Meeting of the Board
18 – 21 August 2020
Virtual meeting
Provisional agenda item 11

GCF/B.26/02/Add.05

28 July 2020

Consideration of funding proposals - Addendum V

Funding proposal package for FP133

Summary

This addendum contains the following seven parts:

a) A funding proposal titled "Resilience to hurricanes in the building sector in Antigua and Barbuda";
b) No-objection letter issued by the national designated authority(ies) or focal point(s);
c) Environmental and social report(s) disclosure;
d) Secretariat's assessment;
e) Independent Technical Advisory Panel's assessment;
f) Response from the accredited entity to the independent Technical Advisory Panel's assessment; and
g) Gender documentation.

Table of Contents

Funding Proposal

Project/Programme title:	Resilience to hurricanes in the building sector in Antigua and Barbuda
Country(ies):	Antigua and Barbuda
Accredited Entity:	Department of Environment, Antigua and Barbuda
Date of first submission:	*2019/11/09*
Date of current submission	*2019/11/09*
Version number	*V.001*

GREEN CLIMATE FUND

Contents

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

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

Please submit the completed proposal to:

fundingproposal@gcfund.org

Please use the following name convention for the file name:

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

A. PROJECT/PROGRAMME SUMMARY

A.1. Project or programme	Project	**A.2. Public or private sector**	Public
A.3. Request for Proposals (RFP)	Not applicable		
A.4. Result area(s)	Mitigation: Reduced emissions from: ☐ Energy access and power generation: ☐ Low-emission transport: ☐ Buildings, cities, industries and appliances: ☐ Forestry and land use: Adaptation: Increased resilience of: ☒ Most vulnerable people, communities and regions: ☐ Health and well-being, and food and water security: ☒ Infrastructure and built environment: ☐ Ecosystem and ecosystem services:		GCF contribution: Enter number% Enter number% Enter number% Enter number% 34% Enter number% 66% Enter number%
A.5. Expected mitigation impact	*Indicate t CO2eq over lifespan*	**A.6. Expected adaptation impact**	Direct beneficiaries: ~73,216 people (52% of which are women and 48% of which are men) Indirect beneficiaries: the entire population of Antigua and Barbuda (equivalent to ~96,000 people).
A.7. Total financing (GCF + co-finance)	46.1 million USD	**A.9. Project size**	Small (Upto USD 50 million)
A.8. Total GCF funding requested	32.7 million USD		
A.10. Financial instrument(s) requested for the GCF funding	☒ Grant 32.7 million USD ☐ Loan Enter number ☐ Guarantee Enter number		☐ Equity Enter number ☐ Results-based payment Enter number
A.11. Implementation period	*6 years*	**A.12. Total lifespan**	*50 years*
A.13. Expected date of AE internal approval	*11/8/2019*	**A.14. ESS category**	B
A.15. Has this FP been submitted as a CN before?	Yes ☒ No ☐	**A.16. Has Readiness or PPF support been used to prepare this FP?**	Yes ☐ No ☒
A.17. Is this FP included in the entity work programme?	Yes ☐ No ☒	**A.18. Is this FP included in the country programme?**	Yes ☒ No ☐
A.19. Complementarity and coherence	*Does the project/programme complement other climate finance funding (e.g. GEF, AF, CIF, etc.)? If yes, please elaborate in section B.1.* Yes ☒ No ☐		
A.20. Executing Entity information	Antigua and Barbuda Ministry of Finance		
A.21. Executive summary (max. 750 words, approximately 1.5 pages)			

Historically, Antigua and Barbuda had only been directly hit by relatively low-intensity tropical storms, with those reaching hurricane status seldom strengthening above Category 3 and with one confirmed Category 4. Consequently, building codes in Antigua and Barbuda did not prescribe the construction methods/technologies required to withstand above a Category 3 hurricane. While designing buildings to withstand up to a Category 3 hurricane was sufficient in the past, the increasing intensity and frequency of hurricanes hitting the country is having severe impacts on the built environment and population. Climate change projections under both the RCP4.5 and 8.5 scenarios indicate that, although the total number of storms is not expected to change significantly, there will be an increase in the frequency of high-intensity storms (Category 4 and 5 hurricanes) experienced by Antigua and Barbuda. The increasing intensity of hurricanes is already evident in the country. The return rate of Category 4 hurricanes in the first half of the 20th century was 1 in 50 years compared with the latter half of the century, when the return period for Category 4 hurricanes shortened to 1 in 10 years. The only Category 5 hurricanes in recorded history to affect the country have occurred very recently, namely Hurricanes Irma and Maria in 2017. The first of these, Hurricane Irma, was a direct hit on Barbuda and resulted in the destruction of ~95% of all infrastructure on the island. The combined impact of the 2017 hurricanes amounted to ~US$136 million in damages and ~US$19 million in post hurricane economic losses, with total recovery costs estimated at US$222 million. The cost related to loss of revenue to the economy up to 12 months after the hurricane is not included here.

Following a Category 5 hurricane, power and water supply in Antigua and Barbuda can be disrupted for 3 - 24 months, while damage to communication and transport infrastructure disrupts associated services for up to 6 months, with considerable impacts on the country's economy. In addition to the general disruption of economic activities, food and medical imports, which are mostly brought in by ship, are disrupted for several weeks after an extreme event, impacting the health and wellness of local communities. These impacts are exacerbated by the significant damage caused by hurricanes to critical public service infrastructure, which limits the capacity of emergency services as well as the National Office of Disaster Services (NODS) to prepare for and respond to extreme climate events. The capacity of the country to prepare for a hurricane is further constrained by inadequate early warning systems and the absence of formalised communication and early action protocols. Given the projected increase in the frequency of Category 4 and 5 hurricanes, the combined impacts on the economy and wellness of local communities will become increasingly severe in the absence of urgent adaptation interventions.

At present, the country has limited technical and financial capacity to fully address the impacts of Category 4 and 5 hurricanes on critical public service and community buildings through domestic sources of financing – including both private and public sector finance. This is because, although Antigua and Barbuda is considered a middle income country on a per-capita basis, its size and small population means that it lacks the scale required to invest adequately in adaptation. The country also has a high public debt burden which, in 2018, reached ~US$1.4 billion — more than 88% of the country's GDP. This burden is increased by extreme climate events, with recovery needs reducing economic growth and the ability of the country to repay public debt. Although this debt was expected to decline by 2019, long standing problems in the fiscal and banking sectors remain unresolved, including this public debt as well as persistent large financing gaps, high rates of non-performing loans caused by repeated extreme weather related disasters and the delay in bank resolution. Consequently, the Government of Antigua and Barbuda (GoAB) is requesting GCF grant finance, which will be combined with government co-financing to initiate a paradigm shift within the country's building sector towards climate-resilient sustainable development. Specifically, the proposed project will create an enabling environment for existing infrastructure to be upgraded to withstand the impacts of Category 4 and 5 hurricanes – which have sustained wind speeds of over 200km/h – as well as for all future development to be equipped to withstand these impacts. This transformative change in the country's approach to climate-resilience will be achieved by: i) enhancing the climate resilience of critical public service and community buildings through increasing the structural integrity of these buildings to withstand Category 4 and 5 hurricanes; ii) ensuring the uninterrupted supply of power and water to critical buildings during extreme climate events; iii) mainstreaming climate change adaptation into the building sector as well as public and private financial, insurance and banking sectors; and iv) strengthening climate information services in Antigua and Barbuda to facilitate early action to secure non-category 4 and 5 buildings as early as possible after a hurricane warning has been issued. By focusing initially on critical public service and community buildings, the project will ensure the uninterrupted provision of critical services – including health, fire, rescue and police. This will facilitate rapid recovery after an extreme climate event, reducing economic downtime and improving the lives and welfare of local communities. Furthermore, mainstreaming climate resilience into national building regulations, combined with strengthening the capacity of local authorities, building inspectors, engineers, architects and draughtsmen to adhere to these regulations, will promote the upscaling of adaptation interventions across the country's entire building sector.

Overall, the project will confer direct adaptation benefits to ~73,216 vulnerable people in Antigua and Barbuda, and indirect benefits to the entire population of the country, by reducing the adverse impacts of extreme climate events on human life and enabling the country's major economic sectors to resume business as usual more quickly following these events. Direct health benefits are also expected to incur through the improved provision of clean water, increased operability of clinics during a storm, integration of storm shelters into existing clinics and improved storage for vital medication that are usually damaged by an intense storm. Further benefits are expected across the Caribbean, with Antigua and Barbuda serving as an example of climate-adaptive building practices for Small Island Developing States (SIDS).

B. PROJECT/PROGRAMME INFORMATION

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

Context

Antigua and Barbuda forms part of the Leeward Islands in the eastern Caribbean. Most of the population, ~94,400 people, live on the island of Antigua, with a further ~1,600 residing in Barbuda[1,2]. As a small island developing state (SIDS), Antigua and Barbuda is among the most vulnerable countries to extreme climate events such as hurricanes and tropical storms[3,4]. This vulnerability is exacerbated by the country's long-standing macroeconomic and financial problems[5], with extreme climate events having significant impacts on the lives and livelihoods of local communities, as well as the local economy. In particular, damage to critical public infrastructure — including centralised power and water supplies, roads, hospitals, clinics, emergency services, telecommunications and schools — leads not only to disruptions to economic activity, but also to considerable recovery costs after an event. Moreover, it often takes several months for the country to recover from such disruptions, which leads to considerable declines in economic productivity and quality of life.[6]

Climate Rationale

Historically, Antigua and Barbuda has only been hit by relatively low-intensity tropical storms, with those reaching hurricane status seldom strengthening above Category 3. The return rate of Category 4 hurricanes in the first half of the 20th century was only 1 in 50 years, and until 2017, the country had never experienced a Category 5 hurricane (Figure 1a). Consequently, building codes in Antigua and Barbuda did not prescribe the construction methods/technologies required to withstand above a Category 3 hurricane. While designing buildings to withstand up to a Category 3 hurricane was sufficient in the past, the increasing intensity of hurricanes hitting the country (Figure 1b) is having severe impacts on the country's built environment and population. For example, Hurricane Irma in 2017 resulted in the destruction of ~95% of all infrastructure on Barbuda, with total recovery costs estimated at US$222 million[7]. The recent occurrence of several Category 5 hurricanes in the region have also driven up insurance prices in Antigua and Barbuda, this is true even if the event does not make landfall in the country. This trend of increasing intensity of storms within the Caribbean region is projected to continue in the coming century (see analysis below). Urgent adaptation measures for the building sector are therefore needed to address the impacts of climate change on the country. Further details on the climate change risks and impacts for Antigua and Barbuda are described below.

[1] United Nations. World Population Prospects. Available at: https://population.un.org/wpp/DataQuery/. Accessed on 8 July 2019.
[2] Government of Antigua and Barbuda. 2011. Population and Housing census.
[3] The following explanation clarifies the use of the terms 'hurricanes', 'tropical storms' and 'high-intensity storms' in this Funding Proposal: The Saffir-Simpson Hurricane Wind Scale defines a hurricane as having sustained wind speeds of more than 74 mph (119 kmh), while a tropical storm has sustained wind speeds of less than 38 mph (61 kmh). Hurricanes are therefore likely to result in more damage to infrastructure and loss of life than tropical storms. Additionally, Category 4 and 5 hurricanes are considered to be high-intensity storms because of the associated sustained wind speeds of these hurricanes. According to the Saffir-Simpson Hurricane Wind Scale, Category 4 hurricanes have sustained wind speeds of 130–156 mph (209–251 kmh) while Category 5 hurricanes have sustained wind speeds upwards of 157 mph (252 kmh).
[4] Further details on Antigua and Barbuda's vulnerability to climate threats are presented in Section 3 of Annex 2: Feasibility Study.
[5] Further information on the country's financial challenges are presented in Section B.5 of the Funding Proposal, and specific details on these challenges can be found at the following reference: International Monetary Fund. 2015. Antigua and Barbuda. IMF Country Report number 15/189.
[6] Further information about the geographic, climatic and socio-economic context in Antigua and Barbuda is presented in Annex 2: Feasibility Study (Section 2).
[7] Government of Antigua and Barbuda. Antigua and Barbuda Recovery Needs Assessment.

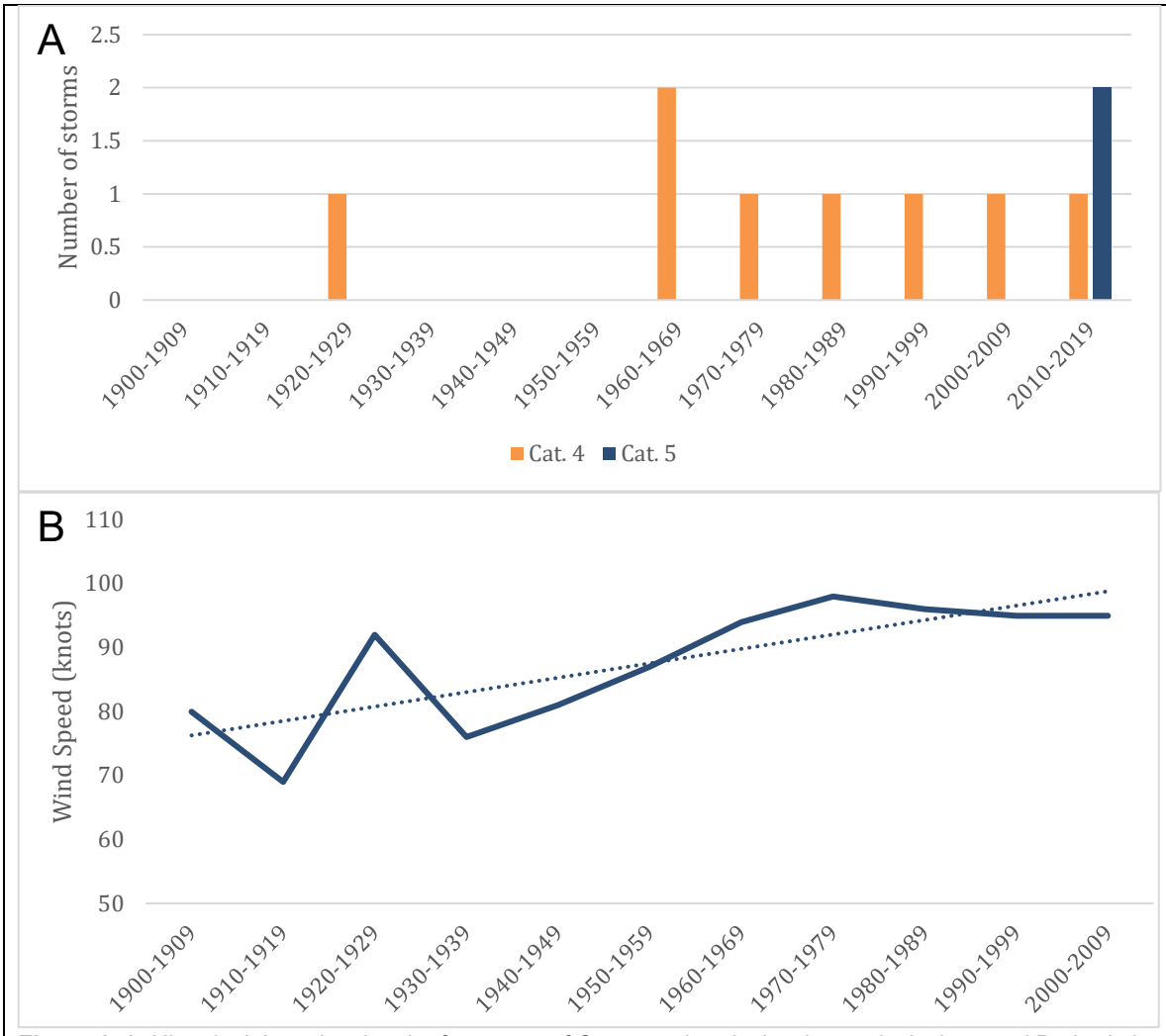


Figure 1. A: Historical data showing the frequency of Category 4 and 5 hurricanes in Antigua and Barbuda between 1900 and 2019. While the data is too sparse to conduct a statistical trend analysis, there is a noticeable increase in the frequency of Category 4 hurricanes in the latter half of the century, with the first ever Category 5 hurricanes observed in 2017. B: Historical data showing the average wind speeds of tropical storms and hurricanes in the Eastern Caribbean. Although not statistically significant, an increasing trend has been observed in the average wind speed of storms in the region.

Climate change risks

Hurricanes and tropical storms are the main climatic hazards affecting Antigua and Barbuda. Since 1995, the country has experienced 15 hurricanes and 14 tropical storms. Most of these storms ranged from Category 1 to 3 in magnitude, with the notable exceptions of Hurricanes Luis in 2005 (Category 4), and Irma and Maria in 2017, which were the only Category 5 hurricanes that have affected the country and region in recorded history.[8] The frequency and intensity of these storms is strongly correlated to: i) high sea surface temperature (SST) in the major development region (MDR); ii) decreasing vertical wind shear (VWS) in the mid-troposphere during depression development; and iii) changes in the La Niña phase of the El Niño Southern Oscillation (ENSO). In the lead up to Hurricane Irma in 2017, the SST anomaly from baseline climatic conditions was shown to be in the order of 1°C in the region to the south-east of Antigua and Barbuda. Hurricane Irma was fluctuating between Category 2 and 3 strength before being deflected west south-west by a high-pressure system back over the area of warmer ocean[9]. This increased SST gave energy to the depression, contributing to its development into a Category 5 hurricane. The analyses below use these parameters to demonstrate the expected increase in the intensity of hurricanes over the next century.

[8] Details on the return periods of hurricanes and tropical storms within a range of 15 to 105 nautical miles are presented in Section 2 of Annex 2: Feasibility Study.

To determine how climate change is likely to result in more favourable conditions for hurricane development, two factors were assessed, namely: i) SST over the oceans in the lead up pathway for most hurricanes affecting Antigua and Barbuda; and ii) VWS in three 4° x 4° locations in the MDRs (Figure 2). An analysis of the projected ENSO cycle under future climate scenarios was not undertaken because of the uncertainty in the relevant literature[10].

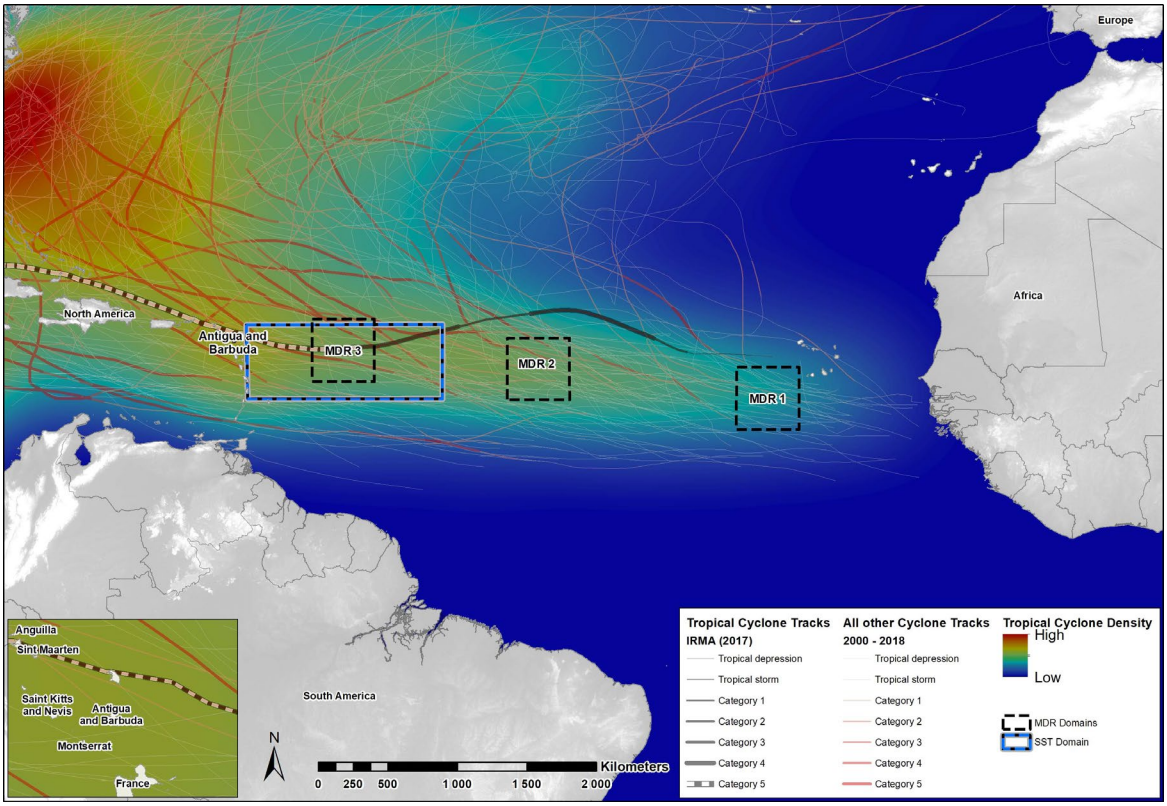


Figure 2. Vertical wind shear (VWS) and sea surface temperature (SST) domains used for the analysis of major development regions (MDRs) for hurricanes that affect Antigua and Barbuda. Lines show the historical trajectories of hurricanes.

Climate change projections under both the RCP4.5 and 8.5 scenarios[11] indicate that, although the total number of storms is not expected to change significantly, there will be an increase in the frequency of high-intensity storms (Category 4 and 5 hurricanes) experienced by Antigua and Barbuda. Furthermore, a 20% slow-down in storm translation speed over land for Atlantic storms has been observed. These speeds are likely to continue decreasing under future conditions of climate change, resulting in heavier rainfall events and increased flood risk.[12] The changes in hurricane patterns are as a result of the projected changes in SST and VWS, which were assessed in the MDRs where most extreme climate events affecting the country develop (Figure 2 above). The results from this assessment show that under RCP8.5, SST in the 50th percentile is likely to increase from the baseline conditions by 2°C in 2050 and nearly 4°C by 2100 (Figure 3) in the SST MDR.

[11] These representative concentration pathways (RCPs) are based on the main forcing agents of climate change, including GHG emissions, GHG concentrations and land-use change. RCP4.5 represents the likely best-case scenario with a peak radiative forcing of 4.5 W/m2 (~650 ppm CO2 eq) at stabilisation after 2100. RCP8.5 represents a very high GHG emission scenario with a peak radiative forcing of 8.5 W/m2 (~1,370 ppm CO2 eq) and no expected stabilisation in emissions. RCP8.5 indicates a business as usual scenario where the rate of GHG emissions continues to increase with no mitigation measures.

[12] Kossin J. 2018. A global slowdown of tropical-cyclone translation speed. *Nature.* 558: 104–107.

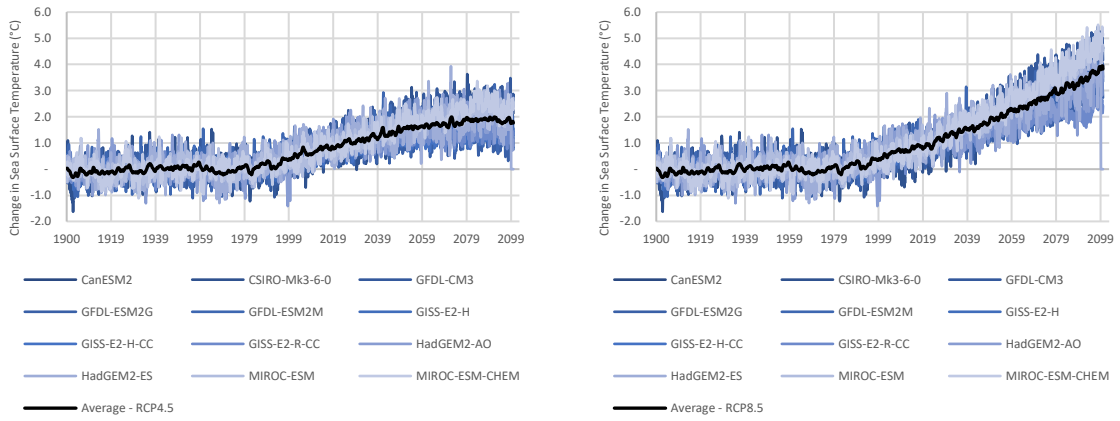
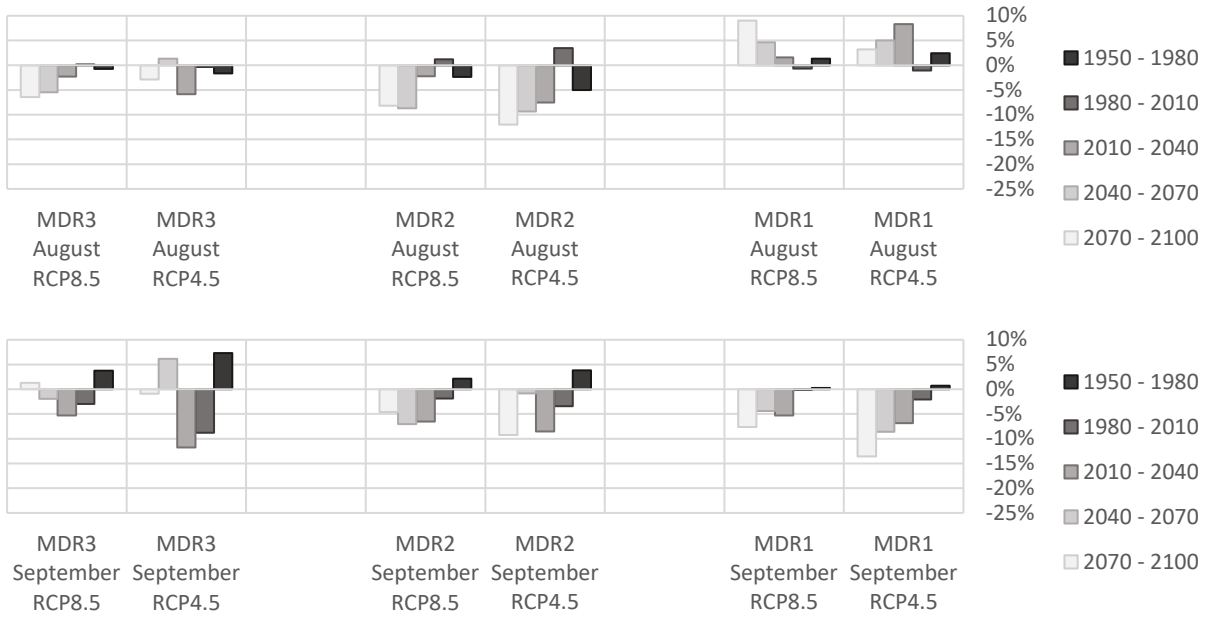


Figure 3. Sea surface temperature (SST) anomaly yearly for RCP4.5 (left) and RCP8.5 (right).

In addition to the increasing SST, a general decreasing trend in VWS is expected under both RCP4.5 and RCP8.5 climate scenarios (Figure 4) and across all MDRs. Such decreases, combined with increasing SST, will create more favourable conditions for the development of high-intensity storms in the MDRs assessed. These key findings are supported by the most recent IPCC AR5 report, which emphasises an expected 50% increase in the frequency of high-intensity storms, along with increases in the magnitude of these events and their associated maximum wind speeds[13].



[13] The Intergovernmental Panel on Climate Change. Fifth assessment report. Available at: https://www.ipcc.ch/assessment-report/ar5/. Accessed on: 19 September 2019.

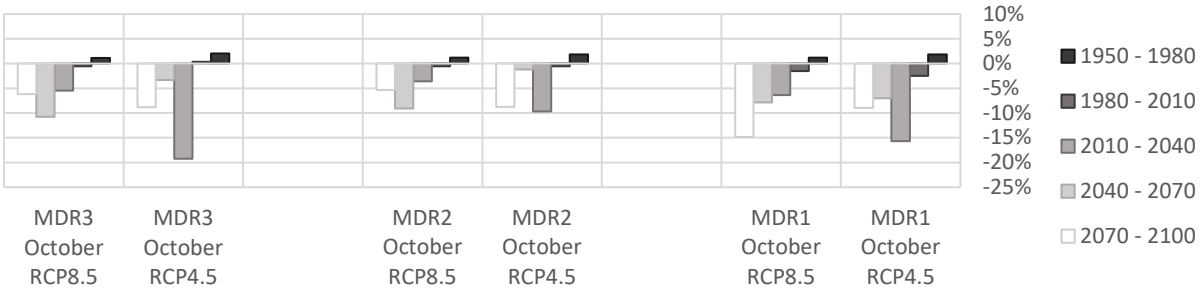


Figure 4. Change in VWS from August (top) to October (bottom) for MDR1-3 and under RCP4.5 and RCP8.5 scenarios. *Climate change impacts and vulnerability*

Given that Category 4 and 5 hurricanes are expected to occur more frequently under future climate conditions, the combined impacts of intense rainfall and strong winds will become increasingly severe in the absence of urgent adaptation interventions. This will have severe impacts on the lives and livelihoods of local communities as well as the economy as a whole[14]. Following a Category 5 hurricane, power and water supply can be disrupted for up to 24 months, while damage to communication and transport infrastructure disrupts associated services for up to 6 months. Furthermore, rough seas and inflated insurance premiums after a storm disrupts the import of vital food, medical and building supplies for several weeks after an extreme climate event. The ability of the country to respond to such events is constrained by the vulnerability of critical public services, including healthcare, police, fire and rescue services as well as government coordination and response agencies. Disruption to these services caused by damages to critical infrastructure reduces the efficiency and effectiveness of emergency response and delays recovery. This vulnerability is further exacerbated by limited capacity within Antigua and Barbuda's Meteorological Services (ABMS) for early warning and preparatory action in response to an extreme climate event. To determine the most appropriate sites to receive project interventions and ensure that maximum benefits are realised as a result of these interventions, a climate vulnerability analysis was conducted. This analysis included a hydraulic flood analysis as well as a walk-time analysis to determine the total coverage of project interventions and support justification for the project to primarily address the impacts of Category 4 and 5 hurricanes. The findings from this analysis are presented in Section B.3 of this Funding Proposal, as well as in Section 10 of Annex 2: Feasibility Study.

Rationale for the use of the Saffir-Simpson Hurricane Wind Scale (SSHWS) as the operational meteorology measure for the proposed project

The current assessment for the project utilises the Saffir-Simpson Hurricane Wind Scale (SSHWS) as the currently accepted, applied and projected academic and operational meteorology measure. There are, however, potential limitations with the SSHWS as a robust and granular measure of a tropical cyclone's potential impact both in observed records and for projecting future tropical cyclone activity. This deficiency is based on the wide variety of noted, on-the-ground impacts within a given hurricane category as a result of being classified primarily by maximum sustained windspeed. However, given the data input requirements (ocean–atmosphere–energy interaction, wind intensity duration, wind speed threshold radii) of alternative hurricane impact indices, the weakness of climate models to accurately simulate these extreme dynamics, and the limited uptake of these scales in academics as well as by the IPCC, the use of the SSHWS remains more feasible.[15]

Baseline projects, programmes and initiatives

Considerable baseline investments are being made through public expenditure and donor-funded initiatives to increase the resilience of Antigua and Barbuda's building sector to extreme climate events. Lessons learned and best practices from these investments have been incorporated into the design of the proposed project to replicate successful adaptation techniques and ensure that there is complementarity between the project and existing actions. During project development, the most relevant baseline investments that will be complemented by the proposed project interventions were identified. Following this identification, an analysis of each of these projects was conducted to ensure that the proposed project will not duplicate or adversely affect these ongoing initiatives. Instead, GCF resources will be used to

[14] A detailed cost-benefit analysis is presented in Annex 3 and summarised in Section D.6 of the Funding Proposal. This analysis describes what the projected costs of extreme climate events will be in Antigua and Barbuda with and without project interventions under baseline and projected climate change scenarios.

[15] Alternative methodologies that seek to address deficiencies in the SSHWS as a granular measure of a hurricane's potential impact are investigated and presented in Section 3.3.3 of Annex 2: Feasibility Study.

enable project interventions to build on and complement existing initiatives to achieve maximum adaptation impact in the target sector. The most relevant baseline investments, including a description of how the proposed project will complement these investments, are presented below[16].

The Government of Antigua and Barbuda (GoAB) is currently implementing a project entitled *Building climate resilience through innovative financing mechanisms for climate change adaptation (2016–2020; SCCF; US$11,390,000),* funded by a grant of US$5 million from the Special Climate Change Fund (SCCF) and co-financing from the GoAB. Among its four primary focus areas are: i) developing innovative financing mechanisms to fund adaptation interventions through the Sustainable Island Resource Framework Fund (SIRF Fund), including for the building sector; and ii) strengthening national policies and plans to promote adaptation to climate change through *inter alia* updating the national building code, which includes considerations for Category 4 and 5 hurricanes. In its current form, the SIRF Fund is optimised for small grants and a revolving loan program. Small grants are provided to vulnerable Community Buildings in vulnerable areas of the country such as churches, schools and community centres. The revolving fund program is highly concessional non-collateralize loans to individual homeowners. The loan portfolio for individual applications is capped at 5% of the total funds available at a given time. The loans are to be used for the incremental cost of the climate interventions only and cannot be used for normal construction cost. The Incremental cost is calculated by identifying the agreed adaptation interventions and what is normal construction cost. The SIRF Fund is the only finding mechanism of this type in Antigua and Barbuda. It is designed to not compete with the local private financial sector. At this time and based on the capital in the fund, no individual loan can exceed $400,000 USD. This acts as a barrier to small- to medium-sized businesses, which often require larger investments to implement the incremental costs related to adaptation interventions. The proposed GCF project will complement the SCCF-funded project as well as to set the stage for the scaling up to the private sector by the following (a) the demonstration of the DCA building codes on government buildings (b) provide a new source of trained construction workers in the public and private sectors who can deliver work to meet the new code (c) the project for the first time will mainstream and increase demand for renewable energy installers and will generate interest in this field for young students and finally (d) provide additional evidence based incremental cost calculation to the SIRF Fund for buildings used for a business. With information and lessons learnt from this GCF project, the SIRF Fund can now establish a window for small businesses. During the implementation of Activity 2.2, options for increasing financial inflows into the SIRF Fund will be investigated (through consultations with relevant public and private sector actors) to increase the available financial resources to address the anticipated cost and other barriers to the implementation of the new code and the scaling up of the number of resilient buildings in the country. This will increase the amount of financing available for access by the public and private sector, which will in turn enable these entities to implement more / larger-scale adaptation interventions on their buildings more rapidly. GCF resources from this project will not be used to capitalise this fund, fill funding gaps or retroactively finance activities already under development or implementation other programmes / initiatives.

The Global Climate Change Alliance (GCCA) climate change adaptation and sustainable land management in the Eastern Caribbean (2013–2018; US$14,575,000) project is closely aligned with the SCCF-funded project in that it supported mainstreaming climate change adaptation into policymaking. Although there is alignment, the building code — which is being updated to meet the design requirements for future climate scenarios — is not included in the country's as part of the national regulatory framework. The building code however enjoys wide range of compliance since the banks and the physical planning department (i.e. Development Control Authority [DCA]) require that the plans for construction are designed to the code. If the plans are not approved by the DCA the banks will not fund the project. This approach actually demonstrates the value of Article 2(1)(c) of the Paris Agreement 2015 (i.e. making finance flows consistent with a low emission and climate resilient development pathway) and is a valuable mechanism to effect change. The fact that the code is just a standard therefore does not necessarily limit the ability of the government to enforce the climate-proofing technologies proposed under the revised building code. The proposed project however will seek to move the building codes from a standard to a legal requirement which allows for the Government to include clear financial incentives to reduce the barriers hindering full implementation of the code. To this end the project will: *i*) draft amendments to the Physical Planning Act (PPA) to make provision for the inclusion of the national building code in the country's regulatory framework; and ii) raising awareness of and providing training for relevant technical staff from *inter alia* Ministry of Works (MoW) and Development Control Authority (DCA), as well as building inspectors, engineers, architects and draughtsmen on the application of the updated PPA and national building code and iii) along

[16] A comprehensive list of baseline projects, programmes and initiatives as well as details of their focus and alignment with the proposed project is presented in Section 6 of Annex 2: Feasibility Study.

with the ADFD[17] project (parallel financing of RE in the private and public sectors) will demonstrate the bulk purchasing of RE equipment for the private sector. In so doing, project interventions may be able to create a stronger enabling environment for the upscaling and replication of climate-resilient solutions across Antigua and Barbuda's building sector. This approach, however, has risks since there is a greater than 50% increase in the cost between a Category 3 and a Category 5 code. This will in turn limit the ability of most citizens as well as the Government to meet this code.

A further two projects are currently being implemented in Antigua and Barbuda to increase the climate resilience of the country's built environment, namely: i) *An integrated approach to physical adaptation and community resilience in Antigua and Barbuda's northwest McKinnon's watershed (2017–2020; AF; US$9,970,000);* and ii) *Integrated physical adaptation and community resilience through an enhanced direct access pilot in the public, private, and civil society sectors of three Eastern Caribbean small island developing states (2018–2023; GCF; US$20,000,000).* Both of these projects address resilience through a multi-stakeholder approach and include private sector and NGO owned buildings and promotes flood reduction using an ecosystems-based approach. The focus of these projects is on drainage infrastructure to prevent flooding and vector management combined with the establishment of community shelters using NGO and community buildings rather than schools. As described above, building the climate resilience of critical public services to the impacts of climate change is essential for reducing economic downtime and faster recover after an extreme climate event. These projects focus on private sector and community buildings, and will involve the implementation of climate-proofing measures on publicly owned and maintained critical public service and community buildings. Resilience interventions will also include decentralised renewable energy and climate-resilient water-harvesting solutions.

Complementarity within Antigua and Barbuda's GCF Country Programme

The proposed project forms an integral part of Antigua and Barbuda's GCF Country Programme. The current portfolio under the Country Programme has been specifically designed to take a holistic approach to climate change adaptation and mitigation in Antigua and Barbuda. Each project addresses a specific element of climate risk in the country, with the concept of complementarity underpinning the entire portfolio. These projects are focused on *inter alia* climate-proofing the country's-built environment, mainstreaming climate resilience into the financial sector in Antigua and Barbuda and initiating a paradigm shift within the transport and electricity sectors towards low-emissions development.

Although hurricanes are considered the most urgent climate hazard in Antigua and Barbuda, the impacts of hurricanes are multi-faceted, and all impacts cannot be addressed in a single project. Interventions under the 'Build' project are directed toward immediate adaptation needs for critical public service and community buildings, particularly with regard to the impacts of strong winds associated with Category 4 and 5 hurricanes on critical services. This project will be complemented by other projects under the Country Programme which will address the additional climate hazards associated with hurricanes, including flooding and storm surges. In particular, two other GCF projects are under development that will: i) increase the climate resilience of road infrastructure, including adaptation measures for reducing flooding and improving drainage; and ii) build the resilience of the fisheries sector to the impacts of hurricanes, with specific focus on storm surges. Of particular relevance within the context of the proposed project is the GCF project currently under development by the GoAB focused on increasing the resilience of key road infrastructure and adjacent utilities in Antigua and Barbuda to withstand the impacts of floods and droughts. Proposed adaptation interventions under this project include a combination of grey and green infrastructure through: i) increasing the thickness of key roads and burying adjacent utilities to withstand the impacts of hurricanes and droughts; ii) constructing detention ponds in key areas upstream of the target road infrastructure to attenuate water flow from heavy rainfall events, therefore, reducing the flood-risk of these roads; and iii) implementing protection measures on specific sections of these roads that are situated along the coastal and consequently vulnerable to sea level rise.

The proposed project, combined with the GCF project focused on climate-proofing key road and utilities infrastructure, will cumulatively reduce the impacts of multiple climate hazards on Antigua and Barbuda's built environment. Furthermore, these projects, combined with the additional projects in Antigua and Barbuda's GCF Country Programme, will contribute significantly towards achieving the adaptation and mitigation goals put forward in the country's NDC (2015).

B.2. Theory of change (max. 1000 words, approximately 2 pages plus diagram)

Problem statement

[17] Abu Dhabi Fund for Development

Climate change is causing an increase in the frequency of high intensity hurricanes making landfall on the small island developing state (SIDS) of Antigua and Barbuda. Historically, the majority of tropical depressions impacting the islands were of relatively low intensity, remaining as tropical storms or Category 1–3 hurricanes. Only nine Category 4 and two Category 5 hurricanes have been recorded since 1850[18], with eight of these more intense storms occurring in the last 15 years alone. Given the previous return rate of major hurricanes, the country's current infrastructure is only designed to withstand the impacts of hurricanes up to Category 3. However, warming conditions over the Atlantic Ocean are resulting in an increased intensity of hurricanes in the Caribbean, with Antigua and Barbuda experiencing their first recorded Category 5 hurricanes (Irma and Maria in 2017. Because existing building codes in Antigua and Barbuda have not accounted for Category 4 and 5 hurricanes, the impacts of such events have been severe, causing significant damages to housing and infrastructure, as well as disrupting basic services such as health, education, telecommunication, electricity, water, sewage and waste systems. Moreover, the disruption of critical service infrastructure — including hospitals/clinics, police and fire stations as well as buildings that serve as storm shelters — limits the capacity of the National Office of Disaster Services (NODS) to respond during and after an extreme event. This problem is exacerbated by limited capacity for and coordination of early warning systems in the country which reduced the ability of communities and government agencies to prepare for an extreme climate event.

The challenge of upgrading existing buildings to Category 4 and 5 is estimated to cost over US$6.4 billion[19]. While Category 4 and 5 standards can be incorporated into new buildings much easier than existing structures. The economy of Antigua and Barbuda is US$1.6 billion[20] and to transition the building sector alone to the climate change impacts will take time to generate the funds needed. Taking into consideration that climate change is now considered an emergency situation, the Government via its NDA and nationally Accredited Entity (DoE) is requesting a grant to expedite the building of resilience in 54 of the 254 buildings in the Government sector. This will allow for the Government to provide critical services while providing time for the resilience of the rest of the buildings within the country to be enhanced over time.

Preferred adaptation solution

For Antigua and Barbuda to adapt to the impacts of extreme climatic events, it is necessary to strengthen the climate resilience of the building sector. Existing infrastructure needs to be upgraded to withstand the impacts of Category 4 and 5 hurricanes – which have sustained wind speeds of over 200km/h. This can be achieved by strengthening the structural integrity of buildings to withstand the wind shear forces, as well as by decentralising power and water supplies to reduce communities' reliance on vulnerable centralised systems. Initial climate-proofing interventions should focus on critical services such as police, fire, and health, as well as community buildings that act as shelters during a storm. Increasing the resilience of these priority buildings will lead to: i) critical services remaining operational during and after an extreme event; and ii) more rapid recovery, including restoring water supply, power and communication services, along with healthcare and education. In addition to climate-proofing critical infrastructure, an enabling environment that includes both the public and private sectors needs to be created to facilitate the upscaling of climate-proofing interventions to all buildings. Finally, climate information services should be strengthened to improve the dissemination of early warnings and facilitate early action for disaster preparedness.

Barriers to the adaptation solution

Several barriers to the preferred adaptation solution have been identified for Antigua and Barbuda. These are summarised below and explained in detail in Section 8 of Annex 2: Feasibility Study.

- *Barrier 1:* The government of Antigua and Barbuda has limited financial capacity to invest in climate proofing critical public service and community buildings to withstand Category 4 and 5 hurricanes. This includes not being able to install decentralised Renewable Energy backup energy and water systems to maintain supply when centralised distribution lines are disrupted by a storm.
- *Barrier 2:* The remote location of Antigua and Barbuda makes it difficult to access replacement solar PV panels to restore power after a storm to critical service buildings that are equipped with decentralised renewable energy systems. There is currently limited stock of renewable energy equipment available in the country and no secure location to store additional back-up equipment.

[18] Antigua and Barbuda Meteorological Services. Antigua Tropical Cyclones 1851–2018. Available at: http://www.antiguamet.com/Climate/HURRICANE_SEASONS/AntiguanStorms.txt
[19] This figure is coming from the initial costings on resilience cost from applications to the SIRF Fund.
[20] World Bank Data. 2018. Antigua and Barbuda. Available at: https://data.worldbank.org/country/antigua-and-barbuda.

- *Barrier 3:* During a major storm, critical information servers/computers at public institutions – including hospitals, police stations and other government institutions – are likely to be damaged resulting in the loss of vital information for public health and security. However, there is currently limited technical capacity to preserve this information, either through the safeguarding of physical infrastructure or the provision of reliable coordinated backup systems.
- *Barrier 4:* The high cost of adaptation in the building sector to Cat 4 and 5 limits the ability to sufficiently mainstreamed into Antigua and Barbuda's regulatory frameworks. Based on initial costings from the initial operation of the SIRF Fund, this amount is approximately US$130/sq ft. At an average of 1000 sq ft per building, and 50 thousand buildings, a conservative cost estimate is US$6.5 billion. In particular, the Physical Planning Act (2003) does not yet make provision for the newly revised national building code — which includes appropriate actions for reducing the risk of buildings to the impacts of Category 4 and 5 hurricanes. As a result, the guidelines established in the building code are not formalised into legislation. There is also limited technical and institutional capacity within the Public Works Department (PWD) and Development Control Authority (DCA) to adequately apply the regulations stipulated in the building code.
- *Barrier 5:* While there is a firm understanding of the need to climate proof buildings in Antigua and Barbuda, local communities and private sector property owners, as well as public sector decision makers and design engineers/architects, have limited knowledge of the adaptation options available for the building sector. This increases the risk of over-engineering of interventions and consequently also higher incremental cost and risks to low income persons that they cannot meet the code.
- *Barrier 6:* There are currently limited evidence based entry level into the national financial systems and mechanisms available to support ongoing investment into climate-resilient development in both the public and private sectors, i.e. the implementation of Article 2.1c of the Paris agreement. This includes limited provision for adaptation finance through existing national private financial entities and local development funds. With limited replenishment of development funds as well as limited consideration of climate change adaptation by the banking and insurance sectors This project will allow for the evidence and information needed to attract replenishments from local and international sources as well as the mainstreaming of adaptation into the private banks.
- *Barrier 7:* The long-term sustainability and upscaling potential of climate change adaptation interventions is constrained by limited technical capacity within NODS, DCA and PWD for long-term monitoring, maintenance and planning for adaptation measures in the building sector. These capacity limitations extend to the local workforce who are ultimately responsible for the installation and maintenance of equipment.
- *Barrier 8:* To effectively prepare for a storm – including the temporary removal of solar panels – requires adequate lead time on early warnings. However, there is currently limited technical capacity in the ABMS and NODS to adequately disseminate early warnings to support early action, particularly with regards to preparing shelters and securing renewable energy equipment ahead of a storm.

Project approach to overcoming the barriers to adaptation

The proposed project will overcome the abovementioned barriers to build the climate resilience of Antigua and Barbuda's building sector. This will be achieved through three interconnected outputs, described in detail in Section B.3. below. The Theory of Change is presented in Figure 5.

Barrier 1 will be addressed by investing directly into strengthening the climate resilience of existing critical service infrastructure, including clinics, fire stations, police stations, and community buildings that serve as shelters during hurricanes (Activity 1.1). This investment will improve the structural integrity of the buildings, as well as decentralising water and energy supplies to ensure that services continue to be provided during and directly after a storm – thereby contributing to GCF Impact Area A.3 and Output A.7. Furthermore, by ensuring the operability of first responders during and immediately after an extreme event, the project will build the overall resilience of vulnerable communities to the impact of such events, thereby contributing to GCF Impact Area A.1. To further support the rapid recovery of critical services, a climate-resilient warehouse will be established to store replacement renewable energy equipment – solar panels and batteries in particular – which can be used to restore power in the event of equipment being damaged by a storm (Activity 1.3). This will overcome Barrier 2. The preservation of data which underpins the operation of these critical service buildings will also be ensured by installing physical safeguards to protect servers from damage during a storm, as well as establishing cloud-based backup servers, thereby overcoming Barrier 3 (Activity 1.4).

In addition to on-the-ground interventions for climate proofing critical infrastructure, a policy-based approach will be adapted to create an enabling environment for future investment into climate-resilient buildings (GCF Outcome A.5). This includes revising building codes and standards to further guide future design and construction accounts for climate

change and the impacts of high intensity storms (Activity 2.1). Awareness campaigns will also be conducted to inform the public and private sectors of the revised building codes and associated adaptation options available on Antigua and Barbuda (Activity 2.3). These interventions will only partially overcome Barriers 4 and 5. The paradigm shift potential of the project will be enhanced by overcoming Barrier 5 through the evidence based analysis of the financial and other barriers to allow the government along with the banking and insurance sectors, as well as in the existing SIRF fund (Activity 2.2) to collaborate to overcome other barriers. These actions are expected to reduce the incremental cost of meeting the standards of the code. Some of these actions may include bulk purchasing, lowering the cost of training new persons, access to concessional financing and others. There are regulatory barriers to access financing, collateral requirements and limits to individual borrowing that are appropriate for the traditional banking sector but limits the urgent need for financing for public and private sector to adopt climate-adaptive technologies.

Barrier 7 will be overcome by establishing training programmes at existing educational institutions that focus on various aspects of climate change adaptation – including planning, implementation, operation and maintenance. The training will target staff at relevant government institutions (NODS, DCA and PWD) to promote effective adaptation planning and adaptive management of adaptation interventions (Activity 2.3). Furthermore, public and private sector stakeholders – including engineers, architects and tradespeople – will be targeted to increase the national capacity for the installation, operation and maintenance of adaptation technologies (Activity 2.4). Training of private sector engineers, architects and tradespeople will contribute to GCF Impact Area A.1 by enhancing their livelihoods through adapting to future needs of the building sector. This will ensure that the adaptation technologies promoted and implemented through the project are sustainable and can be upscaled in the long term (GCF Outcome A.5).

