CARIBBEAN Safe School Initiative CSSI

IMPLEMENTATION OF THE MODEL SAFE SCHOOL PROGRAMME IN THE CARIBBEAN

HAZARD RISK ASSESSMENT REPORT AND COSTED ACTION PLAN

CASTLE BRUCE SECONDARY SCHOOL

DOMINICA

CDRM 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

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 – Castle Bruce Secondary School, Dominica 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

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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 **Castle Bruce Secondary School, one of ten (10) schools assessed in Dominica**. 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 assessments were conducted during the period May 15 to 31, 2019 (Table 1-1) on regular school days, and as such the consultants were able to assess the schools during normal operational hours. All the schools assessed are designated emergency shelters that may be used during a hurricane or other hazard event.

TABLE 1.1: LIST OF SCHOOLS ASSESSED IN DOMINICA

SCHOOL NAME	DATE VISITED
Grandbay Primary	May 15 & 17, 2019
Pierre Charles Secondary	May 15 & 17, 2019
Dominica Community High School	May 15 & 17, 2019
Campbell Primary	May 16 & 17, 2019
Massacre (Canefield) Primary	May 16 & 17, 2019
Castle Bruce Secondary	May 17, 2019
Belles Primary	May 17, 2019
Colihaut Primary	May 17 & 31, 2019
Morne Prosper Primary	May 17 & 31, 2019
Isaiah Thomas Secondary	May 17 & 31, 2019

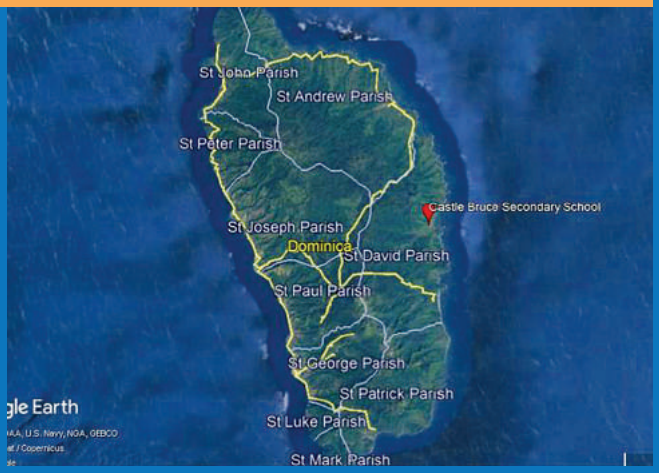
The assessments consisted of interviews with senior administrators, a site walk-through to make general observations and take pictures, as well as a building condition survey described below.

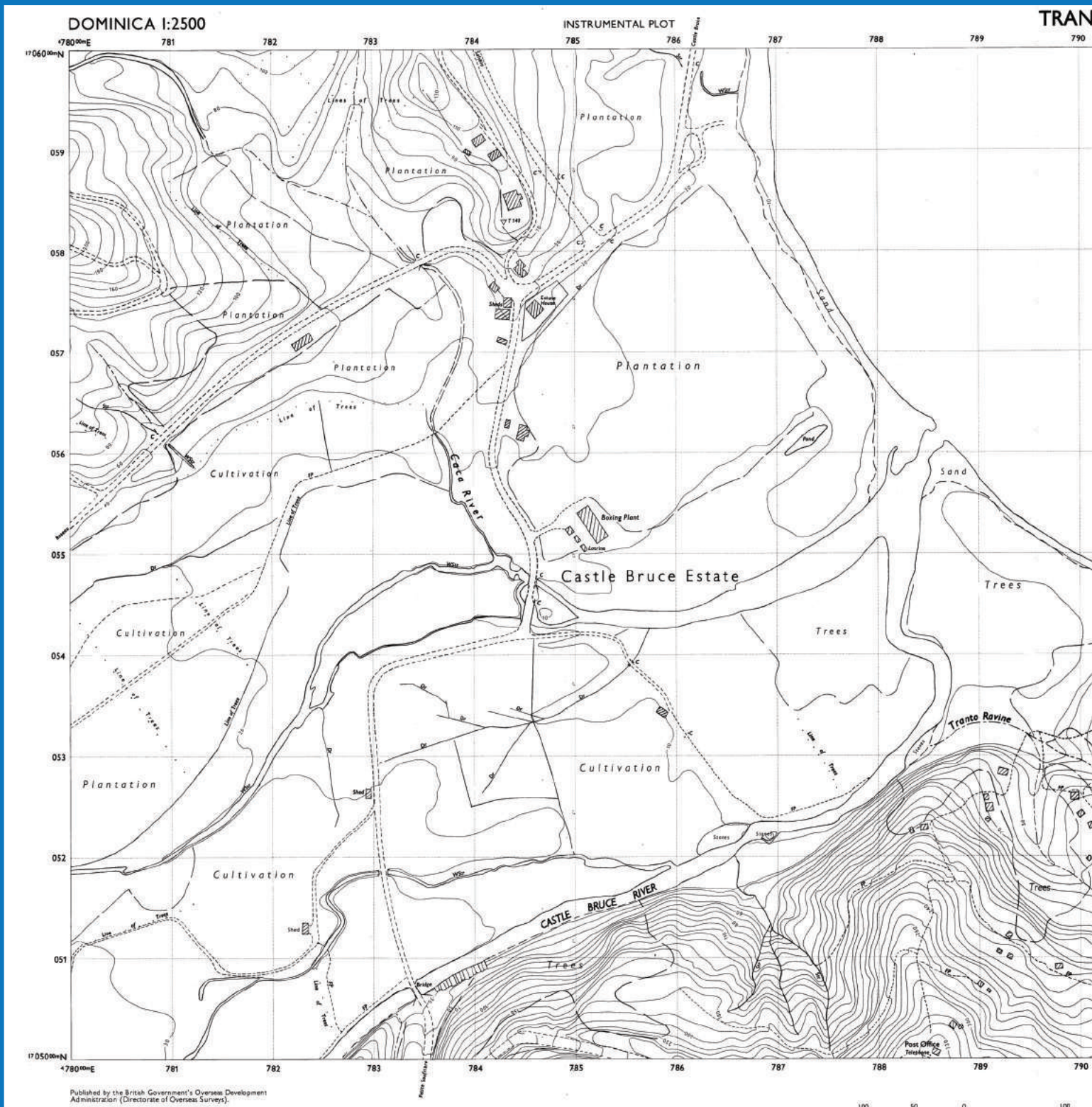
The results of the school assessments are found in the Appendix.

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 Dominica. The list of NSSPC members are included in Appendix.

The team of assessors visited Castle Bruce Secondary School on May 17, 2019. The school is located in the parish of St. David (Figure 1-1), known as Carib or Kalinago territory, and is bordered by the Atlantic Ocean to the east. Additional general information on the school and the scores based on the MSSP Assessment Toolkit Checklists can be found in the Appendix.

