represents a significant risk to private sector development and growth... Antigua and Barbuda has attempted to fill the credit void through the establishment of a national development bank, but the credit needs of the private sector significantly outstrip the available resources (IADB 2013).

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Antigua and Barbuda is seeking to adapt to projected climate impacts; however, a lack of access to affordable credit has severely hindered the ability of the private sector (defined as businesses, household and land owners) to take preventative measures.

A lack of access to affordable and pro-poor credit solutions is especially evident in vulnerable populations. Women have expressed frustration stating: “I cannot go to the bank for a loan because they want title deed and I don’t have that” (Antigua and Barbuda Country Poverty Assessment). The Department of Environment, recognizing the credit barriers to implementing adaptation, is developing a project to the Adaptation Fund that recognizes the challenges individuals face, particularly women, in accessing credit. The project has a Revolving Loan Facility component that was designed to benefit vulnerable groups by offering unsecured and low interest loans for adaptation in communities on the northwest coast of Antigua as a pilot, with a view to scaling up access to affordable credit for adaptation activities over time.

Research Objective

An informed assumption was made during the initial project concept phase that there is significant demand for unsecured, low-interest (2 – 4%) loans for adaptation interventions in the communities of Yorks, Yorks New Extension, McKinnon’s, and Gambles to access at the household/small business level. The preliminary design of the Revolving Loan mechanism is to disburse a total 3 million USD to 150 – 200 households, with individual loans ranging from 5,000 to 75,000 USD, where loans will be on average 20,000 USD.

This investigation was designed to determine the level of market demand for unsecured household and small business loans for adaptation.

The objective of this research is to collect quantitative data to inform the design of the project that the Department of Environment has developed and is submitting to the Adaptation Fund, titled, *An Integrated Approach to Physical Adaptation and Community Resilience in Antigua and Barbuda’s Northwest McKinnon’s Watershed*. The DoE was accredited as a National Implementing Entity to the Adaptation Fund in October 2015.

II. Methodology

The Department of Environment (DoE) developed a methodology that drew on three approaches to data collection in Yorks, Yorks New Extension, McKinnon’s, and Gambles communities within the McKinnon’s watershed:

1. Literature review and baseline data
2. A survey of households and small businesses
3. Community consultations/focus group discussions

The research surveyed 178 persons (8% of the target population), and conducted two consultations/focus group discussions, over the following timeline.

Social Research 2016	6-10 June	13-17 June	20-24 June	27-1 July	4-8 July	11-15 July	18-22 July
Baseline data							
In-person survey							
Telephone survey							
Consultation							
Data Analysis							

1. Literature Review and Baseline Data

Baseline socioeconomic data for the target area was reviewed from the following sources:

- Statistics Division, 2011. *Antigua and Barbuda 2011 Population and Housing Census: Book of Statistical Tables I*. Published April 2014.
- Richards & Associates, 2009. *Social-Economic Residential Survey of St. John's and St. John's Rural on Wastewater Management and other Practices for Antigua's Northwest Coast*. October.
- The CARIBSAVE Partnership, 2015. *Vulnerability Impact and Adaptation Analysis in the Caribbean: Local Vulnerability Analysis for Antigua and Barbuda*. Regional Office for Latin America and the Caribbean (UNEP-ROLAC).

The most relevant and detailed data source was the social-economic study by Richards & Associates in 2009, which conducted 258 face-to-face interviews in the St. John's district. The research was to assess willingness to pay (WTP) for wastewater treatment services, and concluded that there was an appetite to pay for services - forty percent (40%) of respondents were prepared to pay less than EC\$20 per month for a modern off-site water treatment service; twenty-six percent (26%) were willing to pay \$20 - \$30; and an additional fifteen percent (15%) were willing to pay \$40 - \$60. This was a foundational study that led to the establishment of a wastewater treatment facility on the northeastern border of McKinnon's Pond.

A survey method for this investigation was designed to compare current data with this source, and to address areas that were not previously included, specifically the demand for unsecured small loans for adaptation.

2. Survey Methodology

A survey was developed in English and Spanish, and was tested in a focus group at the Department of Environment prior to field administration. The Directorate of Gender Affairs reviewed and edited the survey questions. The survey was administered in person by field researchers of the Department of Environment, and the researchers were sometimes accompanied by the district disaster coordinator.

The wastewater WTP research (Richards & Associates, 2009) surveyed the population of St. John's and St. John's rural, totaling 25 census enumeration districts. Since the research

delivered demographic results for the St. John's population at large – including the Adaptation Fund project site – the sample population for this research on market demand for loans was defined as the number of households or businesses residing within approximately 200 meters of the waterway (Figure 1). This narrow selection was to deliver demographic data specific to the priority population to benefit from interventions under the Adaptation Fund project.

Based on GIS data in the Environmental Information Management and Advisory System (EIMAS), there are approximately 2,500 buildings in target zone. The survey was designed to randomly survey 8% of the sample population, or approximately 200 households and small businesses. Surveys were primarily conducted between 4 and 6 pm from Monday to Friday.

Questions contained in the survey were designed to address the following: to identify vulnerable households within the community; to determine demand for and ability to repay loans based on income; and to identify community shelters and perceptions of them.

Survey Sites - Adaptation Fund Project

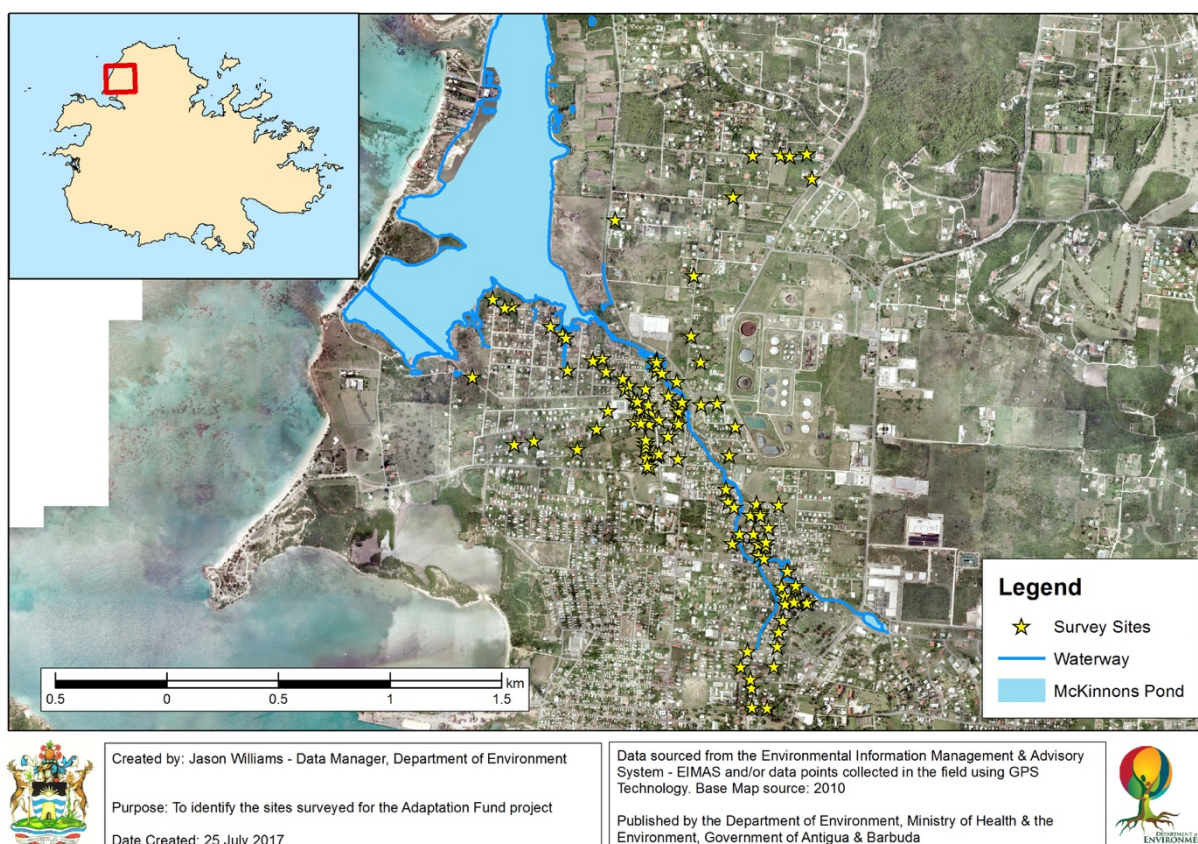


Figure 1. Spatial distribution of household and small business surveys conducted in the project site along McKinnon's waterway

3. Community Consultations and Focus Group Discussions

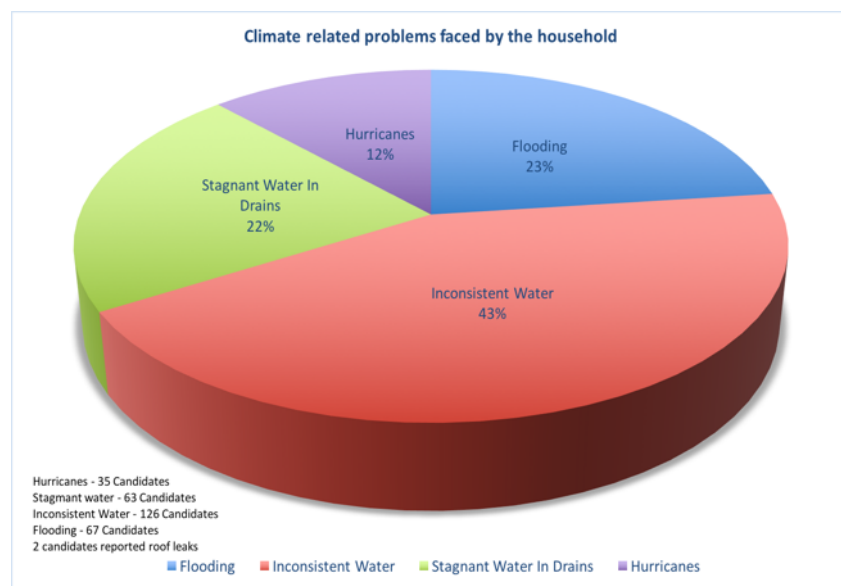
Two community consultations/focus groups were held within the project area on 20th June and 5th July 2016 in the Yorks Community Center. These consultations were advertised through various medias sources, through Community Zone Officers from the Community Development Division, and Disaster Response Coordinators from the National Office of Disaster Services (NODS). The consultations and focus groups were to ensure that a larger cross-section of the target population had an opportunity to be a part of the consultative and social research process. Participants also completed the surveys.

Focus groups were held with 5 – 10 participants per facilitator, and a rapporteur was assigned to take detailed notes and present a summary of the discussion to the Department of Environment’s research team to inform project design. Guiding questions were prepared in advance of the focus groups, however these sessions were semi-structured to let the participants guide the discussion.

The objective of the consultations and focus groups was to discuss in a semi-structured setting the demand for household loans. Recommendations on project design were integrated into the Environmental and Social Safeguards, Gender, and the Technical Feasibility Study that were being developed in parallel.

III. Results and Discussion

Survey respondents were 62% female and 38% male. Age distribution indicated that 42% of respondents were over 50 years of age; 32% were between 35 and 50 years, 28% were 25 to 35 years, and 6% were 18 to 25 years. A total of 25% of survey respondents were civil servants employed by the Government of Antigua and Barbuda.



There is decent electricity and water infrastructure coverage in the community; however the services were identified as intermittent. A total of 93% reported household access to electricity (4% had no access), and 83% had access to potable water (27 respondents or 15% did not have access to potable water at their household).

Figure 2. Respondents most frequently cited “inconsistent water supply” as the climate related problem most frequently experienced by their

Respondents were asked to report climate-related

impacts that their household most frequently suffered from, reporting all that applied (Figure 2). In total, 126 out of 178 respondents (71%) reported inconsistent water supply, signaling a potentially high demand for water efficiency, water recycling, and rainwater harvesting technologies.

Two respondents in the “other” category reported leaks in roof.

Demand for Adaptation Loans

Based on the prior section, there is clearly a need for adaptation interventions at the household level due to the vulnerability and exposure of households to climate change impacts. However, this research sought to determine the interest of households in accessing a concessional, unsecured loan in order to implement adaptation.

Survey respondents were asked if they would be interested in taking out a loan to make their household better able to cope with climate impacts. Of the persons who answered this question, 73% of respondents said that they would be interested in a loan for adaptation. However, many respondents did not answer this question (Figure 3), possibly because there was not an “undecided” response category.

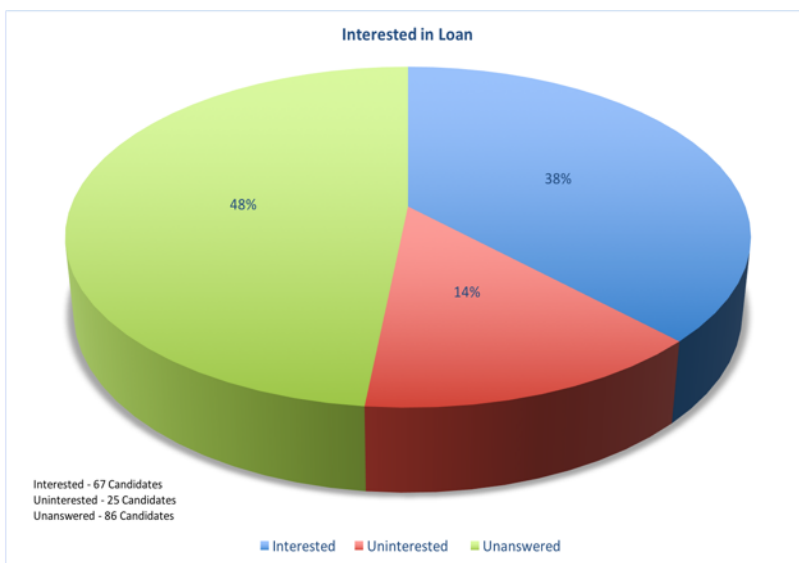


Figure 3. Most of the survey respondents who answered this question were interested in a loan (38% or 67 persons)

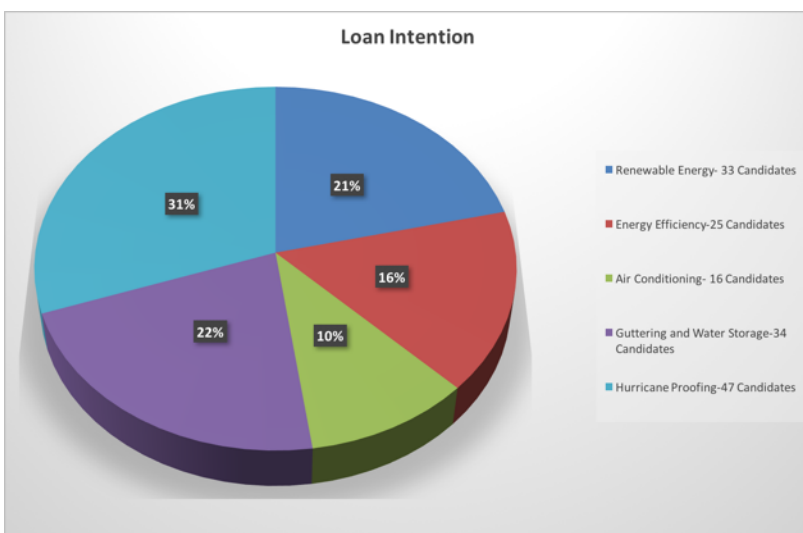


Figure 4. Of the respondents interested in accessing a loan, persons were asked to indicate the adaptation interventions that they would invest in

When asked to indicate the adaptation area that they saw as priority for their household, respondents most commonly cited hurricane resilience, followed by rainwater harvesting infrastructure. Overall energy (renewable energy and energy efficiency) was a priority for many households (combined interest of 37%).

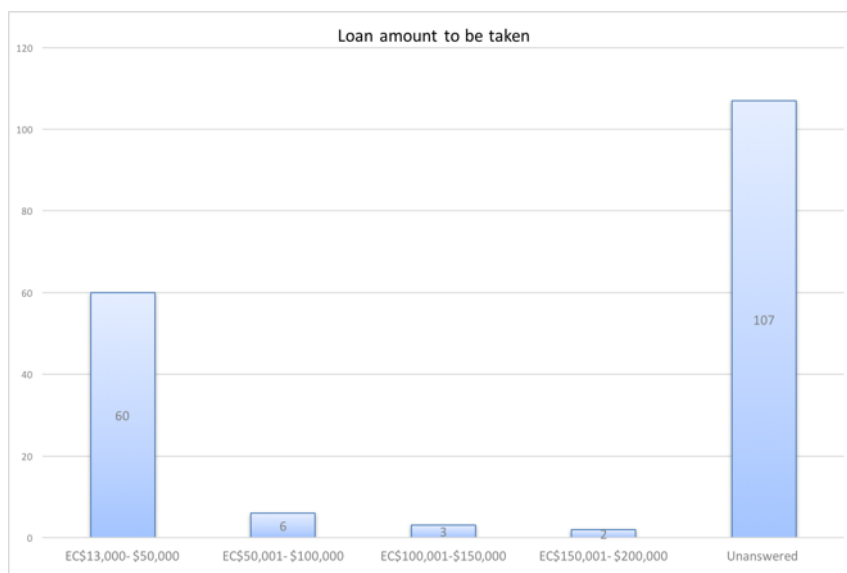


Figure 5. Indicative demand for loan size (ECD)

would request a loan between EC\$13,000 and \$50,000 (US\$5,000 and \$20,000), which is the smallest loan category available.

In the focus group discussions, persons requested that small loan sizes be made available to community members.

Eligibility for Revolving Loans for Adaptation

A key eligibility criterion for the adaptation loans is that the loan must be taken out by the homeowner. Of the persons who were interested in accessing a loan, 82% were homeowners (Figure 6).

Ability to Repay Loan

The survey results confirm that the communities surrounding the waterway way are low income communities. While the median income category of the wastewater willingness-to-pay survey indicated that the average household income was EC\$3,001 – \$5,000 of the sample population, the most common response in this survey was EC\$0 – \$1,500 (Table 1). This suggests

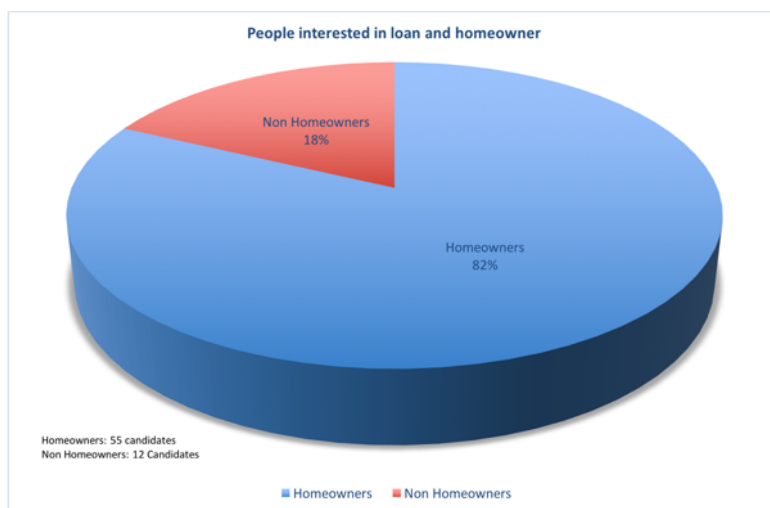


Figure 6. Breakdown of "homeowner" eligibility criteria in loan demand

that loan applicants will require longer payback periods with lower monthly amortized payments.

Table 1. The majority of survey respondents make less than EC\$1,500 (approximately US\$500) per month

Monthly Income (ECD)	Number of Respondents	Percent of Total
\$0 - \$1,500	74 persons	42%
\$1,500 - \$2,500	31 persons	17%
\$2,500 - \$3,500	18 persons	10%
\$3,500 - \$4,500	13 persons	7%
Over \$4,500	9 persons	5%
Unanswered	33 persons	19%

Furthermore, when asked about monthly savings, 42% of respondents save less than EC\$200 per month. Surprisingly, more survey respondents believe that they would qualify for a bank loan than not, however too many respondents did not answer this question to be indicative of the survey population.

Potential sources of bias

Potential sources of bias include methodological bias, recall bias and response incentive bias. Sources of methodological bias could include the timing of surveys conducted – in the late afternoon primarily during week days. Although this time period was selected due its likelihood to include working hours, it could skew the results against certain professions including persons in the services industry.

Recall bias could cause people to recall information that may not represent their situation accurately, for example if it is information that a person would not consider on a regular basis. Recall bias can also be a result of current events, for example the fact that Antigua and Barbuda has not suffered from an extreme hurricane in years could contribute to the relatively low listing of this as a priority adaptation intervention.

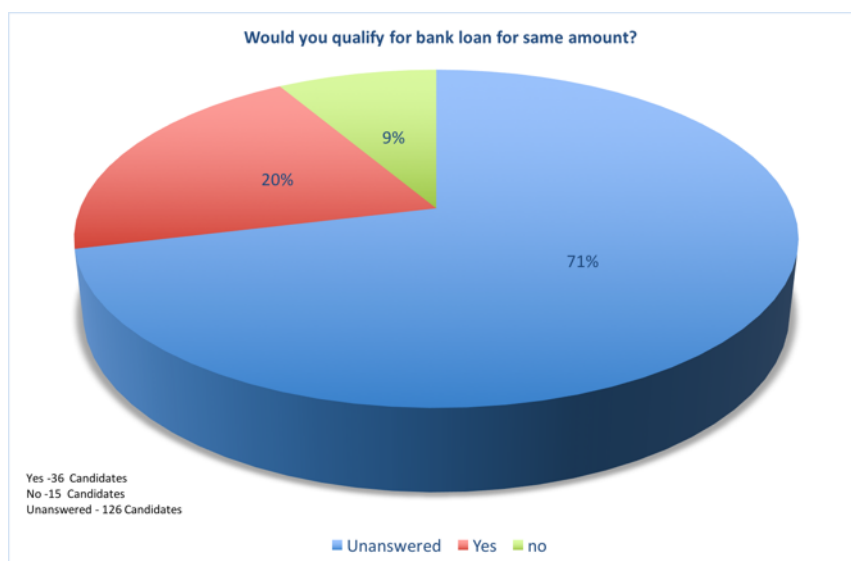


Figure 7. Participant responses when asked whether they thought that they would qualify for a bank loan

Response incentive bias could result in this case since the survey respondents were knowledgeable that the results would inform the design of the Revolving Loans Facility. This could contribute to underreporting of savings, for example.

Statistical significant tests have not been conducted on the survey results. It is recommended that additional statistical analysis be conducted on the research results to inform further analysis.

Community Groups

Component 3 of the Adaptation Fund project is to approve grants to increase resilience in community buildings and specifically emergency shelters, and also to award local community groups contracts to maintain project interventions.

The following groups were identified by respondents:

- Anglican Church
- CERT Members
- Community Watch Group
- Fort Road Community Shelter
- Grace Baptiste Church
- Grace Christian Church
- Jehovah Witness Church
- St Andrews Church, Nazarene
- St. Andrews Church
- St. Andrews Youth Group
- Steel Band Group
- Villa Adventist Church
- Yorks Community Group
- Yorks Community Shelter

Notably, churches are primarily identified as the community organizations, indicating that the churches will be an important project beneficiary. With respect to the shelters, a total of 15% of the survey respondents reported that they had, in the past, used a community shelter. One respondent advised that schools should not be used as shelters, but rather separate and purposeful community buildings should be established and renovated as shelters.

Consultations/Focus Group Data Analysis

The format of the consultations included full descriptions of the project components with the option of Question and Answer throughout the presentations. These presentations sought to provide residents with the objectives of the component, along with the proposed interventions anticipated. Specifically under Component 2, the presentation provided examples of adaptation

interventions that were eligible for funding in order to provide the framework for discussion during the focus group sessions.

Following the presentations the gathering was divided into two groups supported by a facilitator and a rapporteur.

As noted previously the following questions were used as a guide for the focus group discussions. The discussion in this section will therefore focus on how residents responded to these questions.

Guiding Questions:

1. *Would you be interested in taking out a low-interest loan to do any of the following on your home:*
 - a. *Investing of solar panels/energy efficiency/backup battery storage*
 - b. *Guttering and water storage tanks*
 - c. *Installation of hurricane shutters and improving roof systems (clips and screws)*
 - d. *Air conditioning*
 - e. *Mosquito screening*
 - f. *Waste water treatment*
2. *How much would you take out a loan for?*
3. *Do you think you would qualify for a bank loan for this same amount of money?*

Question 1: Would you be interested in taking out a low-interest loan to do climate change adaptation on your home?

During both consultations it was noted that there was a cross-section of responses. Residents expressed interest in obtaining loans for the expressed purpose but varied on what they would implement at their homes. Some respondents noted the need for solar energy, particularly as they had seen the benefits to others within their social circles. Others identified a need to reduce their vulnerability to mosquito vector borne diseases. In instances where residents noted the need for yard drainage to reduce mosquitos they specifically noted the persistence of the Zika virus.

Of note during both consultations was the request to raise homes to deal with instances of flooding. While this had not been previously considered for implementation through this project, the consultations clearly indicated that people were willing to consider costly interventions to minimize damage to their property.

Flooding consistently proved to be a chronic concern among residents. This, combined with inadequate wastewater disposal, was a significant concern for those most affected by fecal deposits in their homes during instances of flooding. Those residents were not keen to invest at all within the community as they saw no possible solution in the near future.

The project is supported by concurrent projects being implemented by the DoE, and while this project should alleviate some of the flooding concerns within the area, it is anticipated that the

IWEco (Integrating Water, Land and Ecosystem Management in Caribbean Small Island Developing States) project will facilitate homes having access to a sewage treatment plant.

Question 2: How much would you take out a loan for?

While some residents were able to identify approximations for how much they would borrow, it was noted that overwhelmingly persons needed more time to make that determination. Residents noted that they would have to assess their homes first, or find out the cost of the interventions on a localized basis.

Residents who were also retirees tended to have more one-on-one discussions with DoE staff regarding their interest in the loans. They tended to indicate lower amounts (US\$5,000 or XCD13,000) since that was more affordable based on their present income. In summary, there was no conclusive response on this question.

Question 3: Do you think you would qualify for a bank loan for this same amount of money?

Results indicate that residents were of the opinion that they would not qualify for loans at banks because of their age and/or income. This was consistent with both focus groups during both consultations.

Summary

Residents demonstrated a keen interest in the project because it would be able to holistically address the issues that their community has experienced over many years. Residents also demonstrated support for the revolving loan scheme with an average of 56% of participants completing loan application forms by the end of each consultation.

Some concerns around the project were raised which would need to be addressed during project design and implementation phase to include:

- Accessibility of loans or grants for persons with disabilities;
- Safeguards to ensure that renters who were able to access the loans did not carry that increased cost to their renters;
- Transparency regarding the selection process for persons who could access the loans

IV. Conclusion

Results indicate that there is sufficient demand to pilot the Revolving Loan Facility for adaptation. Conservatively assuming that all the persons who did not answer the survey question, “Would you be interested in a loan for adaptation” were not interested in a loan, the research indicates that 38% of the population is interested in loans for adaptation. Since the target population was estimated at 2,500, the number of households interested in accessing the loans is approximately 950. Assuming that 82% are homeowners, and conservatively that the landlords of the remaining properties are not interested in loans, then the number of households both interested and eligible will be approximately 780 households. The target number of loans under the Adaptation Fund pilot is 150 – 200 loans, indicating that the pilot

should be oversubscribed, and supporting the original hypothesis of the Department of Environment.

The landownership eligibility criteria will not apparently present a large hurdle, since 82% of the persons interested in loans were homeowners. However, loan sizes are likely to be smaller and payback terms longer in order to support a sustainable Debt to Income Ratio for borrowers in target communities. The income of the surveyed population is reportedly low, consistent with field observations and prior assessments of the communities.

Adaptation priorities are consistently spread across sectors. Survey responses indicate that priorities are evenly distributed across hurricane resiliency measures, energy interventions (renewables and efficiency), and water technologies.

V. Bibliography

Statistics Division, 2011. *Antigua and Barbuda 2011 Population and Housing Census: Book of Statistical Tables I*. Published April 2014.

Richards & Associates, 2009. *Social-Economic Residential Survey of St. John's and St. John's Rural on Wastewater Management and other Practices for Antigua's Northwest Coast*. October.

The CARIBSAVE Partnership, 2015. *Vulnerability Impact and Adaptation Analysis in the Caribbean: Local Vulnerability Analysis for Antigua and Barbuda*. Regional Office for Latin America and the Caribbean (UNEP-ROLAC).



Adaptation Options in Buildings

Antigua & Barbuda

Preparing for Climate Change

Climate change trends for Antigua and Barbuda suggest the following:

- The Caribbean could be 3°C warmer on average by 2070, which can cause heat stress to people, and increase mosquito breeding, contributing to virus outbreaks
- Antigua and Barbuda will likely receive less rainfall in the future – possibly up to 40% less
- At the same time, the country can expect greater downpours, leading to more frequent flooding
- There is a risk of more extreme hurricanes in the future

The Department of Environment in the Ministry of Health and the Environment has established a Revolving Fund to assist home and business owners prepare for climate change by adapting our infrastructure over time.

A number of adaptation options are provided here to help building owners be prepared. The best adaptation options are ones that give the owner value TODAY – not only in the future – by meeting your immediate needs.

Information in this Packet

This information package presents standard adaptation options for: Energy, Buildings, Flooding, Vector Control, Water, and Temperature.

Each page covers one adaptation option, it includes a description, the benefits – including potential economic benefits, and requirements. An approximate budget is included and payback information, however all of this information is subject to change. More details specific to household circumstances can be determined with the staff of the Department of Environment.

Questions? Contact Us at the Department of Environment

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ADAPTATION FUND



Resilient Solar Renewable Energy System

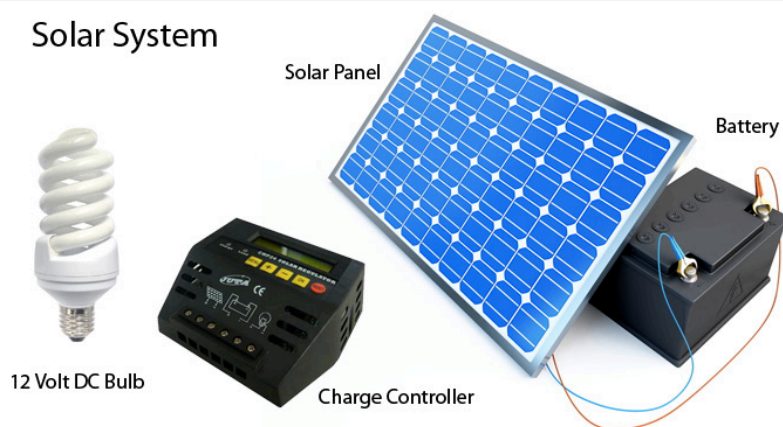
Description

Solar panels are a **distributed renewable energy** system – electricity can be generated in small scales at different sites, such as on rooftops. **Energy resilience** means that the electricity supply is consistent and uninterrupted. Coupling solar panels with a battery system means that buildings can receive energy when the grid is down. The **environmental benefit** of solar is that it generates electricity without burning fossil fuels, thereby reducing carbon dioxide emissions, helping solve climate change, and supporting cleaner air in Antigua and Barbuda.

Adaptation Benefits

Grid-interactive solar (which means that the solar is connected to the grid but also has a battery system) can help households and small businesses to have electricity immediately after a power outage, such as post-hurricane.

Solar System



Economic/Other Benefits

The cost of solar energy installation, spread out over the life of the technology, can be about one third of the cost of standard utility bills.

Requirements

An energy audit is recommended. The roof should be sturdy, and have a gentle south-facing slope so that the panels face the sun. The owner should assess risks of theft and hurricane damage.

Est. Budget	Description	EC\$
Materials	3 kW solar system + 2 yr warranty	
Labour	Installation costs	
	Total:	EC\$42,000

❖ Assuming an interest rate of 3% and a payback period of 5 years

❖ Monthly payments = EC\$755
❖ Sum of repayments = EC\$45,281



Solar Water Heater

Description

Solar water heating collectors capture and retain heat from the sun and transfer this heat to the water. Solar water heaters are energy efficient devices, “eliminating” the need for electricity or gas for water heating (except for water pumping costs) and using sunlight instead, saving up to 100% of water heating operating costs.

Adaptation Benefits

Solar hot water heaters do not require any other inputs, and so they can continue to supply hot water post-disaster. “Load-shedding”, when energy intensive appliances are replaced with alternatives, helps make solar energy meet a building’s electricity needs.



Economic/Other Benefits

Solar hot water heaters reduce electricity cost that would otherwise have been spent heating water.

Requirements

Installation should be secure to withstand strong hurricane winds.

Est. Budget	Description	EC\$
Materials	26 Gallons	\$3,750
Labour	Installation	\$500
	Total:	EC\$4,250

❖ Assuming an interest rate of 3% and a payback period of 2 years

❖ Monthly payments = EC\$183
❖ Sum of repayments = EC\$ 4,384



Energy Efficient Appliances

Description

Globally, buildings account for over a third of total energy use; typically 10 to 20% of energy is consumed during manufacturing and assembly of building materials, construction, maintenance, refurbishment and demolition. Some 80 to 90% of a building's energy is used, over the life of the building, for heating, cooling, lighting and ventilation, and house appliances (laundry machines, televisions, refrigerators, etc). Energy efficient appliances that meet regional standards can be purchased through the Revolving Loan Facility.

Adaptation Benefits

Replacing appliances with efficient ones helps, or "load-shedding", helps make solar energy more viable to meet the building's electricity needs.



Economic/Other Benefits

Energy efficient appliances are a win-win or people and the environment, because they help to reduce energy bills, and reduce carbon emissions from the burning of fossil fuels.

Requirements

For items to be disposed, there must be a solid waste management plan in place.

Est. Budget	Description	EC\$
LED lightbulbs	10 bulbs	\$130
Refrigerator	E.g. Energy Star	\$8,000
	Total:	EC\$8,130

❖ Assuming an interest rate of 3% and a payback period of 2 years

❖ Monthly payments = EC\$350
❖ Sum of repayments = EC\$ 8,387



Roof Reinforcements

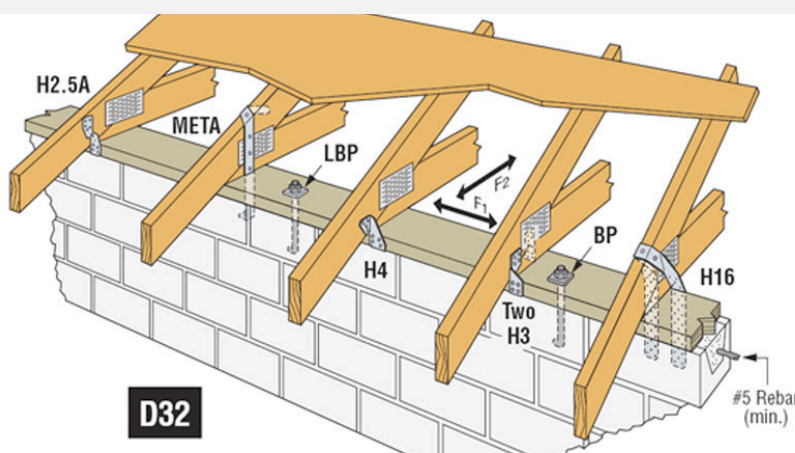
Description

All buildings in Antigua and Barbuda should be able to withstand a Category 5 hurricane. Reinforcing roof structures by replacing galvanize, replacing beams and installing hurricane clips is an important investment for the next hurricane.

This adaptation activity can be coupled with air ventilation or air conditioning adaptations, or roof adjustments in order to install solar energy or solar water heaters.

Adaptation Benefits

Buildings will be able to withstand extreme hurricanes. People will be safer at home during extreme events.



Economic/Other Benefits

This adaptation should not impact day-to-day cost of living for borrowers.

Requirements

This adaptation assumes that the walls and foundations are strong.

Est. Budget	Description (assuming 1,200 sq ft)	EC\$
Materials	Galvanize \$10 per sq ft	
Labour	Installation \$20 per sq ft	
	Total:	

- ❖ Assuming an interest rate of 3% and a payback period of 5 years
- ❖ Monthly payments = EC\$
- ❖ Sum of repayments = EC\$



Strengthening Windows and Doors

Description

All buildings in Antigua and Barbuda should be able to withstand a Category 5 hurricane. Reinforcing windows and doors is an important adaptation measure to bring buildings into compliance with the Building Code, and prepare our infrastructure for hurricanes and extreme weather.

Adaptation Benefits

Buildings will be able to withstand extreme hurricanes. People will be safer at home during extreme events.

Economic/Other Benefits

This adaptation should not impact day-to-day cost of living for borrowers.



Requirements

Assumption that the walls and foundations are strong. This installation process can easily be coupled with installation of mosquito screens, and/or air ventilation and air conditioning.

Est. Budget	Description (concrete buildings)	EC\$
Materials	Per door (\$550), per window (\$550)	\$1,100
Materials	Per hurricane shutter (\$750)	\$750
Labour	Installation	\$1,750
	Total:	\$3,600

❖ Assuming an interest rate of 3% and a payback period of 2 years

❖ Monthly payments = EC\$155
❖ Sum of repayments = EC\$ 3,713



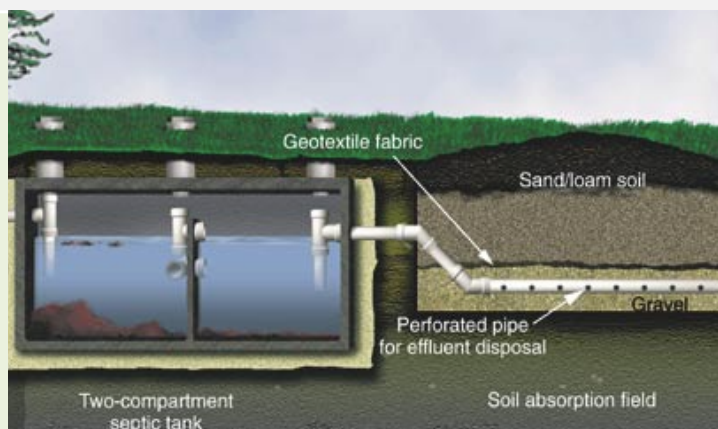
Community Septic Systems for Building Density

Description

Community Septic systems, also known as central septic systems, are septic systems that receive black waste or wastewater in volumes exceeding 2,500 gallons per day, or systems that receive black waste or wastewater from more than two homes or more than two buildings under separate ownership. Adaptation is also relevant for our style of development. Research has shown that single family detached houses take up a lot of land, convert beneficial greenery areas and waterways, and are contributing to environmental problems we are facing.

Adaptation Benefits

Limiting single family type development is an adaptation, and doing this requires proper septic systems. Adaptation loans are available to support community septic systems, which will enable sustainable urban development by building up – not out.



Economic/Other Benefits

Community septic systems can benefit developers and landowners by permitting compact development with smaller lotsizes and reduced infrastructure costs.

Requirements

This requires that two or more households or businesses propose a joint venture to develop a community septic system. Adequate land and joint agreements are required.

Est. Budget	Description	EC\$
Materials		
Labour		
	Total:	\$12,380

❖ Assuming an interest rate of 3% and a payback period of 5 years

❖ Monthly payments = EC\$221
❖ Sum of repayments = EC\$ 13,271



Water Storage

Description

Buildings in Antigua and Barbuda are required to have rain water harvesting in place, however enforcing this can be difficult. For buildings that do collect rainwater, the storage capacity is not always enough to serve the household or building occupancy.

Adaptation Benefits

Rainwater harvesting is a win-win for people and the environment. It helps households to have water during drought, and collecting rainwater can reduce flooding because it diverts runoff.

Economic/Other Benefits

Rainwater harvesting helps to reduce your water utility bill.

Requirements

Guttering is required. The Revolving Loan Facility can provide loans for buildings to install guttering and other water infrastructure.



Est. Budget	Description	EC\$
Materials	1,000 gallon tank + base	\$2,950
Labour		\$950
	Total:	\$3,900

❖ Assuming an interest rate of 3% and a payback period of 2 years

❖ Monthly payments = EC\$168
❖ Sum of repayments = EC\$ 4,023



Water Use Efficiency

Description

Do you have leaky taps or toilets that use way too much water to flush? Water use efficiency targets demand-side management – how much water people are using in homes and buildings. Residential water efficient appliances along with water reuse technologies (such as grey water recycling) can reduce water demand by 50%. Other measures especially for backyard gardens include drip irrigation. These measures are critical as Antigua and Barbuda is expected to experience more extreme droughts in the future.

Adaptation Benefits

Fresh water resources are severely threatened by climate change, especially in Antigua and Barbuda which is already susceptible to slight changes in rainfall due to its lack of natural water sources. Water use efficiency is a cost-effective water conservation measure.



Economic/Other Benefits

Water efficiency means less demand on energy infrastructure through less pumping, and the costs of combining water storage + efficiency are lower than just building storage.

Requirements

Running water in the household. If pipes are leaky, then residents may also wish to repair pipes as part of the water efficiency measures.

Est. Budget	Description	EC\$
Materials		
Labour		
	Total:	

❖ Assuming an interest rate of 3% and a payback period of 5 years

❖ Monthly payments = EC\$
❖ Sum of repayments = EC\$



FLOODING

Green Infrastructure (Pervious Surfaces)

Description

Pervious, or “penetrable”, surfaces means that water can be absorbed through the surface into the ground. When it rains, if there are only hard or impervious surfaces, the water runs off the land, carrying soil and waste with it, and often causes flooding on properties.

Green infrastructure and “pervious concrete” can help reduce flooding.

Adaptation Benefits

Installing surfaces that have areas for water to soak into the ground helps to reduce runoff, recharge groundwater sources, and reduce flooding. Depending on your preference, it also looks nice!



Economic/Other Benefits

This adaptation should not impact day-to-day cost of living for borrowers.

Requirements

Est. Budget	Description	EC\$
Materials		
Labour		
	Total:	

❖ Assuming an interest rate of 3% and a payback period of 5 years

❖ Monthly payments = EC\$
❖ Sum of repayments = EC\$



VECTOR CONTROL

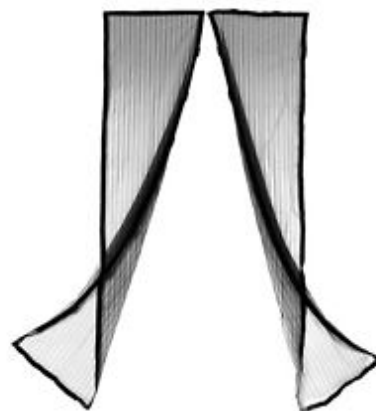
Mosquito Screens

Description

Mosquito mesh on windows and doors offers protection against mosquitos and other insects, protecting against the diseases they may carry, such as dengue fever, Chik-V and Zika. To be effective the mesh of a mosquito net must be fine enough to exclude such insects without reducing visibility or air flow to unacceptable levels.

Adaptation Benefits

Mosquito breeding and therefore disease outbreaks are linked to climate variability – including rainfall and temperature. This adaptation helps to protect health and reduce outbreaks.



Economic/Other Benefits

This adaptation should not impact day-to-day cost of living for borrowers.

Requirements

Windows and doors should be structured to accommodate mosquito screens.

Est. Budget	Description	EC\$
Materials	Mosquito netting 4 sq ft	\$100
Labour	\$100 per 4 sq ft of window area	\$400
	Total:	\$500

❖ Assuming an interest rate of 3% and a payback period of 2 years

❖ Monthly payments = EC\$21
❖ Sum of repayments = EC\$ 516



TEMPERATURE

Indoor Air Quality

Description

Climate change may worsen existing indoor air quality, and it may introduce new problems as outdoor conditions become more severe. Our homes and buildings, where we spend most of our time, protect us. The design, construction, operation and maintenance of buildings can impact the air we breathe, our energy consumption, and our health. Natural ventilation and shading can help control indoor temperatures and the quality of air. This is a good adaptation option to couple with roof retrofits, windows or door replacements and designs.

Adaptation Benefits

Increasing temperatures and changes in wind and other ambient factors can negatively impact indoor air quality. This is especially true in businesses where people are indoors for long periods of time.



Economic/Other Benefits

This adaptation should not impact day-to-day cost of living for borrowers. If indoor areas are cooled, ventilation could increase air conditioning costs.

Requirements

Monitoring air quality is a simple way to determine indoor air quality. Dealing with source pollutants is the most effective solution to improving indoor air quality.

Est. Budget	Description	EC\$
Materials		
Labour		
	Total:	

❖ Assuming an interest rate of 3% and a payback period of 5 years

❖ Monthly payments = EC\$
❖ Sum of repayments = EC\$



Air Conditioning

Description

October 2015 set several new records for the top-ten hottest days in Antigua and Barbuda. Climate change is likely to cause more extreme heat waves, and also warmer nights. Air conditioning is one way to protect health from heat stress. Most residential air-conditioning systems do not bring outdoor air into the house mechanically; advanced designs are starting to add a mechanical feature that brings outdoor air into the building.

Adaptation Benefits

Protect human health from heat stress, especially during hot nights for sleeping and daytime productivity.



Economic/Other Benefits

This adaptation could result in an increased cost of living for borrowers. This measure should be coupled with energy efficiency and/or solar energy adaptations to reduce cost of living.

Requirements

Air conditioning installation should be guided by the building code. Vents intake pipes should be located away from septic tanks.

Est. Budget	Description	EC\$
Materials		
Labour		
	Total:	

- ❖ Assuming an interest rate of 3% and a payback period of 5 years
- ❖ Monthly payments = EC\$
- ❖ Sum of repayments = EC\$

Appendix 6. Community center checklist for component 3 technical assessment



COMMUNITY CENTRE CRITERIA CHECKLIST

For Adaptation Fund Component 3 Rapid Assessment of Shelter Potential and Conditions during Disasters

I. ASSESSING AGENCY DATA

Agency/Organisation Name _____ Immediate needs identified ☐ Yes ☐ No ☐ Unk ☐ NA

Assessor Name/Title _____

Phone _____ - _____ Email or Other Contact _____

II. FACILITY TYPE AND NAME

Shelter Type ☐ Community Recovery ☐ Special Needs Home ☐ Other _____

Date Shelter Designated ____/____/____ (mm/dd/yr) Date Assessed ____/____/____ (mm/dd/yr)

Time Assessed ____:____:____ ☐ am ☐ pm

Reason for Assessment ☐ Preoperational ☐ Initial ☐ Routine ☐ Other _____

Location Name and Description _____

Street Address _____

Facility Contact/ Title _____

Facility Type ☐ Church ☐ Community Centre ☐ School ☐ Other _____

Facility Ownership ☐ Private ☐ Government ☐ NGO ☐ Other _____

Phone _____ - _____ Email or Other Contact _____

Estimated Capacity _____ Number of Residents _____ Number of Staff/Volunteers _____

III. BUILDING LOCATION

Easily accessible ☐ Yes ☐ No ☐ Unknown ☐ NA

Adequate parking space ☐ Yes ☐ No ☐ Unknown ☐ NA

Not in a flood plain ☐ Yes ☐ No ☐ Unknown ☐ NA

Not on fill, rock, or soft deposits ☐ Yes ☐ No ☐ Unknown ☐ NA

Not in coastal plain ☐ Yes ☐ No ☐ Unknown ☐ NA

Sheltered from high winds ☐ Yes ☐ No ☐ Unknown ☐ NA

Not threatened by mudslides or landslides ☐ Yes ☐ No ☐ Unknown ☐ NA

Threat of falling trees, boulders, power lines or flying debris ☐ Yes ☐ No ☐ Unknown ☐ NA

Close to potential hazardous material ☐ Yes ☐ No ☐ Unknown ☐ NA

Threat of dam or reservoir failure ☐ Yes ☐ No ☐ Unknown ☐ NA

IV. BUILDING DESIGN AND LAYOUT

Building is regular in shape (square or rectangular) ☐ Yes ☐ No ☐ Unknown ☐ NA

Length is no more than 3 times the width ☐ Yes ☐ No ☐ Unknown ☐ NA

Has at least 2 entrances and exits ☐ Yes ☐ No ☐ Unknown ☐ NA

At least two wheelchair accessible entrances/exits (3 feet wide or double doors) ☐ Yes ☐ No ☐ Unknown ☐ NA

Two stories or less ☐ Yes ☐ No ☐ Unknown ☐ NA

Ceiling height is 10 feet or more ☐ Yes ☐ No ☐ Unknown ☐ NA

V. FACILITY

Structural damage ☐ Yes ☐ No ☐ Unk ☐ NA

Security/ law enforcement ☐ Yes ☐ No ☐ Unk ☐ NA

Water system operational ☐ Yes ☐ No ☐ Unk ☐ NA

Solar water pump operational ☐ Yes ☐ No ☐ Unk ☐ NA

AC system operational ☐ Yes ☐ No ☐ Unk ☐ NA

Adequate ventilation ☐ Yes ☐ No ☐ Unk ☐ NA

Adequate space per person ☐ Yes ☐ No ☐ Unk ☐ NA

Free of hazards ☐ Yes ☐ No ☐ Unk ☐ NA

Free of pest/vector issues ☐ Yes ☐ No ☐ Unk ☐ NA

VI. SLEEPING AREA

Adequate # of cots/beds/mats ☐ Yes ☐ No ☐ Unk ☐ NA

Adequate supply of bedding ☐ Yes ☐ No ☐ Unk ☐ NA

Bedding changed regularly ☐ Yes ☐ No ☐ Unk ☐ NA

Adequate spacing ☐ Yes ☐ No ☐ Unk ☐ NA

Areas designated for family units ☐ Yes ☐ No ☐ Unk ☐ NA

Acceptable level of cleanliness ☐ Yes ☐ No ☐ Unk ☐ NA

VII. DRINKING WATER AND ICE

Adequate water supply ☐ Yes ☐ No ☐ Unk ☐ NA

Adequate ice supply ☐ Yes ☐ No ☐ Unk ☐ NA

[illegible]

AN INTEGRATED APPROACH TO PHYSICAL ADAPTATION AND COMMUNITY RESILIENCE IN ANTIGUA AND BARBUDA'S NORTHWEST MCKINNON'S WATERSHED

Technical Feasibility Study

Prepared for the Department of Environment Ministry of Health and
the Environment, Antigua and Barbuda

By Bernard-Marie Gagnier

June 20th 2016

Table of Contents

1. Introduction	3
2. Scope and methodology of Feasibility Study	4
2.1. Socio-Economic.....	4
2.2. Ecosystem-based Adaptation.....	5
3. Site description.....	6
3.1. Geographic.....	6
3.1.1. Land Use	8
3.2. Geology.....	10
3.3. Hydrology Management	10
3.4. Sustainable development.....	12
4. Meteorology.....	14
4.1. Rain	15
4.2. Drought	18
5. Observations and feasibility analysis	19
6. Recommendations	26
6.1. Baseline Data.....	30
ANNEXE 1	34
ANNEXE 2	36
Bibliography	37

1. Introduction

The purpose of this study is to examine the feasibility for the implementation of cost-effective adaptation measures for the three components of the Department of environment's project by implementing adaptation in the environment and in the community, building both natural and social adaptive capacity at the same time by implementing adaptation in the watershed and waterways.

Component 1 is through climate resilient drainage systems. Component 2 is implementing a loan program for homes and business owners for adaptation; and Component 3 is providing grants to the community and NGOs to get their buildings ready for climate change, where upgraded community buildings can serve as hurricane shelters, community cisterns as emergency water reserves, and learning centers to strengthen social capital,

This first step is focused on the water course and the problem of the flood. In fact, the waterway is in a big part of the problem and a part of solution. If the peoples in the neighboring of this "river" could take ownership of this environment and use it like a tool of development by changing it into an urban park adapting green and low impact development into a source of protection more than a source of problem a part of the problem could be solved. During this time there is many things to do by many stakeholders.

Create community groups with the skills and capacity they need to maintain the waterway clean and efficient, with assistance and in partnership with the Government.

McKinnon and Yorks low land have suffered of five hurricane and two large flooding events into the last 20 years. These should presage other extreme event that will appended and effects could be worst or more extreme with the climatic changes. One zone in particular of this watershed has suffered more particular in 1999 and still 2014 the stigmas are still there. This zone is mostly inhabited by a low income community and a visit shows that they are mostly retired workers living in the day with grandchildren and mono-parental granddaughter. Some other zones are squatted by peoples who do not have enough income to be elsewhere.

This zone is also definite by haphazard development and by the filling the traditional drainage system to convert the wet lands on economical land ready to reuse without any appropriate adaptation system for compensation of drainage lost neither the benefice of wet lands to retain water and doing water treatment.

2. Scope and methodology of Feasibility Study

The scope of this study is to undertake a technical feasibility assessment of the proposed concrete adaptation actions under the three components to achieve project goals, namely:

- a. Adaptation interventions at the household level and in community buildings in the project area
- b. Evaluate the risk, look for the cause of flooding and mitigation action to do
- c. Establishment of buffer zones around waterways to prevent building in flood risk zones
- d. Look for vegetation coverage to reduce erosion
- e. Construction of check dams/retention ponds to reduce flooding
- f. Re-engineering of waterways to prevent flooding in urban areas
- g. Bio-remediation to improve water quality and prevent disease vectors
- h. Clearing of blocked waterways to prevent flooding.

Specific attention was paid to existing baseline data and gaps, feasibility of the project budget for the scope of activities, and recommendations to facility implementation and achieve project goals.

The study was implemented from 13th June to 25th July 2016, and included one in-country mission for 10 days, facilitated by the Department of Environment and the engineers on staff.

2.1. Socio-Economic

Antigua and Barbuda's population is approximately 91,000 (2014). In 2012, 30% of the population was classified as urban (CIA 2015), with a trend towards increasing urbanization. City of St-John's is the capital and the center of the government.

Northwest McKinnon's watershed is located north of St-John's on the island of Antigua. Most of this area is to be considered as urban to sub-urban.

From 2009 to 2011, Antigua's economy was severely affected by the global economic crisis., there was a steep decline in tourism arrivals, which severely impacted employment opportunities within the country's private sector and combine with the decline or the agricultural (exports) sector

who represent now less than 3% of the economy had placed pressure on the Government the country has not yet returned to its pre-crisis growth levels. (CIA 2015)

The economy and the international credit rating of the Government and the local credits options available to many citizens (especially those working in sectors vulnerable to hurricanes and drought) have been negatively impacted by over six hurricanes (two majors) and three droughts in the past 15 years (DOE 2015-2016). For Antigua and Barbuda, the extreme weather events are not carefully documented (DOE 2015-2016).

To control the economy the government have fixed the actual prime rate at 6,5% and the commercial rate for private banks is around 10%, facing with a unemployment of over 11% (CIA 2015) the impact is felt on the ground and it is another factor causing hardship for the low income class and most of the citizens are now limited for financing appropriate goods and services for health and development resulting in higher level of vulnerability for a large part of the population and specially for those who are retired or who doesn't have large revenues. (R- 1)

2.2. Ecosystem-based Adaptation

Facing population growing, tourism base economy without lakes, rivers or natural springs to provide surface fresh water combined with the pressure of demand on well, the sea water has seeped into the water table, corrupting wells. This fact is becoming a major problem for the country. Except for the rain-water harvesting, the Reverse Osmosis is become the only other source of potable water (DOE 2015-2016). (R-2)

Power is mainly provided by generators using fossil fuel. There is some solar field but they are not enough to provide significant energy to be notify. The country does not produce any fuel neither other sources of energy. So all the country is dependent of external sources of energy for Power and potable water (CIA 2015).

If we add the fact that the base development of the island was done on rural or sub urban development most of the sanitary development is done by septic tank and there is no legislation or regulation to maintain the equipment in good standing. This is particularly a problem in the denser area mainly when the water table is high and the backyards are small. (R-3)

Antigua was affected in the last years by many extreme events, after a storm, the electricity grid can be interrupted, depending on the magnitude of the event, for anywhere between 2 weeks to 3 months. This long period to remain to normal and stable state have to be studied and corrected,

hence the importance of individual infrastructures to help people of the area to be more independent. R-3

According viewpoints; development seems anarchic but in fact it is based mainly on economic values and some planning issues, the developers seem to have forgets to integrate all stakeholders of the development of many part of McKinnon low lands. Rules, regulation and surveys look to be linked mainly with economic development, but the economic point of view has to pass by the sustainable development who include the environment. And environment included rain sewers, rainwater way, sanitary sewers, potable water, urban development packs and sanitation then all the points included into the sustainable development.

Adaptation and sustainable development are concepts in phase of implementation in Europe and North America. These concepts include social and environmental point of view into development like stakeholders. The development, usually has no impacts at the beginning into the community but insidiously problems arrive when some stakeholders was not parts of the studies, when some effect arrived the first time in the area or in the country like the drought of 2015, the economic crisis of 2008, the hurricane of 1999. These events requested a lot of resilience and adaptation of the community.

3. Site description

The watershed of McKinnon;s-York area is draining the hills south of the airport and the northwestern part of Saint John's. The relief vary from 2 to 30m above the sea level.

This watershed is doing around 7, 5 square km. (around 1860 acres or 750 hectares).

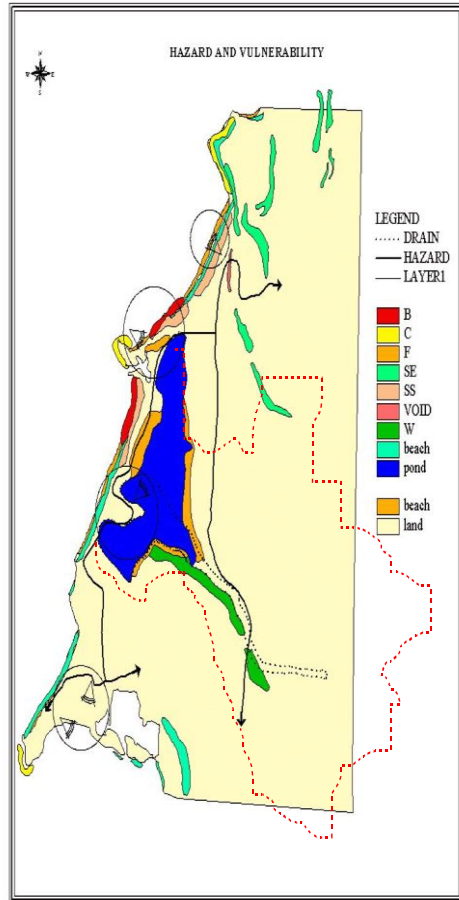
3.1. Geographic

The area of this study is located in the Northwest of the Antigua Island. Bordered by the sea to the west and about 3.5 kilometers at the East to the hilltops of the area Piggots. The top of these hills rising up to 30m ASL (above sea level).

The area of the McKinnon Pond around 200 acres was studied in detail in 2002 by Jackson who makes a large survey and observations still up to date.

There is no detailed topographic map of the area of this study.

Figure 1. From Jackson 2002 Hazard and vulnerability MTE 2002

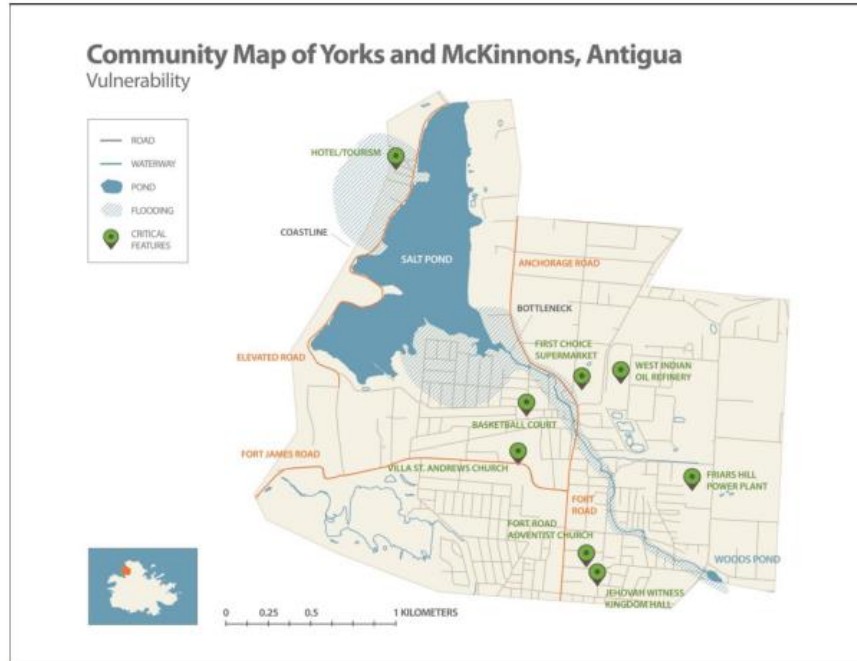


The maps of “hazard and vulnerability” illustrate that in 2002 Jackson has identified several problems (figure 1) and some are still observed during the survey on 2016 like the wastewater pollution is still remaining.

The figure 2 show the area defined as vulnerable for flooding. It shows that there is a large part south of the pond that could be flooded.

Key to Legend	
B	Severe beach erosion and beach loss
C	Severe cliff erosion
F	Area prone to flooding
SE	Slopes > 40% vulnerable to slope erosion
SS	Properties vulnerable to storm surge/waves
W	Wastewater pollution

Figure 2. Area of vulnerability for flooding



As we saw on Figure 2, a big part of the south of the pond is vulnerable for flood. Probably a detailed topographic survey will show that this area has less than two meters over the level of the pond. The pond has an area of 200 acres and the watershed of almost 2000 acres.

The slope from the hill is going down fast and most of the watercourse after the Woods mall and especially after the "Upper fort road" changing the speed of the drainage and the return to

the sea.

In fact, the McKinnon pond is acting partially like a plug onto the way of drainage mainly because the exit of the pond is very small.

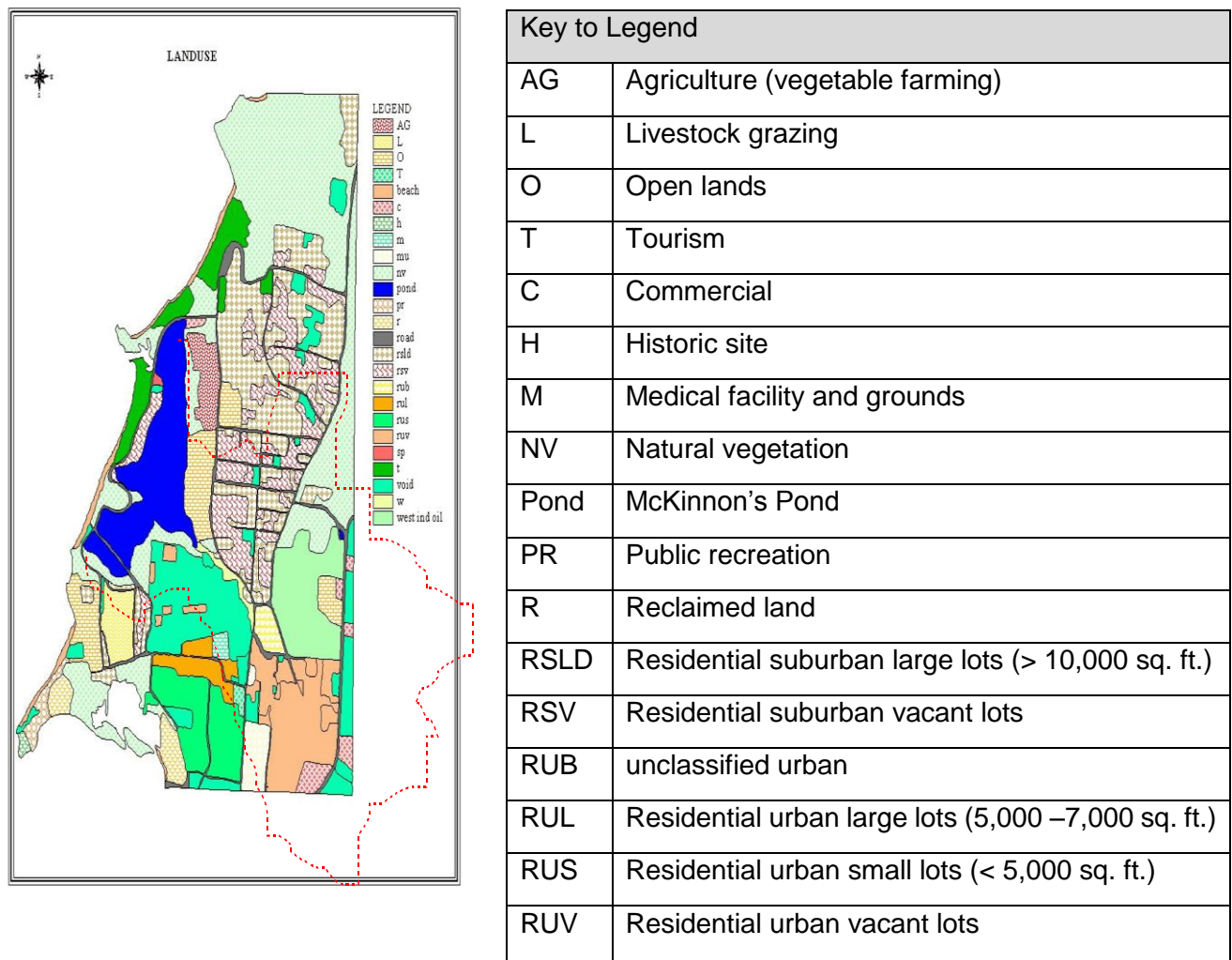
Example: if we are considering that evaporation and infiltration represent 10%, a rain of 100 mm into the watershed will carry enough water to fill around 900 mm of water into the pond. And evacuation to the sea will be done slowly.

