Technical Assistance for Increasing Resilience of the Education System to Climate Change in Saint Lucia and Antigua & Barbuda

Review and Evaluation Report of Schools and Climate Change Ranking

Submitted to

Climate Technology Centre and Network
United Nations Industrial Development Organization

By

ECMC

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Executive Summary

This report presents the methodology and approach used to establish the relative level of climate change vulnerability of twelve schools, as part of the CTCN-UNIDO project - Technical Assistance for Increasing Resilience of the Education System to Climate Change in Saint Lucia and Antigua and Barbuda. A review of the findings of the Rapid Climate Vulnerability Assessment and the evaluation of the twelve schools in Saint Lucia is also presented in the report. Regarding Antigua and Barbuda, the report presents the approach adopted to assist that country in replicating the processes implemented in Saint Lucia.

The twelve schools considered in Saint Lucia are located throughout the Island. The northernmost school is Corinth Secondary and the southernmost is Vieux Fort Primary. Ave Maria Infant and Primary schools are at the lowest elevation of 3.5 to 5.0 metres, and Saltibus Combined at the highest – estimated to be at 278.0 to 280.0 metres.

As mandated by the Terms of Reference for the assignment, the relative vulnerability of the twelve schools was established using the five stipulated hazards, namely: Landslides; Fluvial Flooding; Coastal Flooding and Sea Level Rise; Droughts; and Wind speed/Hurricanes. Where available, established hazard maps were used to identify the location of the schools, thereby assessing their relative climate change vulnerability. In the case of the drought hazard, there was a paucity of data further exacerbated by less than timely responses from the sole producer of water in Saint Lucia. In that regard, the consulting team decided to undertake a qualitative assessment based on information from senior officers of the Water and Sewerage Company Incorporated and the knowledge of the Senior Advisor on the team.

The combined relative climate change vulnerability of each of the schools resulted in an average score, giving rise to the eventual ranking of the schools. The results indicate that Vieux Fort Primary School is ranked number one as being most susceptible to climate change impacts, whereas both Desruisseaux Combined and Corinth Secondary Schools ranked last - 11th. As indicated below, three schools (Ave Maria Infant, Ave Maria Primary and Balata Combined Schools) were identified as having the same rank (third) in terms of high susceptibility.

School	School's Average Hazard Rank*
Vieux-Fort Primary	1
Saltibus Combined	2
Ave Maria Infant	3
Ave Maria Primary	3
Balata Combined	3
Patience Combined	6
Micoud Primary	7
Bexon Primary	7
Fond Assau Combined	9
Vieux-Fort Infant	9
Corinth Secondary	11
Desruisseaux Combined	11

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Contents

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1.0 Introduction

This report presents Deliverable 3.1 which is to produce a "*Review and evaluation report of schools, and a short list and ranking of schools in Saint Lucia"*. Due to a variation to the consultancy arising from a request from Antigua and Barbuda, the report also identifies the process involved in assisting that country in adopting the methods utilized in Saint Lucia to replicate the exercise for 28 selected schools.

1.1 Background

The Climate Technology Centre and Network (CTCN) is the operational arm of the United Nations Framework Convention on Climate Change (UNFCCC) Technology Mechanism and hosted by the United Nations Environment Programme (UNEP) in collaboration with the United Nations Industrial Development Organization (UNIDO) and supported by eleven partner institutions with expertise in climate technologies.

The mission of the CTCN is to promote accelerated deployment and transfer of climate technologies at the request of developing countries for energy-efficient, low-carbon and climate-resilient development. The requests for Technical Assistance (TA) were submitted to the CTCN by the National Designated Entity (NDE) of Antigua and Barbuda and Saint Lucia – the Ministry of Education, Innovation, Gender Relations and Sustainable Development (MEIGRSD) of the Government of Saint Lucia (GOSL) and the Ministry of Education, Science and Technology of the Government of Antigua and Barbuda respectively.

The vulnerability of Saint Lucia and Antigua & Barbuda to climate-related shocks is likely to increase unless their education sectors improve their capacity to anticipate, prepare, adapt, and become more resilient to such events. Some of the public schools designated as emergency shelters in these two Small Island Development States (SIDS) are considered insufficient in terms of structural condition to withstand a Category 5 Hurricane as well as ensuring minimum disruption to the populations' education system. A new approach is also needed to increase the resilience of those schools as emergency shelters for the communities.