FIGURE 1.1: CASTLE BRUCE SECONDARY SCHOOL




DOMINICA 1:2500
INSTRUMENTAL PLOT
TRAN
Castle Bruce Estate
CASTLE BRUCE RIVER
Coca River
Tranto Ravine
Plantation
Cultivation
Trees
Sand
Boxing Plant
Post Office
Telephone
Scale 1:2500
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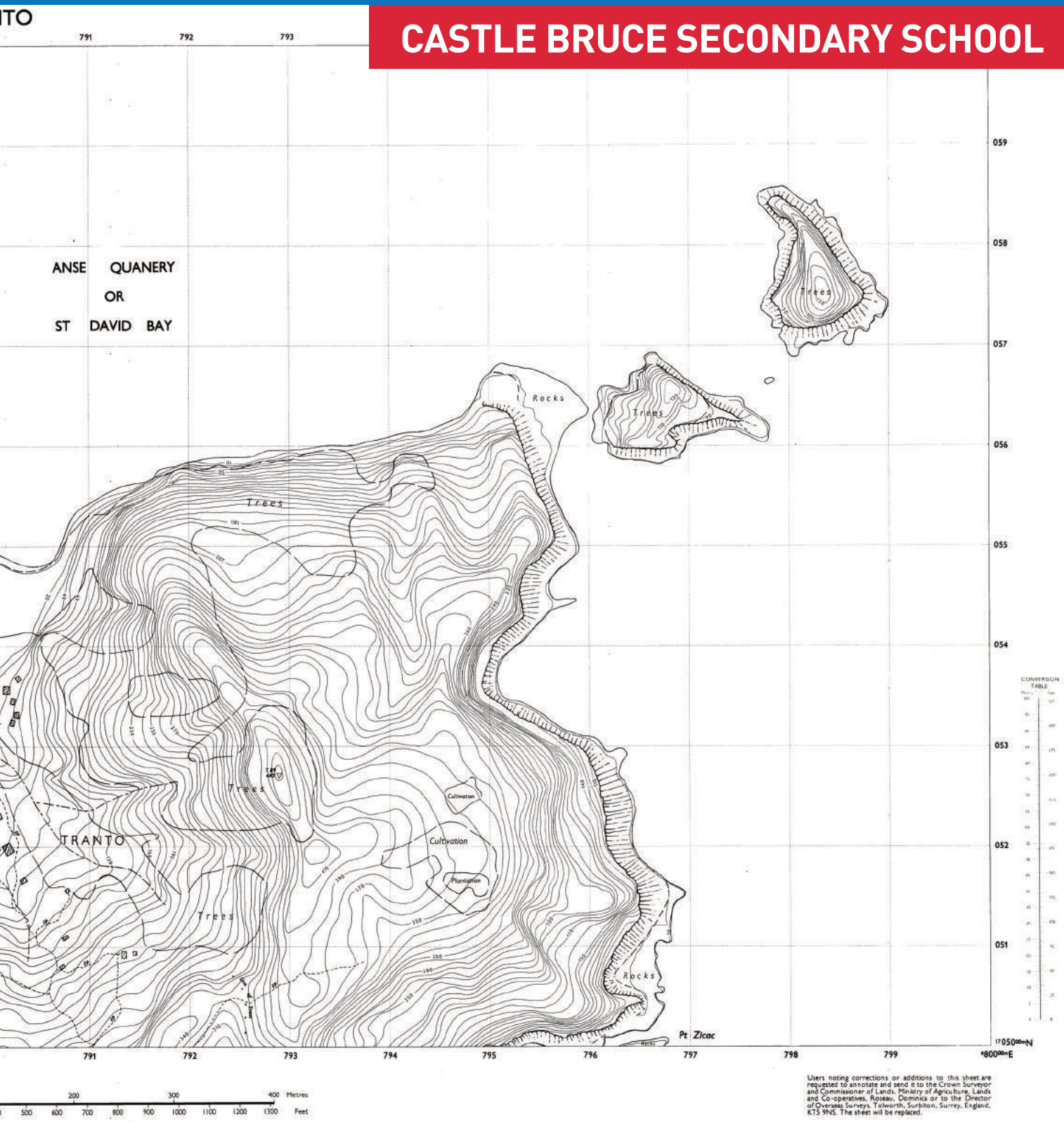
SHEET HISTORY
Edition 1 prepared by the Directorate of Overseas Surveys.
Field Survey Data by D.O.S.
Air Photography by Fairey Surveys Ltd., March/April 1964.
Field Completion by D.O.S., April 1973.
INDEX TO ADJOINING SHEETS
7806
& Part of 7606
7805
7804
HEIGHTS IN
Trigonometrical Station :- Major
Minor
Spot Height
Bench Mark
Footpath, Footbridge
Culvert
Under Construction
Pole, Post or Pylon
Flagstaff
Fire Hydrant
Series D.O.S. 051
Sheet Dominica 7805
Edition 1-D.O.S. 1973

CASTLE BRUCE SECONDARY SCHOOL



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 assessment report is to identify and analyse the hazard vulnerability of **Castle Bruce Secondary School** and to make recommendations to inform decision-making.

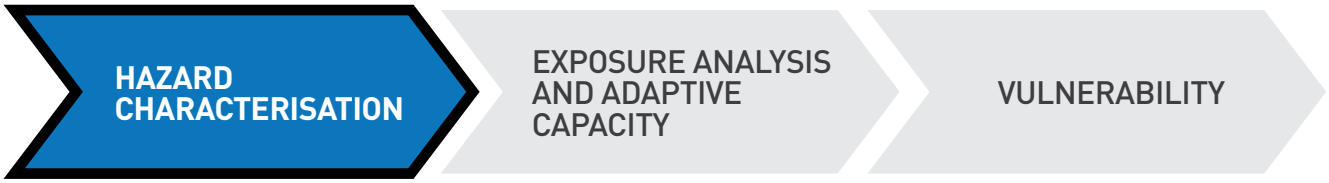
1.2 METHODOLOGY

The vulnerability assessment tool (VAT) draws on the methodology developed by the National Oceanic and Atmospheric Association (NOAA). Some adaptations were made to consider 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

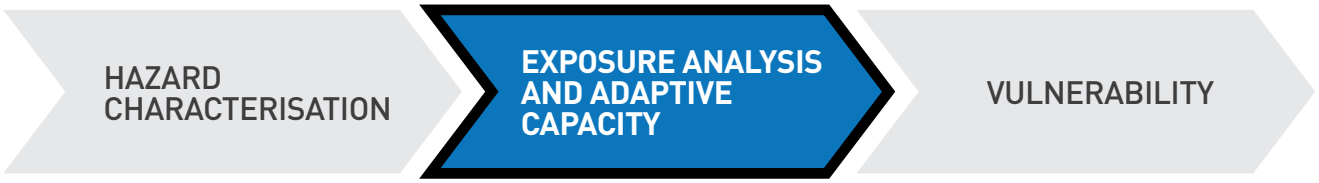


The first step involved the identification of the hazards (hydro-meteorological, geological, etc.) to which each of the countries, and by extension each school, may be exposed. To characterise hazards for each country, the Consultants conducted comprehensive desk research and stakeholder consultations with key agencies and various stakeholder groups 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 school 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 can address them fully and in a timely manner.

2. COUNTRY RISK PROFILE / SITUATIONAL CONTEXT

Dominica, officially the Commonwealth of Dominica, is the largest, most northerly island of the Windward Islands in the Easter Caribbean Sea, located northwest of Martinique and south-southeast of Guadeloupe. The island occupies an area of 750.6 km^2 (48km long and 24km wide) and is characterised as mountainous and volcanic island with steep terrain features. The cone of highest point on the island, Morne Diablotin (1,447m), dominates the topography of the north. A chain of mountains including Morne Tros Piton (1,424m), Morne Micotrin, Morne Anglais and Morne Plat Pays covers the southern half of the island (ECU 2001). The more gently sloping areas of flat land are restricted to the northeastern coast, in river valleys and in the Belle's Wet Area in the centre of the island (ECU 2000). The island is known as "The Nature Island" of the Caribbean, hosting several perennial streams, rivers, waterfalls and lakes including the world's second largest hot spring, Boiling Lake.

The population of Dominica is estimated to be 71,293 (2011 census) and has experienced net zero growth or declines in population over the past three decades due largely to emigration. steeply dissected, mountainous terrain found in Dominica's centre means most population centres are located along mountain tops and stream valleys, with nearly 90% of the population found in settlements along the coastal fringe of the island (GFDRR 2010). Approximately 67% of the population resides in urban areas (ECLAC 2010) and it estimated that 28% lived in the capital Roseau, 5% in Portsmouth and 4% in Marigot (Poverty Research Unit, 2006), all coastal settlements.

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 Dominica:

- 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 the key stakeholders at each school and the Ministry of Education, Dominica is at risk to impacts from all of the above hazards and is ranked as one of the 10 most susceptible countries in the Caribbean relative to total number of events (CRED 2000). The steep slopes of the volcanic hills pose the risk of landslides and volcanic eruption, and with 90% of the population living within 5 km of a live volcano, that risk is quite extreme (GFDRR, 2010). Dominica has 9 of the 16 active volcanoes in the Caribbean making the risk of volcanic event quite serious (Kairi Consultants Ltd, 2010). In addition, the tropical climatic conditions on the island mean that heavy rainfall and flooding is possible any time of year. Heavy rainfall associated with tropical storms and hurricanes can, and has, also caused significant flooding damage and high wind damage. Additionally, storm surge and coastal erosion pose significant threats to the dense, developed coastal areas, not only during hurricanes but also from regular storm activity. This is compounded by the poor roads and high frequency of landslides which can and has isolated persons living in major centres.

3.1 HYDROMETEOROLOGICAL

3.1.1 TROPICAL STORMS AND HURRICANES

Dominica is in the Caribbean, one of the most disaster-prone regions in the world. Since 1950, over 13 named tropical storms have passed within 40km of the island. Since 1979, Dominica has been impacted by over 15 tropical systems including 12 hurricanes. Given that most of Dominica's population and infrastructure are located along the coast, they have experienced severe damage and losses in the past from strong winds and high seas (ODI 09/2001). Several hurricanes are notable as they required humanitarian assistance for recovery:

- **Hurricane Maria (September 2017):** a category 5 hurricane, Maria produced wind speeds of 160mph (with higher gusts), intense storm surges and rainfall and overflowing of rivers that resulted in 31 people deaths, 37 missing people and major destruction of critical infrastructure. It is estimated that over 90% of the population was directly affected; up to four months following the hurricane, approximately 450 people were still in shelters, 15% of children has not yet returned to school and 90% of the population remained without electricity.

