



ADAPTATION FUND

AFB/PPRC.19/15
24 September 2016

Adaptation Fund Board
Project and Programme Review Committee
Nineteenth Meeting
Bonn, Germany, 4-5 October 2016

Agenda Item 7 j)

PROPOSAL FOR ANTIGUA AND BARBUDA

Background

1. The Operational Policies and Guidelines (OPG) for Parties to Access Resources from the Adaptation Fund (the Fund), adopted by the Adaptation Fund Board (the Board), state in paragraph 45 that regular adaptation project and programme proposals, i.e. those that request funding exceeding US\$ 1 million, would undergo either a one-step, or a two-step approval process. In case of the one-step process, the proponent would directly submit a fully-developed project proposal. In the two-step process, the proponent would first submit a brief project concept, which would be reviewed by the Project and Programme Review Committee (PPRC) and would have to receive the endorsement of the Board. In the second step, the fully-developed project/programme document would be reviewed by the PPRC, and would ultimately require the Board's approval.

2. The Templates approved by the Board (OPG, Annex 4) do not include a separate template for project and programme concepts but provide that these are to be submitted using the project and programme proposal template. The section on Adaptation Fund Project Review Criteria states:

For regular projects using the two-step approval process, only the first four criteria will be applied when reviewing the 1st step for regular project concept. In addition, the information provided in the 1st step approval process with respect to the review criteria for the regular project concept could be less detailed than the information in the request for approval template submitted at the 2nd step approval process. Furthermore, a final project document is required for regular projects for the 2nd step approval, in addition to the approval template.

3. The first four criteria mentioned above are:

1. Country Eligibility,
2. Project Eligibility,
3. Resource Availability, and
4. Eligibility of NIE/MIE.

4. The fifth criterion, applied when reviewing a fully-developed project document, is:
5. Implementation Arrangements.

5. It is worth noting that since the twenty-second Board meeting, the Environmental and Social (E&S) Policy of the Fund was approved and consequently compliance with the Policy has been included in the review criteria both for concept documents and fully-developed project documents. The proposals template was revised as well, to include sections requesting demonstration of compliance of the project/programme with the E&S Policy.

6. In its seventeenth meeting, the Board decided (Decision B.17/7) to approve "Instructions for preparing a request for project or programme funding from the Adaptation Fund", contained in the Annex to document AFB/PPRC.8/4, which further outlines applicable review criteria for both concepts and fully-developed proposals. The latest version of this document was launched in conjunction with the revision of the Operational Policies and Guidelines in November 2013.

7. Based on the Board Decision B.9/2, the first call for project and programme proposals was issued and an invitation letter to eligible Parties to submit project and programme proposals to the Fund was sent out on April 8, 2010.

8. According to the Board Decision B.12/10, a project or programme proposal needs to be received by the secretariat no less than nine weeks before a Board meeting, in order to be considered by the Board in that meeting.

9. The following fully-developed project document titled “An integrated approach to physical adaptation and community resilience in Antigua and Barbuda’s northwest McKinnon’s watershed” was submitted by the Department of Environment, Ministry of Health and the Environment, Antigua and Barbuda, which is a National Implementing Entity of the Adaptation Fund.

10. This is the third submission of the proposal. It was first submitted as a project concept in the twenty-seventh Board meeting and was not endorsed. It was then re-submitted intersessionally as a project concept and the Board decided to:

- (a) *Endorse the project concept, as supplemented by the clarification response provided by the Antigua and Barbuda Department of Environment to the request made by the technical review;*
- (b) *Request the secretariat to transmit to the Antigua and Barbuda Department of Environment the observations in the review sheet annexed to the notification of the Board’s decision, as well as the following issues:*
 - (i) *The fully-developed project document should demonstrate how the feedback from community consultations has been reflected in the project design;*
 - (ii) *The fully-developed project document should specify, to the extent possible, the specific and concrete interventions that the project will support (including scale, scope, number of beneficiaries, etc.); and*
 - (iii) *Recognizing both the innovative nature of and inherent uncertainty of the allocation of AF funds, the fully-developed project document should provide the entire set of guidelines, procedures, and terms for the revolving microloan program;*
- (c) *Approve the Project Formulation Grant of US\$ 30,000; and*
- (d) *Request the Antigua and Barbuda Department of Environment to transmit the observations under item (b) to the Government of Antigua and Barbuda; and*
- (e) *Encourage the Government of Antigua and Barbuda to submit through the Department of Environment a fully-developed project proposal that would address the observations under item (b) above.*

(Decision B. 27-28/13)

11. The current submission was received by the secretariat in time to be considered in the twenty-eighth Board meeting. The secretariat carried out a technical review of the project proposal, assigned it the diary number ATG/NIE/Multi/2016/1, and completed a review sheet.
12. In accordance with a request to the secretariat made by the Board in its 10th meeting, the secretariat shared this review sheet with the Department of Environment, and offered it the opportunity of providing responses before the review sheet was sent to the PPRC.
13. The secretariat is submitting to the PPRC the summary and, pursuant to decision B.17/15, the final technical review of the project, both prepared by the secretariat, along with the final submission of the proposal in the following section. In accordance with decision B.25.15, the proposal is submitted with changes between the initial submission and the revised version highlighted.

Project Summary

Antigua and Barbuda – McKinnon's Pond Watershed Restoration and Resilience project

Implementing Entity: *Department of Environment, Ministry of Health and the Environment*

Project/Programme Execution Cost: USD 636,240

Total Project/Programme Cost: USD 9,536,000

Implementing Fee: USD 434,000

Financing Requested: USD 9,970,000

Project Background and Context:

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 is designed to ensure that the community as a whole will be able to withstand projected climate change impacts while the ecosystems accommodate increased rainfall.

Component 1: Upgrade urban drainage and waterways to meet projected climate change impacts (USD 3,550,960)

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.

Component 2: Revolving Loans for homes in McKinnon's watershed to meet new adaptation guidelines established in the building code and physical plan (USD 3,125,300)

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. 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.

Component 3: Adaptation mainstreaming and capacity building in NGOs and community groups

to sustain project interventions (USD 2,223,500)

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 are specifically targeted at enhancing social systems to build adaptive capacity. 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.



ADAPTATION FUND

ADAPTATION FUND BOARD SECRETARIAT TECHNICAL REVIEW OF PROJECT/PROGRAMME PROPOSAL

PROJECT/PROGRAMME CATEGORY: Regular-sized Project

Country/Region: **Antigua and Barbuda**
 Project Title: **An integrated approach to physical adaptation and community resilience in Antigua and Barbuda's northwest McKinnon's watershed**
 AF Project ID: **ATG/NIE/Multi/2016/1**
 IE Project ID: Requested Financing from Adaptation Fund (US Dollars): **\$9,970,000**
 Reviewer and contact person: **Daouda Ndiaye** Co-reviewer(s): **Hugo Remaury, Dirk Lamberts**
 IE Contact Person: **H.E. Amb. Diann Black-Layne, Ruleta Camacho Thomas, Ministry of Health and the Environment**

Review Criteria	Questions	Comments on 18/6/16	Comments on 6/9/16
Country Eligibility	1. Is the country party to the Kyoto Protocol?	Yes	
	2. Is the country a developing country particularly vulnerable to the adverse effects of climate change?	Yes, Antigua and Barbuda is a small island developing state in the Caribbean, and primarily impacted by sea level rise, and extreme weather events such as drought.	
Project Eligibility	1. Has the designated government authority for the Adaptation Fund endorsed the project/programme?	Yes.	
	2. Does the project / programme support concrete adaptation actions to assist the country in addressing adaptive	Yes, the project proposal clearly outlines the range of climate change impacts in the country and target region, as well as how the intended activities directly address the main	

	capacity to the adverse effects of climate change and build in climate resilience?	vulnerabilities.	
	3. Does the project / programme provide economic, social and environmental benefits, particularly to vulnerable communities, including gender considerations, while avoiding or mitigating negative impacts, in compliance with the Environmental and Social Policy of the Fund?	Yes, the proponent has outlined the primary social, environmental, and economic benefits for the project, and guided by an Environmental and Social Management Plan to avoid or mitigate negative impacts.	
	4. Is the project / programme cost effective?	Yes, but the proponent is encouraged to include more financial values. CR1: To bolster the cost-effectiveness argument, please include more financial values, such as those for shelters or mosquito spraying.	CR1: Addressed, additional figures have been provided in the context of the project's cost effectiveness.
	5. Is the project / programme consistent with national or sub-national sustainable development strategies, national or sub-national development plans, poverty reduction strategies, national communications and adaptation programs of action and other relevant instruments?	Yes, the project appears to be very well aligned with relevant policies, strategies, and programs.	
	6. Does the project / programme meet the relevant national technical	Yes.	

	standards, where applicable, in compliance with the Environmental and Social Policy of the Fund?		
	7. Is there duplication of project / programme with other funding sources?	Yes, the proponent has demonstrated how the project builds on existing programmes.	
	8. Does the project / programme have a learning and knowledge management component to capture and feedback lessons?	Yes, however some clarification is requested. CR2: Please comment on how the community members involved in the project components and loan program will be engaged as part of ongoing learning and knowledge management for the project. CR3: Please expand on the tangible, lasting, and concrete products that the project will produce.	CR2: Addressed CR3: Addressed
	9. Has a consultative process taken place, and has it involved all key stakeholders, and vulnerable groups, including gender considerations?	Yes, however some clarification is requested with respect to the engagement of women and other vulnerable groups. CR4: Please clarify if/how special consideration was given to involving vulnerable groups and women in consultations and project design/activities as a result. This is also alluded to in the ESIA.	CR4: Mostly addressed.
	10. Is the requested financing justified on the basis of full cost of adaptation reasoning?	Yes, addressed.	
	11. Is the project / program aligned with AF's results framework?	Yes	

	12. Has the sustainability of the project/programme outcomes been taken into account when designing the project?	Yes, the entire project has been designed with the long-term impact and sustainability of the project in mind.	
	13. Does the project / programme provide an overview of environmental and social impacts / risks identified?	Yes, the project includes an overview of the risks identified as well as a plan/mechanisms to address and manage those risks.	
Resource Availability	1. Is the requested project / programme funding within the cap of the country?	Yes	
	2. Is the Implementing Entity Management Fee at or below 8.5 per cent of the total project/programme budget before the fee?	Yes, 0%	
	3. Are the Project/Programme Execution Costs at or below 9.5 per cent of the total project/programme budget?	Yes, 9.4%	
Eligibility of IE	4. Is the project/programme submitted through an eligible Implementing Entity that has been accredited by the Board?	Yes, it has been submitted by an accredited NIE.	
Implementation Arrangements	1. Is there adequate arrangement for project / programme management?	Yes, the proponent has outlined the mechanisms and structures for project management.	
	2. Are there measures for financial and project/programme risk management?	Yes, the project has identified several risks and mitigation measures.	

	<p>3. Are there measures in place for the management of for environmental and social risks, in line with the Environmental and Social Policy of the Fund?</p>	<p>Yes, an extensive assessment and plan has been provided. However, the following specific issues are flagged for resolution or clarification.</p> <p>CR5: Please clarify or address the following elements with respect to compliance with the AF's Environmental and Social Policy:</p> <ul style="list-style-type: none"> • The EIA that is announced for activities under component 1 using the Department of Environment's ESS policy does not cover all the aspects of the ESP, based on the TOR of Appendix 13. • The project uses an unidentified sub-projects (USP) approach, hence ESMP and sub-project risks/management procedures would be required. This also applies to the activities of 1.1.2, which is currently not sufficiently approached as such. • Output 2.1.1: ESP-compliant mechanism/regulation is required for loan review/approval, including at the fund level allocation rules/guidelines to ensure compliance with Access and Equity principle, Marginalized and Vulnerable groups principle. • Section II. K, risks table. The risks for Marginalized and 	<p>CR5: The issues identified have been addressed at varying levels:</p> <ul style="list-style-type: none"> • Addressed, the TOR have been adjusted to cover all ESP principles • The process chart that has been added to describe the process for handling USPs should be fully integrated and highly prominent in the ESMP. • The review and audit mechanism of the Environmental Protection and Management Act (2015) Section 88 is not adequate to ensure compliance with ESP in the selection of loan activities. In addition, the process described with the TEC on p. 32 to review and approve new subjects to the list of acceptable activities does not
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		<p>Vulnerable groups are similar to those under Access and Equity, and warrant a similar management approach.</p> <ul style="list-style-type: none"> • The Environmental and Social Risk Management Plan (Table 7) would need to include a link to each of the risks identified under II.7, referring to ESP principles. It would also benefit from integration across the components since there is considerable overlap. The same applies to the ESMP. • The ESIA/ESMP mentions on p. 42 – involuntary resettlement – that dwellings and fences are built without respecting the minimum setback distance or without proper planning permission but it is further not clear that these will be considered on an as-is base rather than a should-be base in terms of determining if resettlement will be voluntary or occur at all, rather than a rectification of an illegal situation. The current actual situation, irrespective of its legal status, should be the baseline for determining impacts. • Public Health. The ESIA/ESMP recommends that a Health Impact Assessment be 	<p>provide information how and by whom at that time ESP risk identification and the formulation of mitigation/management actions is carried out.</p> <ul style="list-style-type: none"> • Not addressed. The principle refers to disproportionate impacts on marginalized and vulnerable groups. • Partially addressed. The relevant ESP principles are listed, but not always relevant. The integration across components is still lacking. • Partially addressed. The existing situation is accepted as the baseline, irrespective of its legal status, but the resettlement approach is limited to physical structures and does not include issues of resettlement for livelihoods impacts. • Partially addressed. Provisions for an HIA are included but a mechanism in the ESMP to
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		undertaken. The project should include provisions for an HIA and provide a mechanism in the ESMP to incorporate the HIA findings in the project.	incorporate the HIA findings in the project is not provided.
	4. Is a budget on the Implementing Entity Management Fee use included?	N/A	
	5. Is an explanation and a breakdown of the execution costs included?	Yes	
	6. Is a detailed budget including budget notes included?	Yes. CR6: Please clarify in the case of technical consultants, if local expertise will be utilized.	CR6: Addressed
	7. Are arrangements for monitoring and evaluation clearly defined, including budgeted M&E plans and sex-disaggregated data, targets and indicators?	Yes	
	8. Does the M&E Framework include a break-down of how implementing entity IE fees will be utilized in the supervision of the M&E function?	CR7: Given that no IE fee will be part of the budget, please confirm how the supervision of the M&E function will be conducted.	CR7: Addressed
	9. Does the project/programme's results framework align with the AF's results framework? Does it include at least one core outcome indicator from the Fund's results framework?	Yes. CR8: Please clarify where gender disaggregated data, targets, and indicators will be incorporated.	CR8: Addressed

	10. Is a disbursement schedule with time-bound milestones included?	Yes	
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Technical Summary	<p>The proposed project concept includes several innovative measures to enhance the resilience of Antigua and Barbuda's northwest McKinnon's watershed, including a combination of ecosystem-based adaptation, innovative finance, and capacity building.</p> <p>The initial technical review found that the proposal demonstrated a coherent logic to address climate threats in the context of the small island developing state context in an innovative manner. However, further detail was requested in a few areas.</p> <p>The following clarification requests (CRs) were made:</p> <p>CR1: To bolster the cost-effectiveness argument, please include more financial values, such as those for shelters or mosquito spraying.</p> <p>CR2: Please comment on how the community members involved in the project components and loan program will be engaged as part of ongoing learning and knowledge management for the project.</p> <p>CR3: Please expand on the tangible, lasting, and concrete products that the project will produce.</p> <p>CR4: Please clarify if/how special consideration was given to involving vulnerable groups and women in consultations and project design/activities as a result. This is also alluded to in the ESIA.</p> <p>CR5: Please clarify or address the following elements with respect to compliance with the AF's Environmental and Social Policy:</p> <ul style="list-style-type: none"> • The EIA that is announced for activities under component 1 using the Department of Environment's ESS policy does not cover all the aspects of the ESP, based on the TOR of Appendix 13. • The project uses an unidentified sub-projects (USP) approach, hence ESMP and sub-project risks/management procedures would be required. This also applies to the activities of 1.1.2, which is currently not sufficiently approached as such. • Output 2.1.1: ESP-compliant mechanism/regulation is required for loan review/approval, including at the fund level allocation rules/guidelines to ensure compliance with Access and Equity principle, Marginalized and Vulnerable groups principle. • Section II. K, risks table. The risks for Marginalized and Vulnerable groups are similar to those under Access and Equity, and warrant a similar management approach. • The Environmental and Social Risk Management Plan (Table 7) would need to include a link to each of the risks identified under II.7, referring to ESP principles. It would also benefit from integration across the components since there is considerable overlap. The same applies to the ESMP.
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	<ul style="list-style-type: none"> • The ESIA/ESMP mentions on p. 42 – involuntary resettlement – that dwellings and fences are built without respecting the minimum setback distance or without proper planning permission but it is further not clear that these will be considered on an as-is base rather than a should-be base in terms of determining if resettlement will be voluntary or occur at all, rather than a rectification of an illegal situation. The current actual situation, irrespective of its legal status, should be the baseline for determining impacts. <p>Public Health. The ESIA/ESMP recommends that a Health Impact Assessment be undertaken. The project should include provisions for an HIA and provide a mechanism in the ESMP to incorporate the HIA findings in the project.</p> <p>CR6: Please clarify in the case of technical consultants, if local expertise will be utilized.</p> <p>CR7: Given that no IE fee will be part of the budget, please confirm how the supervision of the M&E function will be conducted.</p> <p>CR8: Please clarify where gender disaggregated data, targets, and indicators will be incorporated.</p> <p>The final technical review finds that the revised proposal has addressed most of the issues raised in the initial technical review. However, the proposal should resolve certain issues to ensure compliance with the Environmental and Social Policy of the Adaptation Fund prior to approval. The following observations are made:</p> <ol style="list-style-type: none"> a) The proponent is requested to strengthen the integration across components within the project relative to the ways in which environmental and social risks are addressed, b) With respect to the selection of loan activities and new subjects to the list of acceptable activities, the proponent is requested to add additional detail and strengthen the means or mechanisms through which the project will ensure compliance with the AF's ESP, c) The proponent should further address the disproportionate impacts on marginalized and vulnerable groups, as well as issues of resettlement for livelihoods impacts.
Date:	6 September 2016



**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

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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.

Financing Concrete Adaptation

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.

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/1M40qsG> 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 SIRD 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

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.

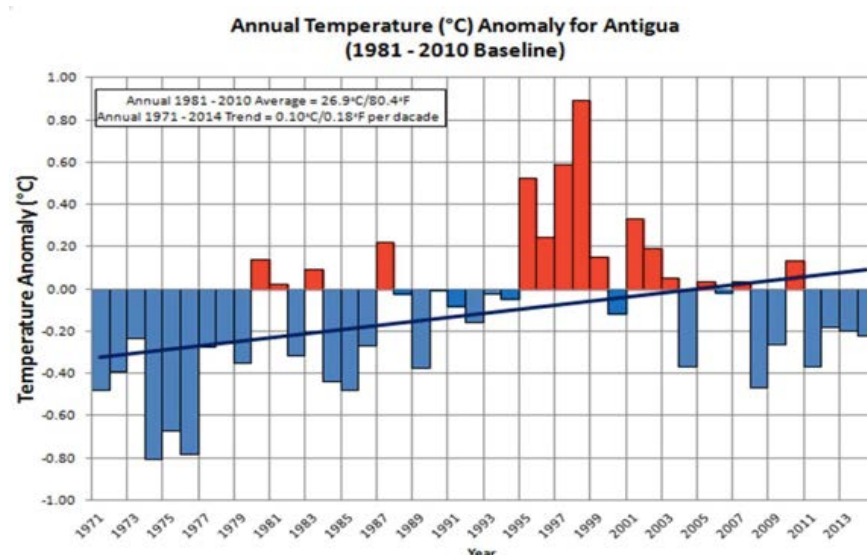


Figure 3. Annual Temperature Anomaly for Antigua (1981 – 2013) (Antigua Met Service)

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.

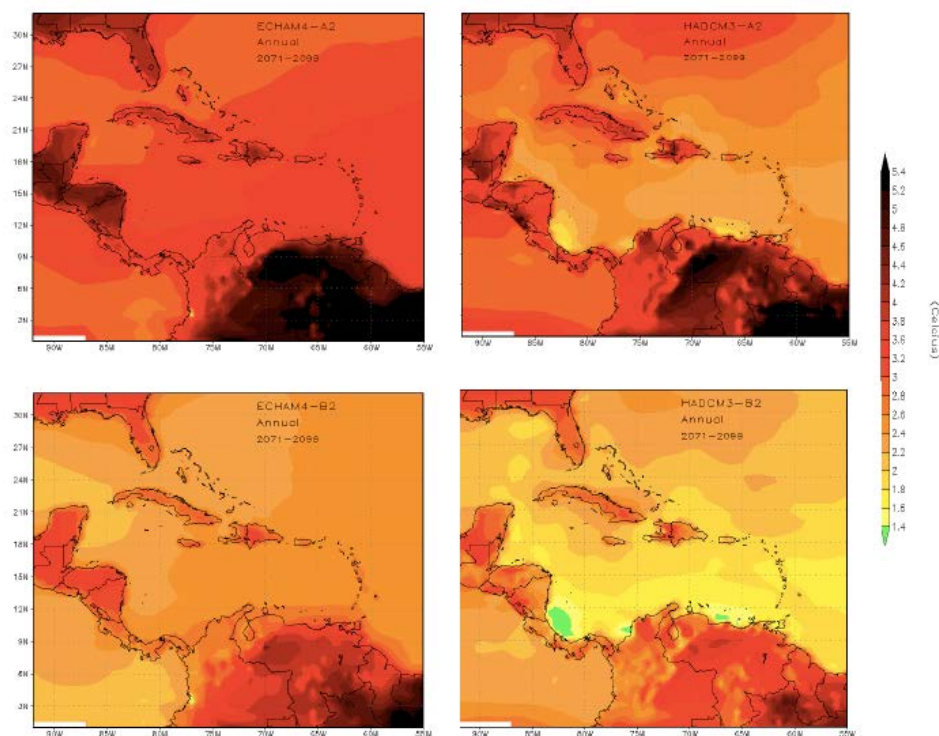


Figure 4. PRECIS regional climate model projected changes in the annual mean surface temperature for 2071-2099 (compared to 1961-1989) for high (top) and low emissions (bottom) scenarios for the Caribbean (ECLAC 2010)

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.