3.1.1. Land Use

McKinnon's Pond is a major feature of the landscape and hydrology of the NWC. The Pond is hydrologically linked to surrounding areas, particularly the low lying adjacent areas < 3m ASL in Yorks, McKinnon's. Adjacent lowlands are poorly drained and are typical of flood plain areas providing temporary storage and slow release of storm water. Development adjacent to the Pond in Yorks and other areas has reduced the Pond's natural flood mitigation function.

As a flood mitigation measure, permeable soils should not be replaced by soils that retard ground water recharge during land reclamation and the low land and waterway must not be filled. The capacity of the surface to provide infiltration must be remain.

Figure 3: Land use of the McKinnon-York area (MTE 2002)



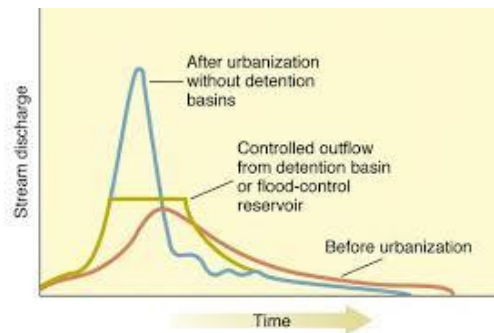
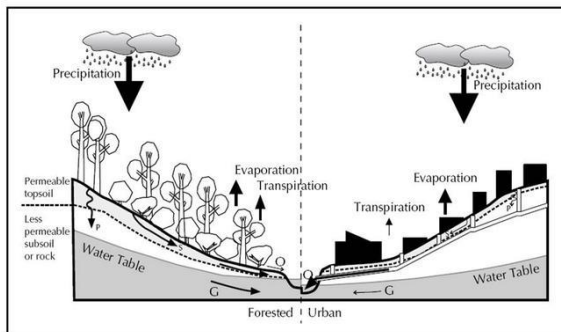
3.2. Geology

It is identified five large soil series for Antigua, the area of McKinnon-Yord and the city of St-John's are located in an area constituted mainly by "Deep kaolinite clay soils": found of the Central Plain. This type of soil is hard to work and is characterized with a weak permeability whose impacts on water resources and wastewater disposal and water infiltration after a rain,

This low permeability of this soil makes it almost impossible for wastewater disposal by the traditional subsurface means, thus resulting in potential health and environmental problems. Then it is normal to see some resurgences of wastewater from some backyards.

3.3. Hydrology Management

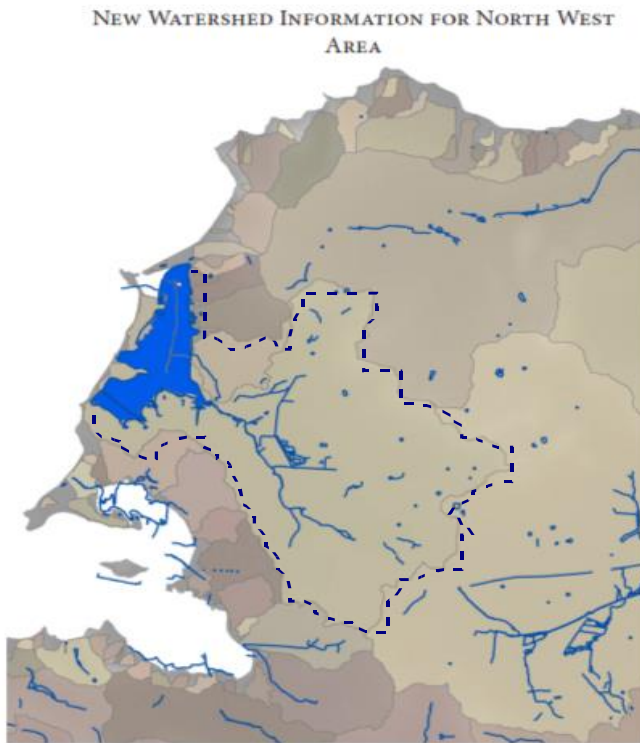
Figure 4. General view of the Runoff or hydrologic cycle. Figure 5. Typical hydrograph curves from before and after development



The dominant process that characterizes the rainfall/runoff behavior of "an original catchment" is retention. Any attempt to create sustainable urban landscapes must incorporate retention practices, green infrastructures (USEPA web site) and Low impact development

Green infrastructure is a cost-effective, resilient approach to adapt and managing wet weather impacts that provides many community benefits. While single-purpose gray storm water infrastructure—conventional piped drainage and water treatment systems—is designed to move urban storm water away from the built environment, green infrastructure reduces and treats or catch storm water at its source while delivering environmental, social, and economic benefits.

Figure 6. Watershed of York - McKinnon (North West area) from: Physical Development Planning, Local Area Plans and Watershed Delineation (Environment presentation 2015)



It could be considered as green infrastructure in Antigua : Rooftop and parking drainage sent to a retention or an underground reservoirs, rain water harvesting, , rain garden, planter boxes, Bio wales, permeable pavement with under pavement drainage, green street alley, green parking, urban tree canopy, land and wet land conservation.

The use of natural drainage picks up storm water leaves impervious areas. Rather than collect and move storm water rapidly to a centralized location for detention and treatment, the goal of these strategies is to take advantage of undisturbed vegetated areas and natural drainage patterns (e.g., small headwater drainage features). These strategies will extend runoff flow paths and slow down flow to allow soils and vegetation to treat and retain it. Using natural systems or green infrastructure to

provide communities with environmental services is often more cost effective than traditional drainage systems, and they provide more ancillary benefits.

Green infrastructure and Low impact development will help to manage the rain flow and to create more adapted drainage system for usual tropical rain.

But the consequence of the peak flow shift from stable state before-to instability erosion or flood after. The watershed (figure 5) is covering an area of 750 hectares (7, 5 km²).

The area is drained from the east to the pond by a main stream following the south border of the watershed, in the other part there is another watercourse flowing from the north to the south and joining the first stream at around 600 m from the beginning of the pond. Jackson have identify and design a proposal for how he want to see the watercourse in 2002 (figures 6 and 7).

The watercourse have a mean slope of 0,1% (30m in 3km) but the slope before the pons is very low then the speed change from the Woods Mall to the "door" of the McKinnon's pond.

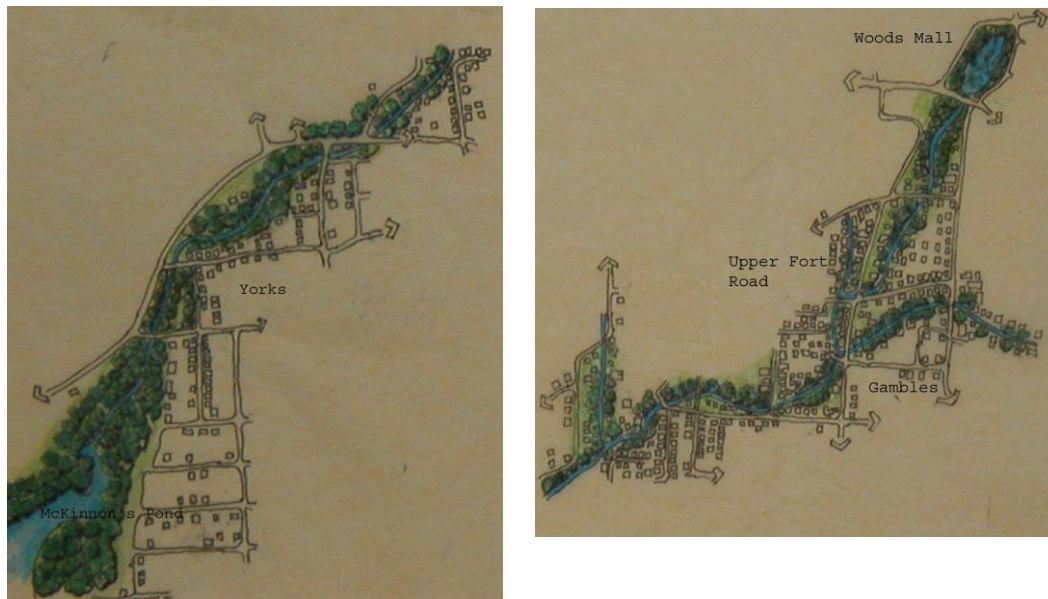
From the previous works there is now more developed area less trees, grass and natural lands.

Developed area mean more bitumen more roof and less area for infiltration or to retain water.

By the pass all along the waterway there was pond and water points. Developed of this area have change the physiognomy of the waterway. It is today looking like an urban river or a small green ribbon view from the sky

During rain or storm, there is less water retention so the flow is faster and arrives faster in low slope areas near the pond causing risk of flooding.

Figure 7. & 8. : Watercourse or drainage of the McKinnon-York watershed. (MTE 2002)



3.4. Sustainable development

Sustainable development is characterized by meeting the needs of today without compromising the needs of future generations. It is adapting the standard of living by protecting human health, conserving the environment, using resources efficiently and advancing long-term economic growth in respect of all the stakeholders.

Natural areas perform a multitude of functions: maintenance of groundwater recharge and base flow, prevention of stream erosion and flooding, and protection of water quality. In other words, they perform the same functions as a storm water management systems! As defined previously Green infrastructures and Low impact development are two concept developed on the same basement.

Here is some measures to mitigate and adapt the development against flood.

- Settlement ponds add area where water could be stock temporary,
- Sediment traps to prevent accumulation of sediments who can bother the normal waterway.
- Artificial impoundments, to stop water on strategic points.
- Open space networks in urban areas, by creating urban park and site to let the water staying on place and be or evaporated or infiltrated.
- Flood plain protection, make sure that there is nothing to disturbed the waterway and adapt the vegetation and trees to a possibility of plants submergence during and after tropical storms.
- Drainage easements for 1 in 25 year storms (drainage easements are often in the form of building setback from natural drainage channels and are determined by channel size and characteristics and storm intensity)
- Restrictions on clearing of trees, shrubs and under-story vegetation in drainage easements
- This Vegetated stream buffers is very important to mitigate and reduce the effects of development on a stream by filtering pollutants, providing shade and bank stability. It's reducing the velocity of storm water runoff. Wetlands store and slow flood water and enhance water quality. Trees and vegetated areas reduce and delay storm water runoff by intercepting and storing precipitation.

Picture 1. Evolution of McKinnons over 44 years



Put side by side these two pictures of the pond, it is clear that a part of the mangrove has disappeared. The road have changed and a new configuration of the effluent is now on place. There is new development just south of the influent of the pond. It is not clear but there is new works on the exit of the pond that can interfere on the evacuation of rain water out of the pond.

Sustainable and mitigation solution concerning the rain

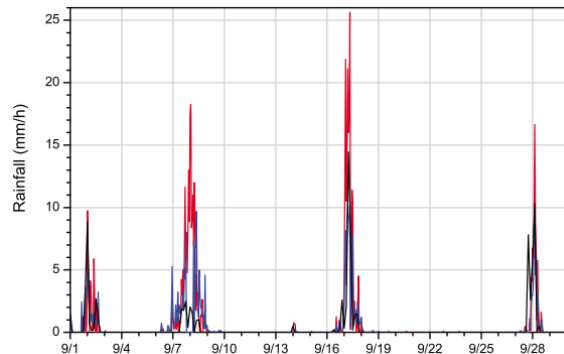
flow drainage is passing by going to retain water on soil, to let the drainage system able to absorb the a part of the flow and delay peaks and increase the evacuation of the rainwater to the sea.

4. Meteorology

Rain fall in Antigua was part of many studies, Alpha engineering 2015 make a nice survey and propose a design base on a rain return of 50 years to scale his catchment and water course.

The data from the daily records for Antigua are available from the Meteorological Services at the VC Bird International airport dating back 1960. Annual values range from 667 mm to 1708 mm with a daily peak of 241.8 mm in Nov. 1999.

Figure 9. Hydrograph (rainfall distribution) tropical hurricane (Frances, Ivan, and Jeanne 2004) following three models: (NLDAS), Stage IV, and Tropical Rainfall Measuring Mission (over Florida) (Villarini and all 2011)



The data from Alpha (2016) in Table 1, and table 2 is returned that the IDF for a period of 50 years and a rain of 6 hours will deliver a flow of 28, 8 mm of rain by hours. This is directly on line with the research of Villarini in figure 9.

Table 1. For the project Cashew hill, DDF and IDF data for a rain done 1 time by 50 years.

From Alpha 2016

Table 1

Durations for 1 in 50Yr. Recurrence Interval	Minutes					Hours			
	5	10	15	30	60	2	6	12	24
DDF Rainfall (mm)	37.2	53.2	61.2	79.8	98.4	125.0	172.8	212.7	265.9
IDF Rainfall (mm/hr.)	446.7	319.1	244.6	159.5	98.4	62.5	28.8	17.7	11.1

Data from the airport VCBird was used to define the IDF (Intensity, Duration, and Frequency) curves (figure 9) to define the risk to be assumed and the values to use for the drainage design. For the project Cashew hill, Cashew hill is located 4 km south of McKinnon watershed and deliver his water into another waterway.

This kind of rain of 6 hours of 28,8 mm by hours (172,8 mm) is probably appended more than 4 time (1976, 1977, 1987, 1999) in the last 40 years and several other days have received more than 100 mm of rain in the same day. Hurricane are unpredictable and in 1999 Antigua has

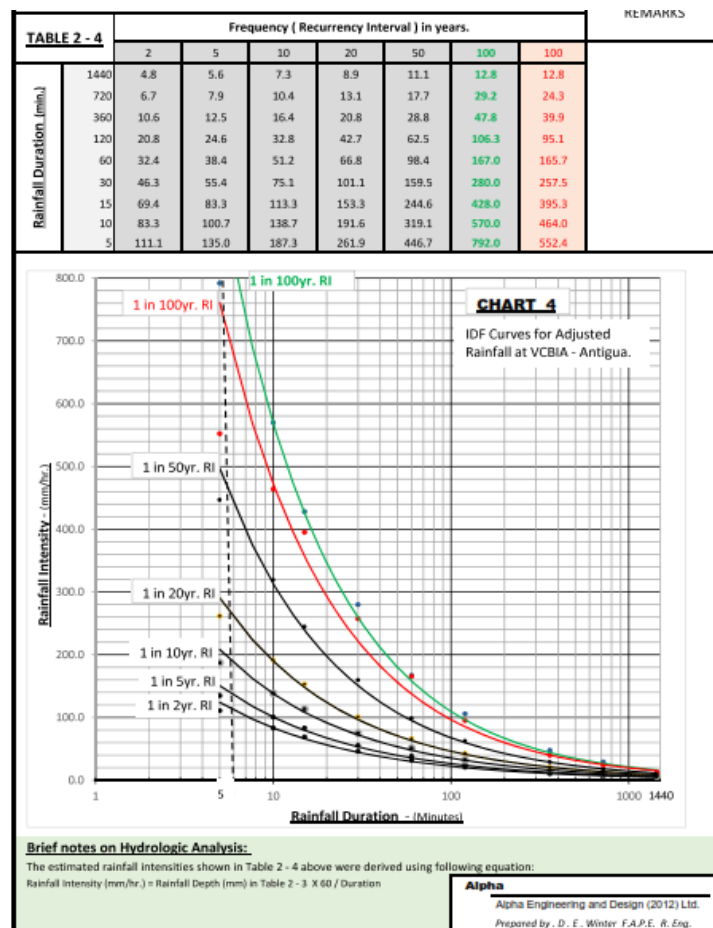
suffered of 241 mm of rain during the same day. (Annex #1) and 556 mm in the same month, Since 1966 there was 8 time that the rainfall has exceed more than 300 mm into a month.

Annex 1.

It is impossible to predict the future but it is clear that the area has to adapt this development, buildings and housing and water level control to be ready and to be resilient in the same time for another hurricane.

The community must remain vigilant and proactive regarding the drainage system and maintains the cleanliness.

Figure 10. IDF curves from Alpha 2016



Note:

- The area of the watershed is evaluated at 725 hectares or (7 250 000 m²) if this area will received 28, 8 mm (0, 0288 m) of water: this is 208 800, 0 m³ of water who arrive on the watershed and flow in direction of the McKinnon's Pond the first hour! There is many factor who make this water not immediately directed to the water run the first hour but more it is raining more that these factors will be attenuated.
- The waterway and the McKinnon's Pond has to be able to support this type of rain without flood!
- All the waterway has to be clean of interferences and external garbage who could stop the normal flow especially under bridges and culvert.
- The waterway has to be as constant as possible, without sharp angles on the way.

- All the drainage infrastructure done and space under bridges have to be able to carry the flow without stops and fouling,
- The water from the McKinnon's pond to the sea must be flowing at the same flow as it's arrived.
- Drainage must consider the speed, slope and the downstream environment (water level).
- As far as water is retained in sloped area, as far the area with a low slope should have time to evacuate the rainwater.

4.2. Drought

During the same period the island suffered historic drought cycles. The problem was more evident for the adaptation of poor people specially woman, workers, and now the single women and young women with babies. These peoples with tinny resources have had to suffer even more because wells have been contaminated by brackish water infiltration. The only source of drinking water now comes from the osmosis seawater and by rainwater harvesting. In period of drought the reserves of rainwater could come strategic for those peoples.

In fact, the soil in the low land of McKinnon and York are contaminated by wastewater where we saw resurgence of wastewater and odors at many places. Waterworks are passing at some place in this table. The water supply is not constant in production and in pressure, this makes a high risk of contamination of waterworks and “potable water” Picture 2 – Picture 7.

Picture 2. The water supply crosses the watercourse at a very low level and the junction from metal pipe to plastic is just near the shoreline of the polluted water.



Like mentioned in soil description; most of the area is covered by a mixture of clay. The volume of a clay should have varied when it is dry or wet related of the clay content, the moisture and porosity after the water is leaving. This shrinkage can cause movement of soil and causing structural problems.

Filling the ponds or old wet area could produce soil movements mostly when the area is suffering a drought like 2015. There was no month who received less than 20 mm of water and it is enough to let these wet area alive.

5. Observations and feasibility analysis

R-1 During the survey we have noticed that most of the house in the low lands are not adapted to resist or be protected against an another tropical storm leaving over 150 mm of water in the same day. With a risk of flood and the socio-economic aspect of the area the people do not have access to a loan to adapt housing at the risk condition. Many roofs have to be rebuilt and same for basement to be raised and reinforced

R-2 With the lack of potable water and the fact that there is rain more than a day by month all the yearlong. It is important for people and for the watershed that the practice of water harvesting must be facilitated as much as possible.

R-3 With the lack of electricity during long period of time, it was observed that there was no minimum solar power system to maintain light and other safety equipment during all day long.

R-4 Because the main power is not constant and unsecure it could be important that one time the housing protected against hurricane people can have access to hot water and electricity mainly to protect the food (refrigerator), safety and security (with light).

The actual survey was done with satellite and areal picture used to create GIS. There is no detail on the level of the roads, bridges, water course side of the roads, house and land level, mainly in the flooding area.

The Implementation of a new design on water way must start by a good map with a detailed topographic view to be able to identify the flooding areas in function of land level. And characterizing more precisely the watershed. With this map, it will be easier to define where and how to protect housing and vulnerable area.

It is reported as many ponds or water points are disappeared and / or are actually under pressure by development. Near the commercial center (Wood Mall) there is a pond who have lose a big part of his area, the parking of this Mall has suffered by the soil movement probably after the drought by compaction of the soil. The bridge over this point is in a bad shape, Picture 3 shows the edge of a pass way over the old pond (Woods Mall). Following discussion with residents there was other ponds along the waterway but are now filled.

Picture 3.



- It is hard to restore all these lost areas.
- Doing nothing will increase the speed of water arriving to the McKinnon's pond and increase favorable condition of flood,
- Rebuy all the original area will cost a lot and this is not as productive as actions.
- The important is to restore the surrounding environment and recreate some covered, green and wet area into urban space.
- There is law and regulation to protect the wet lands than the implementation have to be done.

A simulation by the software SWMM (USEPA) using 100mm of rain, shows that the bridge just before the pond, picture 4, could be a cause of flooding: holes channel openings are not large enough and debris could block the flow of rain. (Without a lack of detailed data on the ground that simulation be considered starting a detailed study)

- In the first time some large pumps have to be identified and be ready to be installed before tropical storms to mitigate the flood period by using them as an enlargement of the four culvert.

Picture 4.



In two days on the field we have met more than 5 site where pipes are directly crossing the waterway in or just above the usual water level of a normal rain. Some of those are rusted and or abandoned. Picture 5 shows a pipe crossing the waterway at the level of the invert of the bridge creating a full interference for water and catching garbage, like this large trunk.

- Many of these pipes have to be relocated or remove by the pipe owner. These pipes are a danger to increase flood risk. A danger for kids who can play on these and for environment.

Picture 5.



The garbage's across the watercourse picture 6 are more frequent as far as we are downstream near the sea. It seems like a poor awareness concerning the fact that garbage could stop rainwater and producing flood when it jams on a bridge!

- Peoples who are living in the area have to be aware of a clean space and kids in class have to be sensitized of the natural environment.
- A sense of belonging to their neighborhood and environment must be created.

Picture 6.



Many areas suffer from the presence of bad odors caused by the overflowing Picture 7 septic tanks who leak up to the waterway. The condition and water quality of the waterway

will impede the success of the adaptation interventions. *Picture 7.*

Furthermore, climate change will impede wastewater treatment. Prolonged periods without any rainfall lead to lower waste water emissions, low water flow through the conduits and consequently to: accumulation of solid waste sediments and incrustation in sewerage conduits that can cause its clogging;



A study has reported that many residents have not cleaned their septic tank since many years. This situation with the concentration of housing in the area could be the cause of water rotting and unpleasant odors; increasing population of rodents from increased quantities of sediments, into the tank and growing risk in disease dissemination; salt water intrusion especially in coastal areas such as McKinnon's Pond area, could cause degradation of sewer systems and affecting the quality of water

- The attachment of homes in an integrated circuit of sanitary sewer, is recommended: there is a station for treatment for the McKinnon's pond area that is being operationalized by the Department of Environment.
- All septic tanks have to be cleaned once each year, it will help.
- Using some species of plants could help contaminated area producing local treatment. Trees also could help by using the roots to pump water and to use Nitrogen and phosphorus as nutrient.

There are four pipes Pipelines (probably from West Indies Oil Company Ltd.) from the port to the industrial installation of WIOC who cross directly the waterway at the riverbed level (picture 8). Contact is done with the oil company.

- These pipes are not identified and the protection against oxidation is strongly attacked.

- There is impact of concrete fall on one pipe. *Picture 8.*
- Discussion are in process to move the pipes.



- These pipes are used by many people as bridge to cross the waterway, so a bridge needs to be constructed. The pipes could be elevated with the bridge.

McKinnon's pond was almost dry after an extended 3-year drought and a lot of garbage is observed before and inside. *Picture 9.*

Picture 9.



- Pond influent channel have to be enlarged and cleaned from scrap to let pass the flow during storms
- Dredging to increase depth and water circulation, reduce flooding and provide opportunities for use of recreational canoes, kayaks (Jackson 2002)
- Since 1966 the McKinnon pond has changed (picture 9) his attractive potential for many use still remain.
- Install a penstock near the sea to control the water level: let pass more water after storms and let a stable see water level for wild life and tourism activities.
- Mangrove and the pond could absorb and help bio remediation of rain water and wastewater.

The government have start to do a cleanup of the watercourse by cutting all the trees and by cleaning the edge of the water. Picture 10 shows an area to be cleaned and picture 6 (red square) and 11 are cleaned. Picture 6 show the erosion due to the lack of vegetation and a slope more than 30 degrees.

- It is recommended that the land not be indiscriminately cleared, leave some trees near the river to protect against erosion and create a recreational environment ready to be use by population.
- Some kind of tree and soil coverage are not adapted for this requested use. Trees in urban development should let soil coverage to be developed, using root to prevent erosion and leaves to give shadow.
- A structured development have to be carried on to choose the right soil and the good tree to change this area linked for drainage to an adapted area.
- Slopes have to be adjusted to be able to carry all the flow of a rain of 172 mm in 6 hours. In fact most of the water course could do it if the sustainable development condition was applied.

Picture 10.



Picture 11.



A large area of public Crown land along the waterway (Picture 12) is a recreational site just south of West Indies Oil, and is also the site of the WIOC pipes crossing the waterway. There is heavy foot traffic as shown in Picture 12.

Key: Blue lines are the waterway; Red lines are private property parcels

Picture 12.



- It is recommended that this could be a site for partnering with WIOC to build a bridge for crossing the waterway and to elevate the pipes at the deck level.
- A green space could also be created around this section of the waterway that widen the waterway and serve as a detention pond to attenuate peak downstream storm flow discharge

The consequential losses ranging from major casualties to minor inconvenience to daily life due to inadequate flood protection standards should be carefully examined on all development works. Ideally, the choice of a design return period should be based on an economic evaluation in which the costs of providing the drainage works are compared with the benefits derived but in fact there is not just economical values that we have to play but a jeopardy game where there is multi factorial factors downstream. Moreover, comprehensive local flood damage (social acceptance, health, poverty) data are normally not available to the degree of precision required for cost-benefit analysis. For this reason, a general policy decision based on such considerations as land use, hazard to public safety and community expectations is more appropriate. For a semi urban development, a period between 50 years (secondary branch) and 100 years

Concerning the area of York and McKinnon's the problem is multi factorial: Geographic, geologic, social development, poverty, health, climate changes but the main problem is the anarchic development due to most of these land are private and some are mainly linked with development (commercial and shopping-centers). The Department of Environment should engage private land owners to secure waterway easements on private land, this is provided for under the laws of Antigua and Barbuda.

The capacity of McKinnon's pond to absorb the water flux and to return it into the sea on time is questionable and will have to be investigate more, same for the last bridge before the pond which looks to be a cause of the flooding problem.

Change the point of view of the community by a long training and sensitization the direction it is necessary to undertake flood mitigation measures in the semi-urban areas such as changing the vocation of the waterway from a problem; to a solution. From a drainage system; to an urban park for the community

6. Recommendations

Component 1. Climate resilient drainage along 3 km of waterways

Problems Identified	Recommendation	Results to be Achieved
Gaps in data for full engineering analysis	Data on the level of the roads, bridges, water course side of the roads, house and land level, mainly in the flooding area	Once data is collected, finalize engineering plans. A design of corrective points could be finalized using SWMM 5.0.
Increased and modified storm flows in catchment due to land use change and rainfall variability in last 20 years	<p>Proper buffers have not been enforced and maintained but consider:</p> <ul style="list-style-type: none"> ○ Enforcing building regulations to set back from watercourses for all new applications ○ Enforcing sustainable development and low impact use as a policy of development. ○ Create upstream detention at crown land site to attenuate peak downstream storm flow discharge 	<p>A steadier stream along the watershed and water run during and after the storms.</p> <p>A lower depth flow along the drainage network after tropical storm.</p> <p>Prevent flooding and increase safety for kids playing along the water.</p>



Evacuation structure of the McKinnon's pond is probably too small.	Proceed to a study to increase the capacity of the pond to evacuate up to 200 000,0 m ³ /h	This structure will prevent flood for a 50-year rainfall rain or a hurricane all the other structure are in the same size...
Some bridges over the water run have to be re-engineered. There is at least one bridge that can cause problems for a rain of 100mm in 6 hours.	Modified the bridge to increase the drainage possibility. Or prepare a set-up for a pump able to be installed in a day for a week by year. This pump will be there only to help.	Help evacuation of water to the McKinnon's pond.
McKinnon's pond expands this area during flood event by the south on household development of York's.	Install dam and retention works at a controlled level decided to let the water level to be raised.	Prevent flooding under a controlled water level of the McKinnon's pond.
Pipes crossing the waterway, which catch debris and contribute to flooding	<ul style="list-style-type: none">- Remove the abandoned pipes (co-financing with applicable entities)- Continue discussions with West Indies Oil Company (WIOC) and APUA for solutions to move the pipes that are causing flooding- For other pipes that are in use, work with the owners to establish safe alternatives through public-private partnerships, such as the WIOC pay for the pipes to be moved and build a bridge, and the project pays for some of the restoration	Move pipes to permit restoration of the waterway, Reduced flooding as the pipes are blocking the waterway. Increase safety for kids who use the pipe as a bridge. Prevent an environmental impact if the pipe is carrying oil, wastewater or sea water!



There is no water park, wet area or water structure to retain water on the water run.	Install a dam or a structure to retain water near Wood Malls north of the road and another dam south of the road. And possibly one or two culvert of 300 mm across the water run to let cross the people, create a water retention site, but these structures will be no more than 500 mm and a large flow could pass over retaining only a blade of water.	Retain a maximum volume of water for a period of 6 hours during a tropical storm. To make sure that all the flow will not arrived immediately to the bridge near the pond
Water run's slope and design are not constant	There is a waterway identified for all the watershed, but slopes and form are not constant and not all the time consistent caused by development. Space and slopes both side of the water run have to be verified to evacuate the capacity for all the flow (in fact a large part have a good capacity).	Create a uniform waterway from the Mall to the pond.
In many sites garbage was observed all along the catchment run.	Remove the garbage and make sure that the waterway will stay clean of debris who can stop the water or could jam the flow (this could be done through issuing of a contact under Component 3)	No external debris will jam the flow
Trees and grass was cut and removed leaving place for erosion.	Some trees and a full floor coverage of ideal grass species must be maintained on the water run, transforming it into an urban park.	Trees and adapted grass will: Prevent erosion, retain as much as possible water, be able to grow with roots into a wet area and able to use wastewater as sources of nutriment and by the way purified the environment.

Wastewater is observed on the last part of the catchment and it's providing from overflow of septic tanks.	<p>It is recommended to implement a mandatory cleaning of septic tank each two years.</p> <p>Or to connect all the zone to a central sanitary sewage system.</p> <p>Identify type of plant, grass or trees who can grow into this environment and can use the gray water as nutriment</p>	<p>Increase safety by taking away disease-carrying mosquitoes</p> <p>Decrease odors of rotten eggs,</p> <p>Using bioremediation to help sanitation</p>
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Component 2. Resilience in buildings (household adaptation)

Problems Identified	Recommendation	Potential Impact
<p>This is not all the houses who was equipped with a good system of water harvesting.</p> <p>Public system is not constant</p>	<p>Given accessibility to everyone to have access to a gutter system and reservoir</p>	<p>Remove water on the water run.</p> <p>Given access of "fresh" water to the housed peoples.</p>
<p>Many houses have very bad roof structure: not strong enough, rotten, or do not have support to stabilize the roof during a tropical storm.</p>	<p>Given accessibility to the householder to a loan to replace or to reinforce the roof.</p>	<p>Protection of physical integrity of peoples during a tropical storm or a hurricane.</p>
<p>Most of the house visited doesn't have screen into the window leaving the door open for mosquito.</p>	<p>Given accessibility to the householder to install screens or to change the windows.</p>	<p>To protect families and kids against diseases vectored by mosquito.</p> <p>Increase the quality of living</p>

Public power plan have had some problems after some tropical storms and is not constant.	<p>Given accessibility to the householder to install Solar energy cells converter and batteries.</p> <p>Given accessibility to change old electric bulbs and other old technology materials to energy saver equipment.</p>	<p>To increase safety by providing light.</p> <p>To increase the quality of life by providing energy for refrigerator.</p> <p>Saving money by using more powerful equipment.</p>
Most of the houses who was flooded during event of 1999 and 2014 have rotten structure and floor.	Given accessibility to the householder to change the floor and structure, raise the house and modified the basement to increase aeration.	To increase the quality of life by providing a safety floor mold-free.
Wastewater and rotten eggs odors was observed in the backyard of such houses.	Given accessibility to the householder to clean and repair the tank and piping evacuation	Create a better environment and increase the life quality by removing rotten smell. And situation conducive to the development of rats, mice and mosquito.

6.1. Baseline Data

The northwest coast of Antigua has a high degree of exposure to climate variability due to its physical features and low-income community; the northwest coast has been increasingly affected by extreme rainfall events causing flooding.

The project area is vulnerable to climate change, undergoing urban expansion, and supports low income and lower middle-income families. These conditions make it a suitable demonstration area for national priorities.

The three specific objectives of the project, which correspond to the three components elaborated below, are to:

- Implement concrete adaptation actions that support natural and physical drainage systems along the 3 km urban and semi-urban waterways to meet projected climate change, in particular extreme hydro-meteorological events and disease vectors.
- Disburse concessional loans through a revolving fund mechanism to vulnerable households to meet new adaptation guidelines and standards for built infrastructure to withstand extreme climate variability.
- Support social adaptive capacity and local ownership of adaptation through community-awarded contracts and climate. (This point was not touched during the visit) but it is very important to create training and sensitization to transform the waterway from the actual drainage environment and a garbage bin to an urban park.

Project/Programmed Components	Expected Concrete Outputs	Expected Outcomes	Amount (US\$)
1. Upgrade urban drainage and waterways to meet projected climate change impacts.	1. Topographic survey and drawings taking into consideration past flooding events, into the York and McKinnon waterway.	1. Make the environment for a real simulation of the watershed.	\$ 25,000
1.2. Produce a SWMM simulation using previous data obtained.	1.2. Make a virtual design of rain and his effect at different point of the watershed.	1.2. Define and sizing and water control and water infrastructures elements.	\$ 25 000
1.3. Implement the outlet water control penstock of the McKinnon pond.	1.3. Install a civil structure able to let pass over 200 000 cubic meter of water to the sea. Design has to be done with the environment consideration of minimum water level, and maximum acceptable water level to do not create flood (answer will come from simulation).	1.3. This structure could be based on a minimum basic water level of the pond. And have the capacity to evacuate more than the total rain fallen into the watershed.	\$150 000

1.4. Remove all the pipes crossing the waterway and cleaning this infrastructure.	1.4. Make the area clean of all pipes and big debris. Negotiate with stakeholders and landowners for removing pipes garbage and debris.	1.4. Make the flow safe with minimum jam possibilities.	\$150 000
1.5. There is just one wet point remain on all the watershed.	1.5. Restore and upgrade McKinnon's 3 km waterway to meet new adaptation requirements for flooding and vector control. Install dams near Woods Mall to create retaining points, and install culvert of less of 300 mm high across waterway to let cross people during most of the time except during storm this to retain water and create wet point for few hours.	1.5. Retain as much as possible the water into the water run.	\$ 250 000
1.6. The bridge before the McKinnon's ponds seems to be the weakest point of the waterway.	1.6. Install a pump set up before McKinnon pond or modify the bridge to let pass more water.	1.6. Evacuating of the water from the water run to the pond must be faster during a hurricane time.	\$ 600 000
2. Revolving Loans for homes in McKinnon's watershed to meet new adaptation guidelines established in the building code and physical plan.	2. At least 10% of the landowner in the target area, during the life of the project, have applied for loans for adaptation measures to meet new standards.	2. Increased quality of the household to be able to resist on climate variability. Increase the life quality and safety of the area.	\$ 3 110 000

<p>3. Adaptation by using training and sensitization of climate change and the effect on housing and water run.</p> <p>Focus groups must be done first on kids in school and woman at home.</p>	<p>3. Trainers group and a plan of sensitization have to be settled.</p> <p>Training must focused on the household and safety against hurricane and water run and flood in a vision of development of urban park.</p>	<p>3. Improved ownership of adaptation and climate risk reduction and to sustainable development.</p>	<p>\$ 200 000</p>
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ANNEXE 1

Data from VC Bird International Airport

MAXIMUM 24-HOUR (8 AM - 8 AM) RAINFALL AT V. C. BIRD INTERNATIONAL AIRPORT, COOLIDGE - 17.14N 61.79W													
Year	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Max
1971	26,4	18	11,4	42,9	28,2	4,3	10,4	31	60,7	54,6	22,4	147,3	147,3
1972	13,5	6,1	49,5	32,8	29,7	10,4	22,4	36,3	39,4	45	10,9	15,7	49,5
1973	13,5	6,1	49,5	32,8	29,7	10,4	22,4	36,3	39,4	45	10,9	15,7	49,5
1974	41,9	7,9	12,4	5,8	40,4	3	4,3	66,3	86,1	38,9	161,8	9,7	161,8
1975	21,3	3,8	8,4	12,2	23,4	7,9	10,9	14,7	36,3	27,4	68,8	48,3	68,8
1976	7,6	15,5	17,8	9,1	9,9	8,6	5,3	41,1	43,4	36,1	41,1	33,3	43,4
1977	5,3	7,4	11,7	6,9	8,9	9,4	8,9	30,7	39,4	36,1	63	11,7	63
1978	14,5	14,2	30,7	39,6	30,5	13	19,1	29,3	8,7	211,5	32,5	19,6	211,5
1979	10,1	4,3	13,6	28,5	85,6	21,9	55,6	50,5	188,4	53,1	104	33,2	188,4
1980	10,5	14,3	7,3	5,7	15,6	13,7	25,2	17,1	15,1	85	12,4	27,9	85
1981	18,4	22,2	26,8	66,6	43,5	23,1	39,9	13,2	120,6	30,9	48,7	39,1	120,6
1982	14,2	39	6,6	39,9	25,5	14	19,2	16,8	15,6	31,2	55,9	16	55,9
1983	5,2	4,2	8,2	13,4	38,2	14,6	9,7	15,1	44,5	12	9,3	11,2	44,5
1984	21,9	7,5	27,6	4,8	11,9	11,7	26,1	8,8	89,7	70	61,3	NA	89,7
1985	13,5	11,2	79,3	34,1	6	5,1	28,2	27,6	76	31	95,6	10,1	95,6
1986	12,3	9,2	8,7	44,6	57	7,4	74	14,6	17,3	3,8	56,5	16,5	74
1987	35,7	11,7	16	10,2	178,6	15	6,6	30,5	43,1	33,9	91,8	36,2	178,6
1988	11,5	11,1	54,2	10,4	9,2	10	34,1	92,8	94,4	37,8	20,7	23,8	94,4
1989	27,4	8,5	11,7	20,8	17,2	65,6	11,4	26,7	159,3	43,7	32,8	17,6	159,3
1990	13,1	18,3	18,8	91,7	44,4	22,8	28,2	15,3	14,8	56	16,2	15,8	91,7
1991	5,9	20,8	3,9	29,4	30,1	13,3	69,1	24,4	52,9	3,4	29	6	69,1
1992	31	14,2	19,6	53,4	77,9	10,2	20,6	31,9	35,2	37,5	46,5	78,8	78,8
1993	10,5	4,8	14,2	42,8	55,5	14,7	46,6	7,5	14,4	21	7,6	16,2	55,5
1994	9,3	7,5	16,5	4,7	17,5	21,5	24,4	18,2	52,2	27,1	38,6	29,4	52,2
1995	11	17,5	10,4	58,3	14,5	7,9	7,6	137	151,8	35,7	23	15,2	151,8
1996	10,4	11,9	6,6	12	25,8	32,1	24,2	34,6	13,4	30,6	40	41,3	41,3
1997	30,9	14,7	7,7	25,4	31,5	11,7	12,3	10,8	20,6	22,4	8,1	20,9	31,5
1998	53,6	24,7	11,6	29,9	20,8	17,4	25	26,1	113,4	115,3	27,7	60,7	115,3
1999	14,3	21,9	3,5	54,6	61,3	46,5	37,6	13,5	41,1	132,5	241,8	16,3	241,8
2000	12	4,7	10,7	49,4	16,7	11,3	7,6	21,3	114,8	6	13,1	8,7	114,8
2001	5,1	8,5	3,5	27,7	3,5	13,7	29,9	26,2	10,6	40,5	21	54,4	54,4
2002	7,9	37,4	87,6	33,8	15,6	31	22,1	27,7	19,6	20,1	64,3	54,9	87,6
2003	12,4	5,2	1,9	7,7	7,1	37	9,5	12,4	12,2	31	38,1	21,4	38,1
2004	7,6	37,5	11,8	24	42,7	26	27,5	9,9	41,7	37,3	65,5	9,9	65,5
2005	26,6	15,6	8,4	15,1	22,2	51,2	36	39,5	19,6	39,4	47,6	8,6	51,2
2006	24,6	11,5	23,7	11,2	8,6	19	23,2	8,7	8,4	45,5	17,6	8	45,5
2007	15	7,4	36,6	29,6	7,5	16,2	16,1	37,3	14,7	64,4	12,3	48,9	64,4
2008	47,2	6,5	5,3	11,1	48,8	12,7	12	20,5	50	147,4	50,2	11,7	147,4
2009	6,8	12,4	5,7	24,1	21,9	16,2	28,5	13,8	28	25,7	19	20,8	28,5
2010	8,6	7,2	25,1	93,9	17,7	62,2	19,9	174,7	12,5	62,7	15,3	34,3	174,7
2011	3,4	9,1	15,6	23,9	58,8	13,9	21,3	47,4	31,3	17	89	34,4	89
2012	11,7	3,1	3,9	34,1	77,9	6,3	24	19,3	17,8	97,5	14,5	8,5	97,5
2013	12	2,2	41,3	38,1	85,4	26	8,6	11,6	31,3	13,1	33,9	36,7	85,4
2014	6,2	3,7	9,5	10,5	21,3	10,4	5,6	18,6	30,4	49,4	66,7	36,5	66,7
2015	5,6	7,4	4	10,3	9,4	8,9	7	10,7	26,9	34,9	13,9	4,5	34,9
*Avg	17,46	14,49	19,07	32,49	32,62	22,04	25,9	31,91	50,08	43,19	43,84	25,96	
*1981 to 2010													
Source: http://www.antiguamet.com/Climate/CLIMATE_DATA/Max24HrRainfallCoolidge.txt													
Antigua Met Service													
Max of Max	53,6	39	87,6	93,9	178,6	65,6	74	174,7	188,4	211,5	241,8	147,3	



Year	AVERAGE RAINFALL			TOTALS IN INCHES FOR ANTIGUA										Average
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
1928	1,88	1,78	3,18	0,84	0,69	0,92	2,41	3,32	5,04	2,84	3,03	4,97	2,58	
1929	1,37	1,08	3,83	1,29	4,07	3,47	1,92	8,56	2,36	4,08	5,06	2,37	3,29	
1930	2,91	1,33	0,36	1,46	1,01	1,91	2,13	3,3	2,15	2,59	5,76	2,15	2,26	
1931	0,64	0,49	0,74	2,23	3,75	8,66	2,64	6,85	2,56	5,61	6,75	4,61	3,79	
1932	2,96	2,16	0,92	2,06	6,29	7,44	4,66	4,14	9,39	7,81	6,48	4,26	4,88	
1933	2,65	0,8	1	3,08	4,95	3,76	6,18	1,68	7,43	1,91	5,47	2,97	3,49	
1934	2,21	0,61	4,76	0,75	1,22	3,71	2,65	7,62	3,23	1,27	12,23	7,12	3,95	
1935	1,69	1,41	1,08	2,07	2,71	2,69	5,46	2,74	3,87	9,59	4,07	2,02	3,28	
1936	2,09	1,37	0,97	3,83	8,66	3,91	5,64	6,41	10,41	9,94	4,83	5,06	5,26	
1937	8,29	3,81	0,85	3,64	1,5	0,96	5,24	6,1	4,85	7,23	8,6	2,22	4,44	
1938	3,27	1,42	1,47	0,71	1,14	12,22	3,37	5,74	3,03	7,56	8,93	3,48	4,36	
1939	1,57	1,09	1,42	0,33	0,77	1,16	3,47	1,94	2,53	10,2	6,51	2,52	2,79	
1940	2,97	3,33	2,05	2,36	4,22	2,7	1,37	4,07	3,54	2,97	7,22	1,96	3,23	
1941	1,84	0,94	2,04	1,89	12,16	3,77	3,24	3,71	4,96	2,64	9,05	2,55	4,07	
1942	5,88	2,11	0,6	4,6	2,44	4,41	3,21	7,23	3	5,79	13,72	2,42	4,62	
1943	3,02	1,82	1,53	0,89	8,67	5,87	2,36	7,62	3,27	10	4,77	3,49	4,44	
1944	2,91	1,84	0,43	0,23	3,44	2,91	6,42	4,45	4,32	6,8	3,77	2,44	3,33	
1945	1,56	2,76	2,75	1,94	4,06	3,34	3,31	4,22	8,54	8,65	2,69	4,07	3,99	
1946	2,79	1,51	2,67	3,78	2,84	2,88	1,82	3,47	5,94	3,53	4,95	4,1	3,36	
1947	3,96	0,6	0,79	1,05	3,4	1,99	2,91	1,89	8,61	4,44	0,99	0,96	2,63	
1948	3	1,21	1,84	0,83	2,87	3,3	1,55	2,88	6,6	9,94	5,6	5,42	3,75	
1949	1,75	2,16	5,27	3,3	1,58	4,2	3,78	3,78	13,79	6,62	2,97	4,03	4,44	
1950	6,24	2,07	1,04	1,25	1,82	1,79	2,25	11,51	4,39	6,69	5,26	3,31	3,97	
1951	3,46	3,11	1,34	3,5	11,31	2,48	4,81	9,27	11,17	5,96	5,66	7,39	5,79	
1952	3,82	2,03	4,32	3,82	4,91	5,76	6,96	10,05	7,07	5,69	7,2	1,94	5,30	
1953	1,83	1,43	3,23	2,81	0,97	0,8	3,79	2,56	3,87	1,13	8,39	3,56	2,86	
1954	3,76	1,98	1,44	0,66	3,73	3,4	4,07	10,18	11,85	7,4	3,01	3,97	4,62	
1955	3,2	1,83	1,46	2,43	2,1	1,22	2,87	11,33	5,96	4,61	2,94	3,14	3,59	
1956	3,81	1,26	1,52	3,45	1,83	5,81	4,28	4,53	4,5	4,36	4,96	2,64	3,58	
1957	2,84	2	1,21	1,65	2,48	3,41	2,77	5,41	5,05	5,95	6,49	5,6	3,74	
1958	1,98	1,58	2,12	2,01	5,57	6,57	3,54	4,24	5,62	5,27	4,21	3,23	3,83	
1959	3,48	1,29	1,31	2,17	4,41	2,42	3,21	4,08	4,82	4,52	4,52	5,11	3,45	
1960	2,43	3,99	2,95	1,38	2,57	2,78	5,9	4,11	4,29	3,79	3,9	4,62	3,56	
1961	1,66	2,76	1,43	1,25	2,33	3,05	4,26	5,82	2,54	5,35	6,43	3,76	3,39	
1962	6,75	0,99	1,22	4,99	4,47	4,71	3,96	9,59	9,94	2,17	6,03	1,55	4,70	
1963	4,55	1,18	0,76	1,87	5,03	8,69	8,85	2,6	3,9	7,18	7,17	1,54	4,44	
1964	2,74	1,25	1,58	7,03	3,19	1,89	3,59	5,76	5,05	1,89	1,99	2,32	3,19	
1965	4,77	0,85	1,88	1,34	4,33	2,22	3,96	2,78	4,37	2,33	5,48	3,53	3,15	
1966	1,15	1,16	1,28	1,56	2,75	0,72	4,56	3,88	3,88	4,46	4,16	3,3	2,74	
1967	1,76	1,41	8,9	1,15	1,46	1,75	5,11	2,02	3,59	5,61	1,89	1,9	3,05	
1968	1,66	0,61	0,69	2,77	3,84	3,27	1,84	2,59	1,75	2,1	4,44	4,96	2,54	
1969	3,46	1,46	1,1	4,58	13,98	2,6	5,18	3,66	4,36	7,97	5,5	1,75	4,63	
1970	1,88	0,76	0,9	2,45	14,01	7,72	6,36	5,02	3,58	7,65	5,68	9,12	5,43	
1971	5,27	2,71	1,39	1,82	4,15	1,38	4,2	4,71	5,79	5,22	1,52	11,02	4,10	
1972	3,14	2	5,92	3,65	2,74	1,49	2,56	4,5	3,74	7,41	2,58	8,56	4,02	
1973	2,2	2,06	1,22	0,78	0,85	1,72	2,34	4,94	5,85	3,19	1,8	2,04	2,42	
1974	3,94	1,35	1,51	1,33	1,59	0,32	0,96	6,84	10,54	6,74	16,29	1,2	4,38	
1975	3,12	1,14	0,59	1,38	4,42	0,83	1,54	3,71	5,2	5,22	6,68	5,89	3,31	
1976	2,24	3,55	2,26	1,55	1,43	2,03	0,62	4,93	4,79	8,22	5,82	4,45	3,49	
1977	0,84	1,09	1,23	1,85	1,1	0,81	1,12	7,14	6,1	6,47	13,34	2,69	3,65	
1978	1,77	1,32	2,09	4,94	7,6	2,06	5,6	7,03	0,99	8,95	6,26	1,94	4,21	
1979	2,46	1,59	1,53	2,82	14,22	4,38	4,99	3,28	9,1	6,47	10,03	7,33	5,68	
1980	2,53	2,24	0,44	0,96	1,67	3,2	4,53	4,18	5,56	6,74	2,46	4,68	3,27	
1981	1,5	3,41	2,93	9,66	5,4	2,69	6,62	3,58	8,87	6,58	5,48	9,27	5,50	
1982	2,7	5,15	1,31	6,09	2,26	0,82	4,36	4,52	2,18	5,72	8,46	5,18	4,06	
1983	1,89	0,32	1,32	1,34	4,42	1,59	3,92	3,5	2,92	2,16	1,37	2,1	2,24	
1984	4,14	1,66	2,67	1,6	3,33	2,11	2	1,52	7,42	6,58	9,23	3,08	3,78	
1985	1,92	1,67	6,72	3,17	0,92	0,49	3,96	3,87	9,09	7,16	8,03	2,32	4,11	
1986	1,33	1,23	2,14	4,79	4,07	0,79	2,97	2,23	2,86	1,93	13,35	2,51	3,35	
1987	2,25	0,88	2,02	1,76	20,02	4,84	2,43	3,02	6,16	8,49	10,61	3,95	5,54	
1988	3,62	2,46	3,55	1,82	1,97	1,99	6,91	11,7	7,18	4,64	4,02	3,67	4,46	
1989	3,4	2,06	2,15	2,05	1,13	2,28	2,16	4,33	12,23	4,79	3,86	1,42	3,49	
1990	1,85	1,34	1,93	5,14	2,95	3,14	2,07	3,33	2,82	10,02	3,38	4,32	3,52	
1991	2,88	2,94	1,07	1,92	2,46	2,4	4,76	2,72	5,92	2,01	6,07	2,1	3,10	
1992	3,03	2,48	5,91	7,8	6,64	3,3	3,96	5,27	6,49	6,71	8,14	7,27	5,58	
1993	2,79	1,23	1,28	3,12	13,4	3,68	6,15	2	2,95	3,09	2,74	2,98	3,78	
1994	2,79	1,89	1,71	2,99	2,33	2,16	2,01	2,63	10,41	3,39	5,12	2,54	3,33	
1995	1,12	2,91	2,71	2,03	2,05	0,81	2,49	11,26	14,69	6,69	2,81	3,16	4,39	
1996	2,35	2,16	0,83	2,38	2,43	4,34	6,36	4,03	2,88	4,62	4,11	9,03	3,79	
1997	2,49	4,75	0,66	2,38	2,61	2,12	4,19	5,77	5,84	4,93	1,88	1,7	3,28	
1998	3,34	2,2	1,77	3,85	1,86	2,84	2,65	5,97	7,68	6,41	8,38	7,2	4,51	
1999	2,59	1,58	1,99	4,04	2,99	3,57	5,81	2,3	4,04	7,25	20,91	3,03	5,01	
2000	2,13	3,79	1,42	3,04	2,04	1,5	2,03	4,13	7,1	1,76	3,83	2,38	2,93	
2001	1,19	0,76	0,56	1,7	0,25	0,67	5,12	2,91	2,71	5,81	3,07	8,77	2,79	
2002	1,24	1,68	3	6,91	1,35	1,92	3,63	2,93	3,2	4,97	3,81	3,19	3,15	
2003	1,9	1,67	0,69	1,12	1,2	3,16	2,32	2,75	1,91	6,58	8,53	3,92	2,98	
2004	1,07	1,61	2,45	2,5	10,91	3,56	5,39	2,1	3,55	9,92	8,11	3,94	5,01	
2005	3,17	2,77	0,41	1,44	2,91	7,33	6,05	5,96	3,2	11,41	5,98	1,62	4,35	
2006	8,57	1,84	1,27	0,94	3,33	3,53	4,07	4,47	5,42	8,07	2,63	2,73	3,91	
2007	3,53	2,02	2,3	2,1	3,33	3,33	3,33							

ANNEXE 2

Simulation from SWMM 5.0

Note: this simulation is just a basic feasibility study not based on real data:

We know that the area is covered around 7, 5 square km. (around 1860 acres or 750 hectares).

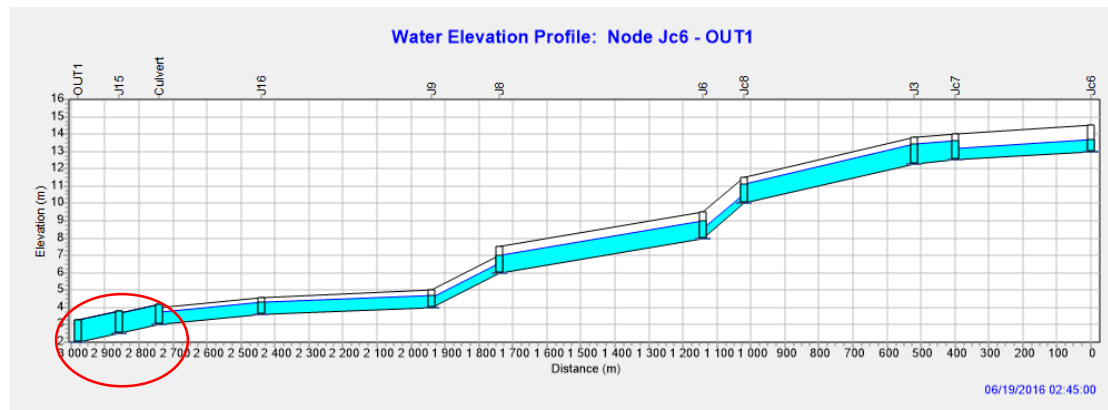
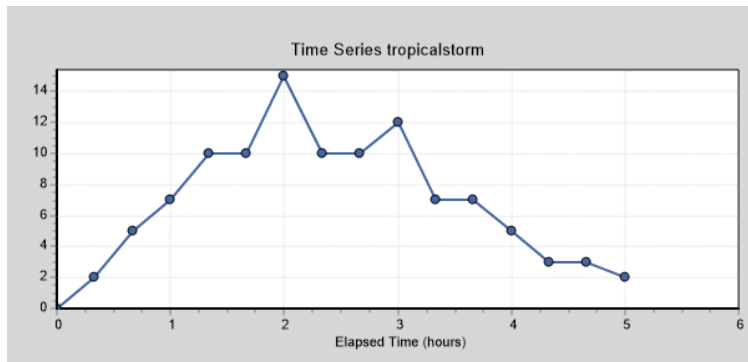
The soil is poorly permeable. The coverage area by structures (housing and road) is around 25%

The slope is from 14 to 2.5 meter above sea level but we do not have distances and slopes,

We know that there is different sub catchment.

I use a drainage system of trapezoidal 1 meter deep 1m bottom width and 5 m slope each side.

For the last bridge I use four pipes of 1.2 m diameter instead of pipes with different size.



This is just a simulation but the problem is given by the pond level, if the pond is empty the bridge could carry this flow but by the size of the pipe his flow is limited.

Bibliography

Alpha Engineering 2016, Technical assistance for flood Management and slope Stabilisation Interventions in Antigua and Barbuda (Cashew Hill) for Organization of Eastern Caribbean State (OECS)

*Cooper, Vincent 2001: Inland Flood Hazard Assessment and Mapping for Antigua and Barbuda Post-Georges Disaster Mitigation Project in Antigua & Barbuda and St. Kitts & Nevis, May 2001, for Organization of American States Unit of Sustainable Development and Environment, 1889 F Street NW Washington DC 20006
<http://www.oas.org/pgdm>*

CDB 2008, Poverty Reduction and Development Human Development in the Caribbean: Addressing the Millennium Development Goals, Caribbean Development Bank (CDB) - Special Development Fund (SDF) 7, July 2008.

Department of Environment 2015, Physical Development Planning Local Area Plans and Watershed Delineation, presentation Power Point

Department of environment 2015, REQUEST FOR PROJECT/PROGRAM FUNDING FROM THE ADAPTATION FUND, An integrated approach to physical adaptation and community resilience in Antigua and Barbuda's northwest McKinnon's watershed.

(Jackson 2002) MTE 2002, NORTHWEST COAST LOCAL AREA PLAN, ANTIGUA, Prepared for the Ministry of Tourism and Environment, Government of Antigua and Barbuda by Ivor Jackson & Associates, November, 2002

(SIRMM 2010) SIRMM AND GEF/IWCAM 2010, DEVELOPMENT OF A WASTEWATER MANAGEMENT STRATEGY FOR ST. JOHN'S WITH SPECIFIC FOCUS ON THE NORTH WEST COAST TOURISM ZONE, Caribbean Water Treatment Ltd. 2010

Villarini G. et al 2011, Characterization of rainfall distribution and flooding associated with U.S. landfalling tropical cyclones: Analyses of Hurricanes Frances, Ivan, and Jeanne (2004), JOURNAL OF GEOPHYSICAL RESEARCH, VOL. 116, D23116.

CIA 2015 <https://www.cia.gov/library/publications/the-world-factbook/geos/ac.html>

USEPA website : <https://www.epa.gov/green-infrastructure/what-green-infrastructure>

<https://riverrestoration.wikispaces.com/Urban+streams>

<http://www.creditvalleyca.ca/low-impact-development/low-impact-development-support/stormwater-management-lid-guidance-documents/low-impact-development-stormwater-management-planning-and-design-guide/>



Government of Antigua & Barbuda

Department of the Environment

Manual

Processing of Grants and Revolving Loans Relationship with the MEPA Trust

*This manual will be reviewed after its first independent
evaluation in 2018*

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Approved by:	
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Date	Version	Created by	Description of Change
February 2016	0.0	Consultant	Draft
June 2016	1.0	Consultant	Inclusion of the Revolving Fund Procedures
July 2016	1.1		Inclusion of the Adaptation Fund Revolving Loan Procedures

OPERATIONAL MANUAL 2016

For the processing of Grants and Revolving Loan SIRF Fund

(GOAB, Private Sector and NGOs)

For review by staff of the DOE during summer retreat July 11 – 17th 2016

Adoption by the PMC on

This Manual was adopted by the PMC ...

Table of Contents

	Page
BACKGROUND AND INTRODUCTION	1
REVIEW OF MANUAL	1
THE DEPARTMENT OF THE ENVIRONMENT (DOE)	1
THE DOE AND THE SIRF FUND	2
DOE/SIRF FUND GRANT PROGRAM	2
<i>Funding set-asides.....</i>	<i>3</i>
DEFINED TERMS AND ACRONYMS	4
THE ALLOCATION OF FUNDS BY THE DOE /SIRF FUND.....	4
<i>Allocation of Funding to NGOs and CBOs.....</i>	<i>4</i>
<i>Funding to the Private Sector Window.....</i>	<i>6</i>
<i>Funding to Government Agencies</i>	<i>8</i>
GRANT FUNDING PROCESS	9
<i>Eligible grant Applicants.....</i>	<i>9</i>
<i>Eligible Projects</i>	<i>10</i>
<i>Eligibility for Grants.....</i>	<i>11</i>
<i>Grant Decision-Making Process.....</i>	<i>11</i>
<i>Grant Applicants.....</i>	<i>12</i>
REQUESTS FOR GRANT PROPOSALS (PROJECTS AND PROGRAMS)	12
<i>Receipt of Grant Proposals</i>	<i>13</i>
<i>Grant Proposal Review Process</i>	<i>13</i>
<i>Grant Proposal Selection Process</i>	<i>14</i>
<i>Project Pipeline.....</i>	<i>15</i>
<i>Notification of Results to Applicants</i>	<i>15</i>
<i>Execution of Grant Agreement.....</i>	<i>15</i>
<i>Indicative Grant Process Timeline – Awarding</i>	<i>16</i>
<i>Disbursement of Grants.....</i>	<i>16</i>
<i>Reconsideration of Funding Decision</i>	<i>17</i>
IMPLEMENTATION, MONITORING AND REPORTING	17
PROJECT CLOSURE	17
KNOWLEDGE MANAGEMENT	17
PROGRAM FUNDING PROCESS	19
<i>Eligible Applicants For Programs.....</i>	<i>19</i>
<i>Eligible Programs.....</i>	<i>19</i>
<i>Special Guide for Programs</i>	<i>20</i>
THE PROGRAM DECISION-MAKING PROCESS CYCLE	20
<i>Government entities.....</i>	<i>21</i>
<i>NGO ENTITIES – NGO Board of the SIRF Fund</i>	<i>22</i>
<i>program Duration.....</i>	<i>23</i>
<i>program Sizes.....</i>	<i>23</i>
<i>program Applicants.....</i>	<i>23</i>

REQUESTS FOR PROGRAM PROPOSALS	23
<i>Receipt of Proposals</i>	24
<i>Proposal Review Process</i>	24
<i>Proposal Selection Process</i>	25
<i>Pipeline</i>	25
<i>Execution of Agreements</i>	25
<i>Disbursement</i>	26
RECONSIDERATION OF FUNDING DECISION	26
REVOLVING LOAN FACILITY	27
BACKGROUND AND RATIONALE	27
THE REVOLVING LOAN FACILITY AND ITS MODALITIES	27
<i>Concept</i>	27
<i>Structure of the Revolving Loan Facility</i>	27
<i>Financing the Facility</i>	28
<i>Legal status</i>	29
<i>Sustainability of the Revolving Loan Facility</i>	29
MANAGEMENT AND ADMINISTRATION OF FACILITY	30
<i>Environmental and Social Safeguards</i>	31
SUMMARY	31
ANTIGUA AND BARBUDA MEPA TRUST – RELATIONSHIP TO THE DOE	31
ENVIRONMENTAL AND SOCIAL SAFEGUARD POLICIES	31
ENVIRONMENTAL SAFEGUARDS	31
SOCIAL SAFEGUARDS	32
GENDER	33
MONITORING AND EVALUATION PROCESSES	33
MONITORING AND REPORTING	34
SITE VISITS	34
PERFORMANCE MONITORING OF THE DOE	34
PERFORMANCE MONITORING OF GRANTS AND REVOLVING LOANS	34
MONITORING OF THE IMPLEMENTATION OF THE NEMS	34
DOE GENERAL PROCUREMENT GUIDELINES	34
PROCUREMENT OF WORKS, GOODS AND GENERAL OPERATING COSTS	35
CONFLICT OF INTEREST	35
CONFLICTS POLICY	35
DECLARATION OF CONFLICTS	35
RECUSAL OF CONFLICTED STAFF OR COMMITTEE MEMBERS	35
AUDITS (DOE AND SIRF FUND)	36
COMPLAINTS MECHANISM FOR GRANTS AND REVOLVING LOANS PROGRAM	36
LIST OF SCHEDULES	38
DETAILED PROCEDURES FOR THE REVOLVING LOAN FACILITY (RLF) OF THE SIRF FUND WITH SPECIAL REFERENCE TO PROCEDURES FOR THE SCCF AND THE AF PROJECTS	51
LOAN RISK MITIGATION – GOVERNMENT OF ANTIGUA AND BARBUDA	81
THE MEPA TRUST, THE CARIBBEAN BIODIVERSITY FUND (CBF) AND THE SIRF FUND	87

BACKGROUND AND INTRODUCTION

This Operational Manual (the “**Operational Manual**”) further clarifies the guidelines and procedures for the administrative and financial operations of the Department of Environment (DOE). The DOE is a legal entity established by the Antigua and Barbuda Government for the management of the Environment at the national as well as any international obligations to relevant agreements. This Operational Manual is to be used by directors, staff, referenced by government agencies and consultants as well as any other persons or entities engaged by the DOE.

This manual is complemented by a detailed Accounting Manual, a detailed Technical Manual, and the Organization of Eastern Caribbean States (OECS) Procurement Guidelines.

REVIEW OF MANUAL

The manual and its procedures are guided by the EPMA and related regulations. The procedures outlined in the manual, and any subsequent changes to the manual or procedures, must be approved by the Project Management Committee (PMC) and the SIRF Fund General Board. These changes, when approved, will be communicated to the staff via the Director of the Department of Environment and the changes will be reflected in the updated manual. This manual will be reviewed after its first independent evaluation in 2018.

