CARIBBEAN Safe School Initiative CSSI

IMPLEMENTATION OF THE MODEL SAFE SCHOOL PROGRAMME IN THE CARIBBEAN

HAZARD RISK ASSESSMENT REPORT AND COSTED ACTION PLAN

MARY E. PIGOTT PRIMARY SCHOOL

ANTIGUA AND BARBUDA

NDRM Natural Disaster Risk Management in the CARIFORUM

An initiative of the African, Caribbean and Pacific Group, funded by the European Union, and implemented by:

CDEMA Caribbean Disaster Emergency Management Agency — Resilient States - Safer Lives

República Dominicana — Ministerio de la Presidencia

SUBMITTED BY:
Environmental Solutions Limited

TO:
The Caribbean Disaster Emergency Management Agency Coordinating Unit

Hazard Risk Assessment Report and Costed Action Plan – Mary E. Pigott Primary School, Antigua and Barbuda for the Consultancy to Develop National Safe School Policies, Assess School Vulnerability to Hazards and Develop School Costed Action Plans in Six Borrowing Member Countries

CARIBBEAN DISASTER EMERGENCY MANAGEMENT AGENCY COORDINATING UNIT
Resilience Way, Lower Estate
St. Michael
Barbados, W.I.

REPORT PREPARED BY ENVIRONMENTAL SOLUTIONS LIMITED

ENVIRONMENTAL SOLUTIONS LIMITED
7 Hillview Avenue
Kingston 10, Jamaica, W.I
Tel : (876) 978-9519, 978-6297, 978-5902
Fax : (876) 946-3745
E-Mail : envirsol@cwjamaica.com
Website : www.eslcaribbean.com

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1. INTRODUCTION

Environmental Solutions Ltd. (ESL) has been contracted by the Caribbean Disaster Emergency Management Agency (CDEMA) to develop/enhance National Safe School Polices in four Caribbean Development Bank (CDB) Borrowing Member Countries (BMCs), conduct hazard assessments of 33 schools across six BMCs, and prepare costed action plans for each of the schools based on the results of the assessments.

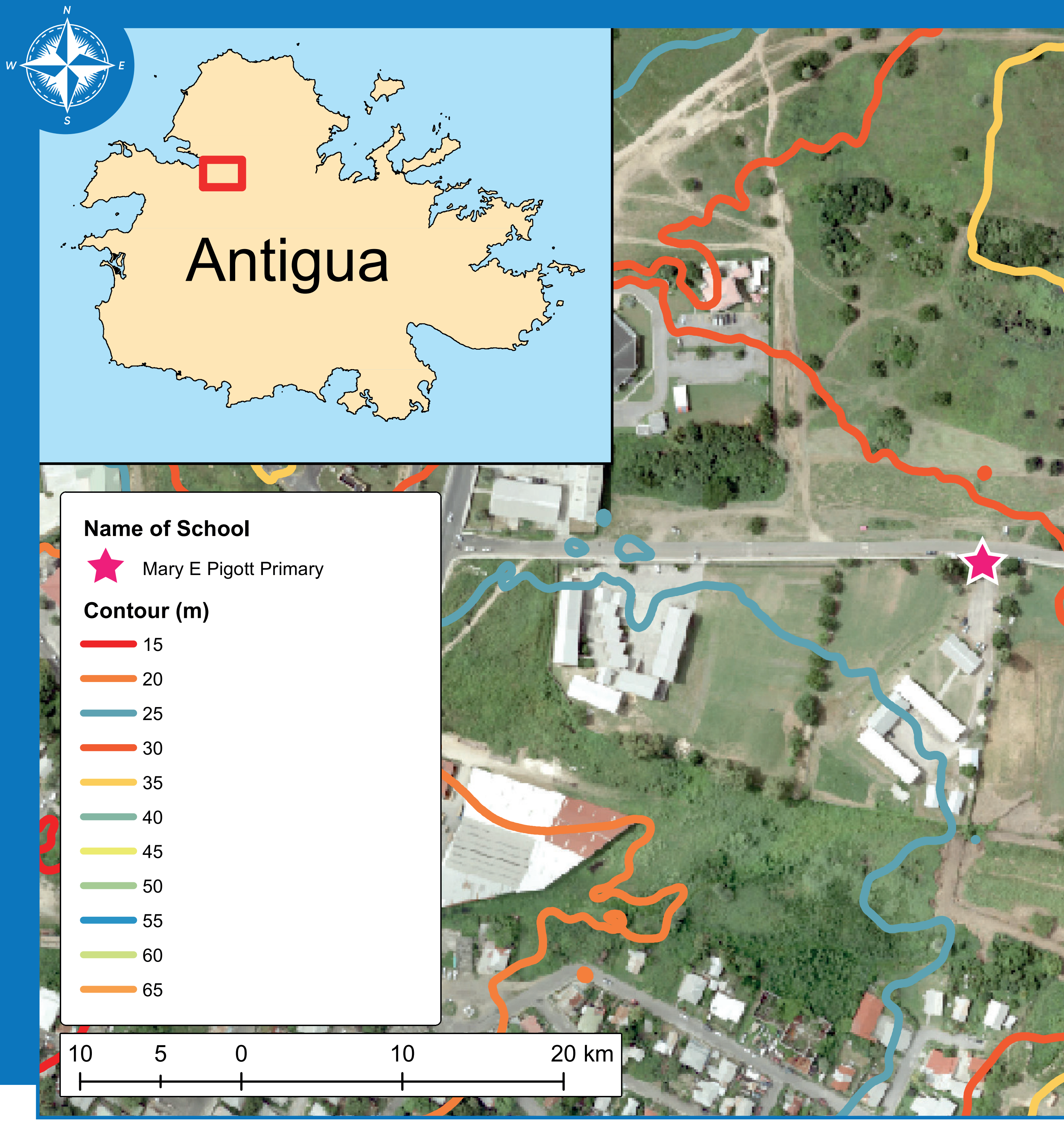
This document presents the Hazard Risk Assessment Report and Costed Action Plan for the **Mary E. Pigott Primary School**, one of seven (7) schools assessed in Antigua and Barbuda (See Figure 1.1). The report forms a part of the second and fourth deliverables (D2 and D4) under this Consultancy, and has been divided into eight main sections. Section 1 describes the method and approach the consultants used to undertake the assessment. Section 2 outlines the Country Risk Profile which presents the natural hazards each country and school is exposed to. Sections 3 to 6 summarize the vulnerability analysis of the identified hazards and Sections 7 and 8 present the summary findings, proposed recommendations and the Costed Action Plan. The results of the school safety and green assessments are presented in the Appendices.

The following schools were visited by the assessment team on regular school days, and as such the consultants were able to assess the schools during normal operational conditions:

TABLE 1.1: SCHOOL ASSESSMENT SCHEDULE

SCHOOL NAME	LOCATION	DATE VISITED
Mary E. Pigott Primary School	St. John's 17° 6'56.30"N 61°50'8.84"W	Tuesday May 14, 2019
Antigua Girls' High School	St. John's 17° 7'22.92"N 61°50'33.92"W	Wednesday May 15, 2019
Golden Grove Primary	St. John's 17° 6'23.77"N 61°50'31.83"W	Wednesday May 15, 2019
Nelvie N. Gore Primary	Willikies 17° 5'2.86"N 61°42'41.86"W	Thursday May 16, 2019
Ottos Comprehensive School	St. John's 17° 6'55.74"N 61°50'5.07"W	Friday May 17, 2019
Adele School for Special Children	St. John's 17° 7'40.40"N 61°50'15.43"W	Friday May 17, 2019
Buckleys Primary	Buckleys 17° 4'0.02"N 61°48'37.22"W	Friday May 17, 2019