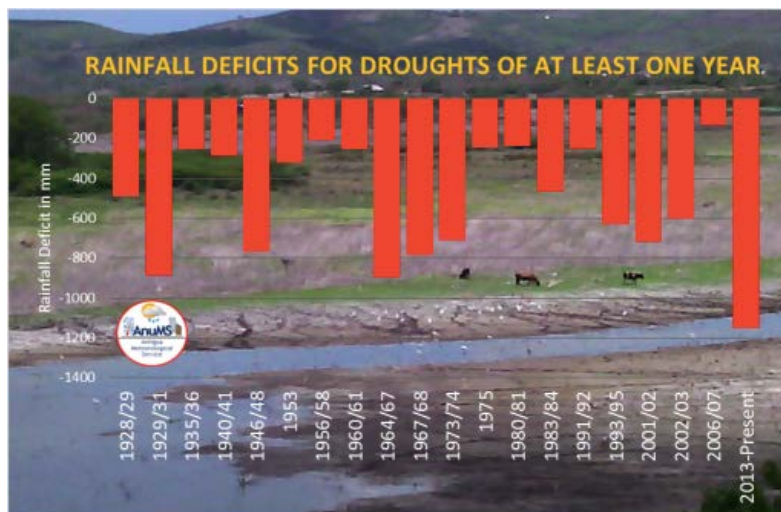


Figure 5. Rainfall deficit for 2013 – 2015 is the most extreme in Antigua’s recorded history (Antigua Met Service)

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

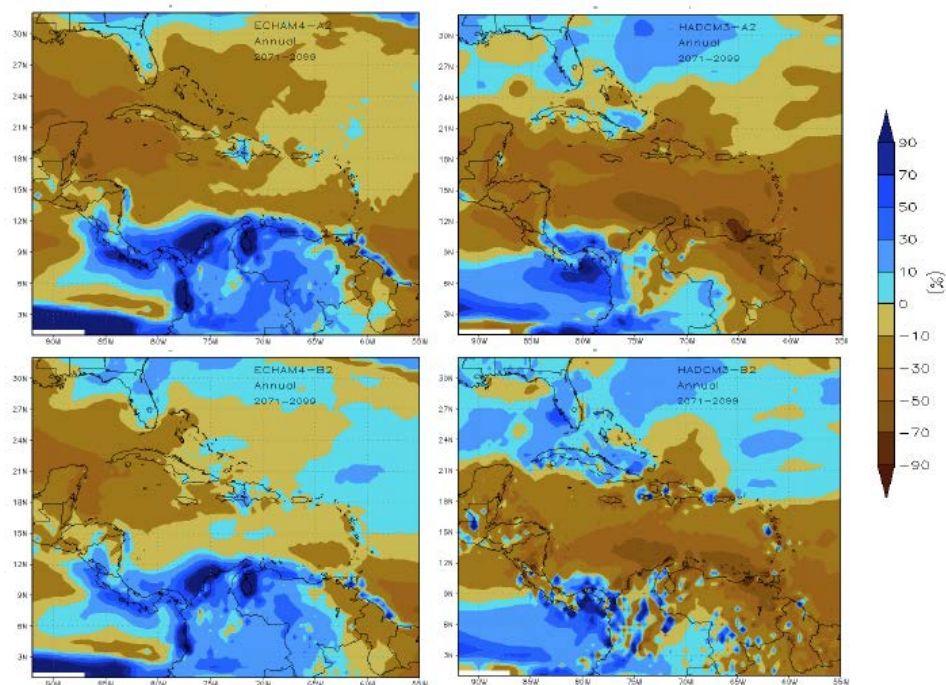


Figure 6. Annual mean changes in precipitation (%) for 2071 – 2099 as simulated by PRECIS for A2 (top – high) and B2 (bottom – low) emission scenarios (ECLAC 2010)

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, dishwashers,

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.

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/25NBF9>

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

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.

significance losses⁴⁶. Similar flood 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

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

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

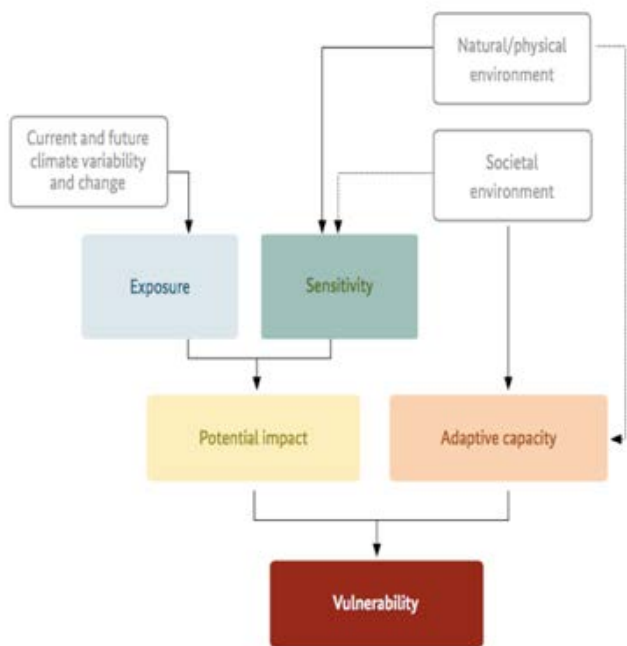


Figure 7. Visual representation: the objective of this project is to support natural and physical systems to reduce sensitivity, coupled with enhanced social adaptive capacity in the building sector, in order to reduce vulnerability in the core settlement area on Antigua's northwest coast. Source: adelphi/EURAC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

include interventions to allow the buildings to withstand hurricanes and droughts.

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	<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	\$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	<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	\$2,235,500
4. Project/Programme Execution cost			\$636,240
5. Total Project/Programme Cost			\$9,970,360

6. Project/Programme Cycle Management Fee charged by the Implementing Entity (if applicable)	<u>\$ 434,000</u> None
Amount of Financing Requested	\$ <u>910,970</u> 00,00 0*

*~~Does not include~~ 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).

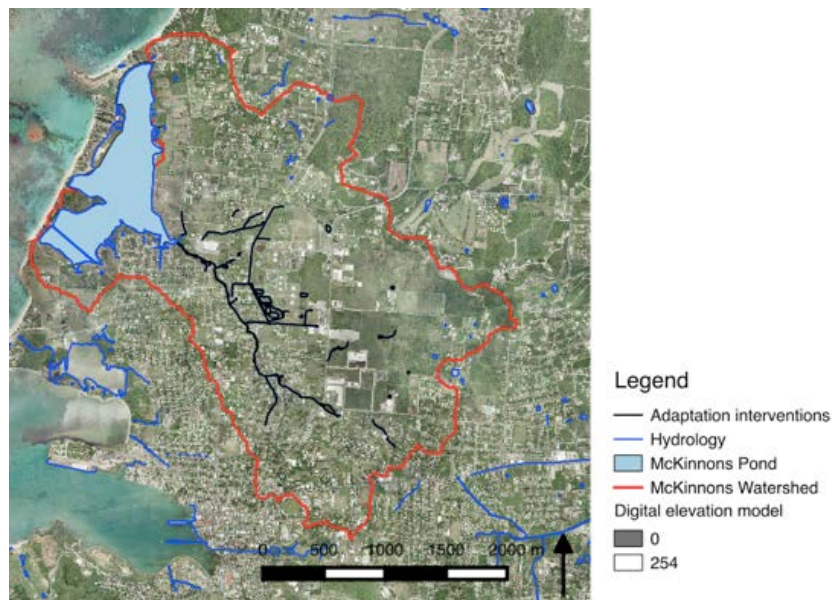


Figure 9. Map of McKinnon's watershed boundary on Antigua's northwest coast, delineating the 3 km waterways bisecting urban and semi-urban areas for adaptation interventions

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 was be~~ used to ~~finalize the~~ draft the TORs for the design and supervision contract, ~~which will be validated by the Technical Advisory Committee (TAC) prior to issue~~ (TORs in Appendix 13).

The Technical Feasibility Study highlighted data gaps, namely detailed topographical data for the waterway, which is necessary to develop flood hazard maps and to finalize climate resilient drainage plans. This drainage design activity has been incorporated into the project budget under Output 1.1.1. Detailed technical drawings of the specific waterway interventions will therefore be the first activity upon project approval, which will then enable a full EIA. The Department of Environment has provided detailed technical drawings for the Cashew Hill waterway adaptation interventions, to illustrate the quality of the outputs that will be produced at the outset of project implementation.

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

Prior to implementation of Output 1.1.2 (physical works), a full EIA is required by national law (Physical Planning Act 2006) to be conducted using the technical drawings in order to apply for planning approval, following which the Environmental and Social Management Plan and Monitoring Plan will be revised accordingly. The figure below provides an overview of the ESS adaptive management and planning process for Component 1.

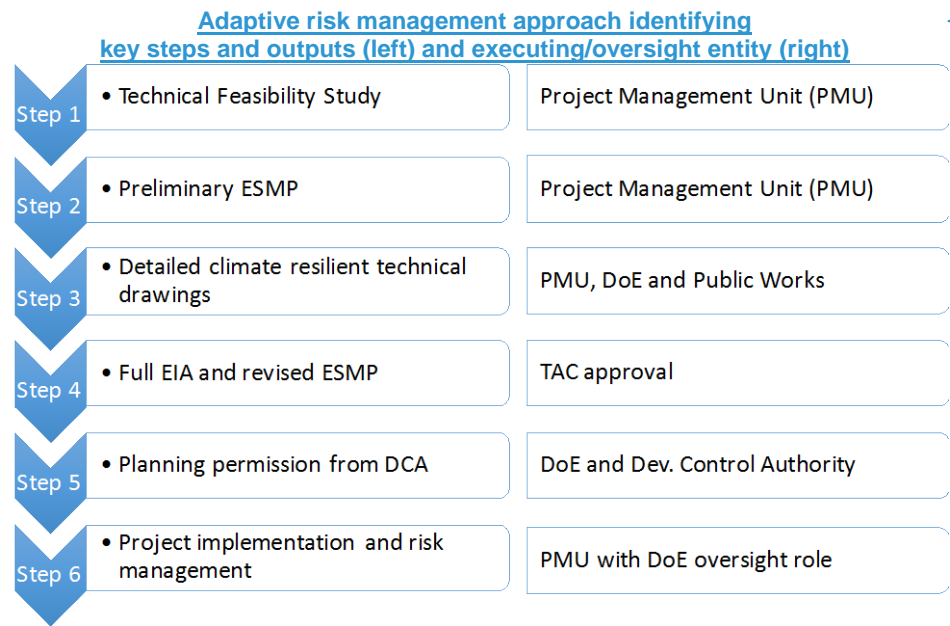


Figure 10. Six-step process for developing and managing environmental and social risks under Component 1

The above figure defines the steps consistent with an unidentified sub-projects (USP) approach. The Environmental Impact Assessment (EIA) requires that an Environmental and Social Monitoring Plan 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 draft Monitoring Plan is available in Appendix 1 and the revised Monitoring Plan 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. Full costing of the Monitoring Plan implementation will be included, and indicators used for monitoring will be disaggregated by gender (Terms of Reference for the EIA in Appendix 13). The EIA and ESMP will include community consultations, and the outputs will be approved by the TAC.

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 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).

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.

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

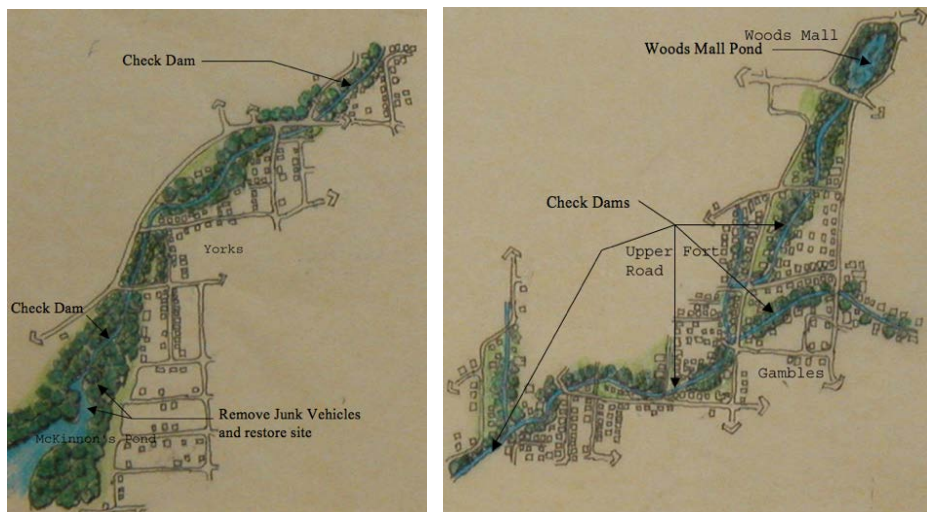


Figure 11. Drawings from Ivor Jackson's 2002 northwest coast local area plan from the waterway leading into McKinnon's pond (lower left) to Woods Pond (top right).

~~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 existing baseline in McKinnon's watershed includes dwellings and structures that are within minimum setback guidelines (currently the setback guideline is 30 feet, but this is projected to increase), and the project's approach, recognizing the current situation and vulnerability of persons in the community, is to take an incremental approach to achieving climate resilient development.

Firstly, the Watershed and Wetlands Management Committee will be convened to oversee waterway physical works and law/policy development. The Committee constitution is provided for in Section 45 of the EPMA and includes the appointment of local residents and other key agencies. Secondly, technical and legal experts under Component 1 will make recommendations for climate resilient waterway setbacks, which will be enshrined in law and policy. Existing structures will be surveyed as part of the technical design process, and these surveys will constitute the existing baseline where structures will be grandfathered in the waterway setbacks. Thirdly, capacity building of the relevant agencies (Lands, DCA, DoE) will be built in order to enforce waterway setbacks going forward. Lastly, as part of the Terminal Evaluation of the project, next steps will be identified based on consultative processes as to how to bring existing

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[structures into compliance with waterway setbacks, if this is still necessary following the project's interventions.](#)

[The technical design for the concrete waterway interventions 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. [Consultation guidelines are established in Appendix 1.](#) 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- The EIA Terms of Reference in TORs in Appendix 13 builds on the minimum legal requirements to address the fifteen categories of the Adaptation Fund's Environmental and Social Policy.)~~

The Technical Feasibility Study assessed the interventions proposed in the 2001 Local Area Plan, and identified new activities that would be required. [Indicative c](#)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	<p>Proper buffers have not been enforced and maintained but consider:</p> <ul style="list-style-type: none"> ○ <u>Revising and enforcing building regulations to set-back from watercourses for all new applications (grandfathering in existing structures to achieve a phased approach to compliance)</u> ○ Enforcing sustainable development and low impact use as a <u>climate resilient development policy of development.</u> ○ 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. 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>
	<p>○</p> 	


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	<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 household development of York's.	<p>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 bioremediation.</p> 	Prevent flooding under a controlled water level of the McKinnon's pond.

	<p><i>McKinnon's pond was almost dry after an extended 3-year drought</i></p>	
<p>Pipes crossing the waterway, which catch debris and contribute to flooding</p>	<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>
<p>There is no water park, wet area or water structure to retain water on the water run.</p>	<p>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.</p>	<p>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</p>

	 <p><i>Eroded infrastructure by Woods Pond</i></p>	
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
	 <p><i>Component 3 will target public awareness about the flooding impacts of improper solid waste disposal</i></p>	

<p>Trees and grass was cut and removed leaving place for erosion.</p>	<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: 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>
<p>Wastewater is observed on the last part of the catchment and it's providing from overflow of septic tanks.</p>	<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. 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>	<p>Increase safety by taking away disease-carrying mosquitoes Decrease odors of rotten eggs, Using bioremediation to help sanitation</p>

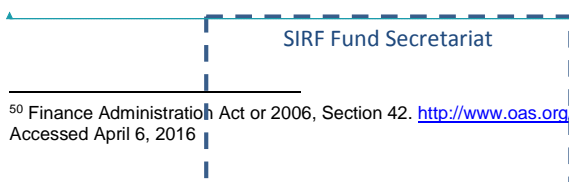
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Several “soft” policy and training activities under this project include incorporating new climate-resilient guidelines and standards into the Building Code for climate mainstreaming; and integrating the LAP into the implementation practices and work 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.

Consistent with an unidentified sub-project approach, there is a five-step process that will be followed to validate the household loans to ensure that activities will meet adaptation and resilience criteria. These steps are detailed in the Manual on Grants and Revolving Loans in Appendix 9, and key risk management procedures are identified below.



⁵⁰ Finance Administration Act of 2006, Section 42. http://www.oas.org/juridico/PDFs/mesicic4_atq_fin_adm_act.pdf
Accessed April 6, 2016

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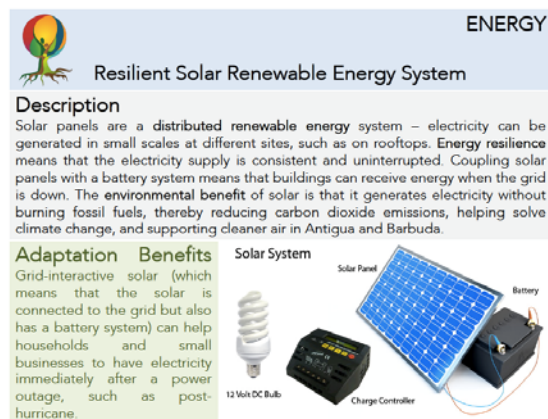


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Figure 12. Roles and Responsibilities in the Loan Decision-Making Process. Source: Appendix 9: Manual on grants and loans.

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At Stage 1, the project will develop informative and educational material about climate change and adaptation at the household level, so that potential beneficiaries understand



activities that can and cannot be funded by the project. Prior surveys in the project site have shown that community members have a high understanding of climate impacts (KAP survey). However, technical knowledge on adaptation is low, and the project seeks to address this knowledge gap.

A draft information package, which is included in Appendix 5, provides a basis for loan approval. If household members apply for loans to cover activities not listed in the information package, when the interventions are reviewed by the Technical Evaluation Committee

Figure 13. Screenshot of the draft information package material in Appendix 5 on adaptation options in buildings

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(TEC) in Stage 2, the TEC evaluate the adaptation value of the interventions, and add the new interventions to the information package so that other interested loan applicants can benefit from a wider variety of approaches to adaptation. This approach will facilitate shared learning and innovation. In addition, the information package will be reviewed and revised as the Building Code is updated. The update of the Building Code to be climate resilient is budgeted under Output 1.1.1 and will provide the basis for guiding the TEC evaluation under Stage 3.

The five stages outlined in Figure 12 constitute the mechanism for compliance with the 15 areas of the Fund's Environmental and Social Policy (ESP). The Environment Act in Section 88 requires by law that the SIRF Fund's activities are audited and reported in a transparent manner. The following Section 88 applies to the Revolving Loan Facility activities and is the mechanism for ensuring compliance with the ESMP:

Environmental Protection and Management Act (2015) Section 88:

(1) Subject to sub-section (2) and not later than the three months after the end of each financial year, the [SIRF Fund] Board shall submit to Cabinet an annual report

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on the work and activities of the Board for that financial year and Cabinet shall not later than one month later lay the same in Parliament.

(2) An annual report pursuant to sub-section (1) shall be in such form as prescribed by Regulations and shall be accompanied by the auditor's report pursuant to section 87.

(3) A summary of an annual report pursuant to sub-section (1) shall be published in the Gazette and at least two newspapers in general and at least weekly circulation in Antigua and Barbuda and the entire annual report shall be made available to the public in electronic format.

Draft Terms of Reference for the Loan Board are provided in provided in Appendix 13, and will be reviewed and adopted by the SIRD Fund Board at its first meeting. The SIRD Fund Board's procedures are governed by the regulations (draft regulations are provided in Appendix 10).

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 SIRD 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



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Figure 14. The project will collaborate with a local waste facility to ensure proper disposal of appliances

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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.

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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:

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

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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*.

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

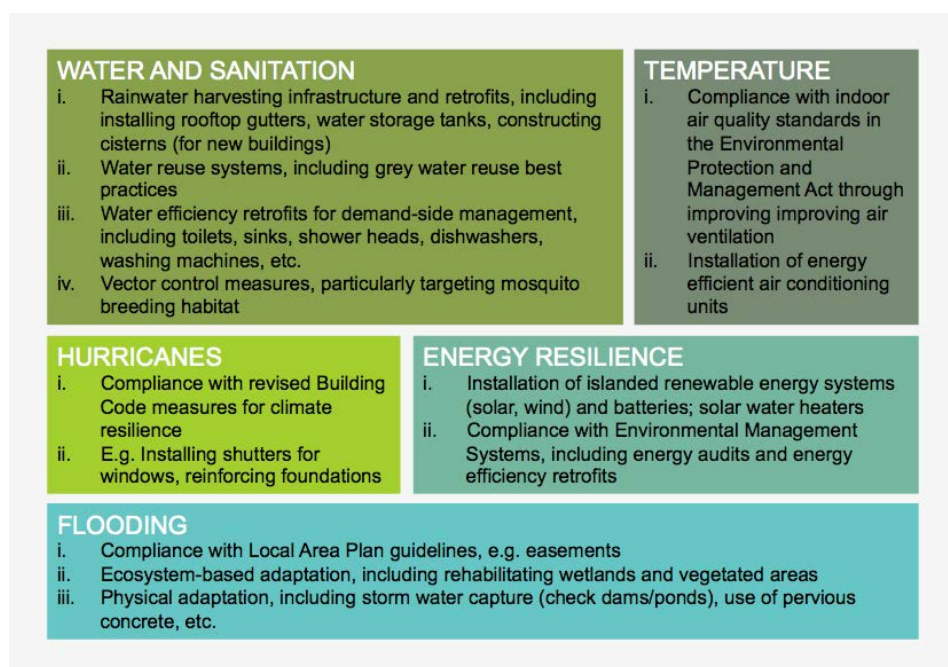


Figure 15. Indicative eligible adaptation activities in buildings to be funded through the revolving loans program as well as other sources of funding.