THE DEPARTMENT OF THE ENVIRONMENT (DOE)

The registered office of the DOE is in at #1 Victoria Park Botanical Gardens, Factory Road, St. John’s Antigua. The Department’s main operational guidelines are captured in the following documents:

- General Auditing and Accounting Manual;
- Accounting Procedural Manuals;
- Audit Plan 2015 to 2018 – TORs for the International and External Auditors as well as the contract for the Internal Auditor;
- Technical Manual – Contains program and project development, stakeholder consultations, environmental and social safeguards provisions and gender policy;
- Operational Manual of the MEPA Trust;
- Operational Manual of the SIRF Fund;
- Environmental Management and Protection Act (2015);
- The Finance Administration Act (2006); and
- The Office of the Director of Audit Act (2014).

THE DOE AND THE SIRF FUND

The DOE is established by the Environment Protection and Management Act (2015). Part XI of the Act established a Sustainable Island Resource Framework Fund. The SIRF Fund is being operationalized by the DOE with assistance from several donors via projects and some grants. The steps in the operationalization includes:

- The drafting of the Business Plan of the Fund;
- The drafting of the Operational Manual(s) and other procedures of the fund;
- Drafting regulations to give effect of the Fund;
- Approval of the Regulations by Parliament;
- Appointment of members and observers to the SIRF Fund Board;
- Hold initial board meeting to approve the operational procedures outlined within the respective manuals.

The DOE has been applying for funding for the operationalization of specific financial services that the fund will provide to facilitate the implementation of the EPMA 2015. This manual initially focuses on the areas of the fund that utilizes grants, and revolving loans. The SIRF Fund also provides the matching funds for the MEPA Trust. The manual provides information on this relationship and the process for these disbursement of these funds.

As indicated above, this manual is complementary to the Operational Manual of the SIRF (see above) which provides more details on program areas of the fund.

The EPMA requires that the Fund has a Director and its own staff. During the operationalization phase of the fund, the Director and staff of the DOE will act as the Director and the Secretariat of the SIRF Fund respectively. The aim is to have the initial board meeting of the Fund in September 2016 and to have the SIRF Fund fully operational by June 2017.

For the purpose of this manual, and unless otherwise stated, reference to Director of the DOE and Director of the Fund are the same.

DOE/SIRF FUND GRANT PROGRAM

Grants from the SIRF Fund can be used to support a wide range of environmental activities as outlined within the Act and further elaborated within the National Environmental Management Strategy. The areas for funding is listed within the Act and further elaborated within the regulations and the Operational Manual of the fund. The Technical Advisory Committee (TAC), with the review of the Project Management Committee (PMC), will provide detailed guidelines

on the eligibility of activities to be funded for each call for proposals. The Board however, is the final body for the approval of all processes and funding decisions.

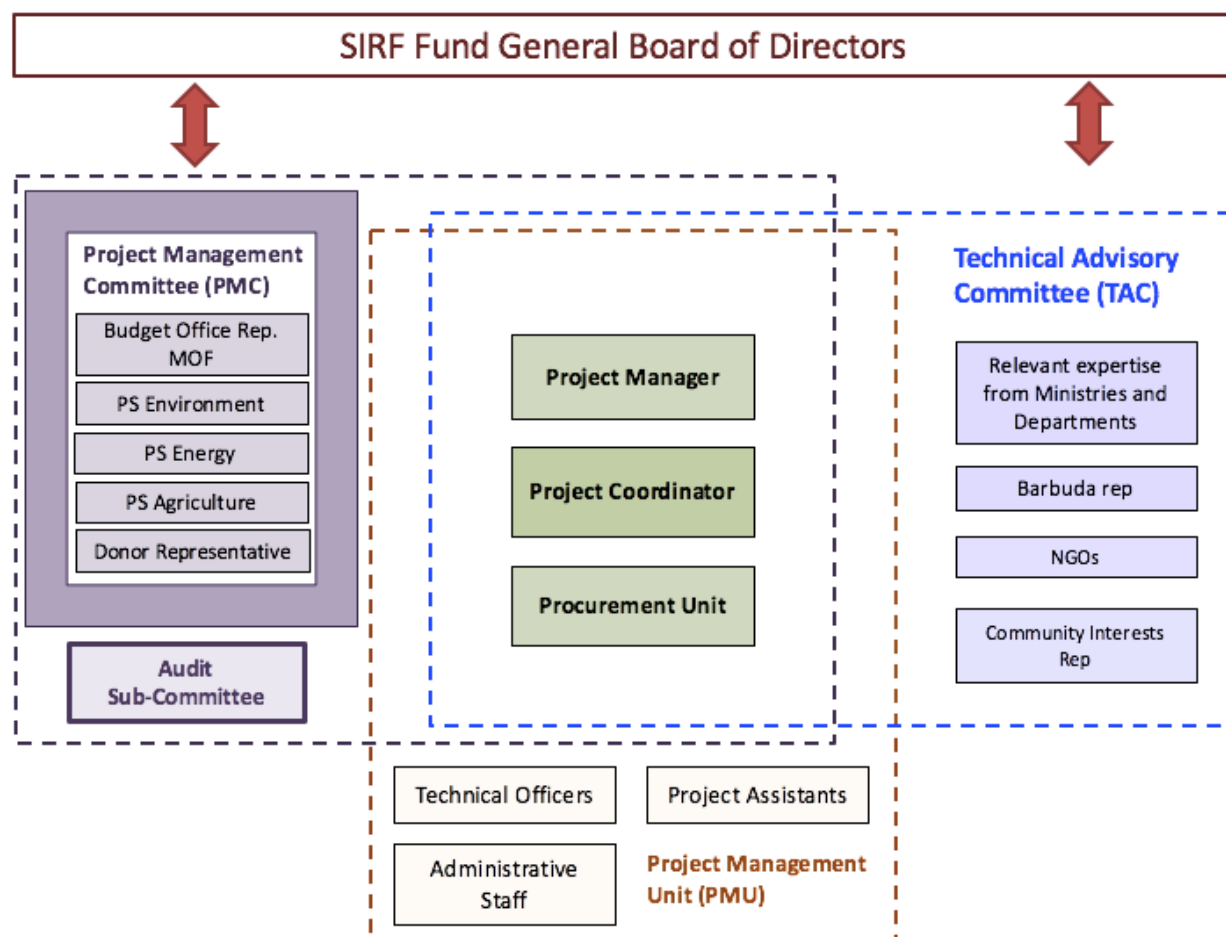


FIGURE 1. PROJECT MANAGEMENT ARRANGEMENTS WITH THE SIRF FUND BOARD

The Board of the SIRF Fund, in consultation with relevant stakeholders and informed by legislation, reports and scientific assessments, will decide on the priorities of funding in particular areas of support. Funding priorities may also be established by set-asides for specific activities by the Board, for legal reasons or as directed by donor requirement (Sectipon(7)(2) of the Draft Regulations of the Fund). These set-asides may be established via regulations and/or rules of procedures.

FUNDING SET-ASIDES

The first set-aside of the Fund is directed by the Environmental Protection and Management Act (2015). These are set-asides for non-governmental organizations (NGOs), the Private Sector and the Caribbean Biodiversity Fund (MEPA Trust) facilities. Other set asides may be

determined by donors, to facilitate project design and government requirements. The purpose of set-asides is for targeted implementation of the EPMA, for example to address particular environmental situations and to target support to vulnerable people and ecosystems.

The provision of funding to the MEPA Trust from the SIRF Fund was a condition of the GEF SPPare project and enshrined within the Act. Other set-asides can be established through regulations of the EPMA and/or rules and procedures. The MEPA Trust set-aside and how this is operationally managed is provided within the Operational Manuals of the SIRF Fund and that of the MEPA Trust.

DEFINED TERMS AND ACRONYMS

Capitalised terms and acronyms used in this Operational Manual are defined in **Error! Reference source not found. (Error! Reference source not found.)**.

THE ALLOCATION OF FUNDS BY THE DOE /SIRF FUND

During the drafting of this manual, the SIRF Fund was still under development and undergoing its operationalization phase, this section is expected to under significant revisions as the Fund is operationalized.

The SIRF Fund is considered a Specialized Unit of the DOE with its own Board and decision making process and regulations. The Fund is expected to be fully operational by the end of 2017, and in the interim, the Director of the DOE acts as the Director of the SIRF and the PMC will act as the interim General Board of Directors. The DOE technical and accounting staff will provide necessary support until the SIRF Fund is fully operational, after which an evaluation of operations will guide continued engagement.

The SIRF Fund Business Model includes the provision of grants to NGOs, Private sector and Government agencies. The Business Model also allows for the fund to provide loans and equity to the private sector and Government Statutory Bodies. The granting process varies for each sector (NGO, Private Sector, and Government agencies).

The EMPA mandates that the DOE, via the SIRF Fund, provide NGO funding, technical assistance for training, research, education and management pertaining to environment issues. The draft regulations seek to place the allocation of funding to the NGOs at 15% of SIRF Funds raised.

ALLOCATION OF FUNDING TO NGOS AND CBOS

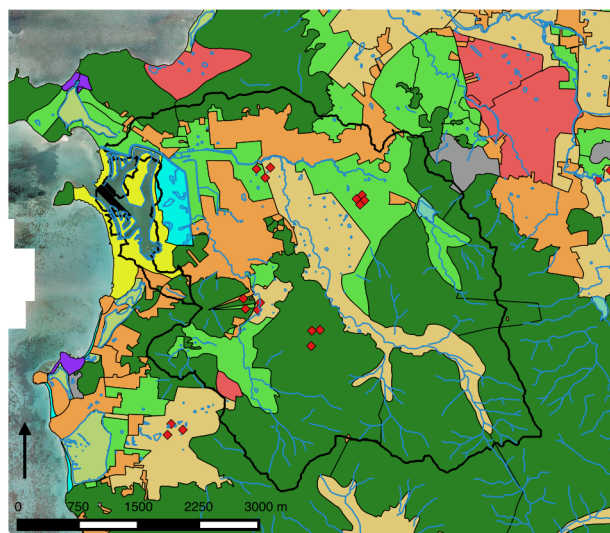
The raising and distribution of funding to the non-governmental organization (NGO) window, which includes community-based organizations (CBOs), is accomplished in several ways, to include:

- Allocation of 15% funds raised via levies and other investments;
- Ensuring that projects negotiated from the AF, GEF, and GCF by the DOE include a budget line for NGOs. These budget lines be be programmed via the MEPA Trust and/or the NGO Window. In exceptional cases the funding may be programmed directly with an NGO or CBO and be considered part of the 15% SIRF Fund allocation.
- Funding is directed via grant agreements, loan agreements, Memorandum of Understanding (MOU) (for Government agencies and certain very small NGOs) and Contracts.
- Direct deposit of donor/Government contributions to the NGO window of the fund.

Funds are allocated to NGOs and CBOs via calls for proposals and the resulting grant agreement, directly from donor to entity (*see Case Study below*), and via contractual agreements such as contracts and MOUs.

Case Study – DOE/SIRF Fund facilitating grant agreements with NGOs/CBOs

The SIRF Fund may facilitate Calls for Proposals or funding allocations where NGOs and CBOs enter directly into agreements with the donor/funding entity. As in the case of the Japan Biodiversity Fund (JBF), the DOE provided technical support to the MEPA Trust to complete a project application to JBF, following which the MEPA Trust entered into a grant agreement directly with the Convention of Biodiversity (CBD), representing JBF.



The project is to support implementation of Antigua and Barbuda's National Biodiversity Strategy and Action Plan (NBSAP) through ecosystem services valuation and data on livelihoods.

This pass through approach of the SIRF Fund is enabled through a MOU between the Department of Environment and the MEPA Trust, which provides for the engagement between the two entities.

The funds will only be allocated to the various entities based on the meeting of basic financial and project management standards consistent with those of the DOE/SIRF Fund, including environmental and social safeguards (ESS) and Gender. The MEPA Trust and any other NGOs must undergo a review and certification process to ensure they can maintain these standards (**certification process is to be developed**).

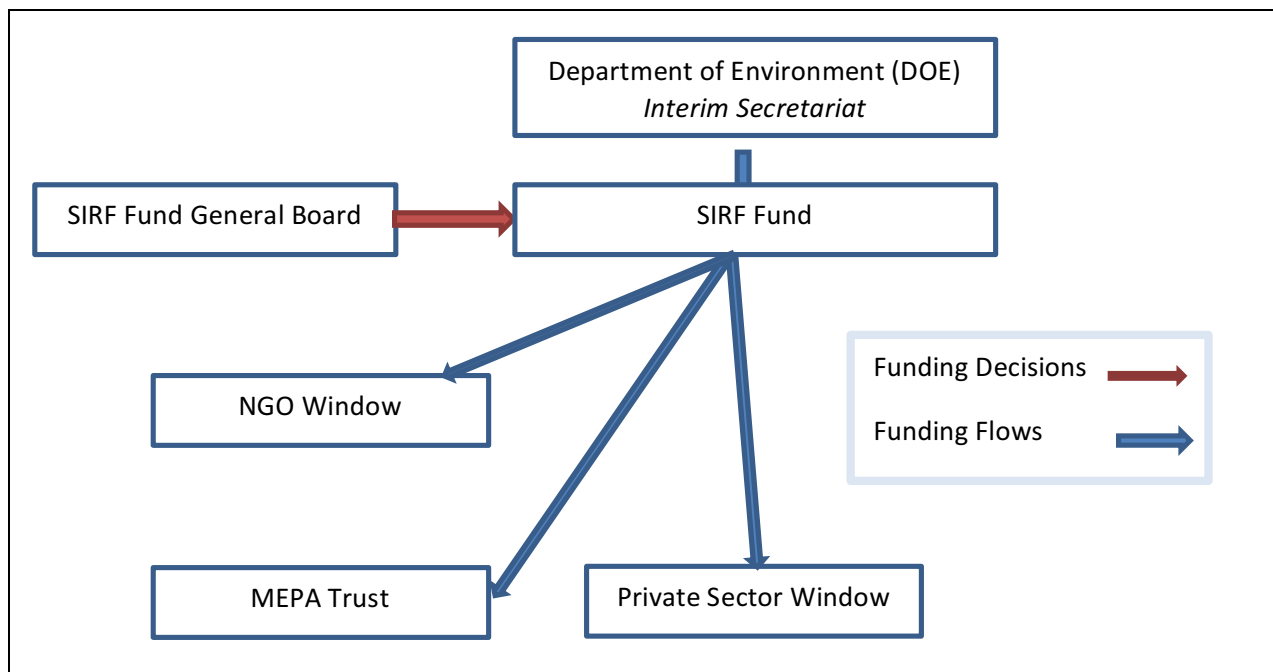


FIGURE 2. LINKAGES BETWEEN THE SIRF FUND AND FUND RECIPIENTS

FUNDING TO THE PRIVATE SECTOR WINDOW

The EPMA requires that the private sector abides by the provisions of the Act by meeting standards for the Building Code and to produce Environmental Management Systems Report. A recent World Bank Report indicated that Antigua and Barbuda ranks 152 globally for ease in the access to Capital. Many of the provisions of the Act particularly those addressing climate risks requires significant capital investments, which many businesses cannot access or the cost of capital is very high. To facilitate compliance in all areas particularly climate change, the private sector will need a special mechanism to access concessional funding. The DOE/SIRF Fund will seek to access funding from multilateral and other sources to allow the private sector to adapt to the impacts of climate change and to reduce their emissions. The targets of the GOAB for climate change is outlined within the Nationally Determined Contribution (NDC) to the UN Climate Convention.

Funding will be provided to the private sector via the Revolving Loan Facility and an Equity Fund, both of which are soon to be established under the fund. The Facility will seek to provide the private sector with concessional loans at interest rates significantly lower than that of the commercial banks and without the request for large amounts of collateral. However, the loans will be controlled such that the investments will only be used for adaptation and mitigation, or other purposes consistent with the provisions of the EPMA. Loan interest rates will be determined by the Cabinet and the rules and procedures are to be established by regulations under the EPMA. The Revolving Loan Facility is designed to work with the private sector that may not be able to access loans from the commercial banks. This will provide an alternate financial option that would not normally be available to the users (NGOs, private sector, community groups, Government etc.)

The GEF-funded Special Climate Change Fund (SCCF) and the Adaptation Fund projects will provide funds to the Revolving Loan Facility for adaptation only. These funds will be treated and established as Set-Asides. To facilitate the requirements of each of these projects (as well as other projects with special requirements) the EPMA regulations provide for the special regulations and procedures for each donor and each project.

The financial risk related to these projects and programs are assumed by the Government of Antigua and Barbuda. The SRF Fund is however, designed to reduce the risks thus reducing the pressure on the Government and increasing the success of the fund.

The DOE is working closely with the Government's existing Revolving Fund programs to draw on their experiences and possible resources. This includes the student loans program, operated by the Ministry of Finance.

GRANTS TO THE PRIVATE SECTOR

The DOE will only provide grants to the private sector under limited circumstances and with special considerations, for example sectors that provide services to vulnerable people and communities in the event of extreme weather, including heat waves, drought and hurricane. Private sector entities that may qualify for grants under the SRF Fund may include:

- Private schools and clinics;
- Private institutions that provide specialist care for targeted vulnerable people e.g. elderly, special needs, vulnerable men and women;
- Private institutions that provide care to flora and fauna, protected areas and ecosystems that are identified as important to the success of the EPMA;
- Private institutions that recycle and divert waste from the land fill.

The procedures for the processing of these grants will follow the same rules as grants for NGOs via the call for proposals.

FUNDING TO GOVERNMENT AGENCIES

The process and criteria for funding Government agencies will be designed to simulate the budget and funding processes of the Government. The SIRF Fund General Board can decide to provide funding for approved programs and projects submitted by public agencies.

The SIRF Fund is to fund the agencies responsible for various section of the EPMA only. Activities not consistent with the Act are ineligible. Core agencies that will qualify for **program** funding are:

- Department of the Environment;
- Development Control Authority;
- Fisheries Division;
- Forestry Unit;
- Ministry of Finance;
- Energy Unit (energy efficiency and RE);
- Management Units for Protected Areas (see Systems Plan for Protected Areas) (this includes the National Parks Biodiversity Protection Unit);

Any department of the government that submits eligible **projects (in Government budget terms these are called Developmental budget)**, and has been **certified** able to implement the fiduciary standards and safeguards by the SIRF Fund, may manage their own project funds and conduct their own procurement. The projects must be executed within the 12-month budgetary period of the government, otherwise funding must either be returned to the SIRF Fund, or the government agency may submit an application for a project where the unspent funds are rolled over into the following year's funding.

The procedures for projects and programs will follow the steps of the government budgetary processes:

1. Submission of projects to the PSIP Unit and programs to the Ministry of Finance Budget Office for initial screening

2. Once screened and approved, programs and projects related to the EPMA will be sent to the SIRQ Fund General Board to review for eligibility, consistency with EPMA mandates, and other requirements.

Case Study – SIRQ Fund as Treasury function

The SIRQ Fund may act as treasury for grants disbursed to public or non-governmental entities, for example in the case of the Men Against Negative Attitudes (MANA) Programme. The SIRQ Fund has managed finances for the MANA programme, overseeing the construction of facilities pictures below.



FIGURE 3. MANA PROGRAMME ACHIEVEMENTS (FROM LEFT TO RIGHT): CHICKEN COUP, PIG FARM, AND WASTEWATER TREATMENT FACILITY, IN MCKINNON'S, ANTIGUA

Once approved, the funds are disbursed directly to the entity, or disbursed on behalf of the entity (the SIRQ Fund may provide a treasury function – see Case Study with the MANA Program). The latter presents the least financial risk to the SIRQ Fund.

Projects and/or programs deemed ineligible by the SIRQ Fund General Board may be appealed. Where there is not adequate funding, projects and programs may be deferred until the subsequent funding period. **Projects and programs decision are taken once per year; the project cycle is 12 months.**

GRANT FUNDING PROCESS

ELIGIBLE GRANT APPLICANTS

Proposals for funding may be received from the following entities:

- Ministries of the Government of Antigua and Barbuda responsible for the implementation of various areas of the EPMA and the MEAs;
- Local universities and colleges (including any departments and faculties thereof);

- Private sector entities;
- Eligible loan applicants;
- Government-owned corporations that prepare an Environmental Management System (EMS) Plan which includes adaptation, renewable energy and energy efficiency activities;
- Local community associations and other community bodies that prepare an EMS plan.

ELIGIBLE PROJECTS

The Technical Advisory Committee (TAC) will develop detailed eligibility criteria for approval by the Project Management Committee (PMC) and the SIRF Fund General Board to ensure that SIRF Funds are only used for the purpose of the effective implementation of the EPMA. Detailed criteria once approved will be placed as an Annex to this manual.

DOE funds shall **not** be directly or indirectly used for:

- Operation or administrative costs of ministries, departments or agencies of the Government of Antigua and Barbuda or the government of any other country;
- Salaries for executive officers and core staff of non-governmental organizations, except for such salaries related to services performed by such persons specifically for the purpose of achieving the objectives of the funds received from the DOE. In this case the amount of funding may be limited by the SIRF Fund General Board;
- Activities relating to the extraction or depletion of non-renewable natural resources (including *inter alia* forests, trees, beach sand, ghut sand and oil/gas);
- The resettlement of people or the removal or alteration of any physical cultural property under any circumstances; or
- Any other use that is deemed to be inconsistent with the general objective of the Act.

Where applicable, all grants and loans must first meet legal requirements such as physical planning permissions, other permits and consultations and activities related to openness and transparency.

ENVIRONMENTAL AND SOCIAL SAFEGUARDS

Activities financed by DOE/SIRF Fund must observe all environmental (as outlined within the EMPA) and Social Safeguard Policies of the Department, the SIRF Fund and all applicable laws and regulations. The recipient should include environmental and social consideration for any project that may have a negative impact on the environment. In some cases, and depending on the project, an Environmental Impact Assessment (EIA) may be required (see Physical Planning Act 2003).

GENDER

The role of men, women, children, specific age brackets and persons with special needs should be taken into consideration when designing, managing and delivering projects and programs. A gender responsive approach will improve project quality and sustainability and significantly reduce project risks. The DOE's approach to gender when developing programs and projects is outlined with the DOE's Technical Manual.

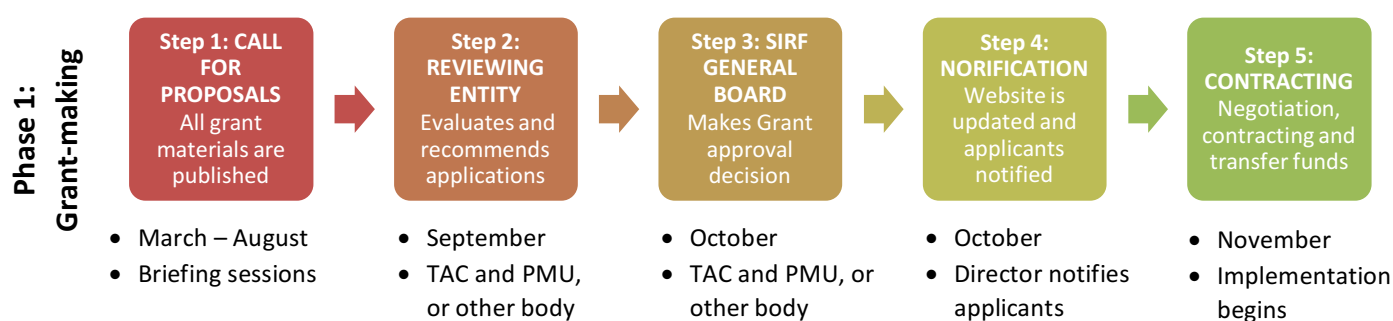
ELIGIBILITY FOR GRANTS

The DOE encourages grant proposals that demonstrate the following characteristics:

- Existing criteria of the GEF Small Grants Program;
- Criteria of the Eastern Caribbean Marine Managed Areas Network (ECMMAN) program;
- Criteria outlined within the MEPA Trust Operational Manual;
- Co-financing or the ability to leverage additional funds and in-kind support;
- Demonstration of coordination with other organizations to reduce duplication of efforts;
- Existence of partnerships or alliances with one or more organization;
- Endorsements from other recognized agencies or authorities;
- Clear plans for long-term sustainability, continuation and/or replication after initial grant funding;
- Community engagement, particularly for activities where the community plays a central role in its success;
- Ample technical competence in project monitoring and evaluation to ensure proper tracking and reporting of grant activities and progress.

GRANT DECISION-MAKING PROCESS

The SIRF Fund decision-making process for grants is based on the evaluation of grant requests on a competitive basis in accordance with the objectives and strategies of the DOE and the broader objectives of the National Environmental Management Strategy (NEMS). The Director of the Fund in consultation with the SRIF Fund General Board will determine the amount of funds available for a period of 12 months for grant-making purposes and will make available funding up to that amount.



Phase 2:
Implementation

FIGURE 4. SUMMARY OF PROJECT GRANTING PROCESS, IMPLEMENTATION, CLOSURE AND KNOWLEDGE MANAGEMENT

GRANT DURATION

Grants awarded by the DOE may be for projects and programs. Projects and programs shall have a maximum duration of one 1 and 3 years respectively.

GRANT SIZES

Grants can be awarded by the fund for amounts between \$20,000 and \$350,000 USD, for any individual project/Program per grant year.

Grants for RE and EE can be considerable larger due to the nature of these projects. Projects however larger than these limits can be considered but will require no-objection letter from the Minister of Finance.

GRANT APPLICANTS

Applicants for grant funding must meet the eligibility requirements set forth in *Eligible grant Applicants* above.

An applicant who has previously received grant funding shall be eligible for further grant funding as long as the applicant has demonstrated clear success in meeting the objectives of the prior grant awarded within the terms of the relevant grant agreement.

REQUESTS FOR GRANT PROPOSALS (PROJECTS AND PROGRAMS)

The Director of the Fund will publish a Request for Grant Proposals [(in the form attached as Schedule [●] hereto)] at least annually with the option of having no more than two calls for proposals per year. Requests for grant proposals shall be published using the same public media used for the publication of procurement requests (see *DOE technical and SIRFF Operational Manuals*).

The proposals will be accepted for a period of 2-3 months after the publication date of the Request for Grant Proposals.

Each Request for Grant Proposal notice published shall indicate:

- The deadline by which all proposals shall be received in order to be eligible;
- An indicative timeline of when the SIRFF will notify applicants of the final award of grant funding for the relevant funding cycle;
- The maximum (and minimum, if applicable) funding amounts available under such Request for Grant Proposal;
- The grant implementation period;
- A description of eligible applicants, eligible programs and eligible projects; and
- The criteria with which Grant Proposals will be evaluated.

The SIRF Fund General Board after consultations with the DOE, PMC the TAC and stakeholders (and vice versa) may further advise on other factors to be determined for issuing a Request for Grant Proposals.

RECEIPT OF GRANT PROPOSALS

Upon receipt of a grant proposal, the SIRF Fund will acknowledge receipt in writing to the applicant and provide an overview to the applicant of the next steps in the grant decision-making process.

To ensure a transparent process, the SIRF Fund shall post the number of applications received on its website, in addition to a list of all successful grant proposals .

GRANT PROPOSAL REVIEW PROCESS

The evaluation of grant proposals that meet the eligibility criteria begins with a review of a submitted grant proposals by the DOE in accordance with the Grant Proposal Initial Review Guidelines. The following factors are among those to be considered:

- Strategic fit with the Act and relevant policies, including the INDC, NAP and the NEMS;
- Strength and clarity of the proposed project concept and activities;

- Applicant qualifications (including eligibility, whether the applicant has previously received DOE grant funding and whether the applicant is a member of the GOAB, private sector or NGO entity);
- Project cost-effectiveness;
- Potential for leverage or generation of sustainable funding with other sources of revenue;
- Level of administrative support the grantee will need from the SIRF Fund in the implementation of the project (Certification Level).

The review of grant proposals will be conducted by Bodies established by the Board to conduct the reviews and may be tailored to meet donor requirements. In the interim, the TAC and the PMC and any other Committee established by the DOE may assist with the granting decision-making process. In the case of NGOs and CBOs, the SIRF Fund General Board may consider using the established granting process of the GEF Small Grants Program, which has been a successful program that groups are generally familiar with. In these cases, the DOE is represented on each of the decision-making bodies and its role is to ensure that the ESS, Gender and eligibility including alignment with environmental laws and policies are maintained. The decisions are taken by the NGOs themselves.

During the review phase, the Reviewing entity may ask the applicant to clarify any outstanding issues or complete any information that it deems to be required in order to consider the grant proposal complete.

The reviewing entity shall aim to complete the review process with respect to all grant proposals no later than one (1) month following receipt of each grant proposal prior to submitting its recommendation to the SIRF Fund General Board.

GRANT PROPOSAL SELECTION PROCESS

Following the review process, with respect to each grant proposal received, the reviewing entity¹ submits a recommendation for approval to the SIRF Fund General Board. This includes a summary of each grant proposal (including amounts requested) and recommendations regarding whether the proposal should be:

1. **Approved** – The grant proposal is recommended for approval in full and as is.

¹ The reviewing entity means that the NGO Board may request the Small Grants Program and/or the ECCMAN and or the MEPA Trust to undertake the review process and make recommendations to the NGO Board for approval. The SIRF Fund may request the DOE to review the projects and programs for Government agencies. The private sector Board may also request an existing entity to assist with loan and equity review. Reviewing entities will be identified as the fund grows and will be engaged via an MOU.

2. **Reworked** – The reviewing entity identifies discrepancies in the proposal. The applicant can either make minor changes to the proposal within ten (10) days, or the applicant can re-submit the proposal at a subsequent Call for Proposals.
3. **Declined** – The review committee determines that the proposal is ineligible or poses fundamental risks and therefore the proposal is declined and cannot be re-submitted to the SIRQ Fund.

The review committee, after having sufficient time to review each proposal, shall discuss any questions or issues with the DOE and take into account the recommendations of the DOE before deciding on the proposal. The decision will be made no longer than one (1) month following submission of recommendations by the DOE.

A positive recommendation on a grant proposal shall be awarded based on consensus of the deciding body. The final recommendations, are provided to the Director to present to the PMC. The final list of recommended projects in order of priority is sent to the Board by the Chair of the PMC for approval.

PROJECT PIPELINE

If the number of projects recommended for approval exceeds the funding available, the PMC may prioritize the projects. Procedures for prioritization will be developed by the TAC for the review of the PMC and the approval of the SIRQ Fund General Board. Projects not funded due to lack of funding should be included into the pipeline in order of priority selected established by the PMC.

NOTIFICATION OF RESULTS TO APPLICANTS

Following the decision of the PMC on the approval of the grant proposals, the Director communicates to each applicant whether its grant proposal has been awarded (including for pipeline recommendations), recommended for reworking, or rejected. In their communications, the Director shall communicate reasons for any rejection or reworking of a grant proposal to the relevant applicant.

EXECUTION OF GRANT AGREEMENT

Upon PMC approval of the grant proposal, the Director along with the Legal Council of the Fund shall prepare and execute a Grant Agreement to be signed by the Director or Deputy Director of the SIRQ Fund and submitted with the grant application.

INDICATIVE GRANT PROCESS TIMELINE – Awarding

The timeline is elaborated below.

TABLE 1. ANNUAL SCHEDULE FOR REQUESTS FOR GRANT PROPOSALS AND REVIEW/NOTIFICATION TIMELINES

	<u>Indicative Activities</u>	<u>Timeframe</u>
PHASE 1: Grant-Making Process		
Step 1.	Requests for Grant Proposals are issued, briefing sessions are held	March to June
	Deadline for submission of grant proposals	August
Step 2.	Completion of review of submitted grant proposals by the Reviewing Entity	September
	Recommendations of grant proposals are submitted to the SIRF Fund Board	September
Step 3.	SIRF Fund General Board decides to award grant; rework; or decline proposal	October
Step 4.	Funding decisions are communicated to applicants and posted on the DOE's website	October
Step 5.	Finalization and signing of grant agreements with each successful applicant; transfer of first disbursement	November
PHASE 2: Implementation and Closure		
Step 1.	Implementation, Monitoring and Reporting	November to October
	Quarterly reporting from the grant recipient	Quarterly
	Mid-term project review	May
Step 2.	Project Closure	
	Submit final financial and performance reports	November
Step 3.	Knowledge Management	Ongoing

DISBURSEMENT OF GRANTS

The SIRF Fund makes arrangements for the disbursement of funds in accordance with the terms of the executed Grant Agreement, which will specify the annual project work plan and associated budgets, deliverables and disbursement schedules. They will also specify monitoring, evaluation and reporting requirements.

RECONSIDERATION OF FUNDING DECISION

Section (89) of the EPMA allows for all applicants to appeal any funding decision of the Board. The applicant will have twenty-one (21) days in which to request a review. The board will develop procedures to facilitate the request to review applications.

IMPLEMENTATION, MONITORING AND REPORTING

Grant recipients will be expected to implement their projects and programs in accordance with the schedules and deliverables that are set out in their Grant Agreements. Standard provisions for monitoring and reporting will include:

- Quarterly reporting from the grant recipient
- Mid-term project review
- A terminal evaluation

PROJECT CLOSURE

A formal project closure process consists of the submission of all final financial and performance reports. Grant recipients may be requested to participate in a close out event, or other activity to raise awareness and contribute to the funded activity.

KNOWLEDGE MANAGEMENT

Grant recipients as part of the contracting process will be requested to provide data to contribute to the Department of Environment's knowledge management systems, which includes the Environmental Information Management and Advisory System (EIMAS).

The Knowledge Management system of the DOE is outlined within the Act and it is a legal requirement for the DOE to collect and make information available to the all in the Country and to international partners.

PROGRAM FUNDING PROCESS

ELIGIBLE APPLICANTS FOR PROGRAMS

Proposals for funding programs may be received from the following entities:

- Ministries of the Government of Antigua and Barbuda responsible for the implementation of various areas of the EPMA and the MEAs;
- Local universities and colleges (including any departments and faculties thereof);
- Government owned corporations that prepare an EMS Plan which includes adaptation, RE and EE activities;
- Agencies responsible for the management of marine and terrestrial protected areas;
- Local community associations and other community bodies that prepare an EMS plan;
- Entities that will participate in the Access to justice program;
- Applications for education and public awareness campaigns;

ELIGIBLE PROGRAMS

SIRFF funds can only be used for the purpose of the effective implementation of the Act. The programs will have detailed eligibility criteria that will be developed by the TAC and approved by the PMC and then the SIRFF Fund Board. Each of these criteria will be developed in detailed and placed within the annex of this manual.

SIRRF funds shall **not** be directly or indirectly used for:

- Salaries for staff of ministries, departments or agencies of the Government of Antigua and Barbuda;
- Salaries for executive officers and core staff of non-governmental organizations, except for such salaries related to services performed by such persons specifically for the purpose of achieving the objectives of the funds received from the SIRFF. In this case the amount of funding may be limited by the Board;
- Activities relating to the extraction or depletion of non-renewable natural resources (including forests, trees, sand, ghut sand);
- Any other use not consistent with the general objective of the Act.

Where applicable all programs must first meet the requirements of the agencies applying for the programs as well as all applicable laws.

ENVIRONMENTAL AND SOCIAL SAFEGUARDS

The proposed activities to be financed by SIRFF must observe all Environmental (as outlined within the EMPA) and Social Safeguard Policies of the DOE and the SIRF Fund and all applicable laws and regulations. The recipient should include environmental and social consideration for any project that might have a negative impact on the environment. In some cases, and depending on the project, an Environmental Impact Assessment may be required (see Physical Planning Act 2003).

Each project will need to be accompanied by a Monitoring plan to track the impact on ESS and Gender.

GENDER

The role of men, women, children, specific age brackets and persons with special needs should be taken into consideration when designing, managing and delivering programs. A gender responsive approach will improve project quality and sustainability and significantly reduce project risks. The SIRFF and the DOE's approach to gender when developing programs and projects is outlined with the DOE's and the SIRFF Technical Manual.

SPECIAL GUIDE FOR PROGRAMS

The DOE encourages program proposals that demonstrate the following characteristics:

- Complementary to the various sections of the Environmental Management and Protection Act.
- The current National Environmental Management Strategy (NEMS). This document will assist the reviewing entities on the programs that are priorities;
- The National Protected Areas Systems Plan and the National Biodiversity Strategy and Action Plan (NBSAP);
- CITES Management programs;
- Pollution and chemical management plans;
- Coastal areas and natural resources management plans;
- If the program is receiving funding from Government and donors and the SIRFF can be complimentary;
- The programs were developed in consultations with the relevant stakeholders; and
- Ample technical competence in program monitoring and evaluation to ensure proper tracking and reporting of grant activities and progress.

THE PROGRAM DECISION-MAKING PROCESS CYCLE

The application of programs by NGOs, and Government agencies will differ in approaches.

GOVERNMENT ENTITIES

The SIRFF program decision-making process for Government entities is based on that of the Government's process for recurrent expenditure. The evaluation of the programs are based on two criteria, these adherence of the program to the Act and the financial proposal for the implementation of the program.

The steps are as follows:

1. The applying entity will need to provide its **strategic plans** and programs with the accompanying budget for up to three years.
2. The documents are first agreed and approved at the level of the Permanent Secretary of the respective Ministry.
3. The program is sent to the Budget office of the Ministry of Finance for review if deemed appropriate submitted to the Director of the SIRFF.
4. The Director will submit the program to the TAC and the PMC for review.
5. Once reviewed the applying entity may be asked to provide clarifications and or amendments;
6. If recommended for approval the program will be sent the Director to submit to the Board for final approval.
 - a. The Board may also request additional clarification priori to approval. The Board may also request deferrals.
 - b. **Important note:** The Board however cannot reject a Government programs since the activities in programs are the implementation of legally binding actions within the EMP Act as well as International Environmental Agreements. The Board may amend or approved with conditions.
7. The Budget office and the respective agencies are notified by the Director of the final decision and the approved programs are placed within the Budget of the SIRFF for submission to the Parliament.
8. The final decision will be incorporated within the Appropriations Bill and debated within the Parliament. With the passage of the budget the Expenditure for the programs becomes law and published on the website of the Government and that of the SIRFF.
9. The agency will be notified by the Director of the passage of the appropriations Act and a MOU developed to address issues such as disbursement schedule, and monitoring and evaluation. The entity may request disbursements directly to its bank account (with certification only), the SIRFF may provide treasury functions, or

the Treasury may provide this function through the process of exchange of cheques².

10. Monitoring and evaluation of Government projects will be done by the TAC along with the PMC.

Government agencies may submit programs jointly with other Government agencies as well as NGOs.

NGO ENTITIES – NGO BOARD OF THE SIRFF FUND

The NGO entities program may also have a program and these will consist of the following steps:

1. Submission of a strategic plan, program concept and draft budget to the Director of the Fund;
2. An initial review is conducted by the reviewing entity for technical merit and financial feasibility and the results along with the proposal sent to the NGO board of the SIRFF;
3. If approved the NGO will be notified by the Chair of the NGO Board and asked to continue with the development of the program. If the entity needs resources to develop the program, the NGO Board may consider a program to provide these resources;
4. If resources are provided a grant agreement will be drafted and the funds disbursed according to the agreement;
5. The NGO provides the fully developed program, with budget and any other relevant documents as per the requirements of the SIRFF overall policies for the consideration of the NGO Board;
6. The NGO Board may approve, reject, amend, approve with conditions or place the program within the pipeline. The NGO is notified of the final decision;
7. The Director of the SIRFF is notified of the final decision and prepared the grant agreement on behalf of the NGO Board;

The NGO Board is responsible for the Monitoring and evaluation of the implementation of the program. This board may enlist the assistance of relevant government and other agencies in the M&E program. The DOE and the SIRFF will provide technical and financial oversight respectively.

Certain aspect of the M&E may be contracted out to various agencies and entities.

² The government entity may submit its vouchers for approved expenditure to the treasury which may issue payments in advance and these payments are reimbursed by the SIRFF. This option may only be used sparing for special circumstances.

PROGRAM DURATION

Program shall be a duration of 2 - 3 years.

PROGRAM SIZES

Grants for programs can be awarded by the fund for amounts between \$20,000 and \$350,000 USD, for any individual project/Program per grant year. Grants for RE and EE may be considerable larger due to the nature of these projects. Projects however larger than these limits can be considered but will require no-objection letter from the Minister of Finance.

PROGRAM APPLICANTS

Applicants for grant funding must meet the eligibility requirements set forth eligible applicants above.

No applicant who has previously received program funding shall be eligible for further funding unless the applicant has demonstrated clear success in meeting the objectives of the prior funding awarded within the terms of the relevant agreements.

REQUESTS FOR PROGRAM PROPOSALS

The Director of the Fund will publish a Request for Grant Proposals [(in the form attached as Schedule [●] hereto)] annually (or semi - annually). Requests for grant proposals shall be published using the same public media used for the publication of procurement requests (see *DOE and SIRFF Operational Manuals*).

The proposals will be accepted for a period of 2-3 months after the publication date of the Request for Grant Proposals.

Each Request for Grant Proposal shall indicate:

- The deadline by which all grant proposals for SIRFF grant funding shall be received in order to be eligible;
- An indicative timeline of when the SIRFF expects to notify applicants of the final award of grant funding for the relevant funding cycle;
- The maximum funding amounts available under such Request for Grant Proposal;
- The grant funding period; and
- A description of eligible applicants, eligible programs and eligible projects.

The SIRFF after consultations with the DOE, PMC the TAC and stakeholders (and vice versa) may further advise on other factors to be determined for grant proposal.

RECEIPT OF PROPOSALS

Upon receipt of a grant proposal, the SIRRF will acknowledge receipt in writing to the applicant and provide an overview to the applicant of the next steps in the grant-decision making process.

To ensure a transparent process, the SIRFF shall post a list of all grant proposal received on its website.

PROPOSAL REVIEW PROCESS

The evaluation of grant proposals that meet the eligibility criteria begins with a review of a submitted grant proposals by the DOE in accordance with the Grant Proposal Initial Review Guidelines. The following factors are among those to be considered:

- Strategic fit with the act, INDC, NAP and the NEMS;
- Strength and clarity of the proposed project concept and activities;
- Applicant qualifications (including eligibility, whether the applicant has previously received DOE grant funding and whether the applicant is a member of the GOAB, private sector or NGO entity);
- Project cost-effectiveness;
- Potential for leverage or generation of sustainable funding with other sources of revenue;
- Level of Administrative Support the grantee will need from the Fund in the implementation of the project (Certification Level).

The review of grant proposals, will be conducted by Reviewing Entities and other bodies established/contracted by the Board to conduct the reviews. The TAC and the PMC and any other committee established by the DOE may assist with the granting process. In the case of NGOs and CBOs the Board may consider using the established granting process of the small grants program. In these cases the DOE is represented on each of the decision making bodies and its role is to ensure that the ESS, Gender and eligibility are maintained. The decisions are taken by the NGOs themselves.

During the review phase, the Reviewing entity may ask the applicant to clarify any outstanding issues or complete any information that it deems to be required in order to consider the grant proposal complete.

The reviewing entity shall aim to complete the review process with respect to all grant proposals no later than three (3) months following receipt of each grant proposal prior to submitting its recommendation to the Director for onward submission to the PMC.

PROPOSAL SELECTION PROCESS

Following the review process with respect to each grant proposal received, the reviewing entity submits a recommendation for presentation to the Director of the SIRFF. This includes a summary of each program proposal (including amounts requested) and recommendations regarding whether the proposal should be approved (with possible minor changes to the budget or activity) or rejected.

The TAC or other technical committee, after having sufficient time to review each proposal, shall discuss any questions or issues with the DOE and take into account the recommendations of the DOE before deciding on the proposal. The decision will be made no longer than one (1) month following submission of recommendations by the DOE.

A positive recommendation on a proposal shall be awarded based on consensus of the deciding body. The final recommendations, are provided to the Director to present to the Board.

PIPELINE

If the number of the programs recommended for approval exceeds the funding available, the SIRFF may prioritize the programs. Procedures to prioritize will be developed by the TAC for the review of the PMC and the approval of the Board. Projects not funded due to lack of funding should be included into the pipeline in order of priority selected by the PMC in collaboration with the Board.

EXECUTION OF AGREEMENTS

Upon board approval of the program proposal, the Director along with the legal Council of the Fund shall prepare and execute the relevant Agreements to be signed by the Director or Deputy Director of the Fund and submitted with the application. Agreements for NGOs and Government agencies will differ. The latter will be via MOU and NGOs via grant agreements.

The draft grant agreement and MOU are attached.

INDICATIVE PROGRAM PROCESS TIMELINE

The timeline below is indicative of the program process:

<u>Action</u>	<u>Completion Date</u>
Posting of Requests for program Proposals	[January and June each year]

Deadline for submission of program proposals	[three months after calls]
Completion of review of submitted proposals by reviewing entities	[one – two month after]
Submission of proposals and recommendations to the board	[September]
Decision of board with respect to each proposal	[October]
Communication of results to applicants	[November]
Finalization and signing of agreements with each successful applicant	[After budget Debate]

DISBURSEMENT

The SIRF Fund makes arrangements for the disbursement of funds in accordance with the terms of the executed relevant Agreement.

RECONSIDERATION OF FUNDING DECISION

Section (89) of the EPMA allows for all applicants to appeal any funding decision of the Board. The applicant will have twenty one (21) days in which to request a review. The SIRF Fund General Board will develop procedures to facilitate the request to review applications.

REVOLVING LOAN FACILITY

BACKGROUND AND RATIONALE

With the onset of climate change and the urgent need to adapt to its impacts there is a major gap in the need to prepare the homes and businesses for the impacts of droughts and hurricanes. Antigua and Barbuda is a developing country and although the country is a SIDS, the cost of adaptation is being borne by the private sector and the government. To meet this cost however, the individuals and businesses need access to low cost capital. With the need to meet ever changing and stringent financial rules many people simply do not qualify for capital or the cost of it is too high. There is therefore a major gap in the ability of the citizens to meet the demands for a new building code that will require residents to meet new standards in the construction of homes, practices on farms and businesses.

The EPMA, as part of its social safeguard mitigation strategy, is to provide low cost loans to the private sector (individuals and business) to allow them to meet the cost of good environmental practices in their homes and business. These practices may include the development of Environmental Management Systems plans which includes adaptation, mitigation pollution control and other aspect of the Act.

The Revolving Loan Facility will be the first feature of the SIRF Fund to be implemented with a grant for adaptation from the Special Climate Change Fund of the Global Environmental Facility and the Adaptation Fund.

THE REVOLVING LOAN FACILITY AND ITS MODALITIES

CONCEPT

By definition 'Revolving Fund' is capital raised with a certain purpose that can be made available to users **more than once**. 'Revolving' represents that the fund's resources circulate between the fund and the users. Revolving funds are established with an intention that they should be self-sufficient and sustainable. Funds may however require a process of replenishment after a period of time. The design of the fund and amount of risks it is willing to undertake will provide an idea of the sustainability of the facility and the appropriate time for replenishment.

STRUCTURE OF THE REVOLVING LOAN FACILITY

The Facility will initially be associated with existing revolving loan facilities of the government. The existing student loan facility and its management and decision making structure will be used as the model for the fund. As the Facility grows it will develop its own modalities as the Board of the SIRF Fund sees fit. These changes will be guided by independent evaluations of the Facility taken biennially or more frequently as determined by the Board or donor. Since the SIRF Fund is new to these funds, using the processes of the Ministry of Finance will assist with avoiding operational and institutional risks to the SIRF Fund.

The decision making structure of the Facility and the operational procedures will be developed by the SCCF project as well as support from the Commonwealth Secretariat and the Organization of Eastern Caribbean States (OECS). These procedures and other guiding documents are planned outputs of the project and these collaborations.

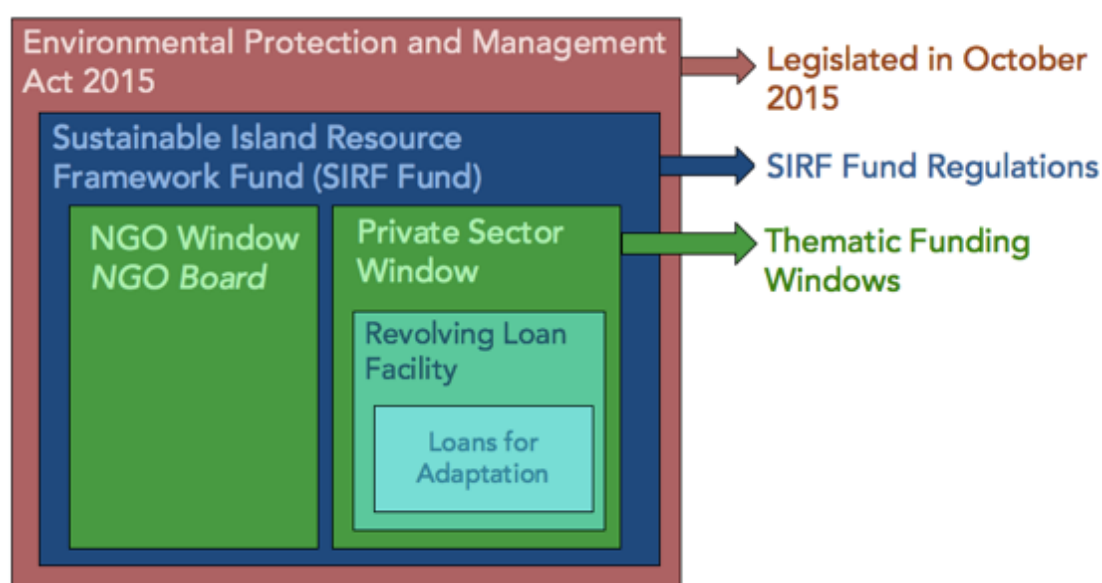


FIGURE 5. LEGAL AND INSTITUTIONAL ARRANGEMENTS OF THE REVOLVING LOAN FACILITY

FINANCING THE FACILITY

The Facility will initially be financed by donor funding from international environmental funds, and projects to capitalize the Revolving Loan Facility are being submitted to the Special Climate Change Fund (SCCF) and the Adaptation Fund. The initial funding package is a total of \$4.8 million USD and the funds will be used primarily for adaptation and mitigation. Each of these are providing capital to pilot the facility in adaptation at the national level and at the community level.

Based on the results of the pilot activities, it is expected that funding streams will increase and will be diversified, including funding from the Government.

LEGAL STATUS

The Revolving Loan Facility is established by regulations as per the requirement of the Finance Administration Act (2006). For the SCCF and the AF contributions however, each of these will require specialized procedures to reflect the specific Set- asides for adaptation, and in the case of the Adaptation Fund project, to be site and purpose specific. The regulations and operational procedures are designed to ensure that the funds will be used in accordance with the purposes specified within the respective project documents.

TIMELINES AND STEPS FOR THE PASSAGE OF REGULATIONS

The SIRF Fund regulations allows for customized approaches to the programming of donor funds. The regulations are drafted and approved by the Board, with technical assistance from the DOE and the TAC. The steps and timelines are as follows:

1. The policy related to the regulations are first developed by the Fund with assistance from the DOE and the TAC and in consultation with relevant stakeholders (2 months);
2. The policy (with draft regulations) is approved by the Board and submitted to the Minister responsible for the Environment for submission to the Cabinet for review and approval (1 month);
3. The regulations are finalized and resubmitted to the Cabinet for approval (two weeks);
4. Regulations sent to the office of the Attorney General for final review and then sent to the Gazette (1 – 2mths);
5. The regulations become law after published three consecutive times in the Gazette (i.e. after 90 days);
6. The regulations are distributed to the Board members and used as a guide for the Fund.

The process outlined in the six steps above is estimated to take approximately nine (9) months in total.

SUSTAINABILITY OF THE REVOLVING LOAN FACILITY

The sustainable design of this facility requires prompt repayments by loan recipients. The sustainability of the fund will depend on inflation (which is steady and predictable in Antigua and Barbuda) and the default rates. The facility by its very nature will make funding available to all residence regardless of risks. Notwithstanding mitigation measures such as direct salary deductions (a common approach in Antigua and Barbuda) for repayments, other default risk mitigation measures will be examined and implemented, while ensuring that the SIRF Fund still serves priority vulnerable populations.

There **will** be users however that will be high risk for non-payments but need the funding to adapt to climate change. The SIRF Fund General Board will develop policies on how to address these users who are at risk to climate and other risks. At this time the goal is to have a balance of users that will ensure the survival of the Facility (See Financial Scenario Report).

MANAGEMENT AND ADMINISTRATION OF FACILITY

The overall management of the facility will be managed by the SIRF Fund and its Board. The General Board will establish decision-making structures for the following:

- Management of the loans process, including issues of eligibility, priority for funding, interest rates, other loan conditions, among others;
- Technical assessment for loan applications;
- Monitoring and evaluation of implementation of the loans;
- Financial and accounting systems to manage disbursements and repayments.
- Fundraising strategy for additional capital injections; and
- Reporting and evaluation.

In Antigua and Barbuda, all of the above procedures and systems are required to be incorporated into law.

The financial reports of the Revolving Loan Facility shall include the following:

- Profit and loss account that will be prepared quarterly for use in monitoring and planning for new applications;
- Cash flow statements indicating overview of sources and applications of funds and forecast for the rest of the year; and
- Balance sheet approved by the fund's trustees and by an external auditor, which shall be finalized annually within three months of the end of the financial year.
- A quarterly balance sheet will also be prepared.

The Revolving Loan Facility will be required to produce a multi-year planning report consisting of a minimum of five-year cash flow forecast, which will be revised annually.

It is important that the information on the personal particulars and all financial aspects relating to the users be kept confidential by storing and securing the relevant information and records appropriately. Third parties shall not have access to them.

The details of the management of the facility will be developed as part of the SCCF project and should be ready for gazette by December 2016.

ENVIRONMENTAL AND SOCIAL SAFEGUARDS

In addition to complying the Environmental and Social Safeguards Policy of the DOE, as described below, the Facility will develop a system of implementation that will be gender responsive and take into consideration ESS that are unique to the program. The result of this work is an Environmental Management Framework Plan that will provide guidance to the SIRF Fund General Board, the TAC and the Technical Evaluation Committee (TEC) on the specific implementation of the facility as well as to provide flexibility for vulnerable users. For example, in Antigua and Barbuda single parent homes with a single income are particularly vulnerable, especially if they work within the hotel or informal sectors. Elderly persons or those with disabilities who cannot move to a shelter during a storm or cannot get water during a drought are particularly vulnerable and may get special rates or priority from the facility.

The details have yet to be finalized, and will require extensive consultations, which will be completed as part of the operationalization of the Facility.

SUMMARY

Draft loan application forms for adaptation in homes and draft loan agreements are provided in Appendix 11 – 13. Purpose specific applications and loan agreements will be developed by the TAC and the legal department as the Facility develops and provides financing in all areas of the EPMA.

ANTIGUA AND BARBUDA MEPA TRUST – RELATIONSHIP TO THE DOE

To be completed. This section will be completed after the approval of the MEPA Trust Board.

ENVIRONMENTAL AND SOCIAL SAFEGUARD POLICIES

The Department of Environment (DOE) developed its Environmental and Social Safeguards (ESS) policy in 2015 and adopted the policy in June 2016. Safeguards are described below, and are operationalized in the funding activities of the SIRF Fund through completing the Environmental Impact Assessment (EIA) Scoping template for each project and programme. This template includes provisions for social safeguards, including assessing and describing impacts to interest groups, livelihoods, cultural resources, recreation amenities and other common resource goods. Provisions for gender equity and women's empowerment are also covered by the EIA screening tool.

ENVIRONMENTAL SAFEGUARDS

The funds provided from the DOE via the SIRFF are expected to generate significant positive environmental benefits as outlined within the NEMS.

Adverse environmental impacts of DOE-financed projects and activities will generally be minor, and localized. It is expected that any impacts can be mitigated through responsive risk management measures. The environmental management screen for environmental impacts and specify existing and additional mitigation measures to address any potential impacts.

An example of the ***Environmental Management Framework Plans*** (EMFP) for marine protected areas and biodiversity is attached as 0. Similar EMFPs will be developed for other areas of the environment. These will be developed to include gender and social impacts.

Projects funded by the GEF, Adaptation Fund and the Green Climate Fund have very specific requirements for ESS. These are related to risk management of the Fund and the requirement of donors. These may therefore be somewhat less in scope than those required by the EPMA. Where this is the case the applicants should ensure that both the EPMA and donor requirements are taken into consideration.

An initial screening for potential environmental impacts associated with the use of SIRF financed projects (either by way of grants or loans) must be undertaken using the guidelines set out in the respective EMFP and risk registry developed by DOE staff and/or through technical consultants, as required.

Where private entities would be responsible for specific activities financed by the fund (e.g. refurbishment or construction of protected area infrastructure such as a visitor centre or eco-tourism activities) relevant safeguards need to be specified and become part of their contractual obligations.

Relevant DOE projects and programs may require an EIA as directed by the Physical Planning Act 2003.

SOCIAL SAFEGUARDS

The proceeds of the DOE are expected to catalyze positive social outcomes. There may however be some potential nonphysical (economic) displacement issues associate with possible restrictions on resource use, for example access to core protected areas.

The SIRF Fund shall address and minimize adverse social impacts resulting from SIRF Fund financed projects and activities by:

- Good communication and transparent operations;
- Ensuring stakeholder consultations are carried out and feedback is incorporated into project design, where appropriate;

- Undertaking adequate and continual monitoring and evaluation in accordance with the M&E Guidelines to verify adoption of relevant guidelines in the thematic areas of funding;
- Operationalize the access to justice program as per the EPMA.

In all cases, the DOE shall be guided by the Principle 10 from Rio + 20 and other good practices³.

GENDER

The DOE developed its Gender Policy in 2016 and is currently reviewing it for adoption. Gender responsive design guidelines are located in the DOE Technical Manual.

MONITORING AND EVALUATION PROCESSES

Monitoring will guide the DOE and the Fund in meeting its objectives and keeping track of progress of the implementation of the NEMs and other policy documents and laws. The monitoring plan should:

- Be simple;
- Be sustainable within existing capacities and resources;
- Seek to integrate with projects and other agreements of donors and the government;
- Lead to management improvements and not detract from environmental management and conservation efforts;
- Involve local communities with the activities and goals of the DOE and the Fund;
- Provide the basis for sharing of experiences and replication of successful outcomes;

Take into consideration gender specific access to information and resources to participate meaningfully in consultations. The monitoring plan comprises the following four components:

1. Monitoring performance of the Fund;
2. Monitoring performance of individual grants;
3. Nationwide monitoring of targets and programs;
4. Where appropriate, regional collaboration particularly with the OECS.

Sub-sections (1) and (2) of paragraph above assess whether the DOE and its grant program have carried out the agreed activities as outlined within the NEMs and other policy documents. The

³ The Cabinet of the Government of GOAB has taken a decision to ratify the new agreement emanating from Principle 10 of the Rio + 20. This new treaty is currently under development. Until and at such time the Department will operationalize its draft principles.

DOE and its partners and Donors need to know how and if all targets and objectives are being met in a manner according to the agreed program and budget.

Sub-section (3) and (4) are aimed at measuring the impacts of DOEs funded activities and projects nationwide. This element of the monitoring plan relates to the effectiveness of implementation of the NEMS management and will provide the necessary information to report to the government and its citizens, as well as the various multilateral environmental agreements.

MONITORING AND REPORTING

Please see Technical Manual.

SITE VISITS

Please see Technical Manual.

PERFORMANCE MONITORING OF THE DOE

Please see Technical Manual.

PERFORMANCE MONITORING OF GRANTS AND REVOLVING LOANS

Please see Technical Manual.

MONITORING OF THE IMPLEMENTATION OF THE NEMS

Where appropriate, Regional Monitoring Collaboration with the OECS (Climate Change, marine protected areas, Biosafety, Access and Benefit Sharing).

[To be completed after negotiations with the OECS]

DOE GENERAL PROCUREMENT GUIDELINES

PROCUREMENT OF WORKS, GOODS AND GENERAL OPERATING COSTS

The DOE/SIRF Fund is responsible for its procurement for projects and programs regardless of the source of funding. The procurement of works, goods and general operating costs for the DOE in accordance with the rules provided in this Operational Manual further detail operation steps as outlined by the secretariat. The DOE has a part-time procurement officer and receives additional procurement support from the Ministry of Finance who has a full time procurement unit. This arrangement is support by a Letter of Understanding.

The Procurement Manual and procedures are available from the Director of Operations who supervises the procurement process.

CONFLICT OF INTEREST

CONFLICTS POLICY

The DOE is committed to ensuring that its transactions, engagements and relationships are transparent and fair, and do not inappropriately benefit interested persons or organizations. To this extent, the DOE has established a conflicts of interest policy and Code of Conduct (the “**Conflicts Policy and Code of Conduct**”), a copy of which is on the DOE website (http://www.environmentdivision.info/code_of_ethics_en_364cms.htm). The policy provides guidance on the legal requirements and sets out the policy of the DOE and the SIRFF with respect to conflicts of interest.

DECLARATION OF CONFLICTS

Each DOE/ SIRFF staff member must declare in a written statement addressed to the Chairperson of the PMC (or their designate they may choose to designate the Audit Committee) the nature and extent of any interest, direct or indirect, which he or she has in a proposed transaction, grant, loan, arrangement or agreement entered into by the DOE/SIRFF which has not been previously declared.

RECUSAL OF CONFLICTED STAFF OR COMMITTEE MEMBERS

A member of staff or committee (TAC, Audit Committee and PMC) should absent himself or herself from any and all discussions in which it is possible that a conflict will arise between his or her duty to act solely in the interest of the DOE, and any personal interest (including but not limited to any personal financial interest).

FINANCIAL ACCOUNTING AND RECORDS

Other accounting and record keeping processes to be discussed can be found in the DOE's Accounting and Operations Manual.

AUDITS (DOE AND SIRF FUND)

The DOE is required by law to have audited accounts. The DOE and SIRF are required to have an Audit Plan as a requirement of the PMC. The Audit Plan covers a period of three-years and has to be reviewed and approved by the Audit Committee. The plan provides for an Internal Auditor and Independent External Auditors. The audits of the financial accounts, records and statements of the DOE/SIRF are subject to national laws as well as donor requirements. As the NDA for the GCF and a NIE for the Adaptation Fund, the DOE is also required to maintain its controls systems according to International Fiduciary Standards. TORs for the audits are included within the Annex of the Audit Plan. The Audit Plan and checklist are attached to the Operational Manual of the Department.

COMPLAINTS MECHANISM FOR GRANTS AND REVOLVING LOANS PROGRAM

The Department of Environment's Complaints Procedure is outline on its website:
http://www.environmentdivision.info/submit_a_complaint_en_365cms.htm

Department of Environment
 Ministry of Health and the Environment
 #1 Victoria Park Botanical Garden
 P.O. Box W693
 St. John's
 Email: antiguaenvironmentdivision@gmail.com



Department of Environment Complaint form

Department of Environment Complaint Form	
Contact information of Complainant:	Name: Telephone: Email Address:
Complaint Recorded by: <i>(Officer who took the complaint)</i>	
Location of Problem: <i>(Detailed accurate location of where the incident is occurring)</i>	
Date of Complaint: <i>(Day/Month/Year)</i>	
When the problem occurred: <i>(Date and Time)</i>	
Describe in Detail and accurately, the nature of your complaint:	
Any information or evidence you may have—particularly eyewitness information, documents or photographs, a videotape, or a water or soil sample: <i>(The information or evidence must be credible and relate directly to the incident being reported).</i>	
Actions that the Office took to remediate the matter: <i>(to be completed by the DoE's officers)</i>	

LIST OF SCHEDULES

DEFINITIONS AND ACRONYMS

“Act” means the Environmental Management Act 2015. This includes all amendments and every statute substituted therefor.

“Administrative Expenses” means staff salaries and employment benefits, consultant fees, expenses, meeting costs, staff training costs, publication costs, office operating costs, staff vehicle costs, staff travel costs and other costs designed by the DOE and board of the SIRF Fund.

“Annual Spending Report” means an annual report prepared by the DOE and approved by the PMC detailing the use of government and donor spending during the relevant fiscal year.

“Annual Work Plan” means a work plan detailing the forecasted spending plans for the DOE, anticipated revenues prepared by the Secretariat and approved by the PMC each fiscal year.

“Applicable World Bank Procurement Guidelines” means the World Bank Non-Consultant Procurement Guidelines and the World Bank Consultant Procurement Guidelines.

“Articles of Incorporation” means the articles of incorporation of the MEPA Trust dated 2015.

“Donors” means internal or external sources of funding to the DOE. Examples can include, but are not limited to the Government of Antigua and Barbuda, GCF and GEF.

“External Audit Terms of Reference” means the terms of reference for the annual external audit of the DOE records, accounts and financial statements, as approved by the PMC a copy of which is attached as 0 (*Internal and External Audit Terms of Reference*). This may be periodically revised, amended, supplemented or otherwise modified by the PMC.