Finally, the project will address Barrier 8 by strengthening the technical capacity of ABMS for the real-time processing of climate data (GCF Outcome A.6). This will be achieved by establishing a centralised online server, housed within ABMS, to ensure that climate threats are detected in advance and facilitate impact-based forecasting (Activity 3.1). In addition, a formalised communication protocol will be established between ABMS and relevant decision-makers to facilitate rapid information sharing and early action preceding a hurricane (Activity 3.2). This will lead to better preparedness, including affording maintenance teams sufficient time to secure vulnerable infrastructure to reduce damages.

Together, the abovementioned interventions will overcome the barriers to climate change adaptation in Antigua and Barbuda, thereby contributing to a paradigm shift within the building sector towards climate-resilient sustainable development. This shift will ultimately reduce the impact of hurricanes on the country, ensuring that critical services remain operational during an event, and that normalcy is restored quickly after the event.

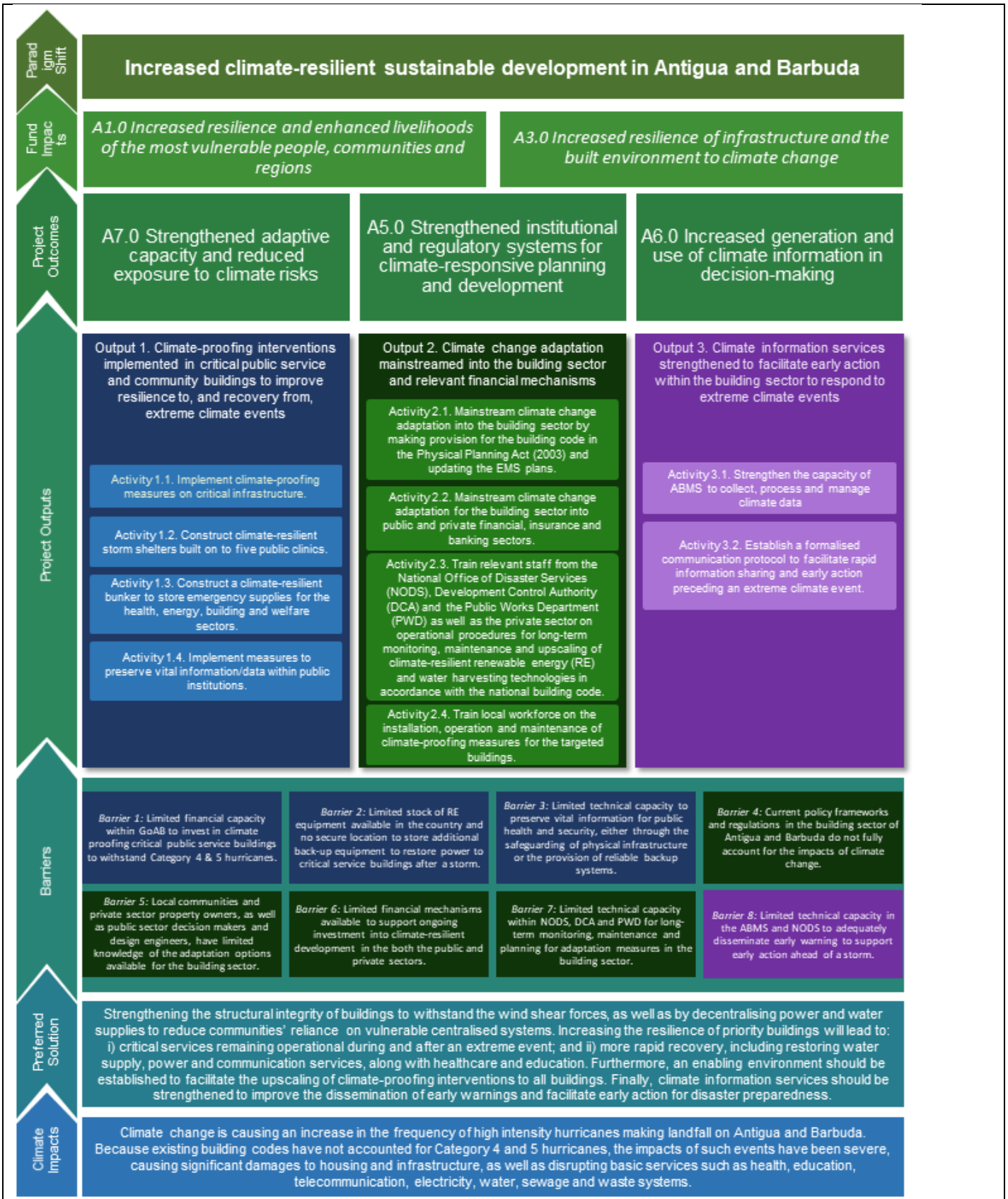


Figure 5. Theory of Change diagram.

B.3. Project/programme description (max. 2000 words, approximately 4 pages)

At present, global development efforts to address the impacts of climate change predominantly focus on the deployment of mitigation measures — primarily clean energy solutions and energy-efficiency measures. Adaptation measures for climate-proofing of structures against climate hazards are still at the preliminary stages of advancement, with limited experience on the ground and practically no calibrated engineering solutions for integrated building codes which embrace both climate change streams. This situation is visible in the broad adoption of 'green' building codes, which relate to energy-efficiency measures and the preservation of natural resources but do not incorporate customised climate-proofing solutions.

With existing worldwide examples of climate-proofing against wind and water loads, it can be preliminarily assessed that climate-proofing solutions are much more disruptive for the structure of buildings than mitigation measures. Consequently, in the cases where mitigation measures are not yet introduced, it is advisable to refurbish structures to achieve climate-proof characteristics prior to the incorporation of renewable energy (RE) or energy efficiency (EE) measures. This is because EE solutions are related to the building structure directly and therefore depend strongly on the building's features and use.

The proposed project is one of first projects in the Caribbean region to introduce building codes that account for the impacts of Category 4 and 5 hurricanes. The successful accomplishment of this task, as well as lessons learned from the refurbishment of a 52 targeted critical public service and community buildings, will allow EE measures to be assessed to determine which solutions are the most efficient and compatible with the improved structural integrity of these targeted buildings. It will also enable the adjustment of existing EE building codes to integrate climate-proofing measures. This exercise can become an important market test to benchmark the scope of integrated building codes for future use. As presented further in this Funding Proposal, RE installations, water harvesting solutions as well as EE measures will be part of the design of the critical buildings, along with the climate-proofing elements. The combined information generated from the implementation of these interventions will create the best combination of both mitigation and adaptation measures to be introduced into building codes. A comprehensive report on this matter will be developed upon the project completion.

Project objective

The proposed project will contribute to GCF's paradigm shift objective of increased climate-resilient sustainable development through enhancing the resilience of Antigua and Barbuda's building sector to extreme climate events such as hurricanes and tropical storms. The proposed transformative approach will shift the country's building sector away from reactive development — involving costly recovery actions after an extreme climate event — towards a proactive approach in which buildings are adapted to withstand the increased frequency of high-intensity hurricanes. This proactive approach will include direct investments into critical public service and community buildings to climate-proof them against Category 4 and 5 hurricanes, as well as mainstreaming climate resilience into the building sector and relevant financial sector and mechanisms to facilitate the upscaling of such interventions across all buildings in the country. The effectiveness of climate-proofing interventions will be enhanced by formalising communication protocols between the ABMS and relevant government agencies to facilitate early action within the building sector to respond to extreme climate events. This will include strengthening the capacity of ABMS to collect, process and manage climate data, thereby improving the accuracy and reliability of early warnings. The combined effect of project interventions will result in a standard of climate resilience for Antigua and Barbuda's building sector being established that can be readily scaled up and replicated nationally and regionally. Proposed project outputs are described below with detailed descriptions of all project activities described in Section E.6 of this Funding Proposal.

Output 1. Climate-proofing interventions implemented in critical public service and community buildings to improve resilience to, and recovery from, extreme climate events

Output 1 will contribute to GCF Outcome A7.0 — Strengthened adaptive capacity and reduced exposure to climate risks — by climate-proofing critical public service and community buildings (hereafter referred to as 'priority buildings') to withstand the adverse impacts of Category 4 and 5 hurricanes and safeguarding critical basic supplies. These priority buildings include hospitals/clinics, police and fire stations as well as buildings that serve as storm shelters. Each of the 54 priority buildings that will be targeted under the project is briefly described in Annex 2: Feasibility Study, with preliminary assumptions regarding their design and adaptation needs also presented in this annex. The technical assumptions were derived from the most advanced protocols developed by the State of Florida. This is possibly the only existing system that encompasses resilience against wind speed above 270 km/s. These provisions, combined

with the findings from Annex 22: Building assessment, enabled the costing of materials and workload to be determined and assigned in the detailed project budget (Annex 4). A full design of each priority building targeted under the project will be a pre-requisite for disbursement of GCF resources. These designs will also embrace a thorough assessment of the drainage needs, RE, EE and water harvesting measures for all critical buildings selected for interventions under the project. Such designs will further support the preliminary selection of these 14 buildings to receive additional drainage engineering solutions in the face of climate change.

To reduce the exposure of priority buildings hurricanes, the structural integrity of these buildings will be strengthened through several adaptation interventions, including the installation of hurricane shutters and using hurricane straps to secure roofs. These interventions will physically protect buildings, thereby reducing damages and maintaining operability of critical services during and directly after an extreme event. The climate-resilience of critical services will be further enhanced through the decentralisation of power and water supplies to priority buildings. Decentralising power and water supplies will reduce the dependence of critical services on vulnerable central systems which are often disrupted for prolonged period both during and after an extreme climate event. This will ensure that priority buildings and the critical services they support maintain an uninterrupted power and water supply when centralised systems are disrupted. To decentralise power supply, renewable energy (RE) systems will be installed on priority buildings, comprising solar PV panels and battery packs. These systems will be grid-interactive and the necessary regulatory process will be followed with the utility authority (APUA). The installation of solar panels account for site-specific requirements, including exposure to climate hazards and the energy requirements of the building. Specifically, solar panels will be installed using hurricane-proof clamps, that will secure panels during periods of extreme winds, while allowing for easy removal prior to extreme winds to prevent damage from flying debris. Maintenance staff at priority buildings, along with teams from the PWD will be trained to safely remove and store panels prior to a Category 4 or 5 hurricane making landfall (See Activity 2.4). To ensure continued power supply during the period that the panels are removed, the storage capacity of battery packs will be sufficient to meet basic electricity demands of priority buildings for 24–48 hours. The effectiveness of battery packs will be enhanced through the installation and use of energy-efficient equipment in priority buildings to reduce demand. To ensure uninterrupted supply of water to priority buildings, climate-resilient rainwater harvesting solutions will be installed. These solutions will be site-specific and secured to withstand the maximum sustained windspeeds associated with Category 4 and 5 hurricanes. Coupled with these water harvesting systems will be the installation of stormwater drainage solutions on 14 buildings situated less than 30 m from inundation zones in Antigua and Barbuda. While flooding is not recognised as a primary hazard at these 14 project sites, these solutions will mitigate the risk of potential flooding that may result from heavy rainfall associated with Category 4 and 5 hurricanes. This flood risk mitigation will be achieved through installing drainage gutters at the 14 target sites to ensure that water from these heavy rainfall events is distributed into the existing drainage systems to avoid localised flooding. Further details on the technical design of climate-proofing interventions and a list of the specific priority buildings that will be targeted by the project are provided in Annex 2: Feasibility Study.

In addition to adaptation investments in existing priority buildings, the project will construct two types of climate-proof structure to protect human life, preserve vital information within public institutions and secure basic supplies — including RE equipment, building materials, food and medicine. First, five climate-resilient storm shelters will be built on to public clinics to provide places of safety for vulnerable community members who may be ill and whose own homes are not equipped to withstand Category 4 and 5 hurricanes. Targeted clinics will take ownership of these extension shelters, which will be sufficiently equipped to protect community members and provide the necessary services during an extreme climate event. Attaching shelters to selected clinics will improve health and safety, not only because nurses will be present on site to treat the sick and injured, but also because the greater distribution of small shelters will reduce health risks associated with crowding in public schools which are currently used as shelters. Furthermore, by limiting the need for schools to function as shelter, the project will reduce the downtime for schools resulting from prolonged occupation after an event. All five shelters will be equipped with RE and climate-resilient water harvesting equipment to reduce their reliance on centralised supply systems. Second, a climate-resilient bunker will be constructed at a central location to store supplies required by critical services during and immediately after an extreme event. The bunker will be operated by a sub-committee for disaster preparedness, comprising representatives from the health, environment, public works and welfare sectors, who will be responsible for maintaining supplies of medicine, RE equipment, building materials and food, respectively. This bunker will also serve as a battery recharge site, allowing for battery packs to be recharged and swapped out at priority buildings if RE systems cannot be made operational again before battery systems run out. In addition to these physical interventions, back-up protocols will be developed and operationalised to secure vital information within critical public institutions, including hospitals, clinics, schools, police and fire stations. In so doing, critical service providers will have increased access to emergency supplies, and vital

information will be preserved. Detailed site-specific assessments will be conducted for Activities 1.1–1.3, preceding the implementation of climate-proofing interventions and construction of the climate-resilient bunker and extension hurricane shelters. The AE will oversee these site-specific assessments and the public sector entities who own the targeted critical buildings that will receive climate-proofing interventions will take ownership of these interventions.

Justification for the selection of target critical infrastructure

The vulnerability-driven selection process was followed for targeted critical public service and community buildings to ensure that climate-proofed critical services provide maximum coverage to vulnerable areas with high population density, the poorest communities and those individuals living in areas outside of the main drainage channels. The distribution of project interventions therefore covers the majority of built-up areas in Antigua and Barbuda, with increased coverage in the more densely populated and exposed communities (Table 1).

Table 1. Population coverage of critical public service and community buildings that will receive climate-proofing interventions under the proposed project.

Parish	Populations	Intervention buildings
Saint John	51,737	28
Saint Mary	7,341	5
Saint George	8,055	3
Saint Peter	5,325	1
Saint Paul	8,128	5
Saint Philip	3,347	2
Barbuda	1,634	2

Project intervention sites were also selected by accounting for the location of lower income communities in Antigua and Barbuda, where infrastructure is generally less resilient to the extreme winds and heavy downpours associated with Category 4 and 5 hurricanes. To ensure maximum coverage of these vulnerable groups by project interventions, a walk-time analysis was conducted at 5-, 15- and 30-minute intervals from these vulnerable communities to critical public service and community buildings targeted under the project (Table 2). This analysis demonstrated that the selection of target intervention sites would ensure that maximum coverage of critical services to the most vulnerable people as a result of project interventions.

Table 2. Walk-time analysis conducted to determine the coverage of project interventions.

Walk time	Population served	Population served (%)	Low income Population served (%)
5 minutes	10,512	11%	17%
15 minutes	45,923	47%	62%
30 minutes	73,216	76%	89%

The majority of the selected project intervention sites are located in areas of higher elevation, outside of the potential inundation areas from extreme downpours associated with hurricanes, such as those noted during Hurricane Irma. Specifically, 9 sites are located within 10 m of the flood inundation zones, 5 are within 30 m, 5 within 50 m, 12 within 100 m and 16 sites are located further than 100 m away from these inundation zones. 60% of the project intervention sites are therefore located 50 m or more away from potential flood inundation zones. For this reason, climate change adaptation measures to be implemented on target critical infrastructure will be focus on reducing the impacts of extreme winds and heavy downpours associated with Category 4 and 5 hurricanes, which are considered the main climate threat to these critical buildings.

Based on the vulnerability-driven selection process, site assessment and the findings from the building assessment (Annex 22), 54 critical public service and community buildings were selected to receive adaptation interventions under the proposed project. These buildings are listed below and maps showing their locations are presented in Section D.1 of this Funding Proposal as well as in Section 10.3.2 of Annex 2: Feasibility Study. Where a need is identified during the implementation phase for originally targeted critical building(s) to be replaced with other buildings, these potential replacement buildings will be subject to same selection criteria used in the selection of the 54 targeted buildings. Additionally, the upgrade cost will be considered during the selection of replacement building(s) to ensure that the cost of upgrading these replacement building(s) does not exceed the original budget allocated to implementing adaptation

interventions on critical public service and community buildings. The AE will notify the GCF if such changes are required and these changes will be subject to GCF approval.

The 54 targeted critical public service and community buildings are listed below. Those buildings that are listed more than once are building complexes with multiple buildings within each complex (corresponding to the number of times the building is listed) targeted for receiving adaptation interventions.

- All Saints Clinic
- All Saints Fire Station
- All Saint's Police Station
- Analytical services 1
- Analytical services 2
- Antigua State College 1
- Antigua State College 2
- Bendals health clinic
- Bolans health clinic
- Clareview Psychiatric Hospital 1
- Clareview Psychiatric Hospital 2
- Clareview Psychiatric Hospital 3
- Clareview Psychiatric Hospital 4
- High Court of Justice
- Defence Force Building 1
- Defence Force Building 2
- Department of Environment 1
- Department of Environment 2
- Fiennes Building 1
- Fiennes Building 2
- Good Shepherd Children's Home
- Met office
- Ministry of Finance
- Ministry of Tourism
- National Archives
- National Office of Disaster Services
- Parham health clinic
- Police Headquarters
- Potters health clinic
- Her Majesty's Prison
- St John's Fire Station
- Swetes health clinic
- Liberta Police Station
- Liberta Primary School
- Urlings Primary School
- Jennings Primary School
- Bolans Primary School
- Bendals Primary School
- Pigotts Clinic
- Princess Margaret Secondary School
- Cedar Grove Clinic
- Old Road Clinic
- Freetown Primary School
- Emergency Medical Service
- Gray's Farm Clinic
- Grays Farm Police Station

- Willikies Primary School
- Red Cross
- Cedar Grove Primary
- Clare Hall Secondary School
- Bethesda Clinic
- Cobbs Cross Primary School
- Barbuda Fire Station
- Barbuda Council & Treasury

Operation and maintenance of climate-proofing interventions

All operations, maintenance and Insurance activities required under the project will be financed by the Government of Antigua and Barbuda. The MoF will create an internal budget line for the maintenance of climate-proofing interventions, highlighting their commitment to ensuring the adequate implementation, operations and maintenance of these interventions. Furthermore, the sustainable operation and management of construction-related project interventions has been secured by identifying key government institutions to oversee specific project activities. MoW will oversee the implementation of climate-proofing measures on critical infrastructure (Activity 1.1), while the Ministry of Health, Wellness and the Environment (MoHWE) will be responsible for managing the shelters that will be built on to five clinics in the country (Activity 1.2). In addition to the operations and maintenance plan for climate-proofing interventions described above, multiple project partners have been engaged to ensure the management and restocking of critical supplies that will be housed within the climate-resilient bunker (Activity 1.3). Responsibilities for the stocking of these supplies will be as follows: i) RE stock and medical supplies will be maintained by the MoHWE; ii) food supplies will be maintained by the Ministry of Social Transformation; and iii) building supplies will be maintained by MoW. To ensure that climate change adaptation measures to be constructed under the project provide maximum benefits, relevant project partners have committed to maintaining all climate proofing measures implemented under the project (including physical upgrades as well as decentralised RE and climate-resilient water harvesting solutions) for at least 20 years after implementation of the project. A framework for effective operations and maintenance of these measures, including the associated costing, is presented in Annex 21. Project activities that will be implemented under Output 1 are summarised below. Further details on these activities, including on the associated sub-activities and deliverables, are presented in Section E.6 of this Funding Proposal and Section 9 of Annex 2: Feasibility Study.

Activity 1.1. Implement climate-proofing measures on critical infrastructure.

To ensure that critical public services remain functional during and directly after a hurricane, the proposed project will invest in improving the structural integrity of critical infrastructure to enable buildings to withstand Category 5 hurricanes. Preliminary assessments have identified appropriate climate-proofing interventions, as presented in Annex 22: Building assessment. During project implementation, detailed site-specific building assessments will be conducted to determine the precise extent of the adaptation upgrades to be conducted as well as the cost associated with upgrading each targeted building. Co-finance will also be provided to invest in baseline repair work required to upgrade priority buildings in accordance with the building code. Targeted infrastructure will include hospitals/clinics, police and fire stations, storm shelters, relevant government buildings and schools. Furthermore, to ensure continuous supply of power and water during and after an extreme event, when centralised systems are down, this activity will install decentralised systems at critical public service buildings. For energy supply, RE systems will be installed, comprising solar PV panels and battery packs. The solar panels will be removable, allowing maintenance teams to take down the panels ahead of a large storm to prevent damages. During these periods, the buildings will run on battery reserves, with power being directed to critical equipment. Energy efficient equipment will also be installed where feasible to maximise battery life. This will include energy efficient cooling and ventilation systems, particularly in shelters where the density of people will be relatively high. Given that the water supply in Antigua and Barbuda is heavily dependent on a reliable energy supply, when the national grid goes down water supply is disrupted. To ensure that those buildings that are used as shelters or provide critical services have a safe and reliable water supply during and directly after an extreme climate event, the project will provide climate-resilient water harvesting equipment (including solar pumps). This decentralised water supply is essential to maintain health and sanitation standards in these buildings. Coupled with these water harvesting systems will be the installation of stormwater drainage solutions on 14 buildings situated less than 30 m from inundation zones in Antigua and Barbuda. While flooding is not recognised as a primary hazard at these 14 project sites, these solutions will mitigate the risk of potential flooding that may result from heavy rainfall associated with Category 4 and 5 hurricanes. This flood risk mitigation will be achieved through installing drainage gutters at the 14

target sites to ensure that water from these heavy rainfall events is distributed into the existing drainage systems to avoid localised flooding.

Activity 1.2. Construct climate-resilient storm shelters built on to five public clinics.
To facilitate the transition away from using schools as storm shelters, the project will commission five purpose-built storm shelters attached to public clinics. These shelters will be managed by the targeted clinics and serve as multi-purpose centres for *inter alia* training and conferences outside of the hurricane season. Attaching the shelters to clinics will not only reduce downtime for schools after being used as shelters but will also improve the health conditions as nurses will be present on site to treat the sick and injured. The shelters will also be equipped with renewable energy systems and water harvesting equipment to reduce reliance on centralised supply systems (see Activity 1.4 below). To ensure the effective operation of and adherence to national health and safety requirements for storm shelters, an emergency protocol will be developed for each shelter. These protocols will include details on the: i) responsible parties; ii) carrying capacity of the shelter; iii) preparation actions ahead of a storm; iv) sanitation, food and water requirements; v) approved duration of stays; and vi) communication channels with the National Office of Disaster Services (NODS).

Activity 1.3. Construct a climate-resilient bunker to store emergency supplies for the health, energy, building and welfare sectors.
To address the need for a secure location to store such supplies, the project will construct a climate-resilient bunker that will service the health, energy, building and welfare sectors. The bunker will be managed by a ministerial sub-committee for disaster preparedness who will be responsible for coordinating efforts between relevant stakeholders. Four specific units will be established within the bunker, each focussing on a specific sector. These units are described briefly below.

- The first unit will serve the health sector, providing safe storage for medicine and medical supplies which can be quickly distributed after an event.
- The second unit will be managed by Antigua and Barbuda's Department of Environment (DoE) and will be used to store backup solar panels to replace those damaged during a storm.
- The third unit will service the Public Works Department (PWD), storing timber and other building materials that can be used as shutters during preparation or for repairs after an extreme event.
- Finally, the fourth unit will be used to store critical food supplies to support emergency responders who have limited opportunity to access personal supplies during and after an extreme event. The distribution of this food will be controlled by the Ministry of Social Transformation.

The climate-resilient bunker will be used year-round to stock medical supplies, RE equipment, building materials, and dry food.

Activity 1.4. Implement measures to preserve vital information/data within public institutions.
Under this activity, protocols will be developed for how to effectively and efficiently back up all vital information and data preceding a storm and IT teams within each public institution will be trained on the application of these protocols. Each targeted institution will be responsible for the delivery of this training to relevant staff. Furthermore, physical protection measures will be designed and implemented on the relevant public buildings to reduce the risk of critical IT infrastructure being damaged by an extreme event.

Output 2. Climate change adaptation mainstreamed into the building sector and relevant financial mechanisms
Output 2 of the project will contribute to GCF Outcome A5.0 – Strengthened institutional and regulatory systems for climate-responsive planning and development – and support the implementation of adaptation interventions under Output 1. The strengthened regulatory frameworks, combined with capacity buildings and skills development in the building sector, will create an enabling environment for the upscaling and replication of project interventions across the country. This upscaling potential will be achieved by: i) mainstreaming climate change adaptation into the building sector, as well as the public and private financial sectors; ii) strengthening the capacity of the public and private sectors to design, implement, operate and maintain climate-adaptive measures for the building sector; and iii) raising awareness within the public and private sectors on the benefits of adopting these adaptation measures.

Mainstreaming climate change adaptation into the building sector

To complement the ongoing SCCF project[21] described in B1 — which updated the national building code to develop standards that account for the impacts of Category 4 and 5 hurricanes — the proposed project will draft regulations for the Physical Planning Act (PPA) of 2003 to make provision for the inclusion of the updated building code in national regulatory frameworks. These regulations will undergo a strategic impact assessment to assess the technical, financial, social and gender impacts. This process and output will contribute to establishing a standard for climate-resilient development across the country. Antigua and Barbuda's building code incorporates elements of the Bahamas Building Code, which in turn was based generally on the South Florida Building Code[22]. Applying the Florida Building Code, which makes provision for Category 4 and 5 hurricanes, has been shown to reduce the damage caused by hurricanes by up to 72%[23]. Similar reductions can therefore be expected, and the adaptation impact of this intervention enhanced, by: firstly, updating the building code to include design criteria that accounts for Category 4 and 5 hurricanes (which is currently being done under the SCCF-funded project); and secondly, strengthening the technical and institutional capacity of technical staff involved in infrastructural design and development (e.g. staff from the MoW, DCA and NODS, as well as building inspectors, engineers, architects and draughtsmen; and the private sector) to apply the updated code. To further contribute to the mainstreaming of climate change adaptation into the building sector, recommendations will be made for the Environmental Management Systems plans (EMS plans) to be updated to include climate-resilient measures. The mechanism for the development of these recommendations will include engaging with relevant project partners to review the EMS plans and identify entry points for the inclusion of climate change adaptation for the building sector. Following this review, recommendations will be drafted proposing the relevant revisions to the EMS plans and milestones for these revisions will be set. The target for these revisions to be complete is the end of Year 2 of project implementation. Annual meetings will be held thereafter with relevant stakeholders to collate and share lessons learned from implementing the EMS plans and ensure that these plans are updated regularly where necessary.

Mainstreaming climate change into public and private financial sectors

Under the SCCF-funded project[24], entry points for climate change adaptation financing within the SIRF Fund have been established to increase public and private sector access to financial resources for adaptation, including for the building sector. The SIRF Fund has two main thematic funding windows, namely the climate change window and biological diversity window, with corresponding programmes under each window.

Climate-proofing buildings in Antigua and Barbuda is currently financed by two streams, namely via the SIRF Fund for small enterprises that do not always qualify for access to funds from mainstream banking sector and the private banks for medium and large enterprises. Under the SIRF Fund's climate change window, there is currently a Revolving Fund Programme for Adaptation which focuses on providing microfinancing for the incremental cost of implementation of adaptation measures to small buildings (i.e. vulnerable households, clinics, schools, etc.). In its current form, this climate change window is optimised for small loans/grants to vulnerable households, with individual applications capped at 5% of the total funds under this window available at a given time. However, as presented below, the anticipated adaptation needs exceed the available funds particularly for medium and large enterprises.

The overall financing needs[25] of small enterprises to climate-proof their premises accounts for US$208.5 million within the next 20 years, while medium and large enterprises require an investment of US$650 million within the next 20 years to achieve the same goal. The current capitalization of the SIRF Fund accounts for US$8 million within next 2 years, resulting in a financial gap of US$5 million/year to bring existing buildings up to standard for the Category 4–5 building code. This financial gap will be addressed by using lessons learned from the proposed project to reduce the cost of adaptation interventions, including: i) determining the incremental cost of building adaptations used in small businesses and applying these to selection criteria to allow for the development costs to be split between baseline and adaptation measures; and ii) developing sustainable bulk procurement processes to reduce the cost of building materials required for climate-proofing infrastructure.

[21] entitled: "Building climate resilience through innovative financing mechanisms for climate change adaptation"
[22] OAS. 2002. Status of Building Codes in the Caribbean. Available at: https://www.oas.org/cdmp/bulletin/codemtrx.htm..
[23] Simmons, Kevin M., Jeffrey Czajkowski, and James M. Done. "Economic effectiveness of implementing a statewide building code: the case of Florida." *Land Economics* 94, no. 2 (2018)
[24] entitled: "Building climate resilience through innovative financing mechanisms for climate change adaptation"
[25] The presented costs estimation will also be further amended via lessons learnt derived for this project.

Although the trajectory of financial needs of medium and large companies for climate-proofing upgrades is not known at this time, the trajectory for the larger companies is currently being assessed by the GoAB. This project will provide more information on the policy guidance that the GoAB needs to consider and adopt to meet these financial needs.

In addition to the financial needs for adaptation of Antigua and Barbuda's building sector, several non-financial market barriers have been identified during project development and have been considered in the proposed solution. These include limited: i) experience in implementing climate-proofing interventions to fully understand the cost requirements, coupled with high costs of bringing materials into the island; ii) technical capacity within NODS, DCA and PWD for long-term monitoring, maintenance and planning for adaptation measures in the building sector; iii) technical knowledge of the adaptation options and approaches available for the building sector, increasing the risk of over-engineering and overpricing interventions; and iv) understanding of private sector partnerships in the building sector to promote upscaling of and investment in adaptation interventions.

To specifically overcome the abovementioned barriers, as well as those listed in Section B2, the proposed GCF project will catalyse the creation of additional entry points to increase the access of both the public and private sectors to financial resources for implementing climate-proofing measures. In particular, the project will introduce incremental cost reasoning to SIRF Fund selection criteria, which will allow for the development costs to be split between baseline and adaptation measures. This will reduce the investment requires from the SIRF Fund, with baseline costs being covered through alternative development funding sources, such as the GoAB as well as other development agencies that can provide funding to undertake baseline-related interventions for the building sector. During the implementation of Activity 2.2, options for increasing financial inflows into the SIRF Fund will be investigated to increase the available financial resources to be accessed by the public and private sector. This will be done to further bridge the financing gap, including incentive programmes, levies and insurance/risk management products. To facilitate this process, engagements will be held with relevant public and private sector stakeholders in Year 1 of project implementation to identify entry points for unlocking finance for climate-resilient sustainable development in Antigua and Barbuda. Through the consultation process, the most appropriate options discussed above will be selected and validated by all project partners. These consultations will happen in Year 1 of implementation. The SIRF Fund guidelines will be updated and validated by all project partners following these discussions by the end of Year 2. To promote the use of the SIRF Fund as a mechanism for financing climate-adaptive measures for the building sector, decision-makers from NODS, DCA and PWD, as well as private sector representatives, will be trained on how to access financial resources under the SIRF Fund — within the specified thresholds. This training will be provided regularly commencing in Year 3. Finally, from the beginning of Year 3 to the end of the project implementation period (Year 6), annual engagement workshops will be held to collate and share lessons learned from public and private sector interactions with the SIRF Fund and processes for replenishment will be discussed and revised where necessary.

In addition to enhancing access, where appropriate, of the private sector to the SIRF Fund for larger scale adaptation investments, the project will refine the SIRF Fund selection criteria for adaptation interventions. Using an evidence-based approach that draws lessons learned from the SCCF and Enhanced Direct Access (EDA) projects[26], as well as the implementation of on-the-ground adaptation interventions under Activity 1.1 of this project, the list of adaptation options supported by the SIRF Fund will be refined. This process will ensure that all options are optimised for the local conditions and markets, and that clear guidelines are set for assessing the eligibility of each application. GCF resources will not be used to capitalise this fund, fill funding gaps or retroactively finance activities already under development or implementation other programmes / initiatives.

Capacity building and awareness raising for the public and private sectors

To ensure the sustainability and upscaling potential of climate-proofing measures implemented under Output 1, training programmes will be developed with partner organisations such as the Antigua and Barbuda Institute for Continuing Education (ABICE). These training programmes will focus on how to appropriately apply the regulations of the building code during the design, installation and monitoring of climate change adaptation measures specific to the building sector. Appropriate local training institutes such as ABICE will deliver these programmes to public and private sector representatives, including staff from MoW and DCA as well as building inspectors, engineers, architects and

[26] Under the GCF project, entitled *Integrated physical adaptation and community resilience through an enhanced direct access pilot in the public, private, and civil society sectors of three Eastern Caribbean small island developing states* (referred to as the EDA project in this Funding Proposal), the SIRF Fund is being used as a mechanism for financing adaptation at a household level. Lessons learned from this intervention will be used to inform interactions with the SIRF Fund under the proposed GCF project.

draughtsmen. A certified training course will also be developed for and delivered to the local workforce through these training institutions. This training course will focus on how to support the installation, operation and maintenance of climate-resilient physical upgrades to buildings as well as RE and climate-resilient water harvesting solutions. To contribute to the uptake of these capacity-building interventions, gender-sensitive awareness-raising campaigns will be designed and conducted for the public and private sectors. These campaigns will promote the availability of training on climate change adaptation for the building sector as well as on the benefits of implementing these measures. The combination of interventions implemented under Output 2 will enable the public and private sector actors to build sufficient capacity for the independent adoption and maintenance of climate-resilient solutions for the building sector. This will maximise the adaptation benefits delivered by these solutions and ensure their sustainability beyond the project lifetime. Activities that will be implemented under this project output are summarised below. Further details on these activities, including on the associated sub-activities and deliverables, are presented in Section E.6 of this Funding Proposal and Section 9 of Annex 2: Feasibility Study.

Activity 2.1. Mainstream climate change adaptation into the building sector by making provision for the building code in the Physical Planning Act (2003) and updating the EMS plans.

Under this activity, climate change adaptation will be mainstreamed into the country's building sector. This will be achieved in three primary ways. Firstly, regulations for the Physical Planning Act (2003) will be drafted to make provision for including the updated building code in the national regulatory framework. Doing so will facilitate the formalisation of the code, which addresses Category 4 and 5 hurricanes, into policy. This will in turn contribute to establishing a standard for climate-resilient development across the country. Secondly, a Strategic Impact Assessment (SIA) of the building code regulations will be conducted to assess the environmental and social safeguards and gender risks, consequences and mitigation measures related to the enactment of these regulations in the Physical Planning Act (2003). This SIA will ensure that the building code is able to be applied by the most vulnerable groups in the country, particularly persons with low income, limited access to financing, as well as the elderly and those people who have disabilities. Thirdly, recommendations will be made for the EMS Plans to be updated to include climate-resilient measures for the building sector. Engagements will be held with project partners to review the EMS Plans and identify entry points for the inclusion of climate change adaptation for the building sector. Following this review, recommendations will be drafted proposing the relevant revisions to the EMS Plans. The target for these revisions to be completed is the end of Year 2 of project implementation. Annual meetings will be held thereafter with relevant stakeholders to collate and share lessons learned from implementing the EMS plans and ensure that these plans are updated regularly where necessary.

Activity 2.2. Mainstream climate change adaptation for the building sector into public and private financial, insurance and banking sectors.

Activity 2.2 will complement the SCCF project to maximise the effectiveness and accessibility of the SIRF Fund's adaptation window. First, public and private sector stakeholders will be engaged to identify additional entry points for accessing climate finance through the SIRF fund for investments. Specifically, for resilience building for small micro businesses that are important to community resilience. Lessons learned from this project will allow the fund to accurately calculate the incremental cost of building adaptations used in small businesses. For the segment of the private sector, it is not expected that they will exceed the current 5% cap. Key to this process will be the introduction of accurate incremental cost reasoning to selection criteria for these business which will allow for the development costs to be split between baseline and adaptation measures. Private sector access to climate finance through the SIRF Fund will be further enhanced by enabling Fund (or some mechanism of the fund working with the private sector) to sustainably procure bulk building materials required for climate-proofing infrastructure. Private entities — for example, businesses, hotels and homeowners — could then buy the materials they need from the Fund at this reduced price and this is included in the loan. This approach is a key option to bridging the financial gap in incremental cost of adaptation financing. This approach is currently being demonstrated with the provision of concessional loans to purchase grid interactive back-up renewable energy to homeowners. The RE equipment is purchased by the Fund in bulk the solar/battery grid interactive systems and made available to loan applicants. Once demonstrated, the effectiveness of the bulk-import model will be reviewed for a potential viable tool to support the financing of climate change adaptation in Antigua and Barbuda's building sector.

In addition to enhancing access of the private sector to the SIRF fund for larger scale (but still micro levels) adaptation investments, this activity will refine the selection criteria for adaptation interventions. Using an evidence-based approach that draws lessons learned from the SCCF and EDA projects, as well as the implementation of on-the-ground adaptation interventions under Activity 1.1 of this project, the list of adaptation options supported by the SIRF Fund will

be refined. This process will ensure that all options are optimised for the local conditions and markets, and that clear guidelines are set for assessing the eligibility of each application. GCF resources will not be used to replenish this fund, fill funding gaps or retroactively finance activities already under development or implementation other programmes / initiatives.

Activity 2.3. Train relevant staff from the National Office of Disaster Services (NODS), Development Control Authority (DCA) and the Public Works Department (PWD) as well as the private sector on operational procedures for long-term monitoring, maintenance and upscaling of climate-resilient renewable energy (RE) and water harvesting technologies in accordance with the national building code.

Training will be provided to relevant staff from NODS as well as building inspectors from DCA and building maintenance teams from PWD on operational procedures for long-term monitoring, maintenance and upscaling of climate change adaptation interventions that will be implemented under Output 1. Building-specific operations and maintenance (O&M) plans will be used to inform this training to ensure that the knowledge shared during these trainings is technically sound. To complement these capacity-building interventions, training programmes will be developed with partner organisations such as Antigua and Barbuda Institute for Continuing Education (ABICE) for the public and private sector representatives, including staff from the Ministry of Works (MoW) and Development Control Authority (DCA) as well as building inspectors, engineers, architects and draughtsmen. This training will focus on how to apply the regulations of the national building code during the installation of climate change adaptation measures that are specific to the building sector, such as renewable energy and climate-resilient water harvesting solutions. In addition, awareness raising campaigns will be designed and conducted to increase the uptake of climate change adaptation measures for the building sector across the public and private sectors.

Activity 2.4. Train local workforce on the installation, operation and maintenance of climate-proofing measures for the targeted buildings.

To complement the capacity-building interventions under Activity 2.3 that are focused on long-term operations and maintenance of adaptation measures for the building sector, the local workforce will be trained on how to support the installation, operation and maintenance of climate change adaptation solutions that will be installed in targeted buildings under Activity 1.1. To facilitate this training, suitable training institutions in the country, such as ABICE, will be engaged to develop and deliver a certified training programme that focuses on: i) installing, operating and maintaining climate-proofing measures for the building sector; and ii) implementing early action protocols (developed under Output 1) preceding an extreme climate event. The training course that will be developed under this activity will apply regional and international best practices for climate change adaptation measures in the building sector.

Output 3. Climate information services strengthened to facilitate early action within the building sector to respond to extreme climate events

Project interventions under Output 3 will contribute to GCF Outcome A6.0 – Increased generation and use of climate information in decision-making – by strengthening Antigua and Barbuda's early warning system (EWS) as well as the capacity of Antigua and Barbuda Meteorological Services (ABMS) to facilitate rapid information sharing and early action preceding an extreme climate event. Interventions under this project output will complement the *Caribbean Disaster Emergency Management Agency (CDEMA) Early Warning Systems (EWS) Regional Readiness Project.* This project is currently under development and is focused on improving regional coordination of EWS across the Caribbean. Although the interventions under the CDEMA project are thematically aligned with the proposed project, the scope of the CDEMA project is not at a sufficient level to improve the production and dissemination of early warnings at a national and local level in Antigua and Barbuda to facilitate early action. Output 3 of the proposed project will fill this gap in two ways. Firstly, a centralised online server will be established and housed within ABMS to process climate data in real time, overcoming existing shortfalls in the data processing capabilities. This will enable ABMS to reliably and timeously forecast extreme climate events using data from the country's existing weather stations. The centralised server will be equipped to process data in several formats which will reduce processing time given that data is inputted from the country's weather stations using several different operational platforms. To further strengthen the capacity of ABMS to produce early warnings, training workshops will be conducted for ABMS staff on how to: i) collect, process and manage climate data generated by the server; and ii) use the generated data to develop early warning information products, including easily interpretable infographics. A knowledge exchange trip will also be conducted to the nearest Regional Climate Centre (RCC), which is under the auspices of the World Meteorological Organisation (WMO). This trip will enable these staff to learn from this RCC, which is currently implementing an impact-based forecasting approach to early warnings focused on early action.

To complement the abovementioned capacity-building interventions and ensure the effectiveness of early warnings, communication and early action protocols will be formalised between AMBS and relevant government agencies to facilitate rapid information sharing preceding an extreme climate event. The communication protocol will define which agencies need to be notified at each stage of hurricane development, from initial identification of a tropical disturbance through to a full hurricane. The communication protocol will be underpinned by specific early action protocols linked to specific stages of hurricane development. Each stage will require action from different stakeholders, including NODS, DoE, the Ministry of Health, Wellness and Environment (MoHWE), the Ministry of Education Science and Technology (MoEST) and the general public. As the threat level increases, so will the required level of response. The early action protocols will define what needs to be done at each stage, as well as how it should be done and who is responsible. These protocols will include variable responses to allow flexibility depending on the anticipated intensity of incoming storms. This will include specific responses for each priority building to ensure that critical services are adequately prepared for a hurricane.

The combined effect of the early warnings and early action protocols will complement Output 2 of the project. This project output will ensure that relevant public institutions responsible for coordinating emergency response —such as NODS — as well as critical service providers — such as hospitals, clinics, police and fire stations — have the technical capacity to implement early action protocols preceding an extreme climate event. This will minimise the adverse impacts of these events on critical infrastructure and vulnerable local communities. Project activities that will be implemented under Output 3 are summarised below. Further details on these activities, including on the associated sub-activities and deliverables, are presented in Section E.6 of this Funding Proposal and Section 9 of Annex 2: Feasibility Study.

Activity 3.1. Strengthen the capacity of ABMS to collect, process and manage climate data.
Under this project activity, a centralised online server will be established and housed within Antigua and Barbuda Meteorological Services (ABMS) to overcome the current barrier of an insufficient climate data processing system. This online server will enhance the real-time processing of climate data to ensure that climate threats are detected in advance and facilitate impact-based forecasting. To support the establishment of the server, staff within ABMS will receive training on: i) efficient and effective methods for collecting, processing and managing climate data in real time; and ii) how to develop early warning information products, including infographics that are locally appropriate and easily interpreted by vulnerable communities. A knowledge-exchange trip, funded by GCF resources, will be undertaken by relevant technical staff at ABMS to the nearest Regional Climate Centre (RCC), which is under the auspices of the World Meteorological Organisation (WMO). This trip will enable these staff to learn from this RCC, which is currently implementing an impact-based forecasting approach to early warnings focused on early action.

Activity 3.2. Establish a formalised communication protocol to facilitate rapid information sharing and early action preceding an extreme climate event.
A formal communication protocol will be developed and operationalised under Activity 3.2 to support the development of early warning information products and impact-based forecasts (Activity 3.1). This will be done to facilitate effective communication of impact-based forecasts from ABMS to decision-makers within relevant government entities responsible for preparation ahead of an extreme climate event. To support this communication protocol, the capacity of ABMS will be strengthened to ensure that the dissemination of climate information is locally appropriate and effective. Early action protocols will also be developed for critical public service and community buildings, with variable responses built into these protocols to account for variable intensities of incoming storms. Training will then be provided to the relevant public and private sector actors on the application of these protocols to ensure decision-makers, that are integral to disaster response (such as NODS), have sufficient capacity to respond efficiently and effectively to the threat of an extreme climate event.

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

The proposed project will be implemented over a six-year period, from 2021–2027. Antigua and Barbuda's Department of Environment (DoE) will be the Accredited Entity (AE) for this project, as designated by the Government of Antigua and Barbuda (GoAB). The AE will be responsible for overseeing the implementation, financial management, evaluation, reporting and closure of the project. To support the selection of the DoE as the AE and highlight the DoE's sufficient capacity to oversee the implementation of all project interventions, the DoE's Project Implementation Manual has been submitted as Annex 25 to this Funding Proposal.

Executing Entity

Antigua and Barbuda's Ministry of Finance (MoF) will be the Executing Entity (EE) for the project. As the EE, MoF will provide oversight and manage entities in the respective government bodies (e.g. MoW, MoHWE, NODS and ABMS) that will be involved in the implementation of project interventions (Table 3). MoF will be accountable to the AE for the project implementation. All operating policies and procedures will follow the DoE policies and procedures.

Table 3. Project Executing Entity and the preferred implementing partners for each project intervention.

Project output	Project activity	Implementing Partners or Affiliates[27]
1. Climate-proofing interventions implemented in critical public service and community buildings to improve resilience to, and recovery from, extreme climate events.	1.1. Implement climate-proofing measures on critical infrastructure.	MoW
	1.2. Construct climate-resilient storm shelters attached to public clinics.	MoHWE; NODS; and MoW
	1.3. Construct a climate-resilient bunker to store emergency supplies for the health, energy, building and welfare sectors.	DoE; MoHWE; MoW; and MoST
	1.4. Implement measures to preserve vital information/data within public institutions.	DoE
2. Climate change adaptation mainstreamed into the building sector and relevant financial mechanisms.	2.1. Mainstream climate change adaptation into the building sector by making provision for the building code in the Physical Planning Act (2003) and updating the EMS plans.	DoE; DCA; and MoW
	2.2. Mainstream climate change adaptation for the building sector into public and private financial, insurance and banking sectors.	DoE
	2.3. Train relevant staff from the National Office of Disaster Services (NODS), Development Control Authority (DCA) and the Public Works Department (PWD) as well as the private sector on operational procedures for long-term monitoring, maintenance and upscaling of climate-resilient renewable energy (RE) and water harvesting technologies in accordance with the national building code.	DoE; NODS; DCA; and PWD
	2.4. Train the local workforce on the installation, operation and maintenance of climate-proofing measures for the targeted buildings.	DoE
3. Climate information services strengthened to facilitate early action within the building sector to respond to extreme climate events.	3.1. Climate information services strengthened to facilitate early action for extreme climate events.	DoE; and ABMS
	3.2. Establish a formalised communication protocol to facilitate rapid information sharing and early action preceding an extreme climate event.	DoE; ABMS; and NODS

Accredited Entity

DoE will be responsible for overseeing the implementation of the proposed project in coordination with the national-level Project Steering Committee (NPSC) and a national-level Project Management Unit (PMU). As the AE, DoE will: i) execute an agreement with MoF to establish clear roles and responsibilities for project execution, including the use of the DoE grievance redress mechanism and the AML/CTF provisions; ii) ensure that the project is executed in

[27] The most suitable name for these partnering government bodies in relation project implementation and in line with the AE's AMA is 'Affiliates' of the AE as defined in Clause 1 of the AMA. This is because all of these entities, including the AE, are under the 'common control' by the Government of Antigua and Barbuda.

accordance with GCF and DoE standards; iii) supervise, oversee and manage the implementation of project interventions; iv) report on project progress; v) participate in the NPSC; and vi) ensure that project activities are well coordinated and aligned with national priorities. A Task Management Team (TMT) will be responsible for project supervision to ensure consistency with GCF and DoE policies and procedures. This TM will participate in: i) biannual NPSC meetings; ii) facilitating Mid-Term and Final Evaluations; iii) preparing Annual Performance Reports and relevant documentation; and iv) technical reviews of project outputs. Project funds will be channelled through AE. The AE will be responsible for the procurement and efficient disbursement of financial resources for the implementation of all project activities.

National Project Steering Committee

The National Project Steering Committee (NPSC) will comprise representatives from *inter alia*: i) DoE; ii) MoF; iii) the Ministry of Health, Wellness and the Environment (MoHWE); iv) Ministry of Works (MoW); v) Ministry of Education Science and Technology (MoEST); and vi) Antigua and Barbuda Meteorological Services (ABMS). The committee will primarily be responsible for providing technical oversight and advisory support. This includes: i) overseeing project implementation; ii) reviewing annual workplans and project reports; and iii) approving any changes to the project's targets, activities or timelines. Biannual NPSC meetings will be held[28] to take management-related and technical decisions, discuss the project's main performance indicators and provide strategic guidance. Any changes made by the NPSC to the project's Results Framework or timeline will be communicated to the PMU. In addition, the NPSC will be responsible for: i) overseeing the PMU; ii) providing technical and administrative functions; and iv) serving as the focal point for engagements and interactions between project stakeholders and partner organisations.

Full-time staff members will be recruited competitively to fulfil the role of PC and PM. The PC who will be responsible for the daily on-the-ground implementation and management of the project. The PC will be primarily responsible for ensuring that the project achieves the targets set out in the Results Framework (Section E) to the required quality standards and within the specified time and budget allocations. To achieve these targets, the PC will: i) report directly to the PSC on project management-related matters; ii) manage the project in accordance with the specified workplans and allocated budget; iii) ensure that all project interventions are implemented according to GCF and DoE guidelines; iii) manage and disburse financial resources allocated for the project during project implementation; iv) work closely with national and local authorities to ensure that the project is managed effectively and that the needs of all beneficiary groups are considered; and v) oversee the efficient and effective information and knowledge-transfer to relevant project partners.