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 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 SIRC 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.

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

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

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

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 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 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), and used as a starting point the DoE's standard EIA approach, adding additional provisions to comply with the Adaptation Fund's environmental and social policy, specifically:

1. Compliance with the Law
2. Access and Equity
3. Marginalized and Vulnerable Groups
4. Human Rights
5. Gender Equity and Women's Empowerment
6. Core Labour Rights
7. Indigenous Peoples (not applicable)
8. Involuntary Resettlement
9. Protection of Natural Habitats
10. Conservation of Biological Diversity
11. Climate Change
12. Pollution Prevention and Resource Efficiency
13. Public Health
14. Physical and Cultural Heritage
15. Lands and Soil Conservation

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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.

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

Viability 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 Pond and would require regular dredging of the Pond every 5 – 7 years, which is approximately 1.5 M USD per dredging. Ecosystem-</p>

	<p>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> <p>In 2016, the Central Board of Health (CBH) was budgeted EC\$3,574,679 (or US\$1.3 M) for the year for Vector Control. This represented a 25% budget increase in vector expenditure in just two years – the 2014 vector control budget was EC\$2,841,903.</p> <p>The cost to the Central Board of Health for vector control over the next 10 years is likely to range from a minimum of US\$13 M to upwards of US\$23 M.</p> <p>Assuming the trend of a 25% budget increase every two years, over the next decade the Central Board of Health could spend upwards of US\$23,494,792 on vector control measures.</p>
COMPONENT 2 – Revolving Loans for Adaptation	
Do Nothing	Not including this small loans component in the project risks the project negatively impacting residents on the

	<p>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	<p>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).</p>
Construct shelters to meet category 5 hurricanes and flooding	<p><u>The cost to construct a basic community shelter is estimated at EC\$1.5 M (US\$560K) for a single storey building, and EC\$3.5 M (US\$1.3M) for a double storey. However, the cost of constructing a climate resilient community shelter with a reliable source of electricity, water and necessities, is estimated at double that cost. For the population of McKinnon's watershed of approximately 5,000 people, at least three double storey community shelters would be needed, at a cost of approximately US\$7.8 M.</u></p> <p><u>There are over 600 hundred homes within the 100ft safety mark for the waterway. It would take well over three shelters to provide for all of the persons who live in the community.</u></p> <p>This alternative would <u>also</u> fail to mitigate the <u>economic and social losses and</u> damages 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</p>

	<p>government an estimated hundreds of millions of dollars.⁵⁶</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	<p>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.</p>
The project can conduct the regular public awareness and hope that can change behaviour of the community and Government agencies	<p>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</p>

⁵⁶

	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”*⁵⁷ 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.

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.

⁵⁷ Government of Antigua and Barbuda, Second National Communication, pg. 261

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 flooding⁵⁸.

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 SIRD Fund).

Sustainable Island Resource Framework Fund (SIRD Fund)

The Government of Antigua and Barbuda is developing a national fund, the Sustainable Island Resource Framework (SIRD) 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 SIRD 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 SIRD Fund will catalyze internal (protected areas visitor fees, a water levy, a carbon tax, and repayments) and external funding sources to enable the country to meet its climate and sustainability goals in a coordinated, systematic and cost-effective manner⁵⁹.

National Poverty Strategy

The National Poverty Reduction Strategy (NPRS)⁶⁰ 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

⁵⁸ UNFCCC. (2009). Antigua and Barbuda’s Second National Communication on Climate Change.

⁵⁹ The SIRD Fund’s business strategy brief is available for download:
http://www.oas.org/en/sedi/dsd/Energy/SECBI/SIRD_BusinessConceptNote.pdf

⁶⁰ GOAB, 2011. Poverty Strategy Reduction Strategy

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 ones⁶¹. NEST is considered a more comprehensive approach to poverty reduction in Antigua and Barbuda, which was developed with the aim of economic rebalancing⁶².

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 and appropriate technology; and (v) are treated equally in land, agrarian reform, and land resettlement schemes.⁶³

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

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

⁶² GOAB, 2012. National Economic and Social Transformation (NEST) Plan

⁶³ Huggins, T. 2014. Country Gender Assessment for Antigua and Barbuda. Prepared for the Caribbean Development Bank (CDB). http://www.caribank.org/uploads/2014/12/CGA-AB-Vol-I- JUNE-2014_FINAL.pdf Accessed May 9th, 2016.

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 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 Fund⁶⁴. 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 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

⁶⁴ The SIRF Fund's business strategy brief is available for download:
http://www.oas.org/en/sedi/dsd/Energy/SECBI/SIRF_BusinessConceptNote.pdf

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.

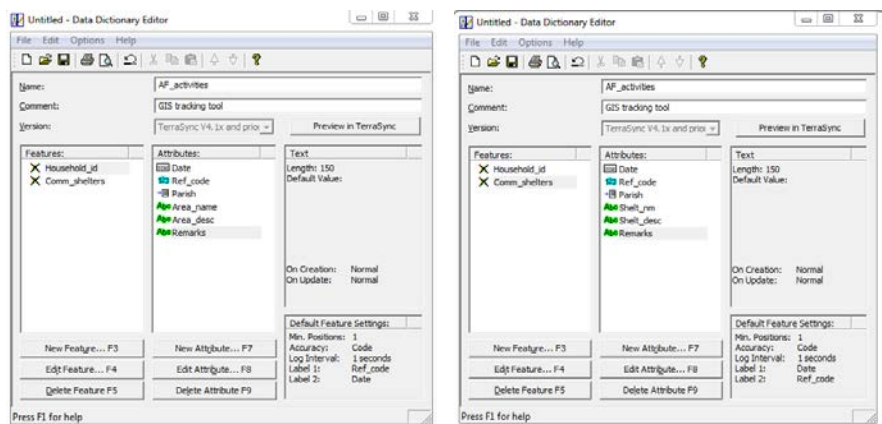


Figure 16. Data dictionary for AF GIS Tracking Tool

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 17. 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.

These knowledge products will be tailored to target different audiences, namely: the general public; technicians; and high-level policy-makers. Tangible, lasting, and concrete outputs include the following indicative products:

- A Local Area Plan available online (Output 1.1.2)
- Informational briefs on the cost-effectiveness of adaptation interventions to be implemented under the Local Area Plan (Output 1.1.2)
- A revised *Adaptation Options in Buildings* informational packet using lessons learned under this project, with printed folders distributed to key partners (Appendix 5)

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- At least three documentary-style videos on concrete adaptation interventions uploaded to the DoE's YouTube channel
- A jingle to sensitize the public about the economic benefits of adaptation to climate change

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The above listed products will be refined and executed through the development and implementation of the comprehensive communications plan for broad-based community education, awareness and mobilization of support, and the other awareness activities budgeted for in Section G. Detailed Budget.

A Knowledge, Attitudes and Practices (KAP) study found that among respondents in the OECS sub-region, television was the preferred medium for receiving information on climate change (73.3%) followed closely by radio (63.7%). The majority also stipulated news and infomercials as their preferred TV & Radio vehicles for the 'packaging' of such information.⁶⁵ Radio and television will be a key means of communication to the general public, however dissemination will target multiple avenues in order to reach a broad audience – for example, according to the KAP Study, younger respondents have a greater preference to get climate change information via websites, email, social media and text messaging. The mediums for communicating these project outputs will be subsumed within an overarching communications strategy that will include a range of the following include;

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- 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 presence in social media, specifically through its Facebook page and twitter account. The AF project will therefore feature heavily as the project unfolds, capturing and displaying the stories of the residents and persons working closely with the project
- The Department has an active Facebook page, twitter account, and other media, including regular TV and radio interviews. The Department maintains a YouTube channel for videos produced: <http://bit.ly/2c3xWvt>
- The Department further has a positive relationship with a local environmental NGO called the Environmental Awareness Group (EAG). This NGO hosts weekly articles in the country's most popular newspaper, who generally has a daily readership of more than 30,000. The Department will partner with EAG to publish articles through the EAG Talk column
- 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

⁶⁵ Orange Media, 2014. Technical Report I: GCCA Visibility Strategy & Action Plan. OECS Project on Climate Change Adaptation & Sustainable Land Management in the Eastern Caribbean.

- 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.
- An annual stakeholder consultation meeting will be held with the community members to review progress of the project, including through presentations by beneficiaries, and solicit learning and lessons shared through focus group discussions. Annual meetings will be documented in detailed reports and will form the basis for adaptive management.
- Community members will be encouraged and supported in developing documentaries on the work that they are involved with, in the respective of components 1 and 2 (Box 1).
- Outcomes of the various components will be packaged in briefing notes/press releases that will be shared on the Department of Environment website, websites of local partner stakeholders (e.g. Public Utilities company, National Office of Disaster Services, Environmental Awareness Group, etc.)
- 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.
- The Department also engages with traditional media and will ensure that the messages and outputs of the project are expressed through regular media blitzes, which include:
 - Radio & Television – Observer, ZDK, Serpent, etc.
 - Print Media – Daily Observer, Caribbean News
 - News Media - Antigua & Barbuda Broadcasting Service (ABS)
 - Cinema – Caribbean Cinemas (a high “bang for buck” publicity)
 - Community noticeboards
 - Proposed Launch Event

VISIBILITY and MOBILISATION⁶⁶

The UNDP FlipCam Project was introduced in 2009 to document their projects on the ground, the FlipCam revolutionized video production at UNDP, enabling a low-cost alternative to acquire footage on UNDP projects around the world. The FlipCam came with a 15 min instructional video that provided all the information needed to use the camera to produce short videos that tells a better story that previously.
[more info: <https://vimeo.com/5542623>]

⁶⁶ Adapted from Orange Media, 2014. iLand Resilience Public Awareness Strategy & Action Plan: Interim Report II. OECS Project on Climate Change Adaptation & Sustainable Land Management in the Eastern Caribbean.

How this could be applied to the Adaptation Fund project

The explosion of smart phones and tablets with high quality cameras is an excellent opportunity to gain more visibility for the cause of concrete adaptation and best practices. Opportunities include:

1. A short film competition on the most innovative household adaptation solution
2. Documenting the progress of the waterway resilience interventions or exposure of other work being done by the community or agencies
3. Citizen journalism to cover real issues occurring in the country in real time for example, to highlight flooding or drought impacts, especially challenges faces by vulnerable community members, and to highlight the good work being done by individuals and community groups.

All of this brings compelling content that are of interest to the local communities within Antigua and Barbuda and could be tweeted, liked or viewed through the social media initiative.

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Box 1. Creative visibility and mobilization content that will be further developed through the project's communications plan

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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 interventions⁶⁷.

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 and West Palm Beach. A quantitative baseline household survey was combined with focus group discussions to provide robust data required to assess vulnerability⁶⁸.

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

⁶⁷ 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

⁶⁸ CARIBSAVE, 2015. LVIA, p. 13

the three areas (60 in Cashew Hill; **51 households in Yorks/McKinnon's** and 48 in West Palm Beach/Jolly Harbour)⁶⁹.

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 literature⁷⁰.

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.

⁶⁹ CARIBSAVE, 2015. LVIA, p. 15

⁷⁰ CARIBSAVE, 2015. LVIA, p. 15

Community Map of Yorks and McKinnons, Antigua

Vulnerability



Figure 18. 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 SIF 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 SIF 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 SIF 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 SIF 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 website⁷¹, along with a powerpoint presentation that summarized the project components and interventions.

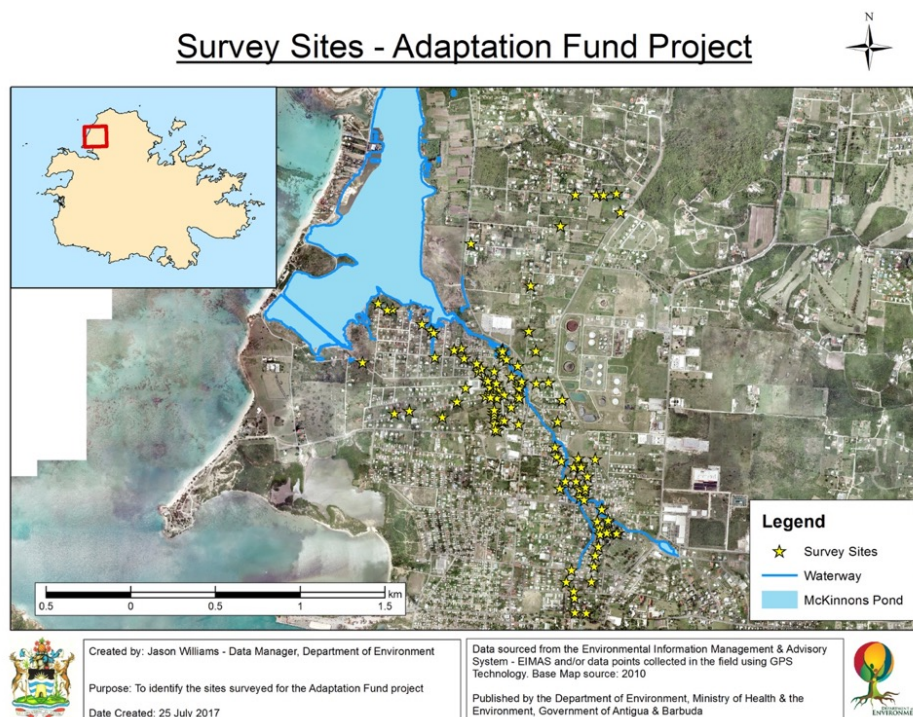


Figure 19. Spatial distribution of household and small business surveys conducted in the project site along McKinnon's waterway

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, 28%

⁷¹ Website of the Department of Environment, 2016. Adaptation Fund Project. Accessed 25th July 2016. <http://www.environmentdivision.info/news.php/news/187/group/16>

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).

Prior to the community consultations an interagency consultation was held at the Department of Environment. Invitees included key agencies that would be able to add value to Component 3 of the project, specifically the discussion on the community shelters. One of the significant issues that arose from that discussion was the need to identify vulnerable peoples within the community. Once they had been identified then further considerations would be made to the community centre checklist, as exemplified in the criteria in Appendix 6, to ensure that all the centres are accessible.

Further, a site visit was conducted by a civil society organization along with the Community Development Division and a representative from the Association of Persons with Disabilities. This site visit completed the objectives as stated above, and also allowed for a basic assessment of the present dwellings of persons within the disabled community. A report of the site visit to exceptionally vulnerable households has been included in Appendix 2. Based on this report, the following recommendations were made:

- The Adaptation Fund project should allocate a portion of the grant resources under Component 3 for exceptionally vulnerable persons who would not be able to repay concessional loans so that they can improve their resilience to climate change
- Criteria to determine households that are eligible for grant funding should be transparent and equitable with strong community ownership. It is recommended that the Antigua and Barbuda Association of Persons with Disabilities (ABAPD) lead the grant award process and criteria for exceptionally vulnerable households

However, the provisions of grants under this project carries a risk of persons not wanting to repay loans. It is estimated that the extremely vulnerable is less than 25 of the 5,000

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households. The project will identify these persons and seek an approach to address needs without undermining the integrity of the entire Revolving Fund program. The process to do this will be the same for the decision-making process of the project.



Mitchum (67 years old) lives alone and has hearing problems and is an amputee. He uses walking sticks and has no electricity or running water. His house is in very bad condition. He is very innovative in his water harvesting methods where an old spout has a hole and a piece of old metal spouting running the water to a plastic container. Wherever the spouting has a hole or a dip, he collects the

water in a container. His income comes from burning wood at the back of the yard in a large kiln to make coal. He made a cart and adapted it for pulling the wood to the kiln.

Box 2. A site visit was conducted to the homes of eight persons with disabilities in the project site, following which a recommendation was made to award grant financing under component 3, to certain exceptionally households in order to improve their resilience to climate impacts. Source: Excerpt from *Appendix 2 Consultation Minutes*.

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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)
Component 3 Adaptation Fund Interagency Consultation	Identification of vulnerable areas based on experience. Itemisation of considerations for community shelter checklist	Expansion of survey area to include all areas identified. Inclusion of disabilities access and other key needs included in the community shelter checklist
Site Visit Report	Concern regarding how persons with disabilities would be included in the project design; whether they would be eligible for loans or if they could receive grants	Inclusion of disability access to community shelters within Component 3
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	<p>Concessional loans must be passed down to renters</p> <p>Inclusion of rent control provisions in the Loan agreements with landlords that rent out their properties</p> <p>Complaints mechanism managed by the DOE where residents could report issues to investigate and act as mediator</p>
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	<p>A manual was developed to clarify processes and increase transparency of the loan decision-making process</p> <p>Information including social safeguards will be uploaded to the Adaptation Fund page of the DOE's website</p>

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 filtrating 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 SIRF 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 prepayments 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 <u>seeks to ensure fair access, transparency, and equity throughout implementation. Direct beneficiaries of project activities are</u> subject to the Department's stringent procurement rules <u>and oversight by the Project Management Committee (PMC).</u>	<p>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 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. <u>Barriers to access micro-loans are being addressed by providing unsecured loans. However, as demonstrated in community consultations, some vulnerable families such as persons with disabilities may not have a source of income. Component 3 as the community component will provide certain exceptionally vulnerable households with grants for climate resilience.</u></p> <p><u>Criteria/guidelines for vulnerable homes to receive grant financing under Component 3 and decision-</u></p>

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		<p>making authorities will be defined transparently and equitably. The Antigua and Barbuda Association for Persons with Disabilities will play a key role in this regard, as some persons with disabilities living in the project site are exceptionally vulnerable.</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.⁷² 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 widelyIt is generally known that women find it difficult to access credit in vulnerable areas. If given an opportunity, women</p>

⁷² CARIBSAVE 2015. Local area Vulnerability Impact Analysis for Antigua and Barbuda

		<p>generally will access financing to protect their homes and families. Gender-disaggregated indicators will track women's involvement. 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.	The project will be establishing waterway setback guidelines for McKinnon's waterway, however existing structures will need to be grandfathered in. The existing baseline indicates that there are structures within the minimum setback distance of the waterway (30 feet), and some structures are so close that works will have to be

		<p><u>done by hand as machines cannot access the areas. 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.</u></p> <p>Property owners along the waterway may object to the repair of the stream if they believe their property boundaries are being infringed on.</p>
<i>Protection of Natural Habitats</i>	The project aims to rehabilitate and protect natural habitats	Work on the roadway may cause temporary untended 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

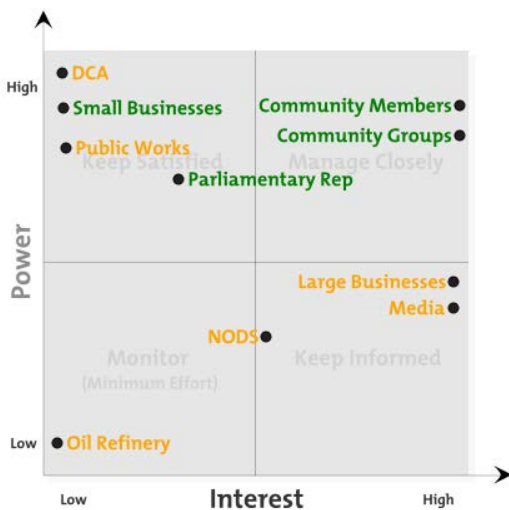


Figure 20. Stakeholder Analysis highlights supporting and neutral actors; no detractors are identified.

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

(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.

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.

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.

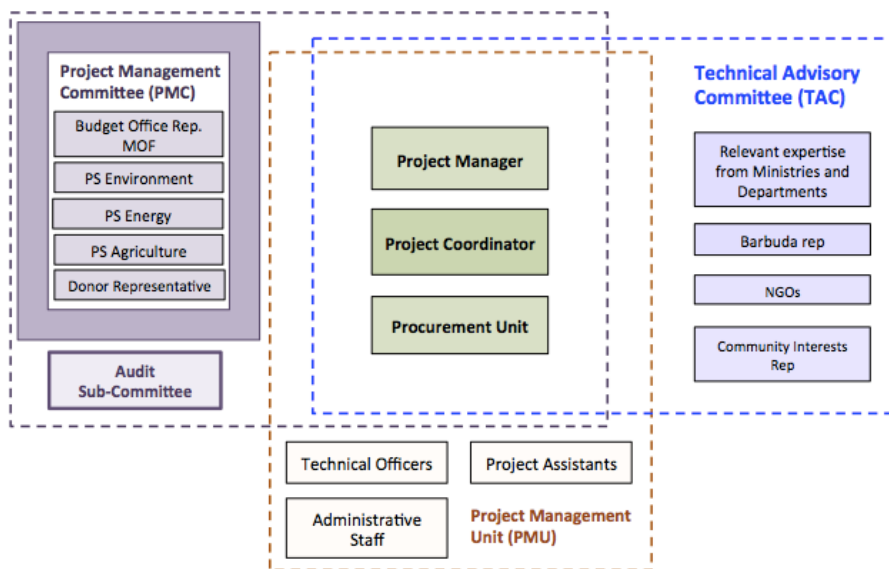


Figure 21. Diagram of the NIE's project management structure

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	Low/ Medium

		scenarios for planning and to calculate costing 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 (see Appendix 1 for the full report). A technical feasibility study was also completed during the project preparation stage (Appendix 7). A comprehensive EIA and ESMP are required under the Physical Planning Act (2003 – Schedule III) once the technical drawings are finalized for the project interventions, therefore the Environmental and Social Risk Management Plan presented here will be revised per the Terms of Reference for the EIA and Monitoring Plan in Appendix 13.