It is our understanding that the main aim of the CTCN TA/consultancy assignment is to enable these two SIDS to strategically assess the climate risk and the related negative impacts to the educational system. The intention is to also appraise improvement measures that will allow both Governments to remove technology barriers and deploy specific adaptation technology solutions in preparation of a project proposal to be submitted to the Adaptation Fund.

1.2 Purpose

As part of the consultancy, the selection criteria had to be agreed with key stakeholders, buildings evaluated against the findings of the rapid climate vulnerability assessment, and a ranking of the twelve identified schools in Saint Lucia produced.

In the case of Antigua and Barbuda, ECMC understood and was aware that other project proposals had already provided adaptation interventions for selected institutional buildings. Consequently, only a listing and ranking of potential schools had to be upgraded and cross-referenced with the list of schools already targeted. However, a revision to ECMC's consultancy resulted in the requirement to provide Antigua and Barbuda with the template for the work undertaken in Saint Lucia. Therefore, this report sets into perspective, the processes involved in ranking the schools and providing the methodology adopted to assist Antigua and Barbuda in undertaking a similar exercise.

The report also articulates how the selection criteria and methodology were coordinated between the stakeholders in Saint Lucia and Antigua and Barbuda. This coordination was particularly important as the NDE of Antigua and Barbuda, had specified the use of a narrow band of interventions.

1.3 Schools' Location

The twelve schools identified under the project are located throughout Saint Lucia, with Corinth Secondary being the northernmost and the Vieux Fort Primary, the southernmost. The Ave Maria (Infant and Primary) schools are at the lowest elevation at 3.5 metres and Saltibus Combined at the highest, 280 metres. Table 1.1 provides information on the geographic coordinates and each of the twelve schools and Figure 1.1, shows the schools in a locational context.

Table 1.1 - Schools and Geographic Location

School	Latitude	Longitude
Ave Maria Infant	14° 0'31.28"N	60°59'18.93"W
Ave Maria Primary	14° 0'31.72"N	60°59'20.00"W
Balata Combined	14° 0'45.28"N	60°57'14.30"W
Bexon Primary	13°57'8.60"N	60°58'30.85"W
Corinth Secondary	14° 2'46.30"N	60°57'57.71"W
Desruisseaux Combined	13°47'53.19"N	60°56'3.15"W
Fond Assau Combined	13°59'47.27"N	60°56'10.91"W
Micoud Primary	13°49'9.90"N	60°54'0.60"W
Patience Combined	13°51'3.47"N	60°54'27.74"W
Saltibus Combined	13°48'17.50"N	61° 0'48.48"W
Vieux-Fort Infant	13°43'51.76"N	60°57'10.26"W
Vieux-Fort Primary	13°43'44.77"N	60°56'58.91"W