“GEF” means the Global Environmental Facility, which is represented by the World Bank acting as the GEF implementing agency.

“Grant Application Initial Review Guidelines” means the guidelines attached hereto as 0 (*Grant Proposal Initial Review Guidelines*) to be followed by the DOE for the preliminary review of grant applications.

“GOAB” means the Government of Antigua and Barbuda, including its various ministries, agencies and departments.

“MPLI Principles” means the principles for mitigating potential livelihood impacts for marine protected areas set forth in 0 (*Process Framework for Mitigating Potential Livelihood Impacts*).

“NPA” means an area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and managed through legal or other protected means.

“National Protected Area System Plan” means the network of NPAs managed by the GOAB, the NPAs funded by the DOE and the MEPA Trust and any other Eligible NPA. [A current map (as of the date hereof) of which is attached hereto

“Preliminary Annual Spending Report” means a preliminary report in the form of Schedule [●] prepared by the Secretariat and approved by the PMC detailing the use of funds by the DOE during the first three quarters of the relevant fiscal year.

“Quarterly Spending Report” means a quarterly report in the form of Schedule (#) prepared by the DOE and approved by the PMC detailing the use of funds during the immediately preceding fiscal quarter.

“DOE accounts” means each of the DOE operating accounts and any other accounts opened and maintained in the name of the DOE in accordance with clause (*Error! Reference source not found.*).

These are some more of the acronyms used throughout the document:

- ESS, MEPA, NOG, CBO, SIRF, GCF, SCCF, RE, MOU, DOE, M&E, EPMA, INDC, AF, MANA, CMO, EE, EMS, PAC, PMC, SIDS

AUDIT PLAN 2015 - 2018
FORM OF QUARTERLY/PRELIMINARY/ANNUAL SPENDING REPORT

Schedule 1

Form of Grant Agreement (can use the same as that of the SIRF and the GEF or ECMANN)

[To be inserted]

GRANT PROPOSAL INITIAL REVIEW GUIDELINES (THIS CAN BE PLACED IN A TABLE AS A CHECKLIST)

Guidelines	Comments
Does the proposed project identified in the grant proposal directly targets the priorities within the NEMS and other policy documents (NBSAP, INDC etc)?	
Does the Grant Proposal satisfy the Eligibility Criteria?	
Will the activities listed and proposed in the grant proposal be likely to achieve the goals identified in the grant application and the broader goals of the SIRF Fund?	
Does the grant proposal justify the need for the proposed project and activities?	
Is the scope of work proposed regional, national or site specific?	
Does the project demonstrate a commitment to coordinate work with local communities, partners or existing initiatives in the region?	
Does the project, comply with relevant national and or regional standards?	
Does the proposed project present any identified or identifiable social or environmental risks that could conflict with the Environmental and Social Safeguards? If so, have social and environmental risk mitigation measures been proposed?	
Does the project articulate plans for continuation and/or replication after grant funding is completed?	
Does the proposal indicate how the project will be	

structured, staffed and managed?	
Is the applicant the best group or person to carry out the proposed project (based on capability, experience, local credibility etc.)?	
Is the grant term proposed sufficient to carry out the activities and work proposed? Is the timeline for completing the work realistic?	
Is the applicant using any of its own funds to support the project? How much?	
Has the applicant identified other sources of funds or matching grants, and or has the applicant committed to leveraging additional resources to support the project?	
Does the project consist of new works or is it an ongoing project and, in the case of the latter, what has been achieved to date and investments in the project have been made to date?	

Schedule 2**- ENVIRONMENTAL MANAGEMENT FRAMEWORK – MARINE PROTECTED AREAS ONLY**

Activities	Potential Environmental Impacts	Associated Mitigation Plans
<p>Managed Dive Sites</p> <p>Managed Snorkeling Sites</p>	<p>Damage to corals and reef area from mismanagement of dive/snorkeling operations, specifically from:</p> <ul style="list-style-type: none"> (i) Excessive dives and damage to sensitive areas; (ii) Extraction of reef materials; (iii) Improper moorings of boats. <p>Inadequate monitoring of reef health, damage, invasive species, etc.</p> <p>Disruption to fish species from feeding by divers/snorkelers.</p>	<ul style="list-style-type: none"> - An assessment of the reef area by a trained Marine Scientist/Coral Reef Ecologist to determine optimal number of dive/snorkeling sites within the MPA limits within the carrying capacity of the site. In addition they would assess information on reef form, fish communities, reef health, sensitive areas and other such reef attributes. - Sensitive areas (such as those recovering from recent physical damage, areas with large concentrations of soft corals and branching hard corals, and areas with high concentrations of coral recruits) should be flagged as “no dive” areas or areas where only experienced divers are allowed to dive. - A dive site map created and used as part of the orientation for the divers. Consideration should be given to depth ranges, wave action, visibility, and currents. - Measures (including fines and sanctions) to stop divers/snorkelers from taking living/nonliving materials from the reef. Instill sense of environmental stewardship by educating divers/snorkelers about collecting marine debris (such as plastic bottles, aluminum cans etc.). - Proper moorings to prevent shifting or breaking, which may cause damage to the reef by boats or mooring chains/cables. Anchoring of boats at dive sites should be strictly forbidden. Dive/snorkeling operators informed of size/capacity of moorings. - Permanent transects should be used to monitor the reef. Photo/video inventories used to measure reef deterioration to inform dive/snorkeling operations. Dive/snorkeling operators can also do ongoing checks of reef health, reporting evidence of coral

Activities	Potential Environmental Impacts	Associated Mitigation Plans
		<p>disease, coral bleaching, physical damage etc. Fish species lists can also be used (divers/snorkelers can check-off types of fish they see) to monitor any significant changes in the fish populations or evidence of invasive species.</p> <ul style="list-style-type: none"> - Prohibit feeding of fish during dive/snorkeling operations so as to not disturb fish and marine mammal populations. - Sound environmental practices in dive shops to deal with waste management, safety, sewage disposal and, boat operations.
Managed Non-Motorized Water Sports	<ul style="list-style-type: none"> - Damage to reefs from inadequate zoning; - Improper storage and cleaning of equipment; impacts on ecosystems; - Removal of shoreline vegetation. 	<ul style="list-style-type: none"> - Zones must be developed to ensure safe areas for such activities, avoiding damage to reefs and other sensitive areas. - Proper storage of water sports equipment at a specific location, not negatively impacting beaches or sand dunes. Cleaning of equipment, especially with soaps or oily substances should not be done close to or in the water. - No removal of shoreline vegetation should be done to facilitate this activity (restrict access to shoreline).
Sea Turtle Nesting Watching	<ul style="list-style-type: none"> - Disturbance of sea turtles due to close proximity by tourists, noise, flash photography etc. - Poor awareness of sea turtle conservation 	<ul style="list-style-type: none"> - Tourists kept at a “safe” distance beyond the location of the nest i.e. they should not be in the area between the high water mark and the location of the nest. - Excessive noise should be avoided; use of bright lights and flash photography should be discouraged. - Activity should be informed with lessons on sea turtle conservation.
Turtle Nest Protection	<ul style="list-style-type: none"> - Inadequate protection measures relating to turtle nesting; - Poor public awareness of 	<ul style="list-style-type: none"> - Trained personnel in sea turtle nesting behavior. - Regular beach combing to monitor nesting activity; appropriate use of GPS markers or landmarks, with

Activities	Potential Environmental Impacts	Associated Mitigation Plans
	nesting activities.	<p>dates to record nesting/hatching.</p> <ul style="list-style-type: none"> - Education on turtle conservation to nearby homes, hotels, and restaurants so that they can assist in monitoring against poachers and animals during the incubation period. - Nesting area adequately protected against light (redirected, changed, or turned off), and roadways (a small soft barrier between the nest and roadway), especially just before the hatching date. - Use of bright lights/flash photography discouraged. Red lights can be used.
Visitor Center	<ul style="list-style-type: none"> - Large footprint of visitor center, damage to sensitive habitats - Improper adherence to local building codes; inadequate solid waste management system 	<ul style="list-style-type: none"> - The footprint of the center should be at a minimum while achieving form and function. Site of the facility should avoid very sensitive habitats. - Visitor centers should conform to local building codes, especially as they relate to set-back limits from coastlines, and sewage disposal. A comprehensive solid waste management system should be implemented and effectively managed. - Alternative sources of energy should be considered, but at the very least, energy conservation mechanisms should be in place; green architecture should be a distinct feature of this structure.
Boardwalk	<ul style="list-style-type: none"> - Removal of vegetation to construct boardwalk - Damage to sand dunes from foot traffic - Use of short-lived and non-recycled materials; toxic weather coating paints 	<ul style="list-style-type: none"> - Minimal vegetation removal (especially in mangrove areas); utilize option to raise the boardwalk and meander it over and around the trees. - Boardwalk traversing sand dunes should be minimal and aim to reduce foot traffic over multiple points of the sand dunes, limiting it to the boardwalk. - The material used for the boardwalk should be long lasting, with consideration given to recycled materials. Toxic weather-coating paints must not be used.

Activities	Potential Environmental Impacts	Associated Mitigation Plans
Artificial Reefs	<ul style="list-style-type: none"> - Damage to nearby coral and ecosystem changes in patterns of plank tonic food supply from improper design/ placement of artificial reef structure - Use of improper materials to serve as the artificial reef structure; pollution - Excessive fishing at artificial reef sites 	<ul style="list-style-type: none"> - A coral reef restoration expert should design the type, number and placement of the artificial reefs structures. The installation should not result in loss of coral from the surrounding areas, and the artificial structures should be anchored properly. - The placement of the artificial structures should not alter the water currents significantly enough to change in patterns of the plank tonic food supply. - Use of old ships as artificial reefs must be carefully considered, as all oils and other harmful agents have to be thoroughly removed from the vessel before it is sunk. - Measures should be put in place to prevent fishermen from exploiting these artificial reefs for fishing.
Multiple-Use Zones Demarcation	<ul style="list-style-type: none"> - Poor demarcation of multiple-use zones - Improper mooring of anchors and buoys, inadequate monitoring 	<ul style="list-style-type: none"> - Upon agreement on zones for various uses, a map should be prepared to guide the physical demarcation of the site. - Mooring buoys should be used; mooring anchors must be carefully placed so that they do not drift or drag along the sea floor causing possible damage to the reef. Mooring lines should be far away from the reef so they do not touch the reef during heavy wave action. Moorings should be checked regularly to reduce the likelihood of being disconnected from the anchor and creating marine debris.
Sand Dune Restoration	<ul style="list-style-type: none"> - Inadequate information about dune/ beach/ mangrove characteristics 	<ul style="list-style-type: none"> - An assessment of the dune/beach site characteristics will be done prior to restoration work. This includes review of historical data, design of restorative profile, amount of sand required, source of sand, species inventory, types of vegetation needed, etc.
Beach Vegetation Restoration	<ul style="list-style-type: none"> - Improper restoration relating to vegetation; impacts on other marine areas 	<ul style="list-style-type: none"> - Local vegetation planted and characteristic of the sand dune/beach vegetation; no new species should be introduced.

Activities	Potential Environmental Impacts	Associated Mitigation Plans
Mangrove Restoration/ Maintenance	<ul style="list-style-type: none"> - Damage to mangrove from use of heavy machinery 	<ul style="list-style-type: none"> - Soft solutions (such as improving vegetation cover) will be explored before exploring hard construction-type solutions involving heavy machinery. Should not impact other adjacent marine areas such as seagrass beds. - Vegetation profile of beach should be taken into consideration, as various species have specific sea spray and wind tolerance regimes. - Hard structures must be removed from the beach, especially between the high water mark and the sand dunes -this would reduce the interference of sand movement.
Bird Watching	<ul style="list-style-type: none"> - Disturbance to bird species due to inadequate consideration of nesting/mating habits; and excessive trips scheduled - Accidental transfer of invasive species due to negligence - Improper waste disposal during trips; oil leaks from boats etc. 	<ul style="list-style-type: none"> - Guides trained in best practices by an ornithologist; trips scheduled after consideration of species-specific mating and nesting habits (time of year, time of day, etc.), to not cause unnecessary disturbances. Carrying capacity calculated to ensure that minimal numbers of visitors and minimal frequency of trips. - Care taken by the bird watchers not to transfer invasive plant/animal species from one area to another. - Trips must make allowances for restroom stops (if trips are long), and deal with all garbage generated on the trip. Boats must be well maintained and not leak oil. Ideally, the engines should be quiet, or non-motorized boats should be considered.
Marine Mammal Watching	<ul style="list-style-type: none"> - Disturbance due to inadequate information about species habit, characteristics etc. leading to improper guidance for organized trips - Injury to marine mammals from boat operations, including from propellers 	<ul style="list-style-type: none"> - An assessment of the marine mammal(s) carried out for site-specific information on species habit, temporal variations in movement, migratory patterns, feeding habits, social relationships, etc. to provide proper guidance for trips including minimal disturbance to the mammals. - Safe viewing distance must be established and observed at all times. Number and frequency of trips should be agreed by the operators (under guidance)

Activities	Potential Environmental Impacts	Associated Mitigation Plans
		<p>and followed.</p> <ul style="list-style-type: none"> - Persons should be well trained in boat handling, and propellers properly guarded to avoid injury especially to slow moving mammals (e.g. manatees).
Scientific Research	<ul style="list-style-type: none"> - Damage to species from improper sampling techniques; introduction of invasive species - Protection of information about location of rare species 	<ul style="list-style-type: none"> - Non-extractive and non-destructive sampling are preferred. If any removal and relocation of live specimens is done, care must be taken not to introduce these species into new areas where they may become invasive. - Sensitive information discovered from scientific research, such as location of rare species, should be given privileged access rather than open access.
Development of Alternate Livelihoods	<ul style="list-style-type: none"> - Negative environmental impacts from the alternate livelihoods activities 	<ul style="list-style-type: none"> - The alternative livelihood developed should not have equal or greater negative environmental impact than the livelihood being displaced. - Ideally, there should be no negative environmental impact. Studies, such as those under the OPAAL project, should be used to guide the development of this activity. - Residual material from previous livelihood (such as fish pots, nets, etc.) should be disposed of properly, or recycled into other products.
Education and Outreach	<ul style="list-style-type: none"> - Misguided messages can lead to promotion of poor practices or non-acceptance of best practices - Inaccuracy of messages - Increased use of paper 	<ul style="list-style-type: none"> - The information transferred to the audience must be carefully constructed; it must be accurate, unbiased and clear. Attention must be paid to highlighting sound environmental practices, therefore, these must be well-researched and applicable to the subject matter and the audience - Excessive use of paper should be discouraged; reuse and recycle paper where possible.

PROCESS FRAMEWORK FOR MITIGATING POTENTIAL LIVELIHOOD IMPACTS FOR PROJECTS IN MARINE PROTECTED AREAS

PRINCIPLES FOR MITIGATING POTENTIAL LIVELIHOOD IMPACTS

[To be discussed further with relevant stakeholders.]

1. **Minimizing Social Impact:** The DOE shall avoid funding projects with negative social impacts that involve loss of livelihood or land. All proposed conservation strategies must take into account actual practices of resident and/or user communities in each DOE project and program activity including affected protected areas compatible with conservation. If a project proposes to limit access to natural resources and/or areas, the following safeguards must be satisfied:
 - (a) The project must demonstrate that if indeed some loss must occur, it is being done in accordance with the Government of Antigua and Barbuda and according to the Laws and permissions of the Government of Antigua and Barbuda. Furthermore, this will only be done with the permission and negotiation of the relevant stakeholders taking note that the government cannot legally acquire home owners to leave their property.
 - (b) All necessary and applicable protocols have been carried out, and all appropriate and legally required permissions obtained, compensations paid, and evidence has been submitted to the DOE of compliance with such protocols and payment of such compensation prior to any advance of funds.
2. **Adherence to National Environmental Management Strategy:** The DOE, where possible, should adhere to relevant national and regional sustainable development plans and programs and keep them under review. **[See legislation has a list of plans and policies]]**
3. **Policies and Plans Monitoring and Evaluation:** Projects should include process and outcome indicators in line with relevant M&E Guidelines.

INTERNAL AND EXTERNAL AUDIT TERMS OF REFERENCE – PROVIDED BY THE DOE

[To be inserted]

DETAILED PROCEDURES FOR THE REVOLVING LOAN FACILITY (RLF) OF THE SIRF FUND WITH SPECIAL REFERENCE TO PROCEDURES FOR THE SCCF AND THE AF PROJECTS

Policies and Procedures of the Revolving Loan Facility

(Draft – Subject to SIRF Fund Board Approval)

Purpose

Award small low interest loans to local entrepreneurs and workers, especially those who are unable to get capital through conventional lending services. Help those that do qualify to get loans or additional sources of funding to implement the provisions of the EPMA and the building code and those who live within 200 feet of a waterway and are in danger of flooding and contracting vector borne diseases.

Measuring Success

Success of Facility operations: It would be ideal to have limited attrition of the revolving loan facility. Therefore, success will reflect both the ability of applicants to enhance self-sufficiency through the utilization of the loans, and their performance in repaying these loans. Operational success will be measured by the efficient disbursement of loans, from the time of application under Phase 1 to the ultimate approval decision under Phase 5 being an indicator of success (Figure XX).

Success of the interventions: The reduction of pollution into the air, waterways and ecosystems, the reduction of GHG and increase resilience of persons who are vulnerable to the impacts of climate change, are indicators for the success of the interventions. Impact will be assessed through the SIRF Fund's ongoing M&E framework and in the SIRF Fund's annual reports to Cabinet.

Success will be achieved when the Revolving Loan Facility will attract additional funding based on the track record of its initial pilot initiatives.

Institutional Arrangements – Loan Board and the Technical Evaluation Committee

The SIRF Fund Revolving Loan Facility Board, known as the RLF Board (Loan Board), comprises volunteer members nominated by the General Board of the SIRF Fund and appointed by the Governor General. Loan Board members are recruited for their expertise and potential to make a positive contribution to the Loan Board. The Loan Board will comprise a minimum of four (4) members and a maximum of eight (8) members. Two of the Loan Board members must also be current directors on the General Board of the SIRF Fund. The Loan Board appoints its

own Chair and makes rules and procedures as provided for under the Regulations for the Act. In addition, the Loan Board Chair may appoint up to three (3) ad hoc members for any particular meeting if, in the Chair's opinion, the ad hoc members contribute an area of expertise that will be helpful for that meeting. These members will be appointed as observers in accordance with the regulations. The Loan Board reviews all loans, and makes recommendations for approval. The General Board alone has the authority to approve them and pledge assets (the Government assumes the risks of these loans and the Ministry of Finance is represented on the General Board).

The Loan Board is responsible for the design, maintenance, and usage of the loan funds. The applications will be made to the Loans Officer of the SIRF Fund and the evaluations will be conducted by Technical Evaluation Committee (Loans **TEC**). The TEC will assist in making field assessment of applications by the Physical Planning Department, DOE, and the Technical School Department of the Ministry of Education. RLF operations will use the opportunity to train young persons in technical schools on how to provide technical assessment and reviews. The technical teams will screen applications for basic eligibility and help ensure they are complete prior to the appointment with the Loan Board, follow up with users and provide status reports to the Loan Board.

The loan decision-making and approval process outlined in Figure 1.

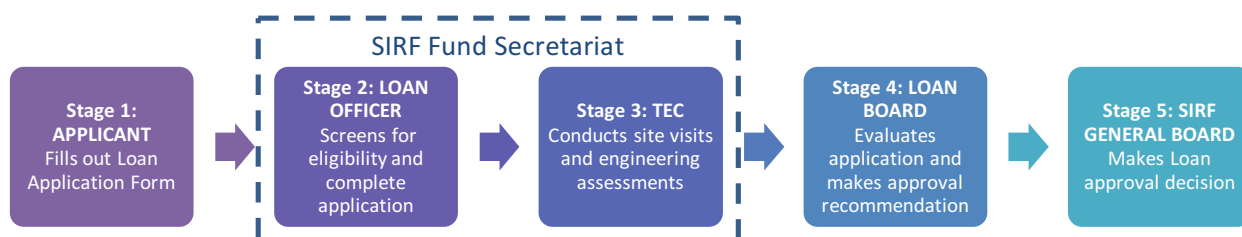


FIGURE 6. ROLES AND RESPONSIBILITIES IN THE LOAN DECISION-MAKING PROCESS

Reporting from the Loan Board

The Loan Board reports to the SIRF Fund Board of Directors on the performance of the loans in the portfolio at minimum on a quarterly-annual basis. This report may include the number of delinquencies, extensions, and loans that are current, anticipated employment impact and the types of businesses and individuals that are pursuing loans. Normally, information about individual users remains confidential but the fund will need to assess the impact of the program using gender-responsive and social indicators. The indicators to monitor the program will be developed and deployed as part of the program roll out.

LOAN GUIDELINES – GENERAL RLF FUNDS

The following section outlines the standard guidelines for the Revolving Loan Facility. These guidelines are adapted to meet the specific requirements of Set-Aside funding allocations, as demonstrated by the tailored Credit Guidelines sections for the Adaptation Fund and the Special Climate Change Fund (SCCF) respectively.

General Eligibility for Applicants

In order to be eligible for the RLF loans, the applicant must own the asset(s) receiving the RLF financing.

The SIRFF may identify areas of special concerns each year as a way to program limited funds while having significant impacts.

Types of Loans

The RLF provides unsecured loans. The maximum loan amount is for three hundred and fifty thousand dollars (USD\$350,000), not including closing fees. The Loan Board encourages application from no lower than USD \$5,000. The annual interest rate is fixed at the time of loan approval and may be adjusted by the Loan Board from time to time with the approval of the General Board. The loan rates will range from 2 – 4 percent with vulnerable persons and homes benefiting from a lower interest rate. For example, in the case of the Adaptation Fund loans, homes and businesses closer to the waterway, most vulnerable to flooding, single parent homes and homes with persons with disabilities will benefit from a lower interest rate.

Approval of Loans

A minimum of four Loan Board Members must be present to review a loan application. A minimum of three Loan Board members, or a simple majority, whichever is more, is necessary to recommend any loan for approval by the SIRF Fund Board. Applicants will be informed of approval or denial within one week of the final interview.

In the case of funds from Set-Asides, it is the responsibility of the Loan Board to ensure that the loans meet the criteria as set out by the funds/donors and the relevant regulations.

Appeal of Decision

The Loan Board has the authority to review applications and approve loans. There is no appeal of the decisions.

Priority

Priority will be given to the positive impacts on the environment and the implementation of the EPMA, will be weighed against the apparent risks for the loan's repayment.

The TEC and the Loan Board will be guided by the priorities developed.

RLF Exclusion List

See exclusion list for grants and programs.

Ninety Day Commitment

Loan decisions are valid for 90 days from the date of the Loan Board meeting in which the commitment was made. If a user is delayed in implementing its plan, or for any reason, and the loan is not disbursed, the Loan Board may revisit the loan decision to renew or decline the commitment.

Use of Repayment Including Interest

All principal payments received by the Loan Board will only be reused for new loans. Interest, fees, and other income may be used for new loans, operating and administrative expenses, training, or advertising.

Delinquency/Default Policy

Point of Default: SIRF would assess collateral when either of the following events occurs:

- Loan is past due 60 days from due date;
- Loan is past due 30 days or more from due date for three consecutive months; or
- Loan is past due and the Loan Board feels that the loan is at risk.

Definition of Default: Failure of borrower to comply with or to perform or follow any term, obligation, or documentation shall constitute an Event of Default. If an Event of Default shall occur, all commitments and obligations (including any obligation to make loan advances, or disbursements) will terminate. The loans will immediately become due, all without notice of any kind to the borrower.

Delinquency Policy:

The following schedule for responding to delinquent loan payments will be followed:

- Any loan payment over 15 days in arrears will immediately be reported to the Loan Board
- Any loan payment over 45 days past due, will require that the Fund representative contact the borrower. A written plan to remedy the delinquency will be prepared by the representative and the borrower, and placed in the borrowers file. If the client does

not respond and the loan continues to be delinquent, the loan may be declared in default and a demand for full payment of the loan will be sent by registered mail.

- Any loan payment over 60 days late will be placed in default. Loans may be placed in default sooner, based upon the relationship with the borrower and the perceived willingness to repay the loan.

Extension Policy

The Loan Board may approve formal extensions or changes of amortization schedule if necessary, based on a detailed written request from the borrower.

Credit History

As part of the package for the Loan Board consideration, the loan applicant must agree to a credit inquiry. The Loan Board may waive a formal credit check as it sees fit in loans under \$5000 USD or if the borrower is a Civil Servant. Each loan applicant's credit history is considered individually. Previous credit problems do not automatically exclude clients from the loan program. The applicant's pattern of managing their debt is very important. Special circumstances may lessen the impact of poor credit history during a particular time period. Some may include:

- **Force Majeure:** If there is a Hurricane or drought this will impact on the borrower's ability to repay the loan. This is particularly true if the borrower works in the hotel and informal sectors. Special arrangements and policies need to be developed to advise the group.
- **Bankruptcy:** An explanation must be given for the bankruptcy. The client must have had two years without credit problems since the bankruptcy.
- **Current Loan Defaults:** The client must have communicated with the lending institution, have made arrangements to pay the debt, and be current with their repayment arrangements.
- **Family and health issues such as divorce, sickness**
- **Bad checks:** Must be resolved with creditor prior to receiving a loan.
- In general, the applicant must exhibit limited credit problems for at least the past year, with two or more years being highly preferred.

Conflict of Interest

If a member of the Loan Board has a personal financial interest in a loan applicant, or in the success or failure of the applicant's business, the Loan Board member is expected to disqualify themselves from decision-making regarding the applicant's loan. Staff members, contractors, and Loan Board members are expected to communicate possible conflicts of interest, and to bring up questions regarding perceived conflicts of interest involving other staff members,

contractors, applicants, and Loan Board members. Conflict or perceived conflict of interest may involve positive or negative effects on those involved.

Changes to Policies and Procedures

Changes in loan program policies and procedures may be recommended by the Loan Board to be approved by the General Board of Directors at any regularly scheduled meeting. Once approved, the General Board shall cause the changes to be reflected by adjusting the operational manuals and where appropriated by regulations.

LOAN GUIDELINES – ADAPTATION FUND AND SCCF FUND

The steps for the approval of these Draft Loan Procedures:

1. Reviewed by the TAC October, 2016;
2. Approval of the PMC October 2016
3. Approval by the Board of the SIRF ... (October – November 2016);
4. Regulations to give effect to the procedures drafted (using Lawyer procured by the OECS and UNEP) (October);
5. Regulations approved by the Cabinet (Nov – Dec 2016);
6. Regulations Published within the Gazette, January, 2016.
7. Evaluation of the Procedures and Regulations – January 2018;
8. Decision to revise (or not) by the Loan Board and then the General Board;
9. If review, Draft new updated procedures and regulations, and repeat steps 1 – 7 above.

REVOLVING LOAN PROCEDURES – ADAPTATION FUND

The provisions under the section GENERAL RLF FUNDS applies to loan guidelines for the Adaptation Fund. Additional details for the Adaptation Fund Set-Asides are provided in the relevant sections below.

I. GENERAL REQUIREMENTS

Priority

For the Adaptation loans, the list of priorities will be developed by the DOE and provided to the General Board for review and approval. For this project priority will be given to persons living closest to the waterway, those living in the general area and then those in the wider watershed areas.

Borrower Eligibility under the Adaptation RLF

To be eligible, loan applicants under the Adaptation Fund pilot must:

- Be the owner of the home/business or property within the McKinnon's Pond watershed boundary, as delineated in the project documents [**Note:** exceptions to this are for loans to support emergency first responders⁴ working within the Government agencies]
- Be employed or have a source of income. If not special arrangements will be developed for persons with intermittent employment
- Be willing to be subjected to direct salary deductions for payments. This is either directly from the bank account and/or the employer
- Adhere to the list of adaptation actions that the loans will be used for; any deviations that are inconsistent with adaptation measures cannot be funded

The Loans can only be used for adaptation measures identified within the Funds guidelines approved by the Board. These are outlined within the Loan application form.

Borrower Obligations under the Adaptation RLF

Upon receiving the loan, the borrower is expected to:

- Provide timely repayments as agreed to by both parties and annexes to the Loan Agreement
- Ensure that the Department of Environment Loans Officer has up-to-date contact information, notifying the Officer immediately of and changes to contact information
- Facilitate site visits with Officers of the Department of Environment to inspect the actions for which the Loans are supporting
- Provide evidence of expenditure on agreed upon activities upon the request of the Department of Environment
- Submit an annual report on progress and expenditure to date for the duration of the loan term, including any issues or problems that the borrower has encountered
- Endeavour to resolve any dispute arising in relation to the loans process by negotiation, voluntary adjustment or settlement

Lender Obligations under the Adaptation RLF

The Department of Environment in its relationships with prospective and current borrowers is expected to:

- Make information about the Revolving Loans Facility for adaptation accessible and consistently available to all prospective borrowers
- Process loan application forms and loan agreements in a timely and efficient manner

⁴ First Responder are, Nurses, Police, Fire, DOE, national officers of Disaster services and Teachers working within the project area.

- Upon receipt of a loan application form, an Officer is to visit the site and conduct an engineering assessment of the property to gauge demand for and benefits of the proposed adaptation actions, and make written recommendations to the Borrower
- Be available to the borrower to answer questions and provide technical assistance upon request
- Endeavour to resolve any dispute arising in relation to the loans process by negotiation, voluntary adjustment or settlement

II. ADAPTATION LOAN TERMS

Loan Provisions under the Adaptation RLF

Loan provisions under the Adaptation Fund Set-Aside are:

- Loans shall range from ECD 13,500 (USD 5,000.00) to ECD 200,000.00 (USD 74,000) per loan to any individual
 - A repayment term of two (2) years minimum and ten (10) years maximum, with an initial preference for shorter loan terms subject to the Borrower's ability to repay
 - Interest at the rate of three percent (2-4%) per annum
 - Adaptation loans shall be unsecured
 - Loan repayments shall be made through direct salary deductions in agreement with the Borrower
- Default interest for situations defined in the Manual for Grants and Loans shall incur an additional shall be further developed with the Board and the Ministry of Finance⁵

III. ADAPTATION LOAN AWARD PROCEDURES

Loan Award Procedures

Loan award procedures are outlined in the figure below and detailed below for each stage in the process.

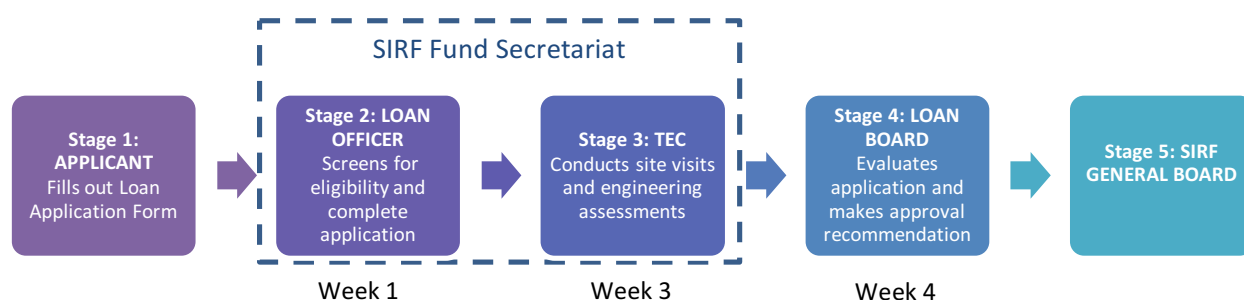


FIGURE 7. ROLES AND RESPONSIBILITIES IN THE LOAN AWARD PROCESS

⁵ The Ministry of Finance underwrites all risk to the Fund and therefore will approve the risk the fund will take.

Stage 1. Applicant – Fills out Loan Application Form

The first step in the process is for the Department of Environment (DoE), on behalf of the Fund, to issue the loan announcement and make all information easily and readily available to prospective borrowers. A Loan Officer will be identified by the Loan Board and appointed by the SIRF Fund General Board as the key person of the DoE leading this effort and the Loan Officer will be readily available to answer questions by community members. As the Adaptation Loan window consists of Set-Asides specifically for adaptation, the DoE will host community and first respondent briefing sessions about the impacts of climate change, the benefits of adaptation, and guidelines for activities that are eligible through concessional loans. The briefing sessions will also review in detail the terms and conditions of the concessional loans.

Upon completing a Loan Application Form, the prospective borrower will return the form and supporting material to the DoE's loan officer. This can be done by physically delivering the form to the Department.

Detailed steps for Stage 1:

- Department of Environment (DoE) makes all loan information available on its website at: <http://www.environmentdivision.info/index.php>
- DoE publishes the Adaptation loan announcement online and in print, distributing Loan Application Forms to: the Community Development Division, Community Centers in the district, schools in the district, and churches
- DoE hosts briefing sessions in target communities, as identified in the consultation strategy
- The Applicant completes the SIRF Fund Loan Application Form [Annex 2] and delivers the form and supporting material to the Loan Officer at the Department of Environment, #1 Victoria Botanic Gardens, St. John's, Antigua
- All information within the Loan application after received is confidential.

Stage 2. Loan Officer – Screens for eligibility and complete application

The Loan Officer is responsible for collecting and collating all Loan Application Forms. Upon receiving an application form, the Officer will within five (5) business days of receiving the form, lodge the loan application in the SIRF Fund Revolving Loan Facility Access Database. In the process of entering information, the Loan Officer will check for completeness of the application, and will follow up with the prospective borrower if any information requires clarification or if any additional information is required.

Detailed steps for Stage 2:

- Within five (5) business days of the DoE receiving a Loan Application Form, the Loan Officer will enter the information into the SIRF Fund Revolving Loan Facility Access Database
- The Loan Officer will contact the applicant to clarify any incomplete sections or missing/unclear information
- The Loan Officer will notify the Technical Evaluation Committee (TEC) on a weekly basis (every Tuesday) of the Loan Applications requiring assessments

Stage 3. Technical Evaluation Committee – Conducts site visits and engineering assessments

Given the relationship-based lending approach of the Revolving Fund, it is important to understand the credit context and risks that the Revolving Loan Facility will face in order to mitigate against known issues and achieve a strong and lasting loan portfolio as reflected in the outputs of the financial model.

On a weekly basis (e.g. every Tuesday), the Loan Officer will notify the Technical Evaluation Committee (TEC) of the loans to be processed. The TEC will conduct site visits and engineering assessments, including geo-referencing properties, within ten (10) business days of receiving notification from the Loan Officer of applications to be processed. This timeline is to prevent a backlog of applications, and to ensure an efficient roll-out of the programme. The TEC will keep the Loan Board abreast of the pipeline of Loan Applications through regular reporting and, if additional processing time is required, request additional time from the Loan Board with an explanation of the circumstances.

The Technical Assessment Form is included in Annex 5 and the Terms of Reference for the TEC are provided in Annex 2.

Detailed steps for Stage 3:

- Conduct property site visits with the property owner using the Engineering Assessment Form (Annex 4), and georeferencing property locations
- Undertake a “tangible benefits” test to assess the benefits of financing before costs are passed on, to assess if the loan will create benefits that are tangibly enjoyed by the loan recipients
- Providing loan application to the Loan Board and responding to additional requests for information from the Loan Board

Stage 4. Loan Board – Evaluates application and makes approval (or recommendation)

The Loan Board reviews all loans, assesses risk levels, and makes approval decisions for loans below a threshold to be established by the Ministry of Finance of the adaptation Set-Aside portfolio. For loans above this threshold, the Loan Board makes a recommendation to the General Board, which has the authority to approve these larger loans and pledge assets. The Government assumes the risks of these loans and the Ministry of Finance is represented on the General Board but the Ministry of Finance may require additional procedures.

Detailed steps for Stage 4:

- Review loan application material and request additional information from applicants and the TEC as necessary
- Take a decision to approve or reject loan applications less than or equal to ECD 200,000, or for loans greater than ECD 200,000 make a recommendation to the Loan Board
- Negotiating with the Borrower on repayment terms and finalizing agreements

Stage 5. SIRD Fund General Board

The SIRD Fund General Board is established through the Environmental Protection and Management Act (2015) and its procedures are provided for in the regulations and operational procedures. The General Board will have oversight and Monitoring role in the Adaptation Set-Aside pilot of the Revolving Loan Facility. As the RLF gains experience (Evaluation and review in 2018), it is anticipated that the thresholds and modalities will be revised.

For loans greater than ECD200,000 under the Adaptation Fund Set-Aside, approval is the responsibility of the SIRD Fund General Board. The General Board may also have additional requirements for larger loans. The General Board meets on an Semi- annual basis, and therefore special sessions of the General Board will be called for loan approvals as needed, and at a maximum on a quarterly basis. The Government assumes the risks of these loans and Although the Ministry of Finance is represented on the General Board the Cabinet may require the loans over certain thresholds will need the Permission of the Minister of Finance.

The Loan Board will monitor the Loan portfolio and track repayments and send reports to the General Board. The General Board will also be responsible for the establishment of any dispute resolution mechanism and for the sending of the reports to the Parliament.

Detailed steps for Stage 5:

- For loans greater than ECD 200,000.00, the Loan Board will submit the Application of the Chair of the General Board
- The Applicants risk profile is reviewed and the procedures (to be developed by the Ministry of Finance) is executed.
- The Board Takes a decision and send the outcome to the Loan Board;
- The Loan Board provides the General Board with an overall status of the RLF to assist it to make its decision.
- Monitor the overall performance of the adaptation pilot revolving loan facility

III. ADAPTATION LOAN EXECUTION AND IMPLEMENTATION PROCEDURES

Loan Execution Procedures

Loan execution and implementation procedures are outlined in the figure below and detailed below for each stage in the process.

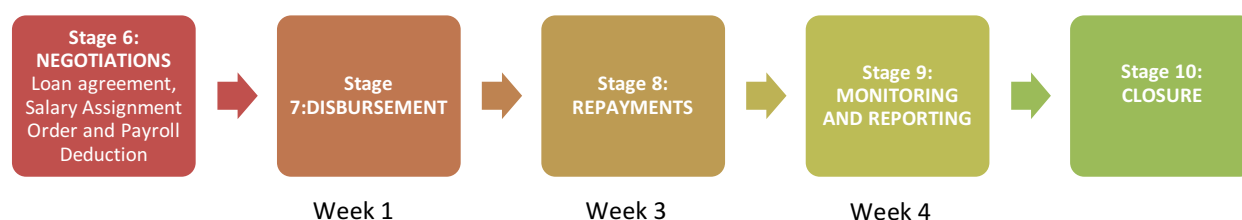


FIGURE 8. ROLES AND RESPONSIBILITIES IN THE LOAN EXECUTION AND IMPLEMENTATION PROCESS

Stage 6. NEGOTIATIONS – Loan Agreement, Salary Assignment and Payroll Deduction

Upon approval of a loan by the Loans Board or the SIRF Fund General Board, the Department of Environment will execute a Loan Agreement with the borrower. The borrower will have proposed repayment terms in the Loan Application Form. The Loan Board may recommend amended repayment terms, subject to the approval of the borrower.

As part of the negotiation process, the borrower and the Department of Environment will agree to disbursement and repayment terms and conditions.

- For borrowers who are employed, repayment will be by way of direct salary deductions. These will be completed through a Salary/Wage Assignment Order (Annex 6) and a Payroll Deduction Authorization (Annex 7).
- For borrowers who are self-employed, repayments will be through the Salary/Wage Assignment Order (Annex 7) only

The Department of Environment will not be collecting any cash. Other options, for example using “Sugapay”, are being examined as possible repayment methods.

Detailed steps for Stage 6:

- The Loan Officer will facilitate negotiations between the Borrower and the Loan Board for disbursement and repayment terms
- The Borrower and an authorized representative of the Department of Environment will enter into the Loan Agreement
- The Borrower and an authorized representative of the Department of Environment will enter into the Salary/Wage Assignment Order (Annex 6)
- If applicable, the Borrower and an authorized representative of the Department of Environment will enter into the Payroll Deduction Authorization (Annex 7)
- SIRF Fund staff, overseen by the Loan Officer, updates the Loan database with all relevant information

Stage 7. DISBURSEMENT

Upon signature of the Loan Agreement, the Loan Officer shall initiate the disbursement per the agreed terms.

Detailed steps for Stage 7:

- Loan Officer submits disbursement authorization with attached Loan Agreement
- Loan Officer confirms receipt by the borrower
- Loan Officer updates the database

Stage 8. REPAYMENT

Upon signature of the Loan Agreement, the Loan Officer shall initiate repayment systems per the agreed terms.

Detailed steps for Stage 8:

- Loan Officer establishes repayment system
- Loan Officer monitors timeliness of repayments and takes default/delinquency actions as necessary

Stage 9. MONITORING AND REPORTING

Loan and related program officers should visit the borrower clients regularly in order to understand the challenges of their households or businesses. By direct interaction they will learn and understand the value clients place on the loans and can guide future clients from this experience. In the absence of collateral, building a presence in the community and getting stakeholder buy-in is critical.

Detailed steps for Stage 9:

- Technical Evaluation Committee (TEC) will organize regular visits to the borrower/property to monitor implementation, at least twice per year for the first year, and annually thereafter, with additional visits as required
- The TEC will document site visits and report to the Loan Board on a quarterly basis the outcome and progress of the loans disbursed
- Any issues identified in the site visit reports will be dealt with by the SIRF Fund management team on a timely basis

Stage 10. CLOSURE

A formal project closure process consists of the submission of all final financial and performance reports.

Detailed steps for Stage 10:

- Upon repayment in full by the borrower, the Department of Environment will confirm repayment with the borrower in writing and provide credit information to the banks

ANNEX 1. Draft Terms of Reference for Loan Officer of the SIRF Fund**Terms of Reference for Loan Officer****I. Background**

The Department of Environment is piloting, through the Sustainable Island Resource Framework Fund (SIRF Fund), an innovative financing opportunity for households and small businesses to adapt to the impacts of climate change. One of the disbursement mechanisms of the SIRF Fund is a Revolving Loan Facility (RLF) adaptation Set-Aside. This disbursement mechanism will make available to households and small businesses low-interest (2 – 4%) unsecured loans ranging from 13,000 to 200,000 ECD dollars per loan. At least 150 loans are anticipated to be disbursed over an 18-month period.

The pilot area is McKinnon's Pond watershed, which includes the communities of Gambles, Yorks, Upper Fort Rd, New Extension, & McKinnon's. Adaptation activities that are eligible for funding through the revolving loan facility adaptation window include, for example: solar energy with battery backup batteries; energy efficient appliances; rainwater harvesting (gutters and water storage tank); mosquito screening; landscaping to promote drainage; and hurricane-proofing of roof, windows and doors.

II. Objectives

The objectives of this consultancy are to ensure a successful pilot of the SIRF Fund Revolving Loan Facility adaptation set-aside.

III. Scope and Activities

- Be familiar with all relevant laws, regulations and international treaty obligations
- Implement activities in accordance with the Code of Conduct, technical and operational manuals, and procedures of the SIRF Fund
- Ensure that the loan disbursement process is operated smoothly and efficiently, including:
 - Developing and recommending additional procedures to the SIRF Fund management
 - Processing loan application forms and maintaining a current and accurate database of loans
 - Participating in the Technical Evaluation Committee (Loans TEC)
 - Supporting the Loans Board and the SIRF Fund General Board through the loan making process
 - Cross-check the expenditure of disbursed loans
 - Regularly report on the RLF portfolio
 - Monitor and evaluate impact of the RLF adaptation pilot

- Be available to all prospective and current borrowers including through scheduled community “open hours”, regularly conduct site visits, and proactively address any issues that may arise
- Participate in training at microfinance and SME lending facilities and provide training in-country for SIRF Fund management and other stakeholders

IV. Qualifications

- The applicant should possess an advanced University degree in a relevant field
- At least five (5) years of sales experience in a microfinance/ bank /insurance institution
- Excellent communication skills
- Strong proficiency in Microsoft Excel and preferable Microsoft Access
- Computer literacy skills

V. Evaluation Criteria

Category	Description	Weighting
1	Qualifications	30
2	Experience with similar work in a microfinance/ bank /insurance institution	20
3	Demonstrated ability to fulfill TOR specifications	20
4	Computer literacy and technical skills	30
	Total	100

ANNEX 2. Draft Terms of Reference for the Technical Evaluation Committee (Loans TEC)**Terms of Reference for the Technical Evaluation Committee (Loans TEC)
serving the Revolving Loan Facility (RLF) Adaptation Set-Aside of the SIRF Fund**Constitution of the Technical Evaluation Committee (Loans TEC)

The TEC is situated within the SIRF Fund Secretariat and will draw on the skills and expertise of the Technical Advisory Committee (TAC).

The TEC shall consist of: the SIRF Fund Loans Officer, an engineer of the Department of Environment (also a TAC member), an officer of the Development Control Authority (DCA) (also a TAC member), and assistance from the Technical School Department of the Ministry of Education, an engineer, and a Contractor. TEC operations will use the opportunity to train young persons in technical schools in Antigua and Barbuda.

Responsibility

The Technical Evaluation Committee (Loans TEC) is responsible for evaluating loans applications by conducting a field assessment to the prospective property, with the property owner. The assessment process uses the Technical Assessment Form of the TEC (Annex 4) to validate the Loans Applications Form, in particular the adaptation value of the intervention, and to provide a costed estimate of the proposed works. This information accompanies the Loan Application Form and is submitted to the Loan Board to take a decision on the loan approval. The TEC must conduct the assessments and submit the Loan Application to the Loan Board within ten (10) business days of receiving notification from the Loan Officer that the application is to be processed.

During the site visit, the TEC is responsible for carrying a GPS to georeference the prospective property, and inputting this data into the SIRF Fund Revolving Loan Facility Access Database. This data will be used to perform spatial analysis and monitoring and evaluation of the adaptation interventions.

Following a decision on the loan by the Loan Board or the General Board, the TEC is responsible for conducting regular visits to the property to monitor implementation. Visits should be at least twice per year for the first year, and annually thereafter. Site visits will be documents and reported to the Loan Board.

Specific activities of the TEC:

- Conduct a site visit to the prospective property, with the property owner
- Complete the Engineering Assessment Form of the TEC
- Georeference the property and add the data to the Access database for inputting into the EIMAS
- Submit the Loan Application Form with the Engineering Assessment Form to the Loan Board, within ten (10) business days of receiving the Loan Application Form from the Loan Officer
- Conduct regular site visits to the property to monitor activities of the loan against the Engineering Assessment and Loan Application Form
- Provide status reports to the Loan Board

- Report on activities to the TAC

Confidentiality

The TEC will from time to time be privy to confidential information and proprietary materials. The TEC shall hold in trust any and all such information received in the course of performance of its functions and all such information as confidential, and the strictest of confidence shall be maintained in respect of such confidential information. The TEC shall handle such information with a degree of care in respect of the disclosure and protection of its own confidential information. TEC members are obligated not to use any information received in the course of this work to let, rent, sell or otherwise materially benefit without the expressed written consent of the Government of Antigua and Barbuda or any of its assigns. TEC Board members agree that the obligation of confidentiality shall continue for the duration of their membership and shall survive their membership.

Conflict of Interest

If a member of the TEC has a personal financial interest in a loan application, applicant, or in the success or failure of the applicant's business, the TEC member will be recused from decision-making regarding the applicant's loan. The TEC members are expected to communicate possible conflicts of interest, and to bring up questions regarding perceived conflicts of interest involving other staff members, contractors, applicants, the Loan Board and TEC members themselves. Conflict or perceived conflict of interest may involve positive or negative effects on those involved.

Remuneration

TEC members receive a stipend (to be determined). Criteria for payment of stipend include:

- Project staff, DCA and DOE staff whose work program includes the work of the TEC shall not receive a stipend
- Stipend will be provided to the Independent Engineers and contractor serving on the TEC.
- Payment of stipends are contingent on proof of contribution

ANNEX 3. Draft Terms of Reference for the Loan Board

**Terms of Reference for the Loan Board
serving the Revolving Loan Facility (RLF) Adaptation Set-Aside of the SIRF Fund**

Constitution of the Loan Board

The SIRF Fund Revolving Loan Facility Board (RLF Board or Loan Board), comprises volunteer members nominated by the General Board of the SIRF Fund and appointed by the Governor General. Loan Board members are recruited for their expertise and potential to make a positive contribution to the Loan Board. The Loan Board is comprised of between four (4) members and eight (8) members. Two of the Loan Board members are also current directors on the General Board of the SIRF Fund.

The Loan Board appoints its own Chair and makes rules and procedures as provided for under the Regulations for the Environmental Protection and Management Act (2015).

The Loan Board Chair may appoint up to three (3) ad hoc members for any particular meeting if, in the Chair's opinion, the ad hoc members contribute an area of expertise that will be helpful for that meeting. These members will be appointed as observers in accordance with the regulations.

Responsibility

The Loan Board is responsible for the design, maintenance, and usage of the loan funds.

The Loan Board reviews all loans, assesses risk levels, and makes approval decisions for loans below 2% of the adaptation Set-Aside portfolio (USD 60,000). For loans above this threshold, the Loan Board makes a recommendation to the General Board, which has the authority to approve these larger loans and pledge assets (the Government assumes the risks of these loans and the Ministry of Finance is represented on the General Board).

Specific activities include:

- Reviewing loan application material and requesting additional information from applications and the TEC as necessary
- Taking a decision to approve or reject loan applications (under USD 60,000) or making a recommendation to the Loan Board
- Developing repayment terms and negotiating with the Borrower
- Regularly reporting to the General Board on the status of Adaptation Set-Aside portfolio
- Taking actions to remedy Default or Delinquent loans

Confidentiality

The Loan Board will from time to time be privy to confidential information and proprietary materials. The Loan Board shall hold in trust any and all such information received in the course of performance of

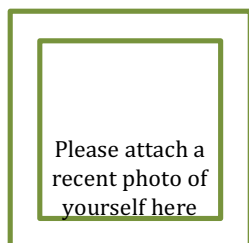
its functions and all such information as confidential, and the strictest of confidence shall be maintained in respect of such confidential information. The Loan Board shall handle such information with a degree of care in respect of the disclosure and protection of its own confidential information. Loan Board members are obligated not to use any information received in the course of this work to let, rent, sell or otherwise materially benefit without the expressed written consent of the Government of Antigua and Barbuda or any of its assigns. The Loan Board members agree that the obligation of confidentiality shall continue for the duration of their membership and shall survive their membership.

Conflict of Interest

If a member of the Loan Board has a personal financial interest in a loan application, applicant, or in the success or failure of the applicant's business, the Loan Board member will be recused from decision-making regarding the applicant's loan. Loan Board members are expected to communicate possible conflicts of interest, and to bring up questions regarding perceived conflicts of interest involving other staff members, contractors, applicants, and Loan Board members. Conflict or perceived conflict of interest may involve positive or negative effects on those involved.

Remuneration

Loan Board members serve in their respective capacities and are not remunerated as part of their services to the Loan Board. The contribution is counted a co-financing towards project support.

ANNEX 4. Draft Template SIRF Fund Revolving Loan Facility (RLF) Loan Application Form**SIRF Fund Revolving Loan Facility (RLF) Loan Application Form****2016 APPLICATION FORM****SIRF Fund Revolving Loan Facility – Adaptation****INSTRUCTIONS:**

Each candidate **must complete one (1) copy of this form**, which is to be either typewritten or hand written legibly in **BLUE OR BLACK** ink.

Please note this form should be accompanied by a receipt for **\$xxx.xx** paid to Caribbean Union Bank

All sections of this form must be completed in full and submitted no later than **XXX XX, 20XX** by 12:00 noon.

The following documents must be submitted with each application form.

DOCUMENTS:

- i. Recent Passport-sized photo (to be attached to the form in the space provided)
- ii. **Certified** copy of photo page and date of expiration page of Passport
- iii. **Certified** copy of your birth certificate
- iv. Most recent Utility Bill (Electricity and water)
- v. Job letter from employer or statement from applicant regarding other sources of funding

- vi. Rationale for undertaking implementation of Climate Change adaptation and mitigation measures
- vii. Detailed breakdown of cost of Climate Change adaptation or mitigation measures that is being sought

Please Note the Following:

The statement regarding funding sources must clearly outline plans to supplement any loan amount received from the SIRF Fund. Documentation, including bank statement, supporting this plan should also be provided. Please note that there is no guarantee that the amount requested will be the actual loan amount granted. (Use a separate sheet).

PERSONAL INFORMATION

Full Name:

Last

First

M.I.

Address:

Home Phone: _____ Mobile
Phone: _____

Email Address

Social Security
Number:

Birth Date:

Marital Status:

Gender:

How many
people live in

the dwelling:

Does anyone living in your household have a disability?

If yes, state the nature of the disability.

LOAN REQUEST INFORMATION

Note: This section can be completed with assistance from the SIRF Fund Loan Officer.

Loan Amount Requested:

Between EC\$13,000 – EC\$200,000

EC\$

Proposed Repayment Schedule:

EC\$ ____/ Month EC\$ ____/ Year

Duration of Loan Term:

Years

JOB INFORMATION

Employer:

Position:

Work Location:

Work Email:

Work Phone:

Cell Phone:

Start Date:

Salary:

\$

Emergency Contact Information

Full Name:

Last

First

M.I.

Address:

Street Address

Home Phone: _____

Mobil Phone: _____

Relationship: _____

TECHNICAL INFORMATION

Area for which loan is required			
Hurricane Resilience	Hurricane shutters [] Hurricane clips [] Roof stabilization []	Other []	
Combatting Mosquitos	Gauze [] Netting [] Yard drainage []	Other []	
Renewable Energy	Solar panels [] Wind turbine []	Combination []	Other []
Energy Efficiency	Refrigerator [] Washer [] Dryer [] Air Conditioner [] Light bulbs []	Other []	
	Are you seeking to replace an item that is no longer functioning well?	Yes [] No []	
	If replacing, give reason(s) why		
Drought Resilience	Roof gutters [] Cistern [] Tank [] Other []		
	Do you have a water catchment system?	Yes [] No []	Tank [] Cistern []
	If yes, is your current system able to meet your needs?	Yes [] No []	
Landscaping			
Other: Please describe			
Other: Please describe			

HOUSEHOLD INFORMATION

Please provide the names, age, gender, occupation, telephone number and relation of all persons living in your household.

NAME	AGE	GEN DER (M/F)	RELATIONSHIP TO YOU	OCCUPATION	TELEPHONE

DECLARATION BY APPLICANT

I declare that the statements contained in this application are, to the best of my knowledge, true and accurate. I authorize the administrators of the Sustainable Island Resource Framework Fund to seek verification of the information provided for the purposes of determining whether to approve this application. If awarded a loan, I am willing to sign a Sustainable Island Resource Framework Fund loan agreement.

Signature of Applicant: _____

Date: _____
DD/MM/YYYY

Assessment Form of the Technical Evaluation Committee (TEC)

Page 1		File Number 	
Name of living person :		Street Name	
Number of person living in this house		Land owner	
Home owner name:		Phone number of the L.O.	
Phone number of the H.O.:		Revenue (?) is from	
Revenue (?) is from			

Water harvesting and roof			Yes = Y and No = N	
Gutter	Number requested: 	Long 	Larg. 	Need
Roof Type (external):	Type : 	Cond.:		Need
Roof structure (internal)	Hurricane proof: 	Roten:		Need
Tank of 1000 gallons	Note			Need

Structure	Roof	support the SWH	Repair
	Floor	rotten wood or broken tiles	Repair
	Foundation is on blocs		Is on concrete or whole covered of bloc
	External Walls		Raise
	Fundation	does it need repair	Repair
	Comments		

Windows, Screens, NOTES				
	Identify the windows by a number Identify the doors by a letter			
<div style="border: 1px solid black; padding: 5px; min-height: 100px;">Note</div>		Left	Front	Right
			Back	

ID	Size of windows or doors	Change	Screen	Shutter	Comments

Energy	Solar panel :	Owner 	Want, or add	kW 	Need
	Battery + converter		Want, or add		Need
	EEA (Energy Efficiency, Appliance)		Refrigerator		
			AC		
			Microwave		
			Light		
			Solar Water heater		
			Other?		

All measurements are in: **Foot ("), inches ("), and US gallons**

Water harvesting		Cost per Unit (ECD)	Units requested	Total (ECD)
Tank of 1000 gallons:		\$ 1,750.00		
Installation of 1000 gal water tank:		\$ 950.00		
Basement and fittings of 1000 gal tank:		\$ 1,200.00		
Cost by running feet to install guttering:		\$ 12.00		
Roof				
Roof Galvanize : cost by sq feet		\$ 10.00		
Install the roof: cost by sq feet		\$ 20.00		
Structure of the roof : by sq feet		\$ 10.00		
Reinforcement of the roof structure : by sq feet		\$ 5.00		
Raise the floor 6" : by sq feet		\$ 1,500.00		
Change the floor or structure : By sq feet		\$ 10.00		
Change the basement by reinforced concrete: lin. Feet		\$ 60.00		
Change the external wall (rotten) : by sq feet		\$ 10.00		
WOODEN - Doors + windows				
Door : by units		\$ 150.00		
Windows : By units of 4 sq feet		\$ 300.00		
Screen : by window of 4 sq feet		\$ 100.00		
Hurricane Shutter : by units of windows		\$ 750.00		
CONCRETE - Doors + windows				
Door : by units		\$ 550.00		
Windows : By units of 4 sq feet		\$ 550.00		
Screen : by window of 4 sq feet		\$ 100.00		
Hurricane Shutter : by units of windows		\$ 750.00		
Energy				
Solar panel : by units of 3 kW		EC\$ 36,000 - 42,000		
Batter backup for Solar panel				
Units of 5 kw		EC\$ 60,000 - 70,000		
Solar water heaters		20-Gallons \$ 3750.00; 40-Gallons \$ 4450.00; 52-Gallons \$		
Refrigerator				
AC				
Other				
Other				
			Grant total requested	\$ -
Notes				

Annex 6. Draft Template Salary/Wage Assignment Order**SALARY/WAGE ASSIGNMENT ORDER**

DATE: XXXXXXXXXXXXXXXX

To: XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXX, ST. JOHN'S, ANTIGUA

FROM: XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

ADDRESS: XXXXXXXXX, ST. JOHN'S, ANTIGUA

Dear Sirs/Mesdames:

Re: Assignment of Salary/Wage to xxxxxxxxxxxxxx Bank

Kindly accept this letter as your authorization to remit my salary directly to xxxxxxxxxxxxxx Bank for my account commencing **xxxxxxxx, 20xx**.

Please note that this arrangement can only be revoked when done in writing by xxxxxxxxxxxxxx Bank.

Kindly indicate your concurrence by completing the section below, and forward the accompanying copy of this letter direct to xxxxxxxxxxxxxx Bank.

Yours faithfully,

.....
Employee's Signature

CREDIT SAVINGS A/C # _____

AGREEMENT OF EMPLOYER TO COMPLY WITH THE FOREGOING REQUEST:

Official Company Stamp

Authorised Signature

Name in Block Capitals
of Authorised Signatory

Title of Authorised Signatory

Annex 7. Draft Template Payroll Deduction Authorization**PAYROLL DEDUCTION AUTHORISATION**

I _____ a recipient of the Department of Environment, hereby authorize my employer _____ to deduct from my salary/wage Bi-Monthly effective _____ the amount of _____ and pay to a/c/# _____ to the above mentioned Department of Environment. This Authority is irrevocable by me, and can only be rescinded by the above mentioned Department of Environment of there is any liability which has been authorized by me, and approved by the said Department of Environment.

Dated this _____ day of _____ 20 ____

Signature of member _____

Place work _____

Name of Pay officer _____ (please print name)

Signature of pay officer _____

TO BE COMPLETED BY Department of Environment **OFFICIAL**

Approved by and on behalf of the said Adaptation Fund

Signature _____

Position _____

LOAN RISK MITIGATION – GOVERNMENT OF ANTIGUA AND BARBUDA

(Draft Subject to the Approval of the Board, the Cabinet, Ministry of Finance and then the Parliament)

<u>Recommended Action</u>	<u>Rationale/Explanation</u>
Principal Repayment through Amortization	The amortized structure allows repayment comprising both principal and interest that prevents the need for disruptive lump-sum payments at the loan's maturity.
Electronic Transfers and Cash Management	Payments will be made at banks only; the Fund will not collect any cash. The Revolving Fund's internal officers will carefully monitor repayment inflows from the loans and cash outflows (from draw-downs, loan origination, and operational expenses) on a day to day basis. To minimize cash handling risks, the Fund will avoid holding of cash and will identify a partner financial institution to execute the cash disbursement.
Resilient Data Collection and Management Systems	The Revolving Fund will seek best in practice systems utilizing internal accounting software from known sources such as CGAP and will also source assistance from local commercial financing institutions for their knowledge of best practices. The Fund will work with the Ministry of Finance and other experts to establish robust cross-checking mechanisms for managing data and cashflows.
Trained Loan and Program Officers	The Ministry of Finance already has trained personnel in place whose expertise can be sourced. To supplement this if necessary, the Fund will send its loan officers and other responsible and overseeing personnel to trainings and roundtables that target microfinance and SME lending facilities. In addition to strengthening internal capacity-building, this will also build bridges with other institutions that the Fund may align with and learn from, and with whom it may share its own knowledge base.
Community Relationship-Building	Loan officers or applicable program officials should visit their clients regularly in order to understand the challenges of their households and businesses. By direct interaction they will learn and understand the value clients place on the loans and can guide future clients from this experience. In the absence of

Recommended Action	Rationale/Explanation
Good Communications and Transparency in Operations	<p>collateral, building a presence in the community and prioritizing stakeholder buy-in is critical. The loan manual will outline how the relationship will be built.</p> <p>Transparency in operations will be important to foster buy-in. A communications strategy should be developed, complementary to the community relationship-building activities recommended above. The SIRD Fund will publish its information at the Parliament and on its website; details around the Fund's portfolio and the borrowers will be confidential.</p>
Third Party Borrower Verification	<p>The information supplied by borrowers will be cross-checked. One of the benefits of this pilot is executing it in a self-enclosed community, and the surveys already have gone considerable distance in identifying and verifying borrower interest and payback capacity. Requiring additional character references and related diligence will further support these applications once loans are requested.</p>
Tangible Benefits Test	<p>A "tangible benefits" test to assess the benefits of financing before costs are passed on to third parties such as renters, or to assess if the loan will create benefits that are tangibly enjoyed by the loan recipients. This could be for example an analysis of the cost of living pre- and post-borrowing of the adaptation loan. Furthermore, loan and program officers should be kept updated on products or services that are valued and conversely, those which are not.</p>
Product Standardization	<p>To the extent possible, the Revolving Fund should offer loans that are standardized along the lines of interest rates, terms and repayment schedules. This will allow the loan portfolio to be easily evaluated, managed, audited and monitored.</p>
Regular Reporting & External and Internal Audits	<p>The Revolving Fund's pilot portfolio performance will be regularly monitored and assessed for various performance metrics required to track vital progress indicators. Furthermore, the Fund will also be audited annually. TORs for the audits are included within the Annex of the Audit Plan. The Audit Plan and checklist are attached to the Operational Manual of the Department.</p>

<u>Recommended Action</u>	<u>Rationale/Explanation</u>
Disbursements Primarily made through Direct Deposit and Collections made through Automatic Wage Deduction	When possible, loan disbursements will primarily be made through direct deposit to borrower's bank accounts in order to establish robust and digital verification mechanisms from the start. The loan repayment will be done through a standing order in place with the borrower's employer that allows automatic deduction at the source of income. This is a common microfinance repayment structure that mitigates non-payment.
Cross-checking Expenditure	The Fund will have methods in place to cross-check the expenditure of its disbursed loans. Program officers will spot check the borrower's home or business after disbursement and recommended or specified vendors of products and services may be used to verify in order to avoid loan diversion.
Loan and Program Officer Code of Conduct	Loan and program officers will be under a code of conduct that will seek to remove conflicts of interest and avoid potentially negative optics surrounding the program.
Building a Robust Borrower Records and Credit History	The Fund pilot will establish systems to track customer repayment and then seek to deploy this data for private sector partners for future credit creation and other services for the target population based on this data. In developing statistically defensible credit information, this will drive positive externalities for both the community and the private sector seeking to do business with them
Borrower Concentration	No more than 3% of the Fund should be loaned to any one borrower. However, the Loan Board or SIRF Fund General Board can approve exceptions to provisions in the risk management plan with review by the SIRF Fund Investment Committee.

Annex 8. Draft Credit Assessment Guide for the Revolving Loan Facility – Adaptation Fund Pilot

Based on a survey of best practices for assessing borrower risk in personal lending, a draft summary credit assessment guide is presented below. This can be amended and adopted by the Loan Board to guide loan decision-making.

The traditional credit evaluation framework to assess borrower risks is the ***“4 C’s of Credit”***:

Character – This emphasizes the good reputation of the individual in assessing the likelihood, responsibility and willingness to repay. The use of personal references here can play a significant role in verifying the borrower’s standing.