FIGURE 1.1: SCHOOL LOCATION MAP - ANTIGUA

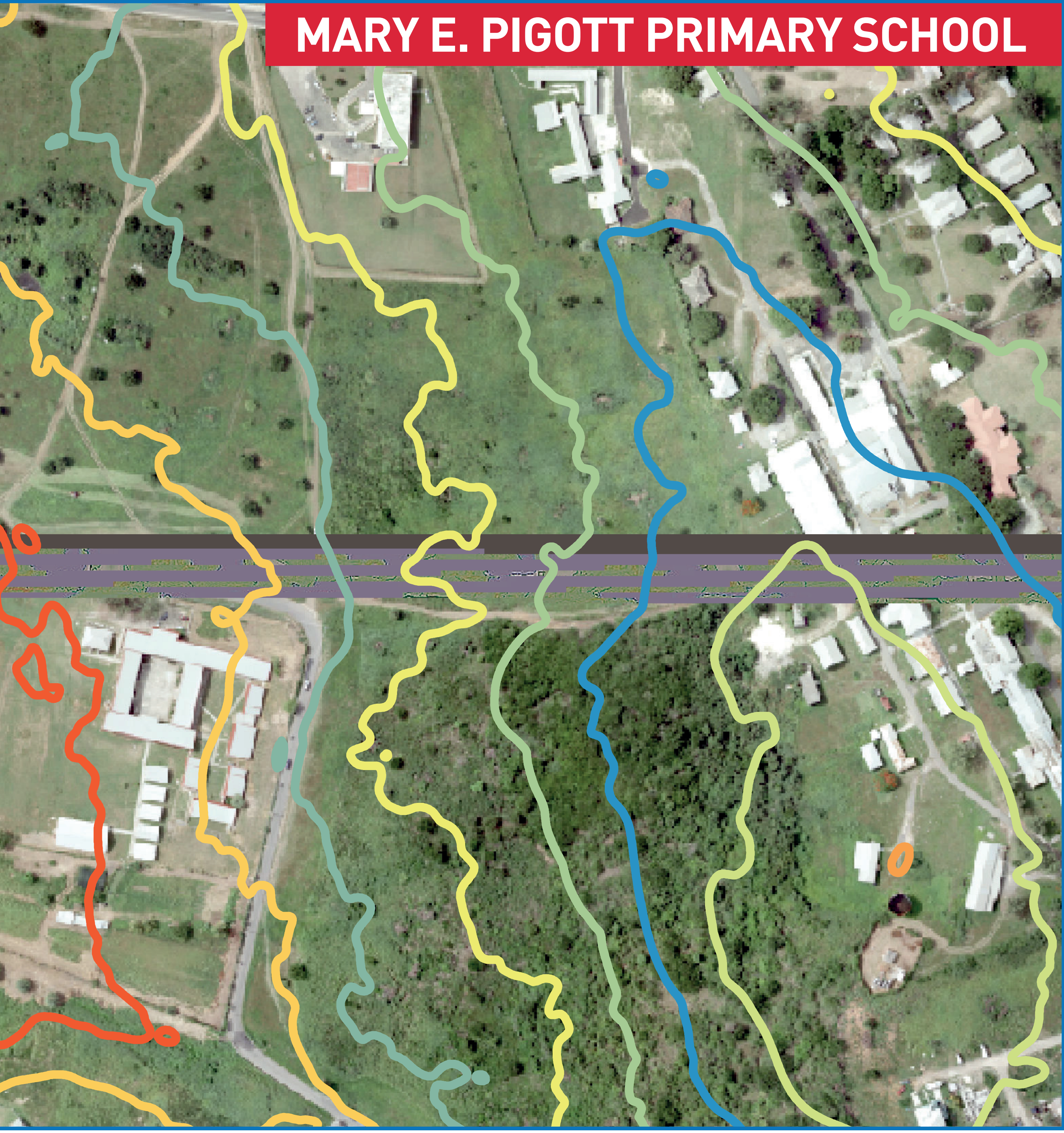


Created by:
Jason Williams - Data Manager, Department of Environment

Purpose: To identify location of school along with 5m interval ccontour

Date Created: 9 June 2019

MARY E. PIGOTT PRIMARY SCHOOL



Data sourced from the Environmental Information Management & Advisory System - EIMAS and/or data points collected in the field using GPS Technology. Base Map source: 2010 Aerial Imagery

Published by the Department of Environment, Ministry of Health & the Environment, Government of Antigua & Barbuda

The assessments consisted of interviews with senior administrators, a site walk-through to make general observations and take pictures, as well as a building condition survey described below.

The results of the school assessments are found in Appendix 1.

These deliverables have been prepared for the Project Implementing Agency, CDEMA, as well as the National Safe School Programme Committee (NSSPC) and national focal point in Antigua and Barbuda. The list of NSSPC members are included in Appendix 2.

1.1 PURPOSE

The Model Safe School Programme (MSSP) Toolkit states that "in a region that is prone to various hazards, many schools may be located in hazardous locations. Wherever possible, Hazard and Vulnerability Assessments should be performed for schools to guide the inclusion of preparedness and mitigation measures in the design, construction and operational phases. Disaster and emergency planning should be founded on a thorough understanding of the specific hazards faced by the education sector in general and at the individual institutions."

The purpose of this hazard risk assessment report is to identify and analyze the hazard vulnerability of the **Mary E. Pigott Primary School** and to make recommendations to inform decision-making.

1.2 METHODOLOGY

The vulnerability assessment tool (VAT) draws on the methodology developed by the National Oceanic and Atmospheric Association (NOAA). Some adaptations were made to take into account the local situation as well as data quality and availability.

1.2.1 HAZARD RISK ASSESSMENT

The consultants undertook the hazard risk assessments through a 3-step process elaborated below.

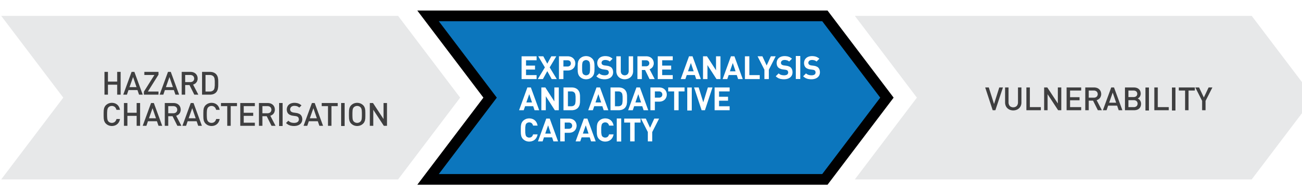
1.2.1.1 STEP 1 - CHARACTERIZING HAZARDS

The first step involved the identification of the hazards (hydro-meteorological, geological, etc.) to which each of the countries, and by extension each school, may be exposed. To characterise hazards for each country, the Consultants conducted comprehensive desk research and stakeholder consultations with key agencies and various stakeholder groups (See Appendix 3) to acquire the necessary information, which included but was not limited to:

- Existing spatial data from local and regional Geographic Information Systems (GIS) databases e.g. Caribbean Risk Information System, CHARIM Handbook & Geo-node, PITCA, CARDIN etc.
- Multi-hazard maps, including:
  - Wind and cyclone hazard maps
  - Seismic zoning
  - Flood hazard maps
- Location of critical infrastructure and supporting infrastructure
- Historical and projected information on hazards for each country
- Damage history of each institution
- Previously conducted studies or country reports

Site visits were also conducted to the respective schools. These visits focused primarily on collecting physical infrastructure data and assessing the vulnerability of the facilities as they relate to the various hazards.

1.2.1.2 STEP 2 - EXPOSURE ANALYSIS AND ADAPTIVE CAPACITY



EXPOSURE ANALYSIS

Exposure analysis involved accessing various databases, including geospatial mapping using GIS, to identify the hazards to which the schools were exposed, as well as site assessments and discussions with stakeholders to ascertain history of hazard events.

Mapping hazard exposure enables stakeholders to visualise individual hazardous settings and identify cumulative hazard scenarios. This mapping also provides an effective tool to anticipate, plan and manage resources effectively in advance of these hazards. This geospatial framework is the foundation of the vulnerability assessment process.

The Consultants used the assessment tools from the MSSP toolkit to gather relevant information to help to inform exposure.

ADAPTIVE CAPACITY ASSESSMENT

The adaptive capacity for each school was determined by examining the characteristics that influence the school's capacity to prepare for, respond to and recover from hazards and disasters. The interaction between natural processes and the built environment is intrinsically linked, and it is the adaptive capacity that determines the risks and burdens created by hazards.

Some of the major factors assessed that influence adaptive capacity included:

- Are the proposed systems associated with each asset/facility designed to anticipate a hazard, cope with it, resist it and recover from its impact?
- Conversely, are there barriers to the ability to anticipate, cope, resist or recover?
- Are the systems associated with the school's assets/facilities already stressed in ways that will limit their capacity to anticipate, cope, resist or recover?
- Is the rate of impact from hazards likely to be faster than the adaptability of the systems?
- Are there efforts already underway to address impacts of hazards of interest related to the school's assets/facilities?

These variables outlined above were adopted for this project along with other indices. A systematic examination of building elements (as elaborated below), facilities, population and other components was carried out to identify features that are susceptible to damage from the effects of specific hazards. A qualitative scoring method was developed to determine the vulnerability of specific structures, exposed population and selected geographic areas. This data was analysed and used to prioritize mitigation activities and to guide disaster risk management within the schools.

The Consultants conducted targeted interviews with school administrators to identify gaps and needs for each school (institutional framework, physical infrastructure, human and financial resources). During the adaptive capacity analysis, the Consultants used the MSSP toolkit to identify gaps, needs and recommendations for capacity building measures and other interventions. Additionally, the Consultants provided a qualitative summary for each school.

Building Condition Assessment Methodology

The structural condition assessment was limited to visual observations and included both non-structural and structural-related issues. No finishes were removed to reveal hidden conditions, and no material or load tests were conducted to ascertain the structural capacity of the buildings' components. Moreover, the survey was limited to cursory inspection of electrical and mechanical systems such as ventilation, water services, plumbing and sewer utilities; egress, fire-suppression or fire rating of the building components.

As such, any comments offered regarding concealed construction are the professional opinions of the Consultants based on analyses, and our joint engineering experience and judgment, and are derived in accordance with the standard of care and practice for evaluations of building structures.

The following standard conditions assessment definitions were used in describing the general state of the elements.

Good condition:
- It is intact, structurally sound and performing its intended purpose.
- There are a few or no cosmetic imperfections.
- It needs no repairs and only minor or routine maintenance.

Fair condition:
- There are early signs of wear, failure or deterioration, although the feature or element is generally structurally sound and performing its intended purpose.
- There is failure of a sub-component of the feature or element.
- Replacement of up to 25% of the feature or element is required.
- Replacement of a defective sub-component of the feature or element is required.

Poor condition:
- It is no longer performing its intended purpose.
- It is missing.
- It shows signs of imminent failure or breakdown.
- Deterioration or damage affects more than 25% of the feature or element and cannot be adjusted or repaired.
- It requires major repair or replacement.

The above was used qualitatively in conjunction with CDEMA's Enhanced Building Condition Assessment Tool (EBCAT) and the findings are contained in Section 5.1.

1.2.1.3 STEP 3 - VULNERABILITY ASSESSMENT

The data and information collected from Step 1 (Hazard Characterisation) and Step 2 (Exposure Analysis and Adaptive Capacity) were combined to determine how and where each school is vulnerable to hazards using the following formula:

HAZARD EXPOSURE + ADAPTIVE CAPACITY = VULNERABILITY

1.3 LIMITATIONS

This assessment represents a one-day snapshot of the schools visited that may or may not be the total depiction of what occurs daily. The team based its findings on the data provided and individual observations made during this one-day time frame. Please be mindful that this assessment is not binding but is merely an independent review to assist school officials in their quest to examine practices and procedures to better serve their student population. It is therefore incumbent upon the Ministry of Education, education officers and school staff to consider the report and determine what they believe is legitimate and critical to address when considering school safety management issues.

Comments in this report are intended to be representative of observed conditions. The consultants have made every effort to reasonably inspect and analyze the main structural components as well the non-structural components which form part of the building envelope. If there are perceived omissions or misstatements in this report regarding the observations made, we ask that they be brought to our attention as soon as possible so that we have the opportunity to address them fully and in a timely manner.