The PM will be required to manage all project risks at all times. Many of the risks are ether medium or high. This is as a result of the fact that the project is being implemented on an Island where most of the items are being shipped, as well as the high risks of hurricane occurring during project implementation. A full time PM will therefore be employed to anticipate risks and address them early, before they can delay the project. The PM will also be responsible to meet with the Cabinet and the PMC to coordinate high-level stakeholders. The PM's role will be maintained until project completion to allow for the fulfilment of all FAA requirement, including submission of the terminal evaluation report — as well as any other required documentation — to the GCF and DoE.

Project management unit (PMU)

A PMU managed by the MoF will coordinate the implementation of project interventions with the AE, EE and other implementing partners. This unit will be primarily responsible for coordinating project activities between the AE, EE and relevant stakeholders. The PMU will consist of: i) the PM; ii) a Project Coordinator (PC); iii) a Financial Officer (FO); iv) a Procurement Officer (PO); v) an Environmental and Social Safeguards Officer (ESO); vi) a Communications Officer (CO); vii) a Monitoring and Gender Officer; and viii) an Administrative Officer (AO). Both the FO, PO and AO will report directly to the PM. Their responsibilities will include: i) providing administrative, logistical and technical financial support to the PMU; and ii) compiling reports on the disbursement procedures for the project and projected requirements for project funding during the implementation phase. The FO in particular will manage the process of requesting financial disbursements from the AE. . A full-time PC will be contracted competitively to support the PM in the implementation of day-to-day project activities. The PC's responsibilities will also include to serve as a focal point for facilitating all stakeholder engagements that will be undertaken during the project implementation phase.

[28] with ad hoc meetings held wherever necessary

Experience and track record of the Accredited Entity

The Department of Environment will be the Accredited Entity for the proposed project. The DoE has a proven track record of implementing resilience building projects from the Special Climate Change Fund (SCCF), the Adaptation Fund (AF) and the Global Environment Facility (GEF) and the GCF. Key resilience projects implemented in recent years are listed below.

- An integrated approach to physical adaptation and community resilience in Antigua and Barbuda's northwest McKinnon's watershed – Adaptation Fund ($10 million USD)
- Sustainable Pathways Protected Areas and Renewable Energy UNEP (SPPARE) – GEF ($2.6 million USD)
- Building climate-resilience through innovative financing mechanisms for Ecosystem-based Adaptation – SCCF ($5 million USD)
- Energy for Sustainable Development in Caribbean Buildings (ESD) – GEF ($ 0.9 million USD)
- Sustainable Energy Facility (SEF) – GEF (1.02 million USD)
- Enhanced Direct Access (EDA) project 'Integrated physical adaptation and community resilience through an enhanced direct access pilot in the public, private, and civil society sectors of three Eastern Caribbean small island developing states' – GCF **(**20 million USD)
- Resilience Back-Up Energy project – ADFD Loan (15 million USD

Experience and track record of the Executing Entity

Antigua and Barbuda's Ministry of Finance (MoF) will be the Executing Entity for the proposed project. The MoF has been identified as the appropriate government entity to fulfil this role because of it has the necessary technical expertise for the implementation of project activities as well as its ability to provide financial risk mitigation measures (insurance, in-kind and cash). The MoF has a proven track record of manging and implementing multiple national and regional projects with a focus on climate change adaptation, sustainable development and public sector social and digital transformation. The projects that the MoF has supported over the last five years are listed below.

- World Bank - Public Sector Social Transformation Project (US$6 million)
- 10th European Development Fund Project (€3 million)
- 11th European Development Fund Project (€2.4 million)
- World Bank – Caribbean Resilience Facility (US$15 million)
- World Bank – Caribbean Digital Transformation Program (US$2 million)
- World Bank – ECPCGC (US$2 million)
- Government of Canada – Eastern Caribbean Debt Management Advisory Services (CAD US$7 million)

Figure 6 below shows the implementation arrangements for project implementation while Figure 7 shows the flow of funds and contractual arrangements.

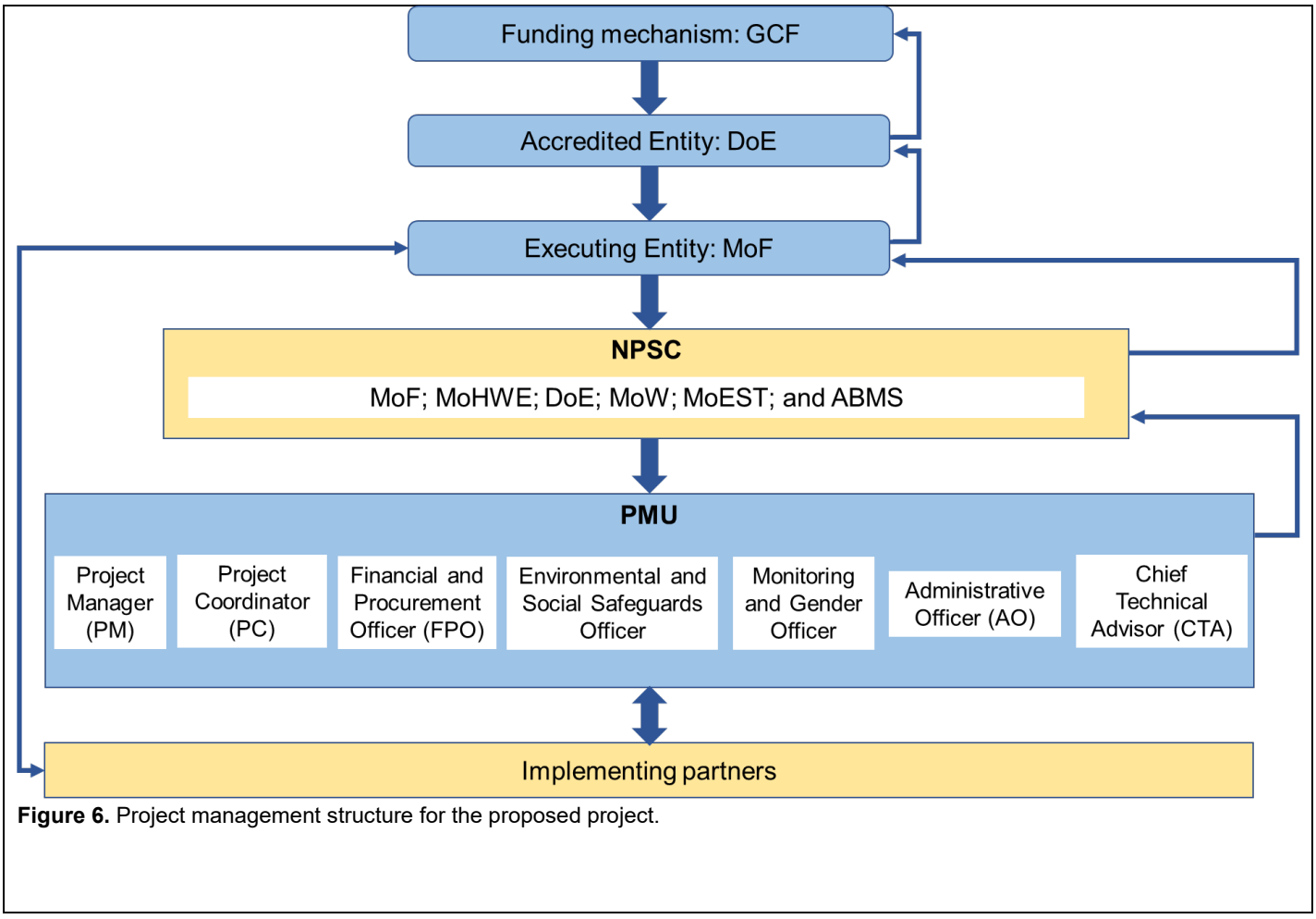


Figure 6. Project management structure for the proposed project.

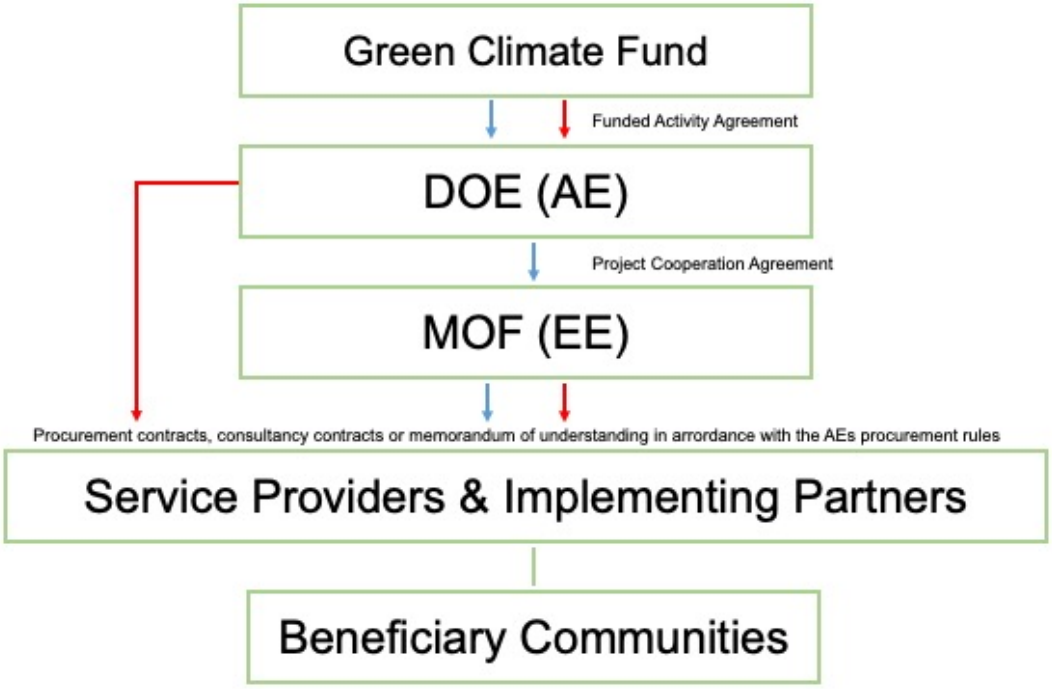


Figure 7. Flow of funds and contractual arrangements for project implementation. The red arrows indicate the flow of funds while the blue lines show the contractual arrangements, including the types of contracts, between the relevant parties.

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

As a Caribbean SIDS, Antigua and Barbuda is one of the most vulnerable countries to extreme climate events such as hurricanes and tropical storms[29]. These events have a significant impact on the country's economy, resulting in significant damaged to infrastructure losses in across key economic sectors, including tourism. Over the quarter century, the intensity and frequency of hurricanes has increased[30], exacerbating the impacts of extreme climate events on the island nation's economy. This includes a series of hurricanes and tropical storms hitting Antigua and Barbuda in 1995, 1998, 1999, 2008, 2011 and 2017. The impact of such events on the economy is severe. For example, Hurricanes Luis and Marylin (1995) resulted in a ~30% decline in the country's GDP, while Hurricanes Irma and Maria (2017) resulted in US$136 million in damages and US$19 million in economic losses across major sectors in the country[31]. To fully recover from the damages and economic losses caused by the 2017 hurricanes, an estimated US$222 million in support was required, including US$5 million for environmental recovery and US$11.5 million for disaster risk management. Table 4 below provides a sector-specific breakdown of these damages and losses as well as the estimated recovery needs.

Table 4. Damages and losses caused by Hurricanes Irma and Maria as well as the recovery needs of the country.[32]

Sector	Damage (million US$)	Losses (million US$)	Total (million US$)	Recovery needs (million US$)
Infrastructure	20.5	0.61	21	38.3
Social	54.2	2.7	57	93.3
Production	59.5	8.7	68.2	70.3
Governance	0.87	0.75	1.5	2.2

[29] Further details on Antigua and Barbuda's vulnerability to climate threats is presented in Section B.1. of this Funding Proposal and Section 3 of Annex 2: Feasibility Study.
[30] Further details on climate trends and projections for Antigua and Barbuda are presented in Sections 2 and 3 of Annex 2: Feasibility Study.
[31] Government of Antigua and Barbuda. Antigua and Barbuda Recovery Needs Assessment. Available at: https://www.gfdrr.org/sites/default/files/publication/Antigua%20and%20Barbuda%20executive%20summary_print_text%282%29.pdf
[32] Government of Antigua and Barbuda. Antigua and Barbuda Recovery Needs Assessment.

Culture	1.15	0.76	1.9	1.4
Total	**136**	**18.9**	**155**	**222**

To address the impact of extreme climate events on the people and economy of Antigua and Barbuda, it is critical to integrate climate change considerations into development planning and to invest in building the resilience of critical public services and the infrastructure that supports them. To address these impacts, the government of Antigua and Barbuda is seeking US$32.7 million of GCF grant financing to build the climate resilience of the building sector, focusing on climate-proofing critical public service and community buildings. At present, the country has limited capacity to finance climate change adaptation interventions through domestic sources of financing – including both private and public sector finance.

Although Antigua and Barbuda is considered a middle income country on a per-capita basis, its size and small population means that it lacks the scale required to invest adequately in adaptation. The country also has a high public debt burden which, in 2018, reached ~US$1.4 billion — more than 88% of the country's GDP[33]. The estimate cost of consideration the cost of upgrading all buildings in the country to Cat 4 & 5 is conservatively estimated about 6.4 Billion USD. This burden is increased by extreme climate events, with recovery needs reducing economic growth and the ability of the country to repay public debt. Although this debt was expected to decline by 2019, long standing problems in the fiscal and banking sectors remain unresolved, including this unsustainable public debt as well as persistent large financing gaps, high non-performing loans in the private sector and the delay in bank resolution[34,35]. Restoring fiscal and debt sustainability has therefore been recommended by the Executive Directors of the International Monetary Fund (IMF) as an urgent need to be addressed by the GoAB. Because of this recommendation, the GoAB is prioritising overcoming fiscal imbalances over investing in climate change adaptation. The recent 2020 global response to the CoVID 19 virus all but makes it impossible for the country to further invest in resilience building. This situation will impact both the public and the private sector for the next three years. GCF support is therefore required to overcome the financial barrier to urgently addressing the climate crisis and by improving the climate resilience of the country's building sector.

Several alternative financing options have been considered during project development, including government funding. However, fully financing the project through government funds is not feasible, with the GoAB having already extended its maximum feasible contribution of US$13 million (~33% of the total project cost) as co-financing. The threat of hurricanes will ensure however that the Government stay committed to this project regardless of the impact of the CoVID 19 response.

GCF financing will be used to overcome the barriers to increasing the resilience of Antigua and Barbuda's building sector to climate change threats. Grants from the GCF will only be used to address the additional impacts of climate change, with government co-finance being used to cover all baseline costs – including business as usual repairs/maintenance to buildings that are necessary to ensure sustainability of climate-proofing interventions. With the support of GCF grant funding, the proposed project will deliver several adaptation benefits that will contribute to achieving a paradigm shift in the country towards climate-resilient sustainable development[36].

Without GCF support, and with the recent CoVID 19 pandemic, the public and private sectors in Antigua and Barbuda will continue to operate under the existing paradigm of reactively recovering from consecutive hurricanes, with national- and local-level decision-makers being limited in their capacity to plan for, and respond to, the increasing impacts of climate change. Moreover, Antigua and Barbuda's critical public service and community buildings will become increasingly vulnerable to extreme climate events such as hurricanes and tropical storms. This will result in: continued declines in the efficiency and effectiveness of critical services, including emergency response units, during and following these events; and increased damages and loss of life under future climate change conditions.

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

[33] Caribbean Development Bank. Country Economic Review 2018; Antigua and Barbuda. Available at: https://www.caribank.org/sites/default/files/publication-resources/CDB%20Economic%20Brief%202018%20-%20Antigua%20and%20Barbuda_0.pdf.

[34] Bank resolution refers to the restructuring of a bank by a resolution authority through the use of resolution tools in order to safeguard public interests, including the continuity of the bank's critical functions, financial stability and minimal costs to taxpayers.

[35] International Monetary Fund. 2015. Antigua and Barbuda. IMF Country Report number 15/189.

[36] A detailed description of project activities is presented in Sections B.3 and E.6 of the Funding Proposal.

Participatory approach to climate-resilient sustainable development
Proposed project interventions have been designed to deliver maximum adaptation benefits to vulnerable communities beyond the project lifetime. These benefits are centred around increasing the climate resilience of critical public services and will be highlighted during numerous workshops that will be conducted during the implementation phase. Uptake of climate resilience technologies within the building sector requires buy-in and commitment from all project partners to ensure that adaptation solutions continue to provide benefits to the population over the long term. The proposed project has been developed through a participatory and consultative process, which has allowed all relevant stakeholders to contribute to the design of the project interventions. Undertaking the development of the project in this way has promoted the country-driven nature of the project, which is a key to ensuring sustainability of project interventions over the long term. An extensive stakeholder engagement plan (Section 10 of Annex 6: Environmental and Social Impact Assessment and Management Plan) has also been developed to ensure that this participatory approach is continued during implementation. The impact and sustainability of project interventions will be further enhanced through the project's focus on ensuring gender-equal benefits are provided to project beneficiaries. Gender sensitive targets for all project activities have therefore been set in the project's Gender Action Plan (Annex 8) to ensure that project interventions are not gender-bias. This will contribute to the ownership of project activities by both women and men which, in turn, will result in gender-sensitive adaptation benefits being conferred beyond the project lifetime.

Upskilling public and private sector representatives for climate-resilient development
Innovative solutions to increasing the climate resilience of Antigua and Barbuda's building sector will be implemented under the project. Such solutions include: i) increasing the structural integrity of critical public service and community buildings to withstand high-intensity storms; ii) installing decentralised renewable energy and climate-resilient water harvesting solutions; and iii) establishing a climate-resilient bunker for the stocking of critical supplies for the energy, medical, welfare and building sectors. Efficient and effective knowledge transfer is critical for achieving sustainability and encouraging scaling up and replication of these innovative solutions. As a result, public and private sector stakeholders will be trained on climate-resilient adaptation solutions for the building sector, incorporating a training-of-trainers approach to ensure that institutional knowledge of these solutions is maintained regardless of staff turnover. Technical staff from DCA (e.g. building inspectors) and MoW (e.g. building maintenance teams) as well as the local workforce will be trained on how to effectively implement, operate, maintain and monitor climate-adaptive measures installed on buildings in line with the requirements of the updated national Building Code. This updated code makes provision for climate change threats, detailing how buildings should be designed and upgraded to withstand Category 4 and 5 storm events. Consumers and producers within the private sector will also be targeted to receive training on the application of this code, including: i) private user groups — for example, business owners and homeowners; and ii) private sector service providers — for example, architects, engineers and private contractors. The provision of such training will ensure that new building designs and upgrades are sufficiently developed to adhere to the updated Building Code. Moreover, it will enable business owners and homeowners to hold private contractors accountable to adhering to the Building Code when upgrades to private buildings are being conducted. Mainstreaming the use of the Building Code into national policy and regulation will further initiate a shift towards climate-resilient development across Antigua and Barbuda's building sector.

Unlocking Private and Publica Sectors investment into climate-adaptive technologies for the building sector beyond the project lifetime
Funding for climate resilience infrastructure is available to the private sector by the Private Banks, Credit Union and the Government owned SIRF Fund. The SIRF Fund will serve as the main mechanism to unlock private financing in several segment of the population, including: i) low income home owners and first responders to upgrade existing homes to Category 4 and 5; ii) community buildings important for hurricane shelter and recovery, including churches, schools, clinics and community buildings; and iii) small businesses that are important to the community and that traditionally provide services such as child care, small shops, bakeries etc. These sectors account for just over 50% of the buildings in Antigua and Barbuda. The SIRF Fund does not provide grants to individuals but can provide grants to communities. In addition, the Fund only provides funding for incremental cost therefore leveraging funding from the Government and or the private Banks.

This GCF project resources will be used to support the Government's efforts catalyse the creation of additional entry points to promote investment into climate-adaptive measures in Antigua and Barbuda (Activity 2.2). Specifically, these resources will be used to expand and inform the Government of Antigua and Barbuda interventions via its SIRF Fund, as well as other financial entities for Cat 4 and Cat 5 infrastructure. In particular, this will further strengthen the enabling environment for private sector access to information and finances from the SIRF Fund for adaptation in the building

sector, in accordance with the guidelines and criteria for the adaptation list of options. The GCF project outputs will assist the technology and capacity risks currently faced by the SIRF Fund with current Cat 4 & 5 construction consists of over engineering and not really a thoughtful attempt to meet the standards via technical design and new technologies. Further this project will provide a new cadre of trained personnel which will increase skilled capacity for construction and for Renewable energy installations. Notwithstanding the lessons learned and success of this GCF project there will be a need to increase capital into the SIRF Fund to meet the private sector demand. During the implementation of Activity 2.2, options for increasing financial inflows into the SIRF Fund is currently under consideration with the aim to increase the available financial resources to be accessed to meet the funding gap to be experienced within the private sector.

To unlock Public Sectors investment in resilient infrastructure the Government of Antigua and Barbuda does not intend to use the SIRF Fund. The Government however in 2020 announced the establishment of the Climate Resilience and Development Fund. The purpose of the fund is to provide funding for climate resilience public sector projects. This Fund receives funding from current taxes and levies on the tourism sector. Lessons learnt from this GCF project as with the SIRF Fund will be providing this new Government Facility with technical guidelines on appropriate technologies and project design. With the CoVID 19 outbreak however, it is not expected that these funds will be available for adaptation until the financial impact of the CoVid 19 pandemic has been addressed. Based on very early IMF discussions (no documents at this time) the CoVID 19 response will cost the Government over six months of income and estimates that this will take the economy three years to recover.

This project will promote the benefits of implementing adaptation solutions in the buildings in both the public and private sectors. Stakeholders may be encouraged to further invest in climate change for future development. At present, there is limited financial capacity for such investment, in both the private and public sectors and this project will provide much needed information and trained capacity to use what resources available even more efficiently.

Operation and maintenance beyond the project lifetime

The sustainable operation and management of construction-related project interventions has been secured by identifying key government institutions to oversee specific project activities, with a commitment from the Government of Antigua and Barbuda to finance all operations, & maintenance and insurance activities required under the project. Interventions under Activity 1.1, focused on increasing the structural integrity of priority critical public service and community buildings, are expected to deliver adaptation benefits for 50 years[37,38], while the installation of solar PV panels and climate-resilient water harvesting solutions on targeted buildings are expected to deliver adaptation benefits for 20 years. The expected lifetime of project interventions was determined based on consultations with local engineers as well as experts and representatives from the DoE, MoW and DCA. MoW will oversee the implementation of climate-proofing measures on critical infrastructure (Activities 1.1 and 1.4), while the Ministry of Health, Wellness and the Environment (MoHWE) will be responsible for managing the shelters that will be built on to five clinics in the country (Activity 1.2). Furthermore, site-specific operational procedures will be developed for long-term maintenance of climate-proofing interventions for each priority building, and these procedures will be integrated into the project O&M Framework. The maintenance plans and costs for the climate change adaptation measures to be installed on priority buildings are presented below.

Table 5 below highlights the required maintenance interventions, including the frequencies, for the priority buildings that will receive climate-proofing interventions under the project. The level of maintenance required for each activity is categorised as follows: i) minimum requirement, ii) recommended, iii) according to manufacturer specification, and iv) site-dependant. During project implementation, assessments of the targeted priority buildings as well as the associated maintenance should be carried out in accordance with the plan presented in Table 5 below.

Table 5. Operation and maintenance works required for the climate adaptation upgrade of target priority buildings.

Maintenance activity	*Level of importance*	*Frequency*

[37] UNDP. 2011. Pacing the Way for Climate-Resilient Infrastructure. Available at: https://www.uncclearn.org/sites/default/files/inventory/undp_paving_the_way.pdf

[38] GIZ. 2011. Climate proofing for development. Available at: https://www.adaptationcommunity.net/?wpfb_dl=34

General Building Repairs (minor repairs)	Minimum requirement	Yearly
General Structural Repairs (major repairs)	Recommended	Yearly
Roof Structural Assessment / Repair	Recommended	Yearly
Windows, doors and shutters maintenance	Recommended	Yearly
Electrical infrastructure and energy efficiency measures	Recommended	Yearly
Maintenance of on-site water supply	Recommended	6 Months
Storm water maintenance and cleaning	Recommended	6 Months
Wastewater treatment	Recommended	Yearly

Maintenance Cost

The cost estimates of annual O&M are represented as a percentage of the replacement costs, ranging from 4–6%[39]. Table 6 outlines the base costs for the routine maintenance of interventions per building, to be conducted during the project lifespan, according to the frequency presented in Table 8. In addition, Table 7 outlines the cost of maintaining project interventions beyond the scope of biannual and annual maintenance works.

Table 6. Annual operations and maintenance costs per building.

Maintenance activity	***Cost per frequency (USD)***	***Total Cost/50 Year Period (USD)***
General Building Repairs (Minor Repairs)	500	25,000
General Structural Repairs (Major Repairs)	200	10,000
Roof Structural Assessment	500	25,000
Storm Shutter Maintenance	500	25,000
Electrical Infrastructure and Energy Efficiency Measures	500	25,000
Maintenance Of On-Site Water Supply	200	20,000

[39] CIDB. Infrastructure Maintenance Budgeting Guideline. Retrieved from: http://www.cidb.org.za/publications/Documents/Infrastructure%20Maintenance%20Budgeting%20Guideline.pdf

Storm Water Maintenance and Cleaning	250	25,000
Wastewater Treatment	250	12,500

Table 7. Cost of additional repairs beyond the scope of biannual and annual maintenance works.

Maintenance activity	***Cost of Additional Repairs (USD)***
General Building Repairs (Minor Repairs)	2,500
General Structural Repairs (Major Repairs)	5,000
Roof Structural Assessment/Repair	3,000
Windows, Doors and Shutter Maintenance	3,000
Electrical Infrastructure and Energy Efficiency Measure	4,500
Maintenance of On-Site Water Supply	2,500
Storm Water Maintenance and Cleaning	1,500
Wastewater Treatment	2,500

Solar PV panels

Table 8 outlines indicative maintenance tasks and frequencies for each component of the solar PV system. The level of importance of each maintenance task falls into four categories, namely: i) minimum requirement, ii) recommended, iii) according to manufacturer specification, and iv) site dependant. In addition, the maintenance extent falls into two categories, namely: i) total system (T) and ii) random unit (R).

Table 8. Maintenance tasks and frequency for Solar PV arrays.

Equipment	***Task***	***Level of importance***	***Frequency***	***Extent***
Modules	Integrity inspection and replacement	Minimum requirement	Yearly	T
	Thermography inspection	Recommended	Yearly	T
	Check tightening of clamps and bolts	Minimum requirement	Quarterly or before any major storms	R
	Module cleaning	Site-dependant	As required	T
	Internal inspection of junction boxes	Recommended	Yearly	T

Electrical cabinets and switchboards	Integrity inspection and cleaning	Minimum requirement	Yearly	T
	Check labelling	Minimum requirement	Yearly	R
	Electrical protection inspection and test	Minimum requirement	Yearly	T
	Check fuse status	Minimum requirement	Yearly	T
	Check surge protection	Minimum requirement	Yearly	T
	Check cables and terminals	Minimum requirement	Yearly	T
	Sensor verification	Recommended	Yearly	T
	Thermographic inspection	Recommended	Yearly	T
	Lubricate locks	Minimum requirement	Yearly	T
	Check tightening	Minimum requirement	Yearly	T
Cables	Integrity inspection and replacement	Minimum requirement	Yearly	R
	Check labelling	Minimum requirement	Yearly	R
	Check terminals	Minimum requirement	Yearly	R
Inverter	Integrity inspection and replacement	Minimum requirement	Yearly	T
	Check labelling	Minimum requirement	Yearly	T
	Electrical protection inspection and test	Minimum requirement	Yearly	R
	Check fuse status	Minimum requirement	Yearly	T
	Check surge protection	Minimum requirement	Yearly	T
	Thermographic inspection	Recommended	Yearly	T
	Sensor verification	Minimum requirement	Yearly	R
	Check parameters	Minimum requirement	Yearly	T
	Test Ventilation system	Minimum requirement	Yearly	T
	Check/replace batteries	According to manufacturer specification	Yearly	T
	Replace fans	According to manufacture specification	Yearly	T
	Safety equipment inspection	Minimum requirement	Yearly	T
	Clean/replace filter	Minimum requirement	Yearly	T
Transformers	Integrity inspection and cleaning	Minimum requirement	Yearly	T
	Check labelling	Minimum requirement	Yearly	R

	Thermographic inspection	Recommended	Yearly	T
	Sensor verification	Minimum requirement	Yearly	T
	Check parameters	Minimum requirement	Yearly	T
	Check oil level	Minimum requirement	Yearly	T
	Check cooling system	Minimum requirement	Yearly	T
	Check MV surge discharge	Minimum requirement	Yearly	T
MV switchgear	Integrity inspection and cleaning	Site-dependant	Yearly	T
	Safety equipment inspection	Minimum requirement	Yearly	R
	Check labelling	Minimum requirement	Yearly	T
	Electrical protection inspection and test	Minimum requirement	Yearly	T
	Thermographic inspection	Recommended	Yearly	T
	Sensor verification	Minimum requirement	Yearly	T
	Check correct operation	Minimum requirement	Yearly	T
	Check fuse status	Minimum requirement	Yearly	T
	Check terminals	Minimum requirement	Yearly	T
	Check/replace batteries	According to manufacturer specification	Yearly	T
	Check lubrication	Minimum requirement	Yearly	T
	Check protection parameters	According to local code	Yearly	T
Power Analyser	Integrity inspection and cleaning	Minimum requirement	Yearly	T
	Check labelling	Minimum requirement	Yearly	R
	Software maintenance	Recommended	Yearly	T
	Monitoring operation test	Minimum requirement	Yearly	T
	Check parameters	Minimum requirement	Yearly	T
Energy Meter	Integrity inspection and cleaning	Minimum requirement	Yearly	T
	Check labelling	Minimum requirement	Yearly	R
	Check parameters	Recommended	Yearly	T
	Check communication devices	Recommended	Yearly	T
UPS	Integrity inspection and cleaning	Minimum requirement	Yearly	T

	Check/replace batteries	According to manufacturer specification	Yearly	T
	Test Ventilation system	Recommended	Yearly	T
Lights	Integrity inspection and cleaning	Minimum requirement	Yearly	T
	Check operation	Minimum requirement	3 years	T
Lightning protection	Integrity inspection and replacement	Recommended	Yearly	R
Fences and Gates	Integrity inspection	Minimum requirement	Yearly	T
	Lubrication of locks	Minimum requirement	Yearly	T
Vegetation	Clearing	Minimum requirement	Site dependant	T
Safety Equipment	Integrity check and replacement	Minimum requirement	Yearly	T
PV Support Structure	Check operation	Minimum requirement	Yearly	T
	Integrity check	Minimum requirement	Yearly	R
	Check tightening	Minimum requirement	Yearly or before major storms	R
	Check potential equalization	Minimum requirement	2 years	T
Weather station	Integrity check and replacement	According to manufacturer specification	Yearly	T
	Sensor verification	According to manufacturer specification	Yearly	T
	Check operation	According to manufacturer specification	Yearly	T
	Check/replace batteries	According to manufacturer specification	Yearly	T
	Monitoring operation test	According to manufacturer specification	Yearly	T
Irradiation sensors	Integrity check and replacement	According to manufacturer specification	Quarterly	T
	Calibration	According to manufacturer specification	2 years	T

	Monitoring operation test	According to manufacturer specification	Yearly	T
Communication board	Communications test	Minimum requirement	Yearly	T
Stock of spare parts	Inventory of stock	Minimum requirement	Yearly	T
	Inspection of stock	Minimum requirement	Yearly	T
	Test of stock	Minimum requirement	Yearly	R
	Stock replenishment	Minimum requirement	Monthly	T

In addition to the operations and maintenance plan for climate-proofing interventions described above, multiple project partners have been engaged to ensure the management and restocking of critical supplies that will be housed within the climate-resilient bunker (Activity 1.3). Responsibilities for the stocking of these supplies will be as follows: i) RE stock will be maintained by the DOE, ii) medical supplies will be maintained by the MoHWE; ii)i food supplies will be maintained by the Ministry of Social Transformation; and iii) building supplies will be maintained by MoW. To ensure that climate change adaptation measures to be constructed under the project provide maximum benefits, relevant project partners have committed to maintaining all climate proofing measures implemented under the project (including physical upgrades as well as decentralised RE and climate-resilient water harvesting solutions) for at least 20 years after implementation of the project. A framework for effective operations and maintenance of these measures is presented in Annex 21.

C. FINANCING INFORMATION

C.1. Total financing

(a) Requested GCF funding (i + ii + iii + iv + v + vi + vii)		**Total amount**		**Currency**	
		32,706,595[40]		million USD ($)	
GCF financial instrument		**Amount**	**Tenor**	**Grace period**	**Pricing**
(i)	Senior loans	Enter amount	Enter years	Enter years	Enter %
(ii)	Subordinated loans	Enter amount	Enter years	Enter years	Enter %
(iii)	Equity	Enter amount			Enter % equity return
(iv)	Guarantees	Enter amount	Enter years		
(v)	Reimbursable grants	Enter amount			
(vi)	Grants	32,706,595			
(vii)	Result-based payments	Enter amount			

(b) Co-financing information	**Total amount**			**Currency**		
	13,458,035			million USD ($)		
Name of institution	**Financial instrument**	**Amount**	**Currency**	**Tenor & grace**	**Pricing**	**Seniority**
GoAB	In kind	8,508,370	million USD ($)	Enter years Enter years	Enter%	Options
GoAB	Grant	4,899,665	million USD ($)	Enter years Enter years	Enter%	Options

[40] This value includes a contingency fee, which will only be used when required and in accordance with agreements between the AE and GCF. The contingency fee is calculated a

(c) Total financing (c) = (a)+(b)	Amount	Currency
	(d) 46,164,630	million USD ($)

(d) Other financing arrangements and contributions (max. 250 words, approximately 0.5 page)	The following are financial resources flows that will run alongside this project which are earmarked for similar outcomes and are consistent with general mitigation and adaptation measures (i.e. 'Parallel Finance' as outlined in Paragraph 6(h) of the GCF Policy on Co-financing): • **Global Environment Facility Sustainable Energy Facility Project** executed by the Caribbean Development Bank – *USD 1.2 million* (Grant) – Focus on installing Back-Up RE Solutions for 10 public buildings (mainly clinics and schools) • **Abu Dhabi Fund for Development Project** – *USD 1.5 million* (Loan) – Back-up RE Generation – Focus on installing Back-Up RE Solutions for 10-11 public and community buildings • **Adaptation Fund Project** – *USD 1.5 million* (Grant) – Focus on installing Back-up RE Solutions and Category 5 Hurricane resilient climate proofing interventions via microfinancing for private households within a vulnerable community • **Italian Government Bilateral Grant** – *USD 0.5 million* (Grant) – Back-up RE Solutions and EMS development for 19 schools • **Indian Government Bilateral Grant** – USD 1 million (Grant) – Back-up RE Solutions and EMS development for 10 schools **Total Parallel Finance = USD 4.2 million (Grant) + USD 1.5 million (Loan)** It should be noted that some of these streams of parallel finance focus on providing RE solutions some of the remaining 20 priority buildings that are not receiving RE which are not receiving RE solutions under Sub-activity 1.1.5 of this project.

C.2. Financing by component

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

Output	Indicative cost (USD)	GCF financing		Co-financing		
		Amount million USD ($)	Financial Instrument	Amount million USD ($)	Financial Instrument	Name of Institutions
Output 1. Climate-proofing interventions implemented in critical public service and community buildings to improve resilience to, and recovery from, extreme climate events.	37,340,858	25,082,823	Grants	12,258,035	Grants	GoAB

Output 2. Climate change adaptation mainstreamed into the building sector and relevant financial mechanisms.	3,050,740	2,880,740	Grants	170,000	Grants	GoAB
Output 3. Climate information services strengthened to facilitate early action within the building sector to respond to extreme climate events.	846,012	746,012	Grants	100,000	Grants	GoAB
Total contingency fee requested from the GCF[41]	2,689,620	2,689,620	Grants			
Project management costs, including M&E costs (USD)	2,237,400	1,307,400	Grants	930,000	Grants	GoAB
Indicative total cost (USD)	**46,164,630**	**32,706,595**		**13,458,035**		GoAB

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

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

Technology transfer

Output 1 of the proposed project will facilitate technology transfer by implementing innovative climate change adaptation interventions within Antigua and Barbuda's building sector. These interventions include: i) strengthening the structural integrity of priority buildings to withstand the impacts of Category 4 and 5 hurricanes (Activity 1.1); ii) installing renewable energy (RE) and climate-resilient water harvesting solutions to ensure continued power and water supply to critical public services during and immediately after a storm (Activity 1.1); iii) constructing a climate-resilient bunker to store critical supplies such as renewable energy equipment, building materials, food and medicine (Activity 1.3); and iv) constructing climate-resilient storm shelters attached to public clinics (Activity 1.2). The total cost of project activities that support technology transfer is US$37,340,858.

The technologies to be implemented under the project are not entirely new to Antigua and Barbuda, having all been implemented to some extent through various channels, including through private sector investment. What is novel under this project, is the approach of mainstreaming these technologies into the building sector. So, instead of being implemented on an ad hoc basis, these interventions will become the new standard approach for the country.

[41] The contingency fee will only be used when required and in accordance with agreements between the AE and GCF. The total contingency fee amount is calculated as the sum of the following: i) 10% of the total GCF cost for project interventions under Output 1; ii) 5% of the total GCF cost for project interventions under Output 2; and iii) 5% of the total GCF cost for project interventions under Output 3. Further details on the contingency fee is presented in Annex 4: Detailed budget.

In the public sector, Antigua and Barbuda has begun developing/implementing several initiatives focused on increasing the resilience of infrastructure, including physical engineering work, installing solar panels on selected buildings and installing climate-resilient water harvesting solutions. Although these initiatives are limited in scale, they have capacitated the Government of Antigua and Barbuda's procurement and legal systems to support the implementation of the proposed project interventions. While these legal and procurement systems are adequate for the project, there is limited capacity within the public and private sector, including the local workforce to implement, monitor and maintain the climate-proofing interventions proposed under this project. To address these limitations, capacity-building initiatives in the form of training and awareness will be delivered under Activities 2.3 and 2.4 to ensure that project interventions achieve maximum adaptation impact. Capacity-building initiatives to be implemented under the project are described in further detail below.

Capacity-building interventions

Technical and institutional capacity of decision-makers and the local workforce will be built under Outputs 2 and 3 of the project. Capacity-building activities under Output 2, in particular, include: i) partnering with local training institutions such as Antigua and Barbuda Institute of Continuing Education (ABICE) to develop and deliver certified courses to the public and private sectors focusing on implementing, monitoring and maintaining climate change adaptation measures specific to the building sector (Activity 2.3); ii) developing training programmes for relevant staff from the Ministry of Works (MoW) and Development Control Authority (DCA), as well as building inspectors, engineers, architects and draughtsmen on climate change adaptation technologies, and how to apply the updated national building code (Activity 2.3); iii) training relevant staff from the National Office of Disaster Services (NODS), Development Control Authority (DCA) and the Public Works Department (PWD) on operational procedures for long-term monitoring, maintenance and upscaling of climate-resilient RE and water harvesting technologies in accordance with the national building code (Activity 2.3); and iv) training the local workforce on the installation, operation and maintenance of climate-proofing measures for the targeted buildings (Activity 2.4). The total cost of all capacity-building activities to be implemented under Output 2 is US$2,508,430.

Under Output 3 of the project, capacity-building activities will focus on increasing the capacity of Antigua and Barbuda Meteorological Services (ABMS) to process climate data in real time and disseminate early warning information products. Specifically, Activity 3.1 will strengthen the capacity of staff within ABMS to collect, process and manage climate data in real time, as well as develop early warning information products, including infographics that are locally appropriate and easily interpreted by vulnerable communities in the country. Activity 3.2 will strengthen the capacity of ABMS to disseminate these early warning information products to critical service providers as well as the private sectors to facilitate early action. The total cost of capacity-building activities to be implemented under Output 3 is US$846,012.

D. EXPECTED PERFORMANCE AGAINST INVESTMENT CRITERIA

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

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

The proposed project will contribute to the GCF's fund-level adaptation objective of increased climate-resilient sustainable development by improving the resilience of Antigua and Barbuda's building sector to extreme climate events — particularly Category 4 and 5 hurricanes. To accomplish this objective, project interventions have been designed to achieve two GCF fund-level impacts and three fund-level outcomes, as presented below[42].

Fund-level Impacts

The proposed project will enhance the resilience of Antigua and Barbuda's building sector by achieving the following fund-level impacts:

- A1.0 — Increased resilience and enhanced livelihoods of the most vulnerable people, communities and regions; and
- A3.0 — Increased resilience of infrastructure and the built environment to climate change.

Project Outcomes

The proposed project will be evaluated against several relevant GCF impact assessment factors, as specified in the GCF Performance Measurement Framework. It is anticipated that the project will achieve three Fund-level Outcomes, described below[43].

A5.0 Strengthened institutional and regulatory systems for climate-responsive planning and development. Output 2 of the project will build the institutional capacity of decision-makers in Antigua and Barbuda to mainstream climate change adaptation into the building sector. This will be achieved through several elements of project design. Firstly, building codes that are currently being updated through the SCCF-funded project will be integrated into legal frameworks and regulations at the national level to ensure effective uptake across all future infrastructural developments (Activity 2.1). Secondly, climate change adaptation will be mainstreamed into public and private financial, insurance and banking sectors, which will facilitate investment in climate-resilient measures for the building sector such as RE and water harvesting measures (Activity 2.2). This will include increasing public and private sector access to financial resources through the SIRF Fund to finance the uptake of climate-adaptive measures in the building sector beyond the project lifetime. And finally, the effectiveness of adaptation options will be supported by the development of technical training programmes on the implementation, operation and maintenance of climate-resilient technologies for the building sector under project Activities 2.3 and 2.4.

A6.0 Increased generation and use of climate information in decision-making. The effective use of climate information will be a central component of early action in response to an anticipated extreme climate event. Output 3 of the proposed project will build on existing early warning initiatives by establishing a communication framework for Antigua and Barbuda's Meteorological Services (ABMS) that will maximise efficiency in reporting on early warnings to the relevant national disaster response agencies (including NODS). Furthermore, early action protocols will be established under Activity 3.2 of the project that link directly to the impact-based forecasts currently under development by ABMS. These protocols will be sector- and building-specific, detailing actions that need to be taken in preparation for a hurricane. By linking the protocols to impact-based forecasts, the timing and extent of preparation actions can be determined relative to the perceived risk. Establishing such a system for early action in Antigua and Barbuda will create a transformational shift in how the country responds to climate threats in the future.

A7.0 Strengthened adaptive capacity and reduced exposure to climate risks. Output 1 of the project will strengthen the adaptive capacity of local communities by installing climate change adaptation technologies on 54 priority buildings in the country. These adaptation measures include: i) increasing the structural integrity of priority critical buildings to withstand high-intensity storms; ii) installing decentralised renewable energy and climate-resilient water harvesting solutions on priority buildings; and iii) establishing community storm-shelters. By securing critical buildings, including

[42] Detailed information on the assumptions and estimates of the impact potential of the proposed project are provided in the project's results framework and economic analysis (Section E of this document and Annex 3, respectively).

[43] A detailed description of the project activities that will be implemented under each output to achieve the GCF project outcomes is presented in Section E.6 of the Funding Proposal.

storm-shelters, the project will ensure that critical services[44] remain operational throughout an extreme climate event, thereby increasing the adaptive capacity of vulnerable communities. In addition, a climate-resilient bunker will be established to store emergency supplies that are urgently required for effective preparation, response and recovery. The availability of these supplies will help secure the critical health, energy, building and welfare sectors during and directly after an extreme event.

Mitigation co-benefits of installing solar PV panels on target infrastructure

While the installation of solar PV panels on 34 target buildings under Activity 1.1 is primarily an adaptation solution proposed under the project, the implementation of this intervention will also deliver mitigation co-benefits.

The methodology used for calculating the avoided emissions that will be realised under the proposed project through installing solar PV panels on 34 target critical buildings is presented below.

Climate additionality of the project

The project is located in Antigua and Barbuda, which is a SIDS. According to CDM methodological tool for demonstration of additionality of microscale project activities (Version 09.0), paragraph 11(a), project activities that are located in SIDS, employ renewable energy and have total installed capacity equal to or less than 5 MW are considered automatically additional. Therefore, the proposed project is considered to meet the climate additionality requirements.

Applied methodology.

The proposed project activity involved the installation of PV generation systems in buildings that are connected to the grid. The PV system supplies electricity to the end users and does not supply electricity to the grid. Therefore, the emission reduction for the project can be calculated using CDM methodology AMS – I.F.: Renewable electricity generation for captive use and mini-grid (Version 3.0).

Emissions reduction calculations

The formula used to calculate the avoided emissions that will result from project interventions is presented below.

$$BE_y = EG_{BL,y} \times EF_{CO_2,y}$$

BE_y	=	1,923 t CO_2/yr	
$EG_{BL,y}$	=	2,776 MWh/yr	[Calculated based on Annex 26]
$EF_{CO2,y}$	=	0.693 tCO_2eq/MWh	[IFI TWG default grid emission factors]

$ER_y = BE_y$ = 1,923 tCO_2/yr

Based on the above assumptions and calculations, installing solar PV panels on 34 critical public service and community buildings in Antigua and Barbuda will result in an estimated 1,923 tCO2/yr of avoided CO2 emissions. Further details on the methodology for calculating the emissions reduction potential of installing these solar panels are presented in Annex 26b: Emissions reduction analysis.

Adaptation impact

The distribution of project interventions covers the majority of built-up areas in Antigua and Barbuda, with increased coverage in the more densely populated and exposed communities. Because of this distribution, project interventions will directly benefit ~73,216 people in Antigua and Barbuda[45] (52% women and 48% men) by securing the provision of critical services to these people during and directly after an extreme climate event, and indirectly benefit the entire population of the country. Overall, project interventions will increase the climate resilience of 54 priority buildings in Antigua and Barbuda, which represents nearly one-third of the country's public building portfolio of 254 buildings. The GCF investment into climate-proofing high-priority critical public service and community buildings will be enhanced by the GoAB's commitment to increase the climate resilience of the remaining public buildings. This commitment is evidenced by the government's annual budget allocation for undertaking the necessary adaptation upgrades to

[44] including hospitals/clinics, police and fire stations as well as buildings that serve as storm shelters

[45] Further details on how project beneficiaries were calculated are presented in Section E2.4 of the Funding Proposal.

strengthen the structural integrity of these buildings to withstand Category 4 and 5 hurricanes. Moreover, project interventions will facilitate public and private sector investment into climate change adaptation through demonstration of the adaptation and economic benefits of climate-proofing existing infrastructure, as well as by creating entry points for increased access of the public and private sectors to resources for financing adaptation upgrades, particularly in the building sector. The combined effect of project interventions will contribute to the creation of an enabling environment for future upscaling and replication of climate change adaptation intervention within the public and private sector, locally, nationally and across the Caribbean region.

A map showing the spatial distribution of the priority buildings to receive climate-proofing interventions under the proposed project are presented in Figure 8 and 9 below.

Figure 8. Priority buildings selected on Antigua island to receive climate-proofing measures under the proposed project. A) the spatial distribution of all priority buildings across Antigua island; and B) the spatial distribution of priority buildings in St. John's.

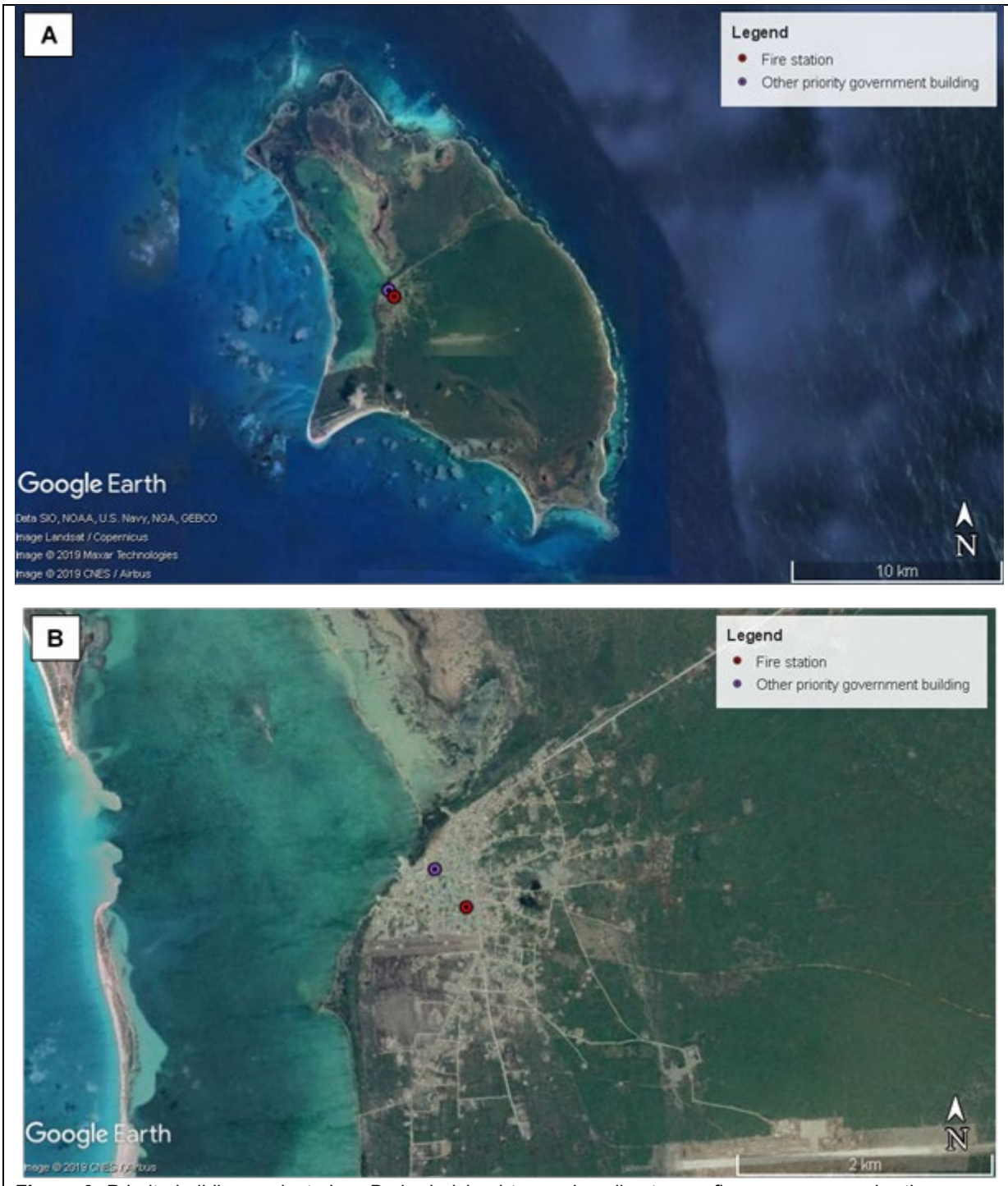


Figure 9. Priority buildings selected on Barbuda island to receive climate-proofing measures under the proposed project. A) the spatial distribution of all priority buildings across Barbuda island; and B) the spatial distribution of priority buildings in Codrington.