- **Tropical Storm Erika (August 2015):** Dominica suffered major infrastructural damage in the wake of Erika, primarily related to transportation, households and agriculture. The island experienced heavy rainfall of up to 850mm in less than 12 hours. The mountainous terrain, excessive moisture and ground saturation from previous rains caused river basins to overflow and triggered flooding and landslides that displaced thousands and killed up to 30 people (CDEMA 30/08/2015).

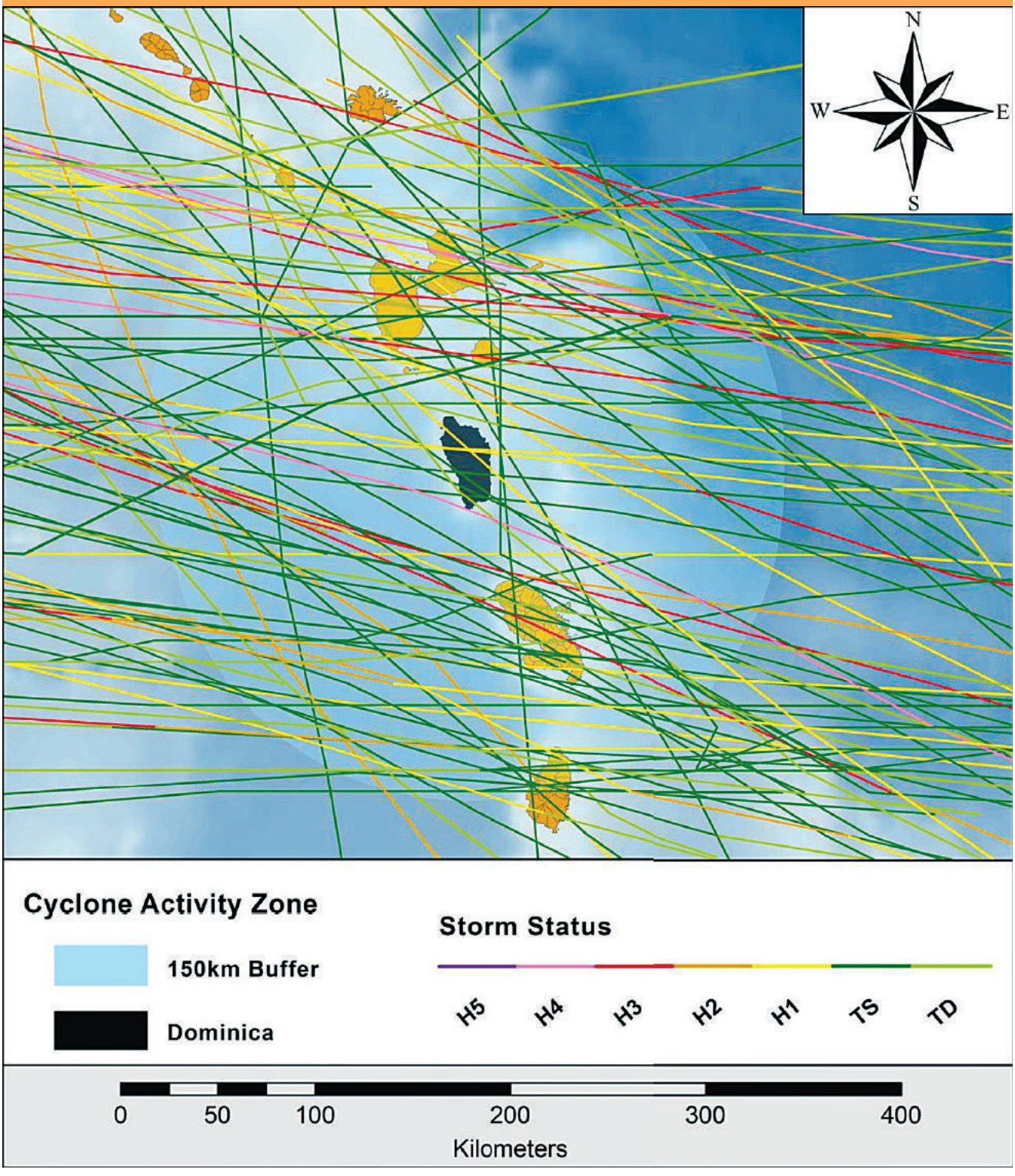
- **Tropical Storm Ophelia (September 2011):** the country experienced more than 80mm of rainfall in six hours, damaging the towns of Massacre, Canefield, Mahaut, Cochrane, Coulibistrie and Campbell most severely (Dom hazard profile).

- **Hurricane David (August 1979):** this category 5 storm produced heavy rainfall and major landslides causing the most damage in areas in the southwest and the capital of Roseau. Most of the country's population was displaced following the hurricane as more than 80% of homes on the island were destroyed.

TABLE 3.1: HISTORICAL HURRICANES DIRECTLY AFFECTING DOMINICA SINCE 1979 (SOURCE: ACAPS 2018)

NAME OF EVENT	YEAR	AFFECTED	DEATHS
Maria	2017	65,000	31
Erika	2015	15,951	13
Ophelia	2011	240	0
Dean	2007	7,530	2
Marilyn and Luis	1995	5,001	2
Hugo	1899	710	0
David and Frederick	1979	72,100	40

FIGURE 3.1: TRACKS OF TROPICAL CYCLONES MOVING WITHIN 150KM OF DOMINICA SINCE 1851 (SOURCE: CCRIF 2013)



3.1.2 FLOODS

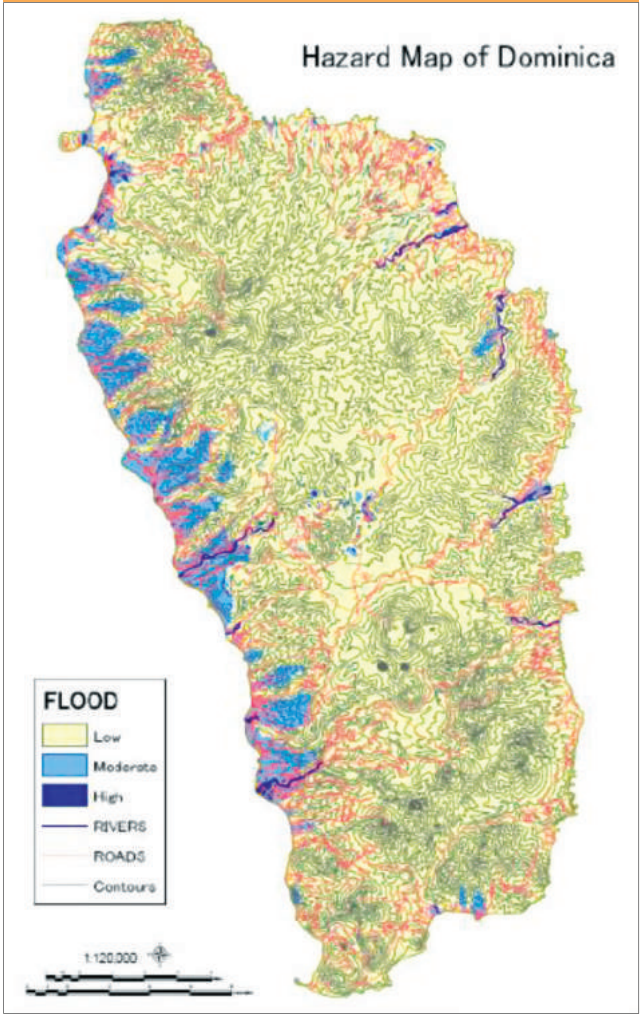
Flooding is a recurrent, annual problem in Dominica particularly as most development has occurred along the coast. Heavy rainfalls associated with tropical storm and hurricanes can trigger flooding. The island also experiences some of the highest annual rainfall amounts in the region, heavily influenced by orographic effects. Dominica is characterized as one of the wettest islands in the Caribbean and humidity is generally above 85% in the interior. The average annual rainfall in the driest section of the island (central west coast) is 1,270mm while the central peaks can receive over 7,620mm (ECU 2001). The combination of rainfall, steep, mountainous terrain and the island's geology means flash floods are also a constant threat, as materials and debris from landslides and soil erosion compromise the hydraulic capacities of river channels.

During the 1998 – 2015 period, eleven (11) significant excess rainfall events impacted Dominica, all caused by hurricanes and tropical storms. In December 2013, a low-level trough produced severe rains and high winds that caused flooding and landslides on the island, affecting hundreds of people, mainly in the south. Hurricane Dean in 2007 caused flooding in Dominica particularly in Roseau, where there was a 1 in 4-year, 24 hour rainfall event (risk atlas).