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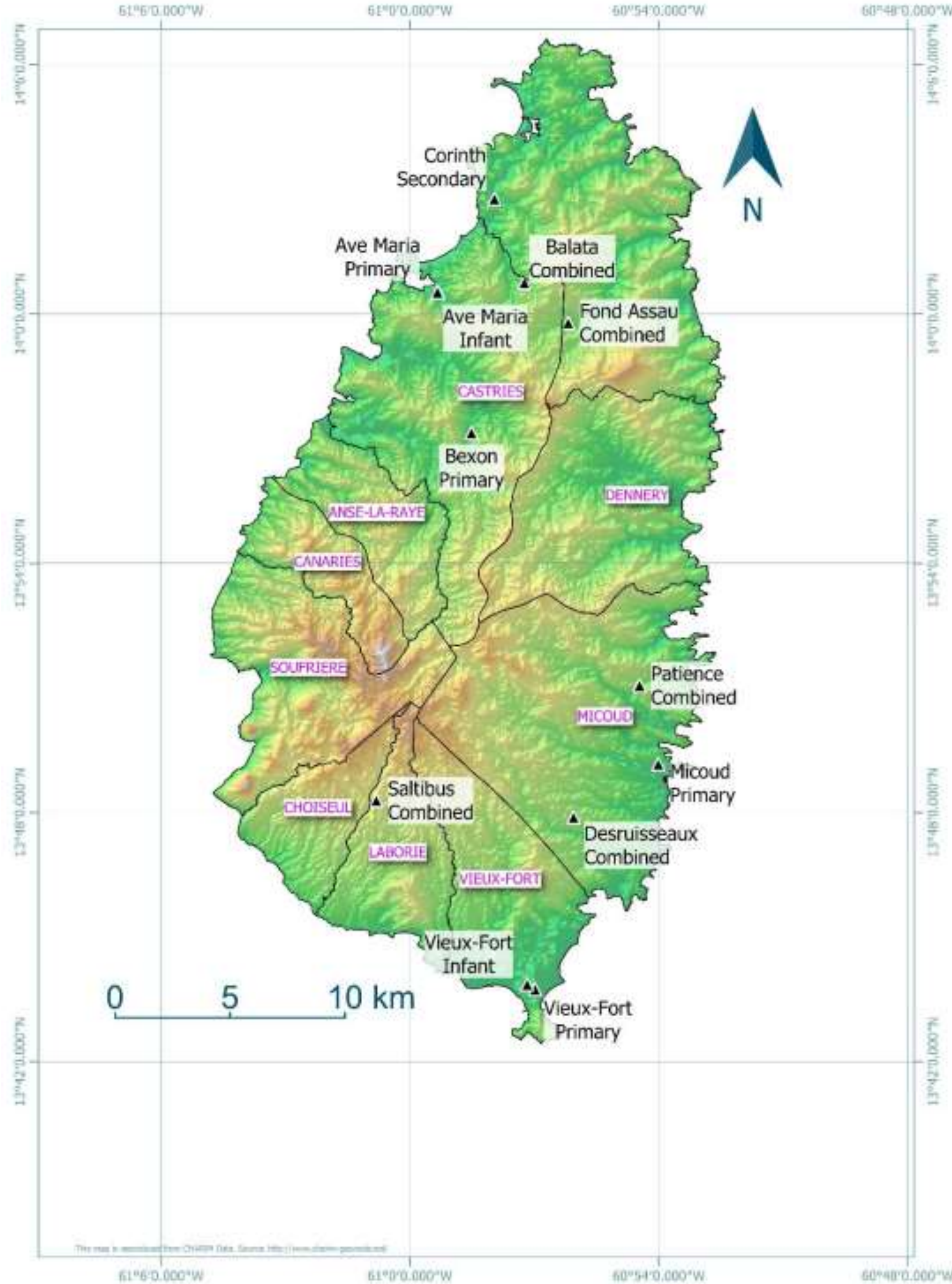

Figure 1.1 - Overview map of each of the 12 schools in Saint Lucia
(note the Ave Maria schools are located very close to each other in Castries and appear as one point)

Source: HR Wallingford produced using data from ECMC Ltd and CHARIM GEONODE

2.0 Methodology and Approach

The ranking of the schools was based on their vulnerability to the impacts of five climatic hazards; namely: Landslides; Fluvial flooding; Coastal flooding and sea level rise; Droughts; and Wind speed/Hurricanes. To undertake the ranking of the schools, their susceptibility to the hazards was established using various hazard maps from several reliable data sources. The relative location of each school to the areas of highest susceptibility determined the extent of the impact on those assets. Where map data was not available, the impact of the drought hazard was measured based on qualitative parameters developed after dialogue with the Water and Sewerage Company Inc (WASCO), the sole producers of water in Saint Lucia.

In the case of Antigua and Barbuda, representatives of the NDE were provided with the methodology used in Saint Lucia and the Senior Advisor on the consultancy team assisted the Country in replicating the approach. During a visit to Antigua and Barbuda, dialogue was held with the NDE's representative and a cursory review of the work undertaken was evaluated and changes recommended.

2.1 Landslides

Landslide susceptibility mapping was available through the Caribbean Handbook on Risk and Information Management (CHARIM) GeoNode1. The CHARIM project completed a national scale landslide susceptibility assessment for Saint Lucia in 2016 (Van Westen, 2016). This categorises landslide susceptibility into Low, Moderate and High categories, with accompanying recommendations for each class; these are shown in the box below. The method report notes that this national assessment of hazard cannot be used for local or site-specific planning, but indicates that in the absence of detailed site-specific recommendations, it represents the best available information for Saint Lucia, despite its uncertainties. The assessment does not include landslide run-out areas. Therefore, locations which are in the potential run out areas for landslides should be subject to more detailed investigations, if more definitive statements are necessary.