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

The proposed project will catalyse a paradigm shift within Antigua and Barbuda's building sector from conventional development to an approach that prioritises the adoption of innovative climate-resilient solutions and early action. Details on how the project will contribute to GCF's paradigm shift objective are presented below.

Potential for scaling up, replication and strengthening policy, Financial and regulatory frameworks

The Caribbean is seeing for the first-time category 5 hurricanes the first being in 2017. There is no well-known studies to show category 5 construction in public buildings, including homes as well as costings and strategy for cost reduction in the Caribbean. The project will catalyse a paradigm shift in the building sector by establishing a new standard for the adoption of climate-resilient interventions that could be readily scaled up and replicated across the country's public building portfolio[46] as well as within the private sector. This process will be supported by: i) implementing climate-proofing measures on critical infrastructure, including RE and climate-resilient water harvesting solutions; ii) making provision for the building code[47] in the Physical Planning Act (2003); iii) increasing the capacity of the public and private sector to apply the building code during all phases of development; iv) increasing the technical and institutional capacity of relevant user groups to install, operate, monitor and maintain climate-proofing measures and v) potential fiscal and other policy interventions, including bulk purchasing. Through the implementation of these transformative adaptation interventions, the project will facilitate the wide-scale replication of climate-resilient development practices nationally and across the Caribbean region. Table 9 below supports the regionally replication potential of the proposed project interventions by showing that similar interventions have been identified as appropriate and viable solutions for these countries to adapt to the impacts of extreme climate events.

Table 9. Countries in the Caribbean region where similar adaptation interventions to those proposed under this project are being implemented.

Country	Project name and date	Intervention	Reference	Project cost (US$)
Antigua and Barbuda, Dominica, Grenada	Integrated physical adaptation and community resilience through an enhanced direct access pilot in the public, private, and civil society sectors of three Eastern Caribbean small island developing states	• Enhanced direct access for CSOs and NGOs to adaptation financing	https://www.greenclimate.fund/project/fp061	22.6 million
Barbados	Water sector resilience nexus for sustainability in Barbados	• Enhanced access of the public to adaptation financing related to the water sector • Installation of rainwater harvesting and water storage systems in critical buildings or vulnerable residences	https://www.greenclimate.fund/project/fp060	45.2 million
Barbados	Disaster risk and energy access	• Installation of solar panels in critical community buildings to be used as shelters	https://unctad.org/meetings/en/Presentation/MSatoh_UNDP_OECS_BBWorkshop_p06_en.pdf	1.7 million
Dominica	Disaster vulnerability reduction project	• Investment in climate-resilient infrastructure	https://projects.worldbank.org/en/projects-operations/project-detail/P166540?lang=en&tab=overview	31 million
Dominica	Dominica Community Resilience Enhancement Project	• Off-grid water and renewable energy supplies for emergency shelters	https://www.greenclimate.fund/document/dominica-community-resilience-	10 million

[46] This portfolio identifies 200 public buildings for implementation of climate-resilient measures.
[47] The updated Building Code outlines design and construction standards for buildings to withstand high-intensity storm events (such as Category 4 and 5 hurricanes).

		• Resilience building of critical agricultural infrastructure	enhancement-project-domcrep	

Knowledge sharing, awareness and the creation of an enabling environment
To support the shift away from the current paradigm of reactive development and recovery[48], climate change adaptation for the building sector will be mainstreamed into public and private financial, insurance and banking sectors. This will facilitate a proactive approach to climate-resilient planning and development by the GoAB and the private sector. This, combined with awareness-raising activities promoting the benefits of installing climate change adaptation measures in the building sector, will encourage further investment opportunities into resilience building, thereby enabling a greater percentage of the population to access financial resources for adaptation.

The uptake and sustainability of climate-resilient adaptation solutions will be enhanced through awareness campaigns that highlight the benefits associated with investing in climate-resilient practices. These benefits include: i) reductions in insurance premiums as a result of a reduced risk to climate-proofed buildings; and ii) reductions in the economic losses caused by extreme climate events as a result of improved structural integrity of critical buildings. Efficient and effective knowledge transfer through the aforementioned awareness campaigns will not only improve the uptake of climate-resilient building practices, but will also improve the preparedness of critical public services, local communities, business owners and other private sector stakeholders for the onset of extreme climate events.

In addition to facilitating the uptake of climate-resilient building practices, the project will shift disaster response by the GoAB from a reactive approach towards a proactive climate-responsive planning. This will be focused on increased preparedness for extreme climate events such as hurricanes and tropical storms. The adoption of such an approach will be achieved through: i) establishing formalised communication channels between ABMS, national- and local-level decision-makers to communicate climate change-related information; ii) developing building-specific protocols for early action ahead of an extreme climate event and iii) establishing a centralised online platform to allow for user-friendly climate change knowledge products to be disseminated to all relevant decision-makers to facilitate early action in the building sector. Improved communication channels between ABMS and decision makers will become increasingly important as the severity of storms increases with climate change. By facilitating rapid information sharing between ABMS, decision-makers and emergency response units, the project will create an enabling environment for early action. This will increase disaster-readiness as clear guidelines will be established for how to efficiently and effectively prepare for a high-intensity storm hitting the country, as well as highlighting the appropriate actions to take at different stages of storm development.

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

The proposed project will contribute towards achieving nine of the 17 UN Sustainable Development Goals (SDGs), including: SDG 3 — Good health and well-being; SDG 4 — Quality education; SDG 5 — Gender equality; SDG 6 — Clean water and sanitation; SDG 7 — Affordable and clean energy; SDG 9 — Industry, innovation and infrastructure; SDG 11 — Sustainable cities and communities; and SDG 13 — Climate action. The contribution of the proposed project to these SDGs aligns with the country's Medium-Term Development Strategy[49] by providing the Necessary Conditions (NCs) to achieve the country's Sustainable Development Dimensions (SDD). Firstly, by contributing to SDGs 7, 9 and 11, the project will assist in the achievement of SDD 1 — Optimal generation of national wealth, by providing several NCs including i) technological adaptation and innovation (including green technology); ii) inclusive growth (growth with equity); iii) adequate infrastructure (including energy, water and telecommunications); and iv) adequate skills and capacity to support sustainable development. Secondly, by supporting SDGs 4 and 5, the project will contribute to the country's SDD 2 — Enhanced social cohesion, by providing the NCs: i) adequate access to health care; ii) adequate access to education and lifelong learning for all; and iii) social inclusion. Lastly, by contributing to SDGs 3, 6 and 13, the proposed project will assist the country in achieving its SDD 3 — Improved health of the natural environment and sustained historical and cultural assets, by providing the NCs: i) water resource management; ii) disaster risk management and climate change resilience; iii) rural and urban planning; and iv) waste management and pollution

[48] Several barriers to adaptation (described further in Section B.2 of the Funding Proposal) prevent Antigua and Barbuda from recovering effectively from extreme events. Rebuilding activities do not consider the increasing impacts of climate change, resulting in the country's building sector becoming increasingly vulnerable to these impacts.
[49] GoAB Ministry of Finance and Corporate Governance. 2015. Medium-Term Development Strategy 2016 to 2020.

control. In addition, numerous environmental, social and economic co-benefits will be achieved through project interventions as described below.

Environmental co-benefits
Increasing the climate resilience of priority buildings through implementing climate-resilient water harvesting and renewable energy (RE) measures will yield several environmental co-benefits. These are listed below.

- Increasing the water harvesting capacity of priority buildings will provide an additional source of freshwater for local communities. This will alleviate pressure on natural water resources by reducing the need for extraction from groundwater and surface reserves.
- Improving the water harvesting capacity of priority buildings will reduce stormwater runoff from priority buildings. This will result in reduced peak flow volume and velocity of stormwater runoff, therefore, contributing to reduced flood impacts and erosion.
- Currently, electricity is supplied by fuel oil-powered plants on Antigua and by diesel generators on Barbuda. The installation of energy-efficient appliances, solar water heaters and rooftop solar PV systems as an alternative renewable energy source in priority buildings will consequently reduce households' dependency on fossil fuel energy sources and minimise the overall emission of GHGs.
- Installing solar PV panels on 34 critical public service and community buildings in Antigua and Barbuda will result in an estimated 1,923 tCO2/yr of avoided CO2 emissions.[50]

Social co-benefits
Climate-proofing priority buildings will increase the resilience of vulnerable communities to extreme climate events and provide several social co-benefits, which are described below.

- Climate-proofing priority critical public service and community buildings will reduce the exposure of these buildings to more frequently occurring high-intensity storms. This will contribute significantly to reducing the risk of injuries and loss of life during such events.
- Installing decentralised renewable energy technologies on priority buildings will ensure the continued provision of energy during and immediately following extreme climate events. As a result, communication networks will continue to be operational, and businesses will be able to resume operations after an extreme event sooner than would be possible in the absence of decentralised power.
- Installing climate-resilient water storage measures on priority buildings will lead to continued sanitation services as well as improved provision of and access to clean drinking water during and immediately following extreme climate events. This will have considerable health benefits for all users of these buildings and reduce the risk of waterborne diseases such as hepatitis A, cholera and typhoid fever that may result from storm or flood events.
- Increasing the water storage capacity of priority buildings will increase national water supply during drought events and therefore reduce the adverse impacts of such events on vulnerable communities in Antigua and Barbuda.
- Strengthening the technical and institutional capacity of the local workforce on how to support the installation, operation and maintenance of climate change adaptation solutions that will be installed on targeted buildings will contribute to increased job security. This will in turn contribute to improved livelihood security as well as enable these individuals to apply similar interventions at scale in their private capacity, which will further increase their resilience to the impacts of Category 4 and 5 hurricanes.
- Climate change knowledge products disseminated to all user groups through a centralised platform will lead to improved preparedness of critical services before the onset of extreme climate events.
- Improving the dissemination of climate change knowledge products will increase the technical and institutional capacity of emergency services to deliver efficient and effective climate-responsive planning and early action.

Economic co-benefits
Project interventions will increase the resilience of priority buildings and critical services, resulting in improved climate-responsive planning and early action. These factors will lead to reduced economic losses from extreme climate events and provide several significant economic co-benefits, as listed below.

[50] The methodology for calculating the estimated total CO2 emissions that will result from the installation of 34 solar PV panels is presented in Annex 26b: Emissions reduction analysis.

- Employment opportunities will be created through the implementation of innovative climate-proofing technologies on priority buildings in Antigua and Barbuda. These opportunities include construction work for installing, operating, monitoring and maintaining climate change adaptation technologies, including decentralised RE and climate-resilient water harvesting solutions. The creation of such employment opportunities will enhance the sustainability of project interventions beyond the project lifetime.
- The cost to repair priority infrastructure following extreme climate events such as hurricanes will be reduced through increasing the capacity of priority buildings to withstand the impacts of these events.
- Increasing the climate resilience of priority buildings will decrease the time required for economic sectors to become operational and for communities to recover immediately following extreme climate events. This will reduce economic inactivity after a storm.
- Improving preparedness of local communities for extreme climate events through strengthening climate information services in the country will reduce personal financial losses of community members. This is because communities will be better prepared to secure their personal assets in anticipation of an extreme event.
- Using decentralised renewable energy and energy-efficient appliances will reduce the associated costs, allowing for additional funds to be made available for maintenance of the systems.

Gender-sensitive development impact

Climate-proofing critical public institutions in Antigua and Barbuda will help to limit the disruptions to core health, education and care services following extreme climate events. Given the gendered demographics of the employees and users of these institutions, as well as gendered vulnerability to climate impacts, this will induce a gender-sensitive development impact, as described below.

- Although certain institutions are predominantly operated and inhabited by men, women often dominate the users and employees of — or more critically dependent upon — the public buildings targeted for climate-proofing interventions. By reducing the disruptions to the functioning of these buildings and delivery of primary services, the project will ensure both women and men's economic and household activities are able to resume without unnecessary delay, following an extreme climate event.
- The project gender action plan (GAP) has outlined actions to promote gender equality in project implementation: i) implement an apprenticeship program for supporting the participation of persons 16 – 24 in construction activities of the project ; ii) implement training and certification opportunities provided to men to learn new techniques to transition to more resilient construction; iii) Development of gender responsive knowledge and communication products to include the promotion of women in construction;
- Through these measures, the project disrupts underlying factors contributing to gender inequality in the country, thereby contributing to gender-sensitive sustainability beyond the projects' timeline.
- Disseminating climate change knowledge products to all user groups through a centralised platform will help overcome gendered accessibility to information and resources, thereby ensuring gender-sensitive preparedness of critical services and increased response capacity of emergency as a result.

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

Vulnerability of the country

As a SIDS, Antigua and Barbuda is particularly vulnerable to extreme climate events such as hurricanes and tropical storms. In 2017, the country was ranked 13th on the global Climate Risk Index (CRI) and third in terms of losses per unit of GDP[51]. The country's NDC identifies five primary reasons for the country's vulnerability, including: i) inefficient planning and management of the built environment; ii) high costs of repairing damage caused by recurrent extreme climate events; iii) the composition of the country's economy[52]; iv) high population density in the coastal zone; and v) limited availability of freshwater resources.

The frequency of Category 4 and 5 hurricanes is already increasing and this is expected to continue under future climate change conditions. Such hurricanes have severe impacts on the country, including loss of life, economic losses and damage to infrastructure. For example, in 2017 Hurricane Irma caused an estimated US$222 million in damages and economic losses in Antigua and Barbuda[53] and resulted in ~129 fatalities across the Caribbean and south-eastern

[51] Germanwatch. 2019. Global Climate Risk Index.
[52] The economic composition clarifies the miscellaneous economic, demographic and cultural attributes of Antigua and Barbuda, which form the basis for region's social and economic development.
[53] UNDP. 2018. Hurricane Irma and Maria: One year on.

region of the United States. The impacts of these extreme climate events on the country are further exacerbated by the country's economic composition. For example, tourism makes up the largest proportion of the country's GDP (~60%) and accounts for the highest overall investment, at ~40%. The onset and aftermath of extreme events, including those events that had regional impacts, but did not directly hit Antigua and Barbuda, significantly reduces tourist activity in the country. This not only affects revenue generation, but also leads to increased unemployment in the tourism sector. Such unemployment results from the closure of tourism-driven businesses and a subsequent reduction employment demand in the sector. Antigua and Barbuda is also heavily reliant on imports of basic supplies, including food, medicine and building materials. Extreme climate events have major impacts on these imports as shipping routes becoming unsafe and insurance premiums for shipping companies becoming unaffordable.

Vulnerability of beneficiary groups

Extreme climate events cause severe damage to critical public service infrastructure in Antigua and Barbuda, increasing the vulnerability of local communities in two primary ways. Firstly, these events disrupt emergency services, disaster response, electricity and water supply, as well as telecommunications[54]. This results in critical services becoming non-operational, which leads to reductions in economic productivity and mobility as well as increases in personal injury and loss of life. Secondly, extreme climate events cause damage to community buildings that are used as shelters, such as schools, churches, clinics and police stations. As a result, these buildings are rendered structurally insecure to provide places of safety to local communities during a storm, especially vulnerable groups such as women, children, the disabled and the elderly.

Socioeconomic status

Antigua and Barbuda's GDP per capita and Human Development Index (HDI) are both relatively high (~US$16,864[55] and 0.78[56], respectively). This high GDP per capita is primarily the result of persons with high income relocating to the country. In reality the per capita of the local people is much lower. The country's small tax and market base as well as its high public debt — more than 88% its GDP in 2018[57] — constrain the government's ability to allocate funding from the national budget for adaptation. Moreover, limited opportunities exist for the public and private sector to access financial resources for addressing climate change impacts, which was estimated to cost the country ~US$20 million per annum[58]. This is nearly fifteen times greater than the DoE's national budget was in 2017[59]. With climate predictions this cost is likely to increase substantially under future climate conditions. External investment is therefore critical to increase the pace needed to achieve climate resilience of Antigua and Barbuda's population to climate change.

Institutional capacity needs

Antigua and Barbuda's National Capacity Needs Self-Assessment identified limited technical and institutional capacity as a major constraint inhibiting the implementation of adaptation interventions in the country. In particular, the GoAB has limited capacity to mainstream climate change adaptation into policy- and decision-making as well as into relevant financial mechanisms for access by the public and private sector. This is largely a result of: i) insufficient knowledge of climate change adaptation benefits, including on how to effectively implement, monitor and maintain climate change adaptation measures; and ii) the absence of formalised processes to enforce such mainstreaming.

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

The proposed project is strongly aligned with Antigua and Barbuda's national priorities, having been designed in collaboration with project stakeholders at all levels. These priorities are summarised below.

- **Antigua and Barbuda's GCF Country Programme** will achieve its target impact potential by integrating adaptation into development processes, thereby avoiding lock-in of long-lived, climate-vulnerable infrastructure.

[54] Hurricane Irma caused moderate damage to several hospitals and it resulted in the complete disruption of the electricity grid, which took six months to reconstruct. Damage to power stations also resulted in a shortage in water supply because of reduced pumping and desalination capacity. Additionally, the hurricane resulted in widespread damage to roads and housing stock; 70–95% of houses on Barbuda were damaged by the hurricane, leaving thousands homeless.

[55] World Bank. 2018. Available at: https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?locations=AG

[56] UNDP. 2017. Inequality-adjusted Human Development Index. Available at: http://hdr.undp.org/en/composite/IHDI

[57] Caribbean Development Bank. Country Economic Review 2018; Antigua and Barbuda. Available at: https://www.caribank.org/sites/default/files/publication-resources/CDB%20Economic%20Brief%202018%20-%20Antigua%20and%20Barbuda_0.pdf.

[58] NDC 2015.

[59] The 2017 budget for the DoE was EC$3,638,601, which is equivalent to US$1,347,629. This amount included provisions for: i) staff salaries, training and travel allowances; ii) advertising and promotional costs; and iii) office supplies and repairs. It consequently leaves almost no resources for implementing climate change adaptation interventions.

Specifically, the country programme identifies the building, water and energy sectors as priority sectors to receive GCF support to increase their climate resilience. The proposed project is strongly aligned with these priorities in that it focuses on increasing the resilience of priority buildings to extreme climate events, and decentralising power and water supply to ensure continued provision of power and water during and immediately after an extreme event. Moreover, these interventions have been designed to be scalable and replicable both nationally and regionally, therefore, enhancing the adaptation impact of the interventions.

- The **Nationally Determined Contribution (NDC)** of 2015 outlines the country's commitments to addressing climate change threats through reducing GHG emissions (Article 2) and increasing the adaptive capacity of the population of Antigua and Barbuda (Article 4). The proposed project aligns specifically with the country's adaptation priorities in that project interventions will increase the climate resilience of priority buildings.
- **Antigua and Barbuda's Readiness Proposal** contributes to the climate change adaptation objectives outlined in the Paris agreement by: i) engaging in adaptation planning processes; ii) supporting the adaptation planning in the country by developing national climate assessments that include climate-resilient sector plans for six sectors; iii) synthesising priority actions into a National Adaptation Plan (NAP); and iv) conducting technical studies in preparation for the implementation of new climate change regulations. The proposed project will build on the outcomes of the Readiness Proposal in several ways. Firstly, Output 1 of the project will contribute to reducing the risk of critical public service and community buildings in Antigua and Barbuda. This output links directly to Readiness Proposal Sub-outcome 2.1: Country Programme for climate finance developed across the climate finance landscape, specifically with regards to identifying major interdependencies and vulnerabilities within the water, power and telecommunications sectors and for critical infrastructure in general. Secondly, Output 2 will enhance the technical and institutional capacity of the GoAB and relevant project stakeholders for climate-responsive planning. This intervention links directly with Readiness Proposal Sub-outcome 2.3: stakeholder engagement. Lastly, under Activity 2.2 of the project climate change adaptation will be mainstreamed into public and private financial, insurance and banking sectors. This intervention is linked directly to the Readiness Proposal Sub-outcomes 2.1: Country Programme for climate finance developed across the climate finance landscape; and 4.5: private sector engagement.
- **Antigua and Barbuda's Medium-Term Development Strategy (MTDS)** outlines the strategies and actions to be undertaken from 2016–2020 to meet the national goal of becoming a developed country in 15–20 years[60]. Within the MTDS, seven Flagship Priorities are emphasised, with two of these directly relating to improved buildings and infrastructure. The technical and institutional capacity of the local workforce, as well as private sector consumers and producers[61] will be built through developing and delivering training programmes under Output 2 of the project. These programmes will focus on the application of the updated Building Code as well as on effective techniques for implementing, monitoring and maintaining climate change adaptation measures on infrastructure[62]. This output aligns closely with Flagship Priority One of the MTDS, which focuses on *inter alia* the renewal and maintenance of critical infrastructure.

Stakeholder engagement

The proposed project was designed following an extensive consultative process with the DoE, which is National Designated Authority (NDA) for Antigua and Barbuda and is responsible for the overall management of Antigua and Barbuda's GCF portfolio, as well as all other relevant project stakeholders. These stakeholders included representatives from DoE, Met Office, NGOs and local communities. Three in-country missions have been conducted during the project development phase.

In March 2017, an initial scoping mission was undertaken during which consultation workshops were held with multiple project partners[63] to: collect baseline information, discuss project implementation arrangements; identify potential risks to the project; and establish methods for ensuring the sustainability of project interventions. Following the initial scoping mission, a second in-country mission was conducted in August 2017 which included technical discussions with relevant government representatives on site selection processes. Shortly after the second mission, Hurricane Irma made landfall on the island of Barbuda, necessitating further discussion on national priorities. This led to the identification of target

[60] Medium-Term Development Strategy 2016 to 2020 (MTDS). 2015. Government of Antigua and Barbuda.
[61] private sector consumers include business owners and homeowners, while private sector consumers refer to architects, engineers and private contractors.
[62] such measures include climate-resilient water harvesting and decentralised renewable energy
[63] including: i) the Chief Fire Officer; ii) Archives Housing; iii) Antigua State College and Five Island Campus; iv) Ministry of Finance; v) National Parks; vi) MSJMC; vii) Analytics Lab; viii) Assistant Commissioner of Police; ix) All Saints Service Complex; x) PWD; xi) NODS; and xii) the Deputy Director of the DoE.

priority buildings to receive climate-proofing interventions[64]. Following these discussions, site visits to the identified target buildings were undertaken to validate the selection of these buildings to receive adaptation measures under the project.

A final mission was undertaken in August 2019 to: i) collect additional baseline information; ii) visit the identified target buildings that will receive climate-proofing measures under the project; iii) collect necessary climate data to strengthen the climate rationale of the project; iv) identify and validate potential project interventions — including appropriate climate-proofing measures — in collaboration with relevant stakeholders; v) engage with the DCA — as the link to the private sector— and MoF to discuss how the private sector could contribute to and benefit from integrating climate change adaptation into their relevant plans and processes; vi) discuss project financing — including co-financing; and vii) determine roles and responsibilities of the relevant implementing entities for the project.

Further details on the stakeholder engagement process are presented in Section 10 of Annex 6: Environmental and Social Impact Assessment and Management Plan.

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

The proposed project is requesting US$32.7 million in grant finance from the GCF to enhance the climate-resilience of Antigua and Barbuda's building sector to extreme climate events. This GCF investment will be supported by the Government of Antigua and Barbuda (GoAB), which has committed approximately US$13 million in co-financing. GCF financing will be used to overcome the barriers to increasing the resilience of Antigua and Barbuda's building sector to climate change threats. Grants from the GCF will only be used to address the additional impacts of climate change, with government co-finance being used to cover all baseline costs – including business as usual repairs/maintenance to buildings that are necessary to ensure sustainability of climate-proofing interventions. With the support of GCF grant funding, the proposed project will deliver several adaptation benefits that will contribute to achieving a paradigm shift in the country towards climate-resilient sustainable development[65].The combined amount of US$46.1 million will be used efficiently and effectively to: i) increase the climate resilience of critical public service and community buildings; ii) mainstream climate change adaptation into the building sector and therefore unlocking opportunities for investment into innovative climate-adaptive solutions for public and private sector buildings; and iii) strengthen the technical and institutional capacity of decision-makers in Antigua and Barbuda's public and private sector for early action and rapid response to climate threats. The cost-effectiveness of proposed project interventions as well as a summary of the international best practices and lessons learned used to inform project development are presented below.

Cost-effectiveness of project interventions

[64] including: i) Police Headquarters, Antigua; ii) MSJMC, Antigua; iii) DoE Office, Antigua; iv) Police Station, Barbuda; v) Fire Station, Barbuda; vi) Community Centre, Barbuda; vii) Barbuda Clinic; viii) Barbuda Secondary School; ix) Fisheries Complex, Barbuda; x) Reverse Osmosis Plant, Barbuda; and xi) NODS, Barbuda

[65] A detailed description of project activities is presented in Sections B.3 and E.6 of the Funding Proposal.

In recent years, Antigua and Barbuda has experienced several Category 4 and 5 hurricanes, resulting in serious damage levels. In order to take decisions regarding the type of climate change adaptation options that the government should respond with, it is necessary to understand the adaptation expenditure options and the associated likely avoided hurricane impact costs. As the two options will have very different cost and impact implications, it is necessary to analyse the intervention expenditure and impact avoidance of the different adaptation options. A cost-effectiveness analysis has been employed to inform the decision-making. This analysis will identify which adaptation options will offer the greatest levels of cost-avoidance, or in other words, which option will be the most effective spend for the Government of Antigua and Barbuda. Four plausible scenarios facing Antigua and Barbuda society were developed and are outlined in Figure 10 below.

Figure 10. The four plausible scenarios analysed to determine the cost-effectiveness of proposed project interventions.

Business as usual with 'normal' weather scenario. Under this scenario government chooses to respond in a manner like the past, where infrastructure is repaired anticipating the past 'normal' weather. Buildings are repaired using conventional repairs, and the centralised water and energy supply system is maintained. To all intents, it is a business as usual response. In terms of the climatic conditions, hurricane phenomena are assumed to be similar to the past, with occasional Category 3 hurricanes.

Business as usual with extreme weather scenario. In this scenario, government also responds in the past manner, where infrastructure is repaired in a conventional manner anticipating 'normal' weather. Buildings are repaired using standard responses, and the centralised water and energy supply system is maintained. However, in terms of climatic conditions, the Antigua meteorological data from 1970 to 2013, and 2017 is adopted, which includes hurricanes of greater frequency and greater intensity (at Category 4 and 5 levels).

Resilient response with 'normal' weather scenario. In this scenario, government responds in a climate resilient manner, by anticipating future extreme weather. In terms of the response to infrastructure, 54 key government buildings are strengthened to resist Category 5 hurricanes (that is, 25% of 200 key government buildings), and water and energy supply is decentralised to allow for multiple supply options (to reduce the risks associated with a single supply system). In terms of human and institutional capital, technical capacity is built in the public and private sector, building codes are regulated, innovative finance facilities to promote building adaptation is provided and an early warning system is established. In terms of the climatic conditions, hurricane phenomena and trends are assumed to be like the past (1900 to 1950).

Resilient response with extreme weather scenario. Here government responds in a climate resilient manner by strengthening 54 key government buildings to resist Category 5 hurricanes, and water and energy supply is

decentralised to allow for multiple supply options. Technical capacity is built in the public and private sector, building codes are regulated, innovative finance facilities to promote building adaptation is provided and an early warning system established. Climate change projections under both the RCP4.5 and 8.5 scenarios[66] indicate that, although the total number of storms is not expected to change significantly, there will be an increase in the frequency of high-intensity storms (Category 4 and 5 hurricanes) experienced by Antigua and Barbuda.

The expenditure on alternative intervention options were clustered into two broad packages, namely:

- A baseline package representing the conventional response to Category 3 hurricane impacts and includes a total capital cost of US$10.4 million and an annual operating expenditure of US$64,800.
- A climate resilient package representing a retrofit of 54 buildings for Category 5 hurricanes, capacity building interventions to lever climate resilient private sector responses and includes a total capital cost of US$23.2 million and an annual operating expenditure of US$717,910.

The Net Present Value (NPV) of the baseline or business as usual intervention package is US$13.8 million, and the climate resilient retrofit is US$36.9 million — the climate resilient option being 2.6 times greater than the baseline. The proposed project's climate resilient NPV is comparable to the cost of similar interventions within the Caribbean. For example, a project in Barbados addressing enhanced access of the public to adaptation financing in the water sector and the installation of rainwater harvesting systems cost US$45.2 million, whereas a project in Dominica addressing the investment in climate-resilient infrastructure cost US$31 million (Table 9). To judge the whether the expenditure is justifiable, it is necessary to quantify the interventions' impacts in the four scenarios. The impacts of the scenarios were estimated by:

- Firstly, analysing the impacts of single hurricane events (both Category 3 and 5 hurricanes) when combined with government intervention packages – either a business as usual response or a climate resilient response.
- Secondly, summing the costs of repeat hurricane events (Category 3 or 5 or both) in either the 'normal' or extreme weather scenarios over the next 50 years.

The quantum of the impacts were estimated as **avoided losses** using i) direct market values with respect to manufactured capital as a proxy for the loss in infrastructure, ii) loss in income as a proxy for the impact on the economy and welfare of people, and iii) the human capital approach as a proxy for the impact on the productive capability of the population as well as pain and suffering.

The analysis then used 'normal' hurricane trends (i.e. more Category 1,2 and 3 hurricanes) reflected in the period 1900–1950 and extreme hurricane trends (i.e. more Category 4 and 5 hurricanes) reflected in the period 1970–2013 and in 20017 to count and sum the different hurricanes and to combine these with the impact costs over 50 years for each scenario. A comparison of the four scenarios' intervention costs and hurricane impacts is outlined in **Figure10 ..** Note the following:

- In *a business as usual with 'normal' weather*, the cost of the interventions is USD 13.8 million, with a USD 551.9 million impact cost. However, in a *business as usual with extreme weather*, while the intervention costs are the same, the impact cost is USD 17.2 billion, orders of magnitude greater.
- On the other hand, in a *climate resilient with 'normal' weather*, the intervention cost is USD 36.9 million, some USD 23 million more than the *business as usual* costs. However, in this scenario, the impact costs are USD 214, some USD 338 less than in *a business as usual with 'normal' weather*. The additional USD 23 million spend buys a cost avoidance of USD 337.9 million. Therefore, even in a 'normal' weather scenario, a climate resilient intervention is a no-regret investment. In terms of a *climate resilient with extreme weather* scenario, the impacts costs are USD 8 billion, some USD 9.1 billion less than *business as usual with extreme weather*. In this case, the additional USD 23 million resilient intervention buys a USD 9.1 billion cost avoidance. This is a highly cost effective spend. **Error! Reference source not found.** below presents a comparison of intervention costs and associated hurricane losses under the four scenarios.

[66] These representative concentration pathways (RCPs) are based on the main forcing agents of climate change, including GHG emissions, GHG concentrations and land-use change. RCP4.5 represents the likely best-case scenario with a peak radiative forcing of 4.5 W/m2 (~650 ppm CO2 eq) at stabilisation after 2100. RCP8.5 represents a very high GHG emission scenario with a peak radiative forcing of 8.5 W/m2 (~1,370 ppm CO2 eq) and no expected stabilisation in emissions. RCP8.5 indicates a business as usual scenario where the rate of GHG emissions continues to increase with no mitigation measures.

Table 10. Comparison of intervention costs and associated hurricane impact costs in the four scenarios.

	Net present value (NPV) of the expenditure on interventions (USD millions)	NPV of "Normal" hurricane impact costs (USD millions)	NPV of extreme hurricane impact costs (USD millions)
Baseline: BaU interventions	$ 13.8	$ 551.9	$ 17,253.0
Resilient interventions	$ 36.9	$ 214.0	$ 8,091.4
Differences between Business as usual and Resilient spend and cost avoidance	$ 23.1	$ 337.9	$ 9,161.7

The cost-effectiveness analysis identifies which options provide the greatest magnitude of avoided losses to society per dollar spent on interventions. Note the following:

- The *'normal' hurricane exposure with a business as usual intervention*, constitutes the *baseline* or the standard by which the other interventions are evaluated. In the comparative ratio, the baseline becomes '1'. Furthermore, in this scenario, a US$1 spend on interventions is associated with a hurricane impact cost of US$39.6. On the other hand, a *climate resilient response with 'normal' weather*, is associated with a US$5.8 hurricane impact cost to society per dollar spend, or some 15% of the baseline – a much lower impact.
- In the *business as usual response with extreme weather* scenario, the loss could be as high as US$1,246 per dollar spend or 31.3 times greater than the baseline scenario. In terms of a *climate resilient response with extreme weather* scenario, the loss could be US$219 per dollar spent, orders of magnitude lower than the baseline.
- **In both weather scenarios, the resilient interventions offer more cost-effective responses than a business as usual response, with the expected avoided losses under the project at US$1.15 billion reduction in loss of assets at mid-term and US$3.34 billion reduction in loss of assets at final term**

Application of best practices in the building sector

Best practices from the Organisation of Eastern Caribbean States (OECS) Building Code and the Caribbean Disaster Mitigation project were used to inform the design of climate proofing interventions to be implemented under the proposed project. Lessons learned from numerous baseline investments into climate change adaptation in Antigua and Barbuda were also used to guide the design of all project interventions. Such lessons include appropriate mechanisms for ensuring that project activities are implemented in a participatory, gender-inclusive and sustainable way. The specific international best practices and lessons learned that were applied to the design of the proposed project and that will contribute to the efficiency and effectiveness of project interventions are summarised below. Specific details on all best practices and lessons learned relevant to the project are presented in Section 7 of Annex 2: Feasibility Study.

International best practices and lessons learned identified for the project include:

- using climate-resilient materials for increasing the structural integrity of critical public service and community buildings, such as pitch pine and / or mahogany wood for hurricane shutters and window frames, as well as straps, bolts or clamps for securing roofs;
- ensuring that designs of buildings under future climate change conditions do not include long overhangs, which are at risk to high-intensity storms;
- incorporating traditional knowledge into training for engineers, architects, draughtsmen on how to design and implement climate-resilient solutions in the building sector;
- increasing compliance with the standards and guidelines stipulated in the national building code;
- updating the national and local policy framework for the building sector to ensure that future development adopts changes in international standards regarding the technical specifications required by all buildings under changing climate conditions;

- drawing on regional experiences and resources to increase capacity to respond to the impacts of extreme events;
- applying an integrated, systemic and coordinated approach to disaster response through the establishment of formalised communication channels;
- developing appropriate strategies for securing financial resources for project development and implementation;
- effectively managing the available financial and human resources to ensure the efficient and cost-effective implementation of project interventions;
- undertaking regular monitoring and evaluation of climate-adaptive interventions to ensure that the most effective and appropriate solutions are being implemented under future conditions of climate change;
- engaging and collaborating extensively with all relevant project stakeholders will encourage buy-in from national- and local-level decision-makers therefore contributing to the sustainability of proposed adaptation interventions over the long term; and
- implementing effective financial and project management strategies to ensure the efficient use of financial resources and avoid delays during the implementation phase.

E. LOGICAL FRAMEWORK

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

E.1. Paradigm shift objectives

Please select the appropriated expected result. For cross-cutting proposals, tick both.

☐ Shift to low-emission sustainable development pathways

☒ Increased climate resilient sustainable development

E.2. Core indicator targets

Provide specific numerical values for the GCF core indicators to be achieved by the project/programme. Methodologies for the calculations should be provided. This should be consistent with the information provided in section A.

E.2.1. Expected tonnes of carbon dioxide equivalent (t CO_2 eq) to be reduced or avoided (mitigation and cross-cutting only)	Annual	1,923 t CO_2 eq
	Lifetime	38,460 t CO_2 eq
E.2.2. Estimated cost per t CO_2 eq, defined as total investment cost / expected lifetime emission reductions (mitigation and cross-cutting only)	(a) Total project financing	47,403,933 million USD
	(b) Requested GCF amount	33,945,898 million USD
	(c) Expected lifetime emission reductions	____ t CO_2eq
	(d) Estimated cost per t CO_2eq (d = a / c)	____ Choose an item. **/ t CO_2eq**
	(e) Estimated GCF cost per t CO_2eq removed (e = b / c)	____ Choose an item. **/ t CO_2eq**
E.2.3. Expected volume of finance to be leveraged by the proposed project/programme as a result of the Fund's financing, disaggregated by public and private sources (mitigation and cross-cutting only)	(f) Total finance leveraged	13,458,035 million USD
	(g) Public source co-financed	13,458,035 million USD
	(h) Private source finance leveraged	____ Choose an item.
	(i) Total Leverage ratio (i = f / b)	**0.4**
	(j) Public source co-financing ratio (j = g / b)	0.4
	(k) Private source leverage ratio (k = h / b)	____
E.2.4. Expected total number of direct and indirect beneficiaries, (disaggregated by sex)	Direct	73,216 people[67] 38,072 women and 35,144 men
	Indirect	94,400 people; 49,088 are women and ~45,312 are men
	For a multi-country proposal, indicate the aggregate amount here and provide the data per country in annex 17.	

[67] Details on the vulnerability analysis conducted that generated beneficiaries' figures, including the methodology, are presented in Section 10 of Annex 2: Feasibility Study.

E.2.5. Number of beneficiaries relative to total population (disaggregated by sex)	Direct	73,216 people (~78% of the total population)
	Indirect	Project interventions will indirectly benefit 100% of the total population of Antigua and Barbuda (i.e. ~94,400 people).
	For a multi-country proposal, leave blank and provide the data per country in annex 17.	

E.3. Fund-level impacts

Expected Results	Indicator	Means of Verification (MoV)	Baseline	Target		Assumptions
				Mid-term	Final	
A1.0 Increased resilience and enhanced livelihoods of the most vulnerable people, communities and regions	*A1.1 Change in expected losses of lives and economic assets (US$) due to the impact of extreme climate-related disasters*	Initial Situation Overview[68] Initial Damage Human Needs Assessment[69] Detail Sector Damage Assessment[70] Recovery needs assessments/Post Disaster Needs Assessment [71,72] Mapping of affected area using GIS Report/assessment of losses avoided Building Maintenance Reports	US$6.6 billion in economic losses per Category 4 or 5 event	$1.5 billion reduction in loss of assets	$3.34 billion reduction in loss of assets	Climate change adaptation measures implemented on target buildings will be adequate to meet current climate projections.

[68] Conducted by a Rapid Needs Assessment Team of national and local authorities. The team is mobilized within 24 hours and the assessment report is available within 3 days and is shared by the National Emergency Operation Center (NEOC)
[69] This assessment is mobilized within 7 days and is conducted by CARICOM as well as national and local authorities. A report is produced within 14 days shared by NEOC
[70] Mobilized after 14 days and is conducted by national and sector experts
[71] If a Category 4 or 5 hurricane hits the country within the project implementation period
[72] Following an extreme climate event, the GoAB conducts a recovery needs assessment, supported by organisations such as the Global Facility for Disaster Reduction and Recovery, United Nations, European Union, Caribbean Development Bank and the Eastern Caribbean Central Bank. Focuses on (i) the valuation of physical damages and economic losses; and, (ii) the identification of human recovery needs of the affected population.

E.3. Fund-level impacts

Expected Results	Indicator	Means of Verification (MoV)	Baseline	Target		Assumptions
				Mid-term	Final	

E.3. Fund-level impacts

Expected Results	Indicator	Means of Verification (MoV)	Baseline	Target		Assumptions
				Mid-term	Final	
A3.0 Increased resilience of intrastructure and the built environment to climate change	*A3.1 Number of physical assests made more resilient to climate variablility and change, considering human benefits*	Building resilience scorecard[73]. Government building upgrade reports/construction logs Government asset registers Site surveys	52 priority buildings at Level 0 2 priority buildings with value USD 8,617,188 at Level 1[74]	27 priority buildings at Level 2 with value USD 53,354,316.53[75]	54 priority buildings at Level 3 with value USD 106,708,633.07 [76]	Climate change adaptation measures implemented on target buildings are adequate for predicted extreme climate events. Persons working in the climate-proof priority buildings are able to return to work and provide critical services during and after a storm.

E.4. Fund-level outcomes

Expected Outcomes	Indicator	Means of Verification (MoV)	Baseline	Target		Assumptions
				Mid-term	Final	
A5.0 Strengthened institutional and regulatory systems for climate-responsive planning and development	*A5.1 Institutional and regulatory systems that improve incentives for climate resilience and their effective implementation*	DCA applications for each year Antigua and Barbuda Investment Authority (ABIA) Construct Antigua and Barbuda Initiative report	Total value of category 4/5 resilient buildings annually approved by DCA is USD 6,388,875 (*i.e. 25 buildings*)[77]	Total value of category 4/5 resilient buildings annually approved by DCA is USD 12,777,750 (*i.e. 50 buildings*)	Total value of category 4/5 resilient buildings annually approved by DCA is USD 63,888,750 (*i.e. 250 buildings*)	Increase in construction costs and greater longevity of buildings with climate resilient investments. Increase in the minimum strength requirement of buildings to a

[73] Level of scale measures the potential to withstand a Category 4 or 5 hurricane - Level 0: Building infrastructure cannot withstand a Cat 4 or 5 hurricane and is fully reliant on centralised water and energy systems; Level 1: Building infrastructure will withstand a Cat 4 or 5 hurricane but still fully reliant on centralised water and energy systems; Level 2: Building infrastructure will withstand a Cat 4 or 5 hurricane and still partially reliant on centralised water and energy systems; Level 3: Building infrastructure will withstand a Cat 4 or 5 hurricane and fully equipped with self-sustaining water and renewable energy systems.

[77] The baseline to be confirmed in year one to maintain midterm and final targets relative to the baseline.

		Customs Report				high-end Cat 4 and a low-end Cat 5 development.
A6.0 Increased generation and use of climate information in decision-making	*A6.1 Use of climate information products/services in decision-making in climate sensitive sectors*	Climate information services (CIS) uptake scorecard for the application of the updated building codes[78] Standard Operating procedures and protocols for early warning National Emergency Centre reports	CIS uptake at Level 1 Decision-makers in critical public services rely on traditional, informal communication channels to prepare for and respond to an extreme climate event.	CIS uptake at Level 2	CIS uptake at Level 3	Effective dissemination of early warnings leads to early action and increased resilience. Sectors are better prepared to respond to threats of extreme climatic events.
A7.0 Strengthened adaptive capacity and reduced exposure to climate risks	*A7.2 Number of males and females reached by [or total geogrpahic coverage of] climate-related early warning systems and other risk reduction measures established/strengthened*	MoW Assessments of critical public service and community Visitor Logs maintained by security and administrative personnel indicating	0	19,000 women and 17,000 men (36,000 people in total) reached by climate-related early warning systems and are supported by climate-resilient critical services secured	38,072 women and 35,144 men (73, 216 people in total) reached by climate-related early warning systems and are supported by climate-resilient critical services secured	Climate proofing measures are sufficient to secure the provision of critical services to communities during a Category 5 hurricane event.

[75] **Aggregate Value of 1 square foot of climate interventions** = USD 130
Post-Climate Interventions Value of 1 square foot of a priority building = Current Market Value of 1 square foot of a priority building + Aggregate Value of 1 square foot of climate interventions (i.e. USD 298 = USD 168 + USD 130)
Post-Climate Interventions Value of a priority building = Total square footage of a priority building X Post-Climate Interventions Value of 1 square foot of a priority building

[76] **Aggregate Value of 1 square foot of climate interventions** = USD 130
Post-Climate Interventions Value of 1 square foot of a priority building = Current Market Value of 1 square foot of a priority building + Aggregate Value of 1 square foot of climate interventions (i.e. USD 298 = USD 168 + USD 130)
Post-Climate Interventions Value of a priority building = Total square footage of a priority building X Post-Climate Interventions Value of 1 square foot of a priority building

[77] The baseline to be confirmed in year one to maintain midterm and final targets relative to the baseline.

[78] The (CIS) uptake scorecard seeks to measure the extent of use of climate change information in relevant early action protocols and procedures. Level 0: Early warnings are not used for disaster preparedness and response; Level 1: First responders receive unclear communications from early warning systems, without formal categorisation of the level of threat. As a result, uncertainty over the level of threat delays action while decisions makers debate on what both the level of threat and the response that needs to be taken. Level 2: First responders receive clear communications from early warning systems that categorisation of the level of threat but do not have standardised response protocols. As a result, response is delayed while decisions makers debate on what actions need to be taken for each escalation of the threat level. Level 3: First responders receive clear communications which indicate the level of threat and have clear protocols in place detailing the appropriate level of response. As a result, response is immediate and can be escalated rapidly as the threat level increases, without having to wait for decision makers to reassess the situation.

		people serviced by these buildings Public works records Census records of people in the vicinity of the buildings that are at risk to the impacts of extreme climate events[79] Annual project reports measure the progress achieved for installing climate proofing measures on target buildings		through climate proofing measures on critical public service and community buildings (corresponding to the reach of 50% of the target buildings)	through climate proofing measures on critical public service and community buildings (corresponding to the reach of 100% of the target buildings)	

E.5. Project/programme performance indicators

Expected Results	Indicator	Means of Verification (MoV)	Baseline	Target		Assumptions
				Mid-term	Final	
1. Climate-proofing interventions implemented in critical public service and community buildings to improve resilience to, and recovery from, extreme climate events.	*Number of priority buildings that can reopen with in 2 days after a category 4 or 5 hurricane and be fully functional to serve vulnerable persons*	• Catalogue of surveys/ assessments from the climate-proofed buildings • Commissioning reports • Results of drills conducted by NODs as part of the National Hurricanes readiness exercises.	2 priority buildings are able to withstand the impacts of Category 5 hurricanes	Total of 27 priority buildings can reopen within 2 days[80] after a category 4 or 5 and be fully functional to serve vulnerable persons Of which: Schools = 8 Police stations = 5 Healthcare buildings = 7 Government Office buildings = 6	Total of 54 priority buildings are at level 3 and can reopen within 2 days[81] after a category 4 or 5 and be fully functional to serve vulnerable persons Of which: Schools = 13 Police stations = 11 Healthcare buildings = 15 Government buildings = 14	Climate-proofing interventions related to buildings only and include the installation of RE solutions. Climate-proofing priority critical service buildings is the major but not the only factor in critical services remaining operational during and immediately after extreme climate events.

[79] The GoAB is responsible for these assessments, which will be conducted to measure project progress and performance.
[80] Workers need time to clean up their homes and then the buildings after any storm and more so after Cat 4 and Cat 5. Also, the Government needs at least 48 hrs to clear roads;
[81] Workers need time to clean up their homes and then the buildings after any storm and more so after Cat 4 and Cat 5. Also, the Government needs at least 48 hrs to clear roads;

				Community Building=1	Community Building=1	
	Change in gallons of water stored at 54 priority buildings to enable continuous water supply when centralised utilities are disrupted by a storm	• Design and QS reports; • Contracts with contractors; • Commissioning reports; • Catalogue of surveys/ assessments from the climate-proofed buildings	3 priority buildings fitted with climate-resilient water harvesting solutions with an average of 1,989.35 gallons stored[82]	27 priority buildings fitted with climate-resilient water harvesting solutions with an average of 17,904.14 gallons stored	54 priority buildings fitted with climate-resilient water harvesting solutions with an average of 35,808.27 gallons stored	The water harvesting and other retrofits on the buildings will be done together. Water harvesting solutions improve water availability during and after a storm. The water storage capacity at each building is sufficient to meet the critical needs of the facility for at least 2 days after a storm.
	Change in recovery time for critical data linked to priority services such as healthcare, safety and security	• Commissioning reports for climate-proofing of on-site data servers; • System logs for servers secured within the climate-resilient bunker	Data recovery takes several months as data is not backed up on secure servers and is lost if a storm damages on-site servers.	Data recovery can be done within 2 days of a storm using backup data stored on secure servers housed in a climate-resilient bunker.	Data recovery can be done in a few hours using data backup on on-site climate-proofed servers, with additional backups accessible within 2 days using backup data stored on secure servers housed in a climate-resilient bunker.	Data backed up on secure servers can be manually downloaded if internet services are disrupted. On-site climate-proofed data servers are connected to a resilient, decentralised backup power source.
2. Climate change adaptation lessons mainstreamed into the building sector and relevant financial	*Change in the % of applications to the DCA for buildings that can meet category 4 & 5 standards;*	• DCA reports	Approximately 5% of 500 applications approved annually by	10% of 500 applications approved annually by the DCA are	50% of 500 applications to the DCA are for buildings that can meet	Technical training is sufficient to increase the capacity of the

[82] **Total Expected Number of People to occupy a priority building** = Total square footage of a priority building ÷ 100 square feet
Total Minimum Water Storage Capacity of a priority building = Total Expected Number of People to occupy a priority building X 10 gallons

institutions and mechanisms.		• Reports generated by consultants; • Consultation and workshop reports; • Regulations drafted and submitted to the office of the Attorney General;	the DCA are CAT 4 or 5	for buildings that can meet category 4 & 5 standards.	category 4 & 5 standards;	local workforce to implement, maintain and monitor climate change adaptation measures installed on buildings in accordance with the national building code and Physical Planning Act (2003). Public and private sector representatives participate in the capacity building programmes.
	Change in the level of awareness and understanding of updated building codes for government officials in MoW and DCA as well as building inspectors, engineers, architects and draughtsmen	Training certificates; Awareness surveys	TBD[83] MoW and DCA as well as building inspectors, engineers, architects, and draughtsmen are required to build to meet Cat 3 standard. DCA is implementing a project with Compete Caribbean to digitalize processes for construction permits in Antigua and Barbuda and these stakeholders will be registered on an online platform.	Baseline + 20%	Baseline + 40%	Training and awareness programs lead to lasting retention of knowledge.