2. COUNTRY RISK PROFILE / SITUATIONAL CONTEXT

Multiple hazards impact Antigua and Barbuda, including storms, earthquakes and drought. The most common threat is the potential for hurricanes and tropical storms. Due to the size of the islands, a single storm has the potential for directly impacting the entire population. High winds and rainfall are the principal risk factors. The islands' lack of significant topographic variability results in open exposures to the effects of wind and rain (GFDRR, 2010).

Earthquake hazards are also high, with a seismically active area of the Caribbean plate boundary located east of Barbuda. Landslide hazards are low. Inland flooding occurs in low-lying areas during heavy rain. There is no direct volcanic hazard, although the active Soufrière Hills volcano on Montserrat does occasionally deposit ash on Antigua and poses some tsunami hazard (CCRIF, 2013).

3. HAZARD IDENTIFICATION/ASSESSMENT

As with many other countries in the Caribbean, there are two broad categories of hazards that can cause potentially minor to significant impacts at any given time in Antigua and Barbuda. These are:

- Hydro-meteorological hazards
  - Hurricanes and Tropical Storms
  - Flooding
  - Drought
  - Storm Surge
  - Landslide

- Geological hazards
  - Earthquake
  - Volcano
  - Tsunami

Based on a review of reports, site visits and consultation with key stakeholders, the main hazards that affect the schools found within the project area are presented below.

3.1 WIND

Antigua and Barbuda has been exposed to a number of storms whose track has passed within 40 km of the two islands. These include notably intense storms which passed directly over the islands such as Donna (1960, Category 4); Luis (1995, Category 4); and Georges (1998, Category 3). Damages estimated in the aftermath of Luis, for example, were placed at approximately 2/3 of the country's GDP (GFDRR, 2010). In 2017, Hurricane Irma hit the islands of Antigua and Barbuda with catastrophic effects. The storm's eye passed directly over Barbuda exposing the island to the to the extraordinary eye wall winds for more than three hours. While out of the path of the eye, Antigua, located approximately 29 miles to the south of Barbuda, experienced tropical storm force winds. Compounding the situation, on September 18, Hurricane Maria (also a category 5 storm) affected the island of Antigua. Although Hurricane Maria did not make landfall, Antigua was exposed to the north-eastern quadrant of storm and experienced again tropical storm force winds and associated rainfall.[1]

FIGURE 3.1: ANTIGUA WIND / HURRICANE VULNERABILITY BY RETURN PERIOD (SOURCE: OAS, 2001)

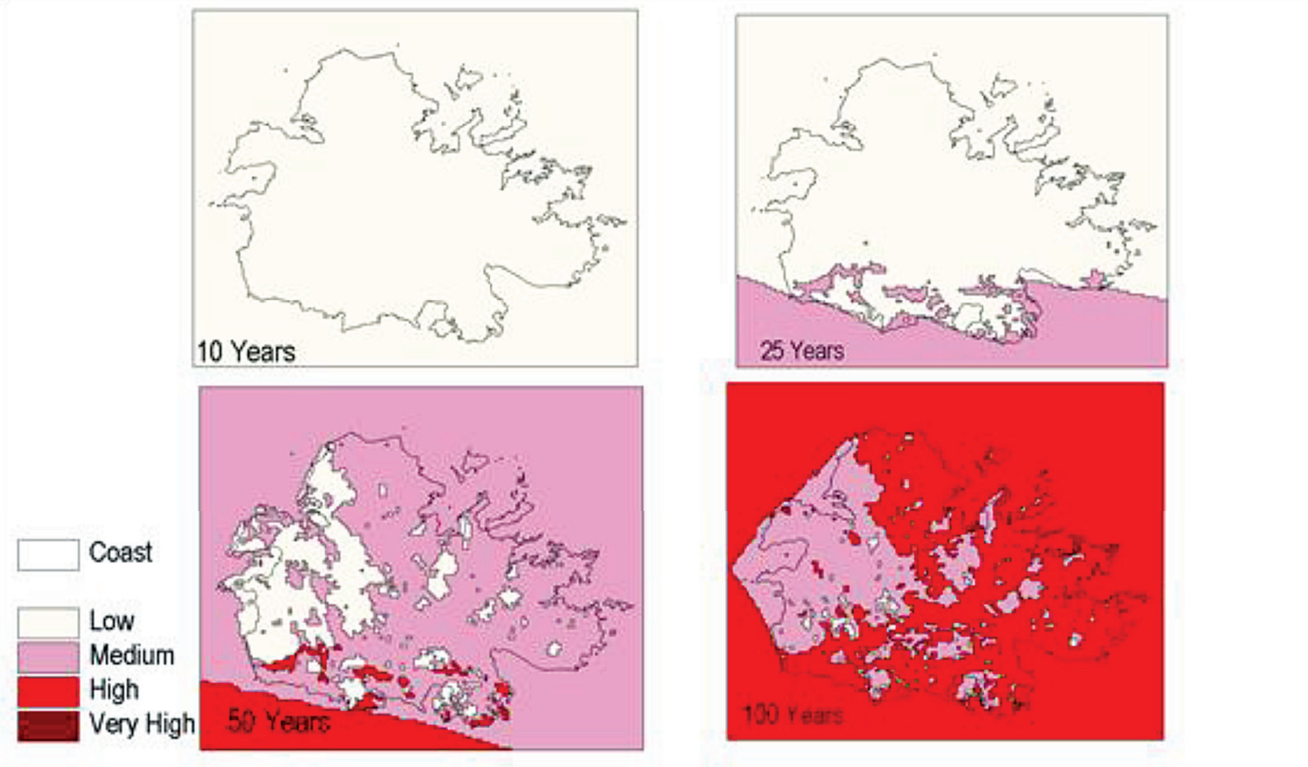


Figure 3.1 above indicates the vulnerability of Antigua to winds by the return periods of 10 years, 25 years, 50 years and 100 years. The 10-year return period subjects the entire island to low vulnerability that is of the tropical storm and hurricane category 2 wind strength. Minimal damage would be expected. The 25-year return period would generate low vulnerability for most of the island with some sections of the southern range experiencing moderate vulnerability. This would create hurricane category 2 winds and moderate damage. For the 50-year return period most of Antigua would be of moderate vulnerability. The western coast would have a low vulnerability with sections of the southern coast subjected to high vulnerability. Category 3 and 4 winds would be expected with extensive and extreme damage. The 100-year storm would place most of the island within the high vulnerability zone. The western third of the island and pockets in the central and eastern districts would have a medium vulnerability. Category 4 winds with extreme damage would be expected (OAS, 2001).

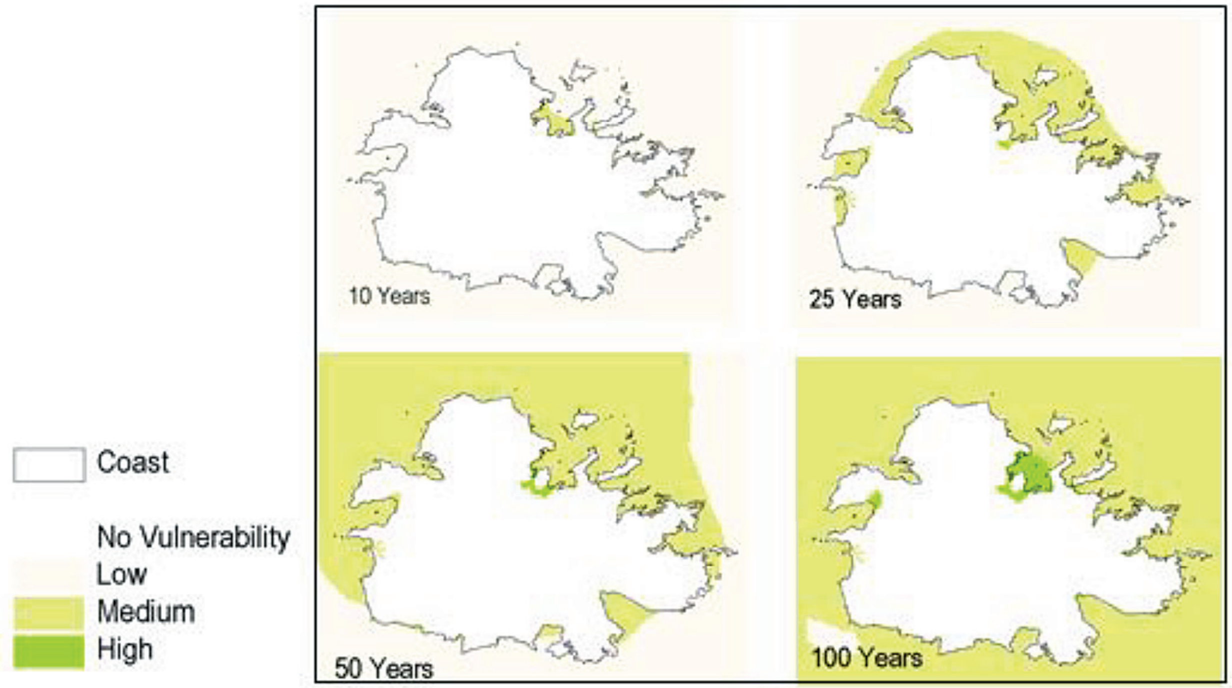
1 https://www.gfdrr.org/sites/default/files/publication/Antigua%20and%20Barbuda%20executive%20summary_print_text %282%29.pdf

3.2 STORM SURGE

Figure 3.2 indicates storm surge vulnerability by return period. It indicates that for the 10-year period the entire coast with the exception of the Fitches Creek / Parham Harbour area would experience low storm surge vulnerability. It would be similar to that experienced in a tropical storm with some damage and surge to the heights of 0.1 to 0.5 meters. The Fitches Creek / Parham Harbour area would experience medium storm surge vulnerability with surge varying between 0.5 and 1.5m minimal damage.

The 25-year return period would place most of the coast within a moderate vulnerability storm surge zone and the southwestern section of Parham Harbour would be subjected to High vulnerability. Intrusions of moderate storm surge would be expected in the Hanson's Bay and Jolly Harbour areas. The sea would surge in Parham Harbour to 3.0 meters and cause extensive damage. The 50-year return period increases the area of intrusion around Parham Harbour, Hanson's Bay and Jolly Harbour. The 100-year return period increases the vulnerability of the Hanson's Bay area to high and results in high storm surge throughout Parham Harbour (OAS, 2001).