TABLE 3.2: HISTORICAL STORM EVENTS THAT HAVE CAUSED FLOODING IN DOMINICA

NAME OF EVENT	CATEGORY	YEAR
Maria	Category 5 Hurricane	2017
Erika	Tropical Storm	2015
Chantal	Tropical Storm	2013
Isaac	Tropical Storm	2012
TC5	NA	2011
Emily	Tropical Storm	2011
Dean	Category 1 Hurricane	2007
Iris	Tropical Depression	2001
Lenny	Tropical Storm	1999
Jose	Category 1 Hurricane	1999
Georges	Category 3 Hurricane	1999

FIGURE 3.2: INLAND FLOOD HAZARD MAP OF DOMINICA (SOURCE: CIPA 2006)



Settlements along the Layou River, the longest and deepest river in Dominica, are highly susceptible to flooding as the river is prone to flooding. In 1997, landslides due to heavy rainfall effectively blocked the discharge of the Matthieu river to the Layou, some 6km northeast from the mouth of the Layou. The subsequent failure of the Matthieu dam resulted in major flooding and damage of the downstream portions of the Layou river, particularly along the Layou Valley to the western coast. Since then, a lake known as Miracle Lake has formed due to a stabilization effect of the landslide over time, however this large volume of water still presents a flood threat to the Layou Valley.

3.1.3 DROUGHT

Drought is a potential hazard facing Dominica as the country depends almost entirely on rain-fed surface water for its freshwater supply. Hence, variations in rainfall can lead to dry spells and periods of drought. The country has experienced severe drought conditions in 2001 and between October 2009 – January 2010 (Simpson 2014).

As a result of a strengthening El Niño contributing to reduced rainfall, a drought warning was issued for Dominica in 2018 and 2019. During these dry spells, stream flow can be as low as 30% of the average rainy season flows, which can adversely impact the country's economy. During dry spells and periods of drought, the increased risk of forest and brush fires can intensify land degradation and affect the quality of water catchments, while increased temperature in rainforest can reduce catchment flows.

3.1.4 STORM SURGE

Dominica's coastline is exposed to storm surge where storm waves can produce major damages. During Hurricane Maria (2017), wind speeds reached 160mph with higher gusts producing intense storm surges.

3.1.5 LANDSLIDE

Similar to flooding, Dominica's combination of rainfall, geology and severe topography makes the island particularly favorable to the development of various types of landslides (GFDRR). The most common landslides are debris flows and roads and villages are under constant threat from rock falls and debris slides presented by the island's steep cliffs. Landslides typically occur along river courses which can lead to temporary pooling of water, which contribute to flood risks. At least 2% of the total land area has been disturbed by landslides (ODI 09/2001) while 35 people lost their lives due to landslides that occurred between 1925 and 2015.

The Good Hope landslide on Dominica is one of the larger identified debris slides (DeGraff, 1987). The community located on the east coast had experienced several days of rainfall, which triggered nearly 17000 m3 of soil and weathered rock to slide from the hillslope above Castle Bruce-Petit Soufriere road. The landslide resulted in major damages to roads, schools, critical infrastructure, injured several residents and caused one fatality. In 2010, heavy rainfalls produced a landslide in Bayside, San Sauveur, claiming the lives of 3 persons. According to a large-scale landslide inventory conducted by the University of Twente in 2018, Hurricane Maria triggered a total of 9,960 landslides (8,576 debris slides, 1,010 debris flows and 374 rock falls). As discussed previously (Section 3.1.2), the 1997 landslide in the Layou River Valley was a major landslide and presently remains active at the confluence of Matthieu and Layou rivers.

FIGURE 3.3:
LANDSLIDE IN THE
LAYOU RIVER VALLEY, 1997
(SOURCE: OAS)

FIGURE 3.4:
IMAGE OF LANDSLIDE
IMPACTS IN DOMINICA

3.2 GEOLOGICAL

3.2.1 EARTHQUAKE

Dominica is considered to be the most geologically active island in the Caribbean and is located in a moderately active sector of the eastern Caribbean Plant margin. Earthquakes originate from plate movements (tectonic) and/or magma displacement (volcanic activity) – in Dominica's case, earthquakes are common and typically linked to volcanic activity. The island suffers from numerous shallow, potentially damaging volcano-tectonic earthquake swarms and trends indicate that earthquakes on the island are trending towards being stronger and shallower. This suggests that Dominica is at increased risk of magmatic eruption(s). Earthquake risk is considered moderate (CRIFF 2013), with the potential for local amplification for coastal areas. Dominica's capital city, Roseau, is also prone to shallow volcano seismic swarms.

The island is also exposed to impacts from earthquakes associated with plate activity. During the period 1998 – 1999, 183 movements were recorded in one day on October 23, 1998 (ECU, 2001). Earthquakes in 2004 and 2007 were located offshore but were of sufficient magnitude (6.3 and 7.4 respectively) to be felt throughout the entire region. The event in 2004 coincided with a three-day period of heavy rainfall and triggered several landslides throughout the island.

Seismic activity also has the secondary risks of landslides, particularly given Dominica's steep terrain.

3.2.2 VOLCANO

Dominica is the only Caribbean island that has more than one volcano, with 9 of the 16 potentially active volcanoes in the region found there: Morne au Diable, Morne Trois Pitons, Morne Diablotins, Morne Watts, Morne Anglais, Wotten Waven Caldera, Valley of Desolation, Grande Soufriere Hills and Morne Plat Pays. It is estimated that over 90% of the population live within 5 km of a live volcano (ECU, 2001). As such the entire island is susceptible to volcanic hazards however studies indicate that the capital Roseau is situated in one of the most hazardous areas of the island[1].

In the past there have been two steam explosions in the Valley of Desolation (Morne Trois Pitons National Park), one in 1880 and subsequently in 1997. Following a volcanic alert in 1998-9, its susceptibility to future volcanic activity is also currently a major cause for concern. Volcanic activity can also trigger earthquakes as discussed in Section 3.2.1.

3.2.3 TSUNAMIS

Tsunamis are not considered a major recurrent risk for the Caribbean region, however the low-lying nature of coastal developments and the concentration of the population and critical infrastructure in coastal settlements make them vulnerable to tsunami activity (GFDRR 2010).

1 http://caribbeanvolcanoes.com/dominica-geology/

3.3 CLIMATE PROJECTIONS

In 2017, Dominica was listed as one of the countries most affected by impacts of weather-related loss events (storms, floods, heat waves etc.) (Germanwatch Global Climate Change 2019 Risk Index.3) mainly due to two factors: (i) the impact of global warming on rising sea levels which are associated with an increased risk of storm surges, and (ii) the increase in the intensity of hurricanes. Similar to the rest of the Caribbean region and consistent with the projected global median, climate change models project that Dominica will trend towards warming and drying and is expected to suffer more frequent heat waves and droughts, increased high intensity rainfall and rising sea levels. The Government of the Commonwealth of Dominica has identified seal level rise (SLR), changes in temperature and precipitation, and impacts from hurricanes and extreme events as the major issues of climate change facing Dominica.

In summary the following is noted about the climate of Dominica (ECU, 2012):

- There is evidence to suggest that the climate of Dominica is changing. Both maximum and minimum temperatures have increased in the recent past.
- The warming trend is expected to continue. The country is projected to be warmer by up to 1.3°C by the 2050s, and between 2 and 3 degrees by the end of the century.
- Winter months will see marginally larger increases in temperature than summer months.
- The frequency of very hot days and nights will increase, while the number of very cool days and nights will decrease.
- The country is likely to be drier in the mean. Projections are for up to 20% drier by midcentury when models show more consensuses about the trend, and up to 50% drier by 2100.
- July-August will likely be drier.
- The seasonality of Dominica will be largely unchanged. The cooler (with respect to late season temperatures) dry early months and wet hotter late months will still prevail.
- Hurricane intensity is likely to increase (as indicated by stronger peak winds and more rainfall) but not necessarily hurricane frequency.
- Caribbean sea levels are projected to rise by up to 0.24 m by midcentury.
- Sea surface temperatures in the Caribbean are projected to warm, up to approximately 2°C by the end of the century.
- ENSO's impact on Dominican rainfall (early and late season) will likely continue, given projections of the phenomenon's continued occurrence in the future.

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 analysing 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 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.

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.

Based on the hazard identification (Section 3) and the exposure analysis, the Castle Bruce Secondary School has a high degree of exposure to hurricanes and tropical storms (and associated wind) and flooding. Additionally, the school is highly likely to be affected by the climate change projections made for the area and the region (Section 3.3). Based on this analysis, the school has been assigned an exposure index of **12.3** (**Moderate**; Table 4-2). It would be prudent for the school to prioritise all hazards that have been given a rating of high or moderate.