Capacity – This references the availability and stability of the borrower’s job, income and cashflows to service the debt payments. This is a critical part of the evaluation for the Fund due to its unsecured nature. Any previous record of successful borrowing done would also help to assess capacity.

Capital – This seeks to assess the capital and assets owned by the debtor, as well as existing liabilities. The presence of cash savings, ownership of a car, property or financial assets indicate potential means to pay the debt, however given that the debt is unsecured, these items cannot be held as collateral and instead merely suggest potential financial capacity. The borrower’s existing debt and its terms (repayment amounts and timing) must also be carefully assessed as well.

Conditions – This assesses the macro conditions that affect the borrower’s ability to repay. Macroeconomic factors such as national inflation, unemployment, devaluation and market interest rates are all forces that can materially impact external conditions. Economic shifts in specific sectors that are critical to Antigua such as tourism and agriculture should also be considered.

In addition to these factors, other criteria impacting repayment ability include the following (Adapted from John M. Chapman and Associates, 1940):

Occupation of Borrowers: It is important to understand the profile, stability and tenure of the borrower’s job, and assess the borrower’s employer or their own business if they are self-employed. The employment status as recorded in the survey indicates that 38% of the sample population is unemployed, which is significant, especially since Antigua’s unemployment rate is 10% (based on a 2011 estimate). This suggests that 1) the number of borrowers who qualify for automatic wage deductions are limited (especially considering those who are self-employed); and, 2) capacity to repay could be significantly impaired in this pilot. Although much of these individuals may have alternate sources of income, uncertainty regarding the stability of such income to service debt implies that flexible repayment options could be a frequent situation for borrowers in this pilot. Seasonality of jobs and income must be considered particularly for borrowers working in tourism and agriculture.

Employment Tenure: The length of employment (in addition to the nature of the occupation) is a strong indicator of the future duration and stability of income. Given that much of the personal loans issued will likely be for a long duration (5 years and over), assessing income stability is important.

Stability of Residence: This indicates roots in the community, and to a certain degree is a proxy for income and job stability. The survey has indicated that prospective borrower population comprises 73% home-owners, while 19% are renters. This indicates that a majority of potential borrowers have roots in the community and also highlights an existing capital base in the form of property.

Age: Typically risk of default is expected to decrease as borrowers age. The relationship between age and borrower risk however interacts and correlates closely with other factors such as income, job tenure and occupation. It is noted that the prospective pilot population is primarily older as 77% are over 35 years old, with 44% of the respondents over 50 years old. Due care must be made in loans made in the 18-35 year old age range, which comprises 23% of the surveyed population.

Gender: Pilot information suggests that the potential borrower population is 62% women. While this point is often debated, it has been found that in the global microfinance sector, women tend to be better borrowers than men with stronger likelihood of repayment. It will be important to track gender repayment in the Fund's pilot in order to assess both this and any other gendered effects from the Revolving Fund.

Number of Dependents: This suggests how much the income must be "spread" to provide support for dependents, and is relevant for evaluating capacity for repayment.

Relevant Financial Ratios for Assessing Borrower Risk

Financial ratios are "rules of thumb" to evaluate potential borrowers, and are quantitative guides that supplement the qualitative assessment outlined above. In evaluating the ratios presented below, the requested loan size and/or its repayment amounts are included in the calculations of debt and expenses to assess post-disbursal positioning. Income should also be after-tax income to the extent applicable as well. Loan assessment should also look at borrower's optional expenses as possible discretionary sources of extra cash when reasonable.

Debt to Income Ratio: This ratio highlights the relative amount of income required to pay all debts, obligations and household expenses. This includes credit card bills, auto loans, child support, student loans plus mortgage payments and other housing expenses, as well as utilities bills, internet/phone bills, groceries and other expenses.

$$\text{Debt to Income Ratio} = (\text{Monthly Debt} + \text{Expenses} + \text{Obligations}) / \text{Monthly after-tax Income}$$

Banks usually use a 35% - 50% ratio here – meaning that income should generally be at least twice the sum of all debt and expenses, for personal loans and mortgages. Beyond this amount is high risk and should require mitigating factors such as existing asset base, cash savings or other identifiable resources, such as reducible expenses. Given the population and the fund's mandate, this may be relaxed somewhat, but above 65% is very risky and mitigation such as extending the term or reducing the amount of the loan in order to reduce the ratio may be necessary.

Savings Ratio: This ratio gauges the percentage of surplus income saved after expenses and this highlights the borrower's vulnerability to income shocks due to reduced income or unexpected expenses.

$$\text{Savings Ratio} = ((\text{Monthly Income}) - (\text{Monthly Debt} + \text{Expenses} + \text{Obligations})) / \text{Monthly Income}$$

A savings ratio of less than 20% indicates risk to income shocks and merits a closer look at the borrower's ability to manage/trim their expenses and service the debt.

Net worth and Solvency Ratio: This ratio establishes the net worth of the borrower as a fraction of their overall asset base. Establishing that a borrower has positive net worth suggests that they could sell their assets at a surplus to cover their liabilities and avoid default in the event of an income shock. Debt calculated here does not include recurring expenses like utility bills because are generally not "firm" debt obligations.

Special attention should be made in identifying if borrowers have, and are up to date on payments for, pre-existing secured loans that utilize critical personal assets as collateral that could lead them to losing their home, or car in a default situation.

Negative net worth indicates insolvency and vulnerability to income shocks that prevent borrowers from covering debt obligations. This would require close look at the stability of their income in servicing the debt.

$$(i) \text{ Net Worth} = \text{Total Assets} - \text{Total Debt}$$

$$(ii) \text{ Solvency Ratio} = \text{Net Worth} / \text{Total Assets}$$

Borrower and Loan Profile

Based on Table 1's prospective amortized repayment terms (using 3% interest), and Table 2's compiled data from the household surveys, the Fund can expect that its portfolio composition will be driven strongly by smaller loan amounts of US\$5,000 – US\$10,000 primarily using longer-term loans in the 5-10 year range. This reflects the limited borrower cashflow strength that requires longer terms of loan amortization to service the debt. Longer loan terms will reduce the expected loan origination amounts from the Revolver.

THE MEPA TRUST, THE CARIBBEAN BIODIVERSITY FUND (CBF) AND THE SIRF FUND

The Caribbean Biodiversity Fund has been established in connection with, and forms part of, the Sustainable Financing & Management of Eastern Caribbean Marine Ecosystems Project (the “**Eastern Caribbean Marine Ecosystems Project**”), a project undertaken by the GEF, The Nature Conservancy and the governments of Antigua and Barbuda, Grenada, Saint Kitts and Nevis, Saint Lucia, and Saint Vincent and the Grenadines. It aims to contribute to enhancing the long-term sustainability of protected area networks in the OECS region by:

- (i) Establishing sustainable financing mechanisms;
- (ii) Strengthening marine protected area networks; and
- (iii) Deploying a regional monitoring and information system for protected area networks in the OECS region.

On September 6, 2012, the Caribbean Biodiversity Fund (the “**CBF**”), a non-profit organization registered with the Charity Commission for England and Wales under No. 8204716. It was established under the Eastern Caribbean Marine Ecosystems Project with support from KfW, The Nature Conservancy and the GEF for the purpose of providing a sustainable flow of funds to support, without limitation, enforcement, infrastructure, monitoring needs and other activities that contribute substantially to the conservation, protection and maintenance of biodiversity within national protected areas systems and any other areas of environmental significance within the countries participating in the Eastern Caribbean Marine Ecosystems Project.

The MEPA TRUST will coordinate and cooperate with the CBF, who will provide financial support to the MEPA TRUST, in each case in accordance with the Partnership agreement signed between the two entities. As part of this agreement, the MEPA Trust must have matching funding to qualify for drawdowns from the CBF.

The **SIRF Fund** has been mandated by the Act to provide the matching funds to the MEPA Trust.

The SIRFF fund may provide the matching funds via direct transfer to the Trust, allocation of funding for projects by the DOE and direct transfer from the treasury of the Government. All funding provided to the Trust must meet the fiduciary and ESS including gender of the DOE and the SIRFF.

END OF MANUAL

**ENVIRONMENTAL PROTECTION MANAGEMENT ACT, 2015
(ACT NO. 11 OF 2015)**

SUSTAINABLE ISLAND RESOURCE FRAMEWORK FUND (SIRFF) REGULATIONS

NO. OF 2016

ARRANGEMENT OF REGULATIONS

**PART I
PRELIMINARY**

1. Citation
2. Definitions
3. Functions of the Minister

**PART II
OBJECTIVES, FUNCTIONS AND STATUS OF THE FUND**

4. Objectives of the Fund
5. Functions of the Fund
6. Powers of the Fund
7. Acceptance of contributions
8. Status of Fund

**PART III
MANAGEMENT AND ADMINISTRATION OF THE FUND**

9. Management of the Board
10. Observers to the Board
11. Functions and powers of the Board
12. Operational Manual

**PART IV
OPERATIONS OF THE FUND**

13. Business plan.
14. Consideration of business plan by Cabinet
15. Amendment of plan
16. New plan to be prepared at intervals.

**PART V
FINANCIAL MATTERS OF THE FUND**

17. Funds and resources of the fund
18. Financial year
19. Use of Fund's monies

- 20. Investment of Fund monies
- 21. Borrowing Funds
- 22. Fund to establish accounts
- 23. Accounts and audits
- 24. Annual Budget
- 25. Limits on administrative expenses
- 26. Recovery of money by Fund

PART VI
CERTIFICATION OF PROJECT IMPLEMENTERS

- 27. Process for applying for accreditation
- 28. Criteria for accreditation

PART VII
THEMATIC WINDOWS OF THE FUND

- 29. Establishment of Thematic Windows

PART VIII
MISCELLANEOUS

- 30. Annual Report
- 31. Dissolution of the Fund
- 32. Review of Regulations
- 33. Power to amend the schedule

SUSTAINABLE ISLAND RESOURCE FRAMEWORK FUND (SIRFF) REGULATIONS

NO. OF 2016

In exercise of the powers conferred by section 109 of the Environmental Protection and Management Act 2015, the Minister responsible for the Environment in Collaboration with the Minister for Finance makes the following Regulations-

Citation

1. These Regulations may be cited as the SIRF Fund Regulations 2016 or the Finance and Administration Act (2006).

SIRF FUND REGULATIONS, 2016.

Definitions

2. In these Regulations-

“Administrative Expenses” means staff salaries and employment benefits, consultant fees and expenses, meeting costs, staff training costs, publications costs, office operating costs, staff vehicle costs, staff travel costs, legal and audit fees, including costs related to the operation of the Fund, as approved by the Board;

“Act” means the Environmental Management and Protection Act 2015;

“Board” means the Board of Directors of the Fund appointed under the Act;

“Chairperson” means the Chairperson of the Board of Directors appointed under this regulation;

“Climate Change” means a change of climate which is attributed directly or indirectly to human activity that alters the composition of global atmosphere and which is in addition to natural climate variability observed over comparable periods of times;

“Deputy Chairperson” means the Deputy Chairperson of the Board under this regulation;

“Director” means a member of the Board as provided for in this regulation;

“Fund” means the SIRF Fund established under section 84 of the Act;

“NBSAP” means National Biodiversity Strategy and Action Plan;

“NDCs” means National Determined Contributions;

“NEMS” means national Environmental Management Strategy and Policy;

“Operational Manual” means rules for coordinating the Fund’s anticipated activities (as amended from time to time);

“Thematic Window” means the thematic funds established for various purposes under section 85 of the Act;

3. Functions of the Minister

The Minister with the responsibility for the Environment shall be responsible for overseeing the general purposes of the Regulations in relation to the Act.

PART II OBJECTIVES, FUNCTIONS AND STATUS OF THE FUND

4. Objectives of the Fund

- (1) seek to facilitate a link between domestic and international climate change finance sources for the Implementation of the Multilateral Environmental Agreements in particular and the implementation of the provisions of the Act;
- (2) serve as a catalyst to attract investments to implement a range of priority actions identified in the Act which includes, Biodiversity, climate change adaptation and mitigation projects and programmes in Antigua and Barbuda.

5. Functions of the Fund

- (1)
 - a. to assist with the cost of the implementation of the policy documents outlined in the NEMS;
 - b. to establish long-term management and expansion of any system of protected areas and other activities that contribute substantially to the conservation, protection and maintenance of biodiversity including areas declared as ecotourism areas under this Act and any system of protected areas established in Antigua and Barbuda including marine protected areas as outlined in the NBSAP.
 - c. to develop programmes for the establishment or management of any area required for biodiversity conservation, or the protection of any carbon sinks that may be designated for the purpose of giving effect to the United Nations Framework Convention on Climate Change (UNFCCC) or any other relevant international Convention to which Antigua and Barbuda is a party;
 - d. programs and measures to assist in the adaptation and mitigation for climate change including the NDCs and other strategic documents for the UNFCCC;
 - e. necessary and recurrent expenses incurred in the negotiation, monitoring or auditing of any code of environmental practice, including the retention of

technical experts, the investigation or analysis of any matter and the undertaking of any environment monitoring or audit programme;

- f. to ensure that the necessary expenses incurred in the formulation of reports are provided in order to carry out the requirements of the Act;
 - g. to carry out scientific research programs related to the furtherance of the Act;
 - h. establish and administer the governance, fiduciary management and administrative arrangements to finance the activities of the Department of Environment;
 - i. set annual funding priorities as determined from time to time pursuant to the operational manual
 - j. to raise public knowledge, appreciation and understanding of environmental impacts on their well being and that of ecosystems, plants and animals in Antigua and Barbuda and beyond;
 - k. to support measures related to disaster risk reduction and response to natural disasters associated with climate change;
 - l. to support actions to build ecosystems resilience to the impacts of climate change;
 - m. to provide support to reduce the vulnerability of the most vulnerable groups, during periods of disaster, response and recovery and rehabilitation, for disaster relief to vulnerable groups, communities and sectors when the Fund considers it appropriate to do so;
 - n. to do or cause to be done such other things as the Fund consider expedient or necessary in carrying out the purpose of the Act under these Regulations.
 - o. to ensure that all funding decisions respect the highest Environmental and Social Safeguards and in a manner that reflects a gender responsive approach as outlined in the Operational Manual of the Fund as well as those of National Laws and requirements of international commitments of the country;
- (2) In carrying out its functions the Fund shall act in accordance with the policies of the government designed to manage, protect, enhance and conserve the environment.
- (3) The Fund shall, in furtherance of its functions discharge the following duties;
- a. raise funds from domestic and international sources;
 - b. negotiate, enter into, monitor and enforce compliance with international and domestic funding agreements;
 - c. administer, disburse and monitor the use of such funds as are appropriate to its activities and ensure that the most beneficial use is made of such funds;

- d. maintain complete financial records of all financial transactions of the Fund;
- e. maintain a complete record and account of all activities of the Fund and provide to the public, free access to information concerning the work of the Fund, except where the Fund may determine that it is necessary to impose a fee for access to specified information.
- f. Prepare periodic Environmental, Social and gender impact statements of the Funds operations and projects and programs

6. Powers of the Fund

- (1) approve all procedures for grants, loans and other funding requests supported by the Fund;
- (2) engage in strategic planning for the Fund;
- (3) pay all or any part of its Funds into a deposit or savings account of a bank carrying on business in Antigua and Barbuda with all interest if any, payable in respect thereof applied as income;
- (4) act as a Fund of money or other property vested in the Fund;
- (5) use money of the Fund to further its objective or to meet the Funds' commitments under any agreement to which the Fund is a party;
- (6) make and enter into contracts or other arrangements for the carrying out of works, the performance of services or the supply of goods or materials;
- (7) review and approve requests for grants and other funding activities supported by the Fund in accordance with the provisions of the Act and these and future regulations;
- (8) decide on issues concerning the employment conditions of the Board, Directors and staff of the Fund, including but not limited to their hiring, functions, terms of employment and dismissal, their supervision, performance review and benefits to be paid;
- (9) approve, periodically review and modify as necessary, the operational manual of the Fund

7. Acceptance of Contributions

- (1) The Fund may accept donations from lawful sources subject to such conditions as may be imposed if doing so would not:
 - a. cause the Fund to violate any provisions of the Act or any other laws of the State; and
 - b. be reasonably expected to impair the Fund's ability to achieve its purpose.

- (2) Contributions to the Fund designated for specific projects or made subject to specific conditions shall be preserved and utilised solely for the designated purpose.

8. Status of Fund

- (1) The Fund is an entity within the Department of the Environment. The capital and revenue of the Fund is public money of Antigua and Barbuda, it is not a part of the Consolidated Fund and it is subject to control and accounting as only provided for by the Regulations;
- (2) The Fund and the Board are exempt from the payment of any stamp duty, customs duty, value added tax, motor vehicle tax, fee, charge assessment, levy impost or other tax whatsoever, on any income expenditure or asset of the Fund or the Board.

PART III

MANAGEMENT AND ADMINISTRATION OF THE FUND

9. Management of the Board

- (1) Subject to section 84 of the Act, the Fund shall be managed by a General Board of Directors (hereinafter called the “Board of the Fund”).
- (2) The composition of the Board is set out in, Schedule XIII of the Act.
- (3) The Permanent Secretary responsible for the Department of Environment shall act as the Chair of the Board; The Deputy Chair shall be elected from amongst the members of the Board.
- (4) A representative of the Department of Environment shall serve as Secretary of the Board.
- (5) Procedures of the Operations of the Board shall be developed and approved at the First Meeting of the Board.

10. Observers to the Board

- (1) The Minister shall appoint, in a open and transparent manner, at least one Observer from each of the following groups: Public, Private, Community and NGOs to the meetings of the Board;
- (2) The Board shall develop procedures for the participation of Observers in consultation with the NGO community.

- (3) The Board shall develop procedures for the participation, terms of office, termination, Remuneration and any other issues to be addressed to allow for the full and effective participation of Observers to the Board.
- (4) During the selection of Observers, the Chair shall disclose on the website of the Department of Environment, the names of all applicants and the sectors that they wish to represent on the Ministry's website.
- (5) Any member of the public who may wish to submit written comments to the Ministry on the suitability of any applicant or nominee may do so within a period of thirty days after applications and nominations have been closed.

11. Functions and powers of the Board

- (1) The Board shall have executive control and management of the affairs of the Fund, and shall exercise and perform the functions, powers and duties of the Fund on its behalf and shall be responsible for its effective and efficient administration.
- (2) The Board shall procure and appoint the Chief Financial Officer for the management of the finances of the Fund;
- (3) The Board Shall appoint an Audit Committee, an Asset Management Committee and an Investment Committee; The Board may also appoint additional Committees as it sees fit and in particular to implement section (7)(2) above;
- (4) The Board may engage consultants for the purpose of obtaining expert advice, as it considers necessary in the execution of its functions.
- (5) The Board shall develop an operational manual, which provides generally for the procedures, which shall guide its operations.
- (6) The Board may delegate any of its functions, other than this power of delegation, to the Director, Chief Financial Officer or any other member of the staff of the Department.
- (7) Any act, matter or thing done in the name of the Fund, by the Board is taken to have been done by the Fund.

12. Operational Manual

The Board shall establish an operational manual to govern the operations of the Board. This operational manual may be further adopted for the Boards of the Thematic Funds, in accordance with the procedures that may be specified by the Minister and or by Regulations.

PART IV

OPERATIONS OF THE BOARD

13. Business Plan

- (1) The Board shall conduct its activities, in accordance with a Business Plan prepared in accordance with these Regulations.
- (2) The Board shall, no later than one year after the commencement of the Regulations, prepare and deliver to the Minister a draft business plan specifying the following:
 - a. Viable options for the Fund, taking into consideration options as determined by the purposes of the Fund;
 - b. Activities to be undertaken to mobilize funds for the Fund;
 - c. Proposed investment policy and strategy in order to generate long-term sustainable financing to carry out the objectives of the Fund;
 - d. Projected flow of funds that will accrue to the Fund;
 - e. The strategy that the Fund proposes to adopt for the following five years to further its objectives;
 - f. The annual budget required for the following five years for the Fund to carry out its objectives
 - g. The strategy for efficiently utilizing the funds of the Fund;
 - h. The criteria that the Fund will meet when entering into funding agreements and parameters for accepting funding;
 - i. The performance indicators by which the Fund's achievements of its objectives are to be measured;
 - j. Environmental and Social Safeguards and Gender considerations as outlined within the Fund's Operational Manual;
 - k. The remuneration and allowances, if any, to be paid to the members of the general and other boards; and
 - l. Staff of the Fund.
- (3) The Business Plan prepared pursuant to this section shall be consistent with
 - a. The evolving funding priorities based on the Policies and plans outlined within the National Environmental Management Strategy, the NDCs to the Paris Agreement, the National Adaptation Strategy; and
 - b. Established criteria to ensure that the funds of the Fund are effectively distributed in an open transparent and coordinated approach to achieve the Objectives of the Act and meeting the requirement of the Finance and Administration Act (2006).

14. Consideration of business plan by Cabinet

- (1) The Minister, in consultation with the Minister for Finance shall, within sixty days of receipt of the draft business plan, shall seek the approval of the Cabinet for the Business Plan if he is satisfied that it complies with the requirements of this Act or refuse to endorse the business plan.
- (2) Where the Minister refuses to endorse the business plan the Minister shall return the plan to the Fund and shall notify the Fund in writing of the refusal, giving reasons for the decision and informing the Fund that the plan may be revised and resubmitted.
- (3) Where no decision is made within sixty days of receipt of the business plan, the business plan shall be deemed to have been endorsed by the Minister, in consultation with the Minister for Finance.

15. Amendment of plan

- (1) The Board may amend the business plan with approval of the Minister, acting in consultation with the Minister of Finance and with the Approval of the Cabinet.

16. New plan to be prepared at certain intervals

- (1) The Board shall prepare a new business plan at least six months before the expiry of its existing business plan.
- (2) Nothing in this section prevents the Board from preparing new business plans at more frequent intervals than those required by subsection (1).
- (3) If a new business plan is not endorsed before the expiry of the five years to which the business plan under which the Board is conducting its activities relates, the Board shall continue to conduct its activities in accordance with the priorities and strategies specified in that plan, in so far as is practicable, until the priorities and strategies specified in the new plan are endorsed

PART V
FINANCIAL MATTERS OF THE FUND

17. Funds and resources of the Fund

- (1) The funds and resources of the Fund shall comprise
 - a. Gifts and bequest;
 - b. Donations;
 - c. Such monies as may be appropriated by the Government of Antigua and Barbuda for the purposes of the Fund;
 - d. Any fees, levies, taxes and fines that are specifically allocated to the Fund;

- e. Revenues from investments, proceeds from the sale, lease or transfer of tangible and intangible property, or other income derived from the assets of the Fund;
- f. Proceeds from services provided by the Fund; and
- g. Any other sources of revenue deemed appropriate by the board.

(2) The Board may reject any gifts, bequests, or donations that may be offered to the Fund.

18. Financial year

The financial year for the Fund shall be for the period commencing 1st July and ending 30th June in each year.

19. Use of Fund's monies

- (1) The funds of the Fund shall be applied in accordance with the purposes of the Act and in a manner that reflects the highest Fiduciary Standards and safeguards for the payment of the following:
 - a. Expenses incurred or incidental to the administration and management of the Fund including,
 - i. Remuneration and other payments to the members of the Boards, the Audit and other Committees and any committee established pursuant to this Regulation;
 - ii. Salaries, remuneration, allowances, pensions, gratuities and other benefits of the staff of the Secretariat or other persons employed in or in connection with the activities carried on by the Fund;
 - b. Any other expenditure authorized by the Board and properly related to the objectives of the Fund.

20. Investment of Fund monies

- (1) All monies which comprise the Fund and which do not have to be used immediately to defray expenses of the Fund shall be invested in such a manner as the Board considers fit to preserve and achieve a reasonable rate of return.
- (2) The Board may either directly or through authorized agents, undertake investments pursuant to subsection (1), including the buying and selling of such securities or other obligations as the Board determines to be appropriate.

21. Borrowing funds

- (1) Subject to such general or specific conditions as the Minister for Finance may specify, the Board may borrow such money as it considers necessary to discharge its functions.

- (2) Without limiting the generality of subsection (1), the Minister for Finance may specify conditions with respect to
 - a. The amount of a loan;
 - b. The sources of borrowing; and
 - c. The terms and conditions of a loan.

22. Fund to establish accounts

- (1) The Board shall not pledge the assets of the Fund as security for any loan, without the written approval of the Minister for Finance.
- (2) The Board shall establish, with the permission of the Minister of Finance, with one or more authorized deposit-taking institutions, such accounts as it thinks appropriate for the money received and expended by the Fund.
- (3) The following funds shall be paid into the accounts of the Fund
 - a. All money received by or on account of the Fund;
 - b. All money directed to be paid into the accounts of the Fund by or under this or any other Act or grant agreement;
 - c. All interest receives in respect of the investment of money belonging to the Fund unless otherwise specified;
 - d. All money borrowed by or advanced to the Fund
- (4) The money in the accounts of the Fund may, subject the terms of any or condition affecting that money or any part of it, be applied for any one or more of the following purposes:
 - a. Providing the remuneration of the members of the Board, the Secretariat and other staff of the Fund;
 - b. Covering the administrative expenses and operating costs of the Fund;
 - c. Discharging the liabilities incurred by the Fund in the exercise of its functions. Including the provision of grants, Loans or Equity;
 - d. Any other purpose authorized by the Cabinet under this or any other Act.
- (5) No monies shall be paid out of the Fund's accounts except with the authority, and in accordance with any general or special directions, of the Board.
- (6) The bank accounts of the Fund shall be subject to inspection by the Board.

23. Accounts and audit

- (1) The Board shall keep proper accounts of all sums of money received and expended or invested in any form by the Board and the matters in respect of which

such receipts; expenditures or investments take place and the assets and liabilities of the Fund.

- (2) The accounts of the Fund shall be subject to inspection by the Board, the Minister, and the Minister of Finance, subject to reasonable restrictions, which may be provided in the operational manual.
- (3) The Board shall prepare or cause to be prepared quarterly financial statements which the Fund shall transmit to the Minister, the Minister of Finance and any interested party.
- (4) The Board shall appoint an independent external auditor of internationally recognized standing and competence, approved by the Board, to audit the financial accounts of the Fund annually.
- (5) The Auditor appointed pursuant to subsection (4) shall verify the Funds balance sheet and other financial accounts for each fiscal year and shall prepare a comprehensive, detailed written report in accordance with international standards for auditing.
- (6) The Board shall make the Auditor's completed annual report publicly available and provide a copy of such report to the Minister of the Environment and the Minister of Finance.

24. Annual budget

- (1) The Board shall, not later than the first day of April in each year, prepare in such form as the Minister and the Minister of Finance may direct, a budget for the next fiscal year which sets forth
 - a. Projected revenue of the Fund from all sources;
 - b. Costs for Fund's administration; and
 - c. Costs of grants and other financial commitments to projects consistent with the Funds purpose.

25. Limits on administrative

- (1) The Fund may use up to ten percent (10%) of its annual budget for administrative expenses as determined by the Business Plan.
- (2) The Fund may use the funds for the payment of consultants as it may see fit to achieve the purposes of the Fund.

26. Recovery of money by Fund

- (1) Any fee or other money due to the Fund may be recovered by the Fund as a debt in a court of competent jurisdiction.

PART VI CERTIFICATION OF PROJECT IMPLEMENTERS

27. Process for applying for Certification

- (1) Any NGO, CBO and private sector or entity that intends to apply for project funding must first apply to the Board for Certification in according to these regulations.
- (2) The process for submission of an application for Certification shall be Developed by the Secretariat of the Fund in a consultative manner and submitted for the approved of the Board.

28. Criteria for Certification

- (1) Criteria for the assessment of an application for Certification may include –
 - a. evidence that the applicant has the human and technical capacity to effectively implement a project;
 - b. evidence that the applicant will be able to meet its reporting obligations;
 - c. evidence that the applicant has in place internal financial processes that will meet the minimum fiduciary requirements of the Fund and ensure the ability to manage and account for the utilisation of project funds; and
 - d. evidence of capacity or intention to provide in-kind contributions to the implementation of the project;
 - e. evidence of a bank account in the name of the applicant;
 - f. evidence of registration as a non-government, charitable or civil society organisation or registration with the Company Registry as a recognised group; and
 - g. ability to meet any other criteria set by the Board from time to time.

PART VII THEMATIC WINDOWS OF THE FUND

29. Establishment of Thematic Windows

- (1) In furtherance of section 84 (b) of the Act the Board, in consultation with Minister and further to the Business Plan will create additional Thematic Windows. Each Window will have its own Board and operational procedures and guidelines. New Thematic Windows shall be established by Regulations.

PART VII MISCELLANEOUS

30. Annual report

- (1) As soon as practicable after the 30th day of June in each year, and in any event no later than the last business day in October of each year, the Fund shall prepare and deliver to the Minister and the Minister of Finance a report of the activities of the Fund during the financial year.
- (2) The report prepared pursuant to subsection (1) shall include copies of the audited financial statements and accounts of the Fund for the financial year to which the report related and the auditor's report on the statements and accounts prepared by the auditor.
- (3) The Minister shall forward the report delivered pursuant to subsection (1) to Cabinet for consideration and as soon as practicable thereafter cause a copy to be laid before Parliament.
- (4) The first report prepared pursuant to this section shall contain a report on the activities of the Fund from the date of commencement of this Act to the end of the first fiscal year immediately following that date.

31. Dissolution of the Fund

- (1) The Board may, by resolution, voluntarily dissolve the Fund in the following circumstances only:
 - a. In the event of bankruptcy of the Fund
 - b. If it has become impracticable to achieve the objectives of the Fund.
- (2) Further to subsection (1) where the Fund is dissolved pursuant to subsection the assets of the Fund shall revert to the Department of Environment;

32. Review of Regulations;

- (1) The minister shall periodically review these regulations to determine whether the policy objectives of the Fund remain valid and whether the terms of the Fund remain appropriate for securing those objectives.
- (2) The review shall be undertaken as soon as possible after a period of five years from the commencement of the Fund.

33. Power to amend the schedule

- (1) The Minister in consultation with the Minister of Finance, may, on the advice of the Board and with the Approval of the Cabinet amend the schedule by Order published in the *Gazette*.

Appendix 11. Letters of endorsement



GOVERNMENT OF ANTIGUA & BARBUDA

21st July 2016

THE DEPARTMENT OF ENVIRONMENT
#1 Victoria Drive Botanic Gardens
St. John's
Antigua

The Adaptation Fund Board
c/o Adaptation Fund Board Secretariat
1818 H Street NW
Washing, DC, 20433
Secretariat@Adaptation-Fund.org
Fax: 202 522 3240/5

RE: ~~ENDORSEMENT FOR FULL PROJECT DOCUMENT:~~

**~~"AN INTEGRATED APPROACH TO PHYSICAL ADAPTATION AND COMMUNITY RESILIENCE IN
ANTIGUA AND BARBUDA'S NORTHWEST MCKINNON'S WATERSHED"~~**

Regarding the captioned subject, the Department of Environment within the Ministry of Health and Environment, being the designated authority for the Adaptation Fund in Antigua and Barbuda, confirms that the full project document, **~~An Integrated Approach to Physical Adaptation and Community Resilience in Antigua and Barbuda's Northwest McKinnon's Watershed~~**, is in accordance with our national priorities and climate adaptation agenda, in implementing activities to reduce adverse impacts of and risks posed by climate change in Antigua and Barbuda.

Accordingly, I wish to endorse the implementation of the above-captioned project, with support from the Adaptation Fund. If approved, the project will be coordinated, implemented and executed by the National Implementing Entity, the Department of Environment, within the Ministry of Health and the Environment.

Sincerely,

A handwritten signature in blue ink, appearing to read "Diann Black-Layne".

.....
Diann Black-Layne
Director, Department of Environment



The Commonwealth

Office of Deputy Secretary-General

Direct Tel: +44 207 747 6118

Direct fax: +44 207 925 1094

Email: d.maharaj@commonwealth.int

1 July 2016

Dear Ambassador Black-Layne

Climate Finance Access Hub: Request for National Advisory support in Antigua and Barbuda

Thank you for your letter to Commonwealth Secretary-General, the Rt Honourable Patricia Scotland QC, dated 26 June 2016 requesting for the placement of a National Adviser in Government as part of the Climate Finance Access Hub support.

I am pleased to confirm that we will support Antigua and Barbuda's request, and I wish to take this opportunity to recognise and acknowledge the strong progress made by the Government of Antigua and Barbuda with respect to planning for its climate resilient development and renewable energy transition. Antigua and Barbuda has taken many proactive steps towards establishing the policy frameworks and enabling environment required to access climate finance. There exists a clear and ambitious way forward and I can see the value that a National Adviser placed under the Climate Finance Access Hub would add.

We are committed to the implementation of the Climate Finance Access Hub and stand ready to deploy a National Adviser in Antigua and Barbuda. To advance this request, please kindly nominate an individual focal point whom our Climate Finance Team can liaise with to expedite next steps. It will be appreciated if the details of your official are sent to Dr Denny Lewis-Bynoe, Adviser and Head, Climate Finance and Small States Team (email: d.lewis-byone@commonwealth.int) and copied to Mr Harsen Nyambe, Economic Adviser on Climate Finance (email: h.nyambe@commonwealth.int).

Please accept the assurances of my highest consideration.

Yours sincerely,

Doodat Maharaj
Deputy Secretary-General
(Economic and Social Development)

Ambassador Diann Black-Layne
Department of Environment
Ministry of Health and Environment
1 Victoria Park Botanical Garden
Factory Road
St. John's
Antigua, W.I.

c.c Her Excellency Ms Karen-Mae Hill, High Commissioner, High Commission for Antigua and Barbuda, 2nd Floor, 45 Crawford Place, London W1H 4LP, enquiries@antigua-barbuda.com

Appendix 12. Risk Registry for project: *An integrated approach to physical adaptation and community resilience in Antigua and Barbuda's northwest McKinnon's watershed*

This project is considered to be a Category B in accordance with the AF's Environmental and Social Policy.

Description	Potential consequence	Mitigation measures	Risk category	Probability & impact (1–5)
Delays in policy revision process.	Any Inefficiencies in existing policy revision system hampers mainstreaming of climate change into national policies and plans. This is particularly true for adaptation where the measures may be resource intensive.	<ul style="list-style-type: none"> • The Project Management Committee and the Technical Advisory Committee, which consists of representatives from 15 agencies, will track and report on progress of policies as they move through the revision process – addressing procedural roadblocks as they arise. • The policy measures will be initiated early within the project and will benefit from the implementation of other project activities that will provide public and political support. The existing building codes are already at a high standard and can be an adequate basis for the loans to be process, while awaiting the approval or agreement on the new codes. • Public awareness of the impacts of climate change and the urgent need for the local area plan 	Organisational	P = 3 I = 2

Description	Potential consequence	Mitigation measures	Risk category	Probability & impact (1–5)
High turnover of staff members in implementing agencies Such as the public work departments and other government agencies working on this project.	High staff turnover and poor institutional memory result in disruptions or delays in project implementation and coordination.	<ul style="list-style-type: none"> Deputies and alternative representatives within the institutions will be recommended at inception to ensure that sufficient membership continuity is available. The PMC will make use of established government structures to capitalise on functioning systems. 	Organisational	P = 1 I = 2
Insufficient uptake of small loans	Insufficient climate change adaptations interventions implemented by vulnerable households.	<ul style="list-style-type: none"> Workshops and outreach activities on applying to the SIRF. National awareness raising activities and campaigns will be rolled out to spread awareness of innovative financing mechanisms and adaptation interventions. 	Social and Gender	P = 1 I = 4
Limited capacity of institutions to undertake data collection in order to create local area development plans	Effectiveness of local area development plans reduced	<ul style="list-style-type: none"> Government technicians will be trained on technical skills required to develop local area development plans <i>inter alia</i>: i) use of the EIMAS to store information and the use of GIS and other equipment/tools for mapping and planning; ii) management of threats to vulnerable ecosystems such as watershed degradation; iii) climate vulnerability and risk 	Institutional	P = 3 I = 4

Description	Potential consequence	Mitigation measures	Risk category	Probability & impact (1–5)
		<p>analysis; and iv) community engagement and outreach.</p> <ul style="list-style-type: none"> • The project will allow for the use of university students to assist with the development of the plan; • Community groups will be engaged in data collection and evaluation. • There is considerable amount of baseline data but the analysis based on the AR5 is still to be done for the site • Where financially possible use consultants. 		
Lack of inter-institutional data sharing or collaboration.	Limited transfer of relevant project information amongst role players and end-users resulting in delayed or ineffective implementation of interventions.	<ul style="list-style-type: none"> • Representation of a range of stakeholders on the PMC and the TAC will promote collaboration and cooperation between government and other institutions. • Support informal knowledge sharing opportunities such as networking events between relevant government departments/units. • The local area development plans to be developed are required by law to have consultation and collaboration between institutions 	Organisational	P = 2 I = 3

Description	Potential consequence	Mitigation measures	Risk category	Probability & impact (1–5)
		<p>after which they will be approved and published by the Parliament.</p> <ul style="list-style-type: none"> • The new National Environmental Management Strategy (NEMS) will establish an environmental data system to provide detailed information to a wide range of stakeholders. 		
Limited government support for project activities in pilot intervention sites	Loss of government support may result in lack of prioritisation of proposed project activities.	<ul style="list-style-type: none"> • Training of government technicians, policy makers and other relevant stakeholders on: i) the effects of climate change on Antigua and Barbuda; and ii) the benefits of adaptation interventions implemented by the project. • Enhance community support for the project, including awarding community contracts 	Organisational	P = 1 I = 4
Disagreement over allocation of loans for implementation of adaptation interventions	It is expected that the fund will be over subscribed and the limited funds for loans may generate conflict. This is particularly true since the project will reveal how vulnerable homes	<ul style="list-style-type: none"> • The loans will be place within the revolving fund for adaptation under the SIRF Fund and will be governed by regulations under the Finance Act • Establish an impartial system to allocate loans • Seek additional funding to contribute to the loan scheme • Engage community leaders to assist with conflict resolution 	Social	P = 3 I = 3

Description	Potential consequence	Mitigation measures	Risk category	Probability & impact (1–5)
	<p>are within the community.</p> <p>Although this will not stop the project it may cause political and social conflict.</p>	<ul style="list-style-type: none"> • Ensure that the system is open and transparent while maintaining confidentiality (e.g. blind review – names not associated with applications during review process) 		
Extreme climatic events and climate variability	Current climate and seasonal variability and/or hazard events result in disruption to implementation of adaptation interventions.	<ul style="list-style-type: none"> • Weather forecasting will be taken into consideration when planning climate-sensitive implementation activities. For example, no construction of hard infrastructure or planting will take place during hurricane season. • Design the flooding phase of the project first and implement in as short a time as possible. 	Environmental	P = 3 I = 4
Limited commitment/buy-in from local communities	Lack of commitment/buy-in from local communities may result in failure of demonstration projects.	<ul style="list-style-type: none"> • A stakeholder engagement plan will ensure that local communities are sufficiently consulted during planning and implementation. • Project design to ensure that the community can implement sections of the project including monitoring and evaluation. • Awareness-raising campaigns will be undertaken to promote adaptation interventions. These campaigns will highlight the importance of project 	Social, Environmental	P = 1 I = 4

Description	Potential consequence	Mitigation measures	Risk category	Probability & impact (1–5)
		interventions to the improved resilience of the community and individuals families.		
AF 15 Risks category				
1. Compliance with the Law	The Department of the Environment is an entity established to enforce environmental and physical planning laws. If the laws applicable to this project are not adhered to it will result in the loss of confidence in the institution and project failure. Further the project can encounter legal challenges if the laws are not followed.	<ul style="list-style-type: none"> • The Department is staffed with two lawyers whose job is to ensure that the laws are closely followed • The Department reports to the Minister on these projects which provides another layer of accountability 	ESS	P-1 I - 5

Description	Potential consequence	Mitigation measures	Risk category	Probability & impact (1–5)
2. Access and Equity	The loans and grants disbursements may be perceived as unfairly distributed, resulting in loss of public trust and reputational risk for the government	<ul style="list-style-type: none"> • Transparency in decision-making process will be key • Introduce loan and grant review methods that distance the review committee members from personal affiliations and ties, such as conflict of interest disclosures and blind application review procedures 	ESS	P-2 I-3
3. Marginalized and Vulnerable Groups	The project may marginalize groups that are non-nationals that reside within the community since they are not the home owners. Further they may not want to participate since they may be considered transient within the community.	<ul style="list-style-type: none"> • Design social assessments to better understand the demographics of people in the target communities, to inform policy approaches • Work with experts trained in empowering marginalized and vulnerable groups (including the Gender Affairs Division, Women Against Rape, and the Community Development Division) 	ESS	P – 2 I – 2
4. Human Rights	Non-identified			

Description	Potential consequence	Mitigation measures	Risk category	Probability & impact (1–5)
5. Gender Equity and Women's Empowerment	The project will impact on the lives of women living within the community. There is potential that inequality may be exacerbated due to the inability of women in women led households or women who are dependent on their partners for income to be able to access loan funding due to low pay and/or poor credit.	<ul style="list-style-type: none"> • Liaise with community leaders to identify vulnerable women within the community. • Specifically tailor a grant mechanism that only they would be able to access. This grant mechanism should have lower rates for paying back. 	Social	P = 5 I = 4
6. Core Labour Rights	No risks identified			
7. Indigenous peoples	No risks identified			
8. Involuntary Resettlement	Waterway interventions may require the movement of structures or the loss	<ul style="list-style-type: none"> • The Land Acquisition Act only allows for voluntary acquisitions. Both parties must agree. • Based on the studies conducted in the past, there are only a few structures that may pose a 	ESS	P-3 I-2

Description	Potential consequence	Mitigation measures	Risk category	Probability & impact (1–5)
	of small amounts of land.	problem to the project interventions. For example, a used car parts business is located at a critical tributary along the watercourse. The Department cannot force any property owner against their will, the relocation of structures will have to be their choice and the project can assist by providing resources.		
9. Protection of Natural Habitats	The area may be upgraded and then become an attraction for the private sector to invest. The gains of the project may then be reversed.	<ul style="list-style-type: none"> • The Environmental Management Act 2015 as well as the Physical Planning Act (2003) will be use to protect any area identified as Sites Important for Adaptation (SIAs). The SIAs will be protected from further development. 		P-2
10. Conservation of Biological Diversity	No negative impacts identified.			
11. Climate Change	The improvement of the homes, for example installation of AC units to cope with heat waves, may increase electricity	<ul style="list-style-type: none"> • The project will be partnering with the IWeco and SPPare projects to plant new trees and the protected of the watershed to absorb carbon dioxide; • The small loans will ensure that any technology adopted will use 	Mitigation	P = 4 I = 1

Description	Potential consequence	Mitigation measures	Risk category	Probability & impact (1–5)
	consumption, which is currently supplied with fossil fuels.	RE as the energy source to offset potential emissions.		
12. Pollution Prevention & Resource Efficiency	No negative consequences identified.	<ul style="list-style-type: none"> • The project will be working with other projects to improve wastewater management. • The project will also conduct solid waste awareness on the impact of garbage within the waterways; • The community will be managing the waterway, which will also assist with pollution prevention and clean up awareness. 		
13. Public Health	The project interventions may be such that it can cause the breeding of mosquitos via the settling of water within the waterway.	<ul style="list-style-type: none"> • The engineering design will be aware of this possibility and where possible wetland systems will be created using local species of fish for control of mosquitos and other vectors; 	ESS	P – 3 I – 4
14. Physical and Cultural Heritage	There are none identified at this time			

Description	Potential consequence	Mitigation measures	Risk category	Probability & impact (1–5)
15. Lands and Soil Conservation	The project interventions may cause further decline in the stability of the waterways within the watershed.	<ul style="list-style-type: none"> The project has a riparian zone re-planting exercise with the project and will use public awareness programs to sensitize the community of the impact of land degradation within the community; 	Environment	P = 1 I = 3

Appendix 13. Terms of Reference for project implementation

Terms of Reference are provided here for:

- Project Manager
- Project Coordinator
- Loan Officer of the SIRF Fund
- Design and Supervision of Physical Adaptation Works
- Environmental Impact Assessment (EIA)
- Project Management Committee (PMC) in relation to Adaptation Fund project guidance
- Technical Evaluation Committee (Loans TEC) serving the Revolving Loan Facility
- Loan Board serving the Revolving Loan Facility
- Terminal Evaluation

Terms of Reference for Project Manager (PM)

Scope of Work

The PM will lead the project team and provide overall operational management for the successful execution and implementation of the project. This includes the daily responsibility to manage, coordinate, and supervise the implementation of the project and the delivery of results in accordance with the project document and agreed work plans. Furthermore, the PM will be responsible for financial management and disbursements, with accountability to the government and management committees. The PM will report to the Project Management Committee (PMC).

Further responsibilities of the PM are to:

- Oversee and manage project implementation, monitor work progress, and ensure timely delivery of outputs.
- Report to the PMC regarding project progress.
- Develop and facilitate implementation of a comprehensive monitoring and reporting system.
- Ensure timely preparation of detailed work programs and budgets for approval by the PMC.
- Write ToRs as required.
- Assist in the identification, selection and recruitment of staff, consultants and other experts as required.
- Supervise, coordinate and facilitate the work of the project officers, M&E specialists and technical support staff (including national and international consultants).
- Control expenditures and assure adequate management of resources.
- Provide a quarterly update of the expenses of the previous three months and the expenses expected for the next three months.
- Establish linkages and networks with the on-going activities of other government and non-government agencies.
- Provide input to management and technical reports and other documents as described in the M&E plan for the overall project. Reports should contain detailed assessments of progress in implementing activities, including reasons for delays, if any, and recommendations on necessary improvements.
- Inform the PMC, without delay, of any issue or risk which might jeopardise the success of the project.

Qualifications

- Master's degree in environment, natural resources management, agriculture or a closely related field.
- A minimum of 10 years relevant work experience including at least 6 years' experience as a lead project manager in relevant sectors.
- Demonstrated solid knowledge of adaptation to climate change, ecological restoration and sustainable exploitation of natural resources.

- Experience in the public participation development process associated with environment and sustainable development is an asset.
- Experience in working and collaborating within governments is an asset as well as experience in GEF projects.
- Fluent in English including writing and communication skills.

Reporting

The PM will report to the PMC. The PM will work closely with the PMC and other policy and technical experts to ensure the availability of information on progress and performance regarding the implementation of the project.

Terms of Reference for the Project Coordinator

The Project Officer will report to the Project Manager.

Responsibilities

- Prepare status reports and progress reports.
- Assist in the submission of terminal reports, transfer and disposal of equipment, processing of semi-final revisions, and support professional staff in preparing the terminal assessment reports.
- Assist in the timely issuance of contracts and assurance of other eligible entitlements of the project personnel, experts, and consultants by preparing annual recruitment plans.

Terms of Reference for Loan Officer of the SIRF Fund

Objectives

The objectives of this consultancy are to ensure a successful pilot of the SIRF Fund Revolving Loan Facility adaptation set-aside.

Scope and Activities

- Be familiar with all relevant laws, regulations and international treaty obligations
- Implement activities in accordance with the Code of Conduct, technical and operational manuals, and procedures of the SIRF Fund
- Ensure that the loan disbursement process is operated smoothly and efficiently, including:
 - Developing and recommending additional procedures to the SIRF Fund management
 - Processing loan application forms and maintaining a current and accurate database of loans
 - Participating in the Technical Evaluation Committee (Loans TEC)
 - Supporting the Loans Board and the SIRF Fund General Board through the loan making process
 - Cross-check the expenditure of disbursed loans
 - Regularly report on the RLF portfolio
 - Monitor and evaluate impact of the RLF adaptation pilot
 - Be available to all prospective and current borrowers including through scheduled community “open hours”, regularly conduct site visits, and proactively address any issues that may arise
 - Participate in training at microfinance and SME lending facilities and provide training in-country for SIRF Fund management and other stakeholders

Qualifications

- The applicant should possess an advanced University degree in a relevant field
- At least five (5) years of sales experience in a microfinance/ bank /insurance institution
- Excellent communication skills
- Strong proficiency in Microsoft Excel and preferable Microsoft Access
- Computer literacy skills

Terms of Reference for Design and Supervision of Physical Adaptation Works

Technical Assistance for Flood Mitigation & Slope Stabilization Interventions in Antigua and Barbuda

- *Draft for approval by the Technical Advisory Committee (TAC)*
- *Procurement method: Competitive Bidding*

OBJECTIVE, PURPOSE & EXPECTED RESULTS

Overall objective

The overall objective of the project under which this assignment is organised is to contribute to the achievement of the provisions enshrined in Article 24 of the Revised Treaty of Basseterre, that each Protocol Member State shall implement the St. George's Declaration of Principles for Environmental Sustainability which seeks to, inter-alia, achieve the long-term protection and sustained productivity of the region's natural resource base and the ecosystem services it provides.

This assignment is linked to project component B (specific Physical Adaptation Pilot – PAPs) and is part of initiatives to implement interventions aimed at flood mitigation, slope stabilization, which includes implementation of engineering drainage solutions.

Hereafter the term "contractor" refers to the entity who will eventually implement the works, while the term "consultant" refers to the service provider signatory of this present contract.

Purpose

The purpose of this contract is to acquire the services of a suitable Consultant to provide Technical Assistance in the design and supervision of interventions to:

- i. Develop and implement engineered drainage solutions in the McKinnon's sub-watershed on the northwest coast of Antigua.

Results to be achieved by the Consultant

The Consultant is to achieve the following:

- A. Development of climate-resilient detailed designs, specifications and cost estimates, for required intervention, works, and supplies
- B. Preparation of relevant tender dossier and assistance with the procurement of contractor(s) for implementation of the approved works and supplies;
- C. Provision of supervision, management and capacity building services for proper implementation of the approved works and supplies.

ASSUMPTIONS & RISKS

Assumptions underlying the project

The following assumptions underlie the implementation of this assignment:

- The detailed designs proposed are technically and financially feasible;
- Availability of requisite contractors and inputs (equipment, materials) for project implementation;

- Minimal delays due to weather/climatic conditions and in deliverables by the Contractor(s);
- Effective mobilisation and coordination of necessary capacity and inputs from relevant national agencies; and
- Full support of The Government of Antigua & Barbuda (GoAB) for the design and implementation of the interventions.

Risks

- Unavailability of appropriate technical expertise, consultants, contractors, equipment and materials to undertake the assignment;
- Low capacity at the national level to support implementation of activities;
- Lack of uptake, response, support, coordination and consensus at the Member State level, such as in the revision of proposed designs;
- Proposed interventions are not technically and/or financially feasible;
- Impact of weather, climate, and/or natural disasters on implementation;
- Delays in the deliverables by the Consultant(s);
- Timely access to and procurement of required tools and materials.

SCOPE OF THE WORK

General

Project description

Development and implementation of engineered drainage solutions in McKinnon's Pond sub-watershed in Antigua.

The main scope of the project consists of:

- Establishing flow levels through re-engineering and construction and maintenance of the drainage infrastructure, including bridges, construction of walkways, culverts and U-drains where appropriate, within the project site to meet and promote predevelopment water flow, including efficient storm drains
- Creation and rehabilitating of ponds and natural wetlands to facilitate natural runoff infiltration and wastewater treatment
- Training civil engineers in methodologies for implementing climate-resilient development using a teaching-by-doing approach

The contract consists of two phases: 1) design of climate-resilient drainage interventions, and procurement of works; and 2) supervision of works.

During the design/procurement phase the Consultant shall develop a drainage plan for the area through *inter alia* conducting studies and modelling of the rainfall intensity, calculating the maximum potential run-off flow using the relevant hydrological analysis, including models for climate change projections. The Consultant shall identify and select drainage zones, locate basin areas and determine the appropriate design, sizes and locations of interventions to be utilized in the solution. The consultant shall conduct a cost-benefit analysis of the options available and make recommendations to the Public Works Department, the Department of Environment, and the Development Control Authority.

During the supervision phase, the consultant is required to supervise the works for quality assurance as agreed to in the design phase.

Specific work

The Consultant will complete the following tasks as part of this assignment:

PHASE 1 – DETAILED DESIGN AND PROCUREMENT

Development and implementation of engineered drainage solutions in the McKinnon's sub-watershed in Antigua.

- (a) Identify all contributing drainage systems leading into McKinnon's Pond.
- (b) Develop conceptual design and drainage plans for the area of McKinnon's Pond based on the site requirements, in sufficient detail to ensure clarity and understanding by the contractors and other relevant stakeholders. All designs should be in conformity with national construction standards.
- (c) Identify hydrological flows and features, taking into account climate change and land management projections for the sub-watershed area.
- (d) Estimate existing and targeted runoff resulting from the proposed improvements.
- (e) Provide cost effective options and recommendations to rectify drainage, mitigate flooding, and control erosion.
- (f) Produce flow lines depicting surface water runoff onto and off of the site.
- (g) Develop a contour map illustrating contours at a minimum of ten-foot intervals or other topographic information approved by the Public Works Engineering Department, the Survey and Mapping Division, and the Environment Division.
- (h) Develop a GIS-based map of existing and proposed drainage channels including all reinforced concrete drains and ditches.
- (i) Provide location and design of any proposed facility for storage or for conveyance of runoff into indicated drainage channels including sumps, basins, channels, culverts, ponds, storm drains and drop inlets.
- (j) Propose flood prevention, erosion and sedimentation control measures.
- (k) Facilitate relevant knowledge transfer to government counterpart staff in drainage systems planning and construction in a learning-by-doing approach.
- (l) Develop a detailed cost estimate and work breakdown structure.
- (m) Provide provisional and detailed project implementation budget and Gantt chart of design, works and supervision.
- (n) Conduct a community and stakeholder consultation to present the design and drainage plans.

A. Tender Dossier and Procurement Assistance:

- (a) Assist the focal point ministry in preparation of tender dossier and relevant amendments and clarification responses;
- (b) Assistance with facilitating clarification meeting and relevant documentation / minutes;
- (c) Assist with analysing and evaluating of tenders and preparation of the evaluation report(s) on the tenders received.
- (d) Assist with contract negotiations (where relevant) and preparation of contract documents.

PHASE 2 – SUPERVISION:

Supervision of works, contract management and capacity building:

- (a) During the construction/implementation phase, the consultant is required to inspect and supervise the works and ensure that the works are carried out to the required standards as specified in the designs, specifications and engineering plans.
- (b) During the implementation phase, the consultant is required to supervise, monitor, and report on the implementation of the public education and awareness program (where applicable) and ensure that they are carried out to the required standards as specified in the designs, specifications and plans. Information on project implementation can be disseminated via various media sources, utilizing press releases or press conferences to update public on progress and impacts.
- (c) Supervise and, where necessary, train government counterpart staff in the areas of focus, including drainage systems planning and construction.
- (d) Monitor construction/implementation and quality control methods to verify and certify that quality of works conform to the specifications, drawings, and plans
- (e) Undertake environmental monitoring during construction;
- (f) Conduct regular site inspections and meetings (daily, weekly, monthly) with the contractor to evaluate progress, issues, problems and solutions. Representatives of the Government shall be invited (as available) and Minutes of such meetings shall be documented and circulated in keeping with these TORs and the Conditions of Contract.
- (g) Develop and maintain detailed record of work activities accomplished by the contractor(s) for measurement and verification of work quantities performed
- (h) Assist the Contracting Authority in the managing of contractual issues including review, evaluation, issuance and confirmation of contract variation/change orders.
- (i) Issue certificate(s) of completion to the contractor(s) upon completion of construction contract(s);
- (j) Carry out and recommend necessary adjustments in the designs/drawing required during construction to account for site requirements and/or as per recommended or approved variations or change orders;
- (k) Prepare progress reports, including relevant analysis and projections.
- (l) Evaluation and issuance of certifications for interim and final payments.
- (m) Perform all other tasks, not specifically mentioned herein, but necessary to properly supervise and control all construction activities in accordance with the terms of the Contract.

At the end of the defect liability period and for closure of the Civil Works contract:

- (n) Carry out inspections and verify that any necessary remedial works has been carried out before the issuance of final acceptance certificate.
- (o) Verify and certify the final statement of account issued by the contractor.

The Consultant shall ensure the capitalisation and sharing of knowledge related to the implementation of the project.

Project management

Responsible body

The Contract is part of the OECS Global Climate Change Alliance (GCCA) project for Climate Change Adaptation (CCA) and sustainable land management (SLM) in the Eastern Caribbean. The Project Technical Team (PTT), based at the OECS Commission in Saint Lucia, shall be responsible for:

- Overall supervision and management of the Contract execution,
- Assisting in technical advice, monitoring and evaluation.

The respective GCCA focal Ministries within the Member States of Anguilla, Montserrat, and Antigua and Barbuda are responsible for day-to-day implementation at the national level.

Management structure

The consultancy will be implemented through the **Department of Environment of Ministry of Health and Environment**, under the direction of the Permanent Secretary. The Contractor will communicate with Deputy Chief Director in the Project Management Unit of the Department of Environment in Antigua and Barbuda, on a regular basis as outlined in Section 7.1. All relevant plans, estimates, verifications and models must receive approval from the Public Works Engineering Department (PWD), the Development Control Authority (DCA) and the Environment Division.

REQUIREMENTS

Staff

The justification should be submitted with the tender and shall include information on the added value the expert will bring as well as proof that the expert is seconded or on personal leave.

Key experts – Team Leader

Qualifications and skills

Minimum requirements for the execution of this work assignment are as follows:

1. A University Degree in Civil Engineering, Geotechnical & Hydrological Services, or related field, and at least seven (7) years of experience; or equivalent combination of training and experience.

General professional experience

1. Demonstrated experience in designing water schemes, such as flood defence programmes, and associated structures, such as pumping stations, pipework and earthworks.
2. Demonstrated experience in supervising climate-resilient engineering drainage solutions.
3. Demonstrated ability to manage and direct complex environmental projects

Specific professional experience

1. Experience in Small Island Developing States (SIDS), particularly one or more OECS Member/Associate States, and specific local knowledge and expertise will be considered an asset;
2. Experience in carrying out consultancy assignments for the EU or other international development partners will be considered an advantage.

All experts must be independent and free from conflicts of interest in the responsibilities they take on.

Non key experts

CVs for non-key experts should not be submitted in the tender but the tenderer will have to demonstrate in their offer that they have access to experts with the relevant competencies and experience, for example surveying, GIS-based mapping, cost estimating, etc.

The Consultant must select and hire other experts as required according to the profiles identified in the Organisation & Methodology and/or these Terms of Reference. It must clearly indicate the experts' profile so that the applicable daily fee rate in the budget breakdown is clear. All experts must be independent and free from conflicts of interest in the responsibilities they take on.

The selection procedures used by the Consultant to select these other experts must be based on (inter alia) professional qualifications, language skills and work experience. The selected experts must be subject to approval by the Contracting Authority before the start of their implementation of tasks.

Support staff & backstopping

The Consultant will provide support facilities to their team of experts (back-stopping) during the implementation of the contract.

Backstopping and support staff costs must be included in the fee rates.

The Consultant shall select and hire other experts as required according to the needs, and will have to demonstrate in their offer that they have access to experts with the required profiles, including professional qualifications, language skills and work experience. The costs for backstopping and support staff, as needed, are considered to be included in the tenderer's financial offer.

Office accommodation

Office accommodation of a reasonable standard and of approximately 10 square metres for each expert working on the contract is to be provided by the Consultant. The costs of the office accommodation are to be covered by the fee rates.

Facilities to be provided by the Consultant

The Consultant must ensure that experts are adequately supported and equipped. In particular it must ensure that there is sufficient administrative, secretarial and interpreting provision to enable experts to concentrate on their primary responsibilities. It must also transfer funds as necessary to support their work under the contract and to ensure that its employees are paid regularly and in a timely fashion.

Equipment

No equipment is to be purchased on behalf of the Contracting Authority / partner country as part of this service contract or transferred to the Contracting Authority / partner country at the end of this contract. Any equipment related to this contract that is to be acquired by the partner country must be purchased by means of a separate supply tender procedure.

Incidental expenditure

The provision for incidental expenditure covers ancillary and exceptional eligible expenditure incurred under this contract.

Lump sums

The cost associated with Phase 1 (Detailed Designs and Procurement) shall be paid on a lump-sum basis.

Expenditure verification

The provision for expenditure verification covers the fees of the auditor charged with verifying the expenditure of this contract in order to proceed with the payment of any pre-financing instalments and/or interim payments.

The provision for expenditure verification for this contract is **EUR 2,500 for each Lot**. This amount must be included unchanged in the Budget breakdown.

This provision cannot be decreased but can be increased during execution of the contract.

REPORTS

Reporting requirements

Interim reports must be prepared every six months during the period of implementation of the tasks. There must be a final report, a final invoice and the financial report accompanied by an expenditure verification report at the end of the period of implementation of the tasks. The draft final report must be submitted at least one month before the end of the period of implementation of the tasks. Note that these interim and final reports are additional to any required in Section 0 of these Terms of Reference. Each report must consist of a narrative section and a financial section. The financial section must contain details of the time inputs of the experts, incidental expenditure and expenditure verification. To summarise, in addition to any documents, reports and output specified under the duties and responsibilities of each key expert above, the Consultant shall provide the following reports:

Name of report	Content	Time of submission
PHASE 1: Detailed Designs and Procurement		
Inception Report	Describes initial findings, progress in collecting data, any difficulties encountered or expected in addition to the work programme and staff travel and other requirements specified under 4.2 “Specific work”.	No later than two (2) weeks after the start of implementation
Monthly Progress Updates	Brief (including presentation /conference call) on project implementation, outlining works carried out, summarizing findings and noting any project delays and any barriers/constraints to the project. Also includes summary of projected work for next period.	No later than 1 week after end of each month, until the Phase 1 Final Report.
DRAFT Technical Analysis and Designs	The detailed designs (of the selected option) will, as a minimum, include construction drawings, Geo-referenced mappings, detailed cost estimates, detailed specifications, detailed Gantt schedule, and calculations to determine and justify the intervention details. The report shall contain a sufficiently detailed description of the different options to support an informed decision on the designs, works, and supplies proposed. This must include designs for the support interventions, including public education and awareness programs where applicable. The detailed analyses underpinning the recommendations will be presented in annexes to the main report.	Within two (2) months from the start of implementation
REVISED Technical Analysis and Designs	Same specifications as above, incorporating feedback on draft designs and any additional data / analysis since submission of the draft designs.	Within one (1) month after receiving comments from reviewers
Tender Dossier	Prepared in the appropriate format, including: Technical Designs, detailed specifications, engineering drawings, bill of quantities, relevant instructions and schedules, special conditions of contract. **Relevant amendments and clarification responses/minutes shall be prepared (as necessary).	Final version: within one (1) month of submission of approved Detailed Designs **during the tender period.
Tender Evaluation	Preparation of administrative, technical and financial analysis for evaluation reports, and providing assistance	Within 2 weeks of receipt and opening of tenders

Name of report	Content	Time of submission
Analysis and Draft Contract(s)	leading to drafting and award of contracts, as per guidelines and templates.	
Phase 1 Final Report	Finalized versions of all interim reports and an executive summary describing achievements, problems encountered and recommendations.	Within 1 month of final interim report (above).
PHASE 2: Supervision of Implementation		
Minutes of site / progress meetings	Documentation of key issues, decisions, agreed actions and instructions.	No later than two (2) days following meetings
Monthly Progress Report	Description of progress (technical and financial) and performance of the contractor(s) including work output, in terms of manpower and equipment utilisation, of the Contractor and the safety record to date, problems encountered; provide forecasts of progress and expenditure, any problems or potential problems in connection with the Works and supply contracts and make recommendations for possible solutions. The report shall also reference relevant interim documentation towards the final implementation report (as outlined below).	No later than 1 week after the end of each month of the implementation period.
Quarterly Reports	Every quarter (ending March, June, September and December) the monthly report shall be replaced by a Quarterly Progress Report which will collate and analyse similar consideration, as above, over the relevant 3-month period.	No later than 1 week after the end of each quarterly period.
Final Implementation Report	The Consultant shall prepare a report which shall include (without being limited to) the following: <input type="checkbox"/> Project Description (purpose, scope and dimensions), <input type="checkbox"/> Project Data (historical data on Contract, financial sources, etc.), <input type="checkbox"/> Monthly Certificates, <input type="checkbox"/> Safety record, <input type="checkbox"/> Manpower utilisation, <input type="checkbox"/> Equipment utilisation, <input type="checkbox"/> Claims, Variation Order and Addenda, <input type="checkbox"/> Project Organization, <input type="checkbox"/> List of Minutes of Site Meetings, <input type="checkbox"/> Quality and Time Evaluation, <input type="checkbox"/> Major problems arisen and measures taken, <input type="checkbox"/> Construction Photographs, <input type="checkbox"/> List of As-Built Drawings provided by the Contractors, <input type="checkbox"/> The Final account, and <input type="checkbox"/> Conclusion and Recommendations	No later than 30 days after Provisional Acceptance
Project Completion Report	This report shall provide an appropriate update to the Final Report to take into account any event and contractors' activities which took place during the Defect Liability Period. It shall also include the final project accounts.	Within 30 days of issue of Final Acceptance Certificate.