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

Risk	Adaptation Fund Environmental or Social Area	Mitigation Measures	Time	Mitigation Measures	Time	Responsibility	Monitoring and Reporting	Frequency
Pollution of McKinnon’s Pond and the watercourse by construction debris including soil, vegetation, solid waste during re-engineering of watercourse.	<ul style="list-style-type: none">Protection of Natural HabitatsConservation of Biological DiversityPollution Prevention and Resource Efficiency	Timely removal of cleared debris (same day depending on volume for resource efficiency)	Thrice weekly					Weekly
Negative impact on health.		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.	As per					As per

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Schedule work during periods of low rainfall

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Water quality monitoring – develop a monitoring plan by the Department of Analytical Services and strict adherence to the plan.

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Monitoring for HIA, implementation of suggested mitigation measures.

Clearing of vegetation from waterways and

- Protection of Natural Habitats
- Conservation of Biological Diversity

Limit clearing to only what is required for construction work within a certain time period.

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banks of the waterway exposing soil and resulting in erosion.	<ul style="list-style-type: none"> • Pollution Prevention and Resource Efficiency • Lands and Soil Conservation 	<p>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.</p> <p>Thrc</p> <p>Replant banks of water course with recommended vegetation as soon as feasible (see appendix 2)</p>	
Inadequate planting material	<ul style="list-style-type: none"> 1. • Lands and Soil Conservation 	<p>Ensure supply beforehand by growing in the DoE nursery or source locally</p> <p>Befc</p> <p>star</p> <p>Use only native or naturalized species</p> <p>Control invasive species during project activities</p>	

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Availability of water for maintenance of vegetative buffer (Due to drought)	<ul style="list-style-type: none"> Climate change 	Choose plants that are drought tolerant and require minimum care (see appendix 2)	Before start	
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	<ul style="list-style-type: none"> Public Health Marginalised and Vulnerable Groups Gender Equity and Women's Empowerment 	Choose designs which minimize vectors using ecosystem-based integrated mosquito abatement strategies Bio-remediation (predatory fish). Monitoring and mitigation as recommended in HIA.	Before start More prone after rain	; not oE
Resistance of property owners (e.g. drainage easements, movement of	<ul style="list-style-type: none"> Human Rights Involuntary Resettlement 	Public consultation and education Stakeholder involvement specifically in the choice of	Before project duration	and

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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	<ul style="list-style-type: none"> • <u>Pollution Prevention and Resource Efficiency</u> 	Maintenance by periodic cleaning after checking level of sedimentation	Cheaper 6 months after conservation and major events	ds
Growth of invasive plants such as	<ul style="list-style-type: none"> • <u>Protection of Natural Habitats</u> 	Periodic mechanical removal to keep them to less than 10% of the pond or waterway	Durable and	of

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<i>Typha</i> spp and water hyacinths	<ul style="list-style-type: none"> Conservation of Biological Diversity 				
Improper location of check dams, retention ponds	<ul style="list-style-type: none"> Protection of Natural Habitats Conservation of Biological Diversity 	Soil percolation tests to determine the best location of the dams	Before project		ds
		Siting on public land where possible			
Release of rodents into the community during clearing of derelict vehicles from the waterway.	<ul style="list-style-type: none"> Public Health 	Rodent extermination before removal of vehicles.	During construction		ds
Pollution of waterway and McKinnon's pond by rodenticide during rat extermination	<ul style="list-style-type: none"> Protection of Natural Habitats Conservation of Biological Diversity Pollution Prevention and Resource Efficiency Public Health 	Use least toxic method that is effective; consult with local experts (e.g. EAG field officers). Monitoring and mitigation as recommended in the HIA.			er ds

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Increased water velocity in areas of the waterway that are covered in concrete	<ul style="list-style-type: none"> Protection of Natural Habitats 	Use pervious surfaces so more of the water will permeate to the soil	Duri engi desi proj inte	y ds
Men might dominate management committees	<ul style="list-style-type: none"> Access and Equity Marginalized and Vulnerable Groups Gender Equity and Women's Empowerment 	<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> <p>Monitoring and mitigation as recommended in the HIA.</p>	Befc duri	

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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)	Throught construction Daily	Site supervisor All personnel under the direction of the Site supervisor	Daily by the Site supervisor or Reporting by DAS after testing of adequate number of samples or if tests reveal any result which may have significant impact on project activities
Designated area for storage of this waste as it is excavated. Storage of construction debris including vegetation in a manner	As indicated in the water quality monitoring plan.	Department of Analytical Services	

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Clearing of vegetation from waterways and banks of the waterway exposing soil and resulting in erosion

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	timeframe.			
	Replant banks of watercourse with recommended vegetation as soon as feasible (see appendix 2).			
Inadequate planting material	Ensure supply before hand 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 minimu m-care (see appendi x-2)	Before project start	DeE	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 mosquitoes	Choose designs which minimize vectors using ecosyste m-based integrate d mosquit e abateme nt	Before project start Monthly after retentio n-ponds constru cted-or after heavy	DeE— engineer DeE-with Central Board-of Health	After 6 months and maintai n records After every water treatme nt event

	strategie	rain event.	to the DoE	
	Bio-remediation (predatory fish)			
Resistance of property owners (e.g. drainage easements, movement of structures on their property)	Public consultation and education	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.	Stakeholder involvement specifically in the choice of intervention. Use Hendersen Simon who is a respected engineer in his community and			

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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	Before start of project	DoE	As it occurs and maintain

	determine the best location of the dams			maintain records
	Siting on public land where possible			
Release of rodents into the community during clearing of derelict vehicles from the waterway.	Redent 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.		CBH, DoE	Record what is used and test water quality before and after event and

	EAG field officers).			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	Before and during project	DoE	Set gender indicators and benchmarks

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

<u>Risk</u>	<u>Adaptation Fund</u> <u>Environmental or Social Area</u>	<u>Mitigation Measures</u>	<u>Time</u>	<u>Responsibility</u>	<u>Monitoring and Reporting</u>
<u>Pollution of McKinnon's Pond and the watercourse by construction debris including soil, vegetation, solid waste during re-engineering of watercourse. Negative impact on health.</u>	• <u>Protection of Natural Habitats</u>	<u>Timely removal of cleared debris (same day depending on volume for resource efficiency)</u>	<u>Throughout construction</u>	<u>Site supervisor</u>	<u>Daily by the Site supervisor</u>
	• <u>Conservation of Biological Diversity</u>		<u>Daily</u>	<u>All personnel under the direction of the Site supervisor</u>	<u>Reporting by DAS after testing of adequate number of samples or if tests reveal any result which may have significant impact on project activities</u>
	• <u>Pollution Prevention and Resource Efficiency</u>	<u>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.</u>	<u>As possible</u>	<u>Site supervisor</u>	
		<u>Schedule work during periods of low rainfall</u>	<u>As indicated in the water quality monitoring plan.</u>	<u>Department of Analytical Services</u>	<u>Monitoring by the Analytical Services lab based on time frame given for water quality testing- As suggested by HIA.</u>
		<u>Water quality monitoring – develop a monitoring plan by the Department of Analytical Services and strict adherence to the plan.</u>	<u>Throughout construction</u>	<u>DoE</u>	
		<u>Monitoring for HIA, implementation of suggested mitigation measures.</u>			
<u>Clearing of vegetation from waterways and banks of the waterway exposing soil and resulting in erosion.</u>	• <u>Protection of Natural Habitats</u>	<u>Limit clearing to only what is required for construction work within a certain time period.</u>	<u>Throughout</u>	<u>Site supervisor</u>	<u>Weekly and maintain records</u>
	• <u>Conservation of Biological Diversity</u>	<u>Cost/benefit analysis of clearing large parts of the waterway and then having to redo it because the vegetation has grown back before</u>			
	• <u>Pollution Prevention and Resource Efficiency</u>				

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<u>Risk</u>	<u>Adaptation Fund</u> <u>Environmental or Social Area</u>	<u>Mitigation Measures</u>	<u>Time</u>	<u>Responsibility</u>	<u>Monitoring and Reporting</u>
	<ul style="list-style-type: none"> <u>Lands and Soil Conservation</u> 	<p>work 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	
<u>Inadequate planting material</u>	<ul style="list-style-type: none"> <u>Lands and Soil Conservation</u> 	<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
<u>Availability of water for maintenance of vegetative buffer (Due to drought)</u>	<ul style="list-style-type: none"> <u>Climate change</u> 	Choose plants that are drought tolerant and require minimum care (see appendix 2)	Before project start	DoE	Monthly and retain records
<u>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</u>	<ul style="list-style-type: none"> <u>Public Health</u> <u>Marginalised and Vulnerable Groups</u> <u>Gender Equity and Women's Empowerment</u> 	<p>Choose designs which minimize vectors using ecosystem-based integrated mosquito abatement strategies</p> <p>Bio-remediation (predatory fish).</p> <p>Monitoring and mitigation as recommended in HIA.</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>

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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		
	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	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	Throughout	Site supervisor	Weekly and maintain records

banks of the waterway exposing soil and resulting in erosion	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. 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 mosquitoes	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 Incentives such as reduced insurance, property tax	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.	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	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	
<u>Issue</u>	<u>Adaptation Fund Environmental or Social Area</u>	<u>Mitigation</u>	<u>Timing</u>	<u>Responsibility</u>	<u>Frequency of Monitoring and Reporting</u>
<u>Impartial and equitable access to loans</u>	<ul style="list-style-type: none"><u>Access and Equity</u><u>Marginalized and Vulnerable Groups</u><u>Human Rights</u>	<u>Loan applicants identified by number not name when application is reviewed</u>	<u>Throughout the loan process</u>	<u>DoE</u>	<u>Monthly and maintain records</u>

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- Gender Equity and Women's Empowerment

Proper and inclusive criteria for selection of beneficiaries

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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 phase 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.

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Monitoring and mitigation as recommended in the HIA.

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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

		measures and be advised on the significance and long term impact on their livelihood, their communities and nationally. Monitoring and mitigation as recommended in the HIA			
Low participation by vulnerable groups due to fear of stigma and a history of bad credit	<ul style="list-style-type: none"> Access and Equity Marginalized and Vulnerable Groups Human Rights 	Highlight the loan as unsecured and important to deal with the coming effects of climate change	Before start of and during component 2	DoE	Monthly and maintain records
		Consultations			
		Accessibility of loan staff to community members. Monitoring and mitigation as recommended in the HIA.			
Some (including women) who are most in need might not have proof of ownership of property and might not be eligible	<ul style="list-style-type: none"> Access and Equity Marginalized and Vulnerable Groups Human Rights 	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.	During component 2	DoE, Legal AID	Biannually and maintain records
		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.			

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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 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

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.

Monitoring and mitigation as recommended in the HIA

Security of new infrastructure

- Access and Equity
- Marginalized and Vulnerable Groups

Increase community ownership to safeguard infrastructure.

During training for component

DoE

Every six months and maintain

Assist in the organization of community watch groups.

3

records of any damage or theft

Insurance against theft

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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.

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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 (included in workshop cost)
Measurement of project indicators (outcome, progress and performance indicators) including baseline data collection	At start of project	PMU	79,00064,040
Project Manager and Project Progress Reports	Twice per year (January and July)	PMU, with review and approval of the TAC and the PMU	76,800 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 / year
Technical Advisory Committee (TAC) meetings	Quarterly	TAC (PMU serves as the Secretariat)	6,000 / year
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	3025,000
Publication of Lessons Learnt and other project documents	End of project	Project Manager, Project Coordinator and PMU	8,200
Total			US\$275,000142,040

E. Results Framework

The results framework presented here is subject to revision during Monitoring and Evaluation (M&E) baseline data collection, which will take into account: disaggregation by women and by marginalized/vulnerable representation; cost effectiveness; availability of existing data; and alignment with data collection in ongoing work programmes of relevant agencies (e.g. Directorate of Gender Affairs).

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 available online</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># of consultations with affected individuals to ensure fair and equitable change</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 50-25-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	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>Low adherence to/implementation of climate resilient guidelines and planning requirements</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</p>	<p>Project report</p> <p>Loan agreements signed</p> <p>Visual observation and</p>

established in the building code and physical plan			<p>% households in compliance with new climate resilient building code measures</p> <p># of climate-related damage incidents reported</p>	<p>Building codes not uniformly followed</p> <p>Vulnerable community members are unable to access "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>shutters and rain water harvesting</p> <p>50% reduction in the number of persons requiring shelters during droughts, with priority 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>	<p>project documents</p> <p>Monitoring and Evaluation</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 = including % of women and vulnerable peoples attending/completing training</p> <p># guidelines and media products published and disseminated</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>30% of vulnerable people in receipt of 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>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>

			# of presentations conducted % of women and vulnerable persons involved in contract design and implementation		At least 3 presentations and workshops to stakeholders by the department and by NGOs to the community with funding provided by the Department.	
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F. Alignment with the Adaptation Fund's Results Framework

Project Objective(s) ⁷³	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>	<p>4.2. Physical infrastructure improved to withstand climate change and variability-induced stress</p>	<p><u>10M</u></p>
Project Outcome(s)	Project Outcome Indicator(s)	Fund Output	Fund Output Indicator	Grant Amount (USD)
<p>1.1 Increased ecosystem resilience of the McKinnon's waterway in response to climate change, extreme rainfall events, and disease vectors</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>4.1. Development sectors' services responsive to evolving needs from changing and variable climate</p>	<p>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)</p>	<p><u>\$3,550,960</u></p>

⁷³ 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>\$2,223,500</u>

G. Detailed Budget

ACTIVITY	Budget USD	Budget Notes
Component 1. Upgrade urban drainage and waterways to meet projected climate change impacts	-	
Outcome 1.1. Increased ecosystem resilience of the McKinnon's waterway in response to climate change, extreme rainfall events, and disease vectors	-	
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

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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; Apply for Physical planning to DCA	-\$39,600	Environmental and Social Impact Specialist 28 days @ \$1,200 per day 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
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	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%

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Vector control using ecosystem-based rehabilitation methods	-\$130,000	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
Development of Local Area Physical development plan and submission for approval and implementation	-\$62,000	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
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	Development of communications material; Training for DCA and Public Works (details for mainstreaming into practices to be finalized as LAP is developed)
<i>Component 1 Subtotal</i>	<i>-\$3,550,960</i>	
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

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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
<i>Component 2 Subtotal</i>	<i>-\$3,125,300</i>	
Component 3. Adaptation mainstreaming and capacity building in NGOs and community groups to sustain project interventions	-	
<i>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</i>	-	
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	

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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

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Monitoring and Evaluation	-\$142,040	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
PROJECT TOTAL	-\$9,970,000	
ACTIVITY	BUDGET USD	BUDGET NOTES
<u>Component 1. Upgrade urban drainage and waterways to meet projected climate change impacts</u>	-	
<u>Outcome 1.1. Increased ecosystem resilience of the McKinnon's waterway in response to climate change, extreme rainfall events, and disease vectors</u>	-	
<u>Output 1.1.1. Technical drawings taking into consideration past flooding events, AR5 projections, and designs that reduce the risks of vector-borne diseases</u>		
<u>Develop an island-wide drainage code with appropriate IDF and DDF curves and integrate into implementation</u>	\$42,000	Hydraulic Engineer 20 days @ \$1,200 Statistical Analysis & Hydrology 10 days @ \$1,200 Process Engineer 5 days @ \$1,200
<u>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</u>	\$72,000	Climatologist 30 days @ \$1,200 GIS expert 20 days @ \$1,200 Human geographer 10 days @ \$1,200
<u>Revise the Building Code with climate resilience measures and submit to Attorney General for approval and Gazetting and signing by the Minister</u>	\$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

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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 Health Impact Assessment	\$5,000	Health Impact Specialist 10 days @ \$500 per day
Conduct the EIAs and other studies required for approval; Apply for Physical planning to DCA	\$34,600	Environmental and Social Impact Specialist 28 days @ \$1,000 per day 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		
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
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	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

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		<u>cubic metre;</u> - 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%
<u>Vector control using ecosystem-based rehabilitation methods</u>	<u>\$130,000</u>	<u>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</u>
<u>Development of Local Area Physical development plan and submission for approval and implementation</u>	<u>\$62,000</u>	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
<u>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)</u>	<u>\$30,000</u>	<u>Development of communications material; Training for DCA and Public Works (details for mainstreaming into practices to be finalized as LAP is developed)</u>
<u>Component 1 Subtotal</u>	<u>\$3,550,960</u>	
<u>Component 2. Revolving Loans for homes in McKinnon's watershed to meet new adaptation guidelines established in the building code and physical plan</u>		
<u>Outcome 2.1 Increased adaptive capacity of built infrastructure and communities to withstand extreme weather and climate variability</u>		
<u>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</u>		
<u>Develop Access database to track loan disbursements and repayments; develop MRV systems</u>	<u>\$24,000</u>	<u>Database expert 20 days @ \$1,200 per day</u>

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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 adation 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		
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

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<u>Disburse grants to communities and NGOs for adaptation and resilience measures in community buildings using adaptation criteria</u>	<u>\$1,500,000</u>	<u>Grants will be provided to at least 5 community buildings for approximately US\$300,000 each</u>
<u>Output 3.1.3. Three contracts are awarded to community groups/NGOs to maintain the adaptation interventions</u>		
<u>Develop a comprehensive communications plan for broadbased community education, awareness and mobilization of support</u>	<u>\$32,500</u>	<u>Communications expert 25 days @ \$500 per day Community Liaison 15 days @ \$1,000 per day Adaptation Specialist 5 days @ \$1,000 per day</u>
<u>Award a community contract to implement the communications plan and disseminate information nationally, regionally and internationally</u>	<u>\$150,000</u>	<u>Community contract award for \$150,000 (terms of reference to be developed bending initial project outputs)</u>
<u>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</u>	<u>\$220,000</u>	<u>Community contract award for \$220,000 (terms of reference to be developed bending initial project outputs)</u>
<u>Award a community contract to for M&E of adaptation measures, data collection and consultations</u>	<u>\$250,000</u>	<u>Community contract award for \$250,000 (terms of reference to be developed bending initial project outputs)</u>
<u>Component 3 Subtotal</u>	<u>\$2,223,500</u>	
<u>JE Fee / Oversight Costs (*max 8.5% of total budget)</u>	<u>\$434,000</u>	
<u>DoE Oversight</u>	<u>\$275,000</u>	<u>M&E budget as reflected in the project document:</u> <u>- Project Manager 48 months @ US\$ 1,600 per month</u> <u>- Project Inception Report @ \$5,000</u> <u>- Measurement of project indicators and baseline data @ \$80,000</u> <u>- Annual Project Report including field visits and workshops @ \$10,000</u> <u>- Project Management Committee meetings @ \$6,000/year</u> <u>- Technical Advisory Committee meetings @ \$6,000/year</u> <u>- Mid-term independent evaluation @ \$18,000</u> <u>- Terminal Independent evaluation @ \$30,000</u>

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		- Publication of lessons learned and project documents @ \$8,200
<u>EIMAS Oversight of M&E results as per the Legal requirements</u>	<u>\$30,000</u>	<u>Data Management Unit - to purchase software and other items related to GIS mapping.</u>
<u>Reporting</u>	<u>\$5,000</u>	<u>Reports to the Cabinet and to the Parliament</u>
<u>Financial oversight (internal auditor)</u>	<u>\$40,000</u>	<u>4 years @ US\$ 10,000 per annum</u>
<u>Audit</u>	<u>\$54,000</u>	<u>4 annual audits @ US\$ 13,500 per audit</u>
<u>Misc.</u>	<u>\$30,000</u>	
<u>Project Execution costs (Project Management Unit) *max 9.5% of total budget)</u>	<u>\$636,240</u>	
<u>Project Coordinator</u>	<u>\$216,000</u>	<u>Project Coordinator 48 months @ US\$ 4,500 per month</u>
<u>Loan Officer and Program Officer for Component 2</u>	<u>\$105,000</u>	<u>Loan Officer (US\$35,000/year) for 4 years</u>
<u>Technical project Officer</u>	<u>\$88,000</u>	<u>Technical assistance to the PC 40 mths @ USD 2200.00/mth</u>
<u>Administrative support</u>	<u>\$110,000</u>	<u>two persons, each at 4 years @ US\$ 13,750 per annum</u>
<u>Project vehicles</u>	<u>\$75,000</u>	<u>Electric vehicle @ US\$ 75,000</u>
<u>Maintenance of office facilities</u>	<u>\$25,000</u>	<u>Maintenance of office and facilities for 4 years @ US\$ 6,250 per annum</u>
<u>Office administration and consumables</u>	<u>\$17,240</u>	<u>Office consumables 4 years @ US\$ 4,310 per annum</u>
<u>PROJECT TOTAL</u>	<u>\$9,970,000</u>	

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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

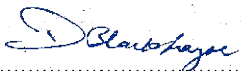
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A. Record of Endorsement on behalf of the government Provide the name and position of the government official and indicate date of endorsement. If this is a regional project/programme, list the endorsing officials all the participating countries. The 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>	
<p> Ambassador Diann Black-Layne Implementing Entity Coordinator</p>	
Date: July 25, 2016	Tel. and email: +1 (268) 462-4625



* 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:
H.E. Amb. Diann Black-Layne
Department of the Environment
Ministry of Health and the Environment
Botanical Gardens, Factory Road
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Ministry of Health and the Environment
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St. John's, Antigua
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Tel. And Email: See above

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".