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

TABLE 4.1: PARAMETERS AND RANKINGS USED IN EXPOSURE ANALYSIS (SOURCE: ADAPTED FROM FEMA HAZARD ANALYSIS WORKSHEET)

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

TABLE 4.2: FINDINGS OF THE EXPOSURE ANALYSIS FOR THE CASTLE BRUCE SECONDARY SCHOOL

HAZARD	COMMENTS	FREQUENCY		WARNING TIME		SEVERITY		DEGREE OF EXPOSURE	
		RANKING	SCORE	RANKING	SCORE	RANKING	SCORE	RANKING	AVERAGE SCORE
Hurricanes and Tropical Storms	This school like the entire island and region was found to be exposed to the Wind Hazard. While hurricanes are a natural part of the region's climate system, the recent increase in intense hurricane activity has redefined the meaning of Extreme Wind or Hurricane Exposure. More intense hurricanes that carry higher wind speeds and more precipitation or expected (Figure 4-1).	**Likely**	**2**	**12-24 hrs**	**1**	**Catastrophic**	**3**	**HIGH**	**2.0**
Flooding (from hurricanes, storms or extreme rainfall events)	The school is located in a flood prone zone and drainage infrastructure at the school needs improvement (Figure 4-2). Flash floods are also likely.	**Likely**	**2**	**6-12 hrs**	**2**	**Critical**	**2**	**HIGH**	**2.0**
Drought	Drought impacts the entire island of Dominica, with ranging severity but high likelihood.	**Likely**	**2**	**24+ hrs**	**0**	**Limited**	**1**	**MODERATE**	**1.0**
Storm Surge	The school is located within 200m of the coast however is not exposed to storm surge. (Figure 4-3).							**NOT EXPOSED**	
Landslide	The school is exposed to landslides (Figure 4-4).	**Possible**	**1**	**24+ hrs**	**0**	**Limited**	**1**	**LOW**	**0.7**
Earthquake	Seismic activity is a risk for all Caribbean islands. The lack of warning and potential for catastrophic impacts suggest that the school has a high exposure to earthquakes (Figure 4-5).	**Possible**	**1**	**Minimal (or no warning)**	**3**	**Catastrophic**	**3**	**HIGH**	**2.3**

TABLE 4.2: FINDINGS OF THE EXPOSURE ANALYSIS FOR THE CASTLE BRUCE SECONDARY SCHOOL

HAZARD	COMMENTS	FREQUENCY		WARNING TIME		SEVERITY		DEGREE OF EXPOSURE	
		RANKING	SCORE	RANKING	SCORE	RANKING	SCORE	RANKING	AVERAGE SCORE
Volcano	The island has very high exposure to volcanic hazards, and an eruption is expected in the next 100 years. The school is not in the immediate zone of the volcano; however, the level of exposure persists (Figure 4-6).	**Possible**	**1**	**Minimal (or no warning)**	**3**	**Catastrophic**	**3**	**HIGH**	**2.3**
Tsunamis	The school is exposed to tsunamis.	**Possible**	**1**	**Minimal (or no warning)**	**3**	**Critical**	**2**	**HIGH**	**2.0**
							OVERALL EXPOSURE INDEX	**MODERATE**	**12.3**

FIGURE 4.1: DOMINICA WIND HAZARD MAP SHOWING LOCATIONS OF SCHOOLS ASSESSED (MAY 2019)

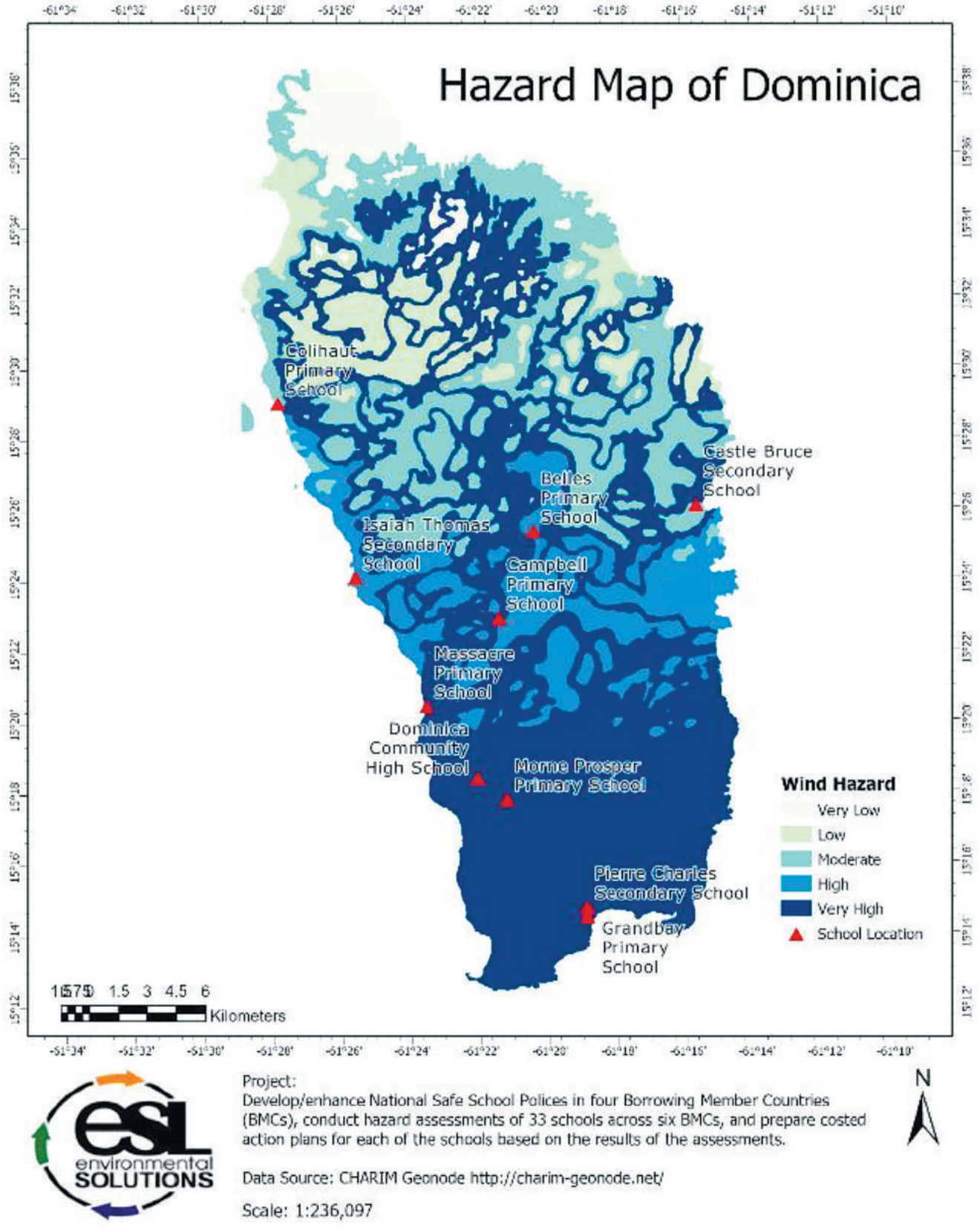


FIGURE 4.2: DOMINICA FLOOD HAZARD MAP SHOWING LOCATIONS OF SCHOOLS ASSESSED (MAY 2019)