"Recommendations from the CHARIM Landslide method report on planning considerations on landslide hazard for each of the three susceptibility classes

- **Low susceptibility**: For planners there is no limitation with respect to expected landslide problems in the development of these areas. No special care should be taken by engineers with respect to planning and maintaining infrastructure in these areas with respect to landslides. Of course it is important to also check the other hazard maps for these areas. Of course it is important to also check the flood hazard maps for these areas, as areas that are flat and near a river or coast might be still flood prone.
- **Moderate susceptibility**: It is advised to carry out a more detailed landslide study for residential development and for critical infrastructure. There is no need to avoid these areas altogether, but care should be taken that landslides might occur. This class is actually the most problematic for use in spatial planning and planning/maintenance of infrastructure, as it is an intermediate class.
- **High susceptibility**: There are severe restrictions with respect to expected landslide problems in these areas. The best is to avoid these areas in the development of future residential areas or critical infrastructure whenever possible. Development plans should always incorporate a more detailed study of landslide hazard in these areas. Engineers should consider the high landslide hazard when designing or maintaining infrastructure. Further evaluations would have to be carried out before allowing new constructions – be that an expert inspection of the site, detailed slope stability evaluations – that may depend on the importance of the asset (e.g. a private building would be dealt with differently than a hospital)

Source: CHARIM Landslide method repot (Van Westen, 2016) "

[1] http://www.charim-geonode.net/ (accessed 14 October 2020)

The landslide susceptibility mapping was overlaid on the schools' locations to provide a national map and a local area map for each school. The landslide susceptibility was also extracted for each school and tabulated in the results section of the Rapid CVA Report[2].

2.2 Fluvial Flooding

Fluvial flood hazard modelling was also carried out as part of the CHARIM project and is available on the CHARIM GeoNode. The modelling used a rainfall-runoff model, and a hydraulic flow routing model to predict the areas which are inundated for the 1 in 5, 1 in 10, 1 in 20, and 1 in 50-year return period storm events (Jetten, 2016). Given the uncertainties associated with these return periods, as well as the hydrological and hydraulic modelling, the mapping has simplified these to qualitative classifications, as set out in Table 2.1.

It should be noted that the flood hazard mapping covers the fluvial flood hazard only, no information was made available on pluvial flooding, and coastal flooding as a result of storm surge or sea level rise. In coastal or low-lying locations, there may be the potential for flooding from the sea or surface water runoff from intense rainfall which is not shown on the fluvial flood maps.

The national scale flood mapping was overlaid with the 12 school locations to produce maps of flood hazard nationally, and at each school location. The flood hazard was also extracted for each school and tabulated in the results section of this report. For those schools which are adjacent to modelled flood prone areas, it is suggested that local surveys should be used to confirm likely flood routes, as the Digital Terrain Model (DTM).

The DTM used in the flood modelling was based on contour data of unknown origin and accuracy, which was gridded and resampled to 20 m horizontal resolution. This level of accuracy means that there is uncertainty in the DTM.

Table 2.1 – Flood Hazard Susceptibility Classes Used in Hazard Maps

Class used in Map Legend	Return Period Associated with Classification
Very low flood hazard susceptibility	Predicted to flood less frequently than a 1 in 50- year return period storm event.
Low flood hazard susceptibility	Predicted to flood for events between 1 in 20 and 1 in 50-year return period.
Moderate flood hazard susceptibility	Predicted to flood for events between 1 in 10 and 1 in 20-year return period.
High flood hazard susceptibility	Predicted to flood for events between 1 in 5 and 1 in 10-year return period.
Very high flood hazard susceptibility	Predicted to flood for events of 1 in 5 years or more frequent.