²**gender** 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

¹ All 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>>.

change adaptation activities, including assessments, planning, implementation, monitoring and evaluation and technology development.

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.

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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.

- **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.

- **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	2.1 Increased adaptive capacity of built infrastructure and communities to withstand extreme weather and

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

	new standards	climate variability
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

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 vectors ⁵
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

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

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 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

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>>.

Fund (GCF) to promote environmental, social, economic, and development co-benefits and take a gender-sensitive approach.

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 Sustainable Development Goals (SDGs)

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

4.2.8 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 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

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

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).

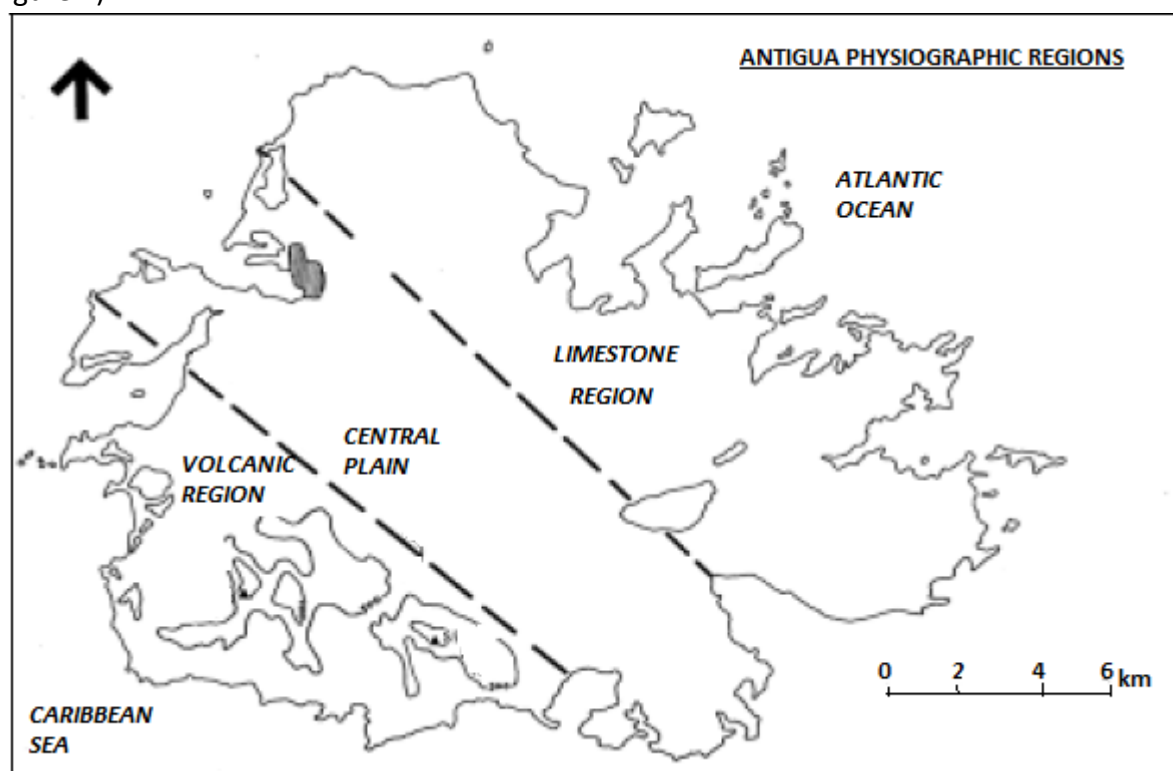


Figure 2. Topographic Zones of Antigua (adapted from National Action Plan)

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 climactic 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

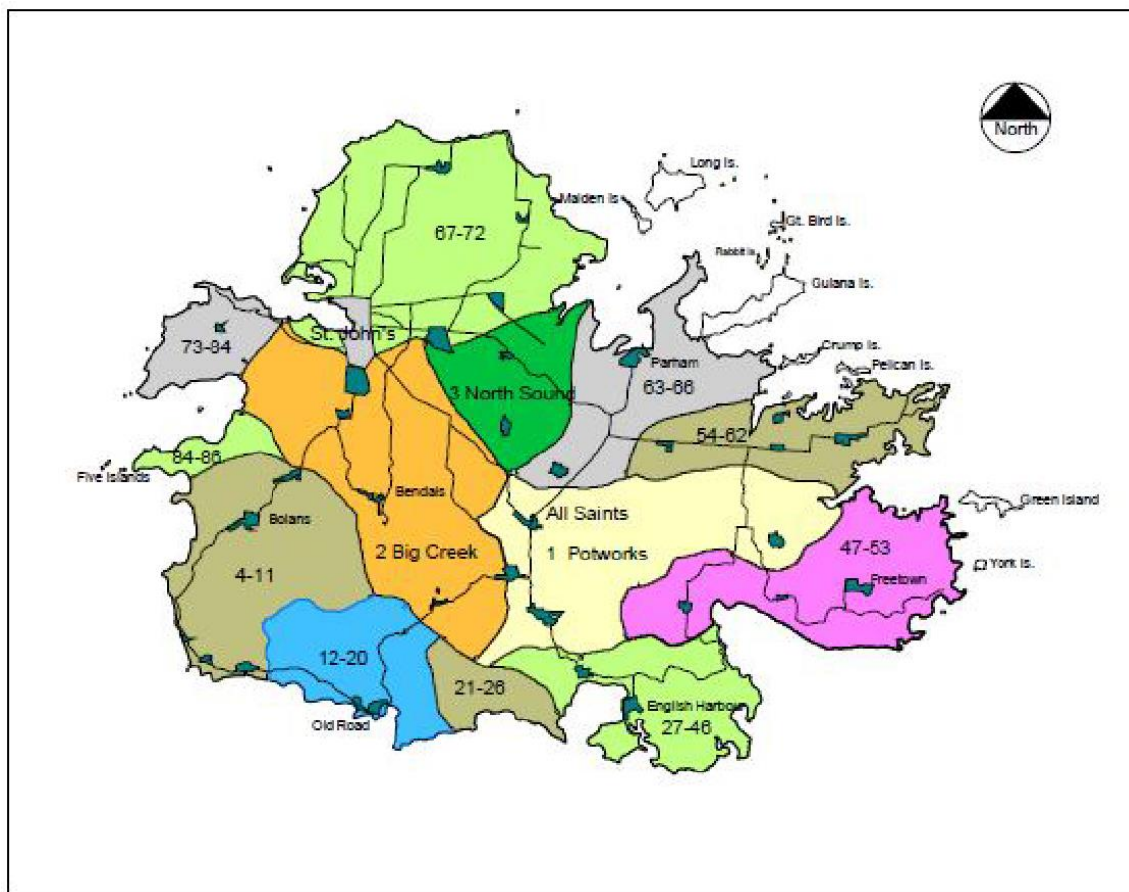


Figure 3 Watersheds of Antigua (source Department of the Environment)

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) ^	<i>Enterococci</i> (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 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

¹⁰GENIVAR, 2012, Sustainable island Resource Management and Zoning Plan for Antigua and Barbuda
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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
TOTAL	450

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. The UN defines gender equality as “the equal rights, responsibilities and opportunities of women and men and girls and boys.” The converse of this, gender inequality, is

often due to systemic, institutionalized and culturally based forms of marginalization. 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. Poor female headed households, particularly those with children, 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

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

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. 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 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

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

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

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

had to use other methods to access funding a part from going to the bank 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. Therefore a component of the project which involves loans that gives loans to households taking into consideration that poor households, particularly single parent households, should be specifically targeted to benefit from the loan component so that they can access the necessary financing to retrofit their homes to withstand disaster and climate change impacts.

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.

Table 4. Stakeholder inputs and responsive project design

Stakeholder Input and Concerns	Options for incorporating into Project Design
Anxiety over landlords gaining 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	DOE should consider approving loans for less than US\$5,000 and just keeping the upward limit of US\$75,000 The DOE should consider the possibility of people applying for a larger number of smaller loans, and develop management to accommodate this portfolio breakdown
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	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 One of the Component 3 community grants could 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)
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	The DOE's engineers are looking into the feasibility of this as an adaptation intervention option and safety/regulatory concerns The DOE should look into insurance or liability risks of the activities that it funds
Community members were very interested in solar energy and requested more information	The DOE should hold a special meeting on renewable energy, or couple a presentation on solar power at the next community consultation Future community consultations should be more technically focused on the proposed adaptation interventions, costs, and requirements for implementation The DOE should put together an information package with more detailed information about the main adaptation interventions

Concern about the selection committee that would be used to approve loan applications to ensure that there will be fairness.	Loan applicants identified only by number to those who approve the loans
Current waterway cleaning practices leave a lot of debris along the side of the waterway that gets washed in during heavy rain, exacerbating flooding	Works in the waterway need clear guidelines for disposing of waste material
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.	<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>
Some residents indicated that they did not want to 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	The DOE should consider flexibility in the loans to assist people in situations where they only want to move homes and not stay in a high risk flooding zone

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.

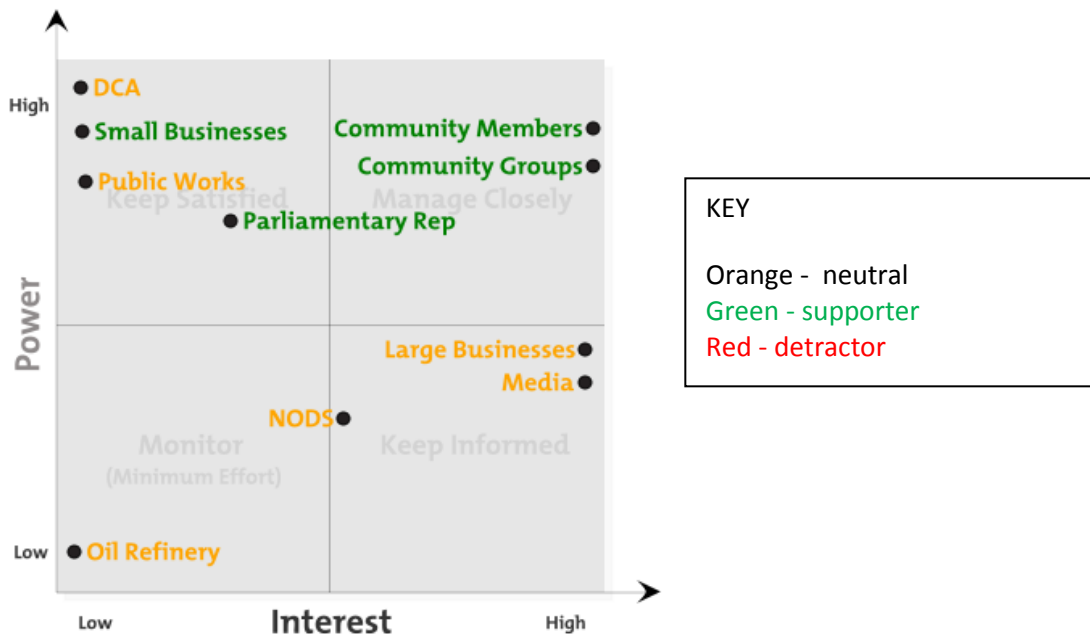


Figure 11. Stakeholder Analysis highlights supporting and neutral actors; no detractors are identified (Source: Andrea Otto)

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

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assess women's vulnerabilities pre, during and post flood, given their disproportionate responsibilities for domestic and child-care. 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 since they may not be able to get to work or to participate in income earning activities as a result of the flooding.

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. Additionally, 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 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

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

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 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

Under Component 1, 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.

Under Component 2, the project's approach is incentive-based compliance to meet the standards with the Building Code and disaster risk reduction policies 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.

However, 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, where persons are squatting. The baseline for the project activities includes these structures, whether legal or illegally placed, and this section addresses potential risks.

Resettlement, whether voluntary or involuntary, is outside the scope and jurisdiction of this project. The activities of the project should be to establish law and policy that guides an optimal setback distance from the waterway, through consultations, involves the community in decision-making and awareness raising, and presents the information to Cabinet for the Government of Antigua and Barbuda. The management body to guide this process is the Watershed and Wetlands Management Committee, established under the EPMA (2015) Section 45. This Committee includes the key stakeholders: Director of Agriculture; a forest officer; a fisheries officer; representatives of Antigua Public Utilities Authority, Lands Division and the Pesticides and Toxic Chemicals Control Board; and local residents and owners of land within a watershed, appointed by the Minister upon recommendation of the Director of Environment and in consultation with the Minister responsible for Public Utilities. This Committee will make recommendations to the Minister, who will then present the information to Cabinet.

Therefore, the project will not result in involuntary resettlement, but rather will establish the baseline and raise awareness of adaptation and climate resilient physical planning actions that can be taken to enhance the viability of the northwest coast to serve as a settlement expansion zone given climate and development projections. The Cabinet will take the decision on how to

address compliance with technical guidelines, laws and policies, and compliance will be the responsibility of the Government of Antigua and Barbuda. Taking this approach, 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

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

Downloaded on 10 July 2016)

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.

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. With regard to the Zika virus, the clear link between this virus and women's sexual and reproductive health and pregnancy outcomes have been established; specifically the link to microcephaly .

In screening this project's suitability for a 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	Increase flow velocities and reduce aquatic weed growth

flooding in urban areas	<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 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</p>

	<p>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 and under-story vegetation	<p>Reduction in velocity of water flow</p> <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	<p>Reduction in pest populations</p>
Clearing of blocked waterways to prevent flooding.	<p>Free flow of water leading to reduction in flooding</p>
Incorporating new climate-resilient	<p>Time constraints as upgrades to guidelines tend to take a long time</p>

guidelines and standards into the Building Code as necessary for climate mainstreaming

Integrating the LAP into the implementation practices and work plan of the Development Control Authority (DCA) Time constraints

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.

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 the 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

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

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. 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

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

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 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 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 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

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

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

possible potential risks for community shelters might include security, accessibility and lack of women's participation in disaster preparedness decision-making and interventions.

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

Environmental and Social/Gender Management Plan

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

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 (eg 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 Health Impact Assessment

The exact nature and significance of any health effects may not be apparent until the project is implemented. It is therefore recommended that a health impact assessment be done, in which the consequences of the project are monitored as they are implemented. This will allow prompt mitigation of negative effects. A suggested methodology is as follows:

1. Scoping to determine the objectives of the HIA and the terms of reference. The TOR will set boundaries and describe the evidence that is acceptable for use during the assessment. It will describe the weighting to be ascribed to evidence sources such as community consultations and scientific or technical reports and/or data.

2. Appraisal using available evidence including scientifically collected data (e.g. reports from Central Board of Health, reports on the effects of similar interventions locally and internationally) and community consultations to establish baseline data and predict the most likely health impacts and their level of significance. This should be done before the start of the project. Appraisal may also include collection of new primary data as appropriate. In addition to health impacts identified during appraisal, the following should be considered for inclusion as a minimum:

a. Biophysical Environment

- Water Quality – waterways and recreation
- Outdoor Air Quality – allergens and irritants, nuisance noises
- Solid Waste – generation, disposal and recycling
- Infectious Diseases and Other Biological Hazards – pest and vector control

b. Psychosocial

- Social networks – support, cohesiveness, inclusion or exclusion
- Discrimination – employment, gender
- Community Participation – political, civic, other

c. Healthcare and Public Health Systems

- Access to quality health systems
- Preventive services
- Emergency medical services
- Disease monitoring and management
- Public safety
- Wastewater treatment

3. Conclusions and Recommendations for mitigation of potential negative impacts and enhancement of positive impacts must then be made. The results of the HIA will determine if and when monitoring should occur during the operational and subsequent phases of the project based on the significance of the identified health impacts.

There will be inevitable overlap between the issues identified in the HIA and those already identified as part of the ESIA. The tables outlining the monitoring and management plans has suggestions for incorporating the HIA into the project.

8.5 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.

8.6 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.

Table 8 Risk Analysis table (from Adaptation Fund Proposal)

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.</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>	Medium to high

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	<p>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.</p>	<p>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.</p>	Medium
Financial	<p>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>	<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	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, 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. 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 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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8.8

8.8.1 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	Adaptation Fund Environmental or Social Area	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. Negative impact on health.	<ul style="list-style-type: none"> • Protection of Natural Habitats • Conservation of Biological Diversity • Pollution Prevention and Resource Efficiency 	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
			As possible	Site supervisor	
			As indicated in the water quality monitoring plan.	Department of Analytical Services	
			Throughout construction	DoE	Monitoring by the Analytical Services lab based on time frame given for water quality testing. As suggested by HIA.
Water quality monitoring – develop a monitoring plan by the Department of Analytical Services and strict adherence to the plan.					
		Monitoring for HIA, implementation of suggested mitigation measures.			
Clearing of vegetation from waterways and banks of the	<ul style="list-style-type: none"> • Protection of Natural Habitats • Conservation of Biological Diversity 	Limit clearing to only what is required for construction work within a certain time period. Cost/benefit analysis of clearing	Throughout	Site supervisor	Weekly and maintain records

waterway exposing soil and resulting in erosion.	<ul style="list-style-type: none"> • Pollution Prevention and Resource Efficiency • Lands and Soil Conservation 	<p>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.</p> <p>Replant banks of water course with recommended vegetation as soon as feasible (see appendix 2)</p>	Throughout	DoE	
Inadequate planting material	<ul style="list-style-type: none"> • Lands and Soil Conservation 	<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 (Due to drought)	<ul style="list-style-type: none"> • Climate change 	<p>Choose plants that are drought tolerant and require minimum care (see appendix 2)</p>	Before project start	DoE	Monthly and retain records
Increase in vectors such as mosquitoes and vector borne diseases which would impact	<ul style="list-style-type: none"> • Public Health • Marginalised and Vulnerable Groups • Gender Equity and Women's 	<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</p>	<p>DoE - engineer</p> <p>DoE with</p>	<p>After 6 months and maintain records</p> <p>After every water treatment</p>

community members, particularly women, among childbearing age who are vulnerable to ZIKA virus from the mosquitos	Empowerment	Monitoring and mitigation as recommended in HIA.	constructed or after heavy rain event.	Central Board of Health	event to the DoE
Resistance of property owners (e.g. drainage easements, movement of structures on their property)	<ul style="list-style-type: none"> Human Rights Involuntary Resettlement 	<p>Public consultation and education</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>	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. Sedimentation of retention ponds	<ul style="list-style-type: none"> Pollution Prevention 	Maintenance by periodic cleaning after checking level of	Checks every 6 months	DoE	After every check and

	and Resource Efficiency	sedimentation	after construction and after any major rain event		maintain records
Growth of invasive plants such as <i>Typha</i> spp and water hyacinths	<ul style="list-style-type: none"> • Protection of Natural Habitats • Conservation of Biological Diversity 	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
Improper location of check dams, retention ponds	<ul style="list-style-type: none"> • Protection of Natural Habitats • Conservation of Biological Diversity 	<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.	<ul style="list-style-type: none"> • Public Health 	Rodent extermination before removal of vehicles. Monitoring and mitigation as recommended in the HIA.	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	<ul style="list-style-type: none"> • Protection of Natural Habitats • Conservation of Biological Diversity • Pollution Prevention and Resource Efficiency • Public Health 	Use least toxic method that is effective; consult with local experts (e.g. EAG field officers). Monitoring and mitigation as recommended in the HIA.		CBH, DoE	Record what is used and test water quality before and after event and maintain records
Increased water	<ul style="list-style-type: none"> • Protection of Natural 	Use pervious surfaces so more of	During	Site	After any heavy

velocity in areas of the waterway that are covered in concrete	Habitats	the water will permeate to the soil	engineering designs for project interventions	supervisor, DoE	rain event by DoE and maintain records
Men might dominate management committees	<ul style="list-style-type: none"> • Access and Equity • Marginalized and Vulnerable Groups • Gender Equity and Women's Empowerment 	<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> <p>Monitoring and mitigation as recommended in the HIA.</p>	Before and during project	DoE	Set gender indicators and benchmarks

8.8.2 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	Adaptation Fund Environmental or Social Area	Mitigation	Timing	Responsibility	Frequency of Monitoring and Reporting
Impartial and equitable access to loans	<ul style="list-style-type: none"> Access and Equity Marginalized and Vulnerable Groups Human Rights Gender Equity and Women's 	<p>Loan applicants identified by number not name when application is reviewed</p> <p>Proper and inclusive criteria for selection of</p>	Throughout the loan process	DoE	Monthly and maintain records

Empowerment

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.

Monitoring and mitigation as recommended in the HIA.