[83] Baseline Survey to be conducted in project Year 1, and reported in first APR

	% reduction of incremental cost for climate interventions as a result of lessons learnt and interventions implemented	SIRF Fund evaluation reports	Average baseline incremental costs of climate interventions is USD$130 SIRF Fund has a mechanism for private access to financial resources for the incremental cost of adaptation to climate change.[84] The incremental cost is very high and can exceed ability to pay.	10% reduction	20% reduction	Lessons learned will allow the Fund to calculate the incremental cost of building adaptations used in small businesses.
3. Climate information services strengthened to facilitate early action within the building sector to respond to extreme climate events. [This output links to GCF Outcome A.6.]	*Change in response times of critical service providers and NODS to alerts and warnings received*	Rate of response drills Drill reports	TBD[85] The Antigua and Barbuda Meteorological Service (ABMS) issues four main bulletins at least every 6 hours between 5 am-11pm. Intermediate Bulletins are produced at times every hour between main bulletins based on the severity of the situation. Bulletins increase based on if the hazard draws closer.	30 minute reduction of NODS response time to bulletins, alerts and warnings	1 hour reduction of NODS response time to bulletins, alerts and warnings	First responders and decision-makers will be the main users of the data; The private sector will be allowed access to the data as well. There is sufficient demand for community level uptake and use of early warning information products among national-level decision-makers, the private sector and the entities responsible for the coordination of disaster response,

[84] There is a limit associated with this mechanism controlling the total amount of financial resources that may be accessed by public and private enterprises.

[85] Baseline drills to be conducted in project year 1 and baseline reported with confirmed frequency of drills in the first APR.

			NODS takes at least 2 hours to start taking action after they receive bulletins from met services.			including ABMS and NODS
	% of early response protocols actioned through the formal communication protocols	Rate of response drills Drill reports; NODS annual Disaster Management Plan	TBD[86]	Baseline + 30%	100%	First responders have access to early response protocols and understand the threat levels.

[86] Baseline drills to be conducted in project year 1 and baseline reported with confirmed frequency of drills in the first APR.

E.6. Activities

Activity	Description	Sub-activities	Deliverables
1.1. Implement climate-proofing measures on critical infrastructure.	Activity 1.1 will ensure that critical public services remain functional during and directly after a Cat 5 hurricane. Targeted infrastructure will include hospitals/clinics, police and fire stations, storm shelters, relevant government buildings and schools. A comprehensive list of target buildings is provided in Section 10 of Annex 2: Feasibility Study. Adaptation measures will include actions to protect the buildings during a storm (structural alterations), as well as operations after a storm by ensuring a continuous supply of power and water. Specifically, the actions will include water harvesting and structural upgrades to windows, doors and roofs.	1.1.1. Develop site-specific engineering designs for climate proofing 52 priority buildings. 1.1.2. Install climate proofing measures on 52 priority buildings based on engineering designs developed in Sub-activity 1.1.1. 1.1.3. Develop site-specific operational procedures for long-term maintenance of climate-proofing interventions for each priority building and integrate these procedures into the project O&M Framework. 1.1.4. Design climate-resilient renewable energy solutions for priority buildings taking into consideration energy efficiency (EE) and indoor air quality for those buildings that have heating, ventilation and air conditioning (HVAC) systems. 1.1.5. Install EE and RE solutions at priority buildings. 1.1.6. Design water harvesting solutions for priority buildings as well as stormwater drainage solutions for buildings in flood risk areas. 1.1.7. Install water harvesting solutions for priority buildings as well as stormwater drainage solutions for buildings in flood risk areas.	• Site-specific engineering designs for climate-proofing 52 priority buildings to withstand the impacts of Category 5 hurricanes • 52 priority buildings retrofitted with climate-adaptive measures • Operation and maintenance guidelines developed and integrated into existing O&M plans for 54 priority buildings • Site-specific engineering designs for climate-resilient RE solutions for 34 priority buildings that provide power for 24 – 48 hrs before needing to be recharged • 53 priority buildings have EE solutions installed. • Climate-resilient water harvesting solutions installed in 51 priority buildings • Restocking protocol • Stormwater drainage solutions installed at 14 project sites
1.2. Construct climate-resilient storm shelters attached to public clinics.	To facilitate the transition away from using schools as storm shelters (a recommendation of the ESS and gender assessment), the project will commission five purpose-built storm shelters attached to public clinics. This will not only reduce downtime for schools after	1.2.1. Develop detailed, site-specific construction plans for hurricane shelters at five public clinics.	• Five custom-built hurricane shelters with decentralised water and renewable energy supplies.

	being used as shelters but will also improve the healthcare response as medical facilities will be readily accessible to users of the shelters during a storm event.	1.2.2. Construct hurricane shelters based on the designs developed under Sub-activity 1.2.1. 1.2.3. Equip hurricane shelters with renewable energy and climate-resilient water harvesting systems. 1.2.4. Develop emergency protocols for each shelter according to national guidelines.	• Emergency protocols for each shelter
1.3. Construct a climate-resilient bunker to store emergency supplies for the health, energy, building and welfare sectors.	After an extreme event, emergency supplies are rapidly required to return the country to normalcy. These supplies include equipment required for the generation of renewable energy, building materials, food and medicine. The project will therefore construct a purpose built bunker of ~749 m^2 (8,050 sq. ft.) to store supplies needed immediately after a storm.	1.3.1. Complete a detailed design and construction plan for the bunker. 1.3.2. Construct the bunker based on the design in Sub-activity 1.3.1. 1.3.3. Develop an operational protocol for the stock and distribution management of emergency supplies that will be stored within the bunker. 1.3.4. Develop a battery recharge and replacement protocol for critical services.	• One climate-resilient bunker • One operational protocol
1.4. Implement measures to preserve vital information/data within public institutions.	Extreme climate events cause long-lasting disruptions to power supplies in Antigua and Barbuda, as well as physical damage to computer servers that store vital medical and security information from hospitals, police stations and other critical sectors. As a result, it is essential for vital information and data housed within public institutions to be protected and backed up to ensure that no losses are experienced during a storm. Under this activity, protocols will be developed for effective and efficient data back-up procedures before a storm and IT teams within each public institution will be trained on the application of these protocols. Each targeted institution will be responsible for the delivery of this training to relevant staff. Additionally, physical protection measures will be designed and implemented on the relevant public buildings to reduce the risk of critical IT infrastructure being damaged by an extreme event.	1.4.1. Develop backup protocols for critical information. 1.4.2. Train IT teams on the implementation of backup protocols. 1.4.3. Design physical protection measures for critical IT infrastructure. 1.4.4. Implement physical protection measures for critical IT infrastructure.	• Backup protocols. • Training modules developed. • Training workshops • Site-specific engineering designs for the physical protection of critical IT systems
2.1. Mainstream climate change adaptation into the	To promote the uptake of climate-resilient development across Antigua and Barbuda,	2.1.1. Draft regulations for the Physical Planning Act (2003) that	• Regulations for the Physical Planning Act (2003)

building sector by making provision for the building code in the Physical Planning Act (2003) and updating the EMS plans.	climate change adaptation standards will be mainstreamed into the country's building sector. This will be achieved through three primary measures. Firstly, regulations for the Physical Planning Act (2003) will be drafted to make provisions for the inclusion of the updated building code in the national regulatory framework. Secondly, a Strategic Impact Assessment (SIA) of the building code regulations will be conducted to assess the environmental and social safeguards and gender risks, consequences and mitigation measures related to the enactment of these regulations in the Physical Planning Act (2003). This SIA will ensure that the building code is accompanied by other policies and measures to safeguard the most vulnerable groups in the country — particularly those with low incomes that have reached their borrowing capacity, the elderly (retired) and those people who have disabilities — so that they are able to meet the requirements of the new code. Finally, recommendations will be made for the EMS Plans to be updated to include climate-resilient measures for the building sector.	makes provision for the Building Code for submission to and enactment by parliament. 2.1.2. Conduct Strategic Impact Assessment (SIA) of the building code regulations to assess the environmental and social safeguards and gender risks, consequences and mitigation measures related to the enactment of these regulations. 2.1.3. Make recommendations for the EMS Plans to be updated to include climate change adaptation measures for the building sector. 2.1.4. Conduct annual meetings with participation from relevant stakeholders to collate and share lessons learned from implementing the EMS plans and ensure that these plans are updated regularly where necessary.	• Strategic Impact Assessment (SIA) • Recommendations report for updating the EMS Plans • Annual stakeholder meetings
2.2. Mainstream climate change adaptation for the building sector into public and private financial, insurance and banking sectors.	Activity 2.2. will complement the SCCF and GCF EDA projects to maximise the effectiveness of scaling up of financing for adaptation in the building sector. This will be achieved by mainstreaming lessons learned from these projects into the financial sector and related mechanisms. The first of these will be the SIRF Fund's adaptation window. Stakeholders will be engaged to identify additional entry points for accessing climate finance through the SIRF fund for investments. Specifically, this will be for building the resilience of small businesses that are important to the functioning of local communities. This sector is currently not being funded under the SIRF Fund.	2.2.1. Consult with representatives from the public and private sectors to identify entry points for accessing government financial support to reduce the barrier of high cost of Cat 4 and 5 construction as well as to partner with the SIRF fund to track current activities being undertaken by the fund to pilot incentive programmes, insurance/risk Mitigation products, and opportunities for fund raising. 2.2.2. Refine the SIRF Fund's list of adaptation options using an evidence-based approach that draws lessons learned from the SCCF, EDA projects, as well as lessons learnt the implementation of adaptation interventions under Activity 1.1 of this project. 2.2.3. Train decision-makers from NODS, DCA and PWD on how to (a) assess, calculate and report on the incremental cost of adaptation in public sector projects for the purposes of tracking the implementation of Article 2.1c of	• Evaluation report on funding processes and procedures for climate proofing infrastructure • Updated SIRF Fund guidelines • Training workshops • Lessons learned report • Private sector climate finance options analysis report

		the Paris agreement (b) implement the new building codes and regulations to assess planning applications (c) to provided trained technical assistance to the SIRF Fund in the evaluation of private sector applications for loans and grants. 2.2.4. Collate and share lessons learned from SIRF Fund application & funding process, with the rest of the Private Financial sector and the Government's newly formed Resilience and Development Fund (2020) .	
2.3. Train relevant staff from the National Office of Disaster Services (NODS), Development Control Authority (DCA) and the Public Works Department (PWD) as well as the private sector on operational procedures for long-term monitoring, maintenance and upscaling of climate-resilient renewable energy (RE) and water harvesting technologies in accordance with the national building code.	Training will be provided for relevant staff from NODS, building inspectors from DCA and building maintenance teams from MoW on operational procedures for long-term monitoring, maintenance and upscaling of climate change adaptation interventions in the public and private sectors that will be implemented under Output 1. Training programmes will be developed for public and private sector representatives — including staff from the Ministry of Works (MoW) and Development Control Authority (DCA), as well as building inspectors, engineers, architects and draughtsmen — with the assistance of partner organisations such as the Antigua and Barbuda Institute for Continuing Education (ABICE). This training will focus on how to apply the new building code.	2.3.1. Train building inspectors from DCA, building maintenance teams from PWD as well as technical staff from NODS and other relevant institutions on the implementation of the operational procedures for the long-term maintenance of climate-proofing interventions in the target buildings, based on building-specific O&M plans and updated national building code. 2.3.2. Design and implement a long-term monitoring framework for building-specific climate-proofing measures – including cost-benefit analyses – to demonstrate the long-term adaptation benefits. 2.3.3. Partner with local training institutions such as ABICE to develop training programmes for relevant technical staff from MoW and DCA; building inspectors, engineers, architects and draughtsmen; and the private sector on best practices for implementing, monitoring and maintaining climate change adaptation technologies, including climate-resilient RE and water harvesting solutions, and how to apply the updated national building code during the installation of these technologies. 2.3.4. Design and conduct a gender-sensitive awareness campaign targeting the public and	• Stakeholder consultations • Training workshops • Awareness campaigns • Installation of relevant software and equipment to monitor buildings • Stakeholder workshops with Ministers, Heads of Departments etc. • Monitoring and Evaluation operational guidelines for buildings • Sign MoUs between DoE and training institutions such as ABICE to formalise partnerships for developing and delivering training on climate change adaptation • Training workshops • Awareness raising campaigns

		private sectors on the updated building code, the benefits of taking up climate-adaptive solutions within the building sector as well as the availability of certified climate change courses. 2.3.5. Develop and implement a gender-sensitive awareness-raising campaign within the government system on the availability of the courses developed under Sub-activity 2.3.3.	
2.4. Train the local workforce on the installation, operation and maintenance of climate-proofing measures for the targeted buildings.	The local workforce in both the private and public sectors will be trained on how to support the installation, operation and maintenance of the climate change adaptation solutions that will be installed in targeted buildings under Activity 1.1. To facilitate this training, suitable training institutions in the country, such as ABICE, will be engaged to develop and deliver a certified training programme that focusses on: i) installing, operating and maintaining climate-proofing measures for the building sector; and ii) implementing early action protocols (developed under Output 1) preceding an extreme climate event. The training course that will be developed under this activity will apply regional and international best practices for climate change adaptation measures in the building sector. Furthermore, the course will align with the national building code to ensure that there is uptake of building standards and procedures that account for Category 4 and 5 hurricanes.	2.4.1. Engage with suitable training institutions such as ABICE to develop and deliver a training programme that targets the local workforce on how to install, operate and maintain climate change adaptation technologies in the building sector as well as implement early action protocols. 2.4.2. Develop training modules in line with regional and international occupational standards for climate change adaptation in the building sector. 2.4.3. Deliver training modules developed under Sub-activity 2.4.2. 2.4.4. Design and conduct an awareness building campaign on the opportunity for training on the installation, operation and maintenance of climate change adaptation technologies in the building sector, with the support of training institutions.	• Engagement workshops • MoUs signed between DoE and relevant training institutions such as ABICE • Training modules • Training programme • Training workshops • Awareness raising campaigns
3.1. Climate information services strengthened to facilitate early action for extreme climate events.	Under this project activity, a centralised online server will be established and housed within Antigua and Barbuda Meteorological Services (ABMS) to overcome the current barrier of an insufficient climate data processing system. This online server will enhance the real-time processing of climate data to ensure that climate threats are detected in advance and facilitate impact-based forecasting.	3.1.1. Establish a centralised online server to enhance real-time processing of climate data. 3.1.2. Increase the technical capacity of staff within ABMS to collect, process and manage climate data in real time. 3.1.3. Conduct a knowledge exchange trip to the nearest	• Centralised online server established • Communication protocol developed and operationalised • Knowledge exchange trip • Training workshops

		Regional Climate Centre, which is under the auspices of the World Meteorological Organisation (WMO), to strengthen the technical and institutional capacity within ABMS for impact-based forecasting. 3.1.4. Increase the technical and institutional capacity of AMBS to develop early warning information products, including infographics that are locally appropriate and easily interpreted by vulnerable communities.	
3.2. Establish a formalised communication protocol to facilitate rapid information sharing and early action preceding an extreme climate event.	A formal communication protocol will be developed and operationalised under Activity 3.2 to support the generation of early warning information products and impact-based forecasts (Activity 3.1). This will be done to facilitate effective communication of impact-based forecasts from ABMS to decision-makers within the relevant government entities responsible for preparation ahead of an extreme climate event.	3.2.1. Design and operationalise a formal communication protocol to facilitate effective communication of impact-based forecasts from ABMS to decision-makers within relevant government entities responsible for preparation ahead of an extreme climate event. 3.2.2 Design and implement early action protocols for critical public service and community buildings with variable responses dependent on the anticipated intensity of the incoming storm. 3.2.3. Train public and private sector actors on the application of the early action protocols designed and developed under Sub-activity 3.2.2. 3.2.4. Improve the capacity of ABMS to disseminate early warning information products to critical service providers as well as the private sector to facilitate early action.	• Standardised protocol • Training modules • Stakeholder workshops • MoUs or other partnership agreement signed • Coordination mechanism developed

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

The Project Manager, under the oversight of Antigua and Barbuda Department of Environment (DoE), will be responsible for monitoring the progress of all project activities against the outcome-based indicators during project implementation. This monitoring of all project interventions will be undertaken on an annual basis. A Monitoring and Evaluation (M&E) Plan detailing the type of specific monitoring activities to be conducted during implementation, as well as the responsible parties for undertaking activities, is presented in Annex 11. Such activities include field observations, key informant interviews and focus group sessions. Reporting on the M&E of project interventions will be conducted by Project Manager and CTA.

During the implementation phase, specific means of verification will be used to assess the: i) progress of project interventions towards achieving GCF Fund-level impacts, Fund-level outcomes; and ii) performance of interventions against the project performance indicators presented in Section E.5 of the Funding Proposal. The salaries of the relevant project management staff that will perform M&E activities will cover the work required for the necessary assessments, interviews and field assessments required to inform project evaluations. The M&E costs, as well as the salaries of the project management staff are presented in Annex 4: Detailed budget.

For on-the-ground monitoring of project interventions, a part-time Monitoring and Gender Officer will be employed to conduct and coordinate the monitoring and evaluation (M&E) of the project and ensure that gender targets are met. The Monitoring and Gender Officer will design and operationalise a performance monitoring framework to track the project's progress towards achieving its targets. This will be achieved by: i) measuring the performance against the project indicators (Sections E.3–5) to evaluate the progress of the project; ii) reporting the project's performance to the Project Steering Committee (PSC) and Project Management Unit (PMU); and iii) providing technical support to the Project Manager (PM). Additionally, the Monitoring and Gender Officer will be responsible for overseeing and monitoring the application of gender-disaggregated indicators [87]. At particular milestones (i.e. baseline, annual performance reports, mid-term and end of project), the project team will carry out evidence-gathering exercises to verify this progress. These internal reports will be validated by two independent evaluations at the mid-term and end of the project implementation, as described below.

DoE will be responsible for managing the Independent Interim Evaluation and the Final Evaluation Report of the project and will oversee the process of contracting these positions. For the Interim Evaluation Report, an independent consultant will be contracted to provide an assessment of project performance against its targets at the project's mid-point (end of Year 3). This will be an outcomes-based assessment and will include analysing whether the project is on track, what problems and challenges the project is encountering, and what corrective actions are required, so that the project can achieve its intended outcomes by project completion in the most efficient and sustainable way. The PSC will participate in the Independent Interim Evaluation and develop a management response to the evaluation recommendations along with an implementation plan. It is the responsibility of DoE to monitor whether the agreed recommendations are being implemented during the remainder of the project's operational life.

An independent consultant will be contracted by DoE to conduct the Final Evaluation Report at the end of project implementation. DoE will be responsible for overseeing the Final Evaluation Report, which is a summative evaluation. This evaluation will include an independent assessment of the project's overall performance against standard evaluation criteria (e.g. strategic relevance, effectiveness, efficiency, likelihood of impact and sustainability) as well as against the project indicators presented in the Logical Framework. This evaluation will be based on *inter alia* documentaries of evidence, field observation visits and key informant interviews.

The draft Final Evaluation Report will be sent to project stakeholders during a commenting process managed by DoE. Formal comments on the report will be shared by DoE in an open and transparent manner. This evaluation report will be publicly disclosed and will be followed by a recommendation on compliance processes.

The costs for results monitoring and performance evaluation are included in the project budget (Annex 4).

[87] The project's gender targets as well as the associated gender-disaggregated indicators are presented in Annex 8: Gender Assessment and Action Plan.

Risk Management

The AE, supported by the project management unit (PMU) and specifically the Project Manager, will be responsible for managing all environmental and social risks, as well as those risks related to project implementation and management. Processes and procedures for this risk management are presented in Annex 25: Project Implementation Manual. The audit plan for the project will also include a detailed assessment of identified risks to track assumptions during the implementation period. Potential project risks that may arise during implementation will be monitored by the AE and EE and escalated to the PMU in accordance with the project risk register where necessary. The PMU will then be responsible for implementing the appropriate risk mitigation measures during project implementation. Further details on risk screening, management and mitigation during project implementation are presented in Annex 6: ESIAMP, with specific details on the AE's protocols for managing risk presented in Annex 25: Project Implementation Manual.

RISK ASSESSMENT AND MANAGEMENT

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

For probability: High has significant probability, Medium has moderate probability, Low has negligible probability

For impact: High has significant impact, Medium has moderate impact, Low has negligible impact

Prohibited practices include abuse, conflict of interest, corruption, retaliation against whistle-blowers or witnesses, as well as fraudulent, coercive, collusive, and obstructive practices

Selected Risk Factor 1

Category	Probability	Impact
Governance	Low	Medium

Description

Limited collaboration and coordination between project stakeholders, including relevant government departments, ministries and the private sector will reduce the timely delivery and effectiveness of the project.

Mitigation Measure(s)

- Extensive stakeholder consultations were undertaken throughout the project development to secure buy-in from the relevant project partners and ensure coordination of project interventions. Moreover, a stakeholder engagement plan has been developed and included in Section 10 of Annex 6: Environmental and Social Impact Assessment and Management Plan (ESIAMP), as well as in Annex 7, and the Gender Assessment and Gender Action Plan to ensure that all project stakeholders are involved in the implementation of project interventions.
- The PMU will be responsible for ensuring coordination between all relevant project stakeholders during the implementation phase. In particular, a full-time Project Coordinator will be contracted competitively under the project to support the PM in the implementation of project activities. The PC's primary responsibilities will be to serve as a focal point for facilitating all stakeholder engagements that will be undertaken during the project implementation phase.

Selected Risk Factor 2

Category	Probability	Impact
Technical and operational	Low	Medium

Description

Bulk importing of timber may compete unfairly and impact negatively impacts the private sector that rely on sale of these materials for their livelihoods.

Mitigation Measure(s)

- To reduce the impact of timber imports on local suppliers in Antigua and Barbuda, a protocol will be developed for managing the timber stock that is not used at the end of each hurricane season (Activity 1.3). This protocol will include provisions for the resale of timber to local suppliers at bulk discount rates. The government will make the initial purchase of these supplies ahead of the storm season, which will reduce costs of individual suppliers importing timber in small batches. As a result, local timber suppliers in the country will be able to maintain their businesses and will not be negatively impacted by a change in market conditions that could disrupt their livelihoods.

Selected Risk Factor 3

Category	Probability	Impact
Technical and operational	High	Medium
Description		
Renewable energy systems may not have the storage capacity to provide power to critical buildings for the duration of a storm when solar panels have been removed.		
Mitigation Measure(s)		
• Additional batteries will be stored in the climate-proof bunker that can be used to rotate supply during and after an extreme climate event. A protocol will be developed for keeping spare batteries fully charged throughout the hurricane season and for recharging batteries as they are cycled out during and after a storm. Priority will also be given to restoring power to the bunker after a storm to facilitate the recharging process.		
Selected Risk Factor 4		
Category	Probability	Impact
Technical and operational	High	High
Description		
Extreme climate events, such as hurricanes and tropical storms may disrupt project implementation.		
Mitigation Measure(s)		
Based on current Climate change projects it is almost certain that a hurricane will occur during project implementation. Adaptation solutions will include: • (a) construct the Hurricane Warehouse (Activity 1.3) very early in the project implement so that materials needed for the project are stored in the warehouse and protected in the event of a hurricane. • (b) Purchase Construction insurance throughout the life of the project; (c) Limit critical construction outside of the hurricane season; (d) After a Hurricane the country will be concentrating on clean up and recovery, the project will have to be slowed down after these events to allow for these vital activities. (e) All project contracts including the FAA as should note this and have a flexible time for project extension due to force majeure clause		
Selected Risk Factor 5		
Category	Probability	Impact
Technical and operational	Medium	High
Description		
Delays in the installation of climate proofing measures and construction of the bunker and shelter extensions (entire outcome 1). could result in increased costs. Such delays could occur because of delays in materials being shipped to the island, and the shipment, limited construction workers, workers strikes and Contract disputes. Further delays can occur in the construction of the buildings since some buildings cannot close; work will therefore have to continue while the upgrades are taking place. This is particularly important for the upgrades of the clinics and critical government buildings.		
Mitigation Measure(s)		

- The implementation plan (Annex 5) has been designed to include a buffer for potential delays in construction activities.
- A full-time Project Manager, in additional to the project coordinator, will be contracted to be dedicate to the management of project risks and to work with the relevant government agencies to ensure that risks are carefully anticipated and addressed early. Further details on the implementation arrangements for the project are presented in Section B.4 of the Funding Proposal.
- Workers will have to upgrade some buildings on the weekends. Labour laws require that they get additional compensation;
- The Project will use the Ministry of Works (MOW) as a service provider to ensure access to stable work force. This allows the government to guarantee its co-financing and there is provision to pay overtime on the weekends;
- The Clinics will be construction no more than one per year since they have to be closed the entire time of construction;
- Schools will have to be address during the summer or Christmas holidays. The summer holidays is also the Hurricane season;
- detailed construction contingency plans will have to be devised for each building in advance of contracting and construction;

Selected Risk Factor 6

Category	Probability	Impact
Technical and operational	Medium	Medium

Description

Limited technical capacity of relevant government authorities, contractors and the private sector will lead to the insufficient implementation, monitoring and maintenance of climate proofing measures.

Mitigation Measure(s)

- Relevant technical staff from the DCA, NODS and Public Works Department (PWD), as well as contractors and engineers, will be trained on how to design and implement climate proofing measures effectively (Activity 2.3).
- The local workforce will be trained under Activity 2.4 on the installation, operation and maintenance of climate proofing measures for the targeted buildings. Furthermore, training modules will be developed in line with regional and international occupational standards for climate change adaptation in the building sector. These modules will be presented to relevant public and private sector representatives.
- The project provides budget for external expertise to design programs for local staff;
- The MOW will be a service provider to the project as a way to reduce several risks. The project will also have contracts with private sector who will be working with their MOW counterparts which will allow for an exchange of expertise. This approach is being used on the current roads project being executed by the MOW along with a loan from the Caribbean Development Bank (CDB) and a private contractor. The team at the MOW has been learning how to build resilient roads. This approach with respect to this project will increase impact of outcomes particular those related to training as well as reduce risks.

Selected Risk Factor 7

Category	Probability	Impact
Technical and operational	Low	Medium

Description

Turnover in key government staff could result in protocols developed during the project (e.g. those that will be developed under Activities 1.3 and 1.4) not being followed correctly in the case of future extreme climate events such as a hurricanes or tropical storms.

Mitigation Measure(s)
• Although the probability of staff turnover adversely affecting the implementation of project interventions is low, regular stakeholder consultations will be held with all project partners involved in the implementation of project activities to ensure that institutional capacity built under the project is retained beyond project closure. Clearly defined arrangements for stakeholder engagements are presented in Annex 7: Stakeholder engagement plan, as well as in Annex 6: ESIAMP. • The bunker will be managed by a ministerial sub-committee for disaster preparedness who will be responsible for coordinating efforts between relevant stakeholders to ensure that the institutional knowledge around the application of the protocols developed under Activity 1.3 is retained amongst project partners.

Selected Risk Factor 8

Category	Probability	Impact
Other	High	Medium

Description
Project activities, specifically those related to construction, could exceed budgeted costs.

Mitigation Measure(s)
• A contingency fee has been built into Annex 4: Detailed budget to ensure that higher-than-expected construction costs do not have any lasting adverse effects on construction activities to be implemented under the project. • The Government is committed to maintain its labour force and therefore the project will utilize the Government's MOW as a service provider to provide in kind labour to the project.

Selected Risk Factor 9

Category	Probability	Impact
Technical and operational	Medium	Medium

Description
There may be limited uptake of climate change adaptation measures in future development planning and construction.

Mitigation Measure(s)
• Training will be provided to the relevant project stakeholders (Activity 2.3) on the application of the updated building codes that include climate change considerations in future development. • Under Activity 2.2, climate change adaptation for the building sector will be mainstreamed into public and private financial, insurance and banking sectors. • Building Codes that were updated as part of the SCCF project will be mainstreamed into national regulations under the proposed project. • With hurricane intensity increasing, Banks and Insurance are requiring their clients to build to Code as a condition of funding. The Banks normally sends their own engineers to check the progress of construction to ensure that the building is built to code. • With hurricane intensity Homeowners are anxious to ensure their homes are safe and they do not have to go to a shelter. There is a high motivation therefore for homeowners to build to code. • Project outcomes can provide advice on how to reduce the high cost construction to Code so it is expected that cost reduction measures will increase uptake;

Selected Risk Factor 10

Category	Probability	Impact
Other	Low	Medium
Description		
The private sector may not take up the proposed adaptation solutions in future private sector development.		
Mitigation Measure(s)		
• Gender-sensitive awareness raising campaigns targeting the private sector will be conducted under Sub-activity 2.3.5. These campaigns will promote the benefits of installing climate proofing measures on infrastructure in Antigua and Barbuda. Such benefits include reduced damages to infrastructure and reduced economic losses as critical services will become operational more rapidly following extreme climate events. • Segments of the private sector will also have increased access to financial resources through the SIRF Fund to finance the incremental costs of the implementation of adaptation interventions (Activity 2.2).		
Mitigation Measure(s)		
• A Gender Action Plan (Annex 8) has been developed that details how gender considerations will be included in the implementation of each project activity. A portion of the project budget has been allocated to ensure that activities are conducted in a gender-sensitive manner. •		

F. GCF POLICIES AND STANDARDS

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

The environmental and social risk associated with the project was evaluated in accordance with GCF's Environmental and Social Safeguards (ESS) as well as the environmental, social and economic policies of Antigua and Barbuda's Department of Environment (DoE), which is the Direct Access Entity (DAE). The DoE has assessed the risk category of the proposed project to be a Category B Risk. This categorisation is supported by the comprehensive Environmental and Social Impact Assessment and Management Plan (ESIAMP)[88] developed by the DoE specifically for the purpose of the project. The assessment and management plan comply with both GCF and DoE standards by: i) defining the context and baseline in which the interventions will be implemented; ii) identifying all negative and positive impacts associated with the proposed project interventions; and iii) providing a management plan to describe how any adverse impacts identified during risk screening will be accounted for and / or mitigated throughout the project implementation period. The primary environmental and social risks that may arise as a result of project interventions — as identified by the ESIAMP— are presented below.

Overall, the environmental, social and gender risks assessed to be present under this project are minor and associated with activities under Output 1, whereby climate-proofing interventions will be implemented in critical public sector service and community buildings. While the project is expected to result in significant net-positive benefits in the long term — specifically with regards to the provision of healthcare, emergency response and other critical public sector services during the aftermath of increasingly severe hurricanes — retrofitting of public sector buildings may cause temporary closures, which will restrict access to services for the population of Antigua and Barbuda.

Environmental impacts

All potential environmental impacts associated with the project are linked with the construction or renovation of public infrastructure and include the generation and subsequent disposal of waste from demolition processes and construction activities as well as concerns regarding the sourcing of materials. Because the majority of construction will focus on in-situ upgrading of facilities — as opposed to the breaking of new ground — many of the potential environmental impacts that are normally associated with construction activities are not applicable. Additionally, because the required construction activities are relatively small in scale, require limited landscaping and will be implemented within urban or

[88] The ESIAMP is included as Annex 6 in the Funding Proposal submission package.

peri-urban vicinities, impacts on biodiversity, critical ecosystems and soils are assessed to be minor and limited in scale. Further information on proposed actions to reduce, manage or mitigate potential negative environmental impacts — where required — are detailed in Annex 6: ESIAMP.

Social impacts

As previously stated, the main social impacts associated with the project are temporary restrictions on access to public sector buildings and services. Where services provided by these buildings are critical — such as hospitals and police stations — construction activities will be implemented in a phased approach to ensure that limited services can still be provided during construction. Additionally, advance notice of closure will be provided to communities and other similar facilities to prepare for an increase in the average number of patrons. There are also several minor social risks that have been identified by the ESIAMP and are associated with construction activities. These include labour practices, construction site safety and social disruptions adjacent to construction sites. These additional minor impacts are all temporary in nature and can be mitigated through regular monitoring and management. Because the project prioritises the provision of services to the most vulnerable people, including women, children, the elderly and people living with HIV or mental disabilities no long-term social impacts are associated with the project. Further information on potential social impacts and associated management strategies are detailed in Annex 6: ESIAMP.

Grievance Redress Mechanism

The established DoE Complaints Mechanism (CM) will be used as the project level Grievance Redress Mechanism (GRM). This mechanism has been previously approved by the GCF. It provides three approaches to lodging complaints[89] with the DoE Complaints Officer. Complaints are presented to the Ethics committee as an independent body, whereby a series of actions are taken until the complaint is resolved. The CM will be used at all stages of the project and will provide an accessible, rapid, fair and effective response to concerned stakeholders, especially any vulnerable groups who may lack access to formal legal systems or support. Further information on the redressal process is provided in Annex 6: ESIAMP.

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

In general, there are no known institutional and legal bias against men or women in Antigua and Barbuda. Even though this is the case and due to the lack of gender disaggregated data however many of the internationally known biases against women are many times included in project design. To ensure the project is truly gender responsive to the local context, during project preparation, a gender assessment was conducted to understand the differential vulnerability to, and impact of, climate change on women and men in Antigua and Barbuda. From the findings of this assessment, and an analysis of the proposed project solution, a gender action plan (GAP) was developed. The process to produce these components included a desktop review of available literature and an analysis of relevant legislation, policy and programmes in the country, as well as interviews and consultations with project and beneficiary stakeholders. These direct stakeholders' assessments span the years 2016 – 2020 and interestingly the gender perspective noticeably change after the Country experienced its first Cat 5 in 2017. After the hurricane there is more acceptance of the impacts of climate change and the need to become more resilient.

The project seeks to build resilience in buildings that project a range of social services. These are education, Health, Security, Social services and operations. Some buildings provide services that can be easily differentiate the impacts by gender. For example, general observations of project activities are:

- project outcomes, for Her Majesty's Prison, the Fiennes Institute and the Clarevue Psychiatric Hospitals[90] hold predominantly male inhabitants, so interventions to increase the resilience of these sites will benefit mainly men.
- Women mainly benefit from the resilience strategies in health, educational and security services. Since mainly women work in these service sectors (except security) construction will mainly disrupt women working in these buildings;
- Training components of the project will mainly target the men in the construction sectors which represent over the 95% of the workers

[89] These approaches include electronic reporting by email, reporting in person or submission of a hard-copy written complaint to the Complaints Officer at the DoE.

[90] 2013 data shows that men consisted 77% of in-patients at Clarevue facilities whilst women represented 55% of out-patients (55%), although the former category would be more highly affected by disruption of services following a hurricane, given the extent of their treatment/accommodation.

- Overall women will be most disrupted by construction conducted under the project in the short-term, they also stand to gain from interventions to build the resilience of buildings in certain sectors.

The GAP seeks to promote gender equality by including activities which will increase women's representation and awareness, as well as ensuring that training programmes are gender-sensitive and -inclusive of the predominately male population. It includes clear targets, gender-sensitive design features and quantifiable performance indicators to promote ensure gender equal benefits from the project.

The actions of the GAP include the following:

- Courses in construction were made available a few years ago to women. The first graduates are expected over the next few years; the project will establish an apprentice program for these women newly coming into the field;
- The transition of the current workforce means the training of predominantly men. The project notes the difference in learning between men and women and girls and boys and seeks to provide gender sensitive training;
- Most of government building do not have access for persons with special needs, while the project acknowledges this, the budget is not adequate to make significant changes.
- The impacts of climate change in the infrastructure sector, mainly impact on persons based on income levels rather than gender. In general persons with disabilities, and older persons are most vulnerable;

Implementation arrangements of the project also include procuring a full time Monitoring and Gender Officer at annually hosted within the project management unit that will provide technical advice and oversight for project delivery as well as an Apprenticeship program for supporting the participation of person 16 – 24 in construction activities of the project;

The full Gender Assessment and project-level Gender Action Plan are included as Annex 8.

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

The Department of Environment (DoE) has expertise in working with donor funds and has a track record in implementing 27 projects in 4 program areas. The DOE is accredited to the adaptation Fund as well as the GCF and for this project, the DoE will be responsible for fiduciary aspects and will be accountable for all financial activities. The financial management and procurement within the project will be guided by procedures and policies of the DOE, which meets the requirements of multilateral and bilateral agreements. The Ministry of Finance (MoF), who will serve as Executing Entity, is a GoAB authority and as such follows the government's financial and procurement rules and standards. The DOE will therefore manage the funds while the EE implements the activities of the project.

International accounting and financial reporting standards will be applied to all aspects of the project. The DoE follows standard accounting procedures for auditing project expenditure and assumes overall responsibility for financial management of the project, ensuring that funds are used efficiently to support the funded activities. A qualified, internationally recognized auditing firm, competitively selected by the AE, will audit the project in compliance with International Standards on Auditing, and will submit all project-related accounts to the GCF on an annual basis. The audits are documented by a signed audit report.

Procurement

The DoE's Procurement Policy is in accordance with the GCF standards and national laws. The policy facilitates procurement within a standardized framework. These are procedures for which the DoE was accredited to the GCF in 2017. The tables below describe the thresholds in the DOE Procurement Policy for purchasing of goods, works and non-consulting services (Table 11), and for consulting services (Table 12).

Table 11. Thresholds in the DOE Procurement Policy – Purchases (Goods, Works and non-Consulting Services).

Cost Threshold (EC$)	Method of Procurement	Approval Authority
Less than $10,000	Price verification – non-competitive – Shopping	Director
$54,338 (or US$20,000) or below	Competitive – RFQ - 3 Quotations	Director (Final Approval) Project Coordinator (initial approval of the requisition)

Over $54,338 (or US$20,000) to $1,358,450 (or US$500,000)	Competitive – ITB	Director (final approval with endorsement from the PMC) Project Coordinator (initial approval of requisition)
Over $1,358,450 (or US$500,000)	Competitive – ITB	Minister of Finance (final approval) Director (initial approval of requisition with endorsement from PMC)

Table 12. Thresholds in the DOE Procurement Policy – Purchases (Consulting Services).

Cost Threshold (EC$)	Method of Procurement	Approval Authority
$54,338 (US$20,000) or below	Competitive – RFP 3 Bids/Proposals	Director (final approval) Project Coordinator (initial approval of requisition)
Over $54,338 (US$20,000) to $1,358,450 (US$500,000)	Competitive – RFP	Director (final approval with endorsement from the PMC) Project Coordinator (initial approval of requisition)
Over $1,358,450 (US$500,000)	Competitive - RFP	Minister of Finance (final approval) Director (initial approval of requisition with endorsement from PMC requisition)

The project's procurement plan is included in the Annex 10.

Oversight

The Department of Environment will ensure: i) the substantive quality of the project implementation and compliance with procurement guidelines; ii) the effective use of resources including value for money; iii) the availability of national contributions to support project implementation; and iv) the proper coordination among all project stakeholders.

G.4. Disclosure of funding proposal

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

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

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

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

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

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

G. ANNEXES

H.1. Mandatory annexes

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

H.2. Other annexes as applicable

☐	Annex 15	Evidence of internal approval **(template provided)**
☒	Annex 16	Map(s) indicating the location of proposed interventions
☐	Annex 17	N/A (Multi-country project/programme information)
☐	Annex 18	N/A (Appraisal, due diligence or evaluation report for proposals based on up-scaling or replicating a pilot project)
☐	Annex 19	Procedures for controlling procurement by third parties or executing entities undertaking projects financed by the entity
☐	Annex 20	First level AML/CFT (KYC) assessment
☒	Annex 21	Operations manual (Operations and maintenance)

☒	Annex 22	Building Assessment
☒	Annex 23	Design of the climate resilient bunker
☒	Annex 24	Design of the hurricane shelters
☒	Annex 25	Project Implementation Manual
☒	Annex 26a	Methodology for calculating avoided emissions
☒	Annex 26b	Emissions reduction analysis
☒	Annex 27	Operations and Maintenance Commitment Letter
☒	Annex 28	Temporary annex for co-financing policy requirements

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

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

GOVERNMENT OF ANTIGUA AND BARBUDA

The Department of Environment
Ministry of Health, Wellness and the Environment
#1 Victoria Park, Botanical Gardens
P.O. Box W693
St. John's
Antigua, W.I.
Tel: (268) 462-4625
E-Mail: doe@ab.gov.ag

Mr. Yannick Glemarec
Executive Director
Green Climate Fund ("GCF")
Songdo International Business District
G-Tower, 24-4 Songdo-dong, Yeonsu-gu,
Incheon City, Republic of Korea

10th March 2020

Re: No-Objection for funding proposal for the GCF by the Department of Environment of Antigua and Barbuda regarding the project "Resilience to hurricanes in the building sector in Antigua and Barbuda"

Dear Mr. Glemarec,

We refer to the project "Resilience to hurricanes in the building sector in Antigua and Barbuda" as included in the funding proposal submitted by the Department of Environment to us on 10th March 2020.

The undersigned is the duly authorized representative of the Department of Environment and the Ministry of Finance and Corporate Governance, the joint National Designated Authority of Antigua and Barbuda.

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

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

(a) The Government of Antigua and Barbuda has no-objection to the project as included in the funding proposal;
(b) The project as included in the funding proposal is in conformity with Antigua and Barbuda's national priorities, strategies and plans;
(c) In accordance with the GCF's environmental and social safeguards, the project as included in the funding proposal is in conformity with relevant national laws and regulations.

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

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

Yours Sincerely,

C. Mason
.....

Carol Mason
Principal Assistant Secretary
Ministry with responsibility for the Environment

G. Imhoff-Gordon
.....

Gail Imhoff-Gordon
Senior Public Financial Management Officer
Ministry of Finance and Corporate Governance

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

Basic project or programme information	
Project or programme title	Resilience to hurricanes in the building sector in Antigua and Barbuda
Existence of subproject(s) to be identified after GCF Board approval	No
Sector (public or private)	Public
Accredited entity	Department of Environment, Antigua and Barbuda
Environmental and social safeguards (ESS) category	Category B
Location – specific location(s) of project or target country or location(s) of programme	Antigua and Barbuda
Environmental and Social Impact Assessment (ESIA) (if applicable)	
Date of disclosure on accredited entity's website	Thursday, May 21, 2020
Language(s) of disclosure	English
Explanation on language	English is the official language of Antigua and Barbuda.
Link to disclosure	https://environment.gov.ag/projects-reports#/Resilience-to-hurricanes-in-the-building-sector-in-Antigua-and-Barbuda
Other link(s)	https://environment.gov.ag/news-events#news/article/75
Remarks	An ESIA consistent with the requirements for a Category B project is contained in the Environmental and Social Impact Assessment and Management Plan.
Environmental and Social Management Plan (ESMP) (if applicable)	
Date of disclosure on accredited entity's website	Thursday, May 21, 2020
Language(s) of disclosure	English
Explanation on language	N/A
Link to disclosure	https://environment.gov.ag/projects-reports#/Resilience-to-hurricanes-in-the-building-sector-in-Antigua-and-Barbuda
Other link(s)	https://environment.gov.ag/news-events#news/article/75
Remarks	An ESMP consistent with the requirements for a Category B project is contained in the Environmental and Social Impact Assessment and Management Plan.
Environmental and Social Management (ESMS) (if applicable)	
Date of disclosure on accredited entity's website	N/A
Language(s) of disclosure	N/A
Explanation on language	N/A
Link to disclosure	N/A
Other link(s)	N/A
Remarks	N/A

Any other relevant ESS reports, e.g. Resettlement Action Plan (RAP), Resettlement Policy Framework (RPF), Indigenous Peoples Plan (IPP), IPP Framework (if applicable)	
Description of report/disclosure on accredited entity's website	N/A
Language(s) of disclosure	N/A
Explanation on language	N/A
Link to disclosure	N/A
Other link(s)	N/A
Remarks	N/A
Disclosure in locations convenient to affected peoples (stakeholders)	
Date	Thursday, May 21, 2020
Place	Department of Environment, Antigua and Barbuda - Front Desk #1 Victoria Park Botanical Gardens Factory Road, St John's St John's, Antigua and Barbuda DOE@ab.gov.ag +1 268 464 7962
Date of Board meeting in which the FP is intended to be considered	
Date of accredited entity's Board meeting	N/A
Date of GCF's Board meeting	Tuesday, June 23, 2020

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

Secretariat's assessment of FP133

Proposal name:	Resilience to hurricanes in the building sector in Antigua and Barbuda
Accredited entity:	Department of Environment, Antigua and Barbuda
Country/(ies):	Antigua and Barbuda
Project/programme size:	Small

I. Overall assessment of the Secretariat

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

Strengths	Points of caution
The project presents a robust approach to addressing the resilience of building construction in the country, embracing investments, law enforcement, technical and financial capacity and systems, as well as a well-designed post-disaster response	
A separate funding modality will be established under the existing Sustainable Island Resource Framework Fund (SIRF Fund). This funding modality is intended to enable resilient infrastructure projects to be accessed by other actors, including the private sector	
The analysis of the project shows exemplary considerations of the following: • Disaster-responsive, robust planning; • Economic analyses based on climate rationale; • New resilience indicators used, such as 'avoided losses'; • Stakeholder engagement used for designing operations and maintenance; and • The most advanced hurricane-proofing design protocols developed for wind speeds of over 270 kilometres per hour	

2. The Board may wish to consider approving this funding proposal with the terms and conditions listed in the respective term sheet and addendum XVIII titled "List of proposed conditions and recommendations".

II. Summary of the Secretariat's assessment

2.1 Project background

2.1.1. Background/history of the project to inform the assessment of the funding proposal

3. Currently, Antigua and Barbuda's infrastructure is only designed to withstand the impacts of hurricanes up to Category 3. While buildings designed to withstand up to a Category 3 hurricane was sufficient in the past, the increasing intensity of hurricanes hitting the country is having severe impacts on the country's built environment and population. Furthermore, the country has limited capacity to fully address the impacts of Category 4 and 5 hurricanes on critical public service buildings with existing sources of financing. In order for Antigua and Barbuda to adapt to the increasing severity of hurricanes it is currently experiencing due to climate change, it is necessary to strengthen the climate-resilience of the building sector.

4. Significant damages occur regularly on critical public infrastructure, including hospitals, clinics and emergency services. In addition, there are blockages and cuts in centralized power and water supplies and telecommunication services, which lead to disruptions in the country's economic activities and places a heavy burden on the government due to the high recovery costs after every extreme weather event. This problem is exacerbated by the limited capacity for and coordination of early warning systems in the country, which reduces the ability of communities and government agencies to prepare for an extreme event. Therefore, this project is designed to address the need to build the resilience of the most critical public buildings across the country. It also introduces corresponding measures to ensure disaster preparedness as well as the operations and maintenance of such resilient infrastructure.

2.1.2. Climate objective

5. Hurricanes and tropical storms are the main climatic hazards affecting Antigua and Barbuda. Since 1995, the country has experienced 15 hurricanes and 14 tropical storms. Warming conditions over the Atlantic Ocean are resulting in an increased intensity of hurricanes in the Caribbean, with Antigua and Barbuda experiencing their first recorded Category 5 hurricanes – Irma and Maria – in 2017. Climate change projections under both the Representative Concentration Pathways (RCP) 4.5 and 8.5 scenarios indicate that although the total number of storms is not expected to change significantly, there will be an increase in the frequency of high-intensity storms, such as Category 4 and 5 hurricanes. Urgent adaptation measures for the building sector are therefore needed to address the impacts of climate change on the country. Hurricane impacts are multifaceted, and both wind speed and water load will be addressed by the building design. However, a feasibility study for the 54 selected critical buildings demonstrates the strongest impact of the wind on the resilience of the structures.

6. Experience in Antigua and Barbuda show that, for example, following a Category 5 hurricane, power and water supply can be disrupted for up to 24 months, while damage to communication and transport infrastructure disrupts associated services for up to 6 months. Disruption to these services caused by damages to critical infrastructure reduces the efficiency and effectiveness of emergency response and delays recovery. This vulnerability is further exacerbated by the limited capacity within Antigua and Barbuda Meteorological Services (ABMS) to carry out early warning and preparatory action, in particular with regard to

collecting and sharing information/data, which reduced the ability of communities and government agencies to prepare for an extreme climate event.

2.1.3. Financing information and environmental and social safeguards category

7. This project will use incremental finance in the form of GCF grant resources to support the resilience-building and climate-proofing of key critical buildings and the mainstreaming of climate resilience in the building sector and relevant financial mechanisms. These interventions will also create an enabling environment, which will facilitate the upscaling of such measures across all buildings in the country. Finally, the project will strengthen climate information services to improve the dissemination of early warnings and facilitate early action for disaster preparedness.