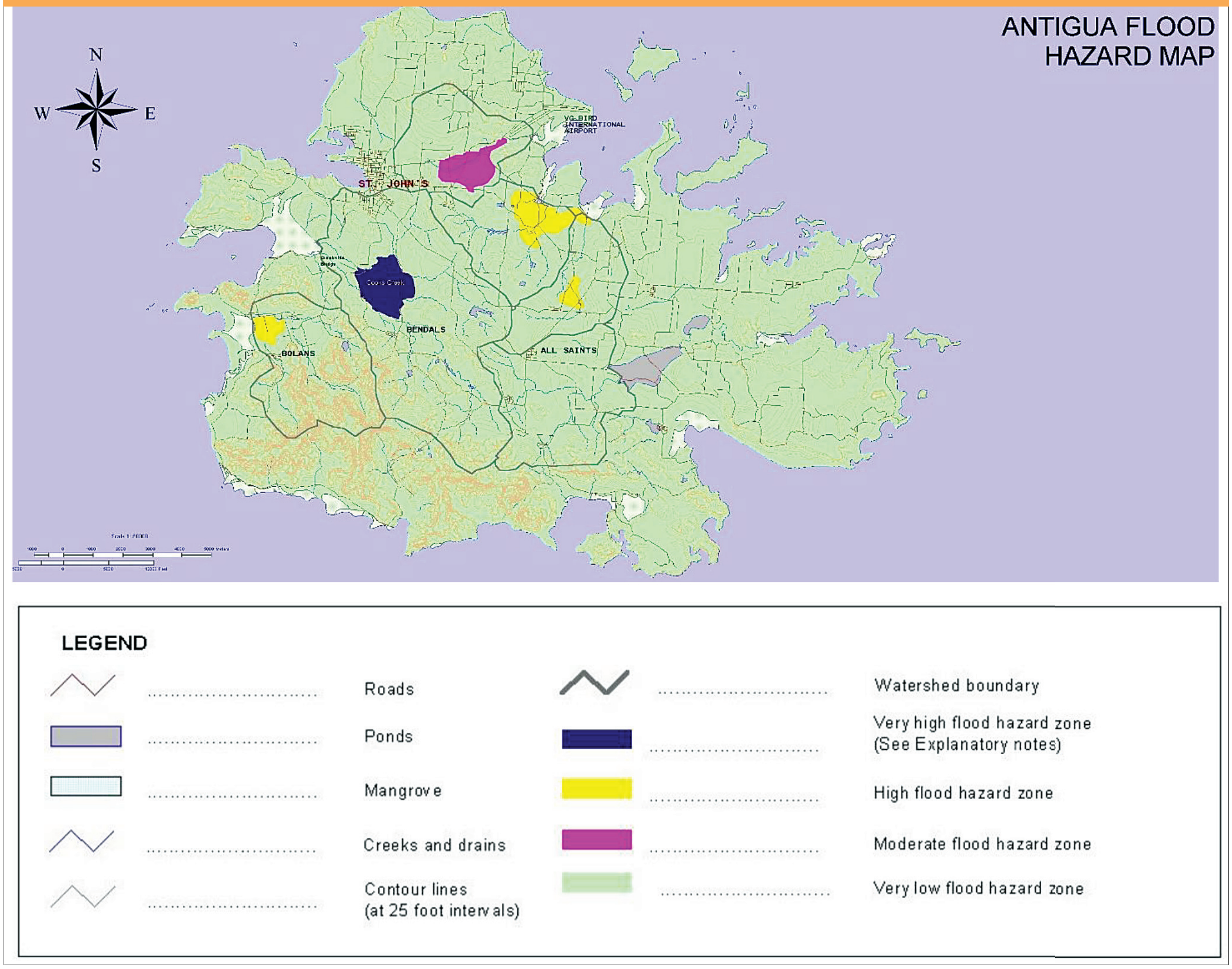
FIGURE 3.2: ANTIGUA STORM SURGE VULNERABILITY BY RETURN PERIOD (SOURCE: OAS, 2001)



3.3 FLOODING

Most of the island has been categorized as a low vulnerability zone for flooding. Flooding occurs in the communities of Point, Grays Farm, Bendals, Urlings and Piggots due mainly to poor drainage in these areas (Kairi Consultants Limited, 2007b). Figure 3.3 shows a Flood Map for Antigua. Important areas are described as follows. The floodplain of Cooks Creek Watershed, seen in dark blue on the diagram is defined as a very high flood zone area. In yellow, are three high flood hazard zone areas and in pink in the central north is a moderate flood hazard zone. Codrington, Barbuda's main city is also located in a high hazard flood zone.

FIGURE 3.3: ANTIGUA FLOOD HAZARD MAP (SOURCE: CARIBSAVE, 2012)



3.4 EARTHQUAKES

Antigua and Barbuda are regularly exposed to seismic risk and are located in seismic zone 4 (on a 0-4 scale), a high-risk earthquake zone. The islands are located along the eastern margin of the Caribbean plate and as recently as 1974, were hit with a 7.5-magnitude earthquake which caused structural damages estimated in the millions (GFDRR, 2010).

3.5 TSUNAMI

While tsunamis are not considered a major recurrent risk for the region, the low-lying nature of the islands would make them particularly vulnerable to storm surge and tsunamis. Tsunami risk is generally associated with the potential effects of an eruption of Kick-'em-Jenny located 500 km south of Antigua. Reports on the 1939 eruption indicate that a 2-meter tsunami was generated (GFDRR, 2010).

3.6 LANDSLIDES / INLAND EROSION

Landslides are not a pressing problem in Antigua and Barbuda, but flooding represents a significant risk to the islands. Internal drainage from development has contributed to some flooding events; however, the greatest risk is from storm surge and wave action. Low elevations coupled with deeply intrusive bays provide ample opportunity for flood events to occur (GFDRR, 2010).

FIGURE 3.4: HAZARD OF GULLYING, LANDSLIDE AND ROCKFALL – ANTIGUA (SOURCE: OAS, 2001)

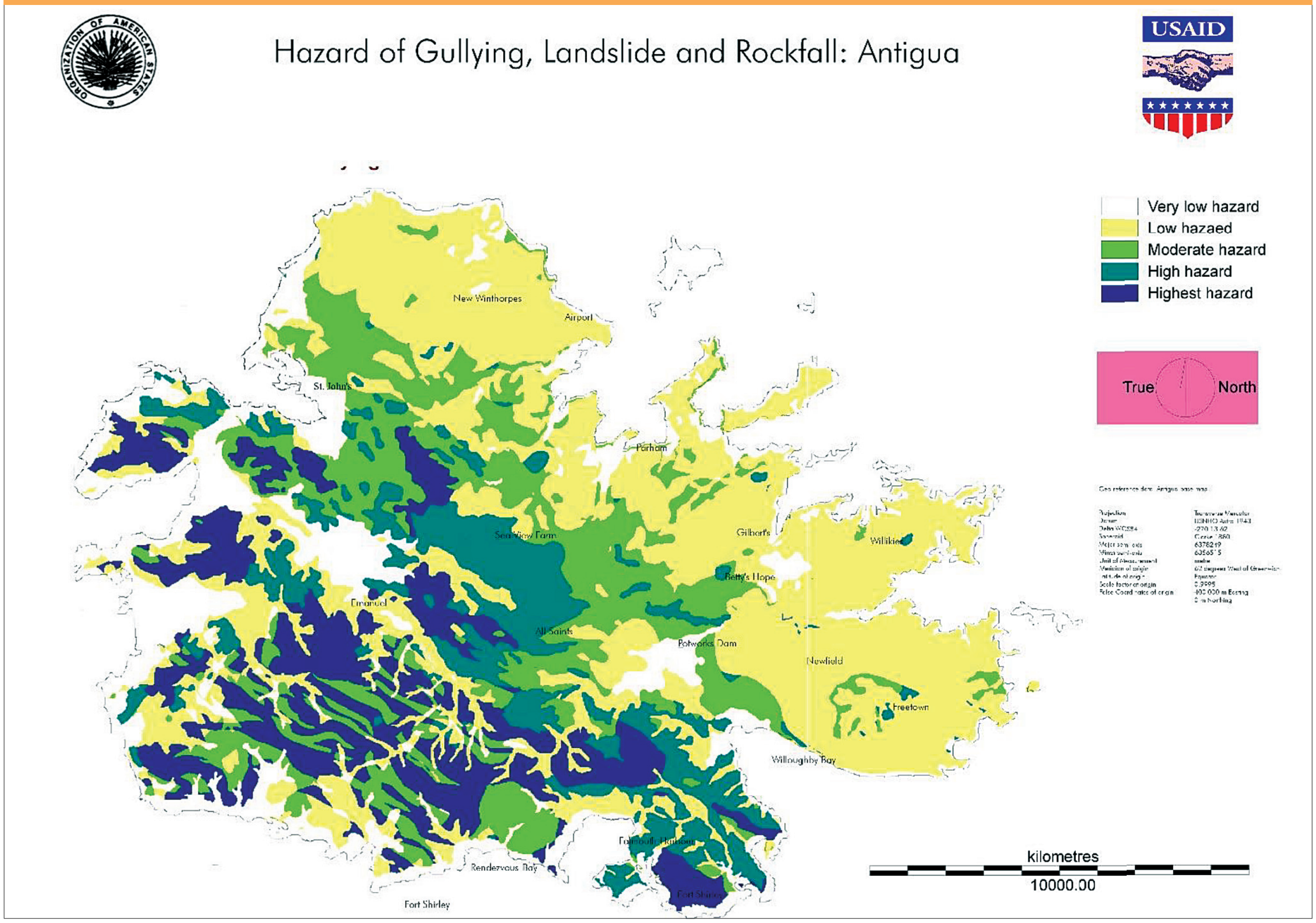


Figure 3.4 indicates that the areas with the highest vulnerability to inland erosion are located within the southwestern half of Antigua. Mainly woodland and rough grazing occupy the zones with high and very high vulnerability to inland erosion. Some central settlements such as Potter's, Sea View Farm and Freeman's are located within these zones. The condition of roads in these areas is adversely affected by erosion (OAS, 2001).