		<p>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</p> <p>Gender training of relevant loans personnel</p>			
Transparency in decision-making processes	<ul style="list-style-type: none"> • Access and Equity • Marginalized and Vulnerable Groups • Human Rights • Gender Equity and Women's Empowerment 	<p>Relevant information is clearly communicated and easily accessible through various means (including non-written video production of loans information)</p> <p>Loan information uploaded on the DoE's website</p> <p>Key offices (e.g. Community Development Division, Directorate of Gender Affairs) is briefed on loans and has relevant</p>	<p>Throughout the loan process</p> <p>One month prior to loan application opens</p> <p>Prior to loan announcement and</p>	DoE; Loan Officer	Monthly reports

		application material	throughout process		
The most vulnerable might not be able to access the loans	<ul style="list-style-type: none"> • Access and Equity • Marginalized and Vulnerable Groups • Human Rights • Gender Equity and Women's Empowerment 	<p>Loans require no security</p> <p>Low interest loans</p>	Throughout the loan process	DoE	Monthly and maintain records
Loan recovery	<ul style="list-style-type: none"> • Access and Equity • Marginalized and Vulnerable Groups • Human Rights 	<p>Salary deductions</p> <p>Standing orders at banks or credit unions</p> <p>Special Request to be approved by the authorizing committee for over the counter payments.</p>	Throughout the life of the loan	DoE	Monthly and maintain records
Interventions contributing to climate change	<ul style="list-style-type: none"> • Climate Change • Pollution Prevention and Resource Efficiency 	<p>Assess the interventions of individual property owners to ensure they will not contribute to pollution, gas emissions which may contribute to climate change.</p> <p>Offer information (in form of pamphlet or as part of the application form) as to what activities can be</p>	During loan application process	DoE – engineer	Monthly and maintain records

		covered by the loan			
		Include guidelines for waste disposal. Monitoring and mitigation as recommended in the HIA.			
No income so unable to access loan (e.g. the disabled)	<ul style="list-style-type: none"> • Access and Equity • Marginalized and Vulnerable Groups • Human Rights • Gender Equity and Women's Empowerment 	Limited number of grants under Component 3 of the project to disabled individuals or those proven most vulnerable. Monitoring and mitigation as recommended in the HIA	Ongoing in Communications	DoE in consultation with ABAPD	As it occurs and maintain records
Dis-interest by non-resident landlords	<ul style="list-style-type: none"> • Access and Equity • Marginalized and Vulnerable Groups • Human Rights 	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	<ul style="list-style-type: none"> • Marginalized and Vulnerable Groups 	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	Prior and during loan application process	DoE	As it occurs and maintain records

purchase		savings during and following the repayment of loans			
Increase in rent as a result of upgrades	<ul style="list-style-type: none"> • Access and Equity • Marginalized and Vulnerable Groups • Human Rights 	<p>Include restrictions on rent increase outside of that prescribed by law, as part of the loan agreement.</p> <p>DoE should provide support to landlords to adopt their own mitigation measures.</p>	Throughout the loan process	DoE	Monthly and maintain records
Large Business owners might appear more attractive based on their capacity to repay loans	<ul style="list-style-type: none"> • Access and Equity • Marginalized and Vulnerable Groups • Human Rights 	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	<ul style="list-style-type: none"> • Marginalized and Vulnerable Groups 	<p>Qualified person must assess certain upgrades and produce technical drawings before loan processing</p> <p>Establish locally relevant</p>	Start of loan application process	Property Owner	Monthly and maintain records

cost estimate system					
Vulnerable groups might be more inclined to take the loans for other competing priorities	<ul style="list-style-type: none"> • Access and Equity • Marginalized and Vulnerable Groups • Human Rights 	<p>Loan to be released in tranches with each subsequent drawdown contingent on proof of completion of previous interventions through inspection or receipts.</p> <p>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.</p> <p>Monitoring and mitigation as recommended in the HIA</p>	Throughout loan process	DoE	Monthly and maintain records
Low participation by vulnerable groups due to fear of	<ul style="list-style-type: none"> • Access and Equity • Marginalized and Vulnerable Groups • Human Rights 	Highlight the loan as unsecured and important to deal with the coming effects of climate change	Before start of and during component 2	DoE	Monthly and maintain records

stigma and a history of bad credit		<p>Consultations</p> <p>Accessibility of loan staff to community members.</p> <p>Monitoring and mitigation as recommended in the HIA.</p>			
Some (including women) who are most in need might not have proof of ownership of property and might not be eligible	<ul style="list-style-type: none"> • Access and Equity • Marginalized and Vulnerable Groups • Human Rights 	<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

Performance Criteria

- Table 11. Management Plan for Component 3**

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		Implementing a communications strategy for broad-based community education, awareness and mobilization of support	Before and during project		On-going and maintain records
No organized community groups	1. Access and • 2. Marginalized and Vulnerable 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	<ul style="list-style-type: none"> • Access and Equity • Marginalized and Vulnerable Groups • Human Rights 	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. Monitoring and mitigation as recommended in the HIA	Throughout project implementation	ABSTEP	Attendance sheets Participant surveys of workshop/training
Systemic gender roles and norms might act as a barrier to women's participation and inclusion	<ul style="list-style-type: none"> • Access and Equity • Marginalized and Vulnerable Groups • Human Rights • Gender Equity and Women's Empowerment 	<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>	Before start of project	DoE, Directorate of Gender Affairs	Monthly and maintain records.

		<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> <p>Monitoring and mitigation as recommended in the HIA</p>			
Security of new infrastructure	<ul style="list-style-type: none"> • Access and Equity • Marginalized and Vulnerable Groups 	<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

8.9 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.

- a. 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.
- b. 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

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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)
<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	

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.

<u>19.</u>	<u>Technical Grant Application for ESP and Gender Compliance</u>	<u>The Department of Environment's application to the Adaptation Fund for Readiness Support in key areas to enhance compliance with the AF's Environmental and Social Policy (ESP) and Gender Policy</u>
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Appendix 2. Minutes of the community consultations and focus group discussions

Adaptation Fund Project
Department of Environment

This document presents minutes from the following consultations:

- June 20th 2016 – York’s Community Centre form 6:00PM to 8:00PM
- 5 July 2016 – York’s Community Centre at 6:00PM to 7:30PM

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The consultation process was designed to include vulnerable and marginalized members of the communities. York’s Community Center is accessible by persons in wheelchairs, and the Project Management Unit worked with the Antigua and Barbuda Association of Persons with Disabilities (ABAPD) to conduct a site visit to particularly vulnerable households. The report from this site visit is included here.

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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

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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
- Participation by gender: women (60%) and men (40%)

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.

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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.

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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

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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

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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

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



ADAPTATION FUND

Component 2 Adaptation Fund Consultation
20 June 2016
Yorks Community Centre

	NAME	VILLAGE	TEL NO	EMAIL ADDRESS
1	Nicole D. MARTIN	MCKINNON'S	268 7641126	nicoleedmartin@gmail.com
2	Heidi Skerrett	Dry Hill - Yorks	268-764-5128	skerretth@hotmail.com
3	Jegune Teague	Yorks	268-784-5535	
4	Calvin Richards	YORK'S	268-771-1105	
5	Cynthia Bullock			
6	Limley Othman	YORK'S VILLAGE	785-4142	
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9	Philippe STRICKER	" "	770 0547	
10	Althia George	Yorks Village	779-0515 462-674	
11	Paul France	Yorks Village	784-5678	paulfrance202@hotmail.com
12	Josefine France	Yorks Village	776-5131/786-0652	josefinefrance@hotmail.com
13	Angela Stone	Yorks Village	721-0563	
14	Rowen & Miriam Thomas	Yorks Village	717-1483/788-4961	twills@gmail.com
15	Lolita Edwards	Yorks Village	460 4868	duke@hotmail.com

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ADAPTATION FUND

	NAME	VILLAGE	TEL NO	EMAIL ADDRESS
16	Kenya George	Yorks	721 7352	
17	Kellyn Shawn	Yorks	722 7675	
	Adrian Tonga		724 4686	
18	Mullins Tonga	YORKS	724 4686	
	Cherissa Barnes	788-3441		
	Rick Shem		783-7286	

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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.
- Participation by gender: women (44%) and men (56%)

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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

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- 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.

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- 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 SIRC Fund to continue their work in order to maintain the waterways, community shelters and water catchments.

E. Q & A

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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

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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.

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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

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Visit to the homes of eight persons with disabilities and special needs

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Yorks Community

Site visit and report submitted by Ruth Spencer, GEF Small Grants Programme National Coordinator

Report reviewed by Lia Nicholson, Department of Environment

Prepared for the Department of Environment for submission to the Adaptation Fund

Saturday May 11th, 2016

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Common themes:

- Groups and agencies come see their situation, make promises but nothing happens.
- ABAPD is well respected in the area so I would advise that this NGO group be one of the NGO's selected to work in the area and that Kemoy with his commitment, dedication and drive can be an outstanding community worker. He was never asked but saw me and came with me to visit the homes, provided information and has been assisting the other disabled person in their particular circumstances to make ends meet.
- Pampers is a high priced commodity for these person so perhaps the ABAPD can function in a cooperative manner to procure and provide such items to their members.
- I observed that in spite of the challenges and disabilities, people tried to make the best with what they have.
- These eight households are exceptionally vulnerable to the impacts of climate change. Persons living here will not be able to repay loans, however it is critical that the project be inclusive and support their resilience.

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Recommendation:

- The project should allocate grant resources for exceptionally vulnerable persons who would not be able to repay even concessional loans so that they can improve their resilience to climate change
- Funding allocations under Component 3 (community shelters) should be broadened to award grants to exceptionally vulnerable qualifying households
- Criteria to determine households that are eligible for grant funding should be devolved to the community. It is recommended that the Antigua and Barbuda Association of Persons with Disabilities (ABAPD) be empowered to lead the grant award process and criteria for exceptionally vulnerable households, such as those hereby presented.

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REPORT OF SITE VISIT

1. Vernon Edwards – 63 suffered a pinched nerve while in Hospital preparing for surgery. He cannot move and his sister Heather Edwards 65 lives about 100 ft away in the same yard. She has to do everything for him-food preparation, his bathing, cleaning house and washing clothes, transport water to the house. His house roof leaks and needs to be done over completely as it is falling apart but he wants his own space. The house needs a ramp for wheel chair use and there must be a wheel chair access way/path of concrete on the property between the two houses. The house has no electricity or water. Heather has to work to and does cleaning in Golden grove to get an income to care for her brother and two children living in the house. She has back problems as a result of lifting him when he fell. Neither has a cell phone so before she goes to work , gives him his tea and a hot meal until she return at 5.30pm. He has to be in pampers since he cannot move to relieve himself which is a major cost. There is no back up water supply. She would like some improvements on her house to include a patio for Vernon to sit on while she is inside working and for putting the house on proper pillars to stop flooding and water logging problems and for a larger space in the house to enable his wheel chair to be accommodated inside when he comes over on weekends. An adventist nurse visited a few weeks ago and she was given the medical report on his blood, pressure and cholesterol which state that all are in good standing.



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2. Kemoy 28 was born not able to walk but he is an active man who just gained training and employment as a weldor with the new company attached to the WIOC. He likes challenges and likes wood work and had been doing mechanic work at Junkyard Cox. He is a great community worker, knows everyone and what is going on in the community and is the Disabled Focal point for the Yorks Community. He accompanied me voluntary to meet all the special needs in the area as he visits them and makes messages and tends to their needs. He lives in a little wooden house on the same lands as his mom Icole Skepper who is 44. His little wooden house needs to be raised since his wheelchair ramp is higher than the flooring and floods when rains come. He has had the house raised about 3 times but without pillars and good foundation, it keeps

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sinking. The house has no back up water supply, needs spouting. 721-7352. One of the highest cost is for the purchase of pampers.

3. Owen Glasgow 78 is blind and lives alone. He does not hear well. His house is falling apart, has no light or water. He has cateracts in his eyes and had hoped to go to Cuba to remove them. Kemoy in wheel chair house has a back gate leading to his house so when Owen needs gas and supplies, Kemoy assists.

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4. Mitchum 67 lives alone has hearing problems and is an amputee. He has been on the land since 1969 He uses walking sticks and has no light and water. His house is in very bad condition. He is very innovative in his water harvesting methods where a old spout has a hole and a piece of old metal spouting running the water to a plastic container. Where ever the spouting has a hole or a dip, he collects the water in a container. His income comes from burning wood at the back of the yard in a large kiln to make coal. He made a cart and adapted it for pulling the wood to the kiln



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5. Victoria Phoenix, 70, said she has 7 children but lives in a house falling apart with a seemingly retarded son Cleofoster 45. She has no water and said the children bring food and wash the clothes. She said her son is abusive, get into problem with drugs, opens the house at nights so she has to be always checking the house at nights. She has a good memory and shared memories of the bus ride with other seniors.

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6. Jeanette Harris has hip problems and cannot walk. her house does not have a ramp. She lives in her mother house and her 2 grandchildren are her company. Her only daughter Celenia lives in a house in the yard that needs to be put on pillars. She had hoped to go to Cuba for surgery as the doctor in the hospital said Cuba could do the surgery and gave her the docs that would require Ambassador Bruce Goodwin's signature but he refused to sign them. Her mother lives in Belmont with her other siblings.

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6. Beres valentine has a retarded son who is chained stays naked and

locked in an old wooden building next to the family home. He was in the Mental house but the father took him out 12 years ago and now cannot get him back there. He was born this way-his mother was mental and on tablets. He used to go to Adelle school was always running away. He damages everything so the toilet is fixed in concrete. he would like an institution to accept him as he is getting old and not fully employed and carrying water and having to care for him is taking a toll on him.

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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

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1. Introduction

This study's purpose is to examine the feasibility of implementing cost-effective adaptation measures to increase transformation within the environment and the community. Those measures will allow the construction of both natural and social adaptive capacities while enforcing the reworking of the watershed and waterways.

Three components are being considered in the making of these measures. First, through climate resilient drainage systems. The second component consist in the creation of a loan program for home and business owners, and the third component is to provide grants to communities and NGOs for them to adapt their buildings for climate changes in order for them to serve as hurricane shelters, community cisterns, emergency water reserves, and learning centers to strengthen social capital.

This first step of this project is to analyse the water course of the region and the eventual problems floods can bring to the environment. In fact, the waterway itself can be considered a part of the problem, but also as a part of the solution. In fact, if people living near the river would take ownership of their environment and use it like a tool of development, a part of the problem could be solved. For example, by transforming the riverbanks into an urban park it could modify the structure and make them a source of protection more than a source of problem. However, changes like those need to become part of a larger process involving many different stakeholders.

In order to facilitate acceptance and make those changes possible, different strategies can be put into place. A great way to do this is to create focus groups with local professionals and inhabitants with the knowledge and expertise to maintain clean and efficient waterways. Governmental organizations should also be invited to contribute as they can orientate the discussions toward solutions that can later be approved by the local legal institutions.

McKinnon and Yorks lowland have suffered five hurricanes and two large floods within the last 20 years. Those statistics are presaging other extreme natural events; events that could have greater impacts on the local environment due to the higher number of natural catastrophes climate changes have brought on this region over the recent years.

A specific zone of this watershed has suffered the consequences of events like those, and stigmas of 1999 natural events are still visible today. This zone is mostly inhabited by low-income families and a visit shows that they are mostly retired workers living with their grandchildren. The lack of economic resources those families are struggling with do not allow them to move to a safer place, or at least a less threaten place.

Also, the traditional drainage system in this region doesn't allow the wet lands to be converted into a more appropriate system who could retain water while transforming those lands and keep the benefits an proper drainage system could bring to the community.

2. Scope and methodology of the feasibility study

The scope of this study is to undertake a technical feasibility assessment of the proposed concrete adaptive actions in order to reach the following objectives:

- a. Interventions in the households and in the community buildings within the project area;
- b. Evaluate the risks, analyse the causes of the flooding and come up with mitigation actions to reduce the impacts;
- c. Establishment of buffer zones around the waterways to prevent buildings to be damage or destroy;
- d. Analyse which vegetation coverage could reduce erosion of the soil;
- e. Construction of 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.

To facilitate the implementation and to achieve the project goals, existing baseline data were taken into consideration in the creation of the feasibility study. Those data were also involved in the making of the budget and the recommendations.

The study was held from June 13th to July 25th 2016, including 10 days on site visit, 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), and the studies showed that the trend was going toward a

even greater urbanization over the next years. The city of St-John's is the political and the economical capital of the country, where most of the governmental organizations are located.

Northwest McKinnon's watershed is located north of St-John's, on the island of Antigua. Most of this area is considered as urban and sub-urban.

From 2009 to 2011, Antigua's economy was severely affected by the global economic crisis as there was a steep decline in tourism arrivals, which severely impacted employment opportunities within the country's private sector. The decline of the agricultural (exports) sector also affected the economical situation of the country. Nowadays, this last sector represents less than 3% of the economy and considering how important that sector was before 2008, it's proof that the country has not yet returned to its pre-crisis growth levels. (CIA 2015)

Also, the government's international credit rating and the national credit institutions 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). In Antigua and Barbuda, the extreme weather events were not carefully documented and were not studied enough for specialists to suggest specific and adapted credit plans to the local population (DOE 2015-2016).

To control the economy, the government rated the actual prime at 6,5% and the commercial rate for private banks around 10%. Also, Antigua and Barbuda is facing an unemployment rate of over 11% (CIA 2015), limiting the access to quality goods and services to most citizens, resulting in a higher level of vulnerability for a large part of the population. (R- 1)

2.2. Ecosystem-based Adaptation

A major challenge for this country is the access to fresh water on the island. First, the population growth is increasing the demand, while the offer cannot increase. Second of all, the tourism industry is growing, making the demand for fresh water higher every year. Finally, not only the offer is steady, but the sea water has seeped into the water table, corrupting the wells, decreasing the offer. The situation is a challenge for the tourism industry, for the government, and for the population, especially as the rain-water and the reverse osmosis are becoming the only other sources of potable water (DOE 2015-2016). (R-2)

As for the energy, power is mainly provided by generators using fossil fuel. There are some solar-panel fields, but not enough of them to provide a significant amount of energy. The country does not produce any fuel neither other sources of energy, making it dependent of external sources of energy for power and potable water (CIA 2015).

Also, because most of Antigua and Barbuda is rural or sub-urban, the sanitary development was done through septic tanks and there are no legislation or regulation to maintain the equipment in good standing. This is a greater problem in the denser area, mainly when the water table is high and the backyards are small. (R-3)

Furthermore, over the last years, the country has been the scene of extreme events who interrupted the distribution of electrical current in many regions. Depending on the severity of the event, electricity can be inaccessible for 2 weeks up to 3 months, slowing down the economical, political and social activities of the country. Studies need to be done on the matter in order to find solutions so people, organizations and businesses can become more independent to the slow reaction of the state in case of an extreme natural event. (R-3)

Based on those observations, the national development can seem anarchic, but most challenges could be overcome through better strategic planning and through the integration of all stakeholders in the process. McKinnon's low-lands need to be developed, not only economically, but through an overall sustainable approach, including the social and the environmental aspects of development. The environmental approach includes the integration of rain sewers, rainwater way, sanitary sewers, potable water and urban development packs in the overall process. Also, the government and the local legal institutions have to create legislations and incentives for the population to integrate social and environmental considerations in their development projects.

Finally, sustainable development is a broad concept always integrated in the phase of implementation of any project held in Europe or in North America. This concept includes social and environmental elements which have to be taken into consideration by every stakeholder from the very start of any project. In order for it to be developed in harmony with all, and for the project to be considered accepted by the community, it needs a social value. In time of crises, it is prior to involve the members of the community as some events requested a lot of resilience and adaptation of the community, like for the drought of 2015, the economic crisis of 2008 or the hurricane of 1999.

3. Site description

The watershed of McKinnon's-York area is draining through the hills at the south of the airport and in the northwestern part of Saint John's. The relief varies from 2 meters to 30 meters above the sea level.

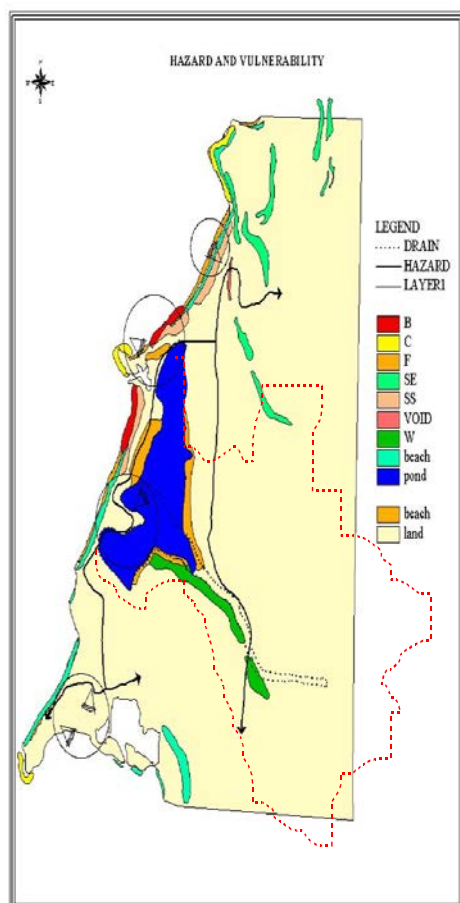
This watershed is about 7,5 square kilometers (1,860 acres or 750 hectares).

3.1. Geographic

The area of this study is located Northwest of the Antigua and Barbuda Island. It is surrounded by the sea to its West and is about 3,5 kilometers East to the Piggots area's hilltops. The top of these hills is rising up to 30 meter ASL (above sea level).

The area of the McKinnon's Pond is about 200 acres, and was studied in details in 2002 by Jackson who made a large survey and whose observations are still considered valid and up to date. There are no detailed topographic maps of this area available.