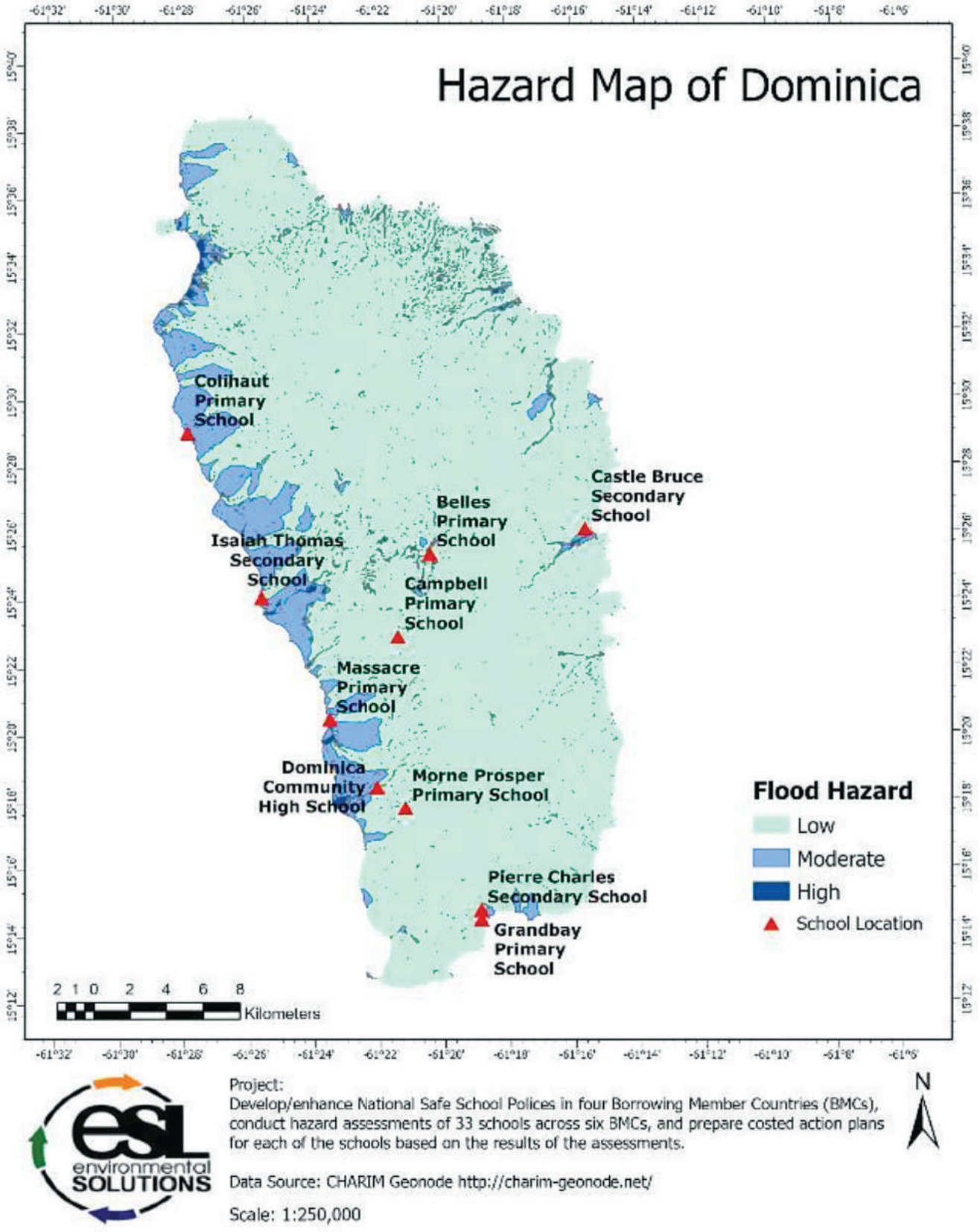


FIGURE 4.3: DOMINICA STORM SURGE HAZARD MAP SHOWING LOCATIONS OF SCHOOLS ASSESSED (MAY 2019)

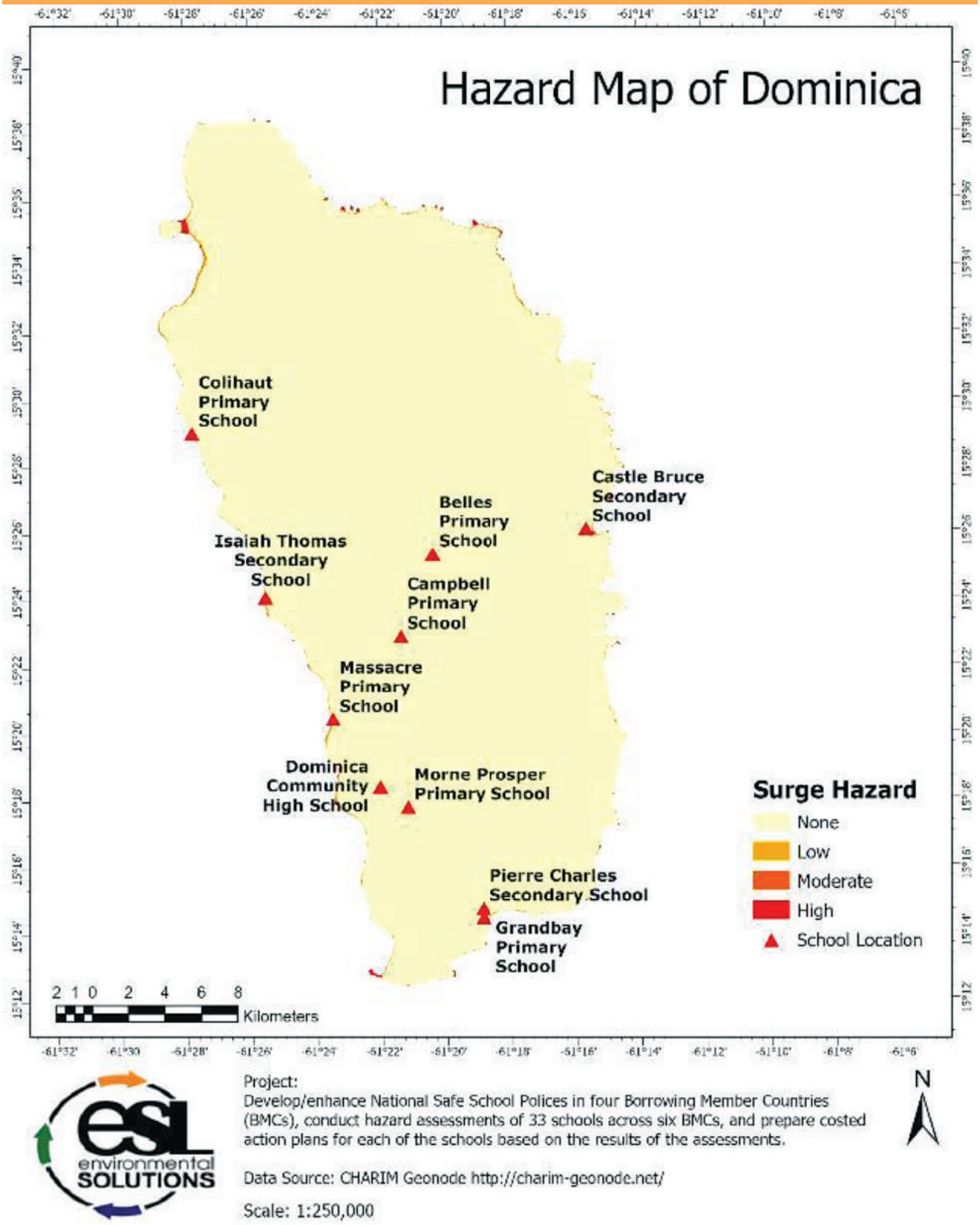


FIGURE 4.4: DOMINICA LANDSLIDE HAZARD MAP SHOWING LOCATIONS OF SCHOOLS ASSESSED (MAY 2019)

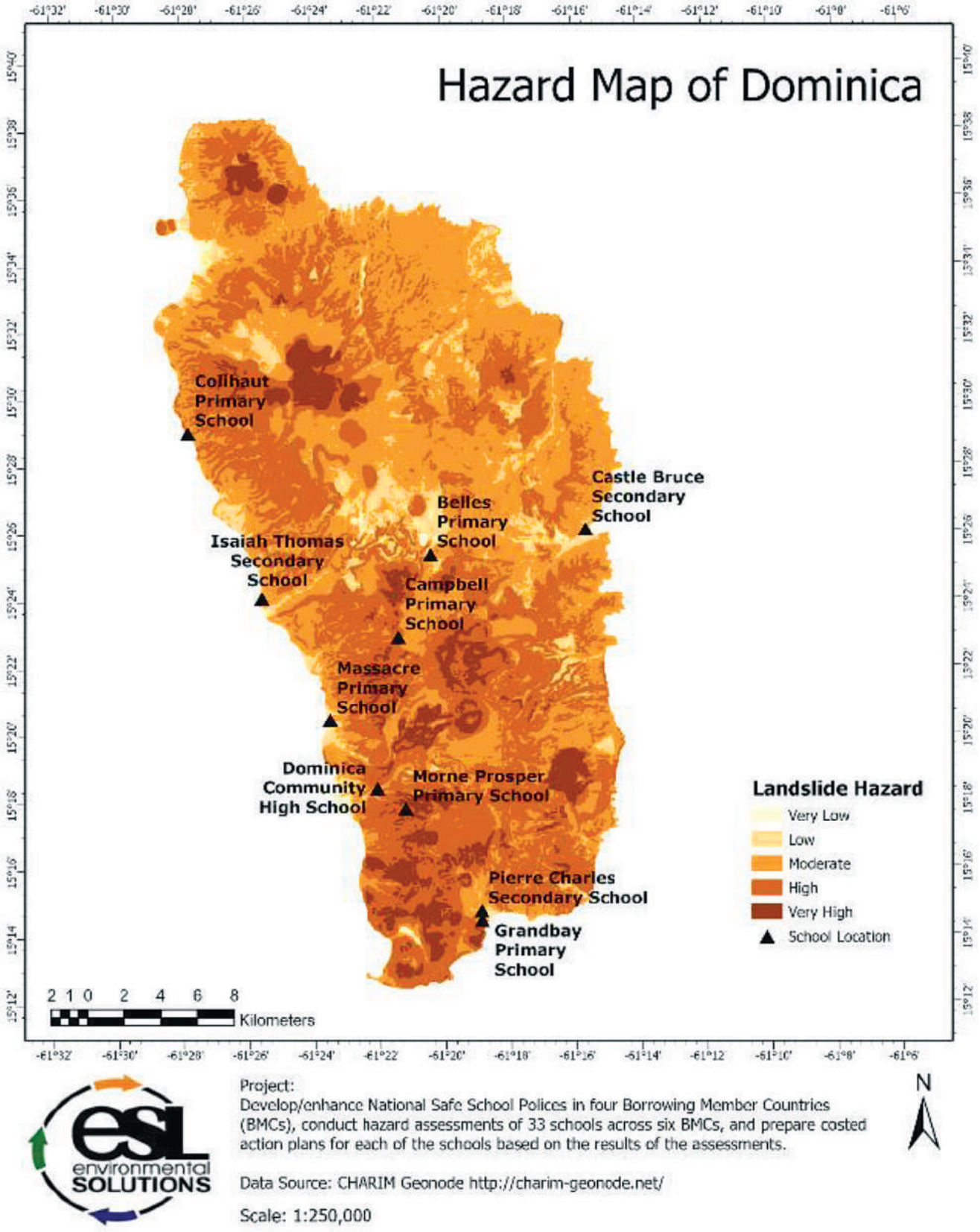
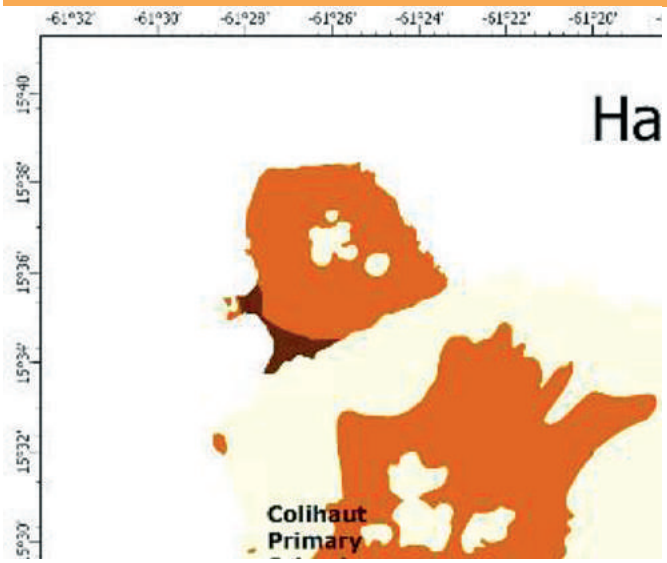