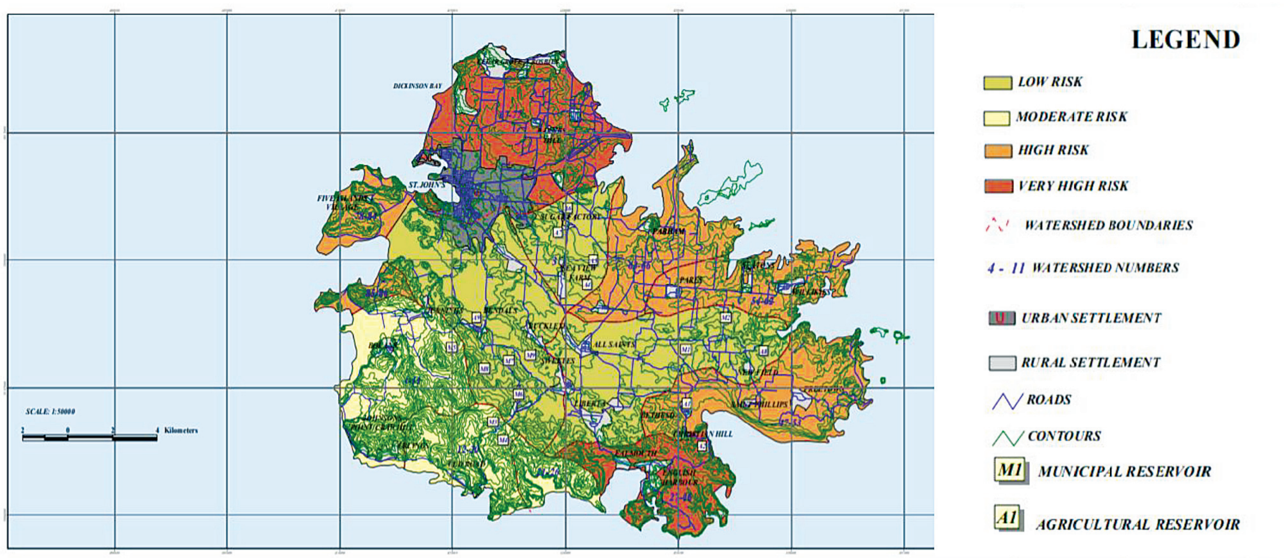
3.7 DROUGHT

Antigua and Barbuda are two of the driest islands in the region owing to their geographic position and topographic features (MPUHATIT, 2001; USACE, 2004). This is due to the geology of the islands, which consists largely of limestone plains. As much of the topography is relatively low-lying, these islands lack a significant stream network. Groundwater is the principal source for freshwater which is recharged by direct infiltration of rainwater through the surface. The islands have added desalination systems to augment freshwater supplies (GFDRR, 2010).

In Antigua and Barbuda, drought is defined as the occurrence of less than 826 mm of rainfall in a given year. The annual rainfall for Antigua ranges from 890 to 1,400 mm and from 508 to 991 mm in Barbuda, with the dry season spanning December to April (USACE, 2004). Additionally, potential evaporation rates are high, being higher than precipitation for roughly 11 months of the year (USACE, 2004). Increasing variability in rainfall patterns also contributes to drought conditions.

The country has a history of drought events and water shortages particularly in the 1960's, but also in 1983, 1993-1994 and 2001-2002 (Meade and Destin, 2008; USACE, 2004). Between 1983 and 1984 water had to be brought via barges from neighbouring islands (USACE, 2004). The 2001 – 2002 drought periods were so intense that Potworks Reservoir was 85% below its average volume in September 2002 (USACE, 2004). The recurrence of drought in Antigua and Barbuda is estimated at once in every three years (Meade and Destin, 2008). However, Barbuda is usually worse affected. Between 1965 and 2000, annual rainfall records indicate totals less than 706 mm for ten years (USACE, 2004). During the dry season groundwater resources can be as low as 30% of yield potential and desalination output can be as high as 83% of demand (USACE, 2004). In Barbuda, drought conditions affect wells and therefore ground water, as they are prone to over pumping and saltwater intrusion (USACE, 2004). Tourism is one of the main revenue generators in Antigua and Barbuda accounting for 60% of GDP (ECLAC, 2007) and is also a heavy water using sector. Sea level rise (SLR) is expected to place additional burden on water supplies due to the threat of saltwater intrusion of coastal aquifers (MPUHATIT, 2001).

FIGURE 3.5: DROUGHT RISK MAP



The northeast and southwest of Antigua are most vulnerable to drought. The eastern and western areas are within a high zone of vulnerability. The southeast of Antigua between English Harbour and St. James Club has been identified as the watershed most vulnerable to drought (OAS, 2001).

3.8 CLIMATE PROJECTIONS

Antigua and Barbuda is already experiencing some of the effects of climate variability and change through damage from severe weather systems and other extreme events, as well as more subtle changes in temperature and rainfall patterns (CARIBSAVE, 2012).

Detailed climate modelling projections for Antigua and Barbuda predict:

- an increase in average atmospheric temperature;
- reduced average annual rainfall;
- increased Sea Surface Temperatures (SST); and
- the potential for an increase in the intensity of tropical storms.

And the extent of such changes is expected to be worse than what is being experienced now.

4. EXPOSURE ANALYSIS

The term exposure is used to indicate those elements-at-risk that are subject to potential losses. Important elements-at-risk that should be considered in analyzing potential damage of hazards are population, building stock, essential facilities and critical infrastructure. Critical infrastructure consists of the primary physical structures, technical facilities and systems which are socially, economically or operationally essential to the functioning of a society or community, both in routine circumstances and in the extreme circumstances of an emergency (UN-ISDR, 2009).

This exposure analysis involves developing a hazard profile for the school by assigning ratings (from 0 to 3) to the parameters[2] listed in Table 4.1 below and averaging the parameter scores for each hazard. Based on the average scores, the school is characterized by the degree of exposure to each hazard and further assigned an **Overall Exposure Index** (sum of the average scores for all hazards).

The objective is to quantify the school's level of exposure and subsequently the potential impact (direct or indirect) of a specific hazard on people, essential facilities, and property. This will enable school administrators, the Ministry of Education and other key decision makers to have a better understanding of the hazards that present the highest risk to the school and focus planning efforts on making schools safer in this context.

Based on the rankings given, the school is characterized by the degree of exposure to each hazard and further assigned an overall exposure index of Low, Moderate or High:

OVERALL EXPOSURE INDEX		
0 - 4	VERY LOW	
5 - 9	LOW	
10 - 14	MODERATE	
15 - 19	HIGH	
20 - 24	VERY HIGH	

2 FEMA risk assessment doc

TABLE 4.1: PARAMETERS AND RANKINGS USED IN EXPOSURE ANALYSIS

PARAMETER	RANKINGS	SCORE
Frequency	**Highly Likely:** Near 100% probability in next year.	3
	Likely: Between 10 and 100% probability in next year, or at least one chance in 10 years.	2
	Possible: Between 1 and 10% probability in next year, or at least one chance in next 100 years.	1
	Unlikely: Less than 1% probability in next 100 years.	0
Warning (potential speed of onset)	Minimal (or no) warning.	3
	6 to 12 hours warning.	2
	12 to 24 hours warning.	1
	More than 24 hours warning	0
Severity	**Catastrophic:** Multiple deaths; Complete shutdown of facilities for 30 days or more; More than 50%of property is severely damaged.	3
	Critical: Injuries and/or illnesses result in permanent disability; Complete shutdown of critical facilities for at least two weeks; More than 25%of property is severely damaged.	2
	Limited: Injuries and/or illnesses do not result in permanent disability; Complete shutdown of critical facilities for more than 1 week; More than 10%of property is severely damaged.	1
	Negligible: Injuries and/or illnesses are treatable with first aid; Minor quality of life lost; Shutdown of critical facilities and services for 24 hours or less; Less than 10% of property is severely damaged.	0

The consultants used existing data and available hazard maps to determine the level of exposure of the school to specific hazards. Table 4.2 presents the findings of the exposure analysis.

TABLE 4.2: EXPOSURE ANALYSIS – MARY E. PIGOTT PRIMARY SCHOOL

HAZARD	COMMENTS	FREQUENCY		WARNING TIME		SEVERITY		DEGREE OF EXPOSURE	
		RANKING	SCORE	RANKING	SCORE	RANKING	SCORE	RANKING	SCORE
Hurricanes and Tropical Storms/Wind	The most common threat is the potential for hurricanes and tropical storms.	Likely	2	More than 24 hours	0	Catastrophic	3	MODERATE	1.67
Storm Surge	The Mary E. Pigott Primary School is located relatively near to the coast.	Possible	1	12-24 hours	1	Limited	1	MODERATE	1.00
Flooding (from hurricanes, storms or extreme rainfall events)	St. Johns in located in a "Very Low Risk" flood hazard zone, but flash- flooding due to very heavy rainfall is possible. The school has experienced flooding in the recent past.	Likely	2	6-12 hours	2	Limited	1	MODERATE	1.67
Earthquake	Antigua and Barbuda is located in a "high risk" earthquake zone.	Likely	2	Minimal (or no warning)	3	Critical	2	HIGH	2.33
Tsunamis	Tsunami is not considered a major recurrent risk, however the school is located in allow lying area relatively near to the coast.	Possible	1	Minimal (or no warning)	3	Limited	1	MODERATE	1.67
Landslide /Inland Erosion	School is located in a "very low hazard risk zone" for Landslide/ Inland Erosion.	Unlikely	0					NOT EXPOSED	
Drought	The recurrence of drought in Antigua and Barbuda is estimated at once in every three years.	Highly Likely	3	More than 24 hours	0	Limited	1	MODERATE	1.33
Volcano	There is no direct volcanic hazard, although the active Soufrière Hills volcano on Montserrat does occasionally deposit ash on Antigua and poses some tsunami hazard.	Unlikely	0					NOT EXPOSED	
								OVERALL EXPOSURE INDEX	**9.67**

Based on the above, the overall multi-hazard exposure was determined to be **moderate**.