8. The project is requesting total financing of USD 32.7 million in the form of grants, with co-financing of USD 13.4 million from the Government of Antigua and Barbuda. GCF resources will be used to (i) retrofit existing critical public sector buildings and strengthen the structural integrity of buildings to withstand the wind shear forces, as well as (ii) decentralize power and water supplies to reduce communities' reliance on vulnerable centralized systems. These interventions will build on and complement existing initiatives and are designed to achieve maximum adaptation impact.

9. The project's environmental and social safeguards (ESS) are assessed as category B, and the entity has submitted relevant documentation (environmental and social management framework) as part of the funding proposal package.

2.2 Component-by-component analysis

Component 1: Climate-proofing interventions implemented in critical public service and community buildings to improve resilience to and recovery from extreme climate events (total cost: USD 37.3 million; GCF cost: USD 25.1 million, or 67 per cent)

10. Under this component, the project aims to strengthen the structural integrity of selected priority buildings through the installation of hurricane shutters and the use of hurricane straps to secure roofs. These interventions will physically protect buildings, thereby reducing damages and maintaining the operability of critical services during and after an extreme event. The climate-resilience of critical services will be further enhanced through the decentralization of power and water supplies, which will reduce the dependence of critical services on vulnerable central systems. Renewable energy systems will be installed, comprising solar photovoltaic (PV) panels and battery packs. These systems will be grid-interactive, and the necessary regulatory process will be pursued with the utility authority. The battery storage packs will be put in place to meet basic electricity demands for 24–48 hours, with the aim of lasting in the event of a hurricane. The effectiveness of battery packs will be enhanced through the installation and use of energy-efficient equipment in priority buildings, and climate-resilient rainwater harvesting solutions will also be put in place.

11. Secondly, the project will construct five climate-resilient storm shelters to be built onto selected public clinics. Those shelters will also be equipped to protect community members and provide the necessary services during an extreme climate event. Attaching shelters to selected clinics will improve the health and safety of affected people, as nurses will be present on site to treat the sick and injured. Health risks will be further reduced as overcrowding will be avoided in public schools, which are currently used as shelters. All five shelters will be equipped with renewable energy-based climate-resilient water harvesting equipment to reduce their reliance on centralized supply systems.

12. The third activity under this component includes building a climate-resilient bunker, which will be constructed at a central location to store supplies required by critical services during and immediately after an extreme event. The bunker will be operated by a sub-committee for disaster preparedness, comprising representatives from the health, environment, public works and welfare sectors, who will be responsible for maintaining supplies of medicine, renewable energy equipment, building materials and food. This bunker will also serve as a battery recharge site, allowing for battery packs to be recharged and swapped out in priority buildings if renewable energy systems cannot be made operational again before battery systems run out.

13. The design solutions for the building structures follow the engineering protocols of the building codes of the State of Florida in the United States of America. This is an excellent example of building design that sustains wind speeds above 270 kilometres per hour. Lastly, back-up protocols will be developed and operationalized to secure vital information within critical public institutions, including hospitals, clinics, schools, police stations and fire stations. In so doing, critical service providers will have increased access to emergency supplies and vital information will be preserved.

14. These adaptation measures therefore present a comprehensive approach to building resilience to hurricanes for the most critical buildings, taking into account the needs of the most vulnerable parts of the population. Furthermore, those measures were introduced after using robust planning and vulnerability assessment tools, which correspond to the highest standards of disaster risk management.

Component 2: Climate change adaptation mainstreamed into the building sector and relevant financial mechanisms (total cost: USD 3.1 million; GCF cost: USD 2.9 million, or 93 per cent)

15. Under this component, climate change adaptation measures will be mainstreamed into the country's building sector. Regulations for the Physical Planning Act (2003) will be drafted to make provisions for including the updated building codes in the national regulatory framework. Strategic impact assessments (SIAs) of the building code regulations will be conducted to assess the ESS and gender risks, and consequences of and mitigation measures related to the enactment of these regulations in the Physical Planning Act (2003). This SIA will ensure that the building code is able to be applied by the most vulnerable groups in the country, particularly the elderly and people with disabilities, and recommendations will also be made for the environmental management plans to be updated to include climate-resilient measures for the building sector.

16. Furthermore, the project will explore additional entry points for accessing climate finance through the SIRF fund, which will include the introduction of incremental cost reasoning to project selection criteria. This will allow for the development costs to be split between baseline and adaptation measures. Following this, a list of adaptation options supported by the SIRF Fund will be refined, and SIRF guidelines will be updated to allow the private sector to access finance for resilient infrastructure investments. This process will ensure that all options are optimized for the local conditions and markets and that clear guidelines are set for accessing the SIRF Fund resources for resilient infrastructure investments.

17. Lastly, various training packages will be developed and relevant staff trained on the operations and maintenance of climate-resilient infrastructure. These include (i) training relevant staff from the National Office of Disaster Services (NODS) as well as building inspectors from Development Control Authorities and building maintenance teams on operational procedures for long-term monitoring, maintenance and upscaling of climate change adaptation interventions; and (ii) training of the local workforce, including the private sector, on how to support the installation, operation and maintenance of climate change adaptation solutions installed in the targeted buildings.

Component 3: Climate information services strengthened to facilitate early action within the building sector to respond to extreme climate events (total cost: USD 0.85 million; GCF cost: USD 0.75 million, or 90 per cent)

18. Under this component, a centralized online server will be established to process climate data in real time, overcoming existing shortfalls in data processing capabilities. This will allow for the forecasting of extreme climate events in a timely manner using data from the country's existing weather stations. The centralized server will be equipped to process data in several formats, which will reduce processing time given that the data is input from the country's weather stations using several different operational platforms. To further strengthen the capacity of ABMS to produce early warnings, training workshops will be conducted for ABMS staff on how to (i) collect, process and manage climate data generated by the server; and (ii) use the generated data to develop early warning information products, including easily interpretable infographics.

19. Lastly, communication and early action protocols will be formalized between AMBS and relevant government agencies to facilitate rapid information-sharing before an extreme climate event.

20. Contingency: the project costs include a budgeted contingency amount of USD 3.9 million, of which the GCF portion is USD 2.7 million, prorated according to GCF financing in the project. The total contingency fee amount is the sum of (i) 10 per cent of the total cost of project interventions under Output 1; (ii) 5 per cent of the total cost of project interventions under Output 2; and (iii) 5 per cent of the total cost of project interventions under Output 3. This contingency amount is needed to account for cost overruns due to price inflation given that building materials are to be imported to the country.

Component 4: Project management and monitoring and evaluation costs (total cost: USD 2.2 million; GCF cost: 1.3 million, or 59 per cent)

21. The project management costs (PMC) will be used for project management and monitoring and evaluation costs, and include the establishment and operations of the National Project Steering Committee, the Project Management Unit (PMU) within the Ministry of Finance (MOF) and the recruitment of an International Chief Technical Advisor.

III. Assessment of the performance against investment criteria

3.1 Impact potential *Scale: High*

22. The project will directly benefit 73,216 people in Antigua and Barbuda, representing 78 per cent of the total population, by securing the provision of critical services to these people during and after an extreme climate event, and it will indirectly benefit the entire population of the country. Project interventions will further increase the climate resilience of 54 priority buildings in Antigua and Barbuda, which represents one third of the country's total number of public buildings, and create new shelters and bunkers for disaster preparedness and management.

23. A climate vulnerability analysis was conducted to determine the most appropriate sites for project interventions and ensure that maximum benefits are realized as a result of these interventions. This analysis included a hydraulic flood analysis as well as a walk-time analysis to determine the total coverage of project interventions and support justifications for the project to primarily address the impacts of Category 4 and 5 hurricanes.

24. A vulnerability-driven selection process was followed for targeted critical public service and community buildings to ensure that climate-proofed critical services provide maximum coverage to vulnerable areas with high population density, the poorest communities and those

individuals living in areas outside of the main drainage channels. This analysis ensured that the selection of target intervention sites would provide for maximum coverage of critical services to the most vulnerable people.

25. While the installation of solar PV panels on 34 target buildings under Activity 1.1 is primarily an adaptation solution proposed under the project, its implementation will also deliver mitigation co-benefits. As a result, installing solar PV panels will reduce an estimated 1,923 tonnes of carbon dioxide equivalent per year in avoided emissions.

3.2 Paradigm shift potential *Scale: High*

26. At the current stage of development in climate change efforts, we are experiencing the deployment of predominately mitigation measures, comprising mainly clean energy solutions and energy efficiency measures. Adaptation options for climate-proofing structures against climate hazards are still in the preliminary stages of advancement, with limited experience on the ground. There are no calibrated engineering solutions for integrated building codes that embrace both climate change streams. This situation is apparent in the broad adoption of 'green' building codes which relate to energy measures and the preservation of natural resources but do not incorporate customized climate-proofing solutions. At the same time, climate-proofing solutions are much more disruptive for the buildings' structure than mitigation measures. Consequently, in case mitigation measures are not yet introduced, it is advisable to refurbish structures to incorporate climate-proofing characteristics before bringing in renewable energy or energy efficiency measures. The energy efficiency solutions are related to the building structure directly and thus depend heavily on the building features and use.

27. This project is one of first in the region to introduce building codes related to climate-proofing measures. The successful completion of this task as well as lessons learned from the refurbishment of 52 critical public buildings will allow for an assessment of what energy efficiency measures will be the most efficient with the new structures of selected buildings. It will allow existing energy efficiency building codes to be adjusted so they can be incorporated alongside climate-proofing measures. This exercise can become an important market test to benchmark the scope of integrated building codes for future use. Renewable energy installations, water harvesting solutions as well as energy efficiency measures will be part of the design of the critical buildings along with the climate-proofing elements. This information will help determine the best combination of mitigation and adaptation measures to be introduced into the building codes. Full reporting on this matter will be developed upon project completion and will serve any future similar projects globally.'

28. The project will catalyse a paradigm shift in the building sector by establishing a standard for climate-resilient interventions, which can be readily scaled up and replicated across the country's public building portfolio, as well as within the private sector. Furthermore, the uptake and sustainability of climate-resilient adaptation solutions will be enhanced through capacity-building and training campaigns, which will ensure the long-term sustainability of investments in climate-resilient practices. These long-term benefits will eventually result in the private sector having (i) a funding modality available to account for and finance incremental costs of adaptation; (ii) reductions in insurance premiums due to reduced risk resulting from climate-proofed buildings; and (iii) reductions in the economic losses caused by extreme climate events.

29. The introduction of new resilience building code standards and other changes to regulatory frameworks that would allow for the construction of resilient infrastructure nationwide, efficient and effective knowledge transfer through the aforementioned training campaigns and improvements to information-sharing related to disaster preparedness will not only improve the uptake of climate-resilient building practices, but will also improve the

preparedness of critical public services, local communities, business owners and other private sector stakeholders for the onset of extreme climate events.

30. Lastly, the combined effect of the project interventions will help create an enabling environment for the future upscaling and replication of climate change adaptation interventions within the public and private sector, locally, nationally and across the Caribbean region.

3.3 Sustainable development potential *Scale: Medium*

31. The proposed project will contribute towards the achievement of 9 of the 17 United Nations Sustainable Development Goals (SDGs), including: SDG 3 – Good health and well-being; SDG 4 – Quality education; SDG 5 – Gender equality; SDG 6 – Clean water and sanitation; SDG 7 – Affordable and clean energy; SDG 9 – Industry, innovation and infrastructure; SDG 11 – Sustainable cities and communities; and SDG 13 – Climate action.

32. The project will generate environmental, social, economic and gender co-benefits. Significant social, environmental and economic co-benefits include increased employment, reduced risk of injuries during hurricanes and increased energy storage capacity, energy and water security, and private sector involvement in the new construction value chain, etc.

33. Project interventions will increase the resilience of priority buildings and critical services, resulting in improved climate-responsive planning and early action. These factors will lead to reduced economic losses from extreme climate events and provide several significant economic co-benefits. Climate-proofing critical public institutions will also help to limit the disruptions to core health, education and care services following extreme climate events.

3.4 Needs of the recipient *Scale: High*

34. As a small island developing State (SIDS), Antigua and Barbuda is particularly vulnerable to extreme climate events such as hurricanes and tropical storms. In 2017, the country was ranked 13th in the Global Climate Risk Index and 3rd in terms of losses per unit of gross domestic product (GDP). Such hurricanes have severe impacts on the country, including loss of life, economic losses and damage to infrastructure, resulting in huge economic and infrastructure damages. In 2017, Hurricane Irma caused an estimated USD 222 million in damages and economic losses in Antigua and Barbuda and resulted in approx. 129 fatalities across the Caribbean and south-eastern region of the United States. The impacts of these extreme climate events on the country are further exacerbated by the country's economic composition. For example, tourism makes up the largest proportion of the country's GDP (approx. 60 per cent) and accounts for the highest overall investment at approx. 40 per cent.

35. During the hurricane events, disruption occurs in emergency services, disaster response, electricity and water supply, and telecommunications. This results in critical services becoming non-operational, which leads to reductions in economic productivity and mobility as well as increases in personal injury and loss of life. Furthermore, extreme climate events cause damage to community buildings that are used as shelters, such as schools, churches, clinics and police stations. These barriers will be addressed through the construction of new shelters that are attached to the clinics, which will serve as better venues for dealing with post-disaster recovery.

3.5 Country ownership *Scale: High*

36. The proposed project forms an integral part of Antigua and Barbuda's GCF Country Programme. The current portfolio under the Country Programme has been specifically designed

to take a holistic approach to climate change adaptation and mitigation in Antigua and Barbuda. The portfolio will be complemented by other projects under the Country Programme, which will address the additional climate hazards associated with hurricanes, including flooding and storm surges.

37. The proposed project aligns with the country's adaptation priorities set in the nationally determined contributions, meaning that project interventions will increase the climate resilience of priority buildings. The project also forms part of Antigua and Barbuda's Medium-Term Development Strategy, with two out of seven flagships included in the Strategy being directly related to improved buildings and infrastructure.

38. The proposed project was designed following an extensive consultative process with the Department of Environment (DOE), which is a national designated authority for Antigua and Barbuda and is responsible for the overall management of Antigua and Barbuda's GCF portfolio, as well as all other relevant project stakeholders. These stakeholders included representatives from DOE, the Meteorological Office, non-governmental organizations and local communities. Three in-country missions have been conducted during the project development phase. Extensive stakeholder consultations were also conducted as part of the vulnerability assessment and the development of project selection criteria and operations and maintenance plans.

3.6 Efficiency and effectiveness *Scale: High*

39. The proposed project is requesting USD 32.7 million in grant financing from the GCF to enhance the climate resilience of Antigua and Barbuda's building sector to extreme climate events. This GCF investment will be supported by the Government of Antigua and Barbuda, which has committed USD 13.5 million in co-financing. This brings the co-financing leverage ratio to 1:0.5.

40. The country's small tax and market base as well as its high public debt (100 per cent of its GDP in 2015) constrain the Government of Antigua and Barbuda's ability to allocate funding from the national budget for adaptation. Moreover, limited opportunities exist for the public and private sector to access financial resources for addressing climate change impacts, which was estimated to cost the country approx. USD 20 million per annum. This is nearly fifteen times greater than the national budget of the DOE in 2017, and is likely to increase substantially under future climate conditions. External investment is therefore critical to increase the resilience of Antigua and Barbuda's population to climate change.

41. Grants from GCF will only be used to address the additional impacts of climate change, with government co-financing being used to cover all baseline costs, including business-as-usual repairs/maintenance to buildings that are necessary to ensure the sustainability of climate-proofing interventions.

42. As part of the efficiency and effectiveness analysis, the project looked at several scenarios for the cost-effectiveness evaluation and outlined the baseline scenario and resilient intervention scenarios. According to the funding proposal, a baseline package representing the conventional response to Category 3 hurricane impacts includes a total capital cost of USD 9.7 million, an annual operating expenditure of USD 64,800. A climate-resilient package representing a retrofit of 54 buildings for Category 5 hurricanes, capacity-building interventions to lever climate-resilient private sector responses includes a total capital cost of USD 21.8 million and an annual operating expenditure of USD 717,910. The net present value (NPV) of the baseline or business-as-usual intervention package is USD 13.8 million, and that of the climate resilient retrofitting activities is USD 36.9 million. The climate-resilient option is 2.6 times greater than the baseline.

43. The project also describes international best practices and lessons learned identified for the project, such as ensuring that designs of buildings under future climate change conditions do not include long overhangs (at risk in high-intensity storms) and updating national policy standards, etc.

IV. Assessment of consistency with GCF safeguards and policies

4.1 Environmental and social safeguards

44. **Environmental and social risk category.** The accredited entity (AE) has assessed the environmental and social risks under this project and rated it as a category B since there are limited adverse environmental or social risks and/or impacts that are few in number, generally site-specific, largely reversible, and readily addressed through mitigation measures. The Secretariat confirms that this is equivalent to category B as per the GCF Environmental and Social Policy. The categorization is supported by the comprehensive Environmental and Social Impact Assessment and Management Plan (ESIAMP) developed by the AE, the DOE of Antigua and Barbuda.

45. **Safeguards instruments and disclosure.** The project has submitted the necessary environmental and social safeguards documents consisting of an integrated ESIAMP, which illustrates the potential environmental and social risks and impacts of the different project activities and the corresponding management measures to mitigate them. The ESIAMP will be disclosed at least 30 days in advance of the GCF Board approval of the project. The safeguard report will be available in English as the official language and made available via electronic links on both the AE and the GCF website as well as in locations convenient to affected peoples in consonance with the requirements of the GCF Information Disclosure Policy and section 7.1 on information disclosure in the GCF Environmental and Social Policy.

46. The following summarizes the project's compliance with the GCF ESS standards and requirements:

(a) ESS 1: Assessment and management of environmental and social risks and impacts. The project has submitted the ESIAMP with sections containing the assessment and management plan. The negative and positive impacts of the project were assessed following a well-defined methodology drawing on national-level environmental impact assessment procedures. The project has put forward an environmental and social management plan that identified potential impact areas, required mitigation measures, responsibilities of stakeholders, timeframes and indicative costs. Construction-related impacts include those related to worker and community health and safety concerns, while operation-related impacts involve the use of water resources as well as potential pollution from solid waste generation and hazardous waste management;

(b) ESS 2: Labour and working conditions. The project is associated with construction with a number of labourers involved. The project underscores that project activities shall respond to the core labour standards per the International Labour Organization and the labour laws of Antigua and Barbuda, including ensuring that labourers and subcontractors will be paid with the correct wages and taking into consideration the impacts of its activities on the working conditions of the labourers. The project will ensure that subcontractors comply with all the relevant labour laws applicable to their personnel, including subcontractors' workers and labourers, and that such laws will be reflected in tender documents and contract provisions;

(c) ESS 3: Resource efficiency and pollution prevention. The project is expected to upgrade and expand upon several sites, and the project considers that this will likely involve the

generation of construction waste, dust and other particulates. The ESIAMP identified and assessed activities related to the construction and operation of the project that may pollute the air, water and land and those that produce project-related greenhouse gas emissions, and has recommended avoidance, minimization, mitigation and compensatory measures;

(d) ESS 4: Community health, safety and security. The project will increase continued access to public healthcare services by providing a consistent supply of electricity and water to clinics. The project provides for necessary measures to address the issues on community health, safety and security associated with the construction works and for the development of an emergency preparedness and response plan that would outline how affected communities will be assisted in cases of emergencies. An accident prevention officer at the project sites will also be appointed;

(e) ESS 5: Land acquisition and involuntary resettlement. There will be no land acquisition under the project, as all interventions are to be installed in situ on existing facilities. Moreover, the project will ensure that the livelihoods of communities living in the vicinity of the project are not adversely affected and shall be monitored during the implementation phase of the project;

(f) ESS 6: Biodiversity conservation and sustainable management of living natural resources. The project activities are not expected to have a negative impact on biodiversity and has recommended a sustainable procurement policy for construction works, including ensuring invasive species are not introduced in the importation of equipment and other products;

(g) ESS 7: Indigenous peoples. The project does not disproportionately affect marginalized groups and indigenous peoples. Rather, it seeks to empower vulnerable communities by improving essential community services (health and education) to beneficiaries. The project stresses that it shall provide fair and equitable access to benefits in a manner that is inclusive and does not exacerbate inequalities. Full engagement of the local communities and their representative institutions should be encouraged throughout the implementation of the project; and

(h) ESS 8: Cultural heritage. While none of the targeted facilities are in cultural sites, some of the areas may be of cultural value. However, it is indicated that during building retrofitting, the process will as much as possible respect physical aesthetics of buildings, especially historically relevant buildings. The project shall also follow the requirements for preserving cultural heritage under the Physical Planning Act.

47. Institutional arrangements and capacity-building needs. The environmental and social management plan has clearly defined the roles and responsibilities of the stakeholders that will be involved in the implementation of the mitigation measures. M&E oversight and responsibilities are also defined. The ESIAMP also includes the M&E arrangements to monitor the implementation of the environmental management systems and other site-specific management plans that may be developed by the contractors.

48. Stakeholder engagement. The project has developed a stakeholder engagement plan and carried out extensive community engagement with the surrounding communities to enable them to provide opinions on the various components of the proposed project and how the project is going to affect them from various perspectives.

49. Grievance redress mechanism. The AE has an existing entity-level grievance redress mechanism, which shall also be implemented at the project sites to receive concerns regarding the environmental and social performance of the project and facilitate their resolution. The ESIAMP has also provided for workshops and training on the DOE complaints mechanism for workers as well as neighbouring communities to ensure access to the grievance redress

mechanism. The DOE also has an assigned Complaints Officer for receiving and forwarding complaints to the relevant units. In addition, a Public Awareness and Community Liaison Officer within the Public Awareness and Community Outreach Unit will be responsible for conducting consultations with communities as well as in informing them of the mechanism for submitting grievances, if any.

4.2 Gender policy

50. The AE has provided a gender assessment and gender action plan and therefore complies with the requirements of the GCF Gender Policy.

51. In the gender assessment, the AE demonstrates the existence of enabling environment for promoting gender equality in Antigua and Barbuda. The country's constitution prohibits discrimination on the grounds of sex. While there is no specific ministry for gender, the DOE Gender Policy formalizes its commitment to mainstreaming gender in its work programme and project portfolio. Antigua and Barbuda has ratified the Convention on the Elimination of all Forms of Discrimination Against Women and its Optional Protocol.

52. The gender assessment is carried out based on a desk review as well as stakeholder consultations, which included discussions with service providers as well as men and women community members. Men are still considered heads of household and breadwinners, while the roles of both women and men has evolved and changed over the years in some aspects. The assessment also illustrates that while men dominate sectors such as construction, agriculture, forestry, fishing and transportation, women are found in service sectors and tourism, education, social work, and financial and insurance activities. The assessment also identifies that young men in the project location may be more likely to be unemployed than any other groups. Men and women engage in the care of children, although the contribution of women is slightly higher, which has an impact on their ability to go back to work post-disaster if services such as day care and schools cannot resume services immediately. Other services provided by the government are critical for the communities and women in particular, as women are usually the primary users of these services. Post-disaster, when schools are closed for longer periods, an increased childcare burden is placed on parents, especially female-headed households, resulting in increased unpaid labour for women and decreased chances to carry out revenue-earning activities. Furthermore, women-headed households face additional challenges post-disaster as the care and responsibility for children and the elderly increase. Therefore, women and their dependents depend heavily on reliable services in all of the sectors, particularly those targeted by the project. While education is provided equally to both women and men, women achieve higher educational levels compared to men. While both men and women have access to information, traditional education and communication systems may not be gender-responsive. The assessment indicates that there are barriers to men's participation in various forums since they are generally less well educated and may not want to participate in information sessions. Through the assessment, the project recognized that certain community members, particularly poorer men and women and their families, face challenges in obtaining continued access to free government services such as preschools and electricity, the latter being a service that is even unaffordable to some middle-income parts of the population.

53. The AE has noted the challenges to both women and men, particularly women and men within the poorer section of the community. As per the requirements in the GCF Gender Policy, it has developed a gender action plan which provides indicators, targets, budgets and a gender expert to support the implementation of the plan. The action plan includes various activities, such as a formal training course in the construction sector for women. At the same time, it will develop trainings that ensure male participation given men's lower levels of educational attainment. The action plan also includes activities related to accessing financial support and early warning information and developing gender-responsive tools and codes. The gender

action plan will be reviewed and refined during the inception phase, ensuring project stakeholders have an opportunity to identify issues. The review and refinement will also benefit from the ongoing work under readiness, particularly the gender baseline assessments currently being conducted under the project "Accelerating a transformational pipeline of Direct Access climate adaptation and mitigation projects in Antigua & Barbuda". The output from the readiness work will assist in refining relevant targets and indicators in the action plan to make sure it is realistic and ambitious.

4.3 Risks

4.3.1. Overall proposal assessment (medium risk)

54. GCF is requested to provide a grant of USD 32.7 million to enhance the resilience of Antigua and Barbuda's building sector to extreme climate events such as Category 4 and 5 hurricanes. The government of Antigua and Barbuda is providing grant co-financing of USD 13.5 million, of which USD 4.9 million is in-kind contribution.

4.3.2. Accredited entity/executing entity capability to execute (medium risk)

55. The DOE will be the AE for the project. The AE has a track record of implementing resilience building projects from multiple donor agencies. Projects have ranged between USD 0.9 million and USD 20 million.

56. The Ministry of Finance (MOF) is the executing entity (EE). The EE has experience in executing projects with a budget range of USD 2 million to USD 15 million over the past five years. The result of capacity assessment conducted by AE was satisfactory. The AE will be responsible for the procurement and efficient disbursement of financial resources for the implementation of the project, and is relied upon to oversee that the EE effectively uses these resources during project implementation.

4.3.3. Project-specific risks (medium risk)

57. Delays in the implementation: the funding proposal has identified risk factors that may lead to delays in the implementation of the project. These include extreme weather events such as hurricanes, tropical storms, disrupted shipment schedules, and limited workforce for construction. To mitigate these risks, the project will construct a warehouse for storage of the materials in early stages of the project, limit construction work during hurricane seasons and purchase insurance for construction related risks. The AE will also include clauses in all relevant project agreements allowing time for project extension due to force majeure, and provisions for contingency budgets.

58. Operations and maintenance: The project will install removable solar photovoltaic panels, batteries and water-harvesting solutions in priority buildings. This equipment will be used during normal operation as well as post-disaster. These systems will be grid-interactive and the necessary regulatory process will be followed with the utility authority. For the harvested water, no utility is involved. In addition, it will also construct bunkers and community shelters to store emergency supplies for the health, energy and building sectors. Therefore, it is critical to maintain these facilities to ensure full operation during emergencies and prevent any theft, spoilage and loss. The funding proposal stated that the Government of Antigua and Barbuda is committed to maintaining climate-proofing solutions, including solar PV panels and climate-resilient water harvesting solutions for the full lifespan of these interventions (i.e. 50 years for interventions contributing to strengthened infrastructural integrity and 20 years for solar PV panels).

59. Government approval for building code: The draft regulations for the Physical Planning Act (2003) that makes provisions for the building code will need to be submitted to and enacted by parliament. The funding proposal states that there is no guarantee that the Act will be approved due to the financial challenges poor income groups face in meeting the building code for their houses. The project will conduct an SIA of the building code regulations to assess the ESS and gender risks, consequences and mitigation measures related to the enactment of these regulations.

60. Coordination with other funds: GCF resources will be used to catalyse the creation of additional entry points to promote investment into climate-adaptive measures in Antigua and Barbuda (Activity 2.2). Specifically, these resources will be used to expand the reach of the SIRF Fund to enhance the enabling environment for the public and private sector to access financing from the SIRF Fund specifically for adaptation in the building sector, in accordance with the guidelines and criteria for the adaptation. To prevent any risk of GCF resources retroactively financing SIRF Fund activities, the AE stated that GCF resources from this project will not be used to supplement the SIRF Fund.

61. Economic and financial analysis: The cost-effectiveness analysis provides a comparison of intervention costs and associated hurricane impact costs in the four plausible scenarios: under normal hurricane with business as usual (BAU) and resilient intervention scenarios, and extreme hurricane with BAU and resilient intervention scenarios. Net Present Value (NPV) calculated for BAU package is USD 13.8 million whereas NPV for climate resilient retrofit is USD 36.9 million. An additional USD 23 million in resilient interventions net cost savings of USD 337 million under hurricane scenarios and USD 9.1 billion under extreme hurricane scenario. This shows that resilient interventions offer more cost-effective responses than a BAU response.

4.3.4. Compliance risk (medium risk)

62. A review of the planned activities did not reveal any element that would pose a high amount of compliance risk for money laundering, terrorist financing or prohibited practices. There is a fair amount of procurement involved in the project, but there are assurances that adequate controls are in place to guard against fraud and other abuses of the procurement system.

63. Based on the review and assurances by the AE, the compliance risk assessment rates this as medium.

4.3.5. GCF portfolio concentration risk (low risk)

64. In case of approval, the impact of this proposal on the GCF portfolio concentration in terms of result area and single proposal is not material.

4.3.6. Recommendation

65. It is recommended that the Board consider the above factors in its decision.

Summary risk assessment		Rationale
Overall programme	Medium	The project aims to enhance the resilience of the building sector to extreme climate events and will involve construction work. The project has risks of delayed implementation due to
Accredited entity/executing entity capability to implement this programme	Medium	

Project-specific execution	Medium	extreme climate events leading to issues in logistics and limited resources in the country. The government's capacity and willingness to approve the draft Building Code and maintain the project facilities will be critical for the success of the project implementation.
GCF portfolio concentration	Low	
Compliance	Medium	

4.4 Fiduciary

66. The DOE of Antigua and Barbuda will be the AE for this project The AE will be responsible for overseeing the implementation, financial management, evaluation, reporting and closure of the project.

67. Antigua and Barbuda's MOF will be the EE for the project. As the EE, MOF will provide oversight and manage entities in the respective government bodies (e.g. ABMS, Ministry of Health Wellness and Environment, Ministry of Works and NODS) that will be involved in the implementation of project interventions. MOF will be accountable to the AE for the effective use of resources during project implementation. All operating policies and procedures will follow the DOE policies and procedures, which includes provisions for financial management and procurement.[1] In addition, project funds will be channelled through the MOF treasury. The MOF will be responsible for the efficient disbursement of financial resources for the implementation of all project activities.

68. A PMU managed by the MOF will coordinate the implementation of project interventions with the AE, EE and other implementing partners. This unit will be primarily responsible for coordinating project activities between the AE, EE and relevant stakeholders. The PMU will consist of (i) the Project Manager (PM); (ii) a Project Coordinator; (iii) a Financial Officer (FO); (iv) a Procurement Officer (PO); (v) an ESS Officer; (vi) a Communications Officer (CO); (vii) a Monitoring and Gender Officer; and (viii) an Administrative Officer (AO). Both the FO, PO and AO will report directly to the PM. Their responsibilities will include (i) providing administrative, logistical and technical financial support to the PMU; and (ii) compiling reports on the disbursement procedures for the project and projected requirements for project funding during the implementation phase. The FO in particular will manage the financial transactions for the project outputs and activities, which will be implemented in line with the established project workplan and national priorities.

69. The DOE will be responsible for fiduciary aspects and accountable for all financial activities. The financial management and procurement within the project will be guided by procedures and policies of the DOE, which meet the requirements of multilateral and bilateral agreements. As the EE, MOF is an authority of the Government of Antigua and Barbuda and as such follows its financial and procurement rules and standards. The DOE will therefore manage the funds while the EE implements the activities of the project. International accounting and financial reporting standards will be applied to all aspects of the project. The DOE follows standard accounting procedures for auditing project expenditure and assumes overall responsibility for the financial management of the project, ensuring that funds are used efficiently to support the funded activities. A qualified, internationally recognized auditing firm, competitively selected by the AE, will audit the project in compliance with International Standards on Auditing and submit all project-related accounts to the GCF on an annual basis.

70. This is a draft assessment and may need to be revised based on the responses of the AE to queries raised on the budget in relation to contingency amounts and other minor clarifications.

4.5 Results monitoring and reporting

71. As an adaptation project, the intervention expects to benefit 73,216 direct and 94,400 indirect beneficiaries. The project will deliver direct benefits to 78 per cent of the population in a SIDS, of which women comprise 38,072 direct and 49,988 indirect beneficiaries as per the gender-disaggregated metrics for the GCF core indicator.

72. Overall, the funding proposal and logic framework sufficiently apply GCF-level (impact and outcome) results management framework/performance measurement framework indicators. The project has included or planned for baselines and is expected to implement data collection activities that can inform progress reporting on expected results. At the project performance level, measurements for behavioural change and climate specificities have been integrated, which are essential to understand, learn and deliver the expected project results.

73. Regarding section E, the logic framework is assessed as complying with GCF standards and has been cleared through Secretariat Review.

74. While the funding proposal theory of change has been cleared during Secretariat review, it would benefit from further details reflecting on the causal pathways at the project level and in relation to the climate rationale (which ideally are tested in implementation either with project performance management indicators or impact data/evidence generated to attribute changes to GCF investment).

75. Under section E.7, the information provided is generic and, primarily per AMA obligations. This was cleared during Secretariat review though it is recommended that the AE further elaborate during implementation how the budget, as allocated to date for M&E, is/remains sufficient to generate the evidence necessary to validate results as reported.

76. Under section E.7, the Secretariat notes the intention of the AE to conduct an "outcomes-based" assessment for the interim evaluation and a summative evaluation for the final evaluation. While cleared during the Secretariat review at this stage, in the detailed budget, the AE needs to continue to ensure that sufficient budget is allocated to generate the necessary data for the validation in evaluations and cover the costs for the evaluations to be sufficiently conducted.

4.6 Legal assessment

77. The AMA was signed with the AE on 28 September 2018, and it became effective on 23 October 2018.

78. The AE has not provided a legal opinion/certificate confirming that it has obtained all internal approvals and it has the capacity and authority to implement the project. It is recommended that, prior to submission of the funding proposal to the Board, (a) the AE obtain all its internal approvals; and (b) GCF should receive a certificate or legal opinion from the AE in form and substance satisfactory to GCF confirming that all final internal approvals by the AE have been obtained and that the entity has the authority and capacity to implement the project.

79. The proposed project will be implemented in Antigua and Barbuda. GCF has signed a bilateral agreement on privileges and immunities with Antigua and Barbuda.

80. In order to mitigate risk, it is recommended that any approval by the Board is made subject to the following conditions:

(a) Delivery by the AE to the GCF of a certificate or legal opinion within 120 days of Board approval confirming that it has obtained all its internal approvals;

(b) Signature of the funded activity agreement in a form and substance satisfactory to the Secretariat within 180 days from the date of Board approval or the date when all internal approvals by the AE are obtained; and

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

4.7 List of proposed conditions

81. A full design of each priority building targeted under the project will be a pre-requisite for the disbursement of GCF resources. These designs will also embrace a thorough assessment of the drainage needs, renewable energy use, energy efficiency, and water harvesting measures for all critical buildings selected for interventions under the project. Such designs will also support the preliminary selection of these 14 buildings to receive additional drainage engineering solutions in the face of climate change.

Independent Technical Advisory Panel's assessment of FP133

Proposal name:	Resilience to hurricanes in the building sector in Antigua and Barbuda
Accredited entity:	Department of Environment, Antigua and Barbuda
Project/programme size:	Small

I. Assessment of the independent Technical Advisory Panel

1.1 Impact potential *Scale: High*

1. The funding proposal is submitted by the direct access entity of a Caribbean small island developing State and is an integral part of Antigua and Barbuda's GCF country programme. Activities planned in this proposal are complementary to other climate change projects being implemented in the region, and particularly in this country. All similar projects are considered in section B.1 of the funding proposal, where its additionality is well demonstrated, focusing on the specificities of climate risks tackled by each project.

2. This is a small-scale adaptation funding proposal with mitigation co-benefits aimed at strengthening the country's adaptation capacities against the impacts of extreme climatic events on the building sector and infrastructure. It contributes to the GCF results areas: infrastructure and built environment; and most vulnerable people, communities and regions.

3. Infrastructure and buildings in Antigua and Barbuda are relatively resistant to Category 3 hurricanes but are highly vulnerable to the Category 4 and 5 hurricanes that have appeared in the last decades; and the infrastructure and buildings need to be upgraded to withstand the impacts of these Category 4 and 5 hurricanes (which have wind speeds of over 200 km/h). Higher resilience can be achieved by strengthening the structural integrity of buildings and whole infrastructure by decentralizing power and water supplies to reduce the reliance of communities on vulnerable centralized systems. Initial climate-proofing interventions will focus on critical services, such as police, fire and health services, as well as on community buildings that could act as shelters during a storm. Increasing the resilience of these priority buildings will lead to: (i) critical services remaining operational during and after an extreme event; and (ii) more rapid recovery, including restoring water supply, power and communication services, along with health care and education. This will be done through: mainstreaming climate change adaptation in the building sector by making provision for the building code established in the Physical Planning Act (2003) and updating the environmental management system (EMS) plans; installing climate proofing measures on 54 priority buildings of the 254 buildings in the government sector; constructing climate-resilient storm shelters attached to public clinics; and constructing a climate-resilient bunker to store emergency supplies for the health, energy, building and welfare sectors.

4. Historically, Antigua and Barbuda had only been directly hit by relatively low-intensity tropical storms, which seldom reached hurricane status above Category 3; only one historical Category 4 has been confirmed. Consequently, building codes in Antigua and Barbuda did not prescribe the construction methods/technologies required to withstand hurricanes above Category 3. Previously, buildings designed to withstand up to a Category 3 were sufficient, but the increasing intensity and frequency of hurricanes hitting the country have had severe impacts on the built environment and population. In recent years, the damage caused by

Category 5 hurricanes – particularly Hurricanes Luis, Maria and Irma – has highlighted the limitations of regulations for the construction of buildings that must now withstand high wind speeds of over 200 km/h and the high levels of rainfall caused by these events.

5. Climate change projections under both the representative concentration pathway (RCP) 4.5 and 8.5 scenarios[1] indicate that, although the total number of storms is not expected to change significantly, there will be an increase in the frequency of high-intensity storms (Category 4 and 5 hurricanes) experienced by Antigua and Barbuda.[2] The increasing intensity of hurricanes is already evident in the country. The return rate of Category 4 hurricanes in the first half of the twentieth century was one in 50 years compared with the latter half of the century, when the return period for Category 4 hurricanes shortened to one in 10 years, the only Category 5 hurricanes in recorded history to affect the country have occurred very recently, namely Hurricanes Irma and Maria in 2017. The first of these, Hurricane Irma, was a direct hit on Barbuda and resulted in the destruction of approximately 95 per cent of all infrastructure on the island. The combined impact of the 2017 hurricanes amounted to USD 136 million in damages and USD 19 million in post hurricane economic losses, approximately, with total recovery costs estimated at USD 222 million without considering the costs related to loss of revenue to the economy up to 12 months after the hurricane.

6. Damage to critical public infrastructure includes centralized power and water supplies, roads, hospitals, clinics, emergency services, telecommunications and schools, and it leads not only to disruptions to economic activity but also to considerable recovery costs after an event. Moreover, it often takes several months for the country to recover from such disruptions, leading to considerable declines in economic productivity and quality of life. Therefore, the resilience interventions include decentralized renewable energy and climate-resilient water-harvesting solutions. Following a Category 5 hurricane, the power and water supply in Antigua and Barbuda can be disrupted for 3–24 months while damage to communication and transport infrastructure disrupts associated services for up to 6 months, with considerable impacts on the country's economy. In addition to the general disruption of economic activities, food and medical imports, which are mostly brought in by ship, are disrupted for several weeks after an extreme event, impacting the health and well-being of local communities. These impacts are exacerbated by the significant damage caused by hurricanes to critical public service infrastructure, which limits the capacity of emergency services as well as the National Office of Disaster Services (NODS) to prepare for and respond to extreme climate events.

7. The capacity of the country to be prepared for a hurricane is further constrained by inadequate early warning systems and the absence of formalized communication and early action protocols. Given the projected increase in the frequency of Category 4 and 5 hurricanes, the combined impacts on the economy and well-being of local communities will become increasingly severe in the absence of urgent adaptation interventions.

8. Several key barriers to the adaptation process are identified in the funding proposal:

(a) Limited financial capacity to invest in climate proofing critical public services and community buildings to withstand Category 4 and 5 hurricanes. This includes not being able to install decentralized renewable backup energy and water systems to maintain supply when centralized distribution lines are disrupted by a storm;

[1] These RCPs are based on the main forcing agents of climate change, including greenhouse gas (GHG) emissions, GHG concentrations and land-use change. RCP 4.5 represents the likely best-case scenario with a peak radiative forcing of 4.5 W/m2 (~650 ppm CO_2eq) at stabilization after 2100. RCP 8.5 represents a very high GHG emission scenario with a peak radiative forcing of 8.5 W/m2 (~1,370 ppm CO_2eq) and no expected stabilisation in emissions. RCP8.5 indicates a business as usual scenario where the rate of GHG emissions continues to increase with no mitigation measures.

[2] The Intergovernmental Panel on Climate Change. Fifth assessment report. Available at: <https://www.ipcc.ch/assessment-report/ar5/>. Accessed on: 19 September 2019.

(b) The remote location of Antigua and Barbuda makes it difficult to access solar photo-voltaic panels for replacement and to restore power after a storm in critical service buildings that are equipped with decentralized renewable energy systems. There is currently a limited stock of renewable energy equipment available in the country and no secure location to store additional backup equipment;

(c) Damage of critical information servers/computers at public institutions, including hospitals, police stations and other government institutions, during a major storm, resulting in the loss of vital information for public health and security. Currently there is limited technical capacity to preserve this information, either through the safeguarding of physical infrastructure or the provision of reliable coordinated backup systems;

(d) The high cost of adaptation of the building sector to Categories 4 and 5 limits the ability to sufficiently mainstream requirements into the country's regulatory frameworks;

(e) Local communities and private sector property owners, as well as public sector decision-makers and design engineers/architects, have limited knowledge of the adaptation options available for the building sector. This increases the risk of over-engineering of interventions and consequently higher incremental costs and risks for low-income groups that cannot fulfil the requirements of the code;

(f) Limited replenishment of development funds as well as limited consideration of climate change adaptation by the banking and insurance sectors due to the lack of evidence-based information;

(g) Limited technical capacity within NODS, Development Control Authority (DCA) and Public Works Department (PWD) for long-term monitoring, maintenance and planning for adaptation measures in the building sector constrains the long-term sustainability and upscaling potential of climate change adaptation interventions. These capacity limitations extend to the local workforce, which is ultimately responsible for the installation and maintenance of equipment; and

(h) Limited technical capacity in the Antigua and Barbuda Meteorological Services (ABMS) and NODS to adequately disseminate early warnings to support early action, particularly with regard to preparing shelters and securing renewable energy equipment ahead of a storm.

9. To remove these barriers three activities with various measures are planned in the funding proposal: implementation of climate-proofing interventions in critical public service and community buildings to improve resilience to, and recovery from, extreme climate events; mainstreaming climate change adaptation into the building sector and relevant financial mechanisms; and strengthening of climate information services to facilitate early action.

10. Strengthening the adaptation capacities of Antigua and Barbuda against high category hurricanes implies: training relevant staff from the NODS, DCA and the PWD as well as the private sector on operational procedures for long-term monitoring, maintenance and upscaling of climate-resilient, renewable energy and water harvesting technologies in accordance with the national building code; training the local workforce on the installation, operation and maintenance of climate-proofing measures for the targeted buildings; strengthening climate information services to facilitate early action for extreme climate events; and mainstreaming climate change adaptation for the building sector into public and private financial, insurance and banking sectors.

11. The technical designs are derived from the most advanced protocols developed by the state of Florida in the United States of America. In addition to these physical interventions, backup protocols will be developed and operationalized to secure vital information within critical public institutions, including hospitals, clinics, schools, police and fire stations. The vulnerability-driven selection process was followed for targeted critical public service and

community buildings to ensure that climate-proofed critical services provide maximum coverage to vulnerable areas with high population density, the poorest communities, and those individuals living in areas outside the main drainage channels. Project intervention sites were also selected by accounting for the location of lower income communities in Antigua and Barbuda, where infrastructure is generally less resilient to the extreme winds and heavy downpours associated with Category 4 and 5 hurricanes.

12. According to the funding proposal, the seventh edition of the Organization of Eastern Caribbean States Building Code is currently under peer review to tailor it to the technical specifications and standards of Antigua and Barbuda, specifically to account for Category 4 and 5 hurricanes. This updated version of the building code is expected to be formalized by Antigua and Barbuda's Cabinet in 2020 and will be aligned with the scheduling of proposed project interventions.

13. Direct beneficiaries of adaptation activities are planned to reach 73,216 vulnerable people and indirect benefits will be gained by the entire population of the country, through reducing the adverse impacts of extreme climate events on human life and enabling the country's major economic sectors to resume business as usual more quickly following the extreme events. Direct health benefits are also expected to incur through the improved provision of clean water, increased operability of clinics during a storm, integration of storm shelters into existing clinics and improved storage for vital medication, which are usually damaged by an intense storm.

14. Mitigation co-benefits are planned within activity 1, which considers the implementation of energy efficiency and renewable solutions in the building sector, along with the strengthening of adaptive capacities. In particular, 1.4 MW solar energy capacity will be installed over the 54 buildings prioritized for strengthening, which is about 3 per cent of the nationally determined contribution (NDC) target. A preliminary calculation shows annual savings of emissions to be 1,923 tonnes of carbon dioxide. The "Approved Methodology for Small-scale Clean Development Mechanisms I.F.: Renewable electricity generation for captive use and mini-grid" (version 3.0) was applied by the project.

15. It is the opinion of the independent Technical Advisory Panel (TAP) that the direct adaptation impact (72 per cent of total population) of the funding proposal is high, while the mitigation co-benefit is moderate.

1.2 Paradigm shift potential *Scale: High*

16. The proposed project will catalyse a paradigm shift in Antigua and Barbuda's preparedness to the disaster risks reduction process from conventional development to an approach that prioritizes the adoption of innovative climate-resilient solutions and early action. In particular, preparedness is focused on the building and infrastructure sectors.

17. The target of the funding proposal is to mainstream climate resilience into national building regulations, combined with strengthening the capacity of local authorities, building inspectors, engineers, architects and draughtsmen to adhere to these regulations. Mainstreaming climate change into public and private financial sectors will promote the upscaling of adaptation interventions across the country's entire building sector. Further benefits are expected across the Caribbean, with Antigua and Barbuda serving as an example of climate-adaptive building practices for small island developing States.

18. This project will ensure the evidence and information needed to attract replenishments from local and international sources as well as the mainstreaming of adaptation into the private banks. In particular, the funding proposal will contribute to strengthening the Sustainable Island Resource Framework (SIRF) fund capacity for financing adaptation projects.

19. Climate-proofing of buildings in Antigua and Barbuda is currently financed by two streams, namely via the SIRF fund for small enterprises that do not always qualify for access to funds from the mainstream banking sector, and via private banks for medium and large enterprises. Under the SIRF fund's climate change window, there is currently a Revolving Fund Programme for Adaptation, which focuses on providing microfinancing for the incremental cost of implementing adaptation measures for small buildings (i.e. vulnerable households, clinics, schools, etc.). In its current form, this climate change window is optimized for small loans/grants to vulnerable households, with individual applications capped at 5 per cent of the total funds available at a given time under this window. However, the anticipated adaptation needs exceed the available funds, particularly for medium and large enterprises. The loans are to be used for the incremental cost of the climate interventions only and cannot be used for normal construction cost. It is designed in a way not to compete with the local private financial sector.

20. The paradigm shift potential of the project will be the evidence-based analysis of the financial and other barriers in order to allow the government, along with the banking and insurance sectors, including the SIRF fund, to collaborate to reduce the incremental cost of meeting the standards of the code.

21. This proposal contributes to increase the country's preparedness to climate change risks through implementation of higher standards of building and infrastructure resiliency, strengthening financial institutions for financing adaptation needs and reducing adaptation costs. These activities are considered by the independent TAP as activities contributing to a paradigm shift process.

1.3 Sustainable development potential *Scale: High*

22. The funding proposal is dedicated to the sustainable development process of Antigua and Barbuda through increasing the resilience of the building sector and infrastructure to climate change extremes. The selection of buildings for increasing resilience was based on the level of vulnerability of the population and public services. The proposal also contributes to increasing energy efficiency in the building sector and share of renewable energy in energy consumption.

23. Measures planned in the proposal increase the safety of the most vulnerable populations (children, women, the disabled) to high category hurricanes; improve the resilience of the public and private sectors; and reduce economic losses.

24. The funding proposal will contribute to the following Sustainable Development Goals (SDGs):

(a) SDG 11: Sustainable cities and communities; make cities and human settlements inclusive, safe, resilient and sustainable. Ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums. By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations. By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015-2030, holistic disaster risk management at all levels;

(b) SDG 13: Climate action; take urgent action to combat climate change and its impacts. Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries. Promote mechanisms for raising capacity for effective climate

change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities;

(c) SDG 3: Good health and well-being; ensure healthy lives and promote well-being for all at all ages. Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks; and

(d) SDG 9:Industry, innovation and infrastructure; build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation. Facilitate sustainable and resilient infrastructure development in developing countries through enhanced financial, technological and technical support to African countries, least developed countries, landlocked developing countries and small island developing States.

25. Potential of the funding proposal to contribute to sustainable development is high.

1.4 Needs of the recipient *Scale: High*

26. The population of Antigua and Barbuda is 102,000 (2017). The country's economy heavily depends on natural resources, low-lying coastal zones and favourable climatic conditions to support the tourism sector, which contributes 80 per cent to the country's gross domestic product. Seventy per cent of the population directly or indirectly are employed in the tourism sector, which generates 85 per cent of foreign exchange earnings.