Submission & approval of reports

Two (2) hard copies of the reports referred to above must be submitted to the Project Manager identified in the contract. The reports must be written in English. The Project Manager is responsible for approving the reports, in consultation with the GCCA Focal Ministry(s) in the respective Member States.

An electronic copy of all reports shall be submitted in PDF format, along with relevant editable formats (MS Word, MS Excel, MS Project, MS PowerPoint, CAD, etc). Reporting shall include an electronic database of all raw datasets collected or used for the project, including a geodatabase of GIS data and maps. The databases must include metadata.

Except otherwise stipulated, reports shall be considered approved if no feedback is issued within two (2) weeks of receipt.

All plans delivered under the contract must receive approval in writing by the lead focal point in the respective Member States, as stipulated in section 4.3.2 (above).

MONITORING AND EVALUATION

Definition of indicators

The Contractor will use a Monitoring and Evaluation framework that draws on the indicators listed below.

Indicators for the Monitoring and Evaluation framework

Indicator	Timeline
Inception Report is received and includes government engineers identified to receive training using a “learning-by-doing” approach for project duration	Within two (2) weeks of signing contract
Technical Designs addressing all comments are developed and approved	Within four (4) months of signing contract
Cost estimates for works and supplies are verified by government engineers	Within four (4) months of signing contract
Tender Dossier and Evaluation Analysis for the Works contract are prepared by the Contractor	Within four (4) months of completion of Technical Design
Minutes of community and stakeholder consultation presenting the design and drainage interventions for sub-watershed area in Antigua and Barbuda	Within five (5) months of signing contract
Approximately six (6) to eight (8) Monthly Progress Reports demonstrating effective construction supervision and quality assurance	Starting from Month 9 (inclusive) of the contract period
Approximately two (2) to three (3) Quarterly Progress Reports demonstrating effective construction supervision and quality assurance	Quarterly progress reports submitted from month 11 of contract
Final Approved Report, demonstrating all comments by parties addressed by the Consultant	Within 15 to 17 months of signing contract

Special requirements

- The Consultant shall adhere to applicable environmental considerations and requirements.

Other relevant guidelines:

The Contractor shall adhere to *the Policy on Agency Minimum Standards on Environmental and Social Safeguards* of the Global Environment Facility (GEF), which aims to “support environmentally sustainable development by ensuring that the GEF and its Partner Agencies undertake sufficient efforts to avoid, minimize, mitigate, and where appropriate, offset any adverse impacts to people and the environment.”

The Contractor is encouraged to use the Caribbean Climate Online Risk and Adaptation Tool (CCORAL), available online (<http://ccoral.caribbeanclimate.bz/>), in screening project activities for climate resilience.

Terms of Reference for the Environmental Impact Assessment (EIA)

This Terms of Reference is to be approved by the Technical Advisory Committee (TAC).

TERMS OF REFERENCE

Environmental Impact Assessment

Project Name:	An integrated approach to physical adaptation and community resilience in Antigua and Barbuda's northwest McKinnon's watershed
Contracting Authority:	Department of Environment, Antigua and Barbuda
Project Duration:	4 years
Consultancy Duration:	60 days
Start date:	May 2017

1. Project Description and Rationale

1. Describe the reason or rationale for the project and its activities
2. State the relevance and conformity of the proposed designs to existing legislation, national sustainable development policies and strategies, with particular focus on sustainable natural resource utilization, physical development plans, climate change resilience best practices, and multilateral environmental agreement obligations
3. Assess alternatives to the project's approach
4. Consider all potential direct, indirect, transboundary, and cumulative impacts and risks that could result from the project
5. Identify for construction and maintenance phases of all aspects of the project, including management of vehicular and pedestrian access during implementation.

2. Site Description

The report should include a detailed site description with special emphasis on the existing terrestrial and wetland landscapes. The report should document the features of the site prior to implementation of the project activities

1. Description and illustrations of land topography to show surrounding slope elevation, hydraulic conductivity, and traditional access routes and uses.
2. Baseline data on environmental resources including soil quality and percolation rates, and water quality.

3. **Socio-Economic Impacts**

1. Describe the potential impacts on identified stakeholders, particularly regarding community residents in the area and potential impacts on the traditional and current uses of the area should also be assessed, building on the Environmental and Social Assessment and Management Plan statement conducted during the preparation phase of this project.
2. Describe how men and women may be diversely affected by the project, in addition to other minority or vulnerable groups

4. **Assessment and mitigation of the direct and indirect environmental and social impacts during construction and maintenance**

The EIA should give consideration to the cumulative impacts of future development in McKinnon's watershed and the effects that this would have on the ecosystem and hydrology of the area.

Impacts should be scaled based on severity - low, medium, and high; and presented in a tabular format. The following table maybe used as a guide:

Table1. Summary assessment and mitigation of environmental impacts

Area of Impact	Brief Description	Risk Significance High/Medium/ Low	Mitigation Measures
Hydrology and drainage			
Landscape & Visual Impact			
Biodiversity and Ecosystem Impact			
Historic and Cultural			
Access Routes			
Socio-economic/ realty value			
Gender equity			
Other			

Table 2. Summary of risks to climate change impacts and mitigation measures

Area of Impact	Brief Description	Risk Significance High/Medium/Low	Mitigation Measures
Extreme rainfall event			
Extreme drought			

Extreme atmospheric temperatures			
Hurricane force wind			
Other			

The section should also consider the following:

1. Measures to avoid, minimize, or mitigate environmental and social risks of the proposed project
2. Gender-responsiveness of the project design
3. Measures to be adopted to ensure proper maintenance of the project interventions
4. Mitigation measures to reduce sediment loading into the marine environment
5. Mitigation of mosquito-breeding habitat using ecosystem-based solutions and design measures
6. Plans for storms and storm surges along with the overall drainage management
7. Measures to be adopted to maintain or enhance riparian vegetation, including species for vegetating waterway buffer areas.
8. Appropriate implementation time and place of measures must be outlined.

5. **Cost Benefit Analysis**

The EIA should examine the potential life span of the project interventions and undertake an investment risk assessment/cost benefit analysis to determine the viability of the project implementation when compared to a business as usual scenario with increased climatic events. This should provide guidelines to sustain future investments to adaptation work in waterways and for drainage construction in urban areas.

6. **Environmental and Social (including Gender) Monitoring Plan**

A draft Environmental and Social Monitoring Plan must be developed to be carried out during the construction stage and the Management Plan/Strategy must be implemented in accordance with Part VI Section 40 subsection 6 of the EMPA 2015 during the Operational phase. The Monitoring Plan which will detail the monitoring requirements for pre-, during- and 2 years post-implementation. This will include recommendations to ensure the documented implementation of mitigation measures; long-term minimization of negative impacts; and maximization of positive impacts. Preliminary costing of the Monitoring Plan implementation should be included, and indicators used for monitoring should be disaggregated by gender.

At a minimum the draft monitoring should include:

- a) An introduction outlining the need for a monitoring programme

- b) The activity being monitored, performance objective and the parameters chosen to effectively carry out the exercise
- c) The methodology to be employed for both the maintenance and monitoring of the intervention, and the frequency of monitoring
- d) Frequency of reporting to the Department of Environment and the Development Control Authority
- e) The sites being monitored. These should incorporate a control site where project interventions were not implemented
- f) Raw data to be collected and relevant tables and graphs to be used
- g) Identification of the entity, body, agency or authority with responsibility for ensuring that measures in the Environmental Monitoring Plan carried out.

7. **Implementation**

- The report should provide recommendations for further mitigation strategies
- The report should provide objectives of the recommended measure and the main concerns which they are to address
- A schedule of implementation measures must be outlined in the report
- All map data should be provided in GIS format as an annex to the report, and in electronic format to the Department of Environment

8. **Composition of the Research Team**

The team required to successfully complete this EIA is expected to include but not limited to the following professional skillsets:

- Social Scientist or Gender Specialist
- Socio-economist or Economic geographer
- Hydrologist, Surveyor, or Soil and water engineer

9. **Appendices:**

The report should include the following appendices at a minimum.

- Glossary of Technical Terms
- Specific Technical Studies, Reports, and Engineering Designs
- Data Tables
- Photographs, GIS files & Maps
- Report of stakeholder consultations

Terms of Reference for Project Management Committee (PMC) in relation to Adaptation Fund project guidance

Background

The PSC will be responsible for undertaking management-related and technical decisions for the project in accordance with these ToRs and providing guidance and direction for the project on a regular basis.

The PSC will review and approve the Annual Work Plans (AWPs) and reports as well as the six-monthly workplans and reports. Additionally, it is required to authorise any substantive deviation from the agreed AWP and budget lines. The PSC will ensure as well that necessary resources are committed, and will arbitrate on any conflicts within the project or negotiate a solution to any problems between the project and external bodies. Last, the PSC will approve the responsibilities of the PM.

The PSC will comprise representatives from key ministries and agencies as well as the PM and the CTA (see Sections 4 and 5). The PSC will meet at least every six months or as required by the chair of the PSC.

Scope of Work

Specific responsibilities of the PSC are as follows:

- Ensure that project objectives are fulfilled in an effective and efficient manner.
- Approve work plans and budgets, and other reports that may be required.
- Ensure effective quality assurance and financial reporting requirements.
- Ensure institutional coordination and facilitate an effective communication and decision-making process between government, implementation partners, civil society and other key actors.
- Monitor and evaluate project implementation to ensure consistency with the approved work plans and results framework of the project.
- Review, revise and approve ToRs for staff, consultants and contractors required to assist in project implementation, as proposed by the PM.
- Propose policy revisions that would facilitate the mainstreaming of the project activities.
- Facilitate interactions between the PM/project team and the relevant ministries or government agencies, in order to optimise project interactions.

Terms of Reference for the Technical Evaluation Committee (Loans TEC) serving the Revolving Loan Facility (RLF) Adaptation Set-Aside of the SIRF Fund

Constitution of the Technical Evaluation Committee (Loans TEC)

The TEC is situated within the SIRF Fund Secretariat and will draw on the skills and expertise of the Technical Advisory Committee (TAC).

The TEC shall consist of: the SIRF Fund Loans Officer, an engineer of the Department of Environment (also a TAC member), an officer of the Development Control Authority (DCA) (also a TAC member), and assistance from the Technical School Department of the Ministry of Education, an engineer, and a Contractor. TEC operations will use the opportunity to train young persons in technical schools in Antigua and Barbuda.

Responsibility

The Technical Evaluation Committee (Loans TEC) is responsible for evaluating loans applications by conducting a field assessment to the prospective property, with the property owner. The assessment process uses the Technical Assessment Form of the TEC (Annex 4) to validate the Loans Applications Form, in particular the adaptation value of the intervention, and to provide a costed estimate of the proposed works. This information accompanies the Loan Application Form and is submitted to the Loan Board to take a decision on the loan approval. The TEC must conduct the assessments and submit the Loan Application to the Loan Board within ten (10) business days of receiving notification from the Loan Officer that the application is to be processed.

During the site visit, the TEC is responsible for carrying a GPS to georeference the prospective property, and inputting this data into the SIRF Fund Revolving Loan Facility Access Database. This data will be used to perform spatial analysis and monitoring and evaluation of the adaptation interventions.

Following a decision on the loan by the Loan Board or the General Board, the TEC is responsible for conducting regular visits to the property to monitor implementation. Visits should be at least twice per year for the first year, and annually thereafter. Site visits will be documents and reported to the Loan Board.

Specific activities of the TEC:

- Conduct a site visit to the prospective property, with the property owner
- Complete the Engineering Assessment Form of the TEC
- Georeference the property and add the data to the Access database for inputting into the EIMAS
- Submit the Loan Application Form with the Engineering Assessment Form to the Loan Board, within ten (10) business days of receiving the Loan Application Form from the Loan Officer
- Conduct regular site visits to the property to monitor activities of the loan against the Engineering Assessment and Loan Application Form
- Provide status reports to the Loan Board
- Report on activities to the TAC

Confidentiality

The TEC will from time to time be privy to confidential information and proprietary materials. The TEC shall hold in trust any and all such information received in the course of performance of its functions and all such information as confidential, and the strictest of confidence shall be maintained in respect of such confidential information. The TEC shall handle such information with a degree of care in respect of the disclosure and protection of its own confidential information. TEC members are obligated not to use any information received in the course of this work to let, rent, sell or otherwise materially benefit without the expressed written consent of the Government of Antigua and Barbuda or any of its assigns. TEC Board members agree that the obligation of confidentiality shall continue for the duration of their membership and shall survive their membership.

Conflict of Interest

If a member of the TEC has a personal financial interest in a loan application, applicant, or in the success or failure of the applicant's business, the TEC member will be recused from decision-making regarding the applicant's loan. The TEC members are expected to communicate possible conflicts of interest, and to bring up questions regarding perceived conflicts of interest involving other staff members, contractors, applicants, the Loan Board and TEC members themselves. Conflict or perceived conflict of interest may involve positive or negative effects on those involved.

Remuneration

TEC members receive a stipend (to be determined). Criteria for payment of stipend include:

- Project staff, DCA and DOE staff whose work program includes the work of the TEC shall not receive a stipend
- Stipend will be provided to the Independent Engineers and contractor serving on the TEC.
- Payment of stipends are contingent on proof of contribution

Terms of Reference for the Loan Board serving the Revolving Loan Facility (RLF) Adaptation Set-Aside of the SIRF Fund

Constitution of the Loan Board

The SIRF Fund Revolving Loan Facility Board (RLF Board or Loan Board), comprises volunteer members nominated by the General Board of the SIRF Fund and appointed by the Governor General. Loan Board members are recruited for their expertise and potential to make a positive contribution to the Loan Board. The Loan Board is comprised of between four (4) members and eight (8) members. Two of the Loan Board members are also current directors on the General Board of the SIRF Fund.

The Loan Board appoints its own Chair and makes rules and procedures as provided for under the Regulations for the Environmental Protection and Management Act (2015).

The Loan Board Chair may appoint up to three (3) ad hoc members for any particular meeting if, in the Chair's opinion, the ad hoc members contribute an area of expertise that will be helpful for that meeting. These members will be appointed as observers in accordance with the regulations.

Responsibility

The Loan Board is responsible for the design, maintenance, and usage of the loan funds.

The Loan Board reviews all loans, assesses risk levels, and makes approval decisions for loans below 2% of the adaptation Set-Aside portfolio (USD 60,000). For loans above this threshold, the Loan Board makes a recommendation to the General Board, which has the authority to approve these larger loans and pledge assets (the Government assumes the risks of these loans and the Ministry of Finance is represented on the General Board).

Specific activities include:

- Reviewing loan application material and requesting additional information from applications and the TEC as necessary
- Taking a decision to approve or reject loan applications (under USD 60,000) or making a recommendation to the Loan Board
- Developing repayment terms and negotiating with the Borrower
- Regularly reporting to the General Board on the status of Adaptation Set-Aside portfolio
- Taking actions to remedy Default or Delinquent loans

Confidentiality

The Loan Board will from time to time be privy to confidential information and proprietary materials. The Loan Board shall hold in trust any and all such information received in the course of performance of its functions and all such information as confidential, and the strictest of confidence shall be maintained in respect of such confidential information. The Loan Board shall handle such information with a degree of care in respect of the disclosure and protection of its own confidential information. Loan Board members are obligated not to use any information received in the course of this work to let, rent, sell or otherwise materially benefit without the expressed written

consent of the Government of Antigua and Barbuda or any of its assigns. The Loan Board members agree that the obligation of confidentiality shall continue for the duration of their membership and shall survive their membership.

Conflict of Interest

If a member of the Loan Board has a personal financial interest in a loan application, applicant, or in the success or failure of the applicant's business, the Loan Board member will be recused from decision-making regarding the applicant's loan. Loan Board members are expected to communicate possible conflicts of interest, and to bring up questions regarding perceived conflicts of interest involving other staff members, contractors, applicants, and Loan Board members. Conflict or perceived conflict of interest may involve positive or negative effects on those involved.

Remuneration

Loan Board members serve in their respective capacities and are not remunerated as part of their services to the Loan Board. The contribution is counted a co-financing towards project support.

Terms of Reference for the Terminal Evaluation

Objective and Scope of the Evaluation

The objective of the terminal evaluation is to: i) examine the extent and magnitude of any project impacts to date; and ii) determine the likelihood of future impacts. The evaluation will also assess project performance and the implementation of planned project activities and planned outputs against actual results.

Methods

This terminal evaluation will be conducted as an in-depth evaluation using a participatory approach whereby the Adaptation Fund, key representatives of the executing agencies and other relevant staff are kept informed and consulted throughout the evaluation. The consultant will liaise with the relevant stakeholders on any logistic and/or methodological issues that can compromise an independent review. The draft report will be circulated to the main representatives of the NIE and the Adaptation Fund. Any comments or responses to the draft report will be sent for collation and the consultant will be advised of any necessary or suggested revisions.

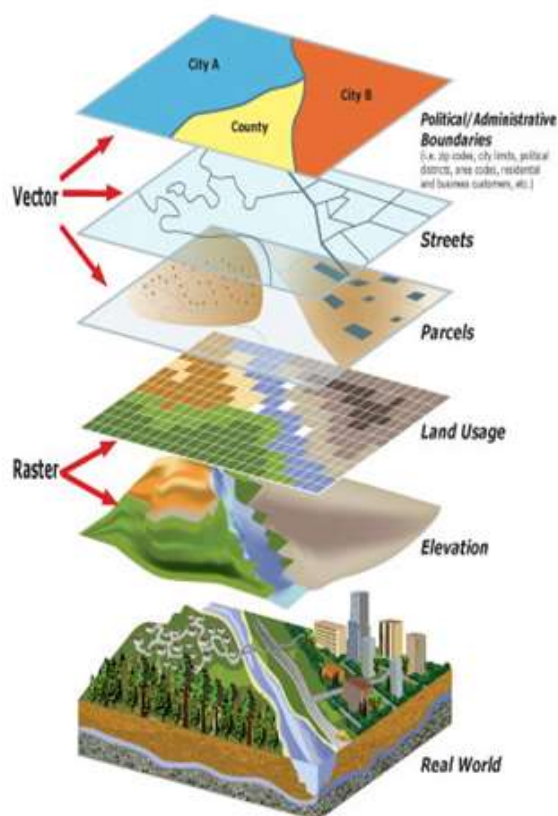
Key Evaluation Principles

In attempting to evaluate any outcomes and impacts of the project, evaluators must remember that the project's performance should be assessed by considering the difference between the answers to two simple questions "what happened?" and "what would have happened anyway?". These questions imply that there should be consideration of the baseline conditions and trends in relation to the intended project outcomes and impacts. In addition, it implies that there should be plausible evidence to attribute such outcomes and impacts to the actions of the project.

Sometimes, adequate information on baseline conditions and trends is lacking. In such cases, this should be clearly highlighted by the evaluator, along with any simplifying assumptions that were taken to enable the evaluator to make informed judgments about project performance.



ENVIRONMENTAL INFORMATION MANAGEMENT AND ADVISORY SYSTEM DATA MANAGEMENT PROTOCOL



Department of Environment
Ministry of Health & Environment
Government of Antigua and Barbuda

FINAL DRAFT - 23 July 2016

Table of Contents

Preface	3
Acknowledgements.....	3
Acronyms.....	4
Introduction.....	5
Drones for Conservation Project	5
Data Management Policy.....	6
Mandate for environmental information	6
History of the EIMAS.....	6
Sustainability of the EIMAS.....	7
Data management objectives and goals	7
Data Management Administration	9
Workflow	9
Duties and responsibilities.....	10
Ownership	10
Custodianship	11
Data Management Architecture	11
Coordinate systems and projections.....	11
Directory structure	12
Naming convention.....	12
Data documentation.....	14
Metadata content standards	15
Data Quality, Control and Validation.....	17
Data Storage and Maintenance	18
In-house data warehouse	19
National data management platforms.....	19
Data Access and Distribution.....	19
Data requests.....	19
Recommendations	20
References	24
Appendices.....	25
Appendix I. EIMAS geodatabase metadata catalog listed by feature dataset, feature class, geometry, attributes and source.....	25
Appendix II. Department of Environment's data sharing agreement	28
Appendix II. EIMAS data request template.....	30
Appendix III. Data User Agreement of the Department of Environment (Draft July 2016).....	31

Acronyms

AB	Antigua and Barbuda
APUA	Antigua Public Utilities Authority
BWI	British West Indies
CERMES	Centre for Resource Management and Environmental Studies
DCA	Development Control Authority
DEM	Digital Elevation Model
DoE	Department of Environment
ECMMAN	Eastern Caribbean Marine Managed Areas Network
EIMAS	Environmental Information Management and Advisory System
GCS	Geographic Coordinate System
GEF	Global Environment Fund
GIS	Geographic Information Systems
GoAB	Government of Antigua and Barbuda
IKONOS	High resolution earth observation satellite operated by Digital Globe
LiDAR	Light Detection and Ranging
NGO	Non-Governmental Organisation
NSDI	National Spatial Data Infrastructure
ODbL	Open Database License
PCS	Projected Coordinate System
R	Restricted
SER	State of the Environment Report
SIRMM	Small Island Resource Management Mechanism
SIRF	Sustainable Island Resource Framework
TAC	Technical Advisory Committee
TNC	The Nature Conservancy
UAS	Unmanned Aircraft System
UAV	Unmanned Aerial Vehicle (Aircraft or Drone)
UTM	Universal Transverse Mercator
UWI	University of the West Indies
WGS	World Geodetic System

Introduction

The Department of Environment within the Ministry of Health and the Environment, is the lead coordination agency on a wide range of environmental issues facing Antigua and Barbuda. As a science-based department, the Department of Environment (DoE) addresses these issues through research, policy development, and is guided by regulation and environmental laws. The Department also executes its' work program through its staff and strategic partnerships with NGOs and the private sector. Programs are focused on conserving, and where necessary, restoring Antigua and Barbuda's natural environment; equipping citizens to make informed decisions on land, water and climate conditions; and minimizing threats to citizens and their environment from pollution. The DoE's programs help to foster understanding and respect that our focus reflects the increasingly evident interdependence between environmental sustainability and economic and ecosystem well-being.

Drones for Conservation Project

The Department of Environment strives to improve data collection for environmental management in Antigua and Barbuda. The 15+ Multilateral Environmental Agreements to which the country is signatory require thorough monitoring, evaluation and reporting. A central pillar to the [Environmental Protection and Management Act](#), approved by Parliament in September 2015, is therefore accurate, reliable, and up-to-date environmental data. To facilitate this, the Act established an Environmental Information Management & Advisory System (EIMAS), to be maintained by the Department of Environment with provisions for public, private, and NGO access. In this way the Department is also taking steps towards supporting a National Spatial Data Infrastructure (NSDI) for the efficient management of all spatial data within which the EIMAS would be the arm responsible for environmental data in Antigua and Barbuda. Despite these realizations, the objectives of the EIMAS as a functional comprehensive environmental data repository, have not yet been fully realized. This is, in part, a result of inconsistent GIS data collection methods and the absence of a data management structure and metadata standards for the EIMAS. Furthermore, data collection through project-based deliverables has magnified these interoperability problems thereby significantly hindering the use and impact of existing GIS data in Antigua and Barbuda.

The Drones for Conservation Project ultimately seeks to demonstrate and enhance spatial data collection and management of information for Protected Areas in Antigua and Barbuda. Thus the first objective of the Project was to train the Department in the use of Unmanned Aerial Systems (UAS), and develop a socially-acceptable UAS policy and operations manual. Next the utility of conservation applications using UAS was highlighted through the collection and processing of aerial imagery at a demonstration site on the south west coast of Antigua within the Cades Bay Marine Reserve. A comparative analysis of UAS data was compared to conventional remote sensing data (i.e. satellite imagery, aerial photos collected from manned aircraft) collected in 2010 using to assess the benefits and constraints of various remote sensing technologies.

The acquisition of UAS and their ability to collect a large amount of data highlights the urgent need to build the Department of Environment's capacity in data management. Thus the last objective of the Drones for Conservation Project is to establish a workflow for the EIMAS including a data management protocol and standards and provide a training session for members of the DoE and other agencies in its' application. Lastly at the conclusion of the Project, lessons learned will be documented and widely shared to support sensitization of the Drones for Conservation Project nationally and regionally with other environmental management practitioners.

Data Management Policy

Mandate for environmental information

The Environmental Protection and Management Act, Part IX: Environmental Information speaks to the DoE's mandate for environmental information in Antigua and Barbuda. This Act sets out the authority for the establishment of a National Environmental Information Management and Advisory System (EIMAS) and a Departmental GIS Unit. Additionally the Act speaks to the need for: a Natural Resources Inventory, Environment Registry, Public Access to Environmental Information, and the creation of a State of the Environment Report (SER).

History of the EIMAS

The development of GIS and the Environmental Information Management & Advisory System (EIMAS) in Antigua and Barbuda has a much longer history than the Act of 2015. Table 1 reviews the advancement of the EIMAS in Antigua and Barbuda.

Table 1. Milestones of GIS and the development of the EIMAS in Antigua and Barbuda.

Time Period	Milestone
2000	APUA hosted two training sessions focused on "Introductions to GIS"
2005	DCA was the first Government agency to start using GIS
July 2009	Technical Officers from Pilot Agencies engaged in GIS spatial analysis and data mining training
September 2009	GIS Users Group published "The Geospatial Dimension of Sustainable Development: A Proposal for Investment in a National Infrastructure for Geospatial Information"
2010	Consultants hired under the Sustainable Island Resource Management Mechanism (SIRMM) Project delivered the Environmental Information Management and Advisory System (EIMAS) to the GoAB
November 2010	Technical Officers from Pilot Agencies engaged in a training exercise where the EIMAS was introduced
April 2011	Training on GIS Application Development in support of the EIMAS
July 2011	Two UWI undergraduate student interns digitized the 2010 aerial photo
July 2012	Two UWI undergraduate student interns delivered training on the use of Trimble Juno 3B GPS handheld units for field data capture
March 2013	GIS/GPS training in support of EIMAS conducted by JASON PLEASE INDICATE
June 2013	World Bank published 'Open Data Readiness Assessment Prepared for Government of Antigua and Barbuda' report

The continued success of the EIMAS therefore hinges upon the ability to produce, manage and deliver timely and usable spatial data and information. To do this, the EIMAS must maintain the quality, interpretability, security, longevity and availability of environmental data for informed decision-making and management in Antigua and Barbuda. Therefore the application of a data management protocol that clearly explains how the Department will implement and maintain the EIMAS is required to serve the data and information management needs of the DoE and the country of Antigua and Barbuda.

Sustainability of the EIMAS

Long-term planning for the EIMAS will be critical to ensure that it can assist the DoE in the attainment of its' mission. Aligning the EIMAS with complementary initiatives of the Department and other government activities, and the development of a business plan can be effective ways to support the advancement and sustainability of the EIMAS. To this end a financial mechanism to implement the Environment Protection and Management Act, entitled the Sustainable Island Resource Framework Fund (SIRF Fund), is being operationalized. Ultimately, it is envisioned that government agencies, NGOs and private sector entities that access the SIRF Fund resources will in turn provide relevant data to the EIMAS.

Data management objectives and goals

Good data management is the means by which scientific information about our environment can become a part of an informed decision-making process. A key objective of the DoE and the Environmental Protection and Management Act is to provide timely and usable information to natural resource managers and decision-makers about the status and trends of the environment and protected areas in Antigua and Barbuda. To meet this challenge, a system that can effectively store, maintain and serve spatial data and informational products is required.

Data management refers to the framework by which data are acquired, maintained, and made available. Data management is not an end unto itself, but instead is the means of maximizing the quality and utility of our environmental information. A robust system for data management is particularly important for long-term programs where the lifespan of a data set will be much longer than the careers of persons who collected the data. Seen in this way, it becomes obvious that data management is vital to the success of any long-term monitoring initiative.

The overall goal of a data management protocol is to ensure the quality, interpretability, security and ownership, longevity and availability of environmental data and information resulting from environmental inventory and monitoring efforts.

- *Quality* – Awareness of the value of information and its underlying data is fundamental to its proper use. Our objective is to ensure that appropriate quality assurance measures are taken during all phases of project development, data acquisition, data handling, summary and analysis, reporting, and storage. These should reflect current best practices and meet rigorous scientific standards. Since standards and procedures can only accomplish so much, an important part of quality assurance is to

continually encourage careful attitudes and good habits among all staff involved in creating, collecting, handling, and interpreting data.

- *Interpretability* – A data set is only useful if it can be readily understood and appropriately interpreted in the context of its original scope and intent. Data taken out of context can lead to misinterpretation, misunderstanding, and bad management decisions. Similarly, data sets that are obscure, complex or poorly documented can be easily misused. Sufficient documentation should accompany each data set and any reports and summaries derived from it, so as to ensure that users will have an informed appreciation of its applicability and limitations.
- *Security* – Our objective is to make certain that data are maintained and archived in an environment that provides appropriate levels of access to project managers, technicians, decision makers, and others. Our data management program will take advantage of existing systems for network security and systems backup, and augment these with specific measures aimed at ensuring the long-term security and integrity of our data.
- *Ownership* - Intellectual property rights can be owned at different levels; e.g. a merged dataset can be owned by one organization, even though other organizations own the constituent data. If the legal ownership is unclear, the risk exists for the data to be improperly used, neglected, or lost. Our data management system will clearly address data ownership to ensure recognition is adequately maintained for data providers.
- *Longevity* – Countless data sets have been lost over time simply because they were not sufficiently documented and organized when they were created. Too often data are left in a condition that renders them effectively irretrievable – either because the format is outdated, or more often because there is not enough documentation to inform subsequent users of the data collection methods, the scope and intent of the data set, the quality assurance procedures, the data format, or the intended use. Without sufficient information about a data set we lose confidence in its quality and applicability, which leaves it useless and unused. The longevity of data can be enhanced by thorough documentation, maintaining the data in a widely interpretable format, and appropriate archival measures. Although this requires an initial investment of time and effort upon creation of the data set, this investment almost certainly pays off over time because the data set is much more likely to be used if it is properly documented and formatted.
- *Availability* – Environmental information can only be useful for informing decisions if it is available to managers, academia, businesses and NGOs at the right time and in a usable form. Our objective is to expand the availability of environmental information by ensuring that the products of inventory and monitoring efforts are created, documented and maintained in a manner that is transparent to the potential users of these products.

The EIMAS Data Management Protocol reflects the Department's commitment to establishing and maintaining a robust system for data management to ensure the availability and usability of high-quality environmental information. Thus the objectives and goals for the EIMAS strives to secure:

- Confidence in the security and availability of environmental data and related information;
- Easy access to most information, and appropriate safeguards for sensitive information;
- Awareness of the intended use and limitations of each data set;
- Infrastructure and documentation that encourages data exploration;
- Compatibility of data sets for exploration and analysis at larger scales and across disciplines;
- Implementation of standards and procedures that facilitate information management, and that reinforce good habits among staff at all levels of project implementation – project leaders, technicians, and volunteer data collectors; and
- A proper balance between the standards needed to ensure quality and usability, and the flexibility to meet specific needs and encourage innovation.

Data Management Administration

Data management administration applies to individuals and organisations as much as it relates to information technology, database practices, and applications. In order to meet data management goals and standards, all involved stakeholders must clearly understand their associated duties and responsibilities. Data management administration should therefore take into account the data workflow and associated duties and responsibilities of involved stakeholders.

Workflow

The workflow, or sequence of administrative processes through which a piece of data passes from initiation to completion should be systematized to permit controlled data management and coordinated administration. The EIMAS workflow, as a series of data management steps that occur as information flows from the field into the information management system and served out to end users is illustrated in Figure 1. The EIMAS workflow can be broadly categorized into six stages, as follows:

- **Data Collection:** Data are collected according to the DoE's data collection protocol. All raw data is archived on the DoE's ENVIRSTORE server.
- **Data Creation:** Data is converted into a digital spatial format including metadata. Data Dictionaries and domains can be applied to specify the types and ranges of the values that can be entered for each attribute.
- **Data Validation:** Data will then be validated by local experts (if relevant), and then undergo a final QA/QC assessment by the Data Manager with support from the GIS unit.
- **Data Storage:** After creating spatial data and metadata, the file is given a standardized name and then saved on the ENVIRSTORE server.

- **Data Maintenance:** All data maintenance (e.g. modifications and edits) are to be completed by corresponding data providers and updates delivered to the DoE's Data Manager. All edits and modifications will be reviewed by the Data Manager supported by the GIS Unit, and updated in EIMAS database metadata catalog and on the ENVIRSTORE server.
- **Data Dissemination:** Individuals needing access to the EIMAS data sets can do so by submitting a formal request in writing to the Director of the Department (see subsequent chapter on Data Access and Distribution). Going forward, the Department is exploring the use of using a web-based platform, to make non-sensitive 'core' data sets easily accessible to the public.

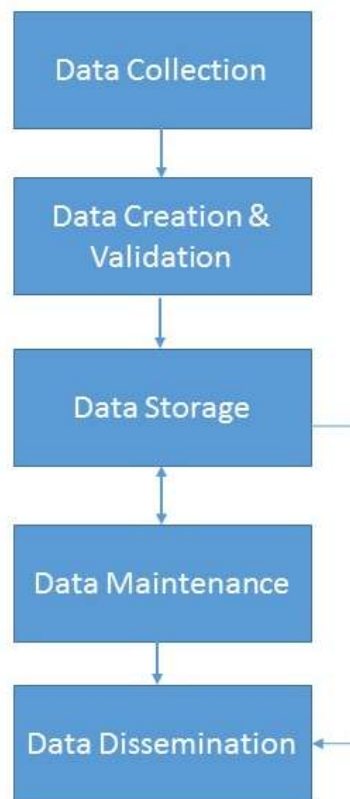


Figure 1. Schematic of the data management workflow for the EIMAS.

Duties and responsibilities

Data management administration requires that the data workflow is implemented. This is enabled through the definition of duties and responsibilities of the data manager, GIS unit and all involved stakeholders.

Ownership

A key aspect of data management involves the identification of the owner(s) of the data. Data owners generally have legal rights over the data, along with copyright and intellectual property rights. This applies even where the data is collected, collated, or disseminated by another party by way of contractual agreements, etc. Data ownership implies the right to exploit the data, and in situations where the continued maintenance

becomes unnecessary or uneconomical, the right to destroy it. Ownership can relate to a data item, a merged dataset or a value-added dataset.

It is important for data owners to establish and document the following (if applicable):

- the ownership, intellectual property rights and copyright of their data;
- the statutory and non-statutory obligations relevant to their business to ensure the data is compliant;
- the policies for data security, disclosure control, release and dissemination; and
- the conditions of use, set out in a signed license use agreement, before data is released.

Custodianship

The duty of data custodians are to ensure that important datasets are developed, maintained, and accessible. Designating an agency and person responsible for overseeing these aspects of data management helps to ensure that datasets do not become compromised.

Responsibilities of a data custodian includes:

- Adherence to appropriate and relevant data policy and data ownership guidelines;
- Ensuring accessibility to appropriate users;
- Maintaining appropriate levels of dataset security;
- Fundamental dataset maintenance, including but not limited to data storage and archiving;
- Dataset documentation, including updates to documentation; and
- Assurance of quality and validation of changes to a dataset, including periodic audits to assure on-going data integrity.

Although spatial data for the EIMAS is managed at different levels, management should be consistent to provide continuity and transferability. At the operating unit level, the EIMAS is managed by the DoE in which the Data Manager is responsible for the custodianship of data. At larger scales, additional spatial data is both created and managed by corresponding national agencies, academia as well as regional and international NGOs. Conversely, the EIMAS data is used by the DoE, other government agencies, project managers, consultants, NGOs, academia and the public.

Data Management Architecture

The architecture of the EIMAS data, or the database 'schema' is the skeleton structure that represents the logical view of the entire geodatabase. The schema defines the not only physical structure of the EIMAS, or how the geodatabase but also the groupings, relationships and properties of each feature dataset. This is of particular importance as a number of national environmental datasets will be provided across many agencies.

Coordinate systems and projections

The application of a standardized spatial reference, or a coordinate system is essential to data quality in that it defines a particular location on the Earth as points in two or three-dimensional space that. An example of a

three dimensional Geographic Coordinate System (GCS) is the latitude/longitude system. This system is three-dimensional because it adds the element of altitude. The altitude is the distance between a defined point and the surface of a reference ellipsoid. The coordinates of a point are specified by the angles latitude and longitude, and the distance from the surface of the ellipsoid, z. An example of a two dimensional Projected Coordinate System (PCS) is the Antigua 1943 British West Indies Grid, Universal Transverse Mercator (UTM) system. This system uses only two coordinates to describe a horizontal position on the Earth. Based on historical precedence in AB, it is recommended that EIMAS data should apply either the Antigua 1943 GCS or the global WGS 84 latitude / longitude and the UTM 20 N coordinate system. Due to known datum shifts in the Antigua 1943 Datum British West Indies Grid, a number of alignment errors have been seen amongst national spatial datasets (Needham 2015; J. Knowles per. comm. 2016). As a result, it is recommended that either the Antigua 1943 datum is updated or a move is made to use the GCS WGS 84, PCS UTM Zone 20 N coordinate system.

The national spatial reference recommended for EIMAS and AB GIS data should apply:

EPSG Projection 2001

Antigua 1943

British West Indies Grid

WGS 84 Bounds: -61.8900, 16.9900, -61.6700, 17.7200

Projected Bounds: 411662.2312, 1878099.7268, 435125.5596, 1958871.8451

Directory structure

The schema architecture or directory structure of the EIMAS framework is set out in the following sections. To start, the EIMAS geodatabase is grouped into 13 themes or 'Feature Datasets' each which contain a number of layers or features classes. Since the EIMAS is still in a developmental stage, a metadata catalog schematic (by feature dataset, feature class, geometry, attributes and data source) has been created that inventories both the existing GIS data as well as any identified data gaps to be populated in the future. The initial EIMAS metadata catalog is provided in Appendix I. As the DoE and partners continue to populate the geodatabase it is anticipated that the following metadata catalog will be developed further.

Naming convention

The application of a standardized naming convention allows for easy referencing and quick assessment of what the data is. A naming convention can also be employed for naming associated map documents and map layout documents. The naming convention used for EIMAS data has been adapted based on a format used in TNC's Caribbean Program Spatial Data Management and is described in detail by Knowles and Roth (2015).

The file name of all EIMAS feature classes should adhere to the following naming convention (**Extent_Island_Theme_Name_Date_Restricted**); whereby a series of key words are separated by underscores with a number at the end. No spaces are to be used.

The first two 'words' identify the geographic scope of the data, and indicate whether it represents a regional, national or island-level dataset. The next 'word' identifies the theme relating to the file (e.g.

marine, infrastructure, socio-economic). The following ‘word’ provides a common name describing what the specific feature represents (e.g. mangroves, schools, coastline, landfills). Lastly, the numbers at the end of the name represent the date for which the data is relevant for as ‘YYYYMMDD’ (e.g. 2012).

Employing the EIMAS naming convention, the following are examples of feature class file names:

- SWW_A_Infrasx_roads_20100123
- B_MarHab_reefs_2004
- AB_Poli_parish_20091201
- Car_AB_Soec_fishgrounds_2006_R
- Glob_Poli_EEZ_2015

Extent and Island

The Extent indicates the geographic extent of the dataset. This could be either a specific location on Antigua or Barbuda (e.g. St. John’s), a regional (e.g. Caribbean) or global dataset. If the dataset is of a national extent then both Islands code are listed in the naming convention ‘AB’ or if the dataset only comprises information for one island then either ‘A’ or ‘B’ is included. If the dataset is a regional geographic extent then ‘Car’ is applied or if it has been extracted from a global dataset then ‘Glob’ is indicated in the naming convention.

Themes

The ‘theme’ or Feature Dataset is provided for an assemblage of related datasets, and is represented in the naming convention as a coded value or abbreviation. Table 3 provides an initial list of abbreviated theme codes to be applied for EIMAS data. As the DoE and partners continue to populate the geodatabase it is anticipated that the following list of theme abbreviations will be developed further.

Table 2. List of theme abbreviations and short description of each to be applied to the naming convention.

Abbreviation	Feature Dataset	Description
Mar	<i>Marine</i>	All habitats, species and biological datasets relating to the marine realm, except for benthic habitat datasets.
Bath	<i>Bathymetry</i>	All bathymetric datasets. For raster datasets this would be marine charts.
InfraSx	<i>Infrastructure</i>	Datasets related to the human built environment such as transportation and utilities infrastructure.
Model	<i>Other model outputs</i>	A theme which includes planning units and modeled GIS outputs, such as tidal / storm surge grids, scenarios, habitat suitability, risk, indices, etc.
SoEco	<i>Socio-economic</i>	Datasets on industries including tourism, fisheries, diving, finances, energy and funerals.
Poli	<i>Political</i>	Country boundaries, EEZs, zones, districts, states, parishes, municipalities, parcels, etc.
Lc	<i>Land cover</i>	Complete land cover/land use datasets.

EIMAS Data Management Protocol

Hab	<i>Habitat</i>	Complete benthic habitat datasets.
Topo	<i>Topography</i>	For raster datasets these would be topographic maps.
Clm	<i>Climate</i>	Datasets related to climate, weather and climate change such as sea level rise and storm surge information.
Fw	<i>Freshwater</i>	All habitats, species, biological datasets related to the freshwater realm
Ter	<i>Terrestrial</i>	All habitats, species, biological datasets related to the terrestrial realms, except for landcover/landuse datasets
Geo	<i>Geology</i>	Rock formation and soil related datasets
HZ	<i>Hazard</i>	Erosion and flooding areas or storm tracks or damage and loss from natural disasters
His	<i>Historical Significance</i>	sites of historical importance or archaeological sites
Img	<i>Imagery</i>	Imagery from satellites (World View 2, Ikonos, LandSat) or airplanes (ECW)
Res	<i>Resources</i>	Resources such as fish, sea turtles, seamounts or any resources extracted or not
RUs	<i>Resource Users</i>	The various livelihoods generated or community using the area.
Mgmt	<i>Management</i>	Spatial management areas such as protected areas, national parks, no anchoring zones, etc.
Elev	<i>Elevation</i>	Digital elevation models (DEM), bathymetric contours, slope, etc.
BioPh	<i>Biophysical</i>	Datasets including rainfall, temperature, soil types.
Abbreviation	<i>Theme name</i>	Description to be determined

Name

Name indicates a commonly used term for the dataset that captures the description of what the feature comprises (e.g. mangroves, census blocks, contours). The various features are grouped into related Feature Dataset themes.

Date

The format for date is 'YYYYMMDD' (e.g. 20040506 for May 6, 2004). Many times only the year is relevant; thus inclusion of the month and day are optional.

Restricted

Include the letter 'R' after the date if the feature data is a restricted dataset and cannot be shared without special permission.

Data documentation

Data documentation is critical for ensuring that datasets are useable well into the future. Data longevity is proportional to the comprehensiveness of their documentation (National Park Service 2008). All datasets should be identified and documented to longevity and facilitate their subsequent identification, proper

management and effective use. To facilitate documentation, the use of a standard naming convention and the creation of metadata or the provision of background information which describes the content, quality, condition, and other appropriate characteristics of each data set should be applied. Metadata clearly describes how, when, why and by whom the data was created and is an essential aspect of spatial information. Without good metadata, the spatial information may be rendered useless for credible decision-making and research. Metadata content standards are particularly important in a co-management or data sharing partnerships such as the EIMAS and a NSDI in AB.

Metadata content standards

The purpose of metadata content standards is to provide information about what elements of the metadata are mandatory and deliver a common set of terminology and definitions for documentation related to these metadata. It is highly recommended that the DoE includes the following metadata standards as a mandatory deliverable product for all geographic data created as a result of projects and contracts.

At a minimum, some basic metadata must be included for all data stored in the EIMAS. The metadata priority fields (i.e. title, tags, description, purpose, data of completion, source citation, contact, access and use limitations) are required for EIMAS data. A description of each field along with associated questions to ask yourself or others when working on metadata are provided below to guide the population of standardized metadata fields.

Title

The title of the feature class. The default title name is the feature's file name. For example, if the dataset has the file name 'AB_InfraSx_Roads', then 'AB_InfraSx_Roads' will appear as the title in the metadata field. This name should be changed for map display purposes to a common term or a name which would make sense in in the legend of a map to something more appropriate such as 'Roads'.

Tags

These are simple keywords that describe the data. Tags should include the common term of the title, topic, extent, island, year, project and any other keywords useful for data discovery.

Description

A brief description of the data layer. The description field is similar to an abstract and should provide the reader with a brief explanation of what the data comprises of (i.e. feature, geometry, extent), how the data was created, by whom and an indication of the overall accuracy of the data.

Questions to ask: What does this dataset describe? How was the data modified? How reliable are the data? What problems remain in the dataset?

Purpose

A brief summary of the purpose, objectives and methods applied to create the data layer. For example, if the dataset was created as part of Project, modelled or if there are use limitations to the data, this information should be included in the summary.

Questions to ask: Who contributed to this dataset? How was the dataset created, generated, processed, or modified? Does it describe conditions during a particular period of time? Why was it created (if this is relevant)?

Date of completion

The date when the dataset was completed. Clearly state both the date of spatial data creation as well as the date of the source dataset (if relevant).

Questions to ask: When was the dataset completed? What is the source of the dataset and when was this created?

Source citation

The source citation should state where the raw or original data actually came from. This field could cite a project (e.g. SIRMM) or an institution or organisation (e.g. Word Bank, TNC, UWI) or a program (e.g. ECMANN) or a publication (e.g. Spalding, M. D., Fox, H. E., Allen, G. R., Davidson, N., Ferdana, Z. A., Finlayson, M., Halpern, B. S., et al. 2007. Marine ecoregions of the world: a bioregionalization of coastal and shelf areas. BioScience, 57(7): 573–583.)

Questions to ask: Who are the originators of the dataset and/or who contributed to the dataset? How should the data be cited?

Contact

A contact for the data could be the original author if the original author still has an available and working contact information. However, this information could be outdated or irrelevant. In these instances, it is best to place the contact as EIMAS. Due to staff turnover, it is best not place a single individual as the contact. Use the generic email address, which will be forwarded to the DoE's current Data Manager at: datamanagerenv@gmail.com

Questions to ask: To whom should users address questions about the data? How can someone get a copy of the source dataset? Who are the originators of dataset?

Access, Use Limitations and Restrictions

It is extremely important to respect the rights of data providers and the varied stakeholders that assist the DoE in its mission. The DoE has developed a data license sharing agreement (Appendix II). In some cases, spatial datasets are restricted from sharing. These could be sensitive national datasets or those that were created using private funding where the funder has explicitly stated that only the DoE can use the data. Or these could be datasets from certain user groups that shared information with the Department in confidence such as other public sector agencies, fishers, private sector or the tourism industry. To ensure that the Department upholds these requests, clear indications should be explicit and upfront in the metadata. One way is to use the letter 'R' in the naming convention. Secondly the word "RESTRICTED" should be used in the metadata's description field. If the data can potentially be shared with special permission the steps for data access should be clearly stated.

For data and information shared with the DoE that is NOT sensitive, it is important to acknowledge their stipulations, use limitations, restrictions and disclaimers. Ideally, this would be in the metadata. If there are no listed use limitations, the Department should ask what uses, stipulations, restrictions and disclaimers are required and if there is a written statement that can be placed in the metadata. If this is not possible for any number of reasons, it is recommended that metadata include the [Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Unported \(CC BY-NC-SA 3.0\)](https://creativecommons.org/licenses/by-nc-sa/3.0/) license language.

A good example statement is to place in the metadata is, 'This work is licensed under a Creative Commons Attribution-Noncommercial-Share Alike 3.0 License (<http://creativecommons.org/licenses/by-nc-sa/3.0/>). By using this information, you inherently agree to these terms.'

Questions to ask: Are there legal restrictions on access or use of the data? Is the data restricted from sharing?

At a minimum all spatial data associated with the EIMAS must meet the following metadata standards:

1. Data must conform to all standards set out in the current version of the Data Management Protocol.
2. The data file must be named according to the standard convention described in this Protocol.
3. The attribute fields (including any abbreviations or codes), data types, data ranges and values must be clearly explained in the metadata.
4. Records should contain valid values for all variables (that do not include NULL among its possible values).
5. Metadata priority fields (i.e. title, tags, description, purpose, data of completion, source citation, contact, access/use limitations) must be completed.
6. Data must be uploaded to the EIMAS geodatabase, entered in the metadata catalog, and stored on the ENVIRSTORE server. In the future all non-sensitive, 'core' datasets must also be uploaded to a public access web-based platform.

Data Quality, Control and Validation

Quality as applied to data is defined as 'fitness for use' and is a measurement of the correctness, completeness and timeliness of data to determine its potential usability. Principles of data quality need to be applied at all stages of the data management process (e.g. capture, creation, storage, analysis, presentation and use). Documentation and the use of metadata is the key to ensure data quality. Without good documentation, it is difficult for users to determine the fitness for use of the data and difficult for custodians to know what and by whom data quality checks have been carried out. Documentation is generally of two types and provision for them should be built into the database design. The first is tied to the validation of each record, and records what data checks have been done, what and when changes have been made, and by whom. The second is the metadata that records information at the dataset level (described previously). Both are important, and without them, data quality is compromised.

Quality Control (QC) is an assessment of quality based on internal standards, processes, and procedures established to control and monitor quality, while Quality Assurance (QA) is an assessment of quality based on standards external to the process and involves reviewing of the activities and quality control processes to insure final products meet predetermined standards of quality (National Land & Water Resources Audit 2008). While QA procedures maintain quality throughout all stages of data development, QC procedures monitor or evaluate the resulting data products.

QA/QC mechanisms are designed to prevent data contamination, which occurs when a process or event introduces either of two fundamental types of errors into a dataset (National Park Service 2008):

- Errors of commission include those caused by data entry or transcription, or by malfunctioning equipment. These are common, fairly easy to identify, and can be effectively reduced up front with appropriate QA mechanisms built into the data acquisition process, as well as QC procedures applied after the data has been acquired.
- Errors of omission often include insufficient documentation of legitimate data values, which can affect the interpretation of those values. These errors may be harder to detect and correct, but many of these errors should be revealed by rigorous QC procedures.

Data quality is assessed by applying verification and validation procedures as part of the quality control process. Verification and validation are important components of data management that help ensure data is valid and reliable. The clear definition of QA/QC mechanisms for the EIMAS are ultimately the responsibility of the DoE's Data Manager and GIS unit; specific duties will need to be further defined as the GIS unit is established.

Data Storage and Maintenance

Data storage and maintenance address those aspects of data management related to the housing of data. This element includes considerations for digital/electronic data and information as well as relevant hardcopy data and information. A database or dataset should have carefully defined procedures for ensuring the currency of data as well as maintenance and in some cases retirement of data. If a dataset is ongoing, including additions, modifications, and deletions, as well as frequency of updates, then versioning will be extremely important. Likewise, metadata is unlikely to be static for data sets in current use. Features and processing information are likely to change as a data set is maintained. For this reason, it must be realized that metadata creation is not a one-time event for a data set, but rather an issue which must be revisited and periodically maintained. Furthermore, management of a database also requires good day-to-day system administration. Database system administration should employ means of threat mitigation, such as regular backups of data hosted on the server.

In-house data warehouse

The DoE's ENVIRSTORE Server is the in-house data warehouse that stores the EIMAS data. The ENVIRSTORE server can be accessed by a mapped network drive. The DoE's has recently employed a Knowledge Information Management Specialist who will be responsible for developing procedures for maintaining data, server security and DoE's procedures for database storage, backup and recovery. Accordingly, the Knowledge Information Management Specialist should specify the precise steps to be taken in this regard and this information documented in subsequent versions of the EIMAS Data Management Protocol.

National data management platforms

In 2014, the World Bank assisted the country of Antigua and Barbuda in the establishment of a national data clearinghouse (i.e. GeoNode). The [ABGeoNode \(http://geonode.data.gov.ag/\)](http://geonode.data.gov.ag/) is an online GIS web platform and provides the country with a secure portal with built-in functionality to restrict access to various datasets. The AB GeoNode brings together authoritative core datasets from national and regional entities, making it possible to create tools for resource management across the region. The DoE can easily leverage this pre-existing, no-cost platform to begin to host and publicly serve non-sensitive, 'core' EIMAS datasets or use a similar open-data web platform to allow for public accessibility to the EIMAS in the future.

Although the primary responsibility of the DoE is for environmental data and related information derived from the Department's activities, it is anticipated that the scope of the EIMAS data management efforts will continue to expand to include national spatial data and thereby contribute to the continued development of a National Spatial Data Infrastructure for Antigua and Barbuda (NSDI 2014). Currently, the Surveys and Mapping Division, an active user of GIS with expressed interest in advancing Spatial Information Management in the country, has already established a national ArcGIS Server platform that can allow for cross-agency access. Presently, the system is managed by IT Department and the Land Registry Department is connected to this platform (V. Bird, personal communication 2016). In light of this, close collaboration should be continued to be sought to align national spatial data initiatives and avoid duplication of efforts.

Data Access and Distribution

Data requests

Under the Environmental Protection & Management Act (2015) environmental information including data hosted by the EIMAS should be readily accessible to those person(s) given the relevant permission to access them. Whether certain information is made available or not, and to whom, is a decision of the data owner and/or data custodian. Decisions to withhold data should be based solely on privacy, commercial, in-confidence, national security considerations or legislative restrictions. An alternative to denying access to certain data is to generalize or aggregate data to overcome the basis for its sensitivity. If data is generalized, it is important for the data custodian to clearly indicate in the corresponding metadata records that there are

limitations applied to the data supplied which could affect its' fitness for use. The decision to completely withhold data should be transparent and the criteria on which the decision is made should be based on a stated policy position.

For all EIMAS data that is to be distributed by the DoE, a formal letter of request for EIMAS data must be made addressed to both the Director and Data Manager. Appendix III provides a template to generate a formal request to access EIMAS data. All requests for data should be submitted a minimum of 14 days prior to the anticipated release of data and must indicate the first and last name of the data requestor, their organisation, contact information including phone number and email address and include a brief statement of the intended use and format of data (e.g. .tiff, .shp, .kmz, .dbf) requested. Additionally each data request must be accompanied by a signed acceptance of the EIMAS Data Use Policy (Appendix IV). Once a data request has been granted approval from the Director of the DoE, EIMAS data will be freely distributed (electronically) to end users. All the desired data will be downloaded and provided in a Data Package. The Data Package will be provided electronically in a folder containing the data files (in one or more of the requested file types) along with associated documented metadata. As part of the DoE's data sharing policy, the end user also agrees to provide to the Department, at no cost a digital copy of any geospatial data, tabular data, reports, imagery, drawing(s), plan(s), and any other form of result that were derived directly or indirectly from the use of these data provided by EIMAS along with its associated metadata.

Recommendations

The application of a data management protocol and standards support the continued development of high quality and accessible spatial data. This together with well trained personnel can streamline public administration and maximize data management efforts in Antigua and Barbuda. The development of this EIMAS Data Management Protocol provides a solid foundation to support the hosting and collection of data and information required for environmental planning, management and analytical research activities. This first version of the DoE Data Management Protocol sets out the architecture and management of the EIMAS geodatabase. Next time and effort will be required by the DoE to clean, convert and validate existing GIS data and spatial information so that the standards developed in this Protocol can be applied and the EIMAS geodatabase populated. After this undertaking, it is recommended that the DoE and partners conduct another EIMAS data inventory and assessment to further identify data gaps and subsequent data to be collected and converted along with a costed methodology. Likewise, continued annual GIS data internships can be used to continue to propagate the EIMAS and reduce DoE expenditures in this regard.

Maintaining data management standards and ensuring access to data and information hosted by the EIMAS will play a critical role in mitigating a problem common throughout the nation and the Caribbean – the lack of current and accurate data to support effective decision-making. The Drones for Conservation Demonstration Project has shown how advances in UAS and remote sensing technologies have made it significantly easier for environmental managers operating in SIDS to quickly acquire and process the data

they need to inform and guide policies based on sound science. Conversely the use of the UAS for data acquisition, across a number of on-going projects in Antigua, has already resulted in a substantially larger amount of imagery and spatial data that will be need to be effectively managed to allow for its' maximum usefulness. Thus the continued development of the DoE's GIS unit, including the establishment of clearly defined roles and responsibilities in regards to applying this data management protocol and QA/QC data validation procedures should be of utmost priority. Given the pace of technology change, data management recommendations (i.e. storage, sharing and access, security) should be periodically reviewed to ensure they are aligned with latest advances.

Public access to information is a central mandates of the Environmental Protection & Management Act (2015). Information should be easily accessible to the public in a manner that is both user-friendly and served at the lowest possible cost to all stakeholders. In recent years, advances in web-based technologies have allowed for low-cost open data sharing (Butler et al. 2011). Towards this end, it is recommended that all non-sensitive or 'core' datasets of the EIMAS be shared and made available via an open-access online web portal. It is recommended that the DoE further explore the possibility of populating and serving 'core' EIMAS data via the ABGeoNode or another similar web-based portal. This will also require that the DoE institutionalize the drafted EIMAS Data Sharing Policy (Appendix III). Likewise it is advised that the DoE continue to work closely with the Surveys Division to adopt a national Data Sharing Policy that can be applied nationally. Although at the time of writing the [Creative Commons License](#) is recommended for attributing open data; recently many international organisations have shifting to the use of the [Open Data Commons Open Database License](#) (ODbL). Thus potential conversion to the use of the ODbL license should be reconsidered when the EIMAS Data Management Protocol is next revised.

Many activities of the GoAB depend on accurate and current spatial data and information. Likewise, growing number of government agencies are investing time and significant resources into acquiring GIS data and training staff in its use (NSDI 2014, EAG 2015, Nurse 2016). Further advancement in the DoE's and other agencies using and contributing to the EIMAS and NSDI, in the use of GIS is required to continue to strengthen their capacity in the use of this and UAS technologies (DoE 2016).

Similarly, the sustained development of a National Spatial Data Infrastructure (NSDI) framework consisting of policies and technologies that can enable organisations to manage data across a national scale in a coordinated way is imperative. A NSDI framework would create a favorable environment for national efforts in the collection, sharing and analysis of data by the public, private, NGO and academic sectors, thereby supporting the objectives of a number of the Multilateral Environmental Agreements (MEAs) to which the country is signatory. Thus the implementation of a NSDI could address multiple data management issues presently encountered by stakeholders in Antigua and Barbuda (Baldwin 2011, NSDI 2014, EAG 2015, Nurse 2016); its' continued development is recommended to coordinate investments between agencies, avoid redundancy, and fully utilize GIS and its' analytical capabilities.

A common obstacle to successful NSDI typically revolves about data sharing and collaborative management efforts (Butler et al. 2011). Contrary to this, government agencies and NGOs in Antigua and Barbuda have instead shown a willingness to collaborate in data sharing and management efforts that can be seen over the history of the EIMAS (Table 1) and the course of this Drone for Conservation Project (NSDI 2014, EAG 2015, Nurse 2015, Baldwin 2016, DoE 2016). It is recommended that ultimately the EIMAS is connected to this national ArcServer platform to allow for web-based national data sharing and the development of a NSDI.

The Drones for Conservation Project has provided a solid framework for the development of the EIMAS and for the DoE and partners to continue to apply information technology to manage, access and extend data collection activities with local partner organisations (e.g. TAC, NGOs, academia, etc.). Additional assistance, in terms of enhancing data acquisition, management, post-processing and analytic technical capabilities of the DoE, its' GIS Unit, and personnel from partner agencies and NGOs is required to populate and ensure the successful implementation of the EIMAS as well as ensure the continued collection of imagery and creation of spatial data to feed a number of ongoing projects and support informed decision-making in Antigua and Barbuda. A summary of recommended data management actions along with timelines is provided in Table 4. Likewise additional GIS training, particularly in the extraction of derivative data from the imagery, advanced geospatial analysis, and data management is strongly recommended to support the continued education and skill sets required to maximize the efficiency of the EIMAS and the data collected by the UAS.

Table 3. Summary table of key recommended data management actions.

Recommended Action	Description	Timeframe
Next steps for the EIMAS	<ul style="list-style-type: none"> Clean, convert and validate existing data to apply standards set out in the Data Management Protocol Prioritize new data to be collected/digitized and develop a costed methodology Institutionalize the format set out in the EIMAS Operations Manual and the DoE Data User Agreement. Annual inspection of EIMAS data for consistency with data management protocol Establish web-based national data sharing and upload non-sensitive layers to an online portal (e.g. GeoNode) Connect the EIMAS to the Survey Division national ArcServer platform Move away from or update the 1943 Antigua British West Indies Datum due to known inaccuracies with datum shifts 	2016 – 2018 2016 2016 Onwards from 2017 2018 2018 – 2020 Onwards from 2017
Institutionalization of the GIS Unit	<ul style="list-style-type: none"> Appropriate authorities identified for inclusion in the GIS Unit Guidelines developed for the responsibilities of the GIS Unit Establish the GIS Unit with clearly defined roles and duties 	2016 2016 – 2017 2017 – 2018
Capacity Building in the EIMAS	<ul style="list-style-type: none"> Enhance technical capabilities of the DoE GIS Unit by including at least five (5) personnel from the TAC agencies in subsequent training (e.g. in-person instructor-led, online courses), data acquisition and post-processing activities to advance the collection of imagery and creation of spatial data for EIMAS Continued training for the Data Manager and partner TAC members in the extraction of derivative data from the imagery, advanced spatial analysis and data management 	2017 – 2018 2018 – 2019
GIS Capacity Building in key actors	<ul style="list-style-type: none"> Annual GIS data internships to propagate the EIMAS GIS training certification for at least 3 people island-wide in key institutions, including: Ministry of Agriculture 	Onwards from 2016 2017 – 2020
Advance the NSDI framework	<ul style="list-style-type: none"> Continue discussions with Surveys Division towards adopting a joint data sharing policy (already drafted by Surveys) Support the Surveys Division in developing the NSDI framework (i.e. policy, legal, data, in-kind). 	2016 2016 – 2019
National reporting on environmental information standardized	<ul style="list-style-type: none"> Develop a format for the State of the Environment Report (SER) Identify relevant staff from the DoE and from other agencies to provide input into the SER Develop a draft SER document 	2016 – 2017 2016 – 2017 2017

References

- Baldwin, Kimberly. 2016. Unmanned Aerial System Policy and Operations Manual. For the Department of Environment, Ministry of Health and Environment, Government of Antigua and Barbuda. Centre for Resource Management and Environmental Studies (CERMES), University of the West Indies, Cave Hill Campus, Barbados.
- Butler, M., P. Boudreau, C. LeBlanc and K. Baldwin. 2011. *Spatial data infrastructure in support of EBM and the ecosystem approach to fisheries in the Caribbean* in 'Towards marine ecosystem-based management in the Wider Caribbean'. Edited by Fanning, L. R. Mahon and P. McConney. Amsterdam: Amsterdam University Press.
- Damon, C. 2016. *Small Unmanned Aircraft (SUA) Pilot Project*. The USAID/Ghana Sustainable Fisheries Management Project (SFMP). Narragansett, RI: Coastal Resources Center, Graduate School of Oceanography, University of Rhode Island and Environmental Data Center. GH2014_SCI019_EDC. 29 pp.
- Department of Environment (DoE). 2016. EIMAS Data Management Workshop Report, Ministry of Agriculture, St. Johns, Antigua. 22 June 2016.
- Environmental Awareness Group (EAG). 2015. Antigua & Barbuda Data Management Training Workshop Report. IUCN, BIOPAMA.
- Knowles, J. and L. Roth. 2015. *Caribbean Spatial Data Management and Standards*. The Nature Conservancy, Caribbean Program.
- Martín, E. and G. Ballard. 2010. *Data Management Best Practices and Standards for Biodiversity Data Applicable to Bird Monitoring Data*. U.S. North American Bird Conservation Initiative Monitoring Subcommittee.
- National Land & Water Resources Audit (NLWRA). 2008. *Natural Resources Information Management Toolkit: building capacity to implement natural resources information management solutions*. National Land & Water Resources Audit, Canberra.
- National Park Service. 2008. *Data Management Guidelines for Inventory and Monitoring Networks*. Natural Resource Report NPS/NRPC/NRR—2008/035. National Park Service, Fort Collins, Colorado. Online:
- National Spatial Data Infrastructure (NSDI). 2014. *A National Spatial Data Infrastructure (NSDI) for Antigua and Barbuda: Draft Proposal*. Department of Environment and Surveys Division, Government of Antigua and Barbuda.
- Needham, E. 2015. Delineation of watersheds, subwatersheds, and creation of new GIS data. Masters in City Planning, Geospatial Internship, School of Design, University of Pennsylvania.

Appendices

Appendix I. EIMAS geodatabase metadata catalog listed by feature dataset, feature class, geometry, attributes and source.