While the development of the modern building code has progressed, many of the schools assessed were built before the adoption of modern building codes, placing them at great risk for hurricane damage. Technologies exist today that allow older buildings to be retrofitted to become more hurricane resistant. Examples of these technologies include reinforcing gabled roofs, creating secondary water barriers in roofs, and installing hurricane straps and clips to ensure a roof stays in place despite high winds.

The **Mary E. Pigott Primary School** was assessed against its National Building Code which is common for the Organisation of Eastern Caribbean States (OECS) territory. The most serious area of deficiency was the Aluzinc roof covering on some of the buildings which appeared to lack the required hurricane straps. There were also cases of missing or broken windows which will put the entire building at risk in an extreme wind event.

Flood mitigation was identified as a definite necessity in this and many of the schools assessed throughout the region. Due to the nature of the flood hazard, it cannot be addressed in isolation of its immediate environs and more generally, the storm water management of each school should be analyzed in the context of the run-off characteristics of the water catchment in which it is located. This may mean that focusing only on the school in attempting to resolve the flooding problem may not yield the required results. Community-based initiatives with specific focus on empowerment of the local community, and linking the community based activities to local development policies may be more effective.

Seismic hazard may or may not be mitigated. For example, fault rupture and ground motion cannot be mitigated because tectonic movement (the main cause of earthquakes) cannot be stopped, but liquefaction at a site can be mitigated by engineering measures. Seismic risk can be reduced through either mitigation of seismic hazard or reduction of exposure or both. For the purposes of this assignment the assessment was concerned more with building form and to a lesser extent soil type as it relates to susceptibility of liquefaction.

It is recommended that a detailed structural analysis be conducted if 'as-built' drawings do not exist. It is based on that analysis that a determination of the need to retrofit will be made.

4.1 OTHER HAZARDS

Comprehensive school emergency planning utilizes an "all-hazards" approach, which considers a wide range of possible threats and hazards. It includes those that might take place in the community and surrounding area that could impact the school. Examples include:

1. Technological Hazards

- Hazardous materials in the community from industrial plants, major highways or railroads
- Hazardous materials in the school e.g. gas leaks, sewage breaks or laboratory spills
- Infrastructure failure e.g. dam, electricity, water, communications or technology systems

2. Biological Hazards

- Infectious diseases
- Contaminated food outbreak
- Water contamination
- Toxic materials present in schools e.g. mould, asbestos, substances in school science laboratories

3. Adversarial, Incidental and Human-Caused Hazards

- Fire
- Medical Emergency
- Intruder
- Active shooter/Threats of violence
- Fights
- Gang violence
- Bomb threat
- Child abuse
- Cyber attack
- Suicide
- Missing student or kidnapping
- Off-site emergencies
- Dangerous animal
- Riots

Asthma was highlighted a big concern for the school. The head administrator reported awareness of an Asthma Action Plan and the school also conducted a health fair. The Principal also reported that a lot of accidents occur at the school, so in general medical hazards can be considered a priority.

It is recommended that the school determine which of the above are priority hazards to be included in the Safety Plan.

5. ADAPTIVE CAPACITY

The adaptive capacity analysis describes the ability of the school to accommodate potential damage, to take advantage of opportunities, or to respond to consequences with minimum disruption or minimum additional cost (Climate Impacts Group, King County, Washington, and ICLEI-Local Governments for Sustainability, 2007). It describes the capacity of the school to learn from previous experiences and to apply those lessons to cope in future.

In the context of what each school may be exposed to (see Section 3), the analysis below, among other things, seeks to determine:

- If the school is already able to accommodate changes
- If there are any barriers to the school to accommodate changes
- If the rate of the projected change is likely to be faster than the adaptability of the school
- If there are efforts already underway to address impacts of various hazards in the school

To develop an overall index of adaptive capacity, 24 indicators were selected and grouped according to five determinants of adaptive capacity in the context of climate change and variability. The indicators were selected using information garnered using the MSSP toolkit checklists, interviews and desk review of other existing data and information (Smit et al 2001, Yohe and Tol, 2002). The index was calculated by first aggregating the scores for the individual indicators to obtain a determinant value, which were then aggregated to an overall score to obtain an **Overall Adaptive Capacity Index**.

OVERALL ADAPTIVE CAPACITY INDEX		
0 - 4	VERY LOW	
5 - 9	LOW	
10 - 14	MODERATE	
15 - 19	HIGH	
20 - 24	VERY HIGH	

This approach provides a holistic perspective on the school's ability to plan for, design and implement effective adaptation strategies or to react to evolving hazards and stresses which may ultimately reduce the likelihood of the occurrence and or the severity of harmful outcomes resulting from hazards.

TABLE 5.1: DETERMINANTS OF ADAPTIVE CAPACITY USED IN SCHOOL ASSESSMENT

DETERMINANT	RATIONALE
Economic	■ Greater economic resources increase adaptive capacity ■ Lack of financial resources limits adaptation options
Information and skills	■ Lack of informed, skilled and trained personnel reduces adaptive capacity ■ Greater access to information increases likelihood of timely and appropriate adaptation
Infrastructure and Technology	■ Lack of technology limits range of potential adaptation options ■ Less technologically advanced regions are less likely to develop and/or implement technological adaptations ■ Greater variety of infrastructure can enhance adaptive capacity, since it provides more options ■ Characteristics and location of infrastructure also affect adaptive capacity
Institutional	■ Well-developed social institutions help to reduce impacts of climate- related risks and therefore increase adaptive capacity ■ Policies and regulations may constrain or enhance adaptive capacity
Physical/Ecological	■ Elements of the physical or ecological environment of a region may enhance or limit the possibilities for adaptation

TABLE 5.2: SUMMARY OF ADAPTIVE CAPACITY ANALYSIS – MARY E. PIGOTT PRIMARY SCHOOL

DETERMINANT	INDICATOR	SCORE	COMMENTS
Institutional	**1.** Is there a national policy on climate change adaptation and/or comprehensive disaster management (or related) for the education sector? **[YES = 1; NO = 0]**	1	The following represent some of the many national policies in place that address climate change adaptation and comprehensive disaster management for the education sector: ▪ The Disaster Management Act of 2002 ▪ Antigua and Barbuda's National Plan to Reduce the Vulnerability of School Buildings to Natural Disasters (1998) ▪ Signatory to Antigua and Barbuda Declaration on School Safety in the Caribbean
	2. Have there been additions to the curriculum that integrate climate change/disaster preparedness/ emergency management? **[YES = 1; NO = 0]**	1	Part of social studies curriculum – earthquake, hurricane. tsunami awareness etc. – done at upper school level.
	3. Is an updated emergency management or disaster management plan in place? **[YES = 1; NO = 0]**	0	Mary E. Pigott did not have a plan in place at the time of the assessment.
	4. Do the plans address priority hazards based on previous assessment(s)? **[YES = 1; NO = 0]**	0	N/A
	5. Is there a designated environmental/health & safety officer, emergency response team or related position/team? **[YES = 1; NO = 0]**	0	
Information and Skills	**6.** Has the school done a walk through to identify and prioritize hazards for the population and visitors? **[YES = 1; NO = 0]**	0	Not formally.
	7. Are all teachers and school staff assigned roles in the overall response, pre-, during and post-hazard event? **[YES = 1; NO = 0]**	0	
	8. Have staff received training in emergency/disaster management? **[YES = 1; NO = 0]**	1	A few teachers have received external training in First Aid, and more are scheduled to be trained.

TABLE 5.2: SUMMARY OF ADAPTIVE CAPACITY ANALYSIS – MARY E. PIGOTT PRIMARY SCHOOL

DETERMINANT	INDICATOR	SCORE	COMMENTS
Information and Skills	**9.** Are there regular drills with staff, students and/or parents? **[YES = 1; NO = 0]**	0	Not reported.
	10. Is the school able to manage an event independently if help is not immediately available? E.g. fire extinguishers, first aid kits, triage? **[YES = 1; NO = 0]**	1	Fire extinguishers and first aid kits are available.
Infrastructure and Technology	**11.** Does the school have reserve water storage with adequate supply for at least 3 days? **[YES = 1; NO = 0]**	1	The cistern reportedly has a 3 1/2 day capacity.
	12. Does the school employ water conservation strategies to adapt to current usage or plan for future changes to water supply? **[YES = 1; NO = 0]**	1	Antigua is drought prone as such water conservation is innately practiced.
	13. Does the school actively harvest rainwater? **[YES = 1; NO = 0]**	1	
	14. Does the school employ energy conservation/efficiency mechanism? **[YES = 1; NO = 0]**	0	
	15. Is there back up electrical power? **[YES = 1; NO = 0]**	0	
	16. Does the school employ other green practices? E.g. recycling, greenhouse/garden, green policy etc? **[YES = 1; NO = 0]**	0	

TABLE 5.2: SUMMARY OF ADAPTIVE CAPACITY ANALYSIS – MARY E. PIGOTT PRIMARY SCHOOL

DETERMINANT	INDICATOR	SCORE	COMMENTS
Infrastructure and Technology	**17.** Can the building withstand the impacts of a hazard in its current condition? **[YES = 1; NO = 0]**	1	Buildings are in generally fair condition.
	18. Have school buildings/plant been repaired or retrofitted to the building code? **[YES = 1; NO = 0]**	0	
ARE THERE ANY EXISTING BARRIERS TO ADAPTATION?			
Physical/ Ecological/ Climate	**19.** Physical or ecological limits? E.g. Does the landscape/physical location/age range and size of the school population limit the range of adaptation options to priority hazards? **[YES = 1; NO = 0]**	1	Flooding has been identified as a priority issue faced by the school however, the school's location (in a fairly urban environment and beside a main road) does not significantly limit the ability to adapt to the challenges presently faced. Drainage solutions can be engineered to effectively address the flooding concerns.
	20. Is climate change likely to exacerbate any of the current hazards? **[YES = 1; NO = 0]**	0	Particularly drought caused by increased temperatures and rainfall variability, and flooding caused by more intense rainfall events.
	21. Is the rate of climate change likely to outpace adaptation efforts? **[YES = 1; NO = 0]**	1	Not necessarily as there are available technologies, however cost may be the limiting factor.
Technological	**22.** Technological limits? Availability of technological options for adaptation e.g. public address system for warning/early warning; electronic data storage. **[YES = 1; NO = 0]**	1	

TABLE 5.2: SUMMARY OF ADAPTIVE CAPACITY ANALYSIS – MARY E. PIGOTT PRIMARY SCHOOL

DETERMINANT	INDICATOR	SCORE	COMMENTS
Economic	**23.** Financial barriers? E.g. Lack of resources may limit the ability of some schools to afford proposed adaptation mechanisms. [YES = 1; NO = 0]	0	The school is government owned so available funding is limited.
Information and Skills	**24.** Information or cognitive barriers (individuals tend to prioritize the risks they face, focusing on those they consider – rightly or wrongly – to be the most significant to them at that point in time)? E.g. concern about one type of risk is heightened while worry about other risks decreases; lack of experience of climate-related events inhibits adequate responses. [YES = 1; NO = 0]	0	
	TOTAL	**11**	**MODERATE**

5.1 DESCRIPTION OF STRUCTURE

The investigation consisted of a visual review of the exterior and interior elements such as walls, slab, columns and beams as well as a general walk-through to examine the existing cracks and other defects which may exist. The results of the building condition assessment are presented below.