[2] Rapid Climate Vulnerability Assessment for Twelve Schools in Saint Lucia – prepared by ECMC, July 2021

2.3 High Wind Speed

ECMC obtained a map in Adobe PDF and GIS shapefile format of the 1 in 100-year 2-minute average wind speed for Saint Lucia from the Physical Planning Department of the Ministry of Agriculture, Fisheries, Physical Planning, Natural Resources and Co-operatives. This work was completed for the Government of Saint Lucia and Caribbean Disaster Emergency Response Agency (CDERA) collaboration through the Caribbean Hazard Mitigation Capacity Building Programme (Kinetic Analysis Corporation, 2006a).

The wind speed shapefile was overlaid on the school locations map to provide a national, plus maps for the north and south of the island. A map for each school was not produced due to the relatively coarse nature of the wind data.

The wind speed was converted into a hazard rating based on the range of modelled wind speed values shown on the map (which ranged from 30-35 m/s up to 50-55 m/s). Note that the wind speed rating is relative and should be used only to compare between the schools, it does not imply that a school with a very low wind speed hazard rating is not exposed to some degree, as all buildings on a hurricane prone island such as Saint Lucia will be exposed to some degree.

2.4 Drought

For the purpose of this assignment, drought risk for the schools was based on the likelihood of water scarcity affecting the school's water supply during the dry season or drought conditions. No modelling or mapping of the water supply system performance was available. ECMC, therefore consulted with the water utility in Saint Lucia, WASCO, to facilitate a qualitative assessment of drought risk for each school based on WASCO's knowledge of the historical performance of the water supply systems for each school.

Each school was scored from 1 (very low drought hazard) to 5 (very high drought hazard), based on the criteria below:

- 1 = very low (low flows resulting in demand restrictions have never been experienced in this system);
- 2 = low (low flows result in demand restrictions implemented less than once in 5 years);
- 3 = medium (low flows result in demand restrictions implemented once every 1 to 5 years);
- 4 = high (low flows result in demand restrictions implemented typically once per dry season on average);
- 5 = very high (low flows result in demand restrictions implemented multiple times each dry season).

This led to the development of the matrix (Table 2.2) which scored the drought hazard for each school with a justification for each scoring. A thematic map was then created at national level showing the drought score for each school.

Table 2.2 - Summary of Drought Impacts, Based on Consultation Between ECMC and WASCO

School	Supplying Intake	Historical Drought Impacts	Notable Periods of Demand Restrictions Due to Drought	Other Notes
Ave Maria Infant	John Compton (JC) Dam & Millet	1	The Ave Maria School has a very consistent water supply annually even during the dry season.	This facility is located near the city centre which is served by the most dependable water system island-wide.
Ave Maria Primary	JC Dam & Millet	1	The Ave Maria School has a very consistent water supply annually even during the dry season.	This facility is located near the city centre which is served by the most dependable water system island-wide.
Balata Combined	JC Dam, Millet, Vanard	2	This institution suffered from acute water issues during the dry season, however, the situation has improved significantly. The institution presently is only affected during prolonged drought periods, for example, this year during the dry season.	The community was transferred from the Marquis, Talvern System to the John Compton Dam to improve the potable water supply. Historically the community was at the far end of the Marquis, Talvern water supply system experiencing low flows and inadequate supply. The situation is now improved.
Bexon Primary	JC Dam, Millet, Vanard	1	The school has a very consistent water supply annually even during the dry season.	This institution is located near the main potable water transmission line.
Corinth Secondary	JC Dam & Millet	1	This educational institution has a reliable and constant supply of water during the dry season. During the 2010 and 2020 droughts, this area was not adversely affected.	This institution is located near the main potable water transmission line supplying water to the north, thus the effect of drought on the water supply is minimal to none.
Desruisseaux Combined	Desruisseaux	2	The Desruisseaux Combined School, as the rest of the community had acute water supply issues historically throughout the year, up until 2018. However, at present, the institution has only been affected during prolonged drought periods for example this year.	The water supply to the community was augmented, thus reducing the vulnerability to drought.
Fond Assau Combined	Marquis, Talvern	3	During the dry season, water rationing schedules are enforced to ensure that water is equitably distributed. However, in extreme drought periods, trucking of water is required to this area for the last 3 to 4 months for example in 2010 and 2020.	Owing to low flows from the river sources during the dry season, potable water supply is diminished resulting in water shortages to the community.