FIGURE 4.5: DOMINICA EARTHQUAKE HAZARD MAP SHOWING LOCATIONS OF SCHOOLS ASSESSED (MAY 2019)



8. IMPROVEMENT PLAN AND COSTED ACTION PLAN

The table below summarizes our opinion of 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. Opinions of cost also excluded any local taxes.

The proposed estimated cost to undertake the remedial work is **One Million, Six Hundred and Forty-Two Thousand, Six Hundred Dollars Eastern Caribbean Currency (XCD$1,642,600.00)**.

TABLE 8.1: IMPROVEMENT PLAN AND COSTED ACTION PLAN FOR CASTLE BRUCE SECONDARY SCHOOL (MAY 2019)

RECOMMENDATION	TASK	RESPONSIBLE PARTY	FUNDS REQUIRED	TIMEFRAME SHORT-MEDIUM -LONG TERM	RESULT
Emergency Planning and Management	Erect safety signage around the school premises.	School administration in coordination with Disaster Management Agency(ies) and other relevant entities.		Short	Improved Emergency Planning and Management
	Run drills and simulations to sensitize teachers and students.	School administration in coordination with Disaster Management Agency(ies) and other relevant entities.		Short	
	Draft emergency management plan (EMP) that addresses hazards with a rating of high or moderate, as well as other hazards. EMP should be submitted to the Ministry of Education. Include in the school safety plan disaggregated date 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.	School administration in coordination with Disaster Management Agency(ies) and other relevant entities.		Short	
	Complete Emergency First Response (EFR) or First Aid Training for all teachers and staff.	School administration in coordination with Disaster Management Agency(ies) and other relevant entities.		Short	

TABLE 8.1: IMPROVEMENT PLAN AND COSTED ACTION PLAN FOR CASTLE BRUCE SECONDARY SCHOOL (MAY 2019)

RECOMMENDATION	TASK	RESPONSIBLE PARTY	FUNDS REQUIRED	TIMEFRAME SHORT-MEDIUM -LONG TERM	RESULT
Occupational Health and Safety	Provide students and teachers with required personal protective equipment for laboratory work.	Ministry of Education and other relevant entities.	XCD$6,000	Medium	Improved culture of safety within the school community.
	Install emergency eye-wash station and shower.	Ministry of Education and other relevant entities.	XCD$4,000	Medium	
	Re-organize science lab chemical storage area: ■ Re-label illegible containers and properly store chemicals [1] (consult Material Safety Data Sheets as well for proper storage) ■ Separate containers to be discarded ■ Ensure Material Safety Data Sheets for each chemical are available and easily accessible	Principal and/or Safety Committee in collaboration with Chemistry Teacher.		Short	
Sustainability and Greening	Create an environmental club for students to lead on the development of various activities/initiatives aimed at "greening" the school i.e. increasing environmental sustainability through awareness and action.	Principal and/or Safety Committee.		Short	Increased awareness and sensitization.
On-site drainage of water (rainwater, wastewater from sinks, etc.) needs to be addressed	Upgrade of storm drains to include additional flood protection from adjacent existing waterway.	Ministry of Education in collaboration with Department of Works.	XCD$184,000	Medium	Improved drainage.

TABLE 8.1: IMPROVEMENT PLAN AND COSTED ACTION PLAN FOR CASTLE BRUCE SECONDARY SCHOOL (MAY 2019)

RECOMMENDATION	TASK	RESPONSIBLE PARTY	FUNDS REQUIRED	TIMEFRAME SHORT-MEDIUM -LONG TERM	RESULT
Other Infrastructural upgrades	Repair roof covering, ceiling and roof drains with current Building Code Standards.	Ministry of Education in collaboration with Department of Works. *some smaller projects can be undertaken by school/community /private organization as a special project.	XCD$315,000	Medium	Increased building resilience; improved school plant.
	Upgrade toilet block to include renewal of septic and soak-away.		XCD$220,500	Long	
	Upgrade of doors and windows to hurricane resistant standards.		XCD$240,000	Medium - Long	
	Construct new water storage.		XCD$120,000	Medium - Long	
	Repairs to electrical wiring complete with new fixtures.		XCD$240,000	Medium	
	Painting to affected areas.		XCD$178,600	Short	
	Repair defective or damaged external and internal walls and slabs.		XCD$84,500	Medium	
	Repair perimeter fence.		Quotations to be solicited by the Ministry of Education and other relevant Ministries /agencies.	Medium	
	Contingency		XCD$50,000		

NOTE:
The recommended actions should commence in the following time periods:
Short term= 1-3 yrs; Medium term= 3-5 yrs; Long term= > 5 yrs

9. REFERENCES

ACAPS Disaster Profile: Dominica. 2018.

Centre for Science in the Earth System (The Climate Impacts Group Joint Institute for the Study of the Atmosphere and Ocean University of Washington and King County, Washington In association with ICLEI- Local Governments for Sustainability, 2007. Preparing for Climate Change: A Guidebook for Local, Regional and State Governments

CCRIF. (2013). Dominica Country Risk Profile. George Town, Cayman Islands: CCRIF.

DeGraff, J.V., 1987. Landslide hazards on Dominica West Indies - Final Report. Organization of American States, Washington, D.C., 25 pgs.

DeGraff, J.V., Bryce, IL, Jibson, ILW., Mora, S., and Rogers, C.T., 1989. Landslides: Their extent and significance in the Caribbean, in Brabb, E.E. and B.L. Harrod (eds.), Landslides: Extent and Economic Significance. A.A. Balkema: Rotterdam, p. 51-80.

Global Facility for Disaster Risk Reduction (GFDRR). 2010. Disaster Risk Management in Latin America and the Caribbean Region – GFDRR Country Notes.

Commonwealth of Dominica. 2001. First National Communication of the Commonwealth of Dominica under the United Nations Framework Convention on Climate Change (UNFCC). Environmental Coordinating Unit, Ministry of Environment, Natural Resources, Physical Planning and Fisheries.

Commonwealth of Dominica. 2012. Second National Communication of the Commonwealth of Dominica under the United Nations Framework Convention on Climate Change (UNFCC). Environmental Coordinating Unit, Ministry of Environment, Natural Resources, Physical Planning and Fisheries.

Intergovernmental Panel on Climate Change [IPCC]. 2013. Climate Change 2013: The Physical Science Basis. Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge, United Kingdom: Intergovernmental Panel on Climate Change, Cambridge University Press.