27. The climate change-related needs of Antigua and Barbuda are well formulated in the country's NDC. The conditional adaptation target of the NDC relevant to the proposed project states that "by 2030, all buildings are improved and prepared for extreme climate events including drought, flooding and hurricanes". Unconditional targets that the country has committed to include enhancing the enabling legal, policy and institutional environment for a low carbon development pathway, as well as updating the building code to address the projected impacts of climate change. This funding proposal also contributes to mitigation targets aiming to "by 2030, achieve an energy matrix with 50 MW of electricity from renewable sources both on and off-grid in the public and private sectors".

28. The NDC states that, in addition to policies and sustainable action plans, national efforts will be made to establish a sustainable financial environment through the SIRF fund established under national environmental law. The executing entity (EE) of the fund is the Department of Environment, which is the direct access entity submitting this funding proposal.

29. According to the NDC (submitted in 2015), for implementation of adaptation targets the country needs USD 20 million and for mitigation targets and USD 220 million annually.

30. Incorporating standards for Category 4 and 5 hurricanes into new buildings is easier and cheaper than for existing structures. Upgrading of existing buildings to resist Category 4 and 5 hurricanes is estimated to cost over USD 6.4 billion[3] while the economy (GDP) of Antigua and Barbuda is USD 1.6 billion[4]. It will take time to transition the building sector alone to adjust for climate change impacts and to generate the funds needed. In addition, this adaptation cost could not be fully covered through domestic sources of financing – including both private and public sector finance. The funding proposal states that although Antigua and Barbuda is considered a middle-income country on a per capita basis, its size and small population mean that it lacks the scale required to invest adequately in adaptation. The country also has a high

[3] This figure is derived from initial costings on resilience expenditure from applications to the SIRF Fund.
[4] World Bank Data. 2018. Antigua and Barbuda. Available at: https://data.worldbank.org/country/antigua-and-barbuda.

public debt burden that, in 2018, reached approximately USD 1.4 billion, which is more than 88 per cent of the country's gross domestic product.

31. Figures provided in the funding proposal demonstrate increasing intensity trends of hurricanes. The frequency and intensity of these storms is strongly correlated to: (i) high sea surface temperature in the major development region; (ii) decreasing vertical wind shear in the mid-troposphere during depression development; and (iii) changes in the La Niña phase of the El Niño Southern Oscillation. In the lead up to Hurricane Irma in 2017, the sea surface temperature anomaly from baseline climatic conditions was shown to be in the order of 1 °C in the region to the south-east of Antigua and Barbuda.

32. The country's vulnerability to such extremes is further exacerbated by limited capacity within ABMS for early warning and preparatory action in response to an extreme climate event.

33. The proposed project seeks to move the building codes from a standard to a legal requirement that allows the Government of Antigua and Barbuda to include clear financial incentives to reduce the barriers hindering full implementation of the code.

34. The long-term sustainability and upscaling potential of climate change adaptation interventions are constrained by limited technical capacity within NODS, DCA and PWD for long-term monitoring, maintenance and planning for adaptation measures in the building sector. These capacity limitations extend to the local workforce, which is ultimately responsible for the installation and maintenance of equipment. Long-term maintenance of destroyed infrastructure and fast rehabilitation after hurricanes, including the temporary removal of solar panels, requires adequate lead time on early warnings, which is one of the barriers considered in the funding proposal. Currently there is limited technical capacity in the ABMS and NODS to adequately disseminate early warnings to support early action, particularly with regard to preparing shelters and securing renewable energy equipment ahead of a storm.

35. The current capitalization of the SIRF fund accounts for USD 8 million within the next 2 years, resulting in a financial gap of USD 5 million/year to bring existing buildings up to standard for the Category 4–5 hurricane building code. This financial gap will be addressed by using lessons learned from the proposed project to reduce the cost of adaptation.

36. Antigua and Barbuda's Medium-Term Development Strategy (MTDS) outlines the strategies and actions to be undertaken from 2016–2020 to meet the national goal of becoming a developed country in 15–20 years.[5] Within the MTDS, seven flagship priorities are emphasized, with two of these directly relating to improved buildings and infrastructure. The technical and institutional capacity of the local workforce, as well as private sector consumers and producers[6] will be built through developing and delivering training programmes under output 2 of the project. Activities planned for this output will focus on the application of the updated building code as well as on effective techniques for implementing, monitoring and maintaining climate change adaptation measures on infrastructure.[7] This output aligns closely with one of the priority directions of the MTDS, which focuses on, inter alia, the renewal and maintenance of critical infrastructure.

37. The independent TAP considers that the country's need to upgrade the building code against the high intensity hurricanes, to implement this upgraded code and ensure long-term sustainability of the system operation is high.

1.5 Country ownership *Scale: High*

[5] Medium-Term Development Strategy 2016 to 2020. 2015. Government of Antigua and Barbuda.
[6] Private sector consumers include business owners and homeowners, while private sector consumers refer to architects, engineers and private contractors.
[7] Such measures include climate-resilient water harvesting and decentralized renewable energy.

38. The funding proposal is included in the GCF country programme.

39. The project applicant and AE is the Department of Environment (DoE) of Antigua and Barbuda. The DoE is also an AE to the Global Environmental Facility.

40. The EE of the project is the Ministry of Finance (MoF) of Antigua and Barbuda. As the EE, MoF will provide oversight and manage entities in the respective government bodies (e.g. Ministry of Works, Ministry of Health, Wellness and the Environment, NODS and ABMS) that will be involved in the implementation of the funding proposal and will be responsible for long-term sustainable maintenance of infrustructure after the project exit. The MoF will be accountable to the AE for project implementation. All operating policies and procedures will follow the DoE policies and procedures.

41. The DoE is executing agency of the SIRF fund and is involved in coordination of the implementation process of climate change-related activities. The SIRF fund was established in 2015 as part of the Environmental Planning and Management Act under the country's Financial Administration Act (2006). The fund serves several purposes, including: (i) streamlining finance by reducing duplication across agencies and consolidating their efforts; (ii) providing a consistent source of financing for planning and contingency efforts to reduce vulnerability; (iii) building resilience, particularly within the energy and water sectors; (iv) achieving long-term financial stability as a strategy for reducing the country's high debt burden; (v) leveraging and supporting non-profit organizations by providing co-financing for project development and implementation; and (vi) providing support for vulnerable groups such as farmers, fishers and building owners through increased access to finance and insurance products. The main sources of capitalization of the fund are international financial institutions, national funding sources (fees for tourist visits to protected areas and ecotourism; water levies to pay for protected areas, watershed and waterways; and carbon tax to pay for adaptation with focus on droughts, hurricane impacts and adaptation insurance); and private finance. Component 2, "mainstreaming climate change adaptation into the building sector and relevant financial mechanisms", significantly contributes to strengthening the fund's capacity in evidence-based decision-making and establishment of eligibility criteria for adaptation projects.

42. The Government of Antigua and Barbuda is currently implementing a project titled "Building Climate Resilience through Innovative Financing Mechanisms for Climate Change Adaptation", funded by a grant of USD 5 million from the Special Climate Change Fund and with co-financing from the Government of Antigua and Barbuda. Among its four primary focus areas are: (i) developing innovative financing mechanisms to fund adaptation interventions through the SIRF fund, including for the building sector; and (ii) strengthening national policies and plans to promote adaptation to climate change through, inter alia, updating the national building code. The proposed GCF project will complement the Special Climate Change Fund project as well as set the stage for scaling up the project for the private sector. GCF resources from this project will not be used to capitalize this fund, fill funding gaps or retroactively finance activities already under development or to implement other programmes/initiatives.

43. The proposed project is strongly aligned with Antigua and Barbuda's national priorities such as: the nationally determined contribution, which defines the country's commitments to addressing climate change threats through reducing greenhouse gas emissions (article 2) and increasing the adaptive capacity of the population of Antigua and Barbuda (article 4); Antigua and Barbuda's Readiness Proposal which contributes to the climate change adaptation objectives outlined in the Paris agreement; and Antigua and Barbuda's MTDS.

44. Considering the needs of the recipient country and level of coordination of ongoing activities through different projects at the national level, the country ownership is high.

1.6 Efficiency and effectiveness *Scale: High*

45. The proposed project is requesting USD 32.7 million in grant finance from GCF to enhance the climate resilience of Antigua and Barbuda's building sector to extreme climate events. The GCF investment will be supported by the Government of Antigua and Barbuda, which has committed approximately USD 13 million in co-financing. GCF financing will be used to overcome the barriers to increasing the resilience of Antigua and Barbuda's building sector to climate change threats. Grants from GCF will only be used to address the additional impacts of climate change, with government co-finance being used to cover all baseline costs – including business as usual repairs/maintenance that are necessary for buildings to ensure sustainability of climate-proofing interventions.

46. As a result of this project implementation, public and private sector stakeholders will be trained in climate-resilient adaptation solutions for the building sector, incorporating a training-of-trainers approach to ensure that institutional knowledge of these solutions is maintained regardless of staff turnover. Technical staff from DCA (e.g. building inspectors) and Ministry of Works (e.g. building maintenance teams) as well as the local workforce will be trained on how to effectively implement, operate, maintain and monitor climate-adaptive measures installed in buildings in line with the requirements of the updated national building code. Consumers and producers within the private sector will also be targeted to receive training on the application of the code.

47. The upgraded building code requires an increase of more than 50 per cent in the costs of implementation between Category 3 and Category 5 codes, which limits the ability of most citizens as well as the Government of Antigua and Barbuda to meet the standards. Therefore, involvement of the private sector in different financial schemes is important for the efficiency/effectiveness of this project and its future sustainability.

48. All operations, maintenance and insurance activities required under the project will be financed by the Government of Antigua and Barbuda within and beyond the project implementation.

49. GCF project resources will be mainly used to support the Government of Antigua and Barbuda's efforts to catalyse the creation of additional evidence-based information on climate change and financial schemes to promote investment in climate-adaptive measures in Antigua and Barbuda (activity 2.2).

50. The increased resilience of 54 public buildings planned within this funding proposal and the adaptation of some community buildings as shelters will allow the Government to provide critical services while the resilience of other buildings in the country can be enhanced over a longer period of time.

51. It is the opinion of the independent TAP that the efficiency and effectiveness of the results should be high.

II. Overall remarks from the independent Technical Advisory Panel

52. The independent TAP recomends this funding proposal for approval by the GCF Board.

Response from the accredited entity to the independent Technical Advisory Panel's assessment (FP133)

Proposal name:	Resilience to hurricanes in the building sector in Antigua and Barbuda
Accredited entity:	Department of Environment, Antigua and Barbuda
Country/(ies):	Antigua and Barbuda
Project/programme size:	Small

Impact potential
The iTAP's assessment for this investment criterion is duly noted.
Paradigm shift potential
The iTAP's assessment for this investment criterion is duly noted.
Sustainable development potential
The iTAP's assessment for this investment criterion is duly noted.
Needs of the recipient
The iTAP's assessment for this investment criterion is duly noted.
Country ownership
The iTAP's assessment for this investment criterion is duly noted.
Efficiency and effectiveness
The iTAP's assessment for this investment criterion is duly noted.
Overall remarks from the independent Technical Advisory Panel: The DOE ATG greatly appreciates the assessment made by the iTAP for this project.

GOVERNMENT OF ANTIGUA AND BARBUDA

DEPARTMENT OF ENVIRONMENT

GENDER ASSESSMENT AND GENDER AND SOCIAL INCLUSION ACTION PLAN

DOE CLIMATE CHANGE PROGRAMME

RESILIENCE TO HURRICANES IN THE BUILDING SECTOR IN ANTIGUA AND BARBUDA

The Project Management Unit (PMU) of the Department of Environment, Ministry of Health, Wellness and the Environment

March 20th, 2020

Prepared for the Green Climate Fund

Department of Environment
PO Box W693, #1 Victoria Park Botanic Gardens, Factory Rd, St. John's Antigua
+1 268 462-4625 | antiguaenvironmentdivision@gmail.com
www.environmentdivision.info

Table of Contents

LIST OF ABBREVIATIONS

AF	Adaptation Fund
AF (2)	"An Integrated approach to physical adaptation and community resilience in Antigua and Barbuda's northwest McKinnon's watershed"
APUA	Antigua Public Utilities Authority
CSEC	The Caribbean Secondary Education Certificate Examination
DCA	Development Control Authority
DMU	Data Management Unit at the Department of Environment
ESIA	Environmental Social Impact Assessment
ESMP	Environmental Social Management Plan
GAP	Gender and Social Inclusion Action Plan
GCF	Green Climate Fund
GCF BUILD	"Resilience to Hurricanes, Floods and Droughts in the Building Sector in Antigua and Barbuda"
GISS	Grid-Interactive Solar Systems for Schools and Clinics
IRENA ADFD	Transformation of the Water and Government Sectors using Renewable Energy
MET OFFICE	Meteorological Department
MOF	Ministry of Finance, Corporate Governance and Public Private Partnerships
MOW	Ministry of Public Works
NODS	National Office of Disaster Services
RE	Renewable Energy
SCCF	"Building climate-resilience through innovative financing mechanisms for Ecosystem-based Adaptation"
SEF	Sustainable Energy Facility
SIRF Fund	Sustainable Island Resource Framework Fund
SPPARE	Sustainable Pathways Protected Areas and Renewable Energy UNEP project

1. EXECUTIVE SUMMARY

1.1. In recent years, the Government of Antigua and Barbuda (GoAB) has sought to reduce the vulnerability of its public infrastructure, particularly critical buildings to natural hazard events with a shift from emergency response and recovery to risk reduction and mitigation; this is deemed far less costly than disaster relief and response. This follows the 2017 hurricane season which cost the GoAB over USD 200 million in loss and damages. Climate predictions indicate that such storms will become more frequent as well as the twin-island state will experience prolonged drought conditions, temperature and sea level rise.

1.2. As an Accredited Direct Access Entity to the Green Climate Fund (GCF), the Department of Environment (DOE) is seeking grant financing to implement climate change adaptation within critical public buildings and community buildings to allow for resilience to hurricanes, droughts and flooding; to increase the technical capacity of the public and private sector in order to sustain the interventions as well as improve accessibility, and visibility and response of community members and the private sector to warnings of threats of disaster . Within the context of the DOE project portfolio, this project is expected to benefit a significant portion of the population, particularly low income to impoverished families who rely on public services as well as rural communities, particularly after an extreme weather event.

1.3. The ESIA and ESMP conducted under this project assessed environmental and general social impacts for this project while mitigating against risks. This Gender Assessment and Action Plan seek to assess the perceived or real differential vulnerability of men and women that are expected to be further exacerbated by the impacts of climate change. This study also seeks to identify the gender related risks that can impact on the project and make recommendations to mitigate the same.

1.4. In general, there are no known institutional and legal bias against men or women in Antigua and Barbuda. Even though this is the case and due to the lack of gender disaggregated data, however, many of the internationally known biases against women are many times included in project design. In the case of this project which specifically address infrastructure, the assessment has identified the following:

- Courses in construction were made available a few years ago to women. The first graduates are expected over the next few years; the project will establish an apprentice programme for these women newly coming into the field.
- Training in construction is predominantly delivered to men. The project notes the difference in learning between men and women and girls and boys and seeks to provide gender sensitive training.
- Most of government buildings do not have access for persons with special needs. While the project acknowledges this the budget is not adequate to make significant changes.
- The project benefits men and women equally, however, it mostly benefits persons who are very low income more so than on the basis of gender.

2. INTRODUCTION

2.1. Country background and problem setting

2.2.1. Antigua and Barbuda forms part of the Leeward Islands in the Caribbean located between the Caribbean Sea and the Atlantic Ocean. The country gained independence from British rule in 1981 and now forms part of the British Commonwealth of Nations[1]. The total population is ~93,500, the majority of which reside on Antigua. The capital city of St John's in Antigua is home to 22,000 people alone, while only 1,600 permanent residents live on Barbuda[2]. More than 60% of the entire population of the country lives within the coastal zone[3].

2.2.2. The country has a tropical marine climate with average daily temperatures between 24°C and 29°C, and an average annual rainfall of 600–1,250 mm[4]. As little as 20% of this rainfall occurs during the dry season between January and April, with almost 50% of the annual rainfall occurring during storms in the hurricane season between August and February. Relative to other islands in the region, Antigua and Barbuda has a greater level of humidity and heavier dew deposits during the night that contribute to water supplies in the drier regions[5]. However, the low annual rainfall and high seasonal variability in precipitation has resulted in Antigua and Barbuda becoming a water-scarce country.

2.2.3. Tourism is the most prominent economic activity in the country and is responsible for: i) 80% of the GDP; ii) 85% of all foreign exchange; and iii) employment for 70% of the population.[6] The tourism industry draws almost one million visitors each year for the country[7;8]. Other prominent economic sectors are agriculture and industry, which contributed 2% and 18% respectively to the national GDP in 2016[9]. Each of these sectors are extremely vulnerable to the impacts of climate change and after a hurricane most persons lose their jobs. The majority of persons working in this sector are women.

2.2.4. SIDS are generally not major contributors to climate change through greenhouse gas emissions, but because of their geographic positioning they are amongst the countries least able to adapt – and most vulnerable – to climate change impacts, particularly from

[1] Nationally Determined Contribution (NDC). 2015. Government of Antigua and Barbuda.
[2] Based on 2011 Census Data.
[3] United Nations Statistics Division. 2017. UN Data: Antigua and Barbuda. Available at: http://data.un.org/CountryProfile.aspx?crName=antigua%20and%20barbuda [accessed 13.03.2017].
[4] Earth Institute: Columbia University. 30 July 2014. Climate change and eastern Caribbean rainfall. Available at: http://climatesociety.ei.columbia.edu/2014/07/30/climate-change-and-eastern-caribbean-rainfall [accessed 13.03.2017].
[5] Ellison AM & Farnsworth EJ. 1996. Anthropogenic disturbance of Caribbean mangrove ecosystems: past impacts, present trends, and future predictions. *Biotropica* 549–565.
[6] The Daily Observer. 7 January 2015. "No end in sight for A&B's water crisis". Available at: www.antiguaobserver.com/no-end-in-sight-to-abs-water-crisis/ [accessed 13.03.2017].
[7] I.e. to both islands.
[8] The Daily Observer. 17 April 2016. "Antigua has the highest monthly water deficit in OECS". Available at: http://antiguaobserver.com/antigua-has-highest-monthly-water-deficit-in-oecs/ [accessed 13.03.2017].
[9] Global Finance. 13 March 2017. "Antigua and Barbuda GDP and Economic Data". Available at: https://www.gfmag.com/global-data/country-data/antigua-and-barbuda-gdp-country-report [accessed 13.03.2017].

rising sea levels[10;11]. The population of Antigua and Barbuda is becoming increasingly vulnerable to extreme climate events, including tropical storms, hurricanes, extended dry periods, floods and rising air temperatures. Climate change is increasing the intensity of these events and subsequently the intensity of impacts experienced across the country[12].

2.2.5. As a result of observed and predicted trends of climate change and associated variability, Antigua and Barbuda is expected to experience *inter alia* rising sea levels, increased intensity of tropical storms and hurricanes, more frequent and intense droughts and floods, rising air temperatures, and a decrease in annual rainfall[13]. These climate change effects are outlined below, with more detail to be provided in the Funding Proposal and Feasibility Study.

2.2.6. Increased intensity of hurricanes

2.2.6.1. Hurricanes and tropical storms are the main climatic hazards affecting Antigua and Barbuda. Since 1995, the country has experienced 15 hurricanes and 14 tropical storms. Most of these storms range from Category 1 to 3 in magnitude with the notable exceptions of Hurricanes Irma and Maria in 2017, which are the only Category 5 hurricanes that have affected country in recorded history.[14] The frequency and intensity of these storms is strongly correlated to: i) high sea surface temperature (SST) in the major development region (MDR); ii) decreasing vertical wind shear (VWS) in the mid-troposphere during depression development; and iii) changes in the La Niña phase of the El Niño Southern Oscillation (ENSO).

2.2.6.2. Climate change projections under both the RCP4.5 and 8.5 scenarios[15] indicate that, although the total number of storms is not expected to change significantly, there will be an increase in the frequency of high-intensity storms (Category 4 and 5 hurricanes) experienced by Antigua and Barbuda. Furthermore, a 20% slow-down in storm translation speed over land for Atlantic storms has been observed. These speeds are likely to continue decreasing under future conditions of climate change, resulting in heavier rainfall events and increased flood risk.

---

[10] Caribbean Climate Change Project. 2011. Global climate change overview. Caribbean Youth Environment Network (CYEN). Available at: http://www.cyen.org/climatechange/documents/cc_and_the_caribbean.html [accessed 13.03.2017].

[11] The reasons for this vulnerability include *inter alia*: i) limited natural resources that are often already under stress from unsustainable human activities; ii) large concentrations of people in the coastal zone; iii) recurrent extreme weather events such as flooding, hurricanes and storm surges; and iv) dependence on limited freshwater resources that are often sensitive to sea-level changes. In addition, adaptation to climate change is difficult in SIDS because of: i) limited land surface area leaving little room for movement in the face of sea-level rise; ii) inadequate infrastructure – across most sectors – that is vulnerable to climate change; and iii) isolation from major markets which limits trade and thus revenue generation, limiting the availability of public resources to support climate change adaptation.

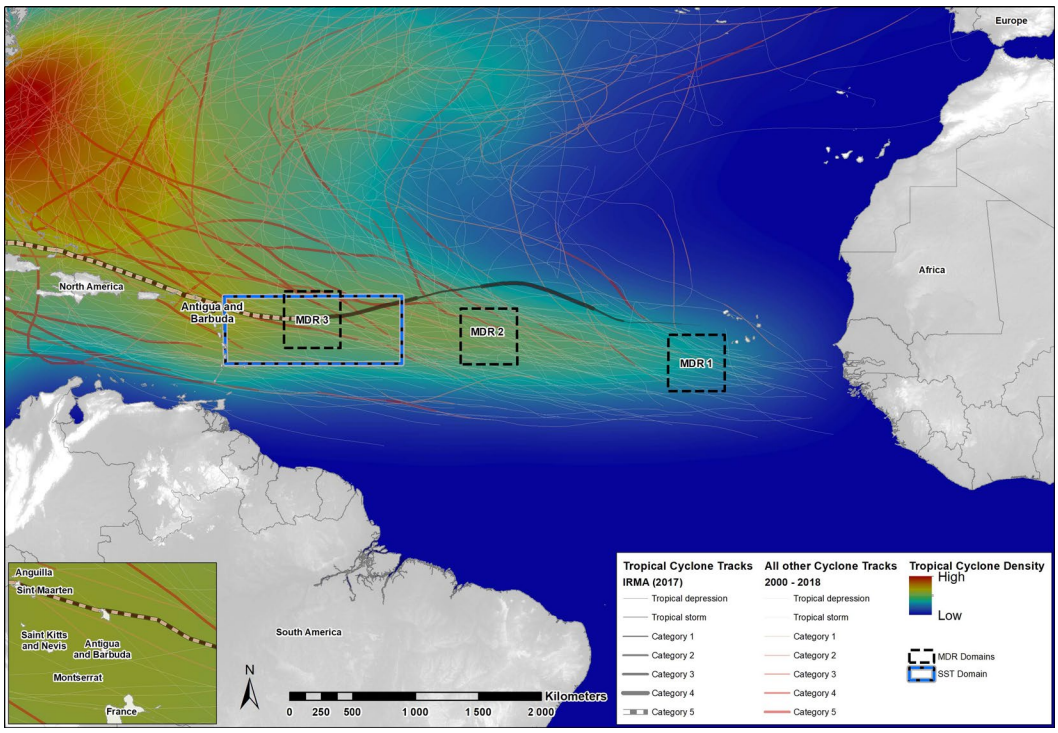
[12] In addition to increasing hurricane intensity, seismic activity across both islands is increasing, with ~7,000 tremors recorded annually. Data on these figures will be provided by the National Office of Disaster Services (NODS) at a later stage.

[13] James 2001 Antigua and Barbuda Country Paper.

[14] Details on the return periods of hurricanes and tropical storms within a range of 15 to 105 nautical miles are presented in Section 2 of Annex 2: Feasibility Study.

[15] These representative concentration pathways (RCPs) are based on the main forcing agents of climate change, including GHG emissions, GHG concentrations and land-use change. RCP4.5 represents the likely best-case scenario with a peak radiative forcing of 4.5 W/m2 (~650 ppm CO2 eq) at stabilization after 2100. RCP8.5 represents a very high GHG emission scenario with a peak radiative forcing of 8.5 W/m2 (~1,370 ppm CO2 eq) and no expected stabilization in emissions. RCP8.5 indicates a business as usual scenario where the rate of GHG emissions continues to increase with no mitigation measures.

FIGURES 1: VERTICAL WIND SHEAR (VWS) AND SEA SURFACE TEMPERATURE (SST) DOMAINS USED FOR THE ANALYSIS OF MAJOR DEVELOPMENT REGIONS (MDRS) FOR HURRICANES THAT AFFECT ANTIGUA AND BARBUDA. LINES SHOW THE HISTORICAL TRAJECTORIES OF HURRICANES.



2.2.6.3. Given that Category 4 and 5 hurricanes are expected to occur more frequently under future climate conditions, the combined impacts of intense rainfall and strong winds will become increasingly severe in the absence of urgent adaptation interventions. This will have severe impacts on the lives and livelihoods of local communities as well as the economy as a whole[16]. Following a Category 5 hurricane, power and water supply can be disrupted for up to 24 months, while damage to communication and transport infrastructure disrupts associated services for up to 6 months. Furthermore, rough seas and inflated insurance premiums after a storm disrupts the import of vital food, medical and building supplies for several weeks after an extreme climate event. The ability of the country to respond to such events is constrained by the vulnerability of critical public services, including healthcare, police, fire and rescue services as well as government coordination and response agencies. Disruption to these services caused by damages to critical infrastructure reduces the efficiency and effectiveness of emergency response and delays recovery.

2.2.6.4. The impact of such events on the economy is severe. For example, Hurricanes Luis and Marylin (1995) resulted in a ~30% decline in the country's GDP, while Hurricanes Irma and Maria (2017) resulted in US$136 million in damages and US$19 million in economic

[16] A detailed cost-benefit analysis is presented in Annex 3 and summarised in Section D.6 of the Funding Proposal. This analysis describes what the projected costs of extreme climate events will be in Antigua and Barbuda with and without project interventions under baseline and projected climate change scenarios.

losses across major sectors in the country[17]. To fully recover from the damages and economic losses caused by the 2017 hurricanes, an estimated US$222 million in support was required, including US$5 million for environmental recovery and US$11.5 million for disaster risk management. Table 1 below provides a sector-specific breakdown of these damages and losses as well as the estimated recovery needs.

TABLE 1: DAMAGES AND LOSSES CAUSED BY HURRICANE IRMA AND MARIA AS WELL AS THE RECOVERY NEEDS OF THE COUNTRY

Sector	Damage (million US$)	*Losses (million US$)*	*Total (million US$)*	*Recovery needs (million US$)*
Infrastructure	20.5	*0.61*	*21*	*38.3*
Social	54.2	*2.7*	*57*	*93.3*
Production	59.5	*8.7*	*68.2*	*70.3*
Governance	0.87	*0.75*	*1.5*	*2.2*
Culture	1.15	*0.76*	*1.9*	*1.4*
Total	136	*18.9*	*155*	*222*

2.2.6.5. Antigua and Barbuda has building codes for Category 3 hurricanes. The country experienced one Cat 5 in 2017. The greatest impacts, however, are:

- Destruction to buildings i.e. homes, business, churches, clinics and schools;
- Persons losing their homes and businesses are still having to make payments to the banks and creditors even though they cannot;
- Over 50% of persons do not have health insurance;
- Over 60% of children attend government schools;
- Where funds are available, materials have to be imported to island. Homeowners may have to wait for months to get the materials they need;
- Risks to homeowners' security when the electricity grid is down. Disruptions to the electricity grid can last for months. Hurricane Irma, a Category 5 storm, the electricity in Barbuda was disrupted for over 9 months.

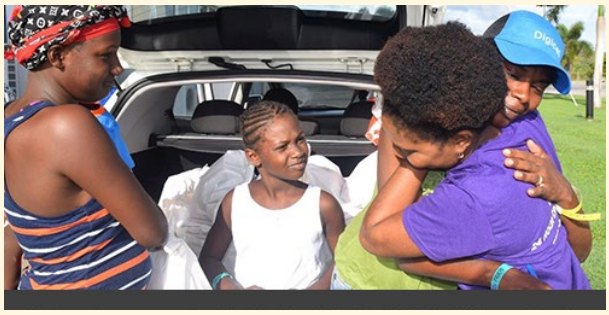
[17] Government of Antigua and Barbuda. Antigua and Barbuda Recovery Needs Assessment. Available at: https://www.gfdrr.org/sites/default/files/publication/Antigua%20and%20Barbuda%20executive%20summary_print_text%282%29.pdf

3. Baseline Gender Situation for Antigua and Barbuda

3.1. In general, **gender** plays an important role in determining the adaptive capacities of individuals to climate change. Different hazards, however, affect men and women differently. Gender considerations can take on board the specific individual impacts based on hazards, the ability of the individual to withstand and recover from hazards and time taken to do so compared to others, and the policy and other interventions that can be undertaken by the state in general and specifically by projects to build resilience and reduce long term vulnerability.

Case Study: Post-hurricane delivery of "dignity kits" to women and girls of childbearing age

After Hurricane Irma struck Antigua & Barbuda in September 2017, the population of Barbuda was evacuated to Antigua and the Directorate of Gender Affairs and the UN distributed "dignity kits", containing basic health and hygiene products such as soap, sanitary napkins and underwear – critical items for women and girls that can be easily overlooked in a disaster response. There were 650 pregnant women at the time of the hurricane.

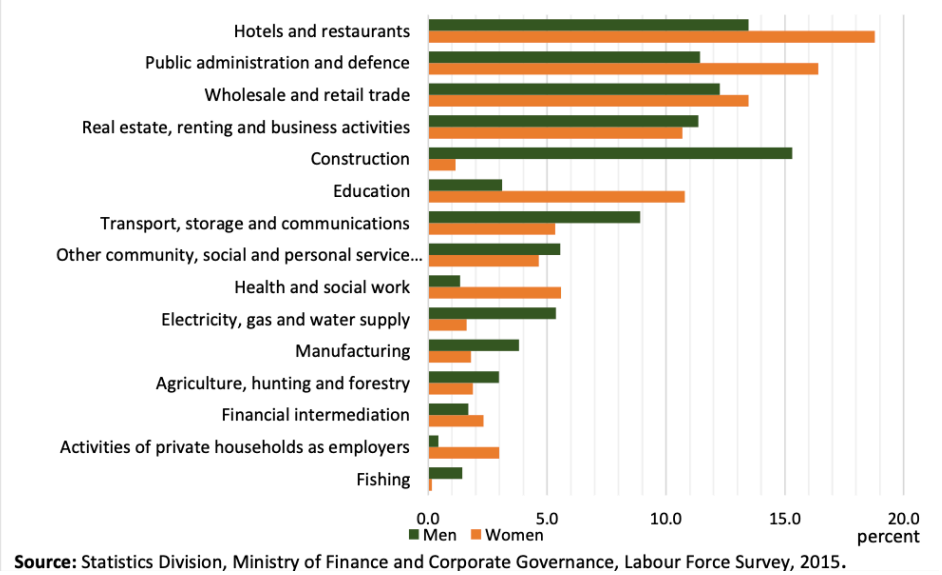


3.2. Gender policy development and implementation in Antigua and Barbuda is led by the Directorate of Gender Affairs in the Ministry of Social Transformation, Human Resource Development, Youth and Gender Affairs. The Department of the Environment's (DOE) gender approach is focused specifically on issues related to the impact of climate change and environmental policy on gender and the specific policy and project design that can be used to respond to these gender differences. This approach is believed to improve project quality, reduce risk and increase changes of support from the most beneficiaries.

3.3. The proposed GCF Build project is designed to increase the adaptability of mainly poorer men and women and their families to have continued access to free government services. These services include health, education, security and key social services to groups of persons with very limited ability to adapt. The project seeks to achieve this via building resilience in the infrastructure such as clinics, schools, police and other buildings that provide the space to deliver these services. The project will seek to focus mainly on the impact of hurricanes on building infrastructure that facilitate the delivery of these services to men, women and their families.

3.4. To achieve this goal, the gender analysis seeks to understand the situation of women, men, boys and girls from communities in Antigua and Barbuda

FIGURES 2: EMPLOYMENT BY INDUSTRY AND SEX



Source: Statistics Division, Ministry of Finance and Corporate Governance, Labour Force Survey, 2015.

4. Comparative Summary of Key Gender Equality Indicators

TABLE 2: KEY GENDER EQUALITY INDICATORS FOR ANTIGUA AND BARBUDA (SOURCE: ADAPTED FROM RAWWIDA BAKSH AND ASSOCIATES, 2014. COUNTRY GENDER ASSESSMENT (CGA) ANTIGUA AND BARBUDA REPORT)

Country	Total pop.	Population 0-14 years old	Population 15-24 years old	Population 64 years and over	Life Expectancy at Birth	%/Number of male or female-headed households	Maternal Mortality Rate	Infant Mortality Rate	Labour Force Participation	Unemployment Rate	Enrolment in Primary Schools	Enrolment in Secondary Schools	Enrolment in Tertiary Education	No. of males/ females in Parliament	Gender-based Violence (GBV)
Antigua & Barbuda	M-40,007 (48%) F-43,271 (52%) T-83,278 (100%) (GOAB Census, 2011)	M-11,333 (51%) F-10,979 (49%) T-22,312 or 24% of total pop. (CIA, 2013)	M-7,465 (49.5%) F-7,622 (50.5%) T-15,087 or 16.7% of total population (CIA, 2013)	M-2,771 (43%) F-3,659 (57%) T-6,430 or 7.1% of total population (CIA, 2013)	M-73.9 years F-78.1 years T-75.9 years	M-56.5% (2001) F-43.5% (2001) (GOAB Census, 2001)	0.81 (CARICOM, 2010)	10.9 (Health Information Division, Ministry of Health Antigua and Barbuda)	M-18,602 (47%) F-21,341 (53%) T-39,943 (Kairi, CPA 2005/2006)	T-12% (estimate) GOAB, 2012	M-100% F-88.1% T-94.0% (GOAB, Ministry of Education, 2009-2010)	M-78.9% F-82.1% T-80.5% (CEPAL, 2011)	M-689 (34.8%) F-1291 (65.2%) T-1980 (100%) (OECS, 2010-2011)	*H.O.R/ Lower House* M-16 (89.9%) F-2 (11.1%) T-18 (100%) *Senate/Upper House* M-10 (58.8%) F-7 (41.2%) T-17 (100%) (IPU 2014)	T-216 victims (DOGA, 2011)

5. Project Background

5.1. To increase the resilience of the population in Antigua and Barbuda to extreme climate events, the proposed project will implement climate-resilient technologies and interventions in public and community buildings (hereafter referred to as 'public buildings') and will strengthen institutional, technical and financial capacity within the GoAB to enable climate-resilient building development in the long term. These climate-proofing interventions will be implemented in buildings providing critical services – including disaster services, healthcare, fire services and police – as well as those buildings providing public and community goods – including *inter alia* community centres and schools. A combination of international, regional and island-specific best practices will be used to climate-proof public buildings to ensure critical service delivery during and following an extreme climate event, ultimately improving disaster risk management under changing climatic conditions. This will be accomplished through *inter alia*:

(i) supporting the mainstreaming of adaptation for the building sector into relevant national policies and standards;

(ii) building institutional and technical capacity to identify, implement, maintain and upscale climate-proofing interventions; and

(iii) climate-proofing existing public buildings to ensure that critical services remain operational during an extreme climate event, with reduced damages to buildings resulting in reduced maintenance costs in the long term.

The proposed project will increase the resilience of the building sector and strengthen disaster risk reduction (DRR) methods to climate change impacts.

5.2. This project also seeks to use some of its lessons learned to inform the enhancement of the Sustainable Island Resource Framework (SIRF) Fund. The SIRF Fund is a financing mechanism established under the Environmental Protection and Management Act (EPMA).[18]

5.3. The project defines a building as a "critical public service" if it meets two (2) of the following criteria:

a. The building provides essential services to the population of Antigua and Barbuda pre- and post- extreme climate event, including:
    - Protective
    - Emergency services
    - Medical services
    - Post-disaster assessment and response
    - Critical government office
b. The location of the building maximizes the number of beneficiaries (e.g. in an urban or settlement area);
c. The location of the building provides essential services to geographically or socially vulnerable populations

[18] Environmental Protection and Management Act (EPMA). No 11 of 2019. Government of Antigua and Barbuda.

TABLE 3: CATEGORY AND GEOGRAPHIC DISTRIBUTION OF CRITICAL FACILITIES

TYPE OF BUILDINGS	DESCRIPTION		
	Building provides essential services to the population	Impacts of hurricane, drought, flooding, heat, energy	Location of the building provides essential services to geographically or socially vulnerable populations.
All Saints Clinic	Medical	X	X
All Saints Fire Station	Security	X	
All Saint's Police Station	security	X	
Analytical Services (2)	security	X	
Antigua State College (2)	Educational	X	
Bendals Health Clinic (2)	Medical	X	X
Clareview Psychiatric Hospital (4)	Medical		X
High Court of Justice (part of Ministry of Legal and Justice Affairs Court)	Security		X
Defence Force (2)	Security		X
Department of Environment (2)	Operational	X	
Fiennes Building (2)	Social		X
Good Shepherd Children's Home	Social		X
MET Office (airport terminal)	Early warning systems	X	
Ministry of Finance	Operational	X	
National Archives	Data Security	X	
National Office of Disaster Services (NODS)	Disaster Response		X
Parham Health Clinic	Medical		X
Police Headquarters	Security	X	X
Potters Health Clinic	Medical	X	X
Her Majesty's Prison	Social		X
St. John's Fire Station	Emergency Security	X	X
Swetes Health Clinic (Can't Find on map)	Medical		X

Liberta Police Station	Security	X	X
Liberta Primary School	Educational	X	X
Urlings Primary School	Educational		X
Jennings Primary School	Educational	X	X
Bolans Primary School	Educational		X
Bendals Primary School	Educationally		X
Pigotts Clinic	Medical		X
Princess Margaret Secondary School	Educational	X	X
Cedar Grove Clinic	Medical	X	X
Old Road Clinic (1)	Medical		X
Freetown Primary School (1)	Educational		X
Emergency Medical Service (1)	Medical	X	X
Gray's Farm Clinic (1)	Medical	X	X
Gray's Farm Police Station (1)	Security	X	X
Willikies Primary School (1)	Educational		X
Red Cross (1)	Emergency/NGO	X	X
Cedar Grove Primary (1)	Educational		X
Clare Hall Secondary School (1)	educational	X	X
Bethesda Clinic (1)	Medical		X
Cobbs Cross Primary School (1)	Education		X
Barbuda fire Station (1)	Emergency/Security	X	X
Barbuda Council and Treasury (1)	Critical operations	X	X

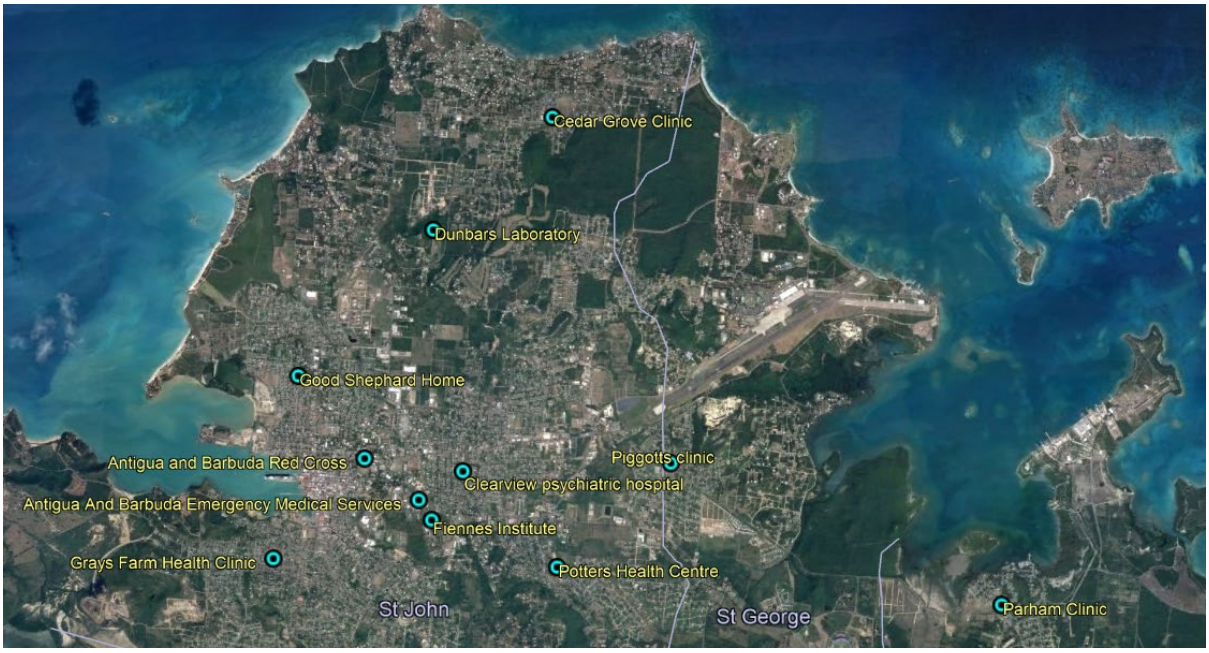
5.4. Maps of Priority Critical Public Service and Community Buildings to Receive Climate-Proofing Interventions

5.4.1. Antigua

FIGURES 3: EDUCATIONAL FACILITIES TO BENEFIT FROM GCF BUILD

FIGURES 4: LAW ENFORCEMENT AND CORRECTIONAL FACILITIES TO BENEFIT FROM GCF BUILD

FIGURES 5: HEALTHCARE FACILITIES (NORTHERN PART OF THE ISLAND) TO BENEFIT FROM GCF BUILD



FIGURES 6: HEALTHCARE FACILITIES (SOUTHERN PART OF THE ISLAND) TO BENEFIT FROM GCF BUILD

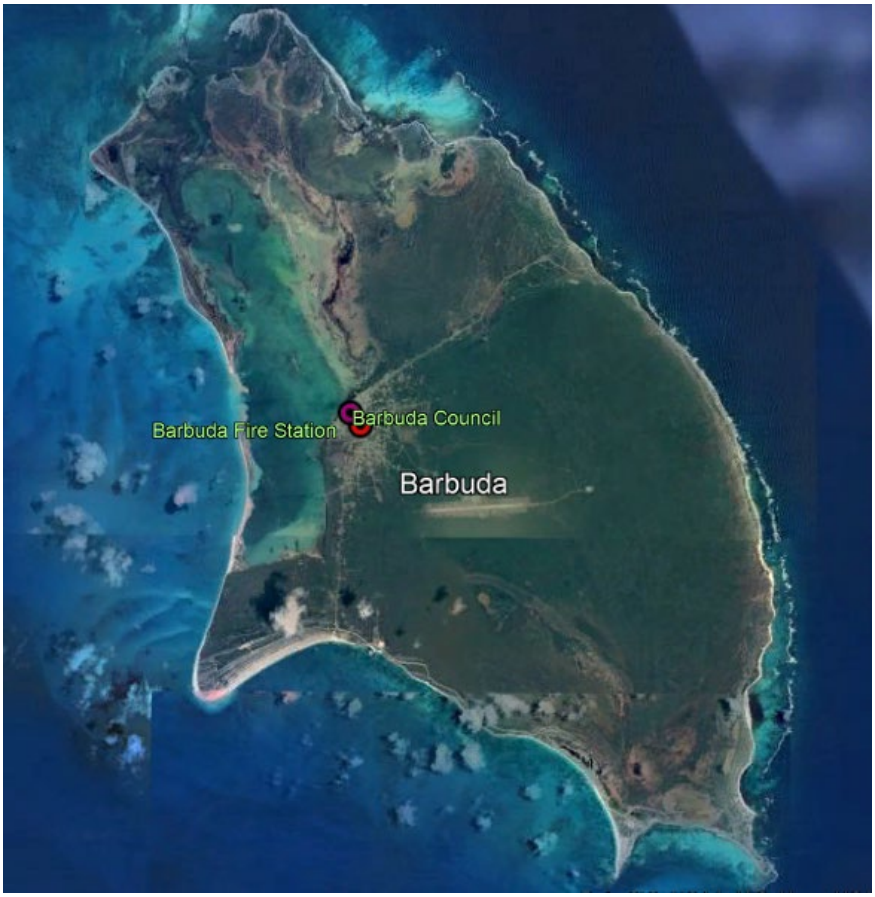
FIGURES 7: FIRE STATIONS TO BENEFIT FROM GCF BUILD

FIGURES 8: GOVERNMENT MINISTRIES AND OTHER PRIORITY GOVERNMENT BUILDINGS IN ST JOHN

FIGURES 9: GOVERNMENT MINISTRIES AND OTHER PRIORITY BUILDINGS (PART 2)

5.4.2. Barbuda Island

FIGURES 10: BENEFICIARY FACILITIES IN BARBUDA



6. GENDER RELATED POLICY AND LEGAL FRAMEWORK

6.1. The following laws, policies and international conventions encapsulated in the table below are applicable to the DOE's commitment to gender equality and transformation and this project in particular.

TABLE 4: LAWS AND POLICIES OF THE GOVERNMENT OF ANTIGUA AND BARBUDA

LEGISLATION	DESCRIPTION AND RELEVANCE TO THE PROJECT
NATIONAL LEGISLATION	
Constitution of Antigua and Barbuda, 1981	The Antigua and Barbuda Constitution prohibits discrimination on the grounds of sex, which refers specifically to the biological differences that determines an individual as male or female. Article 14 (3) states, "In this section, the expression "discriminatory" means affording different treatment to different persons attributable wholly or mainly to their respective descriptions by race, place of origin, political opinions or affiliations, colour, creed, or sex whereby persons of one such description are subjected to disabilities or restrictions to which persons of another such description are not made subject or are accorded privileges or advantages that are not accorded to persons of another such description".
Physical Planning Act (2003)	This Act sets the standards for construction in Antigua and Barbuda. The current Building Code regulates the construction of buildings to withstand a Category 3 – 4 hurricanes.
Environmental Protection and Management Act (2019)	The EPMA serves as the principal guiding policy for the Department of the Environment. It establishes and consolidates the implementation of the Multilateral Environmental Agreements in one legal regime and provides the financial framework for implementation. It governs sustainable environmental protection and management to establish effective allocation of administrative responsibilities for environment management, coordination of environmental management, and the incorporation of international treaty obligations with respect to the environment into national and law related matters.
Childcare and Protection Act, 2004	The CPA establishes a Child Protection Agency in Antigua and Barbuda and provides safety, care and protection for all children. It also provides standards for child-care facilities including reporting abuse or neglect of children and requirements of children's homes. It also ensures that child labour is not allowed.
Disabilities and Equal Opportunities Bill, 2017	An Act to make provision for the protection of the rights of persons with disabilities and for connected matters. The objectives of this Act are as follows— (a) to improve the general standard of living for persons with disabilities (b) to provide a clear and comprehensive national mandate to facilitate the elimination of existing cases of discrimination against persons with disabilities, and to put safeguards in place to prohibit further discrimination against such persons; (c) to promote on a national level, the principle that a person with a disability is entitled to the same fundamental rights as a person who does not have a disability; and

	(d) to ensure full and effective participation in all aspects of society for a person with a disability on an equal basis with a person who does not have a disability. The project must therefore ensure that the buildings in question has the necessary access.
Disaster Management Act, 2002	This Act provides for the effective organization of the preparedness, management, mitigation of, response to and recovery from emergencies and disasters natural and man-made in Antigua and Barbuda.
Antigua and Barbuda Labour Code	The Act stipulates that no employer shall discriminate with respect to any person's hire, tenure, wages, hours, or any other condition of work, by reason of race, colour, creed, sex, age or political beliefs.
NATIONAL POLICIES	
Antigua and Barbuda Interconnection Policy, 2015	Antigua and Barbuda Interconnection Policy was updated in 2015 provides for Net Billing for systems between 0 – 5 kW for resident and commercial facilities. For systems between 5 – 50 kW, the Policy mandates a Feed-in Tariff (buy-all, sell-all) at the avoided cost of fuel (XCD 0.45).
National Poverty Strategy 2011-2015	The 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."
National Youth Policy, 2007	The National Youth Policy identifies factors that are critical to youth empowerment and identifies eight key focus areas; including 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.
INTERNAL POLICIES	
Department of Environment Gender Policy	The Department of Environment Gender Policy formalizes the DOE's commitment to mainstreaming gender into its work programme and project portfolio. Gender is defined as "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. They are context/ time- specific and changeable. Gender is part of the broader socio-cultural context and intersects with other important criteria for socio-cultural analysis including class, race, poverty level, ethnic group and age. As such, the DOE's Gender policy sets out the principles on which the approach to environmental social safeguards and gender review and management by the DOE is based and the and requirements that are applicable to each project.
Department of Environment Environmental Social Safeguard Policy	The DOE operates within three modalities, namely legislative, institutional, and departmental operational. Within the context of these modalities, the Environmental and Social Safeguards Policy formalizes the DOE's commitment to promote environmental and socially sustainable projects. As such, its Environmental and Social Safeguards Policy ("ESS Policy") sets out the principles on which the approach to environmental and social safeguard review and management by the DOE is based and the environmental and social safeguard requirements that are carefully applied to each project.
MULTILATERAL AGREEMENTS, TREATIES AND CONVENTIONS	

Sustainable Development Goals	In September 2015, the General Assembly adopted the 2030 Agenda for Sustainable Development that includes 17 Sustainable Development Goals (SDGs). The project will contribute to the implementation of the following SDGs: GOAL 3: Good Health and Well-being SDG 4 — Quality education; SDG 5 — Gender equality; SDG 6 — Clean water and sanitation; SDG 7 — Affordable and clean energy; SDG 9 — Industry, innovation and infrastructure; GOAL 11: Sustainable Cities and Communities GOAL 13: Climate Action
Convention on the Rights of the Child	A United Nations Treaty outlining the rights of children in the following areas: civil, political, economic, social, cultural, health. Adopted by RES/44/25 at the 44th Session of the United Nations General Assembly in 1989
United Nations Framework Convention on Climate Change (UNFCCC), 1992	The UNFCCC, which entered into force in 1994, provides a framework for intergovernmental efforts addressing climate change and its effects. Member States of the UN meet and share data on greenhouse gas emissions, national policies and best practices, with the goal of developing and implementing strategies for tackling emissions and providing financial and technical assistance for developing countries. The UNFCCC aims for gender balance in bodies established pursuant to the Convention and the Kyoto Protocol, to improve women's participation and inform more effective climate change policy that addresses the needs of women and men equally. The UNFCCC called for the national adaptation plan (NAP) process to be gender-sensitive and calls on the Green Climate Fund (GCF) to promote environmental, social, economic, and development co-benefits and take a gender-sensitive approach. Each country formulates its Nationally Determined Contributions (INDC) to the UNFCCC. By 2030, one of Antigua and Barbuda's climate action target includes preparing buildings for extreme climate events, including drought, flooding and hurricanes, which is aligned to targets for this project.
Convention on the Elimination of all Forms of Discrimination Against Women (CEDAW)	CEDAW is the principal instrument utilized by the UN to protect the rights of women and eliminate all forms of discrimination against them. Adopted by the United Nations General Assembly (UNGA) in 1979, CEDAW was ratified by the Government of Antigua and Barbuda in 1989 and its Optional Protocol signed in 1996. This convention mandates states to ensure that women equally represented their governments and international organizations; have equal rights to bank loans, mortgages and other forms of financial credit; (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.
Beijing Declaration and Platform for Action from the Fourth World Conference on Women	This landmark declaration and Platform for Action (PoA) called for actively involving women in environmental decision making at all levels, integrating gender concerns and perspectives in policies and programs for sustainable development, and strengthening or establishing mechanisms at the national, regional and international levels to assess the impact of development and environmental policies on women.