Feature dataset	Theme	Feature class name	Geometry	Attributes	Data source
Habitats	<i>Terrestrial habitats</i>		Polygon	None	EIMAS 2009
	<i>Marine habitats</i>		Polygon	Class, species, area	Baldwin, K. 2011
	<i>Beaches</i>		Polygon	None	
	<i>Ponds / Waterbodies</i>		Polygon	None	EIMAS 2009
	<i>Wetlands</i>		Polygon	None	EIMAS 2009
Resources (Biodiversity)	<i>Baitfish bay</i>		Polygon	None	Baldwin, K. 2011
	<i>Cockle</i>		Line	None	Baldwin, K. 2011
	<i>Nursery area</i>		Polygon	Species	Baldwin, K. 2011
	<i>Fishing ponds</i>		Polygon	Type of fish	Baldwin, K. 2011
	<i>Sea turtle nesting</i>		Point	Species, status	Baldwin, K. 2011
	<i>Shore birds</i>		Polygon	Species, habitat, description, area, fishing	Baldwin, K. 2011
	<i>Whelks</i>		Line	None	Baldwin, K. 2011
Resource users	<i>Dive shops</i>		Point	Name, number, email	Baldwin, K. 2011
	<i>Landing sites</i>		Point	Name, # fishers, # boats, services	Baldwin, K. 2011
	<i>Tour operators</i>		Point	Name, number, email	Baldwin, K. 2011
	<i>Yachting companies</i>		Point	Name, number, email	Baldwin, K. 2011
Space-uses	<i>Anchorage</i> s		Polygon	Name	Baldwin, K. 2011
	<i>Dive sites</i>		Polygon	Name	Baldwin, K. 2011
	<i>Historical sites</i>		Point	Name, type, infrastructure, protection	Baldwin, K. 2011
	<i>Recreational areas</i>		Point	Name, type, description, use, infrastructure	Baldwin, K. 2011
	<i>Sailing lanes</i>		Line	Name	Baldwin, K. 2011
	<i>Shipwrecks</i>		Point	Name, type, depth, year sunk	Baldwin, K. 2011
	<i>Fishing grounds</i>				
	<i>Shore-fishing</i>		Line	Name	Baldwin, K. 2011
	<i>Vending sites</i>		Point	name, description, # vendors	Baldwin, K. 2011
	<i>Water sport areas</i>		Polygon	name, sports	Baldwin, K. 2011
Threats	<i>Breakwater</i>		Line	Type	Baldwin, K. 2011
	<i>Erosion</i>		Line	Severity	Baldwin, K. 2011
	<i>Outfall</i>		Line	None	Baldwin, K. 2011
	<i>Dumping</i>		Point	None	Baldwin, K. 2011
	<i>Flooding</i>		Polygon		

EIMAS Data Management Protocol

	<i>Storm surge (SLR)</i>		Line		
	<i>Pollution</i>		Polygon		
	<i>Mangrove cutting</i>		Polygon	None	Baldwin, K. 2011
	<i>Sand-mining</i>		Point	None	Baldwin, K. 2011
	<i>Sedimentation plume</i>		Polygon	Name, reason for sedimentation, comments	Baldwin, K. 2011
	<i>Tsunami risk</i>		Polygon	Level of risk	
Management	<i>National Parks</i>		Polygon	Name, area	Cooper, B. EAG 2011
	<i>Marine Reserves</i>		Polygon	Name, area	Cooper, B. EAG 2011
	<i>Heritage Sites</i>		Polygon	Name, area	Cooper, B. EAG 2011
	<i>International Bird Areas</i>		Polygon	Name, area (ha)	Birdlife International
	<i>UAS No Fly Zones</i>		Polygon	Name, area	
	<i>Beach monitoring sites</i>		Point	Name, frequency	
Elevation	<i>Bathymetry</i>		Line	Contour (5m) intervals	FAO 2005
	<i>Slope</i>		Raster	Resolution	
	<i>DEM</i>		Raster	Resolution	
	<i>Contours</i>		Line	Contour intervals	
Drainage	<i>Watershed</i>		Polygon	Name, area	
	<i>Sub-watershed</i>		Polygon	Name, area	
	<i>Hydrology</i>		Polygon	Name, type	
	<i>Flooding</i>		Polygon	Frequency, risk level	
Biophysical	<i>Rainfall</i>		Raster	Density	
	<i>Geology</i>		Polygon	Type	
	<i>Soils</i>		Polygon	Type, area	
	<i>Temperature</i>		Raster	Range	
Infrastructure	<i>Roads</i>		Line	None	
	<i>Buildings</i>		Polygon	None	
	<i>Coastline</i>		Line	None	
	<i>Wells</i>		Points	Name	
	<i>Hotels</i>		Polygon	Name	
	<i>Land use</i>		Polygon	Type	
	<i>Schools</i>		Point	Name	
	<i>Airports</i>		Polygon	Name	
	<i>Military</i>		Polygon	Name	
	<i>Treatment plants</i>		Polygon	Name	
Other	<i>Coastal names</i>		Annotation	Name, type	Baldwin, K. 2011
	<i>Parishes</i>		Polygon	Name, area	

EIMAS Data Management Protocol

	<i>Population density</i>		Polygon	Name, level	
	<i>Enumeration districts</i>		Polygon	Name, area	
	<i>Settlements</i>		Polygon	Name, area	
Imagery	<i>Aerial photos</i>		Raster	N/A	
	<i>Satellite</i>		Raster	N/A	
	<i>UAS</i>		Raster	Naming convention	
	<i>Maps</i>		Raster	N/A	
	<i>Charts</i>		Raster	N/A	
Projects	<i>DoE</i>		Folder	N/A	
	<i>Other Govt.</i>		Folder	N/A	
	<i>EAG</i>		Folder	N/A	

Appendix II. Department of Environment's data sharing agreement

Any Geographic Information System (GIS) data or information received from the Department of Environment or downloaded from the EIMAS (collectively "GIS Data") is licensed under a Creative Commons Attribution-Noncommercial-Share Alike 3.0 License (<http://creativecommons.org/licenses/by-nc-sa/3.0/>). More specific limitations of this data are stated below. By using this information, you acknowledge that you have read, understood, and accepted the terms and conditions stated in this GIS Data User Agreement. DoE reserves the right to change this Agreement at any time and without notice. Your use of this information shall constitute your agreement to be bound by this Agreement and any changes.

The user hereby acknowledges that the GIS Data is subject to constant change and that its accuracy, including but not limited to, its accuracy as to labeling, dimensions, boundaries, placement or location of any map features therein, cannot be guaranteed. All GIS Data is provided as is, with potential faults, errors and without warranty of any kind, expressed or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. Additionally, DoE does not warrant that the information contained in this GIS Data will meet the user's requirements or that the operation of the GIS Data will be uninterrupted or error free, or that data defects will be corrected. The entire risk as to the quality, performance and usefulness of the GIS Data rests with the user.

The user, in using this GIS Data, hereby releases DoE, their agents, consultants, contractors or employees from any and all claims, actions, or causes of action for damages including, but not limited to, any costs of recovering, reprogramming or reproducing any programs or data stored in or used with the GIS Data, damage to private property, damages for personal injury or for any lost profits, lost savings, or other special, incidental or consequential damages arising out of the use of or inability to use the GIS Data, even if such parties have been advised of the possibility of such damage. User agrees to indemnify and hold harmless DoE, their agents, consultants, contractors and employees from any and all liability claims or damages to any person or property arising from or connected with the use of the GIS Data.

Further Data Restrictions

Use of the GIS Data is limited to academic or scientific purposes and may not be used for profitable purposes or by a for-profit corporation. The user hereby commits to acknowledge The EIMAS and the Department of Environment as the data source and compiler when GIS Data received from DoE (through formal delivery or from a website) is used in the preparation of reports, papers, publications, maps and any other products. Any use, display or incorporation of GIS Data shall include the date on which such information was provided.

The user also agrees to provide DoE, at no cost to DoE, a digital copy of any Geo-Spatial Data, tabular data, reports, imagery, drawing(s), plan(s), and any other form of result that were derived directly or indirectly from the use of these data provided by DoE along with its associated metadata.

To ensure that appropriate documentation and data limitations are provided, downloaded data should not be redistributed to third-party users or uploaded to a central server unless written permission is granted by

EIMAS Data Management Protocol

the DoE's EIMAS Data Manager (datamanagerv@gmail.com) and Department of Environment's Director (Diann Black-Layne: dcblack11@gmail.com).

When such GIS Data is used the following disclaimer and waiver of liability shall be included and displayed prominently so as to alert any person viewing or utilizing this information:

NOTICE: It is understood that, while The Department of Environment and its partners of information have no indication or reason to believe that there are inaccuracies or defects in information incorporated in the base map, The Department of Environment and its data partners make NO REPRESENTATIONS OF ANY KIND, INCLUDING BUT NOT LIMITED TO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE, NOR ARE ANY SUCH WARRANTIES TO BE IMPLIED, WITH RESPECT TO THE INFORMATION OR DATA, FURNISHED HEREIN.

Name of Data User

Date

Approved by DoE Director

Date

Witness

Date

Appendix II. EIMAS data request template

Name of Data Requestor

Organisation

Address

Phone Number

Email Address

Date

Amb. Diann Black-Layne
Director
Department of Environment
Victoria Park, Botanical Gardens
St. John's
Antigua and Barbuda

Dear Amb. Diann Black-Layne,

I would like to take this opportunity to formally request the use of **XXX data layers** that are included in the Environmental Information Management and Advisory System (EIMAS). These layers will be used to **deliver XXX of the XXX Project being implemented by XXX under the XXX Project (time period)**. I understand that the data layers must be used solely for this purpose and that I will be held accountable for any deviation from this. I fully understand and have included a signed copy of the Department of Environment's Data Use Agreement. Thanks you and I appreciate your assistance in this matter.

Kind regards,

Name of Data Requestor

cc: Mr. Jason Williams, Data Manager, Department of Environment (datamanagerenv@gmail.com)

Appendix III. Data User Agreement of the Department of Environment (Draft July 2016).

DEPARTMENT OF ENVIRONMENT – DATA USER AGREEMENT

THIS AGREEMENT is made on the [DATE], BETWEEN THE DEPARTMENT OF ENVIRONMENT (DoE) of the Ministry of Health and the Environment for and on behalf of the GOVERNMENT OF ANTIGUA AND BARBUDA (hereinafter referred to as “the Supplier”) of the ONE PART and [NAME AND ADDRESS OF PARTY REQUESTING DATA] (Hereinafter referred to as “the Recipient”) of the OTHER PART.

RECITALS

Whereas:

- I. The Supplier owns and has in its possession and control certain geospatial data on the island of Antigua (hereinafter referred to as “**the Data**”);
- II. The Supplier requires: (a) all staff employed within the Department of Environment (b) staff from other Government agencies (who are authorized by the Director of the DoE to use the Data or other types of information listed in the First Schedule annexed hereto) and (c) such other persons who require authorization by the Director of the DoE to enter into this User Agreement;
- III. It is the Supplier’s desire that the Recipient shall not sell, duplicate or dispose of (a) the Data or (b) any other type of information which is in the ownership, possession and control of the Supplier to any third party for any personal and/or financial gain of the Recipient;
- IV. The Supplier is willing to authorize the Recipient to use the Data upon the terms hereinafter appearing;
- V. A list of the Data and other types of information (the use of which must be authorized by the Director of the DoE) is annexed hereto as the **First Schedule**.

NOW IT IS HEREBY AGREED AS FOLLOWS:

1. Definitions

- 1.1. “Director” means the Director of the DoE as defined under section 2 of the Environmental Protection and Management Act, 2015 of the Laws of Antigua and Barbuda.
- 1.2. “Information” shall include the Data and other information listed in the First Schedule hereto (which Schedule may be amended from time to time by the Director of DoE) in documentary or electronic form whether before, on or after the date of this Agreement which the Supplier authorizes the Recipient to use.
- 1.3. “Parties” means the Supplier and the Recipient who enter into and execute this Agreement.
- 1.4. “Recipient” means: (a) all staff employed within the Department of Environment (b) any other staff employed by Government agencies who are authorized by the Director of the DoE to use the Data or other information listed in the First Schedule and (c) such other persons who require authorization by the Director of the DoE to use the Data or other information listed in the First Schedule.
- 1.5. “Supplier” means Department Of Environment of the Ministry of Health and the Environment for Antigua and Barbuda.

2. The Information

- 2.1. A list of the Information which requires authorization for its use is contained in the First Schedule.
- 2.2. The Director shall from time to time, whenever necessary, amend the First Schedule of this Agreement to include other types of Information which require authorization for its use by the Recipient.
- 2.3. Where the Director amends the First Schedule she shall within 7 calendar days thereafter supply all Recipients with a copy of the amended First Schedule. The amended First Schedule shall specify the date when the amendment takes effect.

3. Persons Requiring Authorization to use the Information

- 3.1. The following persons will require authorization by the Director to use the information listed in the First Schedule and are deemed Recipients, namely:
- All staff employed within the Department of Environment; and
 - Any other staff employed by Government agencies who are presently authorized or who will require authorization by the Director to use the information.
 - Such other persons who will require authorization by the Director to use the Information and shall be required by the Director to enter into and execute this Agreement.
- 3.2. Authorization to use the Information shall take immediate legal effect after the Recipient has executed this Agreement which shall be prepared in duplicate counterparts for signature by any person who requires authorization.
- 3.3. A recipient shall not have access to the Information unless he has executed this Agreement.

4. Obligations of the Recipient

The Recipient:

- Shall not sell or dispose of (a) the Data or (b) any other types of information listed in the First Schedule to any third party for any personal financial gain of the Recipient. The proceeds of the sale of such Data and/or other type of information will be for the sole use and benefit of the Government of Antigua and Barbuda;
- Shall report to the Director any instance(s) where the Data or other any type of information listed in the First Schedule has been sold by any person contrary to the provisions of clause 4 (i) above.
- Who has breached clause 4 (i) above shall account and reimburse to the Government of Antigua and Barbuda any monies which have been wrongfully obtained by him as a result of a breach of the provisions of clause 4 (i) hereof.

5. Breach by the Recipient

In the event that the Recipient breaches any of the provisions of clause 4 of this Agreement the Supplier may in the case of it's employees take disciplinary action including dismissal and in the case of employees within other Government agencies recommend to the head of the relevant Government agency disciplinary proceedings against the Recipient.

6. Termination

This Agreement shall terminate:

- Where the employment of the Recipient is terminated by his employer;
- At the expiration date of this Agreement where this Agreement is entered into between the parties for a term of limited duration.

7. Miscellaneous Provisions

7.1. Binding Agreement

The provisions of this agreement will be binding and inure to the benefit of the parties hereto and their respective heirs, personal representatives, successors and permitted assigns.

7.2. Severability

In the event any provision of this Agreement is held to be illegal, invalid or unenforceable to any extent, the legality, validity and enforceability of the remainder of this Agreement will not be affected thereby and will remain in full force and effect and will be enforced to the greatest extent permitted by the law.

7.3. Complete Agreement

This Agreement constitutes the complete and exclusive statement of agreement among the parties with respect to the subject matter. This Agreement replaces and supersedes all prior agreements by and among the parties or any of them.

EIMAS Data Management Protocol

7.4. Headings

The headings, titles and subtitles used in this Agreement are for the ease of reference only and shall not control or affect the meaning or construction of any provision hereof.

7.5. Notices

Any notice to be given or to be served upon the parties hereto in connection with this Agreement must be in writing and will be deemed to have been given and received when delivered to the address specified by the part to receive notice. Those notices will be given to a party at the address specified in the Second Schedule hereto. The Supplier and the Recipient may, at any time, by giving five days prior written notice to the other party, designate any other address in substitution of the foregoing address to which that notice will be given.

7.6. Applicable law and jurisdiction

- a. This Agreement shall be construed and enforced under the laws of the State of Antigua and Barbuda.
- b. Any proceedings arising out of or in connection with this Agreement may be brought in any court of competent jurisdiction in the State of Antigua and Barbuda.

7.7. Due Authority

Each of the Supplier and the Recipient certify that the individuals executing this Agreement on their behalf have the due authority to bind the said party.

IN WITNESS WHEREOF, the parties hereto have executed and exchanged this Agreement, which is signed in two original counterparts, one for each party, as of the date written above.

For and on behalf of the **Government of Antigua and Barbuda**

By: Diann Black-Layne

.....

Its: Director of the Department of Environment

Ministry: Department of Environment,

Ministry of Health and the Environment

By: (name of employee or consultant)

Ministry:

First Schedule

List of the Data and other types of information is the ownership, possession and control of the Department of Environment which require authorization for it's use

- Parcel layer
- Hydrographic layer
- Contour Layer
- Village layer
- Aerial photo (2010) 1m res. Layer

Second Schedule

Notices

Department of Environment

Director:

Address:

Tel:

Fax:

Email:

Employee or Consultant

Name:

Ministry:

Residential Address:

Tel:

Email:



CTCN
CLIMATE TECHNOLOGY
CENTRE & NETWORK



Workforce Development Strategy to Address Energy Priority Sectors in Antigua and Barbuda's Nationally Determined Contribution

July 2016

Contents

Introduction	3
1. About the Workforce Development Plan	4
1.1 Scope of the Workforce Strategy	5
1.2 Stakeholder Engagement and Potential Roles for Workforce Development Related Activities	6
1.3 Inclusion of Gender, Local Labor and Under-Represented Groups and Safety and Health Considerations.....	7
2. Antigua and Barbuda’s Clean Energy Workforce Profile	9
2.1 Analysis of Gaps in the Existing Clean Energy Workforce	9
2.2 Expected Workforce Breakdown for Clean Energy Sectors.....	11
3. Background Discussion on Key Opportunities for Expanding the Domestic Workforce	19
3.1 Develop Clean Energy Standards.....	19
3.2 Implement Certification and Credentialing Programs.....	21
3.3 Utilize National and Regional Institutions to Support Implementation	24
3.3.1 Antigua and Barbuda National Training Agency.....	24
3.3.2 Educational Institutions.....	25
3.3.3 Industry-Led Skills Development	27
3.3.4 Additional Outreach and Training Opportunities	28
4. Strategy Implementation	Error! Bookmark not defined.
4.1 Focus Areas	Error! Bookmark not defined.
4.2 Risk Analysis of Key Challenges to Successful Implementation.....	33
4.3 Reporting and Evaluation	34
5. Potential Partner Initiatives	35
Appendix A: Policies and Legislation	37
Appendix B.	39
Appendix C. References	40

Introduction

Following the United Nations Framework Convention on Climate Change (UNFCCC) 21st Paris Conference of the Parties (COP 21), many nations have realized the need for assistance in achieving goals established in Paris and outlined in their Nationally Determined Contributions (NDC). Antigua and Barbuda requested such support from the UNFCCC Climate Technology Centre and Network (CTCN) for developing a workforce strategy to mobilize local labor to implement projects in fulfillment of the country's NDC. The CTCN selected the U.S. Department of Energy's National Renewable Energy Laboratory (NREL) to partner with the Antigua and Barbuda Department of Environment on this endeavor, the key outcomes of which were a stakeholder workshop and this workforce strategy.

The Department of Environment in the Ministry of Health and the Environment is Antigua and Barbuda's national focal point on climate change. This workforce strategy was developed in consultation with Department staff, and NREL conducted an in-country consultation in March 2016 targeting private sector stakeholders in particular. The Technical Advisory Committee (TAC) validated the strategy. The TAC is a multi-stakeholder committee that includes seventeen government departments with responsibilities for environment, waste, energy, water, land management, development, and standards, among others; three non-governmental organizations; and one private sector coalition representative.

Building on the information collected during the stakeholder workshop, the workforce strategy identifies short-, medium-, and long-term actions for Antigua and Barbuda to enhance local capacity to implement priority energy sector projects that can help the country to meet its NDC. The workforce strategy includes the purpose and objectives, a budget for programme development and implementation, and key stakeholders and their roles in implementation. The document also describes the expected workforce breakdown, the baseline skills profile of the islands of Antigua and Barbuda, and anticipated areas of skills shortages. The strategy defines the objectives of the workforce and training activities, as well as actions needed to achieve these objectives. The document then goes on to note potential partner organizations, including regional and international finance and development institutions.

1. About the Workforce Development Plan

To demonstrate support for the adoption of the Paris Agreement and as part of its responsibilities under the Agreement, Antigua and Barbuda developed a Nationally Determined Contribution (NDC)¹ outlining its climate change mitigation and adaptation targets. Targets are:

- Unconditional targets
 - Enhancing the enabling legal, policy, and institutional environment, for a low carbon emission development pathway to achieve poverty reduction and sustainable development, *and*
 - By 2020, updating the building code to meet projected impacts of climate change.
- Conditional mitigation targets
 - By 2020, establishing efficiency standards for the importation of all vehicles and appliances,
 - By 2020, finalizing the technical studies with the intention to construct and operationalize a waste-to-energy (WTE) plant by 2025,
 - By 2030, achieving an energy matrix with 50 megawatts (MW) of electricity from renewable sources, both on and off grid and in the public and private sectors, *and*
 - By 2030, protecting all remaining wetlands and watershed areas with carbon sequestration potential as carbon sinks.
- Conditional adaptation targets
 - By 2025, increasing seawater desalination capacity by 50% above 2015 levels,
 - By 2030, improving and preparing all buildings for extreme climate events, including drought, flooding, and hurricanes,
 - By 2030, meeting 100% of electricity demand in the water sector and other essential services (including health, food storage, and emergency services) through off-grid renewable sources,
 - By 2030, protecting all waterways to reduce the risks of flooding and health impacts
 - By 2030, making available an affordable insurance scheme for farmers, fishers, *and* home and business owners to cope with losses resulting from climate variability.

Antigua and Barbuda is actively working to reach its climate targets through a number of national and sub-regional initiatives and policies. For example, the 2010 National Energy Policy contains goals to reduce energy costs, diversify energy sources, and develop new technologies and sectors. The 2013 Sustainable Energy Action plan builds off of the 2010 policy by providing a comprehensive roadmap for renewable energy and energy efficiency policy development, with recommendations for the creation of certain government institutions, policies, and proposed budgets. The Action Plan also includes an internal government goal to reduce public energy consumption and expenditures by 30% by 2020, and, energy goals to achieve 10% electricity generation from renewables by 2020, 15% by 2030, and a 25% reduction in GHG emissions below 1990 by 2020 [1]. Antigua and Barbuda is also actively working to reach its climate development goals through a number of national initiatives and international partnerships. See Appendix A for further information on relevant policies and programs.

¹ Prior to the 21st COP, these commitments were referred to as Intended Nationally Determined Contributions (INDCs) and post COP, as NDCs. “NDC” is used throughout the workforce development plan for simplicity.

For Antigua and Barbuda to achieve its NDC commitments, a sufficient and appropriately trained workforce must be in place. This workforce will include a variety of personnel who will be needed to contribute different skills to support the high-quality development, construction, and operation of best-fit technologies at reasonable labor rates. Antigua and Barbuda has a strong commitment towards training and developing an appropriate workforce. Training and development is also key to empowering employees with the knowledge and skills required to meet the health, safety and environment standards specified in employment and permitting regulations and encountered when developing clean energy projects. This strategy is designed with the local context in mind, focusing on Antigua and Barbuda's climate and development priorities, while utilizing existing on-island as well as regional institutions. This strategy has been prepared to address particular social opportunities and issues, including:

- Encouraging economic development with increased private sector participation and entrepreneurship in developing new energy projects
- Increasing labor-force participation and local skills capacity, including maximizing employment opportunities for local residents and under-represented groups
- Establishing apprenticeships, scholarships, vocational training, and other programs
- Supporting readiness work programs and pre-trade training concepts
- Identifying necessary enabling activities to promote successful initiatives

1.1 Scope of the Workforce Strategy

Antigua and Barbuda's NDC priority sectors are:

1. Energy, including islanded renewable energy, storage, energy efficiency and audits, and WTE;
2. Buildings and Construction, including climate resilient buildings and infrastructure;
3. Transportation, including setting and enforcing new standards for vehicles; and
4. Finance and Fund Management, including the national Sustainable Island Resource Framework Fund (SIRF Fund)

Per guidance from the Department of Environment and given the emphasis of this strategy on private sector and NGO engagement, the workforce strategy focuses on the energy and buildings sectors with actions in the transportation and finance sectors pertaining more specifically to internal government capacity. Within the energy sector, this strategy centers around opportunities to develop and operate solar photovoltaics (PV), WTE, and wind energy generation projects, as well as improve the resiliency and energy efficiency of buildings via retrofits and new construction.

The workforce strategy involves all workforce and training activities, including those of primary contractors. The actions and activities outlined extend across the construction, operation, and decommissioning phases of clean energy projects. This can also include conducting price assessments, developing viable projects, and maintaining systems. Initial recommendations from Antigua and Barbuda indicate capacity development would target small and medium enterprises (SMEs) and would focus on in-person, learning-by-doing trainings leading to internationally recognized certifications. The trainings would be designed for working professionals with a minimum of a primary education. Given the extensive capacity building requirements, the workforce strategy includes specific activities to facilitate the successful recruitment and retention of an appropriate workforce by optimizing direct and indirect employment opportunities, while managing challenges around the availability of, and competition for, local labor.

Most of the categories of labor could be provided by small and medium enterprises. Labor for engineering, design, construction, inspection, operation and maintenance, distribution and retail services can all be provided by SMEs. Some of the services not likely to be provided by SMEs include financing, insurance, and manufacturing. In our analysis of job creation we consider statistics from Hawaii as a model rather than the mainland United States. Hawaii has much more work performed by SMEs than the mainland, and the jobs are more in these service sectors whereas the mainland workforce also includes manufacturing and other aspects not provided by SMEs.

1.2 Stakeholder Engagement and Potential Roles for Workforce Development Related Activities

Engagement with key local, regional and national stakeholders has been essential to the development of this strategy. Initial stakeholder engagement was conducted during a March 2016 workshop. The CTCN collaborated with the Department of Environment to host an in-country workshop on key clean energy issues relating to the implementation of the country's NDC. NREL and the Department of Environment conducted the workshop at the Department of Environment's offices in St. John's, Antigua from March 21-24, 2016. The workshop included over 20 participants from the public and private sector, with several participating organizations delivering presentations on workforce development, renewable energy, energy efficiency, resiliency and disaster recovery, and private sector engagement (a full list of the organizations consulted can be found in Appendix B). The objective of the workshop was two-fold:

- 1) Facilitate in-country stakeholder meetings to discuss barriers to clean energy technology deployment and opportunities for unlocking investments; and,
- 2) Gather information on domestic market conditions and policies to inform the design of a national and regional workforce training program

Consultations with these and other stakeholders aim to provide a broad and holistic perspective on training and recruitment challenges and opportunities in Antigua and Barbuda. As this workforce training strategy is further refined and adopted, stakeholder engagement should continue in an effort to ensure training programs are appropriate; that local, existing institutions are utilized as much as possible; and that training programs are aligned with national policies and cultural requirements. Various stakeholders may also choose to adopt and implement aspects of this strategy.

There are several government agencies and related organizations that can play leading roles in implementing a workforce training strategy; see Table 1.

Table 1. Potential Lead Implementing Organizations and Responsibilities

Organization	Responsibility
Department of the Environment	Develops national resources management policy including for energy resources; Leads implementation of projects to address national climate development priorities; Sets emissions standards and issues pollution permits
Ministry of Tourism, Economic Development, Investment & Energy	Regulates the APUA, the monopoly utility; Establishes stable interconnection policies which are a prerequisite for industrial activity; Engages with hotels and tourism industry for synergy
Labour Department	Identifies requirements from labor force survey; Issues job announcements
Ministry of Public Utilities, Civil Aviation and Transportation, APUA Electricity Unit	Operates the island energy system and therefore maintains overarching accountability for managing employment and training
National Training Agency	Works with training institutions to set standards and get required training done
APUA	As the upstream originator of many of the projects, ensures workforce recruitment and training conditions and commitments are met for their projects
National Solid Waste Management Authority	Identifies staffing and training requirements for landfill energy projects
Bureau of Standards, Development Control Authority	Identifies required standards for energy efficient and resilient building codes; Establishes codes and zoning policies; Provides training and qualification systems to meet required codes. Examples of existing programs can serve as a guide for A&B as a starting point
Contractors	Identifies the skills required to support projects– Primary contractors are required to develop Workforce Development Plans which: <ul style="list-style-type: none"> • Provide evidence of arranging timely training and qualifications programs to meet the skills development needs of the project • Provide training and qualification systems to meet the requirements of the project • Maximize the inclusion of qualified local people to support all phases of the project
Directorate of Gender Affairs; Community Development Division; Professional Organization for Women in Antigua and Barbuda	Engage local women leaders in designing training opportunities; Conducts outreach; Potentially implements mentorships
Donor and partner organizations	Help identify what specific workforce development activities would best enable Antigua and Barbuda to participate in their programs

1.3 Inclusion of Gender, Local Labor and Under-Represented Groups and Safety and Health Considerations

The workforce requirements to implement Antigua and Barbuda’s NDC are significant, and offer an important economic and development opportunity for residents in Antigua and Barbuda. This is

particularly relevant for the component of the local labor force that is currently unemployed or under-utilized. Of approximately 90,000 total populations, the workforce comprises approximately 30,000, and the unemployment rate is around 11% in 2014 (so roughly 3,300 persons). The unemployment rate among younger workers exceeds 20%. Around 80% are employed in the service economy, which is highly dependent upon the global (US, Canada and Europe mainly) due to tourism [9]. The strategy is to develop a renewable energy and efficiency workforce of approximately 400, which is a significant reduction in the unemployment rate.

The use of local labor facilitates a more stable workforce, and enhances the ability of employees to contribute to other aspects of local community development. Local labor can also help avoid the issues around housing and service demand that are often associated with a non-local workforce. Opportunities for local people are defined in Section 2.2 and will optimize the inclusion of local workers during all phases of the project and in all labor categories from professional to unskilled labor.

In line with equal employment principles, this strategy actively encourages the participation women and under-represented groups in all sectors of the workforce. In general, women are often underrepresented in the energy sector. Additional, oft-under-represented groups include people with disabilities, mature-age workers, and young entry-level workers. Antigua and Barbuda, as it implements its NDC, can build capacity in these groups to facilitate access to the range of opportunities available.

The Men Against Negative Attitudes (MANA) is a prisoner rehabilitation programme that was established in 2014 and aims to build skills and experience of prisoners in order to reduce recidivism rates. The role of the MANA programme in this strategy is to be determined in consultation with the administration of that program, but could be substantial since many of the jobs installing utility-scale measures such as large PV, wind, and WTE do not put workers in unsupervised contact with at-risk persons (e.g., children and the elderly).

This workforce development strategy must comply with all applicable regulations and laws in Antigua and Barbuda. Apart from specific legal requirements there is also the common law requirement of 'duty of care,' which is basic an underlying legal principal of ensuring that personnel are equipped with the necessary resources, including knowledge through training and personal protective equipment or safety precautions, to undertake their work in a productive manner that ensures their safety and safety of others with due consideration to environmental aspects. The workforce development strategy is aligned with these requirements.

The DOE provides employment opportunity for persons with physical, mental and social needs. The building of the Department is designed to facilitate the participation of the persons in wheel chair, there is a staff member with Autism, and DOE provides a trainee program for young offenders leaving prison. The training program will continue to include these persons. There are further opportunities to design a workforce training program to include persons with special needs and these will be vigorously pursued and encouraged in other departments of the Government.

2. Antigua and Barbuda's Clean Energy Workforce Profile

This plan for workforce development plan responds to expected skills that will be required in the energy sector to achieve the climate commitments Antigua and Barbuda established in its NDC, taking into account cost effectiveness and capacity constraints. Antigua and Barbuda has a population of 90,000 and a workforce of 30,000, and its GDP is ECD 3.2 billion (USD 1.2 billion) [9]. This strategy takes a practical approach to workforce development by identifying roles and responsibilities that would be more cost effective to build on a regional level, for example jobs that are only needed intermittently given projected demand.

The profile section outlines the baseline and anticipated growth areas to achieve those goals.

2.1 Analysis of Gaps in the Existing Clean Energy Workforce

Currently, renewable energy businesses are small and still developing in Antigua and Barbuda. In 2015, the renewable energy industry employed approximately 20-40 people. Reportedly, pushback from the utility, APUA, slowed growth.² And, uncertainty in policy and regulations needs to be reduced before the renewable energy industry can expand on the islands.

It is anticipated that most of the jobs related to renewable energy development and efficiency will be small and medium sized private firms, although some countries have also had success with state-owned firms or government agencies directly involved in developing and operating power generation assets. In this study we assume private-sector workforce, but some jobs are intrinsic government functions such as permitting, code development and enforcement, and probably inspections.

An analysis of existing gaps in capacity was conducted based primarily during the March 2016 in-country workshop and field visits. The identified needs for workforce development fall into general categories:

Continuation of clear policy signals that will catalyze market development in solar PV, wind, waste-to-energy, and energy efficient, resilient buildings

There needs to be a steady flow of projects to create a workstream and to avoid boom/bust cycles that could hinder development of the sector [5]. Given the relative nascence of the Antigua and Barbuda clean energy workforce, the government will need to establish clear and transparent market signals that provide investors with sufficient assurance to create new, on-island businesses. This market pull will also drive employment opportunities.

Address key skills

Typical job types that are difficult to fill in emerging economies and small islands with a limited work force include project developers; service technicians; data analysts; electrical, computer, mechanical and construction engineers; solar PV and solar thermal system and wind installers and maintainers; architects, code officials and building inspectors [5]. Additional needs identified in Antigua and Barbuda include energy audit activities for which a job task analysis could be broken down into sales, corporate and project management, field data collection, energy modeler/analyst, financial analyst, cost estimator, writer/communications services, and supervisors. Examples of data analytics include geospatial analysis, electric distribution grid analysis, and data analytics involved in monitoring and maintenance of generation assets for stable and reliable grid operations. Actually implementing the

² Based on discussions at the March 2016 workshop.

results of energy audits requires all of the equipment suppliers and installers involved in the building trades including refrigeration/air-conditioning, building metering and controls, lighting, building wiring/electrical, and water heating among all others. Additional needs include the financiers, bonding and insurance agents and adjusters, system integrators, and project managers to support equipment installers with project development services.

Improve capacity at APUA and develop transferable skills

APUA is concerned about its own need for skills development to integrate larger quantities of renewable energy and the potential for renewable energy projects to put APUA employees out of work. There is a need as well as a lack of funding for workforce training and investment in grid stability to support high penetration levels of renewable energy. For example, the grid will eventually have to transition from passive “droop mode” in response to load changes and eventually transition to a fully capable System Control and Data Acquisition (SCADA) system to maintain constant frequency. APUA staff could be trained in installation and operation of a SCADA system. However, APUA must pay generators for spinning reserve and the expertise is not there, so there is a need for skill development and capacity-building in the costs for these spinning reserves at the power plant within independent power purchaser (IPP) contracts. In other words, plants have to develop the physical (automated) controls and human capacity to modulate power output cost-effectively and contracts have to be structured so that they are compensated for providing spinning reserve and resulting reliability even if they are not selling power (because power is coming from renewable plants elsewhere). Positions that are relevant to skills building in APUA for a clean energy transition include: distribution system engineers, generator plant operators, and controls technicians. Operation of a grid with diversified generation resource would ordinarily require a high level of automation, replacing manual generator operators with expertise in controls and information technology.

Regarding negative impacts on the jobs currently held by APUA staff, we do not expect the number of APUA employees (almost 800 persons) to be reduced. The same number of generator operators, linesmen, and customer service representatives will be required. Rather, we do expect a conversion in the way utility revenues and utility expenses are balanced, with an increase of approximately 20, rather than a decrease in APUA staff. Renewable energy measures and many energy efficiency measures do not generally reduce the amount of electrical generation capacity required, since there are always times when the sun is not shining and wind not blowing. Rather, measures reduce the fuel consumption of those generators. The effect is to transition from exporting money from the island to import energy (oil) to keeping that money on the island to install, operate, maintain, and replace renewable energy and energy efficiency systems.

The cost of most solar and wind measures is roughly 50% equipment and materials and 50% labor, with the latter providing new jobs. In addition to new jobs related to a new utility SCADA system and more advanced utility operations, consideration should also be given to how APUA employees could receive additional training to participate in the development and operations of clean energy projects. Of the 25 solar certified installers to date, XXX% work at APUA. In many areas in the United States, the utility itself is the largest implementer of renewable energy systems and this could be the case in Antigua and Barbuda, with much of the renewable energy in utility-scale plants owned by APUA or an IPP.

Establish certifications and other related requirements, and trainings to meet these needs

Developing a pool of certified staff that can carry out specific work has been identified as a need. The Labour Department identifies requirements from a labor force survey and job openings are a source of

information regarding required training. A more detailed analysis of the gaps in openings and current certifications required in postings could provide more insight into areas for developing capacity.

Once policies and codes are established, a workforce needs to be created to support the implementation and enforcement of those policies and codes. This will require training and certification of professionals in the following areas: architects and designers, the construction industry, operations and maintenance staff, and auditors and enforcement officials. There is also a need for certification of wind installers and operations and maintenance staff, along with a desire for manufacturers to commit to hiring local personnel for these roles. The wind manufacturer Vergnet has done projects in Martinique and Guadalupe and may be able to offer local training, pending development of projects on Antigua and Barbuda.

The training process must include procurement, as developing a competitive bid for requests for proposals (RFPs) is essential for SMEs to access clean energy opportunities.

Build skills of government building managers and auditors to access near-term energy savings

There is an identified need for training of maintenance staff in each government building to diligently pursue practices that reduce energy use as well as deploy and maintain new systems. Trained energy efficiency auditors are also needed to ensure buildings are being constructed or renovated to achieve the nation's energy efficiency and resiliency goals.

Landfill energy: Train on evaluating proposals, and operations and maintenance of current systems

Regarding the current landfill workforce, there is a requirement for more staff to support operations and maintenance (O&M), including preventative and repair measures as well as monitoring. The expectation is that the National Solid Waste Management Authority (NSWMA) would issue a "request for proposals" for a third party to finance, design and construct the plant and recruit local labor to operate it. Jobs would be created at the authority to oversee the contract and manage the on-going financial and logistical relationship between the landfill and the WTE provider. There would be a need for people to write the specific terms and conditions and regulations under which a WTE provider would design and operate the plant. There is also a need to for training to properly evaluate proposals in terms of the technologies, costs, construction plans, operations and maintenance requirements, among other considerations.

Soliciting sponsors and competing for project and program funds from international and regional development and finance institutions

Perhaps one of the most refined skills required is to effectively compete for funding offered by international or bi-lateral relationships. Donor agencies are identified as stakeholders in this plan with the expectation that they can help identify what specific workforce development activities would best enable Antigua and Barbuda to participate in their programs. Skills include the ability to research what the current and emerging funding sources are, identify and prioritize project opportunities on the island, plan projects and estimate costs, and write grants. In addition, a project management specialist can help to package the content into a coherent and effective proposal.

2.2 Expected Workforce Breakdown for Clean Energy Sectors

Based on resource assessments, feasibility studies, and the March 2016 workshop, the following technologies have been prioritized as leading opportunities for Antigua and Barbuda to develop the local workforce, in line with its NDC.

- Renewable Energy Electricity Generation
 - Solar PV
 - Wind
 - Waste-to-Energy
- Energy Efficiency and Resiliency
 - Energy efficiency and resilient retrofits
 - Energy efficiency and resilient new builds
 - Solar hot water

A variety of roles are needed to support the clean energy value chain, including equipment manufacture and distribution, project development, construction and installation, and operations and maintenance [5]. However, given the size of Antigua and Barbuda's economy and available manufacturing inputs, we have not included manufacture and distribution estimates. Much of the employment with clean energy is associated with project development and construction and installation with much smaller numbers needed to support operations and maintenance, although operations and maintenance jobs are likely to last longer for energy generation technologies, i.e., 20 to 30 years or roughly the lifetime of the system [5]. Also, many of the skills needed to support clean energy projects are already utilized for other types of projects; however, workers may require some supplemental skills development specific to clean energy projects [5].

Workforce requirements could be identified in the areas of renewable energy (including solar energy, wind energy, waste-to-energy), building energy efficiency and resiliency, and fuels and transportation system efficiency. Of these, renewable energy has a quantitative NDC goal that can be translated into a quantitative number of jobs. Energy efficiency and transportation will also have training and workforce requirements and these are handled in a quantitative way similar to renewable energy, but without the statistical data from Hawaii that informs the estimated number of jobs for renewable energy. Energy efficiency, distributed PV, and solar water heating require the most labor per unit of benefit delivered, whereas wind energy and transportation energy efficiency relies more on off-island manufacturing and less on labor. Jobs are not calculated for energy efficient new construction since the same amount of labor would be involved, presumably, in not-energy-efficient new construction. The estimates are based on jobs commencing in 2017 and continuing through 2030 when the NDC goals are to be met. Assuming it will take until 2020 to get industry employers established, most of the progress towards the goals and resulting employment will occur over the 10-year period from 2020 to 2030. Thus, we average the labor requirement over 10 years. So if it takes 30 workers to install a 1-MW plant in one year, we tally that here as 3 jobs lasting 10 years. Table 2 outlines the occupational categories of the workforce, as well as the scope of activities required for the project planning, construction and operation.

**Table 2. Number of Workers in the Island Industry (averaged over 10 year deployment period)
Associated with NDC Goals (NREL Estimates, Proximal)**

Position Type	Central PV	Distributed PV	Solar Water Heating	Waste-to-Energy	Energy Efficiency	Transportation	Wind Energy
PRIVATE SECTOR JOBS							
Architect					1		
Asset management							
Battery/Storage Consultant	1	1					
Building inspectors		3	1		6		
Code officials	1	3	1		3	3	1
Codes inspector	1	3	3		3		1
Commissioning agent	1			1	4		1
Communications	1	3	3	1	3	9	1
Construction worker	6	9	9	10	5		5
Cultural heritage consultant	2	1	1				2
Data analyst							
Debt financier representatives	1				1		1
Electrical System Designer	3	9					
Electrician - journeyman	9		1	4	18		3
Electrician - master	3	9		1	9		1
Energy auditor					18		
Environmental consultant/advisors	1			2			2
Environmental engineer	1			3			1
Field construction supervisors	3	1	1	3	9		3
Field construction technicians	9	18	3	5	18		5
Financial consultant/broker	1			1			1
Independent engineer	1			1			1
Information technology (IT) specialist	1	1		1	3	1	1
Inspectors/Certifiers	2	9	3	1	5	9	1
Instrument/Control engineers	1			1	4		1
Instrument/Control technicians	2	3	3	3	5		3

Position Type	Central PV	Distributed PV	Solar Water Heating	Waste-to-Energy	Energy Efficiency	Transportation	Wind Energy
Insurance Agent/Adjuster/Underwriter	2	1		1			1
Laborer	7	9	9	3	3		3
Land use negotiator	1	1			1		1
Lawyers	1	1	1	1	1	1	1
Logistics supervisors	1	1	1	1	1		1

Position Type	Central PV	Distributed PV	Solar Water Heating	Waste-to-Energy	Energy Efficiency	Transportation	Wind Energy
Logistics technicians	2	5	3	3	5		3
Maintenance supervisor	2						
Maintenance technician	6	9	9	9	9		18
Mechanical engineer	2		4	3	9		4
Medium/High voltage grid connection lineman	4	1		3	1		3
Occupational health & safety advisors	1			2			1
Primary contracting staff/contracting officer	2			2			2
Recycling and repurposing material/equipment (life cycle)							
Roofers specializing in solar		9					
Sales/retailers		9	9		9		
Small PV – electrician specializing in solar		9					
Small PV system designer		9					
Solar engineers	2	2	2				
Solar thermal – plumbers specializing in solar			18				
Standards-making facilitator						1	
Structural engineer	2			1			1
Superintendents & supervisors	2	5	2	6	5		3
Utility engineers	1	1		1			1
Waste-to-energy	2			3			

Position Type	Central PV	Distributed PV	Solar Water Heating	Waste-to-Energy	Energy Efficiency	Transportation	Wind Energy
engineer							
Waste collection and processing				19			
Wind engineers							3
GOVERNMENT							
Code Officials	1	1		1	3		1
Electrical Inspectors		3			1		
Environmental Compliance Officers		1		2			2
Cultural Resource Officers	1	1		1			1
Permit Officials (building and electrical)	1	1	1	2	2		1
APUA							
Accountant	1			1			1
Generator Plant Operator	1	1		1			
Distribution Engineer/Planner	1	3		1		1	1
Front Office (interconnect agreement process)		3					
Information Technology	1	1		1			1
TOTAL JOBS EACH YEAR AVERAGED OVER 10 YEAR DEPLOYMENT	105	160	88	105	165	25	88

Renewable Energy

Based on United States' statistics, there are around 25 job-years per MW of installed capacity for solar PV [2]. This is at least loosely consistent with [8] that estimates 32 job-years per MW for installation of PV and 0.4 job years per MW for ongoing maintenance. Reference [8] also addresses other renewable energy technologies such as solar thermal, wind, biomass and efficiency. It is anticipated that much of the 50-MW renewable energy goal for Antigua and Barbuda will be met with solar PV, based on cost, barriers to implementation, and reliability of renewable energy technologies, however significant wind investments are also planned.

Since U.S. nation-wide statistics include manufacturing and centralized services, references in this document are made to employment statistics for Hawaii due to its similarity to Antigua and Barbuda in terms of the types of jobs and the island conditions [2]. In Hawaii, there are higher percentages of companies involved in installations (73%), sales (12%), and project development (7%), than in other categories such as manufacturing [2].

In Antigua and Barbuda, maximizing local sourcing of materials and manufacturing will assist with creation of jobs and improvement of island resilience. Manufacturing of PV or wind equipment on a small scale would be possible in Antigua and Barbuda, however due to cost competitiveness and scale of production from countries like China a large operation would not be economically feasible. Some local assembly and fabrication of some components is to be expected. A range of professional, trades, skilled, semi-skilled, and unskilled jobs will be created during construction and operation of the projects. Distributed PV would result in more jobs than centralized/medium to large-scale PV, both for initial marketing and installation as well as for ongoing operations and maintenance. Wind energy would rely largely on imported equipment but also involve large-scale, on-island construction for tower foundations, access roads, and other infrastructure as well as installation of the equipment. WTE plants also involve a lot of imported equipment and also employ a lot of jobs due to the scale and complexity of the plant and the material handling required to collect and process the fuel. For example a Refuse Derived Fuel (RDF) Processing Facility sized at 200 tons per day of MSW (much larger than what is being considered for Antigua and Barbuda) employed 75 jobs for construction and 30 permanent operation jobs. A Power Generating Station of 10-MW net output (again, larger than the waste stream in Antigua and Barbuda would support) employs 300 construction jobs and 60 permanent operation jobs.

Building Energy Efficiency and Resiliency

Energy efficiency improvements in new and existing buildings require skills to identify, evaluate, design and ultimately to implement energy efficiency measures in buildings. Different types of buildings require different skills, with residential buildings being quite simple and uniform and commercial and industrial buildings being more complicated and varied.

Text Box 1. Induced Employment

Clean energy market development may also result in indirect and induced jobs. These additional jobs are created as services and goods are purchased to develop clean energy projects. However, there are several complexities in analyzing these jobs potentials such as "where employment gains in renewable energy are offset by loss of employment in other energy sectors that offsets part of the increase in consumer spending; labor supply imposes a constraint on the extent to which increased consumer spending can generate employment; investment in renewable energy may displace other forms of investment; and measures taken to promote renewable energy have the potential to impact (whether positively or negatively) on activity elsewhere in the economy." [5] Given these challenges, we suggest further analysis of potential induced and indirect job estimates, if these uncertainties can be addressed.

There are more retrofit opportunities than new buildings because the building stock “turns over” very slowly; with perhaps 10 times as many retrofit opportunities as new builds. New building construction generates a lot of jobs, but we assume here that it takes as many jobs to construct an inefficient building as it does an efficient one, since in new construction it is more a matter of making the best decisions and not a matter of implementing additional measures. “Energy Auditor” may be identified as a separate job title, but it is closely related to electrical and mechanical engineering. It does not, however, require the professional licensure of an engineer. Energy audit services are often provided by unlicensed individuals, but under the supervision of an engineer or specialist. However, it does take a high level of experience or insight to walk into a mechanical room or to examine a computer control system and see what improvements may be made. Training can help prepare energy auditors, but there is no substitute for experience and the best auditors have a long background in system installation or operation and maintenance. An auditor identifies, measures and evaluates them in terms of technical feasibility and cost-effectiveness.

Once an auditor identifies measures, a designer is engaged to specify the size and type of replacement components and detail how the measure will be implemented in construction drawings and specifications. The design is often let for bid and the project implemented by building trades such as electrical, mechanical, lighting, refrigeration/air conditioning/ and control system contractors. A commissioning agent may be engaged to ensure that the retrofit system is operating according to the intent of the design. Due to the fact that opportunities are distributed within buildings, and varied and detailed in nature, it requires a lot of labor to deliver benefits compared to central renewable energy plants, but the benefits are robust and permanent. The best kWh is a kWh not used, and efficiency is recognized as a prerequisite to sizing renewable energy systems. Renewable energy and the appropriate controls and system designs are also needed to meet the goals.

3. Key Opportunities for Expanding the Domestic Workforce

To develop and foster skills required for achieving goals established in the NDC, key focus areas have been identified to guide the implementation of the workforce development strategy nationally. The strategy has been laid out by identifying standards and credentials needed, which training institutions can build knowledge within the workforce, and how these employment opportunities can be communicated more broadly.

3.1 Develop Clean Energy Standards

Developing standards is the first step to outlining the goals established in Antigua and Barbuda's NDC. These standards will help the nation achieve those goals and assist the training organizations to identify areas where the workforce needs to continue to develop. Examples of the standards to be developed are broken out by the NDC goals related to energy efficient and resilient building codes, renewable energy, and diversifying fuel to reduce the dependency on imported fossil fuels. The energy specific goals in the NDC are:

- Updating the building code to meet projected impacts of climate change by 2020;
- A low carbon emission development pathway to achieve poverty reduction and sustainable development;
- By 2020, establishing efficiency standards for the importation of all vehicles and appliances;
- By 2020, finalizing the technical studies with the intention to construct and operationalize a WTE plant by 2025; *and*
- By 2030, achieving an energy matrix with 50 MW of electricity from renewable energy sources, both on and off grid and in the public and private sectors

These standards and policies will assist Antigua and Barbuda with achieving goals of gaining energy independence away from imported fuels, diversifying the energy mix away from fossil fuels, and lowering energy costs by increasing competition among energy providers and utilizing lower cost resources, including renewable energy. Once standards are established, the workforce will need to be trained on the techniques and principles in the standards in order to implement change.

Building Codes

Energy efficient and resilient building technologies are deployed as a result of public policy. This is even the case when the cost of energy efficiency measures may not be significantly more expensive than traditional methods or when investments in energy efficient technologies result in energy savings [6].

Text Box 2. Case Study on Jamaica

Jamaica has developed an energy code for commercial buildings and major retrofits using the ASHRAE standard 90.1-1989, plus elements of several other energy codes. Many key requirements of the Jamaica code are more stringent than ASHRAE 90.1-1989 and the code is projected cost-effectively to reduce energy use by 30% or more, as compared with current practice. Yet the code's format stresses brevity and simplicity, resulting from experience in several countries in the Association of Southeast Asian Nations (ASEAN). Jamaica's implementation of the codes stressed in-country skill building and is producing changes in building design practices. Jamaican professionals developed workshops, compliance guidelines, energy and economic analyses, and compliance checks on building designs to ensure compliance with codes.

A study conducted by the U.S. National Institute of Building Science in 2005 determined that the return on the incremental investment in resilience pays off over the life of the building. The study concludes that for every \$1 spent on hazard mitigation, an average of \$4 is saved during the disaster recovery phase. This metric has been applied to multiple situations and is broadly used by U.S. agencies addressing resilience. Not only is updating building codes in Antigua and Barbuda’s NDC, but it will likely lead to fewer costs associated with disaster recovery with anticipated severe weather (e.g., increased hurricanes and severity of storm surges, etc.). “Under circumstances where many countries, faced with elevated levels of unemployment, wish to stimulate activity that creates more decent employment, many have found that encouraging the retrofitting of existing building to reduce carbon emissions makes an effective and significant contribution to this goal” [6].

It is recommended that climate change considerations be incorporated into building codes along with energy efficiency requirements, which will also help with sustainable development and lower poverty levels associated with energy bills and recovering from severe climate-related events.

Antigua and Barbuda plans to use building code guidelines from the Organization of Eastern Caribbean States (OECS) as a basis for revising the building code, and will adapt the code to local circumstances. For example, setback zone guidelines are established in the coastal setbacks policy to protect buildings from sea level rise and increasing storm surges, elevated structures may be needed in certain areas to protect from the same threats, and requiring installation of attached features, such as roofing materials or solar PV panels to a Hurricane 5 level may be needed. Antigua and Barbuda will need to identify the risks, identify the technical measures to reduce the impacts associated with those risks, and also integrate energy requirements at the same time. The Environmental Protection and Management Act of 2015 includes in Part VI “Environmental Management and Monitoring”, in Section 39, which provides for Environmental Management Systems (EMS). The Department of Environment submitted a request in February 2016 to the Bureau of Standards for adopting ISO 14001 Environmental Management Systems.

Text Box 3. Case Study on Bahamas Hotel Industry [7]

In addition to energy standards, governments can work with industry to implement initiatives to spur market development and job creation. The Caribbean Hotel Energy Efficiency and Renewable energy Action-Advanced Program (CHENACT-AP) may serve as an example of best practices to replicate in Antigua and Barbuda.

The objective of the CHENACT-AP, is to improve energy efficiency, renewable energy, and micro-generation. The first phase of the program involves energy audits and participating hotels and recommendations on how to improve energy savings. The energy audits are transformed into financial proposals to obtain funding for implementation.

Energy-related costs represent 15 to 20 percent of a hotel’s operating budget, so the project intends to bundle carbon emission reductions from participating countries.

Energy efficient and resilient building codes will address the following considerations:

- For new buildings, siting to reduce impact from climate related threats (e.g., setback from shore, no more than two stories tall, etc.)
- Passive survivability techniques to reduce energy consumption and allow the building to be occupied without power (e.g., natural daylighting, natural ventilation, rainwater collection, etc.)

- Energy and water storage on site to allow for continued operation without utility services (e.g., solar PV with islanding controls and battery storage, cistern collectors with graywater systems, etc.)

Rolling out codes in a way to target critical infrastructure, such as schools, hospitals/medical clinics, evacuation centers, fire stations, and police stations first will help communities be more resilient during natural disasters. Focusing on residential and commercial buildings after critical infrastructure will help to lower energy costs within those sectors, as well as make them more resilient. Codes should address new construction and renovations. Examples of codes can be found for the region and specific sectors, as well as studies on the topic of passive design codes for specific climates.

With respect to compliance with the EMS, Part XI – Financial Provisions of the Environment Act establishes through the SIRF Fund an incentive-based approach, where government offices, the private sector, and non-governmental organizations can access funds from the SIRF Fund in order to meet their EMS and environmental plans, demonstrated efforts to comply with the EMS will be a prerequisite to accessing SIRF Funds over time.

Renewable Energy Standards

Antigua and Barbuda will adopt standards promulgated by standards-making organizations such as the International Electrotechnical Commission (IEC) rather than develop standards specific to Antigua and Barbuda. Harmonizing standards with existing international standards will smooth implementation and result in a lower cost to meet the NDC goals. A detailed description of standards is beyond the scope of this report, but they may be grouped into categories related to equipment performance, safety, implementation practices, and maintenance. Standards provide uniform definitions of terms and ways of performing calculations and procedures that smooth transactions between parties (financiers; engineering, procurement, construction firms; owners, etc.).

Vehicle Efficiency and Emissions Standards

Antigua and Barbuda will adopt international (European or United States) standards related to vehicle efficiency and emissions. The vehicle market is global and it would not be feasible for manufacturers to deviate from these standards for small markets. Still, within the definitions and procedures established by such standards, Antigua and Barbuda could specify the highest level of efficiency, resulting in significant reduction in fuel imports and emissions. While mainly an issue of off-island manufacturing, some jobs would be created to research, select, and advocate for adopted standards; to educate suppliers and the consumer public on standards; and to enforce standards through customs or inspection stations. It is not clear whether electrification of vehicles would result in more jobs or different jobs for vehicle maintenance. Electric drivetrains require less maintenance than gasoline or diesel because they electric vehicles do not have air filters, fuel filters, oil filters, oil to change, etc. and have much fewer moving parts. Batteries do require replacement, however. The training required for electric vehicles would be similar to, and delivered, in the same way that training is provided through certified dealer networks for conventional vehicles.

3.2 Implement Certification and Credentialing Programs

Creating systems for trained workforce to obtain certifications and credentials will be essential to establishing a quality clean-energy workforce. For example, there is a certification for PV installers in Antigua and Barbuda by APUA, but there is also a need for certification for wind installers; licensed architects with energy efficiency and resiliency design skills; and for O&M service providers for PV, wind

energy systems, and energy efficient systems in buildings. Certification offers assurance that those who have been certified have met standards and qualifications. Because developing certification programs can be a complex and time-consuming process, requires administration, enforcement and review to maintain quality and validity, Antigua and Barbuda may choose to require certifications from existing programs rather than create its own credentialing department. Examples of certification programmes that currently exist elsewhere, which could serve as models or be used as robust certification programs within Antigua and Barbuda, are summarized below:

Renewable Energy

The North American Board of Certified Energy Practitioners (NABCEP) offers professional certification and accreditation programs to renewable energy professionals. Raising industry standards and promoting consumer confidence has put NABCEP at the forefront for PV and solar thermal certifications.

- NABCEP PV Technical Sales: <http://www.nabcep.org/certification/pv-technical-sales-certification>
- NABCEP PV Installation Professional: <http://www.nabcep.org/certification/pv-installer-certification>
- NABCEP Solar Heating Installer Certification: <http://www.nabcep.org/certification/solar-thermal-installer-certification>
- NABCEP Small Wind Installer Certification: <http://www.nabcep.org/certification/small-wind>

Performance Excellence in Energy Renewal (PEER) is a comprehensive, data-driven system for evaluating power system performance. PEER is a dynamic, adaptive rating process designed to measure and improve sustainable power system performance, giving power grids an opportunity to gain competitive advantage by differentiating performance and documenting the value produced. PEER is designed to change the way power systems are regulated, designed and operated, including reliability and resiliency. The resilience category focuses on ensuring reliable delivery of electricity and reducing interruptions and power quality issues, addressing supply availability, risk mitigation, redundancy and microgrid capabilities. Another category addresses energy efficiency and environmental considerations, including adoption of clean and efficient energy, efficiency of power delivery, resource use, renewable energy credits, etc. <http://peer.gbci.org/>

Buildings

The U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) programme is a certification program for assessors and buildings from homes to offices and neighborhoods. LEED certification requires buildings to earn points across various sustainability areas including energy, waste, water and transportation. Buildings are scored to achieve four separate rating levels: Certified, Silver, Gold and Platinum. According to the USGBC, "LEED-certified buildings are resource efficient" and "use less water and energy and reduce greenhouse gas emissions". Because LEED has various rating systems a good place to start is the Selection Guidance page on the USGBC website: <http://www.usgbc.org/articles/rating-system-selection-guidance>

Sustainable Sites Initiative (SITES®) is a program based on the understanding that land is a crucial component of the built environment and can be planned, designed, developed, and maintained to protect and enhance the benefits we derive from healthy functioning landscapes. SITES provides tools for land development and management practices, can address concerns such as climate change, loss of biodiversity, and resource depletion. The SITES Rating System can apply to development projects located on sites with or without buildings, including: open spaces, streetscapes and plazas, commercial,

residential, educational/institutional, infrastructure, government, military and industrial locations.
<https://sitesonline.usgbc.org/>

EDGE is a green building certification system for new residential and commercial buildings that enables design teams and project owners to assess the most cost effective ways to incorporate energy and water saving options into their buildings. EDGE certification is available in nearly 120 countries, and as a project from the International Finance Corporation (IFC), EDGE is intended to be an easy-to-use mass market transformation tool. It empowers developers and builders to quickly evaluate and compare estimated costs for design strategies targeting reductions in energy use, water use, and embodied energy in materials. Cost effective strategies integrated into the project design are verified by an EDGE Auditor. The drivers are financial, but the results are focused on environmental considerations to mitigate climate change through resource-efficient development. <https://edge.gbci.org/>

This list serves as a starting point for consideration of certification programs. An opportunity for individuals to demonstrate competency in a specialty area, not typically covering a full job description, can be obtained through ‘micro-credentialing.’ Candidates may or may not be in the core profession, but some portion of their job might call for a specific set of knowledge and skills associated with that core profession to be performed competently and safely. For example, allied industry workers whose job tasks intersect with energy audits, solar PV, or other clean energy systems on certain projects could benefit from credentialing opportunities based on an analysis of specific subsets of clean energy-related skills and knowledge. Examples of allied industries include code officials and inspectors, real estate appraisers, first responders, electrical engineers, project managers, and architects. Micro-credentials can also apply to practitioners who wish to add defined specialties to existing certifications, or to reach a higher credentialed status through stackable credentials. Specialized clean energy micro-credentials could, for example, cover select topics from areas such as energy storage, energy management, operations and maintenance, and data acquisition. It will be essential for Antigua and Barbuda to identify who will be responsible for credentialing or confirming off-island credentials. This could be a responsibility of the National Training Agency or a separate organization.

3.3 Utilize National and Regional Institutions to Support Implementation

Antigua and Barbuda has a strong national institutional capacity to implement clean energy workforce development training and educational activities as well as access to a regional university system, the University of the West Indies. Making extended training and higher educational opportunities for clean energy skills available is key, as clean energy jobs generally require higher-level qualifications of workers than the average qualification level of the overall workforce [5]. The upside is that higher qualifications should also result in higher wages. And while there are some hazardous tasks required, especially those pertaining to project and building construction, many clean energy jobs can provide for safe and healthy occupations. At the same time, there are also a number of low-skilled and semi-skilled clean energy jobs. But these jobs may provide for more opportunities to move up the occupational ladder, as compared with other low-skills jobs [5].

Many skills can be delivered through specialized as well as cross-disciplinary trainings that are offered through educational and training institutions as well as by companies. Trainings can be provided not only to upcoming or current students, but also to new graduates of less specialized courses as well as those who are already in the workforce [5]. This can include trainings to provide professionals with “add-on” skills, such as “eco-smart” electricians who can install solar panels, efficient lighting, efficient pumps, and other technologies or “eco-plumbers” who have capacity to implement greywater systems, solar hot water systems, rainwater capture, and heating efficiency [6].

Building the capacity of local labor can not only result in additional employment opportunities but also help ensure that Antigua and Barbuda meets its NDC targets through the implementation of high quality projects that achieve the intended energy savings, emissions reductions, and other goals. This may be especially pertinent to economies like Antigua and Barbuda’s where there is a large, informal construction industry and a need to improve general construction skills [6].

3.3.1 Antigua and Barbuda National Training Agency

The Antigua and Barbuda National Training Agency is central to workforce development. The agency establishes, promotes and maintains national occupational standards, establishes an awarding body for National Vocational Qualifications (ABNVQ), and facilitates the implementation of modern apprenticeship through ABNVQs. The functions of the Agency are to:

- a) Promote and coordinate technical and vocational training;
- b) Develop and maintain a national training policy;
- c) Advise on matters related to technical vocational education and training;
- d) Manage a national technical and vocational training system to ensure an adequate supply of trained employees for national development;
- e) Maintain, operate and regulate a system of apprenticeship and traineeship;
- f) Establish and maintain standards in technical vocational education and training;
- g) Ensure that appropriate training courses and places, syllabi, schedules and programs are available in technical or vocational training centers, in industrial, commercial and public sectors, in state enterprises, private establishments and in other places of employment, education or training to meet the needs of the country and of the population;
- h) Develop and maintain a register of national training facilities and resources, national dictionary of occupations, including self-employment, skill profiles for existing and projected occupational opportunities, learning and training materials such as training manuals, information booklets,

learning packages, self-learning packages and audio-visual packages, information on the supply and availability of various skills and on the skills requirements of various trades, industries and technologies;

- i) Define the qualifications system to ensure that no confusion exists regarding qualifications;
- j) Set up a new system of certification (ABNVQs) in a national qualifications framework and cooperate with counterparts at the CARICOM level to set up a regional system of certification (CVQs);
- k) Develop occupational standards based on industry requirements;
- l) Promote a culture of lifelong learning;
- m) Engage in the other activities that the Board determines in consultation the relevant government agencies and bodies.

Antigua and Barbuda also has an Engineering Board that has been reconstituted with the intention of registering architects and involving contractor associations. Certifications range from levels 1 to 5 with level 5 being the highest (professional), 4 being power professionals, and so on. The National Training Agency can cover level 1; the State College can cover level 3; however, a gap has been identified at level 2. Antigua Institute of Continuing Education and State College may be source of level 2 training. CARICOM and the Caribbean Association of National Training Agencies (CANTA) must review and approve certifications programs, and accredit training institutions.³ Only those with a Certificate of Vocational Qualification (CVQ) are recognized as qualified between islands in the region. “Lead bodies” consisting of private contractors and associations of industry develop standards. Specific industries, such as hotels, can train staff, but the curriculum must be approved by the Ministry of Labour to be considered as accepted. The Ministry of Labour also has members on the board of the National Training Agency to coordinate various processes. There is an Occupational Standards Officer and a Quality Assurance Officer who supports this coordination.