Simpson, M. C., Clarke, J. F., Scott, D. J., New, M., Karmalkar, A., Day, O. J., Taylor, M., Gossling, S., Wilson, M., Chadee, D., Stager, H., Waithe, R., Stewart, A., Georges, J., Hutchinson, N., Fields, N., Sim, R., Rutty, M., Matthews, L., and Charles, S. 2012. CARIBSAVE Climate Change Risk Atlas (CCCRA) - Dominica. DFID, AusAID and The CARIBSAVE Partnership Department of Emergency Management (DEM). 2014. Country Document for Disaster Risk Reduction: Dominica, 2014

Smit, B. and O. Pilifosova. 2003. From adaptation to adaptive capacity and vulnerability reduction. In J.B. Smith, R.J.T. Klein and S. Huq, eds., Climate change, adaptive capacity and development. Imperial College Press, London.

Smit, B., et al. 2001. Adaptation to climate change in the context of sustainable development and equity. In J.J. McCarthy and O.F. Canziani, eds., Climate Change 2001: Impacts, adaptation and vulnerability. Contribution of Working Group III to the 3rd Assessment Report of the Intergovernmental Panel on Climate Change

United Nations Office for Disaster Risk Reduction (UNISDR). 2009. Global Assessment Report on Disaster Risk Reduction: Risk and Poverty in a Changing Climate – Invest Today for a Safer Tomorrow.

United Nations Office for Disaster Risk Reduction (UNISDR). 2013. Global Assessment Report on Disaster Risk Reduction: From Shared Risk to Shared Value – The Business Case for Disaster Risk Reduction.

Websites

FEMA Hazard Analysis Worksheet. Retrieved September 2019.
https://www.fema.gov/hazard-identification- and-risk-assessment

Global Climate Risk Index 2019. Retrieved September 2019.
www.germanwatch.org/cri

10. APPENDICES

APPENDIX A: MSSP ASSESSMENT TOOLKIT RESULTS

GENERAL INFORMATION

TABLE 10.1: VITAL INFORMATION FOR SCHOOL SAFETY

NAME OF SCHOOL	CASTLE BRUCE SECONDARY SCHOOL
Type of school (Pre-school, Primary, Secondary, Tertiary)	**SECONDARY**
Is facility private and public?	**PUBLIC**
Location	**CASTLE BRUCE, ST. DAVID, DOMINICA**
Name of Head Teacher or Principal	**STEVE HYPOLITE**
Telephone	**(767) 446-0531**
Email	**-**
Year building(s) constructed	**1998**
Buildings contained on the school compound	**6**
Number of classrooms	**-**
Total school population	**+460**
Students	**Male: 220 Female: 220**
Teachers	**39 (14 x male)**
Non-teaching Staff	**-**
Number of first aid kits available	**4**
Number of fire extinguishers throughout the buildings?	**1**
Natural disaster in the past	**NO**
The type of event and the time it occur	**N/A**
Repairs as a result of the event	**N/A**
School designated as an emergency shelter	**YES**

OVERALL SCORES

TABLE 10.2: SCHOOL SAFETY ASSESSMENT SUMMARY

CHECKLIST	SCORE (%)	CRITICAL STANDARDS MET
Safety	55%	NO
Green	39%	NO

The above scoring is calculated based on the questions and Critical Standards applying to secondary schools only.

SAFETY ASSESSMENT SCORES

TABLE 10.3: SAFETY ASSESSMENT SUMMARY SCORES

SAFETY THEME	SCORE (%)	CRITICAL STANDARDS MET
Disaster Planning	41%	NO
Emergency Planning	56%	NO
Safety Admin	62%	
Medical Emergencies	64%	NO
Physical Plant	40%	NO
Physical Safety	92%	
Protection of the Person	40%	
Hazardous chemicals and materials	78%	NO

GREEN ASSESSMENT SCORES

TABLE 10.4: GREEN ASSESSMENT SUMMARY SCORES

SAFETY THEME	SCORE (%)	CRITICAL STANDARDS MET
Sustainability Management	13%	NO
Natural Resources	28%	NO
Indoor Environment	49%	NO
Hazardous Chemicals and Materials	41%	NO
Facility and Grounds Management	63%	YES
Food Service	52%	YES

APPENDIX B: SELECTED PHOTOGRAPHS

FRONT ELEVATIONS

PANORAMIC VIEW

PANORAMIC VIEW

PANORAMIC VIEW

PANORAMIC VIEW

PANORAMIC VIEW

PANORAMIC VIEW

PANORAMIC VIEW

DETACHED BUILDING
END ELEVATION

SEPARATE BLOCK CONCRETE ROOF
CANTILEVERED COVERED TO

SEPARATE BLOCK CONCRETE ROOF
CANTILEVERED COVERED TO

MECHANICAL BUILDING

STORM DRAINS

COVERED WALKWAY

CANTEEN AREA

CANTEEN AREA

CANTEEN AREA

CORRODED ROOF COVERING

MECHANICAL BUILDING

TYPICAL END ELEVATION

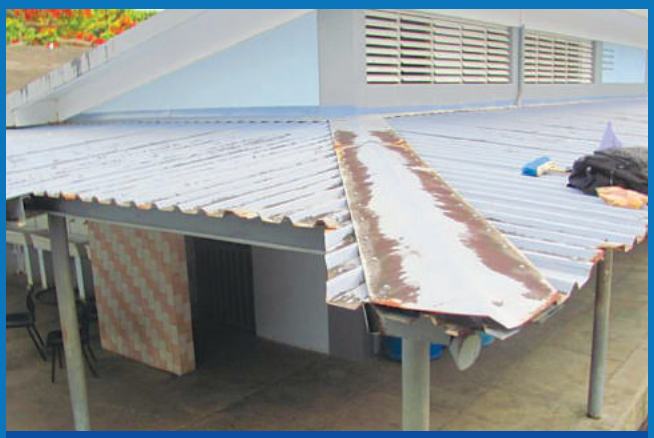
CONCRETE FENCE WALL
WITH DRAIN AT BASE

CONCRETE FENCE WALL
WITH DRAIN AT BASE

STORM DRAINS

STORM DRAINS

- RETAIN WALL WITH DRAIN AT BASE



- ALUZINC SHEET ROOF COVERING

- ALUZINC SHEET ROOF COVERING

- ALUZINC SHEET ROOF COVERING

- FIRE HOSE REEL

- TIMBER DOOR

- REAR ELEVATION (TYPICAL)

- REAR ELEVATION (TYPICAL)

- TIMBER CLASSROOM BLOCK

- TIMBER CLASSROOM BLOCK

- TIMBER CLASSROOM BLOCK

- TIMBER CLASSROOM BLOCK

- ROOF COVERING
  TO TIMBER BUILDING

- RETAIN WALL
  WITH DRAIN AT BASE

Please note that the photographs are not an illustration of all defects at the property.
They are to give you guidance on its general condition. The photographs should not be viewed in isolation.

Please note that there may be some defects in the photographs which are not referred to in the main text.

APPENDIX C: NSSPC - DOMINICA

COUNTRY: DOMINICA						
#	FIRST NAME	LAST NAME	GENDER	JOB TITLE	ORGANIZATION	CONTACT EMAIL
EG.	Jane	Doe	Female	Education Officer - South Division	Ministry of Education	jane.doe@moe.eg.org
1	Melina	Fontaine	Female	Current Education Officer (CEO)	MOE	chiefeduoff@education.gov.dm
2	Dr. Jeffery	Blaize	Male	ACEO	MOE	blaizej@yahoo.com
3	David	Maximea	Male	DEO	MOE	earl31@hotmail.com
4	Cynthia	Joseph	Female	DEO	MOE	ceanjayy@gmail.com
5	Queen	Thomas	Female	DEO	MOE	felixia21@gmail.com
6	Magaret	Jules Royer	Female	DEO	MOE	margoroyer2007@hotmail.com
7	Octavia	Timothy	Female	Coordinator/ Special Education	MOE	octimj98@gmail.com
8	Mervin	Alexander	Male	President DAT	DAT	-
9	Dionne	Durand Smith	Female	Communication Specialist	MOE	dionnedurand@gmail.com
10	Veda	George	Female	Coordinator Early Childhood	MOE	coordinatorecd@dominica.gov.dm
11	Donaldson	Frederick	Male	ODM	-	donalsonfrederick@gmail.com
12	Andy	Prosper	Male	Engineer	Public Works	andpros@hotmaill.com
13	Natalie	Murphy	Female	President	Dominica Association of Persons with Disability	-
14	Sawana	Fabien	Female	Program Director	IsraAid	sfabien@israaid.org

APPENDIX D: ORGANISATIONS CONSULTED

Organizations consulted:

- Ministry of Education
- Physical Planning Division
- Ministry of Public Works
- Principals
- National Safe School Committee
- Isra-Aid
- Early Childhood Unit
- Special Education Unit
- Dominica Association of Local Govt
- Engineers Without Borders
- Office of Disaster Management (ODM)
- Climate Resilience Execution Agency for Dominica (CREAD)