Figure 1. From Jackson 2002 Hazard and vulnerability MTE 2002

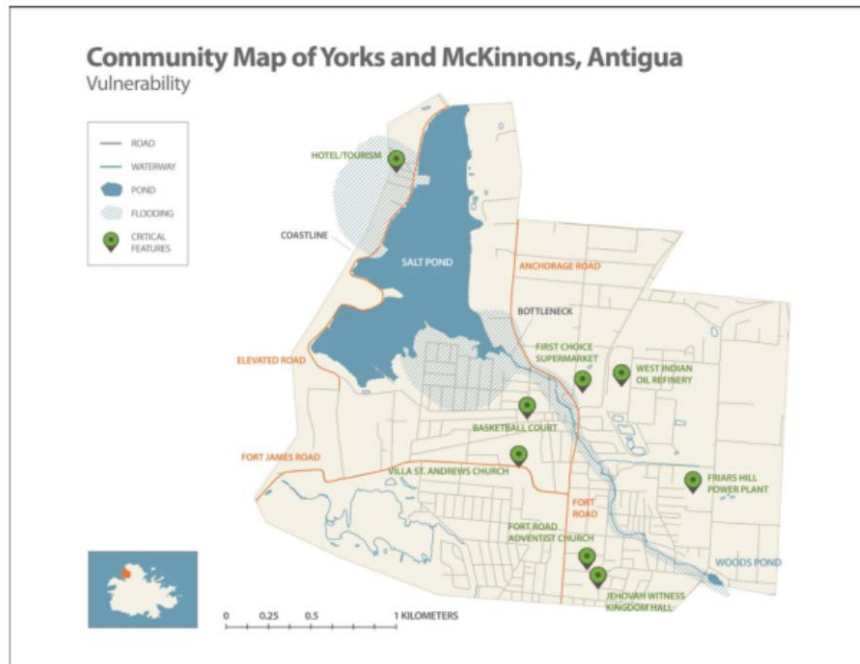


Key to Legend	
B	Severe beach erosion and beach loss
C	Severe cliff erosion
F	Area prone to flooding
SE	Slopes > 40% vulnerable to slope erosion
SS	Properties vulnerable to storm surge/waves
W	Wastewater pollution

This map of "hazard and vulnerability" illustrates that in 2002 Jackson has identified several problems (figure 1) and some were still visible during the survey of 2016, like the wastewater pollution.

The figure 2 shows the areas defined as vulnerable for flooding. It shows a large part, at the south of the pond, that could be at risk for flooding.

Figure 2. Area of vulnerability for flooding



As we can see on Figure 2, a zone in the southern part of the pond is vulnerable. A detailed topographic survey would probably show that this area is less than two meters over the pond level. The pond has an area of 200 acres wide while the watershed is almost 2000 acres big.

The slope from the top of the hill to the sea is steep and it is assumed the water is going down fast, and it shows that the speed of the drainage is probably changing after the “Upper

fort road” before going to the sea.

In fact, the McKinnon's pond is acting partially like a stopper along the way of the drainage, mainly because the exit of the pond is very small.

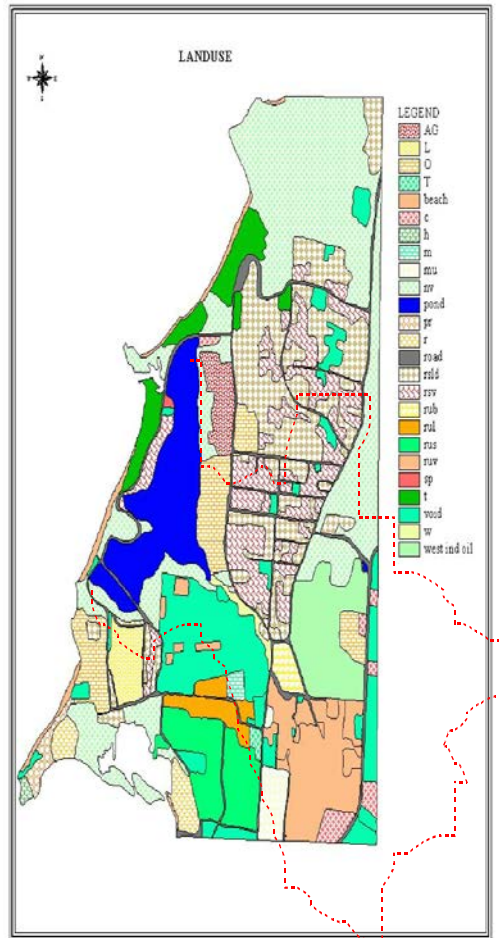
Example: if we considered that evaporation and infiltration represent 10% of the overall drainage, a rain of 100 mm into the watershed would carry enough water to fill around 900 mm of water into the pond, therefore, slowing down the evacuation into the sea.

3.1.1. Land Use

McKinnon's Pond is a major landscape feature and its hydrology impact the whole region. The Pond is hydrologically linked to the surrounding areas, particularly the low lying adjacent areas < 3m ASL in Yorks, McKinnon's. Adjacent lowlands are poorly drained and are typically flooded as they are mostly made of plain areas, therefore providing temporary storage and slow release of storm water. Also, the development projects adjacent to the Pond in Yorks and near other similar areas have reduced the Pond's natural flood mitigation function.

As a flood mitigation measure, permeable soils should not be replaced and the low-lands and waterways must not be filled. The capacity of the surface to provide infiltration must remain.

Figure 3: Land use of the McKinnon-York area (MTE 2002)



Key to Legend	
AG	Agriculture (vegetable farming)
L	Livestock grazing
O	Open lands
T	Tourism
C	Commercial
H	Historic site
M	Medical facility and grounds
NV	Natural vegetation
Pond	McKinnon's Pond
PR	Public recreation
R	Reclaimed land
RSLD	Residential suburban large lots (> 10,000 sq. ft.)
RSV	Residential suburban vacant lots
RUB	unclassified urban
RUL	Residential urban large lots (5,000 –7,000 sq. ft.)
RUS	Residential urban small lots (< 5,000 sq. ft.)
RUV	Residential urban vacant lots

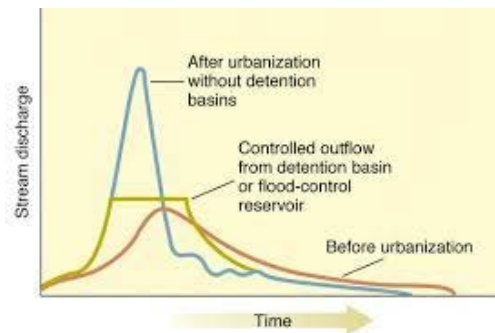
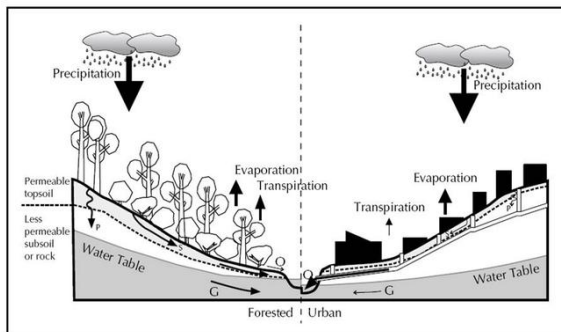
3.2. Geology

There are five different types of soil in Antigua and Barbuda, and the area of McKinnon-York and the city of St-John's are located in an area constituted mainly by a type called "Deep kaolinite clay soils". This type of soil is hard to work on and is characterized by a weak permeability, which impact on the wastewater disposal and water infiltration after the rain.

This low-permeability type of soil makes it almost impossible for wastewater disposal to evacuate water by the traditional subsurface means, thus resulting in potential health and environmental problems. Making it normal to see some resurgences of wastewater in 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



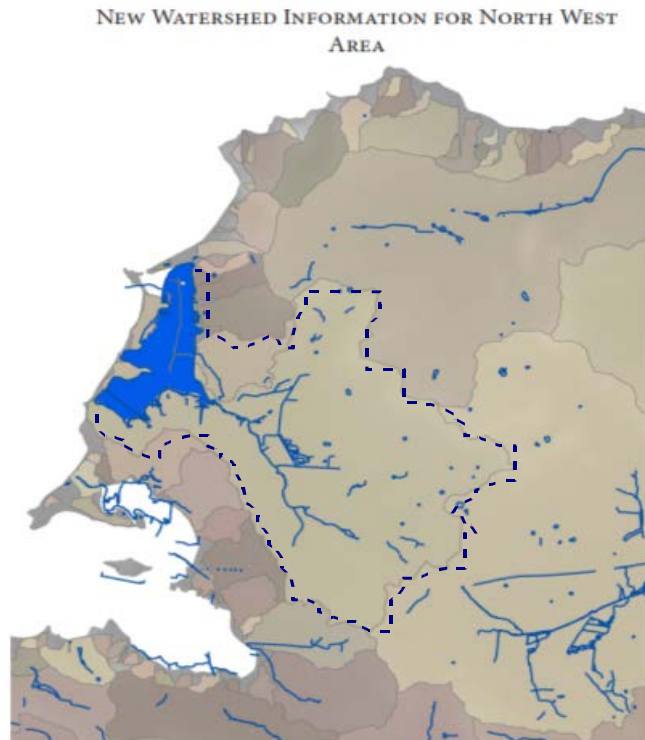
The dominant process that characterizes the rainfall/runoff behavior of "an original catchment" is retention. Any attempt to create sustainable urban landscapes must incorporate retention practices, green infrastructures (USEPA web site) and low-impact development.

Green infrastructures are a cost-effective, resilient approach to adapt and manage wet weather impacts that also provide many social benefits. While single-purpose gray storm water infrastructures—conventional piped drainage and water treatment systems—are designed to move urban storm water away from the built environment, green infrastructures reduce and 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 has identify and design a proposal for how he want to see the watercourse in 2002 (figures 6 and 7).

The watercourse has 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.

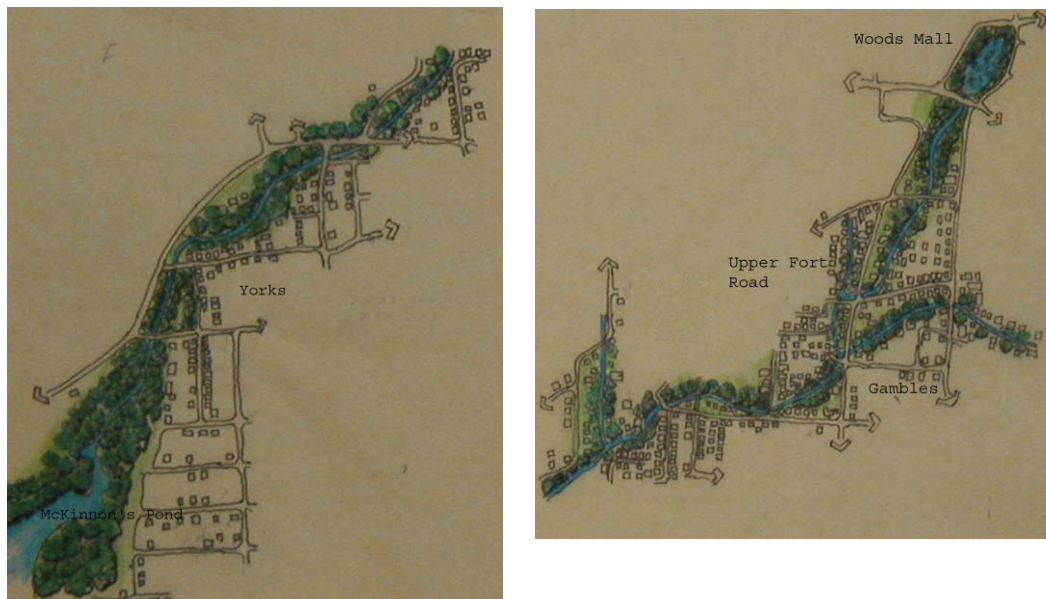
From the previous works there is now more developed area less trees, grass and natural lands.

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 system. As defined previously

Green infrastructures and Low impact development are two concepts developed on the same basement.

Here are 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 McKinnon's 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 has 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

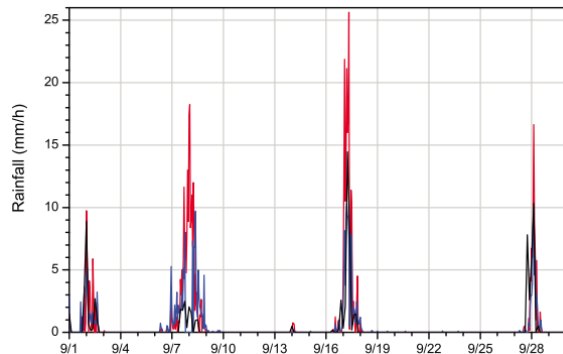
flow drainage is passing by going to retain water on soil, to let the drainage system able to absorb a part of the flow and delay peaks and increase the evacuation of the rainwater to the sea.

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 show 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 hour, which supports 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) and to analyse the risk and values to use for the drainage design. For the project Cashew hill, Cashew hill is located 4 km south of McKinnon watershed and delivers its water into another waterway.

This kind of rain (6 hours at 28,8 mm by hour (172,8 mm)) has happened 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 suffered from 241 mm

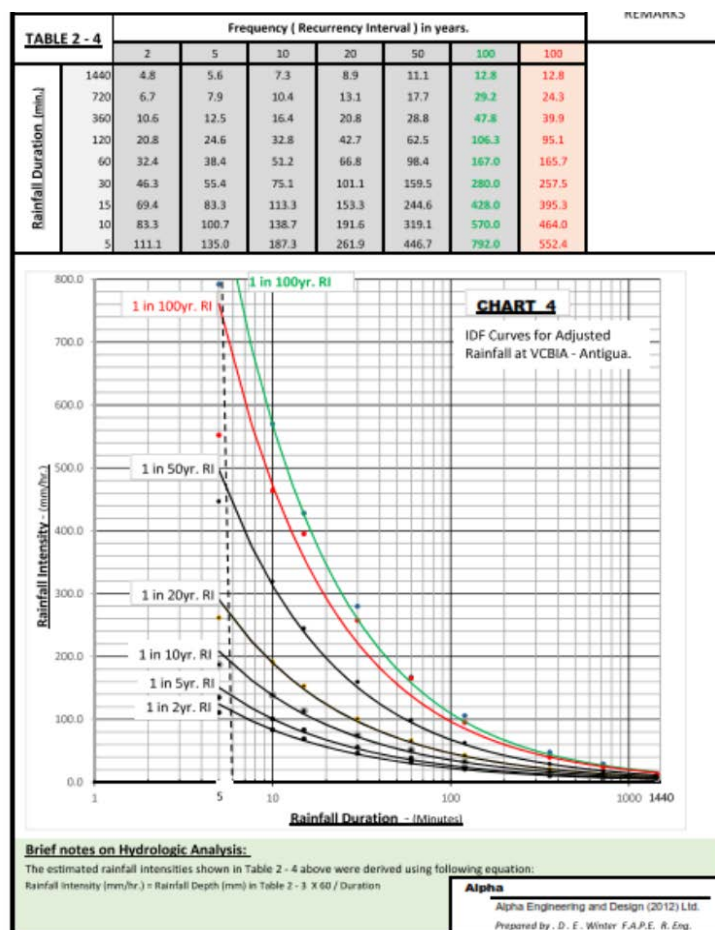
of rain during the same day (Annex 1.) and 556 mm in the same month. Since 1966, there were 8 time that the rainfalls exceed more than 300 mm within a month.

Annex 1.

It is impossible to predict the future, but it is clear that the area has to adapt to the undergoing buildings and housing development. The water level control has to be ready and resilient at the same time in the event of another hurricane.

The community must remain vigilant and proactive regarding the drainage system by maintaining clean.

Figure 10. IDF curves from Alpha 2016



Note:

- The area of the watershed is evaluated at 725 hectares (7,250,000 m²). If this area receives 28, 8 mm (0, 0288 m) of water, it means 208,800 m³ of water arriving in the watershed and flowing in direction of the McKinnon's Pond within the first hour.

Many factors can direct the water in a different path than directly into the water run, but the more it rains the more these factors will be attenuated:

- The waterway and the McKinnon's Pond have 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 infrastructures need to be done and all the space under the bridges have to be able to carry the flow without stopping it;
- The water from the McKinnon's pond to the sea must be flowing at the same flow's speed all along its way down;
- Drainage must consider the speed, the slope and the downstream environment (water level);
- The area with a low slope should have time to evacuate the rainwater.

4.2. Drought

During the same period the flooding occurred, the island suffered historic drought cycles. This problem was even harder to manage for the people living in the area, specially for woman, workers, and for the single mother with babies or children. These peoples with small resources suffered even more because wells were contaminated by brackish water infiltration. The only source of drinking water came from the osmosis seawater and by rainwater harvesting. In period of drought the reserves of rainwater always became strategic for those peoples.

In fact, the soil in the low land of McKinnon and York is contaminated by wastewater where we saw resurgence of wastewater and odors at many places. The production of water supply and its pressure are not constant, therefore increasing the risks of contamination of the waterworks and the fresh 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.



As mentioned previously, most of the area is covered by a mixture of clay. The volume of clay should change when it is dry or wet, depending on the clay content, the moisture and the porosity of it after the water has left the substance. This shrinkage can cause movement in the soil and create structural problems.

Filling the ponds or old wet area can produce soil movements mostly when the area is suffering a drought like in 2015.

5. Observations and feasibility analysis

R-1 During the survey we've noticed that most of the houses in the low lands are not adapted to resist or to another tropical storm that could leave over 150 mm of water in the same day. With a risk of flood, and with the socio-economic aspects 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 basement have to be raise and reinforce.

R-2 With the lack of potable water and the fact that there is rain more than a day by month all the year long, it is important for people and for the watershed that the practice of water harvesting is facilitated as much as possible.

R-3 With the lack of electricity during long period of time, it was observed that there were no minimum solar power systems to maintain light and other safety equipment for days.

R-4 Because the main power is not constant and unsecure, it could be important that once the house is protected against hurricane, people can have access to hot water and electricity.

The actual survey was done with satellite and areal picture used to create GIS. There are no details about the roads, the bridges, the water courses, the sides of the roads, the houses and land level, mainly in the flooding area.

The implementation of a new design for the waterway must start by a good mapping of the region with a detailed topographic view, so the identification of he flooded areas can be done while taken into consideration the land level and a precise view of the watershed. With this map, it will be easier to define where and how to protect housing and vulnerable areas.

It has been reported that many ponds and water points have disappeared and/or are under the pressure of some important urban development projects. Near the commercial center (Wood Mall) there is a pond who lost a big part of its area and the parking of this Mall suffered from soil movement, probably after the drought by compaction of the soil. The bridge over this point is in bad shape, Picture 3 shows the edge of a crossing way over the old pond (Woods Mall). Following discussion with residents, there were other ponds along the waterway but they are now filled.

Picture 3.



- It is hard to restore all those lost areas.
- Doing nothing will increase the speed of water arriving to the McKinnon's pond and might increase favorable conditions for flooding.
- Rebuilding completely all the original areas will cost a lot and is not as productive as restoring them.
- The important is to restore the surrounding environment and recreate some covered, green and wet area into urban space.
- Some laws and regulations have to be put in place to protect the wet lands, and only after implementation can 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. (The lack of detailed data on the ground create a demand for a detailed study over a simple simulation)

- 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.



After two days on the field, we have seen more than 5 sites where pipes are directly crossing the waterway in or just above the usual water level in a normal rain situation. 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, therefore creating interference for water while catching debris.

- Many of these pipes have to be relocated or removed by the pipe owner. These pipes are directly related to flood risk and can even increasing the chances of flooding in the region. It is also a danger for kids playing on these and for the environment.

Picture 5.



The closer we get to the sea; the more garbage we can see across the watercourse (Picture 6). Little to no awareness is spread around the community regarding the fact that those debris are the one jamming the water under the bridge, and then creating flooded areas.

- Peoples living in the area have to be aware that a clean environment might be a big part of the solution and kids in class have to be educated on this matter.
- A sense of belonging to their neighborhood and their environment must be created.

Picture 6.



Many areas suffer from the presence of bad odors caused by the overflowing of the (Picture 7) septic tanks leaking in the waterway. The quality of the water in the waterway will decrease and might interfere in the success of the interventions.

Furthermore, climate changes will impact on the wastewater treatment. Prolonged periods without any rainfall lead to less waste water evacuation and to the accumulation of solid waste sediments and incrustation in sewerage conduits that can cause its clogging.

Picture 7.



A study has reported that many residents have not cleaned their septic tank for many years. This situation, in a dense housing area, could be a cause for water rotting and unpleasant odors. The increasing population lead to a larger quantity of sediments into the tanks and the risk of disease being spread by those sediments are also increasing. Also, salt water intrusion, especially in coastal areas such as McKinnon's Pond area, could cause degradation of sewer systems and it could affect the quality of the water.

- All homes need to be integrated in a sanitary circuit as there is a water treatment station managed by the Department of Environment in the McKinnon's pond area.
- All septic tanks have to be clean once each year.
- Using some type of plants could help decontaminate area and planting trees could also help as they can use their roots to pump water and use Nitrogen and phosphorus as nutrient.

There are four pipes related to the pipelines (probably from West Indies Oil Company Ltd.) from the port to the industrial installation of WIOC. Those pipes are crossing directly the waterway at the riverbed level (picture 8). The oil company has been contacted on this matter.

- These pipes are not clearly identified for the population to see

and the protection system covering the pipes against oxidation is less and less efficient with time.

- Some concrete fell on one of the pipe and it's now at risk of breaking.
- Discussions have started among the stakeholders to move the pipes.

Picture 8.



- 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 around the pond. (Picture 9)

Picture 9.



- The pond main channel has to be enlarged and cleaned from debris to let the water flow during storms.
- Digging the channels would increase depth of the water way and would foster a better water circulation. This would reduce flooding and would provide opportunities for recreational activities such as canoeing and kayaking (Jackson 2002).
- Since 1966, the McKinnon pond has changed (picture 9) his attractive potential, but many opportunities can be developed.
- Installing a penstock near the sea could control the water level. It would allow more water to go after storms and let a stable sea 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 picture 11 are showing cleaned areas. Picture 6 shows the erosion due to the lack of vegetation and a slope more than 30 degrees.

Picture 10.



- It is recommended to leave some trees near the river to protect against erosion and create a recreational environment ready to be use by the population.
- Some kind of trees and soil coverage are not adapted for this requested use. Trees in urban development should let soil coverage be developed, using root to prevent erosion and tree leaves to give shadow.
- A structured development study has to be done in order to choose the right soil and the good trees to transform this area in the most efficient way.
- 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 conditions were applied.