3.3.2 Educational Institutions

The ability Antigua and Barbuda to meet its workforce needs for this effort relies on the implementation of a comprehensive training and development strategy, including coordination with public schools, colleges, and universities. The delivery of relevant coursework in these institutions is essential to supporting the recruitment of an appropriate workforce for the energy project, given the specialized nature and large scale of activities to be undertaken. Although the Antigua and Barbuda Institute of Technology and Antigua Barbuda Training Institute have focused on computer skills, they offer a good model regarding workforce development that could be applied to building out energy efficiency and renewable energy capacity.

From a broader perspective, training and development programs would support community development and build on-island social capital. This aligns with a key objective of this plan to “improve the skills base of people in Antigua and Barbuda through education and training strategies.”

Specific programs and initiatives are outlined below that could be implemented to promote training and up-skilling of the workforce over time.

Secondary Education

Schools are the first opportunity to pique students’ interest in careers related to efficiency and renewable energy, as well as educate tomorrow’s consumers. In schools, there is a challenge to get

³ <http://cantaonline.org/>

synchronized with the curriculum and make sure relevant topics are covered when they appear in the curriculum. There are 40 schools in Antigua and Barbuda, which include high schools with vocational training programs. Secondary education is also a good opportunity to encourage girls' participation in science, technology, engineering, and math courses, which could help prepare them for higher-skill clean energy jobs.

Course example: Introduction to clean energy technologies in science course; Clean energy themes includes in science fairs; Upper secondary vocational education as a renewable energy technician specializing in solar systems [5]

Vocational Training

A good example of what the National Training Institute can accomplish was a recent air conditioning and refrigeration training that came through National Training Institute. New refrigerants are very flammable and hazardous and training was needed regarding occupational safety and health. The refrigeration association was part of coalition sitting on the committee that developed, organized, and delivered the required training. The National Training Institute is also considering standards for energy management (technical capabilities), but this would require the support of executive leadership to move forward.

Course example: Installation and maintenance of wind farms; Installation and maintenance of solar PV; Building analysis for auditors or residential buildings including training on building science fundamental, analysis of diagnostic equipment, and assessment of building tightness; Building envelope specialist training including building analysis course, health and safety, indoor air quality, and advanced blower door applications and other topics [5,6]

2-Year Community College

The State College of Antigua and Barbuda has an Engineering Department. Usually students first do two years of study at the State college and then go to University of West Indies in Jamaica, Trinidad and Tobago, or Barbados. There is an opportunity to provide scholarships to students to go on to the University of the West Indies to get degrees that are pertinent to clean energy with some requirement or encouragement to return to Antigua and Barbuda to contribute to the local job force. The Antigua State College could also offer energy auditor training, similar to the Industrial Assessment Centers in the United States that send students to collect information and prepare energy audit reports under the supervision of qualified faculty.

Course examples: Two-year energy auditor training; Green building certification; Renewable energy systems sales; Small project design and development

4-Year Undergraduate and Graduate Studies

The University of the West Indies has campuses in Barbados, Trinidad, and Jamaica, and it maintains extramural departments on several other islands, including Antigua and Barbuda. After completing two years at the Antigua and Barbuda State College, students can complete a two-year degree program at this university. Or they can initiate a 4-year degree at a West Indies campus. Those seeking higher education and professional studies also travel to schools in Cuba, the United Kingdom, the United States, Europe and Canada. These courses can build off of existing curricula, such as engineering, geosciences, law, business, information technology, social sciences, architecture, etc. [5]

Course examples: Mechanical, energy, and environmental engineering, with a major in energy conservation, renewable energy, or green building [5]; Green building engineers; Energy management;

Environment design courses required or offered as part of architectural design studies; Electives on sustainable construction and thermal performance of buildings [6]

3.3.3 Industry-Led Skills Development

APUA conducts training in-house, in-plant. Renewable energy industries may also provide or facilitate skills development, including via internships and apprenticeships. The Antigua and Barbuda government could also consider sponsoring students to study abroad to develop technical know-how via internships, apprenticeships, and other training programs [5]. All of these opportunities are a chance to not only engage women as trainees, but also as trainers and mentors.

Internships

Paid and unpaid internships can be helpful at many stages of a career, especially for sectors that are young in Antigua and Barbuda where foreign consultants have a competitive advantage. Most internships are geared towards students in a formal education program, but many internships also accept focused people with relevant background and interests. Internships provide: experience working in different environments before graduating, the opportunity to get to know how to work in a company or agency before accepting a job there, and the chance to make contacts that may be helpful throughout a career.

Securing an internship is not as difficult or expensive as a university degree or finding a permanent job, as many companies are eager to engage interested and motivated people in their field. Internships can be arranged by lists or on-line searches, but the best approach is to network by “word of mouth.” Applicants can search individual company websites for internship opportunities, as most are listed on company job search pages and contain a category for internships. Large companies offer more opportunities than small companies, and are more likely to have formal internship programs. The small businesses more typical of Antigua and Barbuda would rely more on networks of contacts. Such contacts include teachers and training instructors who can point to specific companies with intern programs. Government agencies such as the Antigua and Barbuda National Training Agency (ABNTA)⁴ can also help match internships to interested parties. Even if there are not specific programs tailored for renewable energy, a sponsoring agency can include clean energy topics. Non-profit agencies are more likely to offer technical internship programs. A national coordinator such as ABNTA could work with businesses, educational institutions, and training programs in Antigua and Barbuda to create internship opportunities in the clean energy sector.

With robust industry support, students will get applied learning experiences to enrich their formal classroom learning. People will migrate if they do not find training opportunities, so one idea is to seek internship opportunities abroad. This will not only provide a good technical experience but provide an exposure to newer technologies and approaches.

Text Box 4. E-Learning Initiatives

Certain skill sets may be provided wholly or part through on-line training. This may especially be the case for continuing education and maintaining previously acquired certifications.

However, there are skill sets to which online training is not well suited. Examples include any type of training that requires hands-on learning, such as technology installation and site assessment. Also, online learning may not be ideal as the sole medium for more intensive workforce development programs, e.g., two-year programs and those provided by colleges and universities.

⁴ <http://www.caribbeanjobs.com/National-Training-Agency-Jobs-193.aspx>

Apprenticeships

The Antigua and Barbuda government has a role in regulating apprenticeship programs to ensure they adequately prepare apprentices to practice. An apprenticeship is an occupational training that is required to progress through a licensure regime, for example, from apprentice to journeyman to master electrician. Apprenticeships combine supervised on-the-job training experience with classroom instruction. Apprentices usually begin at half the salary of journey workers (those who have completed their training and have industry certification). Apprentices receive pay increases as they learn to perform more complex tasks. When they become licensed, they increase their chances of finding a well-paying job in industry. Apprenticeship committees, made up of employee and employer representatives from the specific industries, operate apprenticeship programs. Typically, apprenticeships last two to five years, depending on these requirements imposed by industry and government regulators. Apprentices must attend related classroom training along with gaining on-the-job-training experience. Most programs require approximately 12 hours of classroom training per month. The industry/government committee determines the related training requirements according to industry standards. Apprentices might earn credit towards a degree (e.g., an associate degrees at the Antigua State College) for classroom hours or for the completion of a properly regulated apprenticeship program.

Examples: Green building construction and maintenance [6]

Professional Development, Continuing Education, and Other In-Company Training

Companies may find it necessary and a benefit to their employees to provide professional development trainings to ensure that staff remain current in their understanding of clean energy technologies and related standards and policies. Even outside of the company environment, experienced clean energy personnel may find it necessary or an opportunity to participate in additional training, either to maintain current levels of certifications or to potentially be able to access other types of employment given the acquisition of additional skillsets. Professional development and continuing education courses vary in content and length but are often short [6]. Some trainings may be provided by outside organizations, whereas large companies (e.g., multinational resorts) may offer in-house capacity building. [6] This includes technologies providers, such as those that supply green building products, wind turbines, etc., which may provide training as part of their business model, enabling access to local skilled labor.

Example: Short courses for architects on energy efficient, resilient buildings [6]

3.3.4 Additional Outreach and Training Opportunities

Antigua and Barbuda may also want to consider additional opportunities for supporting workforce development and broader outreach, such as community initiatives, creating a regional center or excellence, as well as frequent and wide-reaching job vacancy announcements.

Community Outreach

Community-based programs might be the first exposure to energy efficiency and renewable energy for people that pursue careers in those fields, as well as the primary way in which consumers of these services and technologies become aware. These programs are important, as a “lack of sufficient knowledge about energy efficiency and retrofitting by many household and building owners is a significant factor limiting investment in retrofitting projects...and is a factor in decisions about incorporating energy efficiency, water efficiency, and other sustainability features in the design of new buildings...” [6]. One idea that was raised during the March 2016 workshop was to utilize advertisement space in bus shelters to promote clean energy messages. This could be one of several valuable and lower-cost opportunities to spread the word on clean energy interventions, with others including use of

radio and television spots. Another opportunity identified during the 2016 workshop was to do a train-the-trainer program for community organizers who could then conduct information sessions on “low-hanging fruit” ways to reduce energy costs and improve sustainability in the home and in the community.

Example: Information campaigns, conferences, publications, and web sites” [6]

Regional Center of Excellence

There is an opportunity for an institution to be a regional leader in energy efficiency, resiliency and renewable energy training. Such a “center of expertise” could attract students from other islands and abroad; work with the Antigua State College; merge tourism and education and research; and be similar to schools of medicine and archeology on Antigua and Barbuda. The Antigua and Barbuda Institute of Technology was trying to do something similar with computer technology. Medical schools succeed because the high value of the medical education justifies the travel costs, and they are private for-profit enterprises and have more autonomy. Antigua and Barbuda, if it develops a strong skills-based clean energy sector, could export this expertise to other OECS islands.

Announcing Job Opportunities and Fair Procurement Procedures

To successfully realize the objectives of this strategy, it is important to provide full and fair access to information on job and training opportunities. Mechanisms to communicate opportunities, and explain the processes involved in expressing an interest in these opportunities include:

- Word of mouth/referral
- Job fairs
- Print advertising/newspaper help wanted ads
- Workforce investment board referrals
- Social media tools such as LinkedIn, Twitter, or Facebook
- College/school recruitment
- Online job postings such as Monster.com, HelpWanted.com, KnowYourPros.com, CallForProposals.com
- Industry employment websites/advertisements
- Local job expos

Of these, “Word of mouth/referral” is by far the most effective. Solar firms do not rely heavily on traditional methods of recruitment. Instead, solar firms strongly prefer word of mouth and referrals to fill vacant positions. Other leading means of recruitment are online job postings and seeking out talent through educational institutions.

The Labour Department is a key resource. It is implementing registry of unemployed and job opportunities to match job seekers to vacancies. The registry was revamped in 2014, the Department is building relationships with employers, and the Department has a Facebook page and an interactive website to advertise vacancies.

4. Strategy Implementation

This section identifies specific focus areas, action plan, risks, and possible evaluation and reporting requirements.

4.1 Focus Areas

Table 3. shows where strategic partnerships with government, industry and community stakeholders could be formed to leverage workforce development initiatives. The focus areas for this strategy have been designed to incorporate short-, medium- and long-term activities that focus on various sectors of the community and training providers. Short term is typically activities that can be accomplished within one year, while medium term ranges between two and three years and long-term is anything over three years. This approach aims to support a diverse workforce, which is sustainable over the long term.

Table 3. Action Plan for Workforce Strategy Implementation

Timeframe	Action Item	Responsible Party and Deadline
Short term	Identify labor market needs The Antigua and Barbuda National Training Agency (ABNTA) will conduct a gap analysis through a survey and interviews to identify a) relevant workforce training providers and b) highlight the gap between the skills that trainees already possess and those needed to be marketable to clean energy employers. This analysis is similar to what has been done for other topic areas, such as the hospitality sector and the results of the study will inform workforce strategies moving forward.	Antigua and Barbuda National Training Agency By January 2017
	Create an agency to issue high-quality standards and manage credentialing An agency will be created to conduct a number of activities, such as a) develop a list of required credentials involving objective and transparent assessments according to well-developed sets of criteria, requirements, and standards, to ensure not only safety and quality in the workforce, but also, the industry's long-term success. (Examples of existing credentialing bodies provided in Section 3.2); b) manage the certification process confirming on- and off-island credentials; c) Identify 'micro-credentialing' opportunities; d) incorporate accreditation standards into workforce development efforts so training program providers can be assured that their students will gain the skills and training that they require to succeed, and employees know what they are getting when they hire a credentialed worker.	WHO SHOULD DO THIS? By January 2017

	<p>Implement stable utility interconnection policies</p> <p>Use examples of stable utility interconnection policies as examples and revise for Antigua and Barbuda. The clean energy industry benefits from policies and incentives that accelerate growth and help bring the industry to scale. Employers cite unstable or hostile interconnect policies as the main impediment and customs incentives as the main driver of industry and employment growth.</p> <p>Develop high-skills training programs</p> <p>Training providers will create curriculum to train the workforce, or identify trainings that are required off-island to be certified. Options for integration into A&B’s education system are through comprehensive entry-level programs through technical high schools, community-based organizations, and community colleges that prepare lower-skilled workers to move into more highly skilled occupations. Training should be compiled for a) installation, b) the procurement process (e.g., how to create a competitive bid in response to requests for proposals), c) operations and maintenance of systems. Through this program a “match-making” approach should be implemented for apprenticeships/internships and interested parties.</p>	<p>WHO SHOULD DO THIS? By January 2017</p> <p>WHO SHOULD DO THIS? By September 2017</p>
<p>Medium term</p>	<p>Provide clear, transparent, and adjustable policies</p> <p>Policymakers and decision makers will collaborate to make a multi-year, staged policy strategy that provides near-term incentive for market development without risking environmental considerations. Policies should address clean energy, energy efficiency, sustainable development and resilient buildings.</p>	<p>WHO SHOULD DO THIS? By January 2018</p>
<p>Long term</p>	<p>Integrate renewable energy, energy efficiency, and resilient building curricula into traditional mainstream coursework</p> <p>Curriculum writers will work with training providers and educators to include clean energy skills along with other training programs and help ensure that program graduates are diverse enough to be successful in numerous clean energy fields, educating a generation of clean energy consumers utilizing the public education system.</p>	<p>WHO SHOULD DO THIS? By January 2017</p>

Industry directly supports high-quality training

The A&B government will engage industry through “advisory boards” at institutions; through donating time and equipment for practical educational experiences; and by providing field trips and sharing information.

WHO SHOULD DO THIS?
By December 2017

Financial support for trainees

A&B will create a revolving loan fund, capitalized through industry contributions, creating a mechanism for supporting clean energy projects and workforce development into the future. Financial support (e.g., scholarships and loans) could solve the potential problem of workers not being able to afford training until they get a job, but needing qualifications to get a job.

WHO SHOULD DO THIS?
By January 2018

4.2 Risk Analysis of Key Challenges to Successful Implementation

In consideration of the skills context of Antigua and Barbuda, a risk assessment determines the key challenges and focus areas for the workforce development strategy. Table 4 includes risks/challenges that have been identified, and that serve as drivers for the development of appropriate and responsive programs and strategies.

Table 4. Risk Types and Descriptions

Risk	Description
Labor supply	Shortfalls in labor supply can occur when there is a sharp increase in demand or a lack of interest such jobs [5]. Because clean energy jobs are based around projects, market booms and busts can significantly impact employment levels.
Workforce competency	<p>There is a risk that the workforce is not competent to meet industry requirements without structured learning. Most employers experience some difficulty in recruiting qualified employees, which impacts workforce competency. Main reasons cited for worker application deficiency include [2]:</p> <ul style="list-style-type: none"> • Not enough applicants with required technical experience • Competition from other companies • Applicants demonstrated poor work ethic • Lack of networking or other opportunities to meet prospective applicants • Not enough applicants with required education • Applicants had deficiencies with communications, problem solving, or analytical abilities. <p>A lack in appropriate competency could result in these skills being procured outside of Antigua and Barbuda or in poor quality projects being installed. Regarding poor quality, example implications include problems with:</p> <ul style="list-style-type: none"> • Insulation, which may lead to higher cooling costs than planned, higher carbon emissions and lower comfort • Renewable energy systems that can result in a lower energy yield of useful energy than planned, this makes the technology less economically viable, reduces its impact on carbon emissions, and may shift the lifecycle impact on carbon emissions against the technology • The design of heating and cooling systems and with building environmental controls that can cause them to consumer more energy than necessary, resulting in higher carbon emission than necessary, while at the same time compromising comfort.” [6]
Training capacity	The capacity and capability of training providers may be insufficient to respond to rapid accelerated growth in workforce demand. It can be difficult for training providers to quickly respond to rapid changes in requirements for workforce skills [5]. This is because it takes some time for course providers to develop new curriculum [5]. “The absolute minimum delay between recognizing a need and providing new graduates is the duration of the course, which for many relevant types of skill will be two, three, four or more years for an initial education or training course. Even for a course design to provide specialist skills to people with a relevant existing qualification, the course duration may be anything from a few weeks to perhaps two years.” Also, developing a new course is an investment that a training institution expects to recoup over time as the training is delivered on multiple occasions [5].
Generic programs	Generic competency based training packages may be misaligned with specific

Risk	Description
	project needs. Trainings must be adapted to match standards.
Replacement demand	Loss of skills, experience, knowledge over time. This can be addressed with continuing education and professional development programs.
Community impacts	Recruitment of a new workforce might draw skilled labor from traditional occupations in the local community and local businesses may experience difficulties in replacing a large number of employees. One barrier to renewable energy deployment is concern regarding the impact on APUA workforce; penetration of renewable energy should not put APUA personnel out of work. Training should engage APUA in training for people involved in grid stability and grid upgrades needed to accommodate high-penetration of renewable energy, as well as engage the APUA workforce in renewable energy deployments.
Regulatory and policy framework	The opportunity for workforce growth in Antigua and Barbuda is a direct reflection of the strength, transparency, and bankability of national clean energy policies. There is also risk in having APUA as the single off-taker of power sales. Legislation that would allow wheeling to other customers and payment to APUA for transmission or distribution costs would help address this risk.
Grant funding for training	Antigua and Barbuda is a highly indebted nation and has very limited public finance available. Grant funding to implement the training programme is necessary to catalyze private finance in clean energy in the island.
Clean energy investments	Investing in clean energy workforce development will only be worthwhile if the country transitions to a clean energy economy, and this will require considerable investments in to these technologies in Antigua and Barbuda

4.3 Reporting and Evaluation

The evaluation of progress against workforce and training objectives will occur through Monitoring, Reporting, and Review (MRR). In general, MRR is designed to:

- Respond to conditions on monitoring social impacts
- Outline internal processes for monitoring performance indicators of implementation
- Outline an external reporting framework through which key stakeholders can receive information on implementation and progress
- Identify known performance indicators (KPIs) specific to workforce and training targets will likely include:
 - Proportion of people employed nationally, regionally, and internationally
 - Proportion of the workforce comprised of under-represented groups (e.g. women)
 - Participation in training opportunities, including enrollment and completion rates
 - Participation in apprenticeships
 - Satisfaction of industry and partner agencies with engagement and delivery process determined through surveys and consultations

Educational institutions will report on courses delivered and the number of people trained. Industry will also report on employment, training, and development figures, including details of the number of workers and types of skills hired. Evaluation and reporting will be undertaken in consultation with key stakeholders including Antigua and Barbuda National Training Agency; the Ministry of Energy; the Ministry of Legal Affairs, Public Safety, Immigration and Labour; the Antigua and Barbuda Coalition of Service Industries; and the Community Development Division.

5. Potential Partner Initiatives

Antigua and Barbuda could consider partnering with any of the following initiatives to help implement aspects of this strategy (e.g., developing a vocational training program or offering an entrepreneurial mentorship). Or, in some cases, these organizations may have done preparatory work off of which Antigua and Barbuda could build (e.g., the CARCIOM Technical and Vocational Education and Training Strategy).

Table 5. Potential Partners, Initiatives and Descriptions

Organization	Program Description
Organization of Eastern Caribbean States (OECS)	The OECS can provide sub-regional training for member states, which would be relevant since OECS is working towards a more common framework for climate-related standards.
Green Climate Fund (GCF)	Although the GCF focuses on concrete adaptation and mitigation projects, the GCF provides Readiness support to countries to build capacity, and Antigua and Barbuda's Readiness allocation could be programmed to provide training and capacity building
New Joint Initiative of the Inter-American Development Bank, Caribbean Development Bank, United States Department of Energy, and the Caribbean Community	This Memorandum of Understanding provides that these organizations will collaborate to support strategic projects, activities, and programs developed in cooperation with regional governments in the Caribbean, including non-reimbursable technical assistance and programs to promote knowledge exchanges, capacity building activities, and to help mobilize technical assistance. <i>More information:</i> http://www.iadb.org/en/news/news-releases/2016-05-05/idb-cdb-caricom-usdoe-offer-caribbean-energy-aid,11461.html
CARICOM Regional Technical and Vocational Education and Training Strategy	The strategy, developed in 2014, is a 5-year program that provides "stakeholders, policymakers, practitioners and clients with a framework that will develop and certify, to international standards, the competence and productive capacities of the region's workforce." <i>More information:</i> http://www.collegesinstitutes.ca/wp-content/uploads/2014/09/CARICOM_Caribbean_Report_September12.pdf
Organization of American States - Energy and Climate Partnership of the Americas	Various regional initiatives including capacity building and educational programs. <i>More information:</i> http://www.ecpamericas.org/Initiatives/default.aspx?id=88 and http://www.oas.org/en/sedi/dsd/Energy/SECBI/SECBI_default.asp
OAS funded a renewable energy education programme that should go here – I will send info	
CARICOM Building Codes and Minimum Performance	'The CARICOM Energy Programme with support from the Renewable Energy and Energy Efficiency (REETA) Project has been collaborating with the CARICOM Regional Organisation for Standards and Quality (CROSSQ) towards the

Organization	Program Description
Standards	<p>development of a Draft Energy Codes for Building as well the Minimum Energy Performance Standards (MEPS) for public buildings within the Region by the end of 2015.'</p> <p><i>More information:</i> http://caricom.org/projects/detail/minimum-energy-performance-standards-meps</p>
Clinton Foundation	<p>The Clinton Foundation focuses its efforts in Latin America and the Caribbean on “strengthening economic development by training individuals in underserved communities with marketable job skills, providing small business and micro-enterprises with greater market access, and working with city governments to implement green technologies.” This includes a distinct Islands Energy Program.</p> <p><i>More information:</i> https://www.clintonfoundation.org/our-work/by-region/latin-america-caribbean and https://www.clintonfoundation.org/our-work/clinton-climate-initiative/programs/islands-energy-program</p>
Branson Centre for Entrepreneurship, Caribbean	<p>“The centre specifically recruits entrepreneurs who are passionate about people, planet, and profit and who can act as socially-minded change makers in their communities. The centre takes a personalized and family-like approach, so that recruits can form meaningful relationships and links to help each other’s businesses grow. The centre’s entrepreneurs are enrolled onto a training programme where they have access to online learning. Some are also given mentoring and expert advice too.”</p> <p><i>More information:</i> https://www.virgin.com/unite/branson-centre-entrepreneurship-caribbean</p>
Caribbean Centre for Renewable Energy and Energy Efficiency	<p>The CCREEE offers regional capacity building efforts, including development of training competency standards and certification and accreditation schemes; coordination of national training centres and related accreditation programs; implementation of train-the-trainer workshops; baseline industry assessments; trainings for utilities on renewable energy grid integration and stability; and, provision of targeted business development training for clean-tech SMEs and entrepreneurs (e.g., energy auditors, equipment installers, renewable energy service providers).</p> <p><i>More information:</i> http://www.ccreee.org/content/capacity-development</p>

Appendix A: Policies and Legislation

This appendix provides an overview of policies and legislation:

- **Utility Act of 1993:** APUA exclusive right to distribute electricity but allows for IPP with written permission from APUA; \$3k fine or 6 months in jail for selling power without permission. But in one area utility power was not available so they were allowed to develop with solar and batteries (off grid, Turtle Bay).
- **National Energy Policy of 2011** (to be reviewed soon); reduce energy cost; reduce energy intensity by 10% from 2010 to 2020; diversify sources into 15% RE by 2030 (already there); increase reliability; protect customer; protect quality of electricity; stimulate environmental protection. 15% “penetration” is exceeded per capacity, but only 5% of Energy (10MW=16.5 GWh).
- **APUA Interconnection Policy:** goal of 15% on grid RE; changed net metering to net billing; dual registry meter; any excess power bought at 45% of retail. 0-5kW net billing; >5kW buy all sell all.
- **RE Act of 2015:** gives Ministry of Energy authority for RE policy. Sets goal of 20% RE by 2020; 20% reduction in energy use; 20% carbon reduction; promotes solar, wind, WTE and geothermal. New tariff structure for on grid solar; creates RE fund to do 10 MW (3 MW airport; 1 MW Barbuda; 4 MW in Bethesda; 2 MW on government facilities in Antigua). Exempts RE from import duties; waiver of customs; no corporate tax; no A+B tax.

The following, additional policies and studies are relevant in the development of a workforce development strategy:

- IRENA Readiness Assessment
- IRENA Grid Stability Study
- World Bank Impacts of Increased RE Penetration in Antigua (by HOMER Energy)
- 2013 Sustainable Energy Scope of Work:
http://www.oas.org/en/sedi/dsd/Energy/Doc/EAP_AntiguaBarbuda_web.pdf
- APUA’s interconnection standards
- APUA’s net billing program
- The RET shall consider the data, analysis and recommendations including within these recent analyses conducted by third parties:
Wind Data Evaluation of Crabbs Peninsula in Antigua and Barbuda
- 2013 CARICOM Caribbean Sustainable Energy Roadmap:
[http://www.worldwatch.org/system/files/nPhase%201%20CSERMS%20Summary%20for%20Policymakers%20\(1\).pdf](http://www.worldwatch.org/system/files/nPhase%201%20CSERMS%20Summary%20for%20Policymakers%20(1).pdf)

The following are highly relevant ongoing projects Antigua and Barbuda is conducting with other international and regional institutions:

- The **National Renewable Energy Laboratory** worked with Antigua and Barbuda on modeling and analysis to inform the country’s Intended National Contribution (INDC) submission to the UNFCCC.
- The **World Bank** is exploring providing assistance to Antigua and Barbuda on analysis and recommendations regarding a potential new net-metering/net-billing/feed-in-tariff policy.
- The **Sustainable Island Resource Framework Fund (SIRF)** was established by the Environmental Protection and Management Act of 2015 to raise investment funds for renewable energy technology initiatives, including up to 25 MW of solar, wind, and possibly ocean thermal energy conversion. The

electricity generated will be sold to the national utility, the Antigua Public Utilities Authority (APUA), which has agreed to these purchases. Proceeds from these power purchase agreements will be funneled back to the SIRF in a revolving fund to further other investments. Expenditures of the SIRF are guided by legislation.

- Antigua and Barbuda have submitted a policy-based Nationally Appropriate Mitigation Actions (NAMA) to the **UNFCCC** requesting financial and technical assistance support. The request is for implementation of sustainable financing for environmental stewardship through capital investments in renewable energy. Revenues generated will be used to fund climate change adaptation and biodiversity conservation.
- **International Renewable Energy Agency (IRENA)** worked with Antigua and Barbuda to provide a renewables readiness assessment (RRA), which is a holistic assessment of conditions for renewable energy deployment in a country, and the actions necessary to further improve conditions.
- Antigua and Barbuda have been working with the United Nations Environment Programme to create **Sustainable Pathways – Protected Areas and Renewable Energy**, which will formalize an agreement for the SIRF Environment Fund to receive profits from renewable energy systems (see component 2) and increase revenue for protected areas by \$2 million annually. The program would initiate the following projects:
 - A pilot installation of 1 to 4MW wind and/or solar energy (which would generate an eventual estimated minimum of \$700,000/year for PA management) with feasibility scale up of up to 50% of A&B's energy needs at 25MW,
 - Improve management effectiveness of a financially sustainable pilot protected area -- Mount Obama National Park, *and*
 - Restore surrounding watershed forests key to improved water management and eventual pumped hydro energy storage (to scale up component 2), as well as reduce the threat of fire to forested areas.
- Antigua and Barbuda secured a concessional loan from the **Abu Dhabi Fund for Development (ADFB)** for USD 15 million in 2016 to invest in climate resilient solar and wind capacity

Appendix B. Stakeholder meeting in Antigua

The three-day stakeholder meetings had over 20 participants, including representatives from the following A&B organizations with seven women and 14 men:

- Ministry of Health & Environment
- National Solid Waste Authority
- Ministry of Tourism, Economic Development, Investment & Energy
- Ministry of Energy
- Ministry of Legal Affairs, Public Safety, Immigration and Labour
- Ministry of Minister of Works and Housing
- AB Coalition of Service Industries
- Royal Police Force
- Community Development Division
- Citizenship by Investment Unit (CIP)
- Themba Biofuels
- Rotary Club of Antigua Sundown (RCAS)
- OSIW Energy Solutions
- FP Electrical Engineering
- Antigua and Barbuda Investment Authority
- Antigua and Barbuda Refrigeration and Air Conditioning (ABRACA) Association
- Fire Department

Appendix C. References

- [1] Antigua and Barbuda's Sustainable Energy Action Plan, March 2013. Accessed on 5/16/2016 at www.oas.org/en/sedi/dsd/Energy/Doc/EAP_AntiguaBarbuda_web.pdf.
- [2] Solar Foundation; National Solar Jobs Census; annually. Accessed on 5/16/2016 at www.thesolarfoundation.org/solar-jobs-census/.
- [3] Climate-Specific Passive Building Standards. Graham S. Wright and Katrin Klingenberg, Passive House Institute. July 2015. Accessed 5/18/2016 at www.nrel.gov/docs/fy15osti/64278.pdf.
- [4] RG-T2015 : Caribbean Hotel Energy Efficiency and Renewable Energy Action - Advanced Program. Inter-American Development Bank. Accessed 5/18/2016 at www.iadb.org/en/projects/project-description-title,1303.html?id=RG-T2015.
- [5] Skills and Occupational Needs in Renewable Energy, 2011. International Labour Office. Accessed 5/29 at: http://www.ilo.org/wcmsp5/groups/public/---ed_emp/---ifp_skills/documents/publication/wcms_166823.pdf
- [6] Skills and Occupational Needs in Green Building, 2011. International Labour Office. Accessed 5/29 at: http://www.ilo.org/wcmsp5/groups/public/---ed_emp/---ifp_skills/documents/publication/wcms_166822.pdf
- [7] "Hotel industry in The Bahamas to improve energy efficiency in hotels," InterAmerican Development Bank, February 14, 2013 press release. Accessed 5/29 at: <http://www.iadb.org/en/news/news-releases/2013-02-14/energy-efficiency-in-the-bahamas,10334.html>.
- [8] Rutovitz, J., Atherton, A. 2009, Energy sector jobs to 2030: a global analysis. Prepared for Greenpeace International by the Institute for Sustainable Futures, University of Technology, Sydney.
- [9] CARICOM Economic Statistics; <https://www.quandl.com/collections/antigua-and-barbuda/antigua-and-barbuda-economy-data>; accessed 7/13/2016

IMPORTANT

All application forms must be fully completed, signed and accompanied by relevant supporting documents INCLUDING a receipt for a \$50.00 non-refundable application fee to be paid to Royal Bank of Canada.

The application form must be submitted by the deadline and be accompanied by all supporting documents. If an applicant will not receive his/her acceptance letter before the deadline, then he/she should submit the application form with all other documents. However, he/she must submit the official acceptance letter from the University no later than Friday, July 29th, 2016

Applicants will be required to deliver his/her completed application form to a member of the NSLF Secretariat at the Ministry of Finance who will review the application form to ensure that all necessary documents are provided.

Application forms may be downloaded from the Government website:

www.antigua.gov.ag

Facebook Page: National Student Loan Fund

Application forms are available at the:

- ◆ Ministry of Finance
- ◆ Antigua State College
(Department of Undergraduate Studies)
- ◆ Barbuda Council

COMPLETED APPLICATION FORMS SHOULD BE DELIVERED TO:

National Student Loan Fund Secretariat
Ministry of Finance and Corporate Governance
Government Office Complex
Parliament Drive
St. John's, Antigua

ALL APPLICANTS ARE KINDLY ASKED TO REVIEW THE INFORMATION CONTAINED IN THIS BROCHURE BEFORE COMPLETING THE NATIONAL STUDENT LOAN FUND APPLICATION FORM.

CONTACTS

Ms. Shantal Browne
Mrs. Atasha Whyte

National Student Loan Fund
c/o Ministry of Finance and Corporate Governance
Government Office Complex
Parliament Drive
St. John's, Antigua

Phone: 268-562-7483

268-462-4860/1

Fax: 268-462-5093

Email: nslf@antigua.gov.ag
nationalstudentloanfund@gmail.com

The National Student Loan Fund is funded by the Government of Antigua and Barbuda



Finance Administration Act:
National Student Loan Fund
Regulations 2008



INFORMATIONAL BROCHURE



"I was able to obtain funding through the National Student Loan Fund which afforded me the opportunity to continue my studies towards a Bachelor Degree in Business Administration in Business Management. "

Natasha Watts BBA (Hons)

Applications Forms can also be downloaded at
www.ab.gov.ag

The Deadline for submission of Application Forms is
12:00 noon on May 09, 2016.

Applications will NOT be accepted after this date.

PURPOSE

The National Student Loan Fund (NSLF) supports the educational development of our nationals by providing affordable financing that assists Antiguan and Barbudan students to undertake various courses of study. The intent is for these students to ultimately contribute to the economic and social development of Antigua and Barbuda.

ELIGIBLE AREAS FOR FINANCING:

- ◆ Undergraduate Studies
- ◆ Graduate Studies
- ◆ Post Secondary/Technical Education
- ◆ Vocational Education



ELIGIBILITY OF APPLICANTS:

In order to qualify for a loan under the programme, applicants must meet the following criteria:

- Be a citizen of Antigua and Barbuda;
- Be at least eighteen (18) years of age;
- Be enrolled or accepted for enrollment in a programme offered by an eligible institution.
- Be pursuing or propose to pursue a fulltime course of study approved by the Student Loan Advisory Committee (SLAC).

LOAN DETAILS:

- 1) The maximum loan amount is \$50,000.00. There is no guarantee that the amount requested will be the amount approved by the Committee.
- 2) The loan will be disbursed to the student in installments in accordance with the period of study. All disbursements will

take place in the month of August each year.

3. The interest rate on the loan is 3% per annum.
 4. Loans shall be repaid in monthly installments over a period of not more than ten (10) years from the time of disbursement.
- The following options are available for repayment:

- a. The student may make interest and principal payments while studying, or
- b. The student may make interest payments only while studying.

In respect to option b above, payment of the principal must commence within six (6) months after completion of the programme of study.

- 1) The loan amount will be determined by the expenses expected to be incurred in pursuing the particular course of study/training and will cover such costs as registration, tuition, books, laboratory fees, thesis fees, security deposits and approved transportation to and from foreign countries at the most economical costs, living expenses associated with studies/training e.g. room and board, medical expenses and incidentals.
- 2) All applicants will need to provide the names of two (2) sureties. The sureties must be employed and must live in Antigua and Barbuda, and cannot be sureties for any current NSLF recipient.
- 3) All approved applicants along with his/her sureties will be required to sign a student loan agreement and a bond agreement.
- 4) Once an applicant receives a student loan, he/she cannot apply for or receive another loan from the NSLF until he/she has repaid the existing loan.
- 5) If an applicant receives a full scholarship that covers all costs related to his/her programme of study, then he/she will not be eligible for an NSLF loan.

OBLIGATIONS OF THE APPLICANT:

The student must attend the educational institution and pursue the programme of study for which the loan is approved. Any transfer contemplated in respect of the educational institution or programme of student must be approved by the Student Loan Advisory Committee.

After completion of the programme of study, the student must work in Antigua and Barbuda for at least two (2) years.

RESPONSIBILITIES OF THE SURETY:

The sureties will be expected to:
Sign the student loan agreement and the bond agreement along with the student;

Ensure that the student honours his/her obligations as per the loan and bond agreements;

Repay the loan if the student fails to make payments.

ELIGIBLE PROGRAMMES OF STUDY:

The eligible programmes of study will include those areas covered by the Board of Education along with any other programme as may be stipulated by the SLAC. Loans will also be extended to individuals pursuing courses of study via distance learning/online programmes.

ELIGIBLE INSTITUTIONS:

All accredited national, regional and extra-regional institutions that offer undergraduate, graduate, and technical/vocational training in the eligible programme areas.

OTHER TERMS AND CONDITIONS:

- 1) Priority will be given to applicants pursuing technical/vocational and adult education programmes that are offered by the national institutions such as Antigua Barbuda Institute of Continuing Education (ABICE) and Antigua Barbuda International Institute of Technology (ABIIT).
- 2) Except in situations where the course of study being pursued is not offered by a national institution, priority will be given to applicants who are pursuing undergraduate studies and have utilized the national programmes such as the programmes offered by ABIIT, the first and second year university programmes at the Antigua State College, Antigua Barbuda Hospitality Institute and the University of the West Indies Open Campus (Antigua & Barbuda).
- 3) Where the programme is not offered locally, preference will then be given to applicants pursuing the course of study at a regional institution.

Special consideration will be given to applicants:

- a. from single parent households;
- b. from households with few earners and a high dependency ratio;
- c. from large households (i.e. two adults and three children below the age of 18)
- d. without assets (especially land and/or monetary savings) and who demonstrate that they do not qualify for credit otherwise;
- e. whose parents are disabled/indigent

Applicants who meet the above criteria and have received a partial scholarship may also apply.

STUDENT LOAN ADVISORY

COMMITTEE:

Applications will be reviewed and approved by the Student Loan Advisory Committee, which will assess each application based on the stipulated criteria. The Committee will also provide guidance and advice to applicants where necessary in order to assist in identifying the most effective and financially viable options towards attaining their educational objectives within the framework of the NSLF.

ANTIGUA AND BARBUDA STUDENT LOAN AGREEMENT

THIS AGREEMENT is made the day of Month, 2014 BETWEEN the STUDENT LOAN ADVISORY COMMITTEE (acting herein for and on behalf of the Government of Antigua and Barbuda) whose offices are located at the Headquarters of the Ministry of Finance, the Economy and Public Administration, Parliament Drive, St. John's, Antigua (hereinafter referred to as "the Committee") of the FIRST PART, of, , in the Parish of St. Paul, Antigua (hereinafter referred to as "the Student") of the SECOND PART and of , in the Parish of St. John, Antigua and of in the Parish of St. John, Antigua (hereinafter called "the Sureties") of the THIRD PART.

WHEREAS:

- (1) The Committee is an administrative body established pursuant to section 42(2) of the Finance Administration Act, 2006 to facilitate the implementation of the National Student Loan Fund;
- (2) The Student has applied for a student loan to pursue a programme of study in Psychology with a minor in Management (B.Sc.) at University of the West Indies, Cave Hill Campus, Barbados for a period of two (2) years from August 2014 to May 2016;
- (3) The Committee has determined that the Student is qualified to be granted such a loan;
- (4) The Sureties have agreed to guarantee the performance of the Student's payment obligations herein by joining in a bond with the Student and agreeing to be jointly and severally bound to the Government to repay the sum of Thousand Eastern Caribbean Dollars (EC\$0.00) with interest thereon calculated at the rate of three percent (3%) per annum on the said sum.
- (5) The Sureties have further agreed to perform certain obligations hereinafter stated.
- (6) The parties have agreed to enter into this Agreement upon the terms hereinafter stated.

NOW THEREFORE IT IS HEREBY AGREED as follows:

1.1. The Loan

Subject to the availability of funds allocated by the Government of Antigua and Barbuda, the Committee will provide by way of loan a sum of Eastern Caribbean Dollars (EC\$0.00) to the Student.

- 1.2.** The loan granted to the Student by the Committee pursuant to the provisions of clause 1.1 hereof shall be secured by the Student entering into a bond with the Sureties to repay the loan with interest at the rate of three percent (3%) per annum.

2. Purpose of Loan

The loan herein granted by the Committee to the Student shall be used to cover maintenance costs and other expenses associated with the Student's attendance at the University or Institution where she is enrolled.

3. Disbursement of Funds to Student

- 3.1.** The first payment of Zero Thousand Zero Hundred Eastern Caribbean Dollars (EC\$0.00) will be made to the Student and the University or Institution in September, 2014 upon receipt by the Committee of proof of admission of the Student to a University or Tertiary Educational Institution (hereinafter referred to as "the Institution").
- 3.2.** A subsequent payment of Zero Thousand Zero Hundred Eastern Caribbean Dollars (EC\$0.00) will be disbursed to the Student and the University or Institution during the month of August 2015 upon receipt by the Committee of satisfactory performance reports from the said University or Institution where the course of study is being pursued.
- 3.3.** For the purpose of sub-clause 3.2 the term "satisfactory performance reports" means that the student has achieved the minimum standards of the University or Institution to enable her to progress forward towards completion of her university degree.

4. Registration at the University or Institution

Upon registration at the University or Institution, the Student shall submit the following information to the Secretariat of the Student Loan Advisory Committee, Ministry of Finance, the Economy and Public Administration, Parliament Drive, St. John's, Antigua:

- (a) proof of registration at the University or Institution;
- (b) her contact details whilst at the University or Institution including:
 - (i) postal address;
 - (ii) residential address;
 - (iii) electronic mail address;
 - (iv) telephone number(s).

5. Repayment of Loan

- 5.1.** The Student shall repay the loan within ten (10) years from the date of the first disbursement in accordance with the repayment schedule attached hereto as Annex 1.
- 5.2.** Unless otherwise agreed with the Committee, the Student shall commence servicing the loan no later than six (6) months after the completion of the course of studies.

5.3. Interest at the rate of three percent (3%) per annum shall be paid on the loan in monthly instalments commencing October 29th 2014. Interest payments shall continue until November 29th 2016 or until the Student commences servicing the loan, whichever is sooner.

5.4. The Student shall complete repayment of the loan by September 29th 2024.

6. Notices of Changes to Name, Address, Telephone Number.

The Student and/or her Sureties shall notify the Committee in writing within thirty (30) days of any change to their name(s), address(es) or telephone numbers. Written notice of the change shall be sent to the Secretariat of the Student Loan Advisory Committee, Ministry of Finance, the Economy and Public Administration, Parliament Drive, St. John's, Antigua or to such other address of the Committee as it may provide in writing to the Student and her Sureties.

7. Events of Default

The following matters hereinafter stated constitute events of default the consequences of which are specified in the sub-clauses below:

7.1. If the Student withdraws or is dismissed from the course of studies for which the student loan is granted for any reason other than illness, then all funds paid to the Student under this Agreement, together with interest thereon shall be paid in full within ninety (90) days of the withdrawal or dismissal.

Notwithstanding the provisions of clause 7.1 the Committee may in its absolute discretion extend the period for which the student is required to make repayment under clause 7.1 above.

7.2. If the Student withdraws or is dismissed from the course of study for which the student loan is granted due to serious illness, then the Student shall immediately inform the Committee within thirty (30) days of her withdrawal or dismissal. Upon receipt of proof of the said illness, the parties shall endeavour to conclude the terms upon which the Student will settle her outstanding liability under this Agreement with the Committee.

7.3. If the Student and/or her Sureties fail to notify the Committee of any change in their addresses as required under clause 6 above then all amounts disbursed to the Student may be forfeited at the discretion of the Committee and repaid as directed by the Committee.

8. Default Interest

8.1 Default interest means additional interest calculated at the rate of ten percent (10%) per annum payable on any outstanding balance of principal and interest payable by the Student and/or her Sureties under the terms of this Agreement.

8.2 The Student and/or her Sureties shall be liable to pay the Committee default interest in any of the following circumstances specified below:

- (a) If the Student uses the loan amount or any part thereof for purposes other than as provided in clause 2 of this Agreement;
- (b) If the Student fails to return to Antigua and/or fails to repay the loan.

9. Other Provisions

- 9.1** Upon completion of the course of study, the Student shall return to Antigua and Barbuda and work in Antigua and Barbuda for not less than two (2) years. She shall enter into a bond with the Government to this effect and where the Student has entered into a bond with the Board of Education (hereinafter referred to as "the Board") the said bond shall run concurrently with the Student's bond with the Board provided that the time remaining on the bond with the Board is more than or equal to two (2) years.
- 9.2.** The Committee is authorized to commence whatever actions are considered necessary to enforce this Agreement and achieve a repayment of the loan provided to the Student by the Committee.
- 9.3.** The terms and conditions of this Agreement shall be interpreted in accordance with the laws of Antigua and Barbuda.
- 9.4.** The parties shall endeavour to resolve any dispute arising out of or in relation to the terms of this Agreement by negotiation, voluntary adjustment or settlement failing which either party shall be at liberty to commence legal proceedings in a court of competent jurisdiction in Antigua and Barbuda to resolve the issue(s).

SIGNED by the **CHAIRMAN** and)
SECRETARY of the **STUDENT**)
LOAN ADVISORY COMMITTEE)
for and on behalf of the Government)
of Antigua and Barbuda in the)
presence of:-) □ □ □ □ □ □ □ □ □ □ □
) **Chairman**
))
) □ □ □ □ □ □ □ □ □ □ □
) **Secretary**
□ □ □ □ □ □ □ □ □ □ □ □ □ □ □)

SIGNED by _____)
Student in the presence of:- _____)
_____) □ □ □ □ □ □ □ □ □ □
_____)
_____)
□ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □)

SIGNED by _____)
and, _____)
Sureties in the presence of:- _____)
_____) _____)
_____) _____)
_____) _____)
_____) _____)
_____) _____)
_____) _____)

ANTIGUA AND BARBUDA



**THE FINANCE ADMINISTRATION (NATIONAL STUDENT LOAN FUND)
REGULATIONS, 2008**

STATUTORY INSTRUMENT

2008, No. 37

*[Printed in the Official Gazette Vol. XXVIII No. 53
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*The Finance Administration (National Student Loan Fund)
Regulations, 2008.*

2008 No. 37

2008 No. 37

*The Finance Administration (National Student Loan Fund)
Regulations, 2008.*

**THE FINANCE ADMINISTRATION (NATIONAL STUDENT LOAN FUND)
REGULATIONS, 2008**

ARRANGEMENT

Regulations

1. Short title.
2. Interpretation
3. Establishment of the National Student loan Fund
4. Administration of the national Student Loan Fund
5. Functions of the Committee
6. Details of the Student Loan
7. Eligibility

**THE FINANCE ADMINISTRATION (NATIONAL STUDENT LOAN FUND)
REGULATIONS, 2008**

2008, No. 37

THE FINANCE ADMINISTRATION (NATIONAL STUDENT LOAN FUND) REGULATIONS made in exercise of the powers contained in section 42 of the Finance Administration Act, 2006 No. 23 of 2006.

1. Short title

These Regulations may be cited as the Finance Administration (National Student Loan Fund) Regulations, 2008.

2. Interpretation

In this Act unless the context otherwise requires—

“Fund” means the National Student Loan Fund established under regulation 3 of these Regulations.

“Loan” means the student loan established under regulation 6 of these Regulations

“Minister” means the Minister responsible for Finance and the Economy.

3. Establishment of the National Student Loan Fund

(1) There shall be established a Special Fund to be called the National Student Loan Fund in accordance with Section 42 (1) (b) of the Finance Administration Act No. 23 of 2006.

(2) The National Student Loan Fund shall be funded by the Government of Antigua and Barbuda with an initial endowment of Two Million Eastern Caribbean Dollars (EC\$2,000,000.00).

4. Administration of the National Student Loan Fund

(1) The Student Loan Advisory Committee (hereinafter referred to as the Committee) shall be responsible for the administration of the Fund.

(2) The Committee shall:

(a) consider and approve applications for funding under the Fund;

- (b) provide guidance and advice to applicants where necessary in order to identify the most effective and financially viable options towards attaining their educational objectives within the framework of the Fund.

(3) The members of the Committee shall be appointed by the Minister of Finance and shall include:

- (a) the Financial Secretary who shall be the Chairperson of the Committee, and another representative from the Ministry of Finance and the Economy;
- (b) a representative from the Antigua Barbuda Development Bank;
- (c) a representative from the Antigua Barbuda International Institute of Technology;
- (d) a representative from the Antigua State College;
- (e) a representative from the Ministry of Education who shall be the Secretary to the Committee;
- (f) a representative from the Ministry of Labour;
- (g) a representative from the National Scholarships Committee;
- (h) a representative from the Board of Education; and
- (i) a representative from the University of the West Indies — Open Campus, Antigua and Barbuda.

(4) The Minister shall appoint any other person to be a member of the Committee, upon consultation with Cabinet.

(5) The members of the Committee shall serve for a period of two (2) years and may be reappointed.

(6) The Ministry of Finance and the Economy and the Ministry of Education shall each nominate an officer to be appointed by the Minister to function as the Secretariat to the Committee.

(7) The Minister and the Minister of Education shall establish the terms of reference of the Committee.

(8) The members of the Committee and the Secretariat staff shall be paid such remuneration as may be determined by the Minister.

(9) The Committee shall work in conjunction with the Ministry of Finance and the Economy to establish the Special Fund to be called the National Student Loan Fund.

(10) Payments of interest and repayment of principal for any loans granted under the Fund shall be made to and in the name of the National Student Loan Fund.

(11) The Committee shall establish the necessary administrative mechanisms through which the loans will be disbursed.

(11) The Committee shall submit reports to the Accountant General in accordance with the provisions of section 43 of the Finance Administration Act 2006.

5. Functions of the Committee

The functions of the Committee shall include:

- (a) the review and approval of applications for student loans;
- (b) the provision for guidance and advice to applicants where necessary;
- (c) the monitoring of the disbursement of resources from the Fund;
- (d) the submission of reports on the performance of the Fund to the Minister;
- (e) advice to the Minister on other possible sources of funding for the Fund; and
- (f) any other function as may be determined by the Minister

6. Details of the Student Loan

(1) The Committee shall not grant to any applicant a loan exceeding \$50,000.00.

(2) The interest rate on the loan shall be 3%.

(3) A loan shall be repaid in monthly installments over a period of not more than ten (10) years from the time of disbursement.

(4) The options that are available for the repayment of a loan include:

- (a) the student may make interest and principal payments while studying; or
- (b) the student may make interest payments only while studying; or

(c) the student may defer payment of interest and the principal amount until after completion of his/her studies.

(5) Where a student exercises the option in sub-regulation (4) paragraph (b), payment of the principal amount must commence within six (6) months after completion of the programme of study.

(6) Where a student exercises the option in sub-regulation (4) paragraph (c), payment of interest and the principal amount must commence within six (6) months of the completion of the programme of study.

(7) Where a student chooses the option in sub-regulation (4) paragraph (c), the interest will be capitalised.

(8) The Committee shall establish appropriate procedures and arrangements, including agreements with the student, to ensure the repayment of loans granted under the Fund.

7. Eligibility

(1) Eligible programmes of study to be funded by loans from the Fund include:

- (a) undergraduate studies;
- (b) graduate studies;
- (c) post secondary/technical education;
- (e) vocational education; and
- (f) any other programme of study as may be determined by the Committee from time to time.

(2) Eligible institutions include all accredited national, regional and extra-regional institutions that offer undergraduate, graduate, and or technical/vocational training in the eligible programme areas.

(3) An applicant who qualifies for a loan under the Fund, must be


- (a) a citizen of Antigua and Barbuda;
- (b) at least eighteen (18) years of age;
- (c) enrolled or accepted for enrollment in a programme offered by an eligible institution;
- (d) pursuing or propose to pursue a full-time programme of study approved by the Committee.

(4) In addition to the' aforementioned qualifications, special consideration shall be given to an applicant who is the child of

- (a) a single parent;
- (b) a family with inadequate earning capacity;
- (c) a large family (at least two adults and three children below the age of 18);
- (d) parents without assets (especially land and/or monetary savings) and who demonstrate that they do not qualify for credit otherwise; and
- (e) a parent who is disabled or indigent.

(5) The Minister may from time to time establish further or better administrative procedures in respect of the Fund.

Made the 8th day of August, 2008.

A handwritten signature in black ink, appearing to read 'L. Errol Cort', with a stylized flourish at the end.

Dr. Leon Errol Cort,

LOAN AGREEMENT

THIS LOAN AGREEMENT (this Agreement) dated this day of 2016
BETWEEN:

(the “Lender”)

AND

(the “Borrower”)

WHEREAS the parties have agreed that, upon and subject to the terms and conditions contained herein, the Lender will advance by way of loan to the Borrower, and the Borrower will borrow, the sum of **XXXXXXXXXXXXX**;

OR

WHEREAS the Borrower has applied to the for a loan to be given pursuant to the terms and conditions of this Agreement (the “Loan”) for the purpose of assisting with **Climate Proofing** of residence and or business (which may be a house or multi-unit dwelling) located at **xxxxxxxxxx** and more particularly described or identified as:

(the residential premises and property hereinafter called the “Property”);

NOW THEREFORE THIS AGREEMENT WITNESSES that, in consideration of the mutual covenants and agreements contained herein and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged by each of the parties hereto, the parties hereto hereby covenant and agree as follows:

1. **Loan.** The Lender has agreed to advance the sum of **xxxxxxxxxxxxxxxxxx** Dollars (**xxxxxxxxxxxxxxxxxx**) (the “Loan”) by way of loan to the Borrower upon and subject to the terms and conditions contained in this Loan Agreement.
2. **Repayment of Loan.** The principal amount of the Loan together with accrued interest shall be repayable on **xxxxxxxxxxxxx, 20xx**.
3. **Interest.** The Loan shall bear interest at the rate of **xx%** per annum payable monthly in arrears commencing on the last day of the month after the date of the advance of the Loan.
4. **Default.** Notwithstanding anything to the contrary of this Agreement, if the Borrower defaults in the performance of any obligation under this Agreement, then

the Lender may declare the principal amount owing and interest due under this Agreement at the time to be immediately due and payable.

5. **Governing Law.** This Loan Agreement shall be construed in accordance and governed in accordance with the laws of Antigua and Barbuda.
6. **Costs.** All costs, expenses and expenditures including, without limitation, the complete legal costs incurred by enforcing this Agreement as a result by any default by the Borrower, will be added to the principal then outstanding and will immediately be paid by the Borrower.
7. **Successors and Assigns.** This Loan Agreement shall ensure the benefit of and be binding upon the parties hereto and their respective successors and assigns.
8. **Amendments.** This Agreement may only be amended or modified by a written instrument executed by both the Borrower and the Lender.
9. **Severability.** This Agreement may be executed in counterparts, each of which when so executed and delivered shall be deemed to be an original and such counterparts together shall constitute one and the same Agreement.
10. **Entire Agreement.** This Agreement constitutes the entire agreement between the parties and there are no further items or provisions, either oral or otherwise.
11. **Notices.** Any notice or other communication to be given hereunder to any of the parties hereto shall be in writing and may be given by delivery, or sent by facsimile or other similar means of electronic communication, or if postal services and deliveries are then operating, mailed by registered mail to such party at its address set out below or at such other address as such party may have designated by notice so given to the other parties hereto.

to the Lender, at:

to the Borrower, at:

12. Any notice or other communication shall be deemed to have been given, if delivered, on the date of delivery, or if sent by facsimile or other similar means of electronic communication, on the Business Day next following the date of sending, or if mailed by registered mail as aforesaid, on the third Business Day following the date of the mailing if postal service and deliveries are then operating.

IN WITNESS WHEREOF the parties hereto have duly executed this Loan Agreement as of the date first written above.

Department of Environment
Lender

Authorised Signing Officer

Witness - Print name below

Borrower

Witness – Print name below

Authorised Signing Officer

Witness - Print name below

DRAFT

Annex 18. Logframe of Antigua and Barbuda's project submitted to the Special Climate Change Fund (SCCF).

The Department of Environment is the implementing agency for both the SCCF and Adaptation Fund projects and has developed projects that will complement and strengthen the overall impact and results of the adaptation programme on the northwest coast of Antigua. As this document demonstrates, the SCCF project will focus on the “soft” adaptation interventions, including the vulnerability assessments; the policies, strategies and plans; technical training; and knowledge and lessons learned. The Adaptation Fund allocation is prioritized for financing the concrete adaptation interventions along McKinnon's waterway, operationalizing the Revolving Loan Facility for Adaptation, and contracting community groups to sustain interventions.



UNITED NATIONS ENVIRONMENT PROGRAMME

Programme des Nations Unies pour l'environnement Programa de las Naciones Unidas para el Medio Ambiente

Программа Организации Объединенных Наций по окружающей среде برنامج الأمم المتحدة للبيئة

联合国环境规划署



PROJECT DOCUMENT

SECTION 1: PROJECT IDENTIFICATION

1.1	Project title:	Building climate resilience through innovative financing mechanisms for climate change adaptation	
1.2	Project number:	GFL/ PMS: 5523	
1.3	Project type:	FSP	
1.4	Trust Fund:	SCCF	
1.5	Strategic objectives:		
	GEF strategic long-term objective:	Climate Change Adaptation	
1.6	UNEP priority:	Climate Change Sub-Programme, Expected Accomplishment (A) (adaptation), Output 112	
1.7	Geographical scope:	National	
1.8	Mode of execution:	External	
1.9	Project executing organization:	Environment Division of the Ministry of Health and Environment	
1.10	Duration of project:	48 months Commencing: Technical completion:	
	Validity of legal instrument:	months	
1.11	Cost of project	US\$	%
	Cost to the GEF Trust Fund	5,000,000	28
	Co-financing		

Cash		
Ministry of Health and Environment	2,700,000	15
Public Works	6,800,000	38
NODS	2,000,000	11
<i>Sub-total</i>	11,500,000	64
In-kind		
OECS	1,000,000	6
UNEP-REGATTA	200,000	1
UNEP Coastal EbA	200,000	1
<i>Sub-total</i>	1,400,000	8
Total	17,900,000	100

1.12 Project summary

1. Antigua and Barbuda is an island state in the east of the Caribbean Sea. Climate change is expected to result in an increase in the frequency and intensity of extreme weather events, especially hurricanes and droughts. This is likely to result in: i) damage to infrastructure; ii) reduced water availability for agriculture; iii) reduced income from tourism owing to destruction of tourism facilities and attractions; and iv) threats to human health and well-being including loss of life. Apart from direct negative effects relating to the health, agricultural and tourism sectors, the country's economy is strained by costs related to repairing infrastructure and compensating local communities after extreme weather events.

2. Inadequate planning and management have resulted in the degradation of ecosystem functioning, threatening the ecosystem services upon which Antigua and Barbuda's economic economy and vulnerable communities depend. The predicted effects of climate change will further exacerbate current environmental degradation and threaten the sustainability of the country's economy. These climate change effects necessitate the implementation of appropriate adaptation interventions. Current adaptation strategies focus on reducing damage from extreme weather events. However, current financing needs for adaptation are not being met at a local or national scale. The Environmental Protection and Management Act¹ has recently established the Sustainable Island Resource Framework (SIRF) Fund – a Fund that is designed to finance environmental management – and will include an “adaptation window” to finance adaptation interventions. However, there is currently limited capacity to inform the design of this adaptation window and to implement adaptation interventions within the country.

¹ This legislation was enacted by the Parliament of Antigua and Barbuda in April 2015.

Table 5. Key stakeholders and roles/responsibilities during implementation of the SCCF project.

Outcome	Output	Stakeholders	Roles/responsibilities
Outcome 1: National and sub-national policies, strategies and plans strengthened to promote medium- and long-term adaptation to climate change, with a focus on ecosystems and innovative financing for adaptation.	Output 1.1: Revised policies and plans that promote and facilitate medium- and long-term adaptation to climate change including using innovative financing mechanisms.	<ul style="list-style-type: none"> • Department of Environment • Public Works • CBH • NODS • Development Control Authority • Surveys Division • APUA 	<ul style="list-style-type: none"> • Participate in the Technical Advisory Committee • Support the development of a draft National Climate Change Adaptation Policy and Implementation Strategy • Support the development of local area development plans as a legally binding vehicle for integrated watershed management • Oversee the review of the Building Code
	Output 1.2: Technical training delivered on integrating climate change adaptation into local-level planning.	<ul style="list-style-type: none"> • Department of Environment • Public Works • CBH • NODS • Development Control Authority • Surveys Division • APUA • Ministry of Trade 	<ul style="list-style-type: none"> • Provide input into policy and information briefs, technical guidelines and training needs requirements • Participate in training and capacity building of key staff
Outcome 2: Access to innovative financing mechanisms to address the negative impacts of climate change through adaptation interventions is increased.	Output 2.1: Operational guidelines and financial products developed for disbursement and management of outflows from the adaptation window of the SRF Fund.	<ul style="list-style-type: none"> • Department of Environment • Ministry of Finance 	<ul style="list-style-type: none"> • Overseeing process and provide technical input into establishment of adaptation window • Provide input into mechanisms for promoting funding flows into the SRF Fund
	Output 2.2: Operational and financial guidelines developed for promoting funding flows into the adaptation window of the SRF Fund.	<ul style="list-style-type: none"> • Department of Environment • Ministry of Finance • Public Works • CBH • NODS • Development Control Authority • Surveys Division • Micro-finance institutions, credit unions, banks • District Disaster Coordinators for project sites 	<ul style="list-style-type: none"> • Provide input into the development of operational guidelines for disbursement of outflows from the SRF Fund • Develop a list of interventions eligible for receiving funding from the adaptation window • Develop criteria governing the approval of loans under the adaptation window • Provide input into the development of operational guidelines for recovery of loan repayments into the SRF Fund

Outcome	Output	Stakeholders	Roles/responsibilities
		<ul style="list-style-type: none"> Local communities and community groups 	
	Output 2.3: Adaptation interventions demonstrated through piloting small loans disbursed through the adaptation window of the SIRF Fund.	<ul style="list-style-type: none"> Department of Environment Ministry of Finance Public Works CBH NODS Development Control Authority Surveys Division Micro-finance institutions, credit unions, banks District Disaster Coordinators for project sites Local communities and community groups 	<ul style="list-style-type: none"> Oversee the disbursement and recovery of funds flowing through the adaptation window of the SIRF Fund Oversee the implementation of household-based adaptation interventions
	Output 2.4: Strategy developed to upscale and replicate funding adaptation interventions through the adaptation window of the SIRF Fund.	<ul style="list-style-type: none"> Environment Division Ministry of Finance Public Works CBH Development Control Authority 	<ul style="list-style-type: none"> Provide input into the development of an upscaling strategy for the adaptation window of the SIRF Fund
Outcome 3: Pilot adaptation interventions focused on ecosystems implemented in the St. Johns watershed to decrease sensitivity of local communities and support them to cope with the effects of climate change.	Output 3.1: Cost-effective adaptation interventions designed for three vulnerable watersheds and implemented in St. Johns watershed.	<ul style="list-style-type: none"> Department of Environment Public Works CBH NODS Development Control Authority Surveys Division APUA District Disaster Coordinators for project sites Local communities 	<ul style="list-style-type: none"> Coordinate the community consultations and hydrological surveys to inform the formulation of local area development plans and design of adaptation interventions Implementing adaptation interventions based on the local area development plans Oversee the development of a strategy for upscaling and long-term M&E
	Output 3.2: Local communities in the project sites trained to implement and sustain adaptation interventions.	<ul style="list-style-type: none"> Department of Environment Public Works CBH NODS Development Control Authority District Disaster 	<ul style="list-style-type: none"> Oversee the development of community-based training programmes for adaptation interventions Facilitate training-of trainers Support training workshops and communication forums Provide input into the design of a participatory M&E framework

Outcome	Output	Stakeholders	Roles/responsibilities
		Coordinators for project sites <ul style="list-style-type: none"> Local communities and community groups 	
Outcome 4: Knowledge base for supporting the development of adaptation financing mechanisms and implementation of adaptation interventions is strengthened.	Output 4.1: National awareness raising activities undertaken on climate change adaptation and innovative financing mechanisms.	<ul style="list-style-type: none"> Department of Environment Public Works CBH NODS Department of Education 	<ul style="list-style-type: none"> Oversee development of training tools on climate change adaptation Facilitate national awareness campaigns on climate change adaptation Support the revision of school curricula to include climate change and adaptation
	Output 4.2: Regional knowledge sharing on innovative financing for adaptation is enhanced in the Caribbean through exchange of lessons learned.	<ul style="list-style-type: none"> Department of Environment UNEP-REGATTA OECS 	<ul style="list-style-type: none"> Facilitate a regional workshop on climate change and adaptation in the Caribbean Oversee the development and dissemination of professional development modules on climate change through the Communities of Practice