NAME OF SCHOOL:	**MARY E. PIGOTT PRIMARY SCHOOL**
SCHOOL ADDRESS:	St. Johns
TOTAL NUMBER OF BUILDINGS:	Seven (7)
SPECIAL HAZARD RISK:	Wind, flooding
GENERAL COMMENTS:	Buildings are in generally fair condition. Major repairs and retrofit are recommended as well as some flood mitigation interventions.

	BUILDING 1 & 2	BUILDING 3	BUILDING 4	BUILDING 5, 6 & 7
Number of Storeys per Building:	2	1	1	1
Floor Type:	**Description:** Reinforced concrete **Observation:** Floor slab in generally good condition with some spalling concrete at some areas.	**Description:** Reinforced concrete **Observation:** Floor slab in generally good condition with some spalling concrete at some areas.	**Description:** Reinforced concrete **Observation:** Floor slab in generally good condition.	**Description:** Timber **Observation:** Floor in generally fair condition.
Wall/Partition Type:	**Description:** Reinforced masonry in fair condition.	**Description:** Reinforced masonry in fair condition.	**Description:** Reinforced masonry in fair condition.	**Description:** Timber panels in fair condition.
Roof Structure:	**Description:** Timber structure in generally good condition.	**Description:** Timber structure in generally good condition.	**Description:** Timber structure in generally good condition.	**Description:** Timber structure in generally fair condition.
Roof Covering:	**Description:** Aluzinc sheets in generally good condition.	**Description:** Aluzinc sheets in generally good condition.	**Description:** Aluzinc sheets in generally good condition.	**Description:** Aluzinc sheets in generally good condition.
Repairs/ Retrofitting Conducted:	None	None	None	None
Is there Disabled Access/ Special Needs Access to the Building?	None	None	None	None
Approx. Age of Each Building	More than 20 years	More than 20 years	More than 20 years	More than 10 years
Building Use	Classrooms	Admin	Toilets	Classrooms
Overall Condition	Good	Good	Good	Fair

5.1.1 SITE OBSERVATIONS / DISCUSSION

EXTERIOR

WALLS

There were some signs of water ingress through the external walls that may be porous, and the affected areas can be corrected by re-plastering of defective areas.

SLAB & BEAMS

Slab and beams were found to be in generally good condition with some isolated areas of spalling concrete.

COLUMNS

Columns were found to be in good condition generally.

INTERIOR

WALLS

Interior walls were of both masonry and timber. Masonry walls were in good condition as were the timber panels.

WINDOWS

Several broken windows were also observed the timely repairs of which will be critical in order to ensure that the building envelope is not compromised during an extreme wind event.

DOORS

Doors were all of timber in conditions varying from good to poor. The problems ranged from termite infestation to broken or missing ironmongery and for which the timely repairs will be critical in order to ensure that the building envelope is not compromised during an extreme wind event.

GENERAL CONDITION

The summary of the main findings is as follows:

1. Historically, the issue of water ingress is normally not associated with structural assessments, however in recent times a direct link between water ingress and structural deterioration has been established. Generally, water ingress through inadequate seals around windows are doors as well as wall flashing need to be addressed. Water ingress around windows was identified as the main defect to be addressed.
2. There is also the need to repair roof and roof drainage as there are signs of deterioration, crude repairs and in some cases leaks.
3. There were some signs of water ingress through the external walls that may be porous and the affected areas can be corrected by re-plastering of defective areas.
4. Based on the observations, there is no immediate concern about the structural integrity of the building. It is anticipated that the building should perform adequately for its life. Nonetheless, it is recommended that the observed defects be remedied.
5. Storm water drainage system needs to be enhanced and regularly monitored and maintained.

6. VULNERABILITY ASSESSMENT

The final step in the vulnerability assessment process is to combine the findings of exposure and adaptability to determine how and where the school is vulnerable. It is important to note that the vulnerability assessment does not remain static, it can improve or worsen with time. Changes can occur within the school, such as implementation of preparedness activities, and/or new threats may emerge. These can all influence the school's overall vulnerability.

Mary E. Pigott Primary School has been classified as having an **overall moderate exposure** (Table 4.2). The analysis of the adaptive capacity (Table 5.2) revealed that while the school may have some barriers and limitations, their capacity to adjust to change (induced by the hazards to which they are exposed), moderate potential damages, take advantage of opportunities, and/or to cope with the consequences is **moderate**.

While the administration has taken active measures towards disaster management and the physical plant of the school has not been structurally compromised, there are additional strategies that the school can employ to improve their adaptive capacity, however these may come at significant cost (presented in Section 8). As the school is government funded, this may further constrain the school's capacity to adapt. As such, Mary E. Pigott Primary School can be characterised as having **moderate vulnerability**.

7. SUMMARY FINDINGS

Based on the observations, there is no immediate concern about the structural integrity of the buildings. Once the remedial works are undertaken the structural integrity and useful life of the buildings should be greatly enhanced.

KEY STRENGTHS:

- The school has in place a programme to encourage positive behaviour management. There are signs throughout the school reinforcing this.
- Parent contact information is updated yearly.
- A cistern is on property with a reported storage capacity of 3 1/2 days. There are also two (2) black tanks.
- Rainwater harvesting is practiced.
- A first aid kit is available.
- Every teacher is CPR trained/certified. The principal is trained in first aid.
- There are three fire extinguishers across the school.
- The ancillary staff are provided with personal protective equipment (PPE) such as aprons, rubber gloves, latex gloves, water boots, and masks.
- Despite the lack of play-ground equipment, the school does have a green space where physical education and other activities are carried out. It is recommended that benches and/or picnic tables be put in the green area.

FIGURE 7.1: SOME EXAMPLES OF KEY STRENGTHS AT THE MARY E. PIGOTT PRIMARY SCHOOL

AREAS FOR IMPROVEMENT:

Disaster/Emergency Management

- School needs to develop a Disaster/Emergency Management Plan (also known as School Safety Plan) based on a risk assessment to determine potential areas for hazard. The School Safety Plan needs to critically examine information about the student population (such as number of students broken down by age group and sex), as the number and age of the students can make a significant difference in the event of an emergency.
- There are no facilities are in place for persons with physical disabilities.

Grounds and Facilities

- Paving of quadrangle is a main priority – teachers and students have been greatly affected by dust. Windows have to be kept closed which negatively impacts ventilation and cooling. In the interim, the school can consider sprinkling the surface with water to reduce fugitive dust.
- Drainage is a cause for concern as storm-water run-off from outside the school flows through an earthen drain that runs through the school compound.
- There is a very large palm tree immediately adjacent to one of the buildings. This is a cause for concern particularly in an extreme wind event such as a hurricane.
- The Kindergarten and school meals buildings are small wooden structures which also have the potential to become projectiles during an extreme wind event such as a hurricane.

General Safety and Security

- The lack of security in the evenings and on weekends is a major concern. The school was broken into in the past.
- There was no observed visitor sign-in procedure being enforced

FIGURE 7.2: EXAMPLES OF AREAS FOR IMPROVEMENT

8. COSTED ACTION / IMPROVEMENT PLAN

Table 8.1 summarizes the recommended improvements and budgets for capital expenditures (remedial works, repairs, retrofitting) identified by this report. Expenditures that are expected to be managed as part of normal operations are not shown. The budgets assume a prudent level of ongoing maintenance. It should be noted that costs excluded engineering indirect costs and any local taxes.

TABLE 8.1: COSTED ACTION / IMPROVEMENT PLAN

RECOMMENDATION	TASK	RESPONSIBLE PARTY	FUNDS REQUIRED ($EC)	TIMEFRAME SHORT-MEDIUM -LONG TERM	RESULT
Disaster/Emergency Management	Install Emergency Signage.	Principal and/or Safety Committee.	$1500	Short Term	Improved culture of safety within the school community.
	Develop Safety plans, policies and guidelines Include in the school safety plan disaggregated data on student population (age, gender) as this will better inform disaster and emergency planning. This can be updated as needed and appended to the plan.	Principal and/or Safety Committee in collaboration with National Disaster Office and MOE.	None	Short Term	
General Safety and Security	■ Review contractual obligations of current security service providers – particularly performance clauses ■ Explore options for other service providers by issuing a new request for proposal	Ministry of Education.	Ministry of Education to obtain.	Medium Term	Improved safety and security.
Staff and student well-being	Pave surfaces for adequate dust control.	Ministry of Education in collaboration with Department of Works.	Ministry of Education to obtain.	Medium Term	Reduced dust nuisance and health related impacts.
	Add new recreational/seating areas for staff and students.	School administration in collaboration with Ministry of Education. *some smaller projects can be undertaken by school/community/ private organization as a special project.	$6000	Short – Medium Term	Increased emotional/ mental well-being.