Commission on the Status of Women (CSW)	*The 52nd session of the Commission on the Status of Women (2008) identified gender perspectives on climate change as its key emerging issue.* The CSW, which is convened annually at United Nations Headquarters in New York, urged Member States to integrate gender into the design, implementation, monitoring and evaluation and reporting of national environmental policies; as well as to strengthen mechanisms and provide adequate resources to ensure women's full and equal participation in decision making at all levels on environmental issues, with particular emphasis on strategies related to climate change and the lives of women and girls.
UN Convention on the Rights of Persons with Disabilities (CRPD)	The Convention is intended as a human rights instrument with an explicit, social development dimension. It adopts a broad categorization of persons with disabilities and reaffirms that all persons with all types of disabilities must enjoy all human rights and fundamental freedoms. It clarifies and qualifies how all categories of rights apply to persons with disabilities and identifies areas where adaptations have to be made for persons with disabilities to effectively exercise their rights and areas where their rights have been violated, and where protection of rights must be reinforced.
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.
UNFCCC Gender Action Plan	The UNFCCC Gender Action Plan aims to increase the participation of women in all UNFCCC processes. It also seeks to increase awareness of and support for the development and effective implementation of gender-responsive climate policy at the regional, national and local levels. The purpose of this gender assessment is to provide the context of gender in Antigua and Barbuda.

7. APPROACH AND METHDOLOGY

7.1. This Gender Assessment and Gender Action Plan was developed by consultants within the Project Management Unit (PMU) of the Department of Environment. **(See Section 1.2.2 on Implementation Arrangements within the ESIA and ESMP for details on the Project Management Unit and human resourcing arrangements). T**he elaboration of these steps are outlined in Figure 12.

FIGURES 11: METHODOLOGY FOR THE DEVELOPMENT OF THE GENDER ASSESSMENT AND GENDER ACTION PLAN

7.2. Desktop Research

7.2.1. Desk research for this project involved the consultation of a number of sources including a legislative and policy review **(as seen in Section 3)** as well as the consultation of a number of professional studies and documents. As the various laws, policies and international regimes which have guided the preparation of this project were outlined in Section 3, this

section on desk research will present the key technical documents used to support the elaboration of this project.

7.2.2. This project is one of the initiatives under the Climate Change Programme. Baseline data and documentation that are relevant to this Gender Assessment and Gender Acton Plan include:

- United Nations Electricity Supply Partnership report titled, Solar PV facility screening study for public and educational facilities on Antigua and Barbuda, prepared for CDB and shared with the Bank on 30 January 2018
- Environmental Impact Review – Wind Turbines at Crabbes, 2014 under the GEF-funded Special Pathways Protected Areas and Renewable Energy (SPPARE) project
- Antigua and Barbuda Renewables Readiness Assessment, 2016
- Environmental and Social Impact Assessment (ESIA) and Environmental and Social Management Plan (ESMP) for the Adaptation Fund project, including the Revolving Loan facility for homes and small businesses (includes installation of Renewable Energy), 2016
- Environmental, Social and Gender Impact Assessment and Management Plan for the Climate Change Programme Deploying Renewable Energy for Schools and Clinics via the Sustainable Financing Mechanism for Environmental Management – SIRF Fund
- Green Climate Fund (GCF) ESIA and ESMP for the Enhancing Direct Access project, including solar RE plus batteries installation for home and business owners, 2017
- Environmental Management Systems pilot for two facilities in Antigua and Barbuda, including installation of backup renewable energy, 2018
- Technical and Financial Feasibility and Impact Assessments for the Abu Dhabi Fund for Development (ADFD) with IRENA, 2015
- 2018 CDM Audit Tool Report - Antigua and Barbuda
- Barbuda Building Damage Assessment Preliminary Findings – United Nations Development Programme 2017
- Hurricane Irma – Preliminary Damage Assessment for Antigua and Barbuda's Fisheries Sector 2017
- Hurricane Irma Recovery Needs Assessment: A Report by the Government of
- Energy sustainability in Antigua and Barbuda: Peer Analysis and Recommendations on a Solar Buy-In Tariff and a Social Rate for APUA, 2015

7.3. Consultations with Stakeholders and Informal Interviews

7.3.1. Public consultations for this project were achieved through two methods. Firstly, there were stakeholder meetings where an open and frank exchange was encouraged and secondly, through stakeholder interviews. ESS and Gender stakeholder consultations with representatives of the beneficiary facilities were held from 14 – 18 August 2017. In total, 35 participants were in attendance. In addition, consultations were held on 8-9 January 2018 with NGOs as well as representatives from the schools and clinics to consult on the DOE's draft Environmental and Social Safeguards Policy and draft Gender Policy. Interviews were conducted with community representatives as well as representatives from the government agencies through one-on-one interactions.

7.3.2. During the period 6 – 16 August 2019, consultations were held with project teams and executing partners including the Ministry of Works, the Met Office and NODS, through the C4 Eco Solutions. A total of 30 interviews were conducted in Barbuda during the period 12 – 16 August 2019 with government officials, including the Barbuda Council, nurses and security

forces. Further, seventeen (17) interviews were conducted with regular household members as well as seven (7) interviews with business owners in Barbuda. Consultations continued in 2020 with representatives from the Ministry of Works, Ministry of Education, Data Management Unit as well as feedback from the Ministry of Finance and the Directorate of Gender Affairs on the Gender Action Plan.

6.3.2. Some important milestones in the consultation process include: final consultations will be held on the final draft of the FP going to the Board and disclosure of ESIA and GAP on the DOE website.

7.4 Gender and the Department of Environment Gender Policy[19]

7.4.1 **A Gender analysis/assessment** refers to methods used to understand relationships between men and women, their access to resources, their activities, and the constraints they face relative to each other. *A comprehensive gender analysis/assessment entails the examination of the different roles, rights, needs, and opportunities of women and men, boys and girls in a given project/programme context.* It is a tool that helps to promote gender – relevant entry points, policies and identify opportunities for enhancing gender equality in a particular project/programme. In the case of climate change projects/programmes, a well-done gender analysis/assessment helps to identify multiple causes of vulnerability, including gender inequality. It also helps to identify and build on the diverse knowledge and capacities within communities/households that can be used to make them more resilient to climate related shocks and risks.[20]

7.4.2 In 2018, the DOE adopted its Gender Policy. The policy elaborates on the DOE's approach to meeting gender considerations and mainstreaming based on the guidelines and principles of key multilateral partners, namely the Green Climate Fund, the Adaptation Fund, and the Global Environment Facility, through which the DOE accesses financing. The Gender Policy outlines the commitment of the department to:

- Promote a gender-transformative management culture;
- Determine and assess social and gender risks and impacts of projects, including through consultations with stakeholders and vulnerable communities, including women and men;
- Contribute to gender equality and achieve greater and more sustainable environmental and climate change, results, outcomes and impacts;
- Create gender safeguards and mechanisms to mitigate risks and negative social and gender impacts associated with projects;
- Ensure that DOE staff, partners and stakeholders receive training and capacity-building to enable them to mainstream gender into their work;
- Cooperate with partners to build capacity in gender risk mitigation and facilitate implementation of gender and social safeguards, as well as monitoring and evaluation;
- Ensure pro-active implementation of the Directorate of Gender Affairs' internal policy against sexual harassment; and

[19] Department of Environment Gender Policy 2018

[20] Green Climate Fund Gender and Social Inclusion Action Plan Template, available via http://www.greenclimate.fund/documents/20182/574712/Form_09_-_Gender_Assessment_and_Action_Plan_Template.pdf/3f4b8173-fbb2-4bc7-9bff-92f82dadd5c0

- Make efforts to achieve gender balance in recruitment and procurement.[21]

7.4.3 Through this commitment, the DOE seeks to ensure that the project:

- Maximizes gender, environmental and socio-economic benefits to society as a whole and to vulnerable communities
- Minimizes negative environmental, gender and socio-economic impacts;
- Includes a gender policy and gender impact assessment; and
- Complies with gender, social and environmental standards.

7.4.4 The DOE will not knowingly finance projects that:

- Harm individuals or undermine human rights and gender protections
- Can potentially cause significant negative gender, socio-economic, or environmental impacts
- Fail to meet the environmental and social safeguard requirements of the DOE

7.4.5 Disclosure and Public Consultation

7.4.5.1 The DOE also requires that relevant information on a project or sub-project's environmental, social or gender risks are made accessible and understandable to stakeholders likely to be affected by related activities . These stakeholders are provided with opportunities to input and offer risk mitigation measures that can be integrated within the design and implementation of the project or sub-project. This is particularly important in projects that may involve land acquisition, economic displacement or involuntary resettlement.

FIGURES 12: CONSULTATIONS WITH TECHNICAL TEAMS INCLUDING WOMEN

7.4.5.2 The DOE makes projects related to gender as well as environmental and social safeguard information public and is committed to publishing on its website projects and summaries, including those that require Gender and Environmental and Social Impact Assessments, via its information database. Stakeholder engagement plans are disclosed

[21] Department of Environment Gender Policy 2018

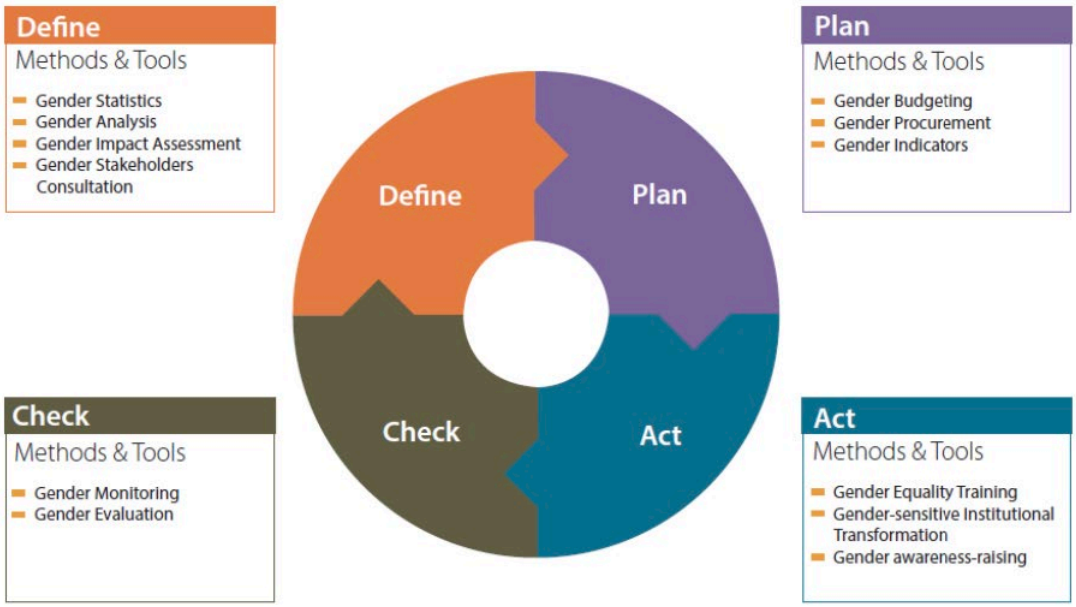
early in project development and summary reports of consultations are circulated and stored electronically.

Women or men who may be affected by a development of a donor funded project can communicate their concerns about any gender, environmental, social, or economic performance of the development through the DOE's Complaints Mechanism. Project consultations should be conducted according to the DOE's Stakeholder and Community Consultation Strategy.

7.4.6 Gender Diligence

7.4.6.1 The DOE will conduct gender diligence through Gender Impact Assessment (GIA) at the overall portfolio level as well as the individual project level for higher risk projects (see Risk Management Policy and Manual of the DOE). Stakeholder consultations will present possible gender and social impacts to local communities and interested persons, in the presence of the DOE and other relevant government agencies. Concerns of stakeholders are captured and submitted as part of the final report/ statement on the GIA. Development projects are required to appropriately address such concerns prior to formal approval and implementation. Annex 1 and the figure below illustrates the process for screening development projects and conducting portfolio-level as well as project level gender impact assessment.

FIGURES 13: METHODOLOGY FOR CONDUCTING A GENDER IMPACT ASSESSMENT (SOURCE: EUROPEAN INSTITUTE FOR GENDER EQUALITY)



Source: Department of Environment Gender Policy (page 8)

8. GENDER ISSUES RELEVANT TO THE PROPOSED PROJECT

The project is being implemented in collaboration with other projects in the DOE's portfolio. A brief Summary is provided in Fig 6.

FIGURES 14: SUMMARY OF DOE COMPLIMENTARY CLIMATE CHANGE PROGRAMME

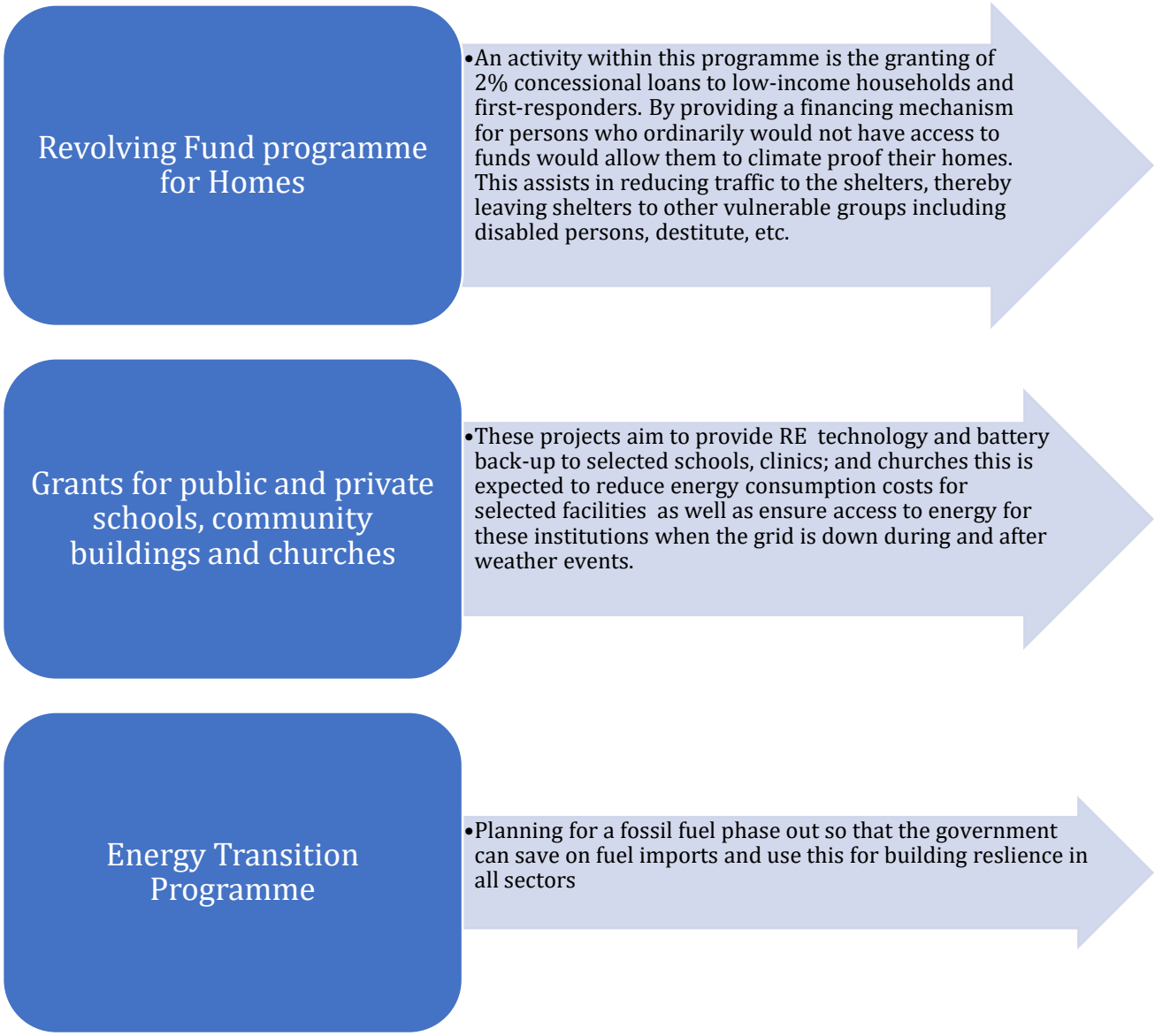


TABLE 5: GENDER ANALYSIS FOR PROJECT PREPARATION STAGE (SOURCE: GREEN CLIMATE FUND GENDER ANALYSIS/ASSESSMENT AND GENDER AND SOCIAL INCLUSION ACTION PLAN TEMPLATES. [22])

	Row Number	Questions	Data/Information Collected	References
What is the Context? Context of Antigua and Barbuda	**One**	**Demographic and socioeconomic data, disaggregated by sex and income**	- See **TABLE 6** Socio-demographic groups in Antigua and Barbuda that are vulnerable to poverty and unemployment include: youth, adolescent mothers, working class men, the homeless, the disabled, older men and women.	• Rawwida Baksh and Associates, 2014. Country Gender Assessment (CGA) Antigua and Barbuda Report) • (Health Information Division, Ministry of Health Antigua and Barbuda)
	Two	**% of households that are headed by women/men**	- Approximately 44% are female headed households - The differential declaration of head of household status by women and men may be attributed to the country's patriarchal social organization. Internationally, men have been and continue to be considered heads of the home. This is also the case to some extent in Antigua and Barbuda. This is premised on conservative interpretations of religious texts found commonly in Christian societies. - Women headed families carry the greater % of time for care is greater in these instances, but they generally have significant family related safety net.	• Government of Antigua and Barbuda, 2014. Antigua and Barbuda 2011 Population and Housing Census **(Table 5.11: Population by Relationship to Head of Household by Sex)** • Rawwida Baksh and Associates, 2014. Country Gender Assessment (CGA) Antigua and Barbuda Report)

[22] Green Climate Fund Gender and Social Inclusion Action Plan Template, available via http://www.greenclimate.fund/documents/20182/574712/Form_09_-_Gender_Assessment_and_Action_Plan_Template.pdf/3f4b8173-fbb2-4bc7-9bff-92f82dadd5c0

	Three	**What are the main sources of income for households in the vulnerable areas (disaggregated by sex)?**	- The largest occupational category continues to be the service and sales sector followed by clerical support work. Elementary occupations are the largest followed by professional and technical and associate professionals. - Men typically dominate the following sectors: construction, agriculture, forestry and fishing, transportation. - Women typically dominate the following sectors: services (accommodation, tourism), education, social work, financial and insurance activities - Young men are more likely to be unemployed than any other group	• Rawwida Baksh and Associates, 2014. Country Gender Assessment (CGA) Antigua and Barbuda Report) • Government of Antigua and Barbuda, 2018. Antigua and Barbuda 2015 Labour Force Survey Force
	Four	**What are the uses/needs of women and men when it comes to critical services in Antigua and Barbuda i.e. health, education, disaster response, emergency and security?**	- Women usually have primary users of these services. Therefore, women and their dependents depend heavily on reliable services in all of these sectors. - These government services are free to all citizens. In the case of health, those who can afford it also have access to the services provided by the private health sector. Only 50% persons have additional health insurance. After a storm and these services are not available 50% of persons will not have an alternative access. - In the education sector, there are also private schools which provide education to over 40% of children of primary school age. Men and Women are equally impacted if the government education system cannot take the children due to damage to the infrastructure. Recent studies show that both men and women are responsible for home care if the schools are closed. Women, however, represent the majority, but the role of men is significant. - After a hurricane, the country normally issues a state of emergency to lower the risk of looting and other crimes. Women depend heavily on this service although men and women can be equally impacted. - The security services are mostly performed by men although there are many women in this field. This increased need of these services reduces the time that men in families can provide their role in home care. This will, therefore, have to be undertaken by the other parent (female) or extended family. The project, therefore, provides additional opportunity for men and their families to remain in the police and fire station facilities.	• Consultation with beneficiaries of facilities (14 – 18 August 2017, 8-9 January 2018, 6-16 August 2019, 12 – 16 August 2019, March 2020) • Government of Antigua and Barbuda, 2014. Antigua and Barbuda 2011 Population and Housing Census **(Table 6.2: Population by Health Insurance Status by Five-Year Age Groups by Sex)** • Government of Antigua and Barbuda, 2014. Antigua and Barbuda

			- Men and women equally need the services of early warning systems.	2011 Population and Housing Census **(Table 6.2: Population by Health Insurance Status by Five-Year Age Groups by Sex)** • Government of Antigua and Barbuda, 2015. Antigua and Barbuda Education Statistical Digest: Statistics on Education in Antigua and Barbuda 2012 – 2015 **(Table B2: Number of Primary, Secondary and Post-Secondary Institutions as at 2014-15)**
	Five	**How do the current climate risks affect men and women?**	- It depends on their role and occupations. Women who work in the tourism/services sector will be out of work if a hurricane damages this sector and will rely on the government services. - Women headed households will have their problems compounded with additional duties for child and elderly care; - Drought can cause the services to close if there is not adequate water to the facilities thus limiting access to schools and clinics. - The climate is getting hotter which can cause severe health impacts such as heat strokes on men and women. The buildings to be upgraded have predominantly female workers that provide services from the facilities to be updated and are affected by additional heat. - Individuals are susceptible to vector-borne diseases	• Kairi Consultants Ltd in Association with the National Assessment Team of Antigua and Barbuda, 2007. Living Conditions in Antigua and Barbuda: Poverty in a Services Economy in Transition
	Six	**Are there any legal barriers to women in the project-relevant sectors?**	- No legal barriers have been identified at this stage	• (Laws, policies and ratified international conventions in

				Section 3: Policy and Legal Framework)
	Seven	**Describe any community beliefs about the specific roles of women and men.**	- Heavy labour tasks assigned to men - Food preparation, child-care and domestic duties are assigned to women - Men are the head of the household and are the bread winners. They are involved in construction, energy, heavy duty labour etc. The roles of women and men have evolved. Women are now leaders, farmers, fishers, vendors etc. and caretakers of their families. - Women are more likely to avail themselves of health care services than men	• Rawwida Baksh and Associates, 2014. Country Gender Assessment (CGA) Antigua and Barbuda Report) • Consultation with beneficiaries of facilities (14 – 18 August 2017, 8-9 January 2018, 6-16 August 2019, 12 – 16 August 2019, March 2020)
Services and Infrastructure: Access and Benefits:	**Eight**	**Who owns the land and other project assets?**	- The Government of Antigua and Barbuda	
	Nine	**Describe household energy access and sources.**	- It is an essential service provided through a utility company with a monopoly in Antigua and Barbuda	• Antigua and Barbuda The Public Utilities Act
	Ten	**How much do households spend on services under this project?**	- **50%** of the population purchase additional health and educational services; overall 48% of children attend public primary school and 54% public secondary school education. Majority of children attend private daycare and preschools. A large proportion of children are in private preschools. There are three government supported preschools that operate in vulnerable communities, but this represent a very small number of children. In general, most preschoolers are in private schools. - As security measures, many homes use lighting and dogs as their main source of protection. Since the electricity prices are very high, many low income and even middle income homes owners frequently forgo lighting. Security provided by the Government is therefore very important. After a hurricane, the electricity will not be available and security from the police	• Government of Antigua and Barbuda, 2015. Antigua and Barbuda Education Statistical Digest: Statistics on Education in Antigua and Barbuda 2012 – 2015 **(Table B2: Number of Primary, Secondary and Post-Secondary**

			is important. The RE systems are important for these buildings to continue to support communication and security support.	**Institutions as at 2014-15)**
	Eleven	**Do men and women have bank accounts, and can they access finance to scale up this project to their homes?**	- Men and women, especially low-income households, save money through an informal savings club (box hand) and have accounts at credit unions where there are less rigid eligibility criteria as oppose to other traditional banks. The credit union also provides low interest loans compared to other banking institutions. On average women save more than men.	• Department of Environment, 2017. Environmental and Social Management System (EMS) and project risk management arrangements: "An integrated approach to physical adaptation and community resilience in Antigua and Barbuda's northwest McKinnon's watershed" **(Summary of Environmental, Social and Gender Impacts)**
	Twelve	**Do men and women benefit from construction sector, health and educations services (or other project-relevant services)?**	- Women are underrepresented in the construction sector, which composes of 96% of male workers compared to women.	• Government of Antigua and Barbuda, 2018. Antigua and Barbuda 2015 Labour Force Survey Force **(Chart 6.4.2: Employment by industry and sex)**
	Thirteen	**How do men and women access information? Do**	- Men learn by visual teaching tools - Women can learn equally from visual and written methods - Both men and women have access to information, but traditional education and communication systems may not be gender responsive	• Department of Environment, 2017. Environmental and Social Management

		they have access to different technologies?	- A high proportion of Antiguans and Barbudans have a cell phone but older persons still use radio and TV as their main source of getting information; - Internet is available but low-income persons may not have these available to them.	Plan (ESMP) and Gender and Social Inclusion Action Plan (GAP) for the Enhancing Direct Access pilot in the Eastern Caribbean
	Fourteen	**What are the levels of training / education?**	- Women are generally more highly educated than men and spend more time in schools.	• Rawwida Baksh and Associates, 2014. Country Gender Assessment (CGA) Antigua and Barbuda Report) • Consultation with beneficiaries of facilities (14 – 18 August 2017, 8-9 January 2018, 6-16 August 2019, 12 – 16 August 2019, March 2020)
Who does what? Roles and responsibilities	**Fifteen**	**How are men and women connected to markets / how do they participate in the economy?**	- As producers, both men and women sell and market their products. it Women are often at the market and roadsides selling their products.	• Department of Environment, 2017. Environmental and Social Management Plan (ESMP) and Gender and Social Inclusion Action Plan (GAP) for the Enhancing Direct Access pilot in the Eastern Caribbean • Consultation with beneficiaries of facilities (14 – 18

				August 2017, 8-9 January 2018, 6-16 August 2019, 12 – 16 August 2019, March 2020)
	Sixteen	**What would be the implications of the proposed intervention, given primary tasks and responsibilities by gender?**	- Families innovate and juggle work and activities to get things done	• Department of Environment, 2017. Environmental and Social Management Plan (ESMP) and Gender and Social Inclusion Action Plan (GAP) for the Enhancing Direct Access pilot in the Eastern Caribbean • Consultation with beneficiaries of facilities (14 – 18 August 2017, 8-9 January 2018, 6-16 August 2019, 12 – 16 August 2019, March 2020)
	Seventeen	**Who is responsible for child/elderly care and household tasks?**	- All family members, men and women take on this responsibility	• Department of Environment, 2017. Environmental and Social Management Plan (ESMP) and Gender and Social Inclusion Action Plan (GAP) for the Enhancing Direct Access pilot in the Eastern Caribbean

				• Consultation with beneficiaries of facilities (14 – 18 August 2017, 8-9 January 2018, 6-16 August 2019, 12 – 16 August 2019, March 2020)
	Eighteen	**(a) What would be the best times to hold trainings for women and men on the new systems/technologies or skills to be delivered through the project?** ***(b) how do men learn compared to women; (c) how do women learn compared to men;***	- For community members, after normal working hours, and on Sundays after church - The time of day is taken into consideration when planning to host consultations. The most appropriate time is around 5PM and lasts no later than 7PM. The consultations are regularly held in well-lit and central areas to ensure women/men feel safe traveling to and from the consultations.	• Department of Environment, 2017. Environmental and Social Management Plan (ESMP) and Gender and Social Inclusion Action Plan (GAP) for the Enhancing Direct Access pilot in the Eastern Caribbean • Consultation with beneficiaries of facilities (14 – 18 August 2017, 8-9 January 2018, 6-16 August 2019, 12 – 16 August 2019, March 2020)
Who decides? Participation in decision-making	**Nineteen**	**Who are the community leaders? Are there any women leaders?**	- Antigua and Barbuda do not have community leader structures as other countries. Community leaders are normally church and political leaders. Women leaders are normally wives of the church pastors, nurses and teachers assigned to work in particular areas. - Women are the main voters in Antigua and Barbuda and have great power with the political directorate. They normally can exercise power individually by direct negotiations and rarely rely on a traditional community leadership structure to get what they want.	• Consultation with beneficiaries of facilities (14 – 18 August 2017, 8-9 January 2018, 6-16 August 2019, 12 – 16 August 2019, March 2020)

	Twenty	**Are there women's organizations that are active in the targeted area targeted project can partner with?**	- Within the context of the project, the main body that supports both men and women are the labour unions, which negotiate for salary as well as good working conditions. These are very powerful bodies. Other groups are being consulted but there is rarely an all-female or all male group.	• Consultation with beneficiaries of facilities (14 – 18 August 2017, 8-9 January 2018, 6-16 August 2019, 12 – 16 August 2019, March 2020)
	Twenty One	**Do women and men participate (equally) in associations, management relevant to the project sector, and any other producer/user groups? Which ones?**	- Women and men do not generally participate equally in community meetings. - Participation in meetings is based on i they know each other well	• Consultation with beneficiaries of facilities (14 – 18 August 2017, 8-9 January 2018, 6-16 August 2019, 12 – 16 August 2019, March 2020)
	Twenty Two	**Who manages / makes decisions in the household, notably around how money and time are spent?**	- Women generally manage the budget although men participate in a significant way.	• Consultation with beneficiaries of facilities (14 – 18 August 2017, 8-9 January 2018, 6-16 August 2019, 12 – 16 August 2019, March 2020)
	Twenty Three	**Will both women and men be able to equally participate in using and learning about the new interventions in the proposed project as well as the training?**	- Yes, both men and woman will have equal access to participate - There are barriers to men's participation since they are generally less educated and may not want to participate. The project will have to design the training and the transition of the workforce to ensure male participation. This has been identified as a significant project risk.	• Consultation with beneficiaries of facilities (14 – 18 August 2017, 8-9 January 2018, 6-16 August 2019, 12 – 16 August 2019, March 2020)

Who benefits? Impacts	**Twenty Four**	**Will the services from the project interventions be freely available to men and women? Are there any risks/restrictions on movement (security or cultural)? Are there any discriminations/risks to certain community members in terms of accessing the project benefits?**	- Meetings held late at night are a risk; there must be adequate lighting for women and men to attend meetings - The services will be freely available to both men and women. As stated above, it is mandated by law that NGOs, civil society organizations, governments, private sector whether women/men must be involved in decision making as it relates to environmental projects. It is mandated by Law and is also stated within the Department of Environment environmental and social safeguards that the Department of Environment is mandated to ensure that all environmental projects being executed must conform and adhere to ESS and reduce the impacts of risks. Thus, we do not foresee any significant risks/restrictions as it relates to gender involvement.	• Department of Environment, 2018. Environmental Social Safeguard Policy • Department of Environment, 2018. Gender Policy
	Twenty Five	How will men and women benefit from the project interventions?	- Women in particular will benefit from the interventions at the household level as well as the working environment; - Men could benefit more from the construction sector jobs and the training programs to transition the workers to Cat 5 standards; - Both men and women will have access to funding to participate in the training programs;	• Consultation with beneficiaries of facilities (14 – 18 August, 2017, 8-9 January 2018, 6-16 August 2019, 12 – 16 August 2019, March 2020)
	Twenty Six	3. What will be the impact of the project interventions on women's workload and income?	- There is not expected to be any workload change for men or women. The project was designed over 6-year period to limit the additional surge in work.	• Funding Proposal: Resilience to hurricanes in the building sector in Antigua and Barbuda 2019
	Twenty Seven	4. Are there specific project impacts or benefits for women?	- Women can now benefit from a formal training course in the constructions sector. Although it is available to some extent and was accessible to women, the project will be promoting this approach to generate some interest in women;	• Consultation with beneficiaries of facilities (14 – 18 August, 2017, 8-9 January 2018, 6-16

			- Additional hurricane shelters in communities. These shelters will be smaller and less crowded allowing persons who are vulnerable to be more comfortable and secure in the clinics rather than the larger school. - Men will benefit mainly from knowing that vulnerable members of their families will have place to go that will take care of their needs;	August 2019, 12 – 16 August 2019, March 2020)
	Twenty Eight	5. Will the project help create a better balance between women's productive and household tasks (e.g. childcare, domestic work)?	- Yes. The project is designed to target buildings with geographic distribution. In the event of a hurricane, the clinics and schools will not close thus allowing women to use the services closer to their own homes and not having to travel any distances. - More time will be spent at home after a hurricane and drought (water is not available for washing cooking etc.). This project will seek to address this.	• Funding Proposal: Resilience to hurricanes in the building sector in Antigua and Barbuda 2019
	Twenty Nine	6. Will the project contribute to strengthening women's participation in decision-making? How?	- Women in Antigua and Barbuda generally participate in decision making process. This culture will be maintained as the project proceeds. - Women participate in the Project Management Committee, Technical Advisory Committee, Technical Evaluation Committee, Project Management Unit, community consultations and ad hoc consultation events.	• Consultation with beneficiaries of facilities (14 – 18 August 2017, 8-9 January 2018, 6-16 August 2019, 12 – 16 August 2019, March 2020)

9. GENDER ACTION PLAN

Project Title: *Resilience to Hurricanes in the Building Sector in Antigua and Barbuda*

A project/program-specific Gender and Social Inclusion Action Plan (GAP) is a tool used to ensure gender mainstreaming is clearly visible in project/program design and implementation[23]. This GAP will serve as a key guiding tool throughout the delivery of the project, *GCF BUILD*.

The Gender Action Plan presented below identifies key project activities and indicative outputs through which gender specific strategies, actions and outcomes will be progressed and monitored. The Plan will be reviewed and refined during the inception phase, which will also ensure that all project stakeholders have the opportunity to identify issues and are aware of responsibilities for delivering and monitoring the Gender Action Plan.

Implementation arrangements of the project include an ESS and Gender Expert as part of the Technical Evaluation Committee that will provide technical advice in the decision-making process of the project's sub-activities.

The targets for the GAP are provisional as GCF Build is a component of a larger project pipeline. The need for targets that are consistent with the overarching project pipeline targets will be informed by gender baseline assessments (GBA) currently being conducted under the project "*Accelerating a transformational pipeline of Direct Access climate adaptation and mitigation projects in Antigua & Barbuda" (*GCF Readiness 4) and through support from the NDC Partnership's Climate Enhancement Action Package (CAEP) initiative. The outcomes of the GBA will inform the selection of specific targets for indicators listed in the table below, so as to ensure that Antigua and Barbuda is adopting ambitious and transformative gender responsive strategies.

The aforementioned GCF Readiness 4 GBA aims to assess the current situation as it relates to the impact of climate change on gender disaggregated spending patterns (i.e. how males and females and their associated households are impacted differently by climate related events). Furthermore, it will give insight into the adaptive capacities of respondents by providing information on their spending preferences, the extent of risk management approaches, vulnerabilities and climate related finances — capacity to spend pre-and post-disaster and by extension their capacity to build resilience (reduce exposure and recovery).

The outcomes of this study will inform gender responsive climate strategies for Antigua and Barbuda by providing clearer understanding of the post-disaster finance needs of males and females across varying social classes. It will also give insight into the precautions/ risk management strategies adopted by gender pre-disaster, whether that be insurance, investments in protective supplies, such as shutters etc. It is envisioned that this information, in addition to identifying targets, would guide the development of sustainable financing strategies for the private sector by providing baselines which can be used to create climate-related financial instruments tailored to social factors, but also able to meet the needs of citizens. The assessment will help in identifying the most vulnerable groups and identifying action areas for capacity building to enhance overall adaptive capacity of citizens. It will provide a better understanding of the distribution of vulnerability across gender but also across social classes and identifying economic sectors/jobs most at risk.

Complimenting this assessment is the NDC gender baseline assessment, which is currently in development. The NDC GBA will provide more in-depth gender disaggregated data and fill remaining gender-related data gaps by collecting spending patterns data specifically

[23] GCF Gender Analysis/Assessment and Gender and Social Inclusion Action Plan Templates http://www.greenclimate.fund/documents/20182/574712/Form_09_-_Gender_Assessment_and_Action_Plan_Template.pdf/3f4b8173-fbb2-4bc7-9bff-92f82dadd5c0

regarding the uptake of technologies and how financing strategies can be developed to optimise efforts for both resilience and low-carbon development. The NDC GBA will focus on the willingness to uptake technologies, practises and training related to capacity building for climate change impacts, with particular emphasis on the energy, transport and back-up energy sectors. The NDC gender assessment will capture information needed to shape programme development and inform projects such as the Just Transition of the workforce by generating data on citizen's understanding on climate change, their willingness to pay and willingness to engage.

These two baseline assessments complement each other as the GCF Readiness 4 assessment will create baselines for spending and understanding levels of preparedness amongst citizens as well as identifying those most vulnerable. While the NDC Partnership assessment will help to identify the ways in which citizen's adaptive capacities can be enhanced. The assessments will analyse the current financial situation as it relates to climate impacts, the associated appetite for climate related strategies and programmes and identify sectors most at risk and critical to the success of these strategies —resultantly, informing targets for the components of the GAP outlined in table 8 below.

Methodology

The NDC GBA is currently in development, however, the GCF Readiness 4 GBA was designed using the GCF gender analysis template and the data needs of the department's climate change project pipeline.

The GCF Readiness 4 GBA was deployed on three levels with the aim of obtaining 1,100 responses:

1. A national survey targeted to reach 500 persons on mainland Antigua

2. Community survey targeting 500 residents in both rural and urban communities that have been identified areas as most vulnerable to sea level rise, storm related surges and flooding. These communities were McKinnon's, Yorks, Cashew Hill, Urlings, Willikies and Bethesda.
3. A survey targeting 100 residents in Barbuda

The GCF Readiness 4 Survey instrument was developed using Kobo Toolbox software, which will also be used for data collection. The surveys are being administered by trained enumerators using the Kobo Toolbox software to facilitate ease of data collection and analysis. The surveys are conducted via 30-45-minute telephone calls and adopt mixed sampling methodologies:

- Simple random sampling is being used with the telephone director as the sampling frame. This was done to accommodate social distancing guidelines imposed by the government due to COVID 19
- However, stratified sampling was also adopted to ensure equal representation by parish, age and gender. As a quality check, the gender proportionality of respondents was checked using the Kobo for every 50 surveys that were completed, so as to avoid skewing data. To account for isolation of key respondents, snowball sampling was also adopted to acquire contact information and referrals to other respondents. The sampling unit was head of household/ individual(s) responsible for household finances.

The assessments will also make use of secondary data generated by national statistics and reports as well as other studies conducted by the DOE and other national agencies.

TABLE 6: GENDER ACTION AND SOCIAL INCLUSION PLAN

ACTIVITIES	INDICATORS AND TARGETS	BUDGET	TIMELINE	RESPONSIBILITIES
Impact Statement: Increase climate-resilient sustainable development by improving the resilience of Antigua and Barbuda's building sector to extreme climate events — particularly Category 4 and 5 hurricanes *(for the benefit of a population consisting of 49,088 women and ~45,312 men)*				
Outcome Statement: Enhancing the climate resilience of Antigua and Barbuda's building sector will strengthen its adaptive capacity, reduce exposure to climate risks; strengthen institutional and regulatory systems for climate-responsive planning and development; and increase generation and use of climate information in decision-making				
Output 1. Climate-proofing interventions implemented in critical public service and community buildings to improve resilience to, and recovery from, extreme climate events				
Design and implement an apprenticeship program to support the participation of persons between the ages of 16 – 24 years in the project's construction activities	30% of women who complete the program have increased access to construction jobs Equal opportunities are provided for men and women to participate in the new procedures training	$200,000 Sub-activity 2.4.3 (B50)	Year 1(Q1)— Year 6 (Q24)	ESS and Gender Expert
Develop gender responsive knowledge and communication products that include the promotion of women in construction	50% of men and women have increased knowledge and access to appropriate tools to address climate change impacts in construction of critical infrastructure (regardless of their literacy levels)	$25,000 Communication Officer (PM8)	Year 1 (Q1)	ESS and Gender Expert
Conduct detailed consultations on the design of gender responsive shelters with RE back up energy systems	20% of recommendations by key stakeholders (men, women and disabled groups) are reflected in the improved design of shelters 10% of participants at the consultations are persons with special needs	$15,000 Sub-activity 1.1.1. (A1)	Year 1 (Q3)—Year 2 (Q6)	ESS and Gender Expert
Integrate access and the needs of individuals, families, the elderly and persons with special needs into health and safety protocols of shelters	Enhanced access to services and quality of health and safety protocols benefitting 50% of individuals, families and persons with special	$30,000 Sub-activity 1.2.4. (A29) (A30)	Year 1 (Q3)— Year 6 (Q24)	Ministry of Works

	needs who stay at shelters during a storm At least 40% of persons report satisfaction with the health and safety services provided at the shelters (disaggregate by set)			
Output 2. Climate change adaptation mainstreamed into the building sector and relevant financial mechanisms				
Prepare a Strategic Impact Assessment (SIA) of the regulations related to the Building Code	Cost of constructing at Cat 5 increase by 30% due to the updated Building Code[24] % of women and men with increased spending as an impact of the code [25]	$10,000 Sub-activity 2.1.1. (B4)	Year 1 (Q1)— Year 1 (Q4)	ESS and Gender Expert Construction Sector Expert Economist
Develop lessons learnt to communicate that the SIRF Fund is assisting persons who cannot access financing for the additional cost related to the code	50% of applicants who access financing through the SIRF Fund annually are women	$22,500 Sub-activity 2.2.4. (B29)	Year 3 (Q9)— Year 6 (Q24)	Local consultant
Design gender responsive communication tools to target men and women differently in both the public and private sector on the updated building code, the benefits of taking up climate-adaptive solutions within the building sector as well as the availability of certified climate change courses	50% of persons in the private sector that benefit from information to allow scaling up are women 30% of persons trained in new standards for water harvesting and RE systems are women	$27,000 Sub-activity 2.3.4. (B38)	By Year 1 (Q3)	ESS and Gender Expert
Design and conduct gender-sensitive certification training programmes on how to support the installation, operation and maintenance of the climate change adaptation solutions	50% of men and women in the workforce are retrained 50% of students trained are women All courses developed are gender sensitive 70% of participants demonstrate an understanding of new adaptation solutions[26]	$22,500 Sub-activity 2.3.3. (B35)	By Year 2 (Q5)	ESS and Gender Expert
Output 3. Climate information services strengthened to facilitate early action within the building sector to respond to extreme climate events				

[24] To be updated based on results of GCF Readiness 4 Baseline Gender Assessment

[25] To be updated based on results of GCF Readiness 4 Baseline Gender Assessment

[26] Assessed through an evaluation tool developed for the programme

Develop information and communication products based on stakeholder workshops that aim to reduce losses and damage and risks for the benefit of males, females, and vulnerable communities	All information and communication products are gender responsive and tailored to meet the differential needs of males, females, and vulnerable communities 50% of recommendations by key stakeholders are integrated into the design of communication products	$37,500 Sub Activity 3.2.1 (C17)	By Year 2 (Q5)	Communications Officer
Output 4: Fully functional gender balanced staff that can respond to the gender requirements of the project as well as the beneficiaries				
Promote gender balance as well as sustainable procurement in AE's procurement policies (with consideration given in the selection of goods and services to persons with disabilities and persons of varying ages)	Equal representation of men and women on project management team	N/A	From Q1 Year 1 thereafter	Accredited Entity/Executing Entity
Ensure office space is gender responsive	At least two special needs persons are working in the PMU by project end Special provisions are made to facilitate persons under the age of 24, and over the age of 60 to work on the project team	AE fees	Year 1	Accredited Entity/Executing Entity
Provide gender training for all project staff	Equal representation of men and women at gender awareness training sessions At least three reports include sex-disaggregated data per year	AE fees	Year 1	Accredited Entity/Executing Entity

10. BIBLIOGRAPHY

10.1. GOVERNMENT REPORTS

- Antigua and Barbuda 2015 Labour Force Survey Report, Antigua and Barbuda 2015 Labour Force Survey Report § (2015).
- Antigua and Barbuda. Ministry of Finance and Corporate Governance, *2019 Antigua and Barbuda Recurrent and Development Estimates*. St. John's, 2019.
- Antigua and Barbuda National Mental Health Policy 2013
- 2011 Census of Population and Housing. Report. St. John's, Antigua: Statistics Division (Ministry of Finance and Economy, 2014.
- Department of Environment (2015). *Antigua and Barbuda Third National Communication*. St. John's: Department of Environment.
- *Mainstreaming Gender in Green Climate Fund Projects: A Practical Manual to Support the Integration of Gender Equality in Climate Change Interventions and Climate Finance*. 2019. EBook. Incheon: Green Climate Fund. https://www.greenclimate.fund/documents/20182/194568/Guidelines_-_GCF_Toolkit_Mainstreaming_Gender.pdf/860d1d03-877d-4c64-9a49-c0160c794ca7.
- James P. 2001. Antigua and Barbuda Country Paper on National Climate Change Issues. Component 4: Formulation of a Policy Framework for Integrated (Adaptation) Planning and Management, Caribbean Planning for Adaptation to Climate Change.
- "Hurricane Irma Recovery Needs Assessment." *Hurricane Irma Recovery Needs Assessment*. St. John's, Antigua and Barbuda: Government of Antigua and Barbuda, 2017.
- Project Management Unit (Department of Environment) (2018). *Environmental, Social and Gender Impact Assessment: Deploying Renewable Energy for Schools and Clinics via the Sustainable Financing Mechanism for Environmental Management*. St. John's: Department of Environment.

10.2. REGIONAL/INTERNATIONAL REPORTS

- Kairi Consultants Ltd in Association with the National Assessment Team of Antigua and Barbuda. "Living Conditions in Antigua and Barbuda: Poverty in a Services Economy in Transition." *Country Poverty Assessment Reports* 1 (August 2007)
- Ms. Tamara Huggins, Rawwida Baksh and Associates. *Country Gender Assessment Antigua and Barbuda.* Report. Caribbean Development Bank. Vol. 1. St. Michael, Barbados: Caribbean Development Bank, 2014.
- United Nations Development Programme (2012). *Human Development and the Shift to Better Citizen Security*. Caribbean Human Development Report 2012. [online] New York: United Nations Development Programme. Available at: https://www.undp.org/content/dam/undp/library/corporate/HDR/Latin%20America%20and%20Caribbean%20HDR/C_bean_HDR_Jan25_2012_3MB.pdf [Accessed 7 Oct. 2019].
- United Nations Human Settlements Programme (UN-HABITAT) (2019). *Antigua and Barbuda: All Saints Urban Profile*. Nairobi: United Nations Human Settlements Programme (UN-HABITAT).
  United States Department of State, 2016 Country Reports on Human Rights Practices - Antigua and Barbuda, 3 March 2017 available at: https://www.state.gov/documents/organization/236870.pdf [accessed 24 November 2017]

10.3. INTERVIEWS AND CONSULTATIONS

- Project Management Unit (Department of Environment), 2017. Consultation with beneficiaries of facilities
- Project Management Unit (Department of Environment), 2018. Consultation with schools and clinics
- Project Management Unit (Department of Environment), 2018. Consultation with NGOs/CSOs and beneficiaries as identified (See critical facilities under Table 3), 2018
- Project Management Unit (Department of Environment), 2019. Consultation with project teams and executing partners including the Ministry of Works, the Met Office and NODS
- Jacobs, C. and Versailles, C. (2019). *Interview with the members of the Police Unit and the Fire Department in Barbuda*.
- Nedd, P. (2019). *Interview with Member of the Barbuda Council*.
- Charles, A. Jones, Cuffy, J. (2019) *Interview with nurses in Barbuda*
- Project Management Unit (Department of Environment) 2019. Interviews with household members and private business owners in Barbuda
- Project Management Unit (Department of Environment) 2020. Consultation with beneficiaries of facilities 2020