Picture 11.



A large area of the 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.

- 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. It could be use as a detention pond to attenuate peak downstream storm flow discharge.

Key: Blue lines are the waterway; Red lines are private property parcels

Picture 12.



The consequential losses, ranking from major casualties to minor inconveniences, in daily life due to inadequate flood protection standards should be carefully examined in any 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 is compared with the benefits it could bring. However, there are not just strictly economical values to be considered but multi factorial factors impacting the downstream. Moreover, comprehensive local flood damage (social acceptation, 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.

Concerning the area of York and McKinnon's, the problem is multi factorial: geographic, geologic, social development, poverty, health and climate changes. However, the main problem is the anarchic development due to most of these land being private and some are directly linked to development (commercial and shopping-centers) projects. The Department of Environment should engage private land owners to secure waterway easements on private land.

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 seems to be a cause of the flooding problem.

Change the point of view of the community by a long training and an education program. 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.	Collect data about the roads, bridges, water course side of the roads, houses 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.
Increase and modify storm flows in catchment due to land use changes and rainfall variability in last 20 years.	Proper buffers have not been enforced and maintained but we could consider: <ul style="list-style-type: none"> ○ Enforcing building regulations to set back actual 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 a 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 m ³ /h.	This structure will prevent flood in the case of a rainfall or a hurricane.

Some bridges over the water run have to be re-engineered. There is at least one bridge that can cause problems with a 100mm rain in 6 hours.	Modify 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 and decide to raise the water level.	Prevent flooding under a controlled water level of the McKinnon's pond.
Pipes crossing the waterway, which catch debris and contribute to flooding the area.	<p>Remove the abandoned pipes (co-financing with applicable entities).</p> <p>Continue discussions with West Indies Oil Company (WIOC) and APUA for solutions to move the pipes that are causing flooding.</p> <p>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>	<p>Move pipes to permit restoration of the waterway.</p> <p>Reduced flooding as the pipes are blocking the waterway.</p> <p>Increase safety for kids who use the pipe as a bridge.</p> <p>Prevent an environmental impact if the pipe is carrying oil, wastewater or sea water.</p>
There is no water park, wet area nor 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	Retain a maximum volume of water for a period of 6 hours during a tropical storm to make sure that all the flow will

	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.	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 are not constant. Space and slopes on both side of the water run have to be verify.	Create a standard 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 (this could be done through issuing of a contact under Component 3).	No external debris will jam the flow.
Trees and grass were 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 water as possible, grow plants with roots into a wet area, use wastewater as a source of nutriment and purify the environment.
Wastewater has been observed in the last part of the catchment and it's creating an overflow of the septic tanks.	It is recommended to implement a mandatory septic tanks cleaning every two years or to connect all the zones to a central sanitary sewage system. Identify types of plant, grass or trees who can grow into this environment and can use the gray water as nutriment.	Increase safety by taking away disease-carrying mosquitos. Decrease odors of rotten eggs. Use bioremediation to help sanitation.

Component 2. Resilience in buildings (household adaptation)

Problems Identified	Recommendation	Potential Impact
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Not all houses were equipped with a good system of water harvesting. Public system is not constant.	Give possibility to everyone to have access to a gutter system and a reservoir.	Remove water of the water run. Give access to fresh water.
Many houses have very bad roof structure: not strong enough, rotten, or without the support to stabilize the roof during a tropical storm.	Give possibility to the householders to get a loan to replace or reinforce their roof.	Insure protection during a tropical storm or a hurricane.
Most of the house visited don't have screen into the windows, leaving them open for the mosquitos to come inside.	Give possibility to the householders to install screens or to change their windows.	Protect families and kids against diseases vectored by mosquitos. Increase the quality of life.
Public power plan have had some problems after some tropical storms and is not constant.	Give possibility to the householder to install solar energy cells converter and batteries. Give possibility to change old electric bulbs and other old technology equipment for energy saver equipment.	To increase safety by providing light. To increase the quality of life by providing energy for refrigerator. Saving money by using more powerful equipment.
Most of the houses who were flooded during event of 1999 and 2014 have rotten structures and floors.	Give possibility to the householder to change the floor and the structure, to raise the house and to modify the basement to increase aeration.	To increase the quality of life by providing a safety floor mold-free.
Wastewater and rotten eggs odors were observed	Give possibility to the householder to clean and	Create a better environment and increase

in the backyard of those houses.	repair the tank and the piping evacuation system.	the quality of life by removing rotten smell.
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6.1. Baseline Data

The northwest coast of Antigua has a high degree of exposure to climate variability due to its physical features; the northwest coast has been increasingly affected by extreme rainfall events causing flooding.

The project's area is vulnerable to climate changes and supports low income and lower middle-income families. These conditions make it a suitable 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 changes, in particular extreme hydro-meteorological events and disease vectors.
- Distribute concessional loans through a revolving fund mechanism to vulnerable households to meet new adaptation guidelines and standards for built infrastructures to withstand extreme climate variability.
- Support social adaptive capacities and local ownership through community-awarded contracts. This point was not mention during the visit, but it is very important to create training programs to transform the actual drainage environment into a waterway and the actual garbage bin into 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. Transform the environment in order to create 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 its effects at different points of the watershed.	1.2. Define water control and water infrastructures elements.	\$ 25 000
1.3. Implement the outlet water control penstock on the McKinnon pond.	1.3. Install a civil structure able to distribute over 200 000 cubic meters 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 clean the infrastructure.	1.4. Make the area clean of all pipes and big debris. Negotiate with stakeholders and landowners to remove pipes garbage and debris.	1.4. Make the flow safe with minimum jam possibilities.	\$150 000
1.5. There is just one wet point remaining 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. Install culvert of less than 300 mm high across waterway to let cross people during most of the time, except during storm in order to	1.5. Retain as much water as possible into the water run.	\$ 250 000

	retain water and create wet point for a few hours.		
1.6. The bridge before the McKinnon's pond 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 more water go under.	1.6. Evacuating 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 households quality to resist through extreme climate events. Increase the life quality and safety of the area.	\$ 3 110 000
3. Adaptation by climate changes education and the effects on housing and water runs. Focus groups must be done first on kids in schools and woman at home.	3. Teachers group and education programs need to be settled. Training must focus on households and on safety during hurricanes and floods for a better development of an urban park.	3. Improved adaptation measures towards risk management and sustainable development.	\$ 200 000



**INGÉNIEURS
SANS FRONTIÈRES
QUÉBEC**
TRAVAILLER POUR LE MONDE



ANNEXE 1

Data from VC Bird International Airport

MAXIMUM 24-HOUR (8 AM - 8 AM) RAINFALL AT V. C. BIRD INT'L 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	27,5	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	



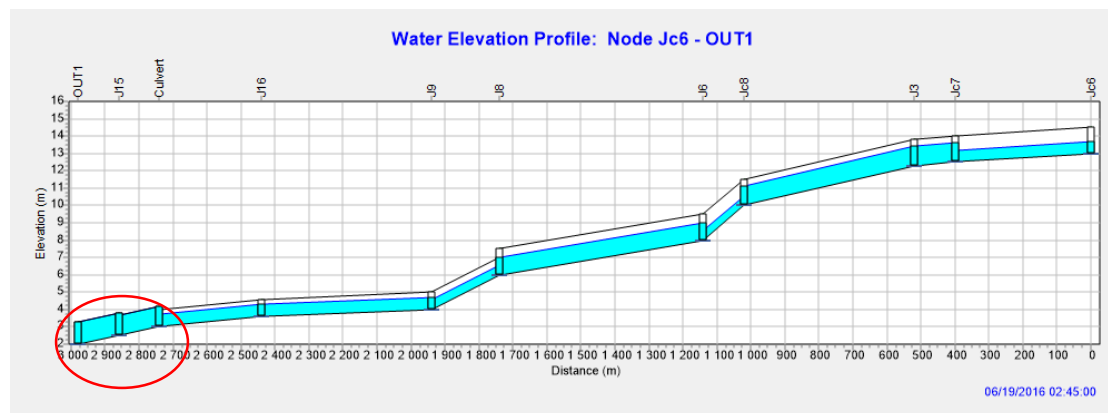
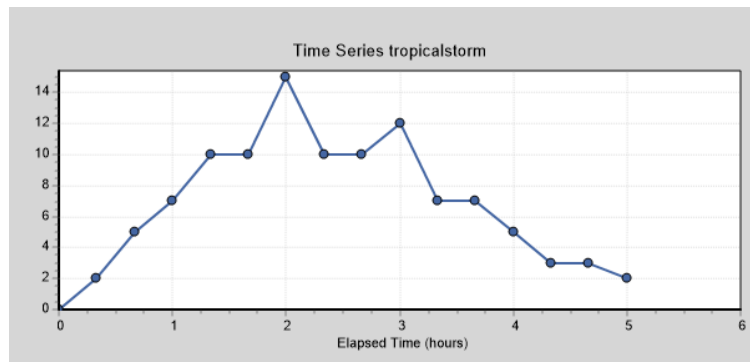
Year	AVERAGE RAINFALL TOTALS IN INCHES FOR ANTIGUA													Average
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
1928	1.88	1.78	3.18	0.84	0.69	0.92	2.41	3.32	5.04	2.84	3.03	4.97	2.58	
1929	1.37	1.08	3.83	1.29	4.07	3.47	1.92	8.56	2.36	4.08	5.06	2.37	3.29	
1930	2.91	1.33	0.36	1.46	1.01	1.91	2.13	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	2.07	1.61	2.45	2.5	10.91	3.56	5.39	2.1	3.55	9.92	8.11	4.94	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	1.1	1.1	1.1	1.1	1.1					

ANNEXE 2

Simulation from SWMM 5.0

Note: this simulation is just a basic feasibility study and is not based on real data:

- We know that the area is about 7, 5 square km. (1860 acres or 750 hectares);
- The soil is poorly permeable;
- The area covered by structures (housing and road) is around 25%;
- The slope is from 14 meters to 2, 5 meters above sea level (no distances);
- We know that there are different sub catchments;
- I used a drainage system of trapezoidal 1-meter-deep, 1-meter bottom width, and 5-meter slopes each side;
- For the last bridge, I used four pipes of 1,2 m diameter instead of pipes with different sizes.



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 the size of the pipe shows its flow is limited.

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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~~ ~~OR~~ ~~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,

Deedat 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 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)

Requirements for approval: ~~This~~ Terms of Reference is to be update upon the completion of the detailed drawing for the waterway interventions. Issuance is subject to approval by the Technical Advisory Committee (TAC) prior to advertising.

TERMS OF REFERENCE

*Environmental Impact Assessment
Including revisions to the Environmental and Social Management Plan*

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: ~~360~~ 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. Describe the project's use of renewable energy and resources, including efficiency. Outline sanitation plans; refuse collection, and storm water management.
5. Describe the specific, important malfunction/ accidental events or risks that may have a reasonable probability of occurring during the operational life of the project.
- ~~3.6.~~ Provide a detailed analysis for the management of vehicular and pedestrian access and parking as part of a traffic and management plan, particularly in the event of road/traffic disruptions.
4. Describe plans for construction, operation, maintenance, and commissioning phases of all aspects of the project ~~Consider all potential~~

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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.

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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 uses and topography to show surrounding slope elevation, watershed, hydrology, soil conductivity, and traditional access routes and uses.
2. Baseline data on environmental resources and critical habitats in the area including ambient air quality, soil quality and percolation rates, and water quality.
3. Describe existing biodiversity relevant to terrestrial biological environmental components, including species at risk (flora and fauna) and when each species, if any, is likely to be present in the project area.
4. Identify, if any, natural or heritage resources deemed valuable or protected by the local community
5. Describe the socio-economic environmental components, to include demographic data disaggregated by gender and vulnerable groups, such as persons with disabilities, elderly, and youth (household type, labour force, etc.); local services, past and ~~foreseeable~~ foreseeable land uses, transportation and associated infrastructure
6. Existing public health and safety concerns, if any.

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3. Socio-Economic Impacts

1. Provide an accurate representation of the social, cultural and economic conditions of the community's population
2. Describe how men and women may be diversely affected by the project, in addition to other minority ~~and~~ or vulnerable groups
3. Identify and describe the potential socioeconomic impacts (both positive and negative) of construction, operations, decommissioning and life cycle of the project. ~~Identified stakeholders~~ In particular, regarding community residents in the area and potential impacts on the traditional, ~~and~~ current and foreseeable 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.

4. Identify the stages of the project intervention in which fair and equitable access to benefits may be derived by the local community, particularly vulnerable and marginalized groups
5. Provide a report on public consultations, ensuring that all members of the community have been afforded a medium to voice their concerns, particularly marginalized and vulnerable groups, and where such concerns have been captured. A minimum of (3) public consultations should be held throughout the implementation of the project.
6. Provide a statement of community involvement for the implementation of the project.
7. Describe measures to adhere to the Antigua and Barbuda Labour code in the project management
- ~~2. Describe how men and women may be diversely affected by the project, in addition to other minority or vulnerable groups~~

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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.

Indicative environmental and social risks and impacts have been identified in the project document, technical feasibility study, and the environmental and social management plan.

Impacts should be scaled based on severity - low, medium, and high; and presented in a tabular format. The following table ~~maybe used~~ **is provided** as a guide:

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Table1. Summary assessment and mitigation of environmental impacts

Area of Impact/<u>Recept or</u>	Brief Descripti on	<u>Impact Type</u> <u>Positive/Negat ive</u>	Risk Significanc e High/Mediu m/ Low	Mitigati on Measur es	<u>Responsi ble</u> <u>Authoritie s</u>
Hydrology and drainage					
<u>Soils</u>					
Landscape & Visual Impact					
<u>Protected Areas</u>					

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Biodiversity and Ecosystem Impact					
Physical, Historic and Cultural Assets					
Land uses					
Access Routes					
Socio-economic/ realty value					
Human resources/wellbeing (project implementation/ construction phases					
Gender equity					
Settlements & relocation					
Local community services and resources, especially of vulnerable or marginalized populations					
Public Health & Safety ¹					

¹ The Health Impact Assessment should address the following:

a. Biophysical Environment

- Water Quality – waterways and recreation
- Outdoor Air Quality – allergens and irritants, nuisance noises
- Solid Waste – generation, disposal and recycling
- Infectious Diseases and Other Biological Hazards – pest and vector control

b. Psychosocial

- Social networks – support, cohesiveness, inclusion or exclusion
- Discrimination – employment, gender
- Community Participation – political, civic, other

c. Healthcare and Public Health Systems

- Access to quality health systems
- Preventive services
- Emergency medical services
- Disease monitoring and management

Economic					
Labour force					
Energy					
Pollution/ Contamination					
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	Responsibility Authority
Extreme rainfall event				
Extreme drought				
Extreme atmospheric temperatures				
Hurricane force wind				
National GHG Emissions				
Other				

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The section should also consider the following:

1. Measures to avoid, minimize, or mitigate environmental and social risks of the proposed project
2. [Develop attainable mitigation measures to enhance positive impacts and reduce or avoid negative impacts, commensurate with the levels of risks determined](#)
- 4.3. [Increasing stakeholder engagement, ownership and empowerment](#)
- 2.4. Gender-responsiveness of the project design
- 3.5. Measures to be adopted to ensure proper maintenance of the project interventions
- 4.6. Mitigation measures to reduce sediment loading into the marine environment
- 5.7. Mitigation of mosquito-breeding habitat using ecosystem-based solutions and design measures
- 6.8. Plans for storms and storm surges along with the overall drainage management

- [Public safety](#)
- [Wastewater treatment](#)

- 7.9. Measures to be adopted to maintain or enhance riparian vegetation, including species for vegetating waterway buffer areas.
- 8.10. Appropriate implementation time and place of measures must be outlined, in addition to persons or entities responsible for implementation.

Measures must demonstrate compliance with the key risk areas identified in the Adaptation Fund's Environment and Social Policy, as well as its Gender Policy, namely: to comply with the Adaptation Fund's environmental and social policy, specifically:

1. Compliance with the Law
2. Access and Equity
3. Marginalized and Vulnerable Groups
4. Human Rights
5. Gender Equity and Women's Empowerment
6. Core Labour Rights
7. Involuntary Resettlement
8. Protection of Natural Habitats
9. Conservation of Biological Diversity
10. Climate Change
11. Pollution Prevention and Resource Efficiency
12. Public Health
13. Physical and Cultural Heritage
14. Lands and Soil Conservation

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-Management Plan~~**

A draft Environmental and Social ~~Monitoring-Management Plan~~ has been developed as part of the project preparation activities, and the consultant is to revise the Environmental and Social Management Plan in light of the updated technical drawings and additional risks/impacts identified.

The ESMP must be developed to be carried out during the construction stage and ~~at~~ 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. ~~Full Preliminary~~ costing of the Monitoring Plan implementation should be included, and indicators used for monitoring should be disaggregated by gender.

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At a minimum the ~~draft monitoring~~revised Management Plan should include:

- a) An introduction outlining the need for a monitoring programme
- b) The management and monitoring measures to be implemented throughout the life of the project; highlight activities being monitored, performance objective and the parameters chosen to –effectively carry out the exercise
- ~~b)c)~~ Linkages between the risk management recommendations and the fifteen risk areas described in the Adaptation Fund's Environmental and Social Policy, as well as the Gender Policy
- ~~e)d)~~ The methodology to be employed for both the maintenance and monitoring of the intervention, and the frequency of –monitoring
- ~~e)e)~~ Frequency of reporting to the Department of Environment and the Development Control Authority
- ~~e)f)~~ The sites being monitored. These should incorporate a control site where project interventions were not implemented
- ~~f)g)~~ Raw data to be collected and relevant tables and graphs to be used
- ~~e)h)~~ 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 and/or Gender Specialist
- Socio-economist or Economic geographer
- Hydrologist, Surveyor, or Soil and water engineer,
- Climate Adaptation Specialist

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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 including participation by women and vulnerable/marginalize persons

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 documented 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.



Request for assistance in complying with the Fund's Environmental and Social Policy

Submission Date: 29 August 2016

Adaptation Fund Grant ID:

Country/ies: Antigua & Barbuda

Implementing Entity: Department of Environment

A. Timeframe of Activity

Start date of activity	November 1st, 2016
Completion date of activity	March 1st, 2017

B. Type of support requested

Describe the activities to be undertaken to support the accreditation of NIE candidate(s) in the target country(ies)

Types of Support Activities	Support requested (please check the relevant case)	Type/name of provider of requested support ¹	Requested budget (USD)
Development of procedures manual/guidelines for screening projects for environmental and social risks	✓	Individual consultant or consulting firm	US\$5,000
Development of procedures manual/guidelines for undertaking project environmental and social risk assessment and for formulating risk management plans	✓	Individual consultant or consulting firm	US\$10,000
Development of a policy/avenues for public disclosure and consultation	✓	Individual consultant or consulting firm	US\$5,000

¹ Specify if it is an institution, consulting firm or individual consultant. When possible, provide the name of the institution, firm or individual identified or selected.

Development of transparent and effective mechanisms for receiving and resolving complaints about environmental and social harms caused projects/programs during the course of implementation of AF supported projects/programs			
Training of select entity staff to carry out the relevant tasks related to the implementation of the E&S Policy	✓	Individual consultant or consulting firm	US\$5,000
Other type of support requested (please describe)			
Total Grant Requested (USD)			US\$25,000

C. Implementing Entity

This request has been prepared in accordance with the Adaptation Fund Board's procedures

Implementing Entity Coordinator, IE Name	Signature	Date (Month, day, year)	Implementing Entity Contact Person	Telephone	Email Address
Department of Environment		August 28 th 2016	Diann Black-Layne	+1 268 464-6410	dcblack11@gmail.com
			Lia Nicholson	+1 876 512-5885	nicholsonlia@gmail.com

D. Record of endorsement on behalf of the government

Provide the name and position of the government official, Designated Authority of the Adaptation Fund, and indicate date of endorsement. The endorsement letter should be attached as an annex to the request.

<i>Diann Black-Layne, Director, Department of Environment</i>	<i>Date: August 28, 2016</i>
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DEPARTMENT of
ENVIRONMENT
Antigua and Barbuda

Director
Ambassador Diann Black- Layne

The Adaptation Fund Board
c/o Adaptation Fund Board Secretariat
1818 H Street NW, Washington DC, 20433
Secretariat@Adaptation-Fund.org
Fax: 202 522 3240/5

August 28, 2016

RE: ENDORSEMENT FOR ESP & GENDER TECHNICAL ASSISTANCE GRANT FOR ANTIGUA & BARBUDA

Dear Adaptation Fund Secretariat,

I hereby support the application submitted by the Department of Environment (DoE), as NIE to the Adaptation Fund (AF), to request Readiness support to build capacity in Environmental & Social Safeguards (ESS) and Gender.

Since January 2016, the DoE has been working closely with the AF Secretariat to develop a direct access project to implement climate adaptation in Antigua's northwest McKinnon's watershed. This project proposal has gone through several iterations, and we thank the Secretariat's support through the process. Based on lessons learned, it is evident that the DoE project staff would significantly benefit from Readiness support to revise the DoE's ESS policy to better align with the key areas of the AF, as well as its gender policy. Specifically, the following activities will be extremely beneficial: screening projects for environmental and social risks, undertaking project environmental and social risk assessment and formulating risk management plans; public disclosure and consultation; and training to carry out implementation.

I thank you for your favourable consideration of the Readiness application.

Sincerely,

.....
Director
Department of Environment

The Department of Environment
Ministry of Health and the Environment
#1 Victoria Park, Botanical Gardens
ST. JOHN'S ANTIGUA, W.I.

Tel: (268) 462-6265
Fax: (268) 462-4625
Email: antiguaenvironmentdivision@gmail.com