TABLE 8.1: COSTED ACTION / IMPROVEMENT PLAN

RECOMMENDATION	TASK	RESPONSIBLE PARTY	FUNDS REQUIRED ($EC)	TIMEFRAME SHORT-MEDIUM -LONG TERM	RESULT
Grounds and Facilities	Upgrade of storm drains to include additional flood protection from existing waterway.	Ministry of Education in collaboration with Department of Works.	$244,000	Short – Medium Term	Improved safety of Physical Plant.
	Replace roof covering, ceiling and roof drains to current Building Code Standards.		$112,000	Medium Term	
	Upgrade of doors and windows to hurricane resistant standards.		$64,500	Short Term	
	Expand and upgrade toilet block to include new septic tank and soakaway.		$112,200	Medium - Long Term	
	Upgrade of water storage.		$120,000	Long Term	
	Electrical rewiring complete with new electrical fixtures.		$160,000	Medium Term	
	Repair defective external and internal walls.		$48,000	Medium Term	
	Painting.		$64,400	Short – Medium Term	
	Contingency		$50,000		
TOTAL			**$982,600**		

9. REFERENCES

Antigua/Barbuda Hazard Vulnerability Assessment Project: Final Report; Post-Georges Disaster Mitigation Project in Antigua & Barbuda and St. Kitts & Nevis. Organization of American States, 2001

Antigua and Barbuda Country Risk Profile. Caribbean Catastrophe Risk Insurance Facility (CCRIF), 2013

Antigua and Barbuda Sustainable Island Resource Management Zoning Plan for Antigua and Barbuda (including Redonda). GENIVAR in Association with Ivor Jackson and Associates and Kingdome Consultants Inc., 2011

Disaster Risk Management in Latin America and the Caribbean Region: GFDRR Country Notes- Antigua and Barbuda. Global Facility for Disaster Reduction and Recovery (GFDRR), 2010

The CARIBSAVE Climate Change Risk Atlas (CCCRA) Climate Change Risk Profile for Antigua and Barbuda. CARIBSAVE, 2012

10. APPENDIX 1

10.1 SAFETY ASSESSMENT

TABLE 10.1: VITAL INFORMATION TABLE

NAME OF SCHOOL	MARY E. PIGOTT PRIMARY SCHOOL	
Type of school (Pre-school, primary, secondary, tertiary)	PRIMARY	
Is facility private and public?	PUBLIC	
Location	ST. JOHNS	
Name of Head Teacher or Principal	CHRISTOPHER ROBERTS	
Telephone	(268) 770-4273	
Email	christopherroberts255@hotmail.com	
Year building(s) constructed	1981	
How many buildings are contained on the school compound?	6	
How many classrooms are within each school building?	14	
What is the total school population?	325	
Students	Male: 163	Female: 166
Teachers	Male: 2	Female: 22
Non-teaching staff	Male: 3	Female: 5
How many first aid kits are available for use?	1	
How many fire extinguishers are installed	3	
Was the school affected by any natural disaster in the past?	YES	
If yes, what type of event was it and when did it occur?	HURRICANE IRMA 2017	
Were there any repairs as a result of the event?	Trees. No structural damage	
Is the school designated as an emergency shelter?	YES	

10.1.1 SCHOOL SAFETY COMPLIANCE ASSESSMENT

TABLE 10.2: SCHOOL SAFETY ASSESSMENT SUMMARY

MARY E. PIGOTT PRIMARY SCHOOL			
	SCORE	%	CRITICAL STANDARDS MET
Safety Assessment	174	40%	NO
Green Assessment	261	55%	NO

TABLE 10.3: SCHOOL SAFETY COMPLIANCE ASSESSMENT

	%	CRITICAL STANDARDS MET
Disaster Planning	33%	NO
Emergency Planning	18%	NO
Safety Admin	29%	-
Medical Emergencies	76%	NO
Physical Plant	49%	YES
Physical Safety	30%	-
Protection of the Person	30%	-
Hazardous chemicals and materials	71%	YES

10.2 GREEN ASSESSMENT

TABLE 10.4: GREEN ASSESSMENT SUMMARY SCORES

	%	CRITICAL STANDARDS MET
Sustainability Management	31%	NO
Natural Resources	49%	NO
Indoor Environment	57%	YES
Hazardous Chemicals and Materials	81%	-
Facility and Grounds Management	61%	YES
Food Service	86%	YES

10.3 PHOTOGRAPHS

- SCHOOL'S CENTRAL COURTYARD

- MAIN CLASSROOM BLOCK #1
  – FRONT ELEVATION

- MAIN CLASSROOM BLOCK #1
  – REAR ELEVATION

- MAIN CLASSROOM BLOCK #2
  – FRONT ELEVATION

- DETACHED BLOCK
  – NO COVERED LINKAGE TO MAIN COMPOUND

- DETACHED BLOCK
  – NO COVERED LINKAGE TO MAIN COMPOUND

MAIN ENTRANCE TO SCHOOL COMPOUND

MAIN ENTRANCE TO SCHOOL COMPOUND

MAJOR WATERWAY FLOWS THROUGH SCHOOL COMPOUND IN SHALLOW DITCH

MAJOR WATERWAY FLOWS THROUGH SCHOOL COMPOUND IN SHALLOW DITCH

MAJOR WATERWAY FLOWS THROUGH SCHOOL COMPOUND IN SHALLOW DITCH

MAJOR WATERWAY FLOWS THROUGH SCHOOL COMPOUND IN SHALLOW DITCH

- DETACHED ADMINISTRATIVE BLOCK

- MAIN BLOCK #3

- SCHOOL MEALS PROGRAMME IN SMALL WOODEN BUILDING

- INFANTS ACCOMMODATED IN SMALL WOODEN BUILDINGS

- ADJACENT PALM TREE IN CLOSE PROXIMITY TO BUILDING

10. APPENDIX 2: NATIONAL SAFE SCHOOL PROGRAMME COMMITTEE (NSSPC) MEMBERS

COUNTRY: ANTIGUA AND BARBUDA

#	FIRST NAME	LAST NAME	JOB TITLE	ORGANIZATION	CONTACT EMAIL	CONTACT PHONE NUMBER
1	Rolston	Nickeo	-	Ministry of Education	rnickeo@yahoo.com	721-8373
2	Alvacea	Burton	-	Ministry of Education	alvaceaburton@gmail.com	720-7217
3	Desiree	Antonio	-	Ministry of Education	zone3education@gmail.com	462-5972
4	Emil	Michael	-	Ministry of Education	emilmichael@gmail.com	723-4464
5	E. Jonah	Greene	-	Ministry of Education	ejonahgreene@gmail.com	728-0755
6	Priscilla	Nicholas	-	Ministry of Education	prisca143@hotmail.com	722-4129
7	Jessie	Purcell	-	Ministry of Education	jessiegeorge98@hotmail.com	771-1331
8	Mervin	Browne	-	Board of Education	mbrowne@apuainet.ag	727-6877
9	Kadian	Camacho	-	Ministry of Education	kadiancamacho@yahoo.com	722-6541
10	Randel	Pyle	-	Ministry of Works	randell.pyle@ab.gov.ag	764-8331
11	Kaye	Tomlinson	-	Ministry of Health	dmonkay@yahoo.com	770-5100
12	Emile	Floyd	-	Ministry of Health	emile.floyd@gmail.com	764-3436
13	Joycelyn	James	-	ABUT	stress_release@yahoo.com	723-7214
14	Michal	Francois	-	Holy Trinity	angellofrancois@gmail.com	732-7385
15	Rexford	Harry	-	Sir McChesney George	rmharry0711@hotmail.com	772-0673
16	Alvah	Guishard	-	Ministry of Social Transformation	alvahguishard@gmail.com	464-2024

COUNTRY: ANTIGUA AND BARBUDA

#	FIRST NAME	LAST NAME	JOB TITLE	ORGANIZATION	CONTACT EMAIL	CONTACT PHONE NUMBER
17	Chevaughn	Burton	Teacher Zone One	S.R Olivia David	chevaughnburton26 @gmail.com	789-4178 462-7400
18	Chelo	Francis	-	Ministry of Education	chichif@live.com	-
19	Dornett	Defoe	Teacher Zone Two	Potters	successful_dornett @hotmail.com	764-4054
20	Chaka	Grant	Teacher Zone Two	Willikies	chakagrant@yahoo.com	775-2803
21	Sheresa	Knowles	Teacher Zone Three	C.T. Samuel	gloriousme_454 @hotmail.com	770-6121
22	Sonilda	Burton	Teacher Zone Three	J.T. Ambrose	sonildab@yahoo.com	773-1696
23	Anthea	Anthony	Teacher Zone Four	Mary E. Pigott	m.e.p.school@hotmail.com antheaanthony468@gmail.com	789-4718
24	Foster	Roberts	Teacher Secondary	Ottos Comprehensive	fosterroberts@yahoo.com	729-7081
25	Oral	Evanson	-	Ministry of Education	evansonoral@gmail.com	764-2550
26	Stacy	Mascall	-	Ministry of Education	stacymascall@hotmail.com	770-4436
27	Wendy	Valentine	-	Disability Association	wendyvalentine74@gmail.com	725-7260
28	Diana	Martin	-	National PTA	diandivine@gmail.com	775-1578
29	Eloise	Hughes	-	Ministry of Education	esilston@hotmail.com	782-2415
30	Embler	Spencer	-	Ministry of Education	1emblerspencer@gmail.com	783-4049

10. APPENDIX 3: ORGANIZATIONS CONSULTED

Antigua and Barbuda

- National Youth Council
- Antigua and Barbuda Union of Teachers
- Department of Environment
- Ministry of Education
- Central Board of Health
- Ministry of Health
- National Safe Schools Programme Committee
- Principals, Teachers
- Board of Education
- Early Childhood Unit
- Barbuda Council
- Ministry of Works
- Development Control Authority
- Antigua and Barbuda Institute of Architects
- UNDP
- National Parent Teachers Association

Main entrance to school compound