School	Supplying Intake	Historical Drought Impacts	Notable Periods of Demand Restrictions Due to Drought	Other Notes
Micoud Primary	Micoud	2	This educational institution has suffered from water supply issues during extended drought periods as in 2010 and 2020.	The school is located approximately 100 metres from the utility's water storage facility and within the 24-hour service area of the community treatment plant. Water problems are only serious if drought conditions persist over six months.
Patience Combined	Patience	3	There are water shortages every dry season for the past 10 years. Water is trucked in for 2 to 3 months per year has become the norm. The situation got to its worst in 2010 and then in 2020.	There are serious water storage issues in this area and during the dry season, the lack of storage amplifies the problem.
Saltibus Combined	Upper Saltibus	4	To sustain operations, water must be trucked to this institution 4 to 5 months a year during the dry season. This has been ongoing for the last 10 years.	The water system in this community cannot normally meet the needs of the residents and the dry season further exacerbate this situation.
Vieux-Fort Infant	Beausejour	1	The school has a very consistent water supply annually even during the dry season.	This community is ideally located both geographically and topographically in relation to the water treatment plant and storage facilities. Therefore, the facility has a constant supply of water annually, although areas in higher elevations from the same community suffer from water supply issues during the dry season due to low flows from the river sources.
Vieux-Fort Primary	Beausejour	3	This facility has suffered from water shortages every dry season over the past 10 years, with the situation being at its worst in 2010 and 2020. Water rationing regimes are employed every dry season to mitigate this issue.	This system has been over-expanded and supply does not equate demand. This situation worsens during the dry season when water flows from the river source drop significantly.

Source: Ranking completed by WASCO and ECMC Ltd

2.5 Coastal Flooding and Sea Level Rise

The elevations of the schools were extracted from a DTM from the CHARIM GeoNode3. It is unclear how this DTM was generated, but the metadata appears to indicate it was created from a contour dataset, which was itself created from a DTM derived from photogrammetry conducted by Fugro. Given the uncertain provenance of this dataset, it is difficult to comment on its likely vertical accuracy.

The hazard from sea level rise and coastal flooding has been determined by combining a school's elevation with a 4 m storm surge and a maximum anticipated sea level rise (SLR) of 1.1 m. This sea level rise is derived from the latest IPCC report on sea level rise (Oppenheimer et al, 2019, see Technical Summary p55-56). The anticipated 4 m storm surge was derived from local mapping outputs for each of the schools studied. The product of anticipated sea level rise (1.1 m) and a 4 m storm surge was calculated (i.e. 5.1 m). If the elevation of the school is lower than this value it was deemed to be impacted by sea level rise and coastal flood hazard. If the elevation of the school was above 5.1 m it was ascertained to have no impact.

The documents received from the Physical Planning Department also included a 1 in 100-year coastal flood hazard map showing coastal storm surge and predicted wave height (Kinetic Analysis Corporation, 2006b), shown in Figure 2.1. Although the resolution of the map is rather low, it indicates storm surge conditions of between 1 m and 3 m for the 1 in 100-year return period event. The largest storm surge heights are associated with the eastern side of the Island, notably the southeast of relevance to the Vieux Fort area. For the purposes of this assessment, the 4 m storm surge was used to provide some additional conservatism in the results, given the uncertainty over the data sources and DTM.

Table 2.3 summarises the school elevations from the DTM against the 1 in 100-year coastal flood levels, the 4 m surge scenario and the 4 m plus 1.1 m SLR scenario. It indicates that under the 4 m scenario only the Vieux Fort Primary School is exposed to coastal flooding. When 1.1 m SLR is included, both Ave Maria Infant and Primary schools are exposed.

It may be prudent that the ground level and floor levels for the Ave Maria Infant and Primary, and both Vieux Fort schools be surveyed to validate the levels extracted from the DTM. The verified information may result in these schools being at greater risk than predicted in the Rapid CVA Report. The ground levels of the other schools were found to be 15 m or higher, and are therefore not considered to be at risk from coastal flooding unless there are gross errors in the DTM.

Detailed modelling of storm surge under present and future sea levels is recommended, based on a suitably accurate DTM, for example, based on LiDAR data. This would provide more confidence in assessing the risks posed to coastal developments from storm surge and sea level rise.

[1] http://www.charim-geonode.net/layers/geonode:dem (accessed 14 October 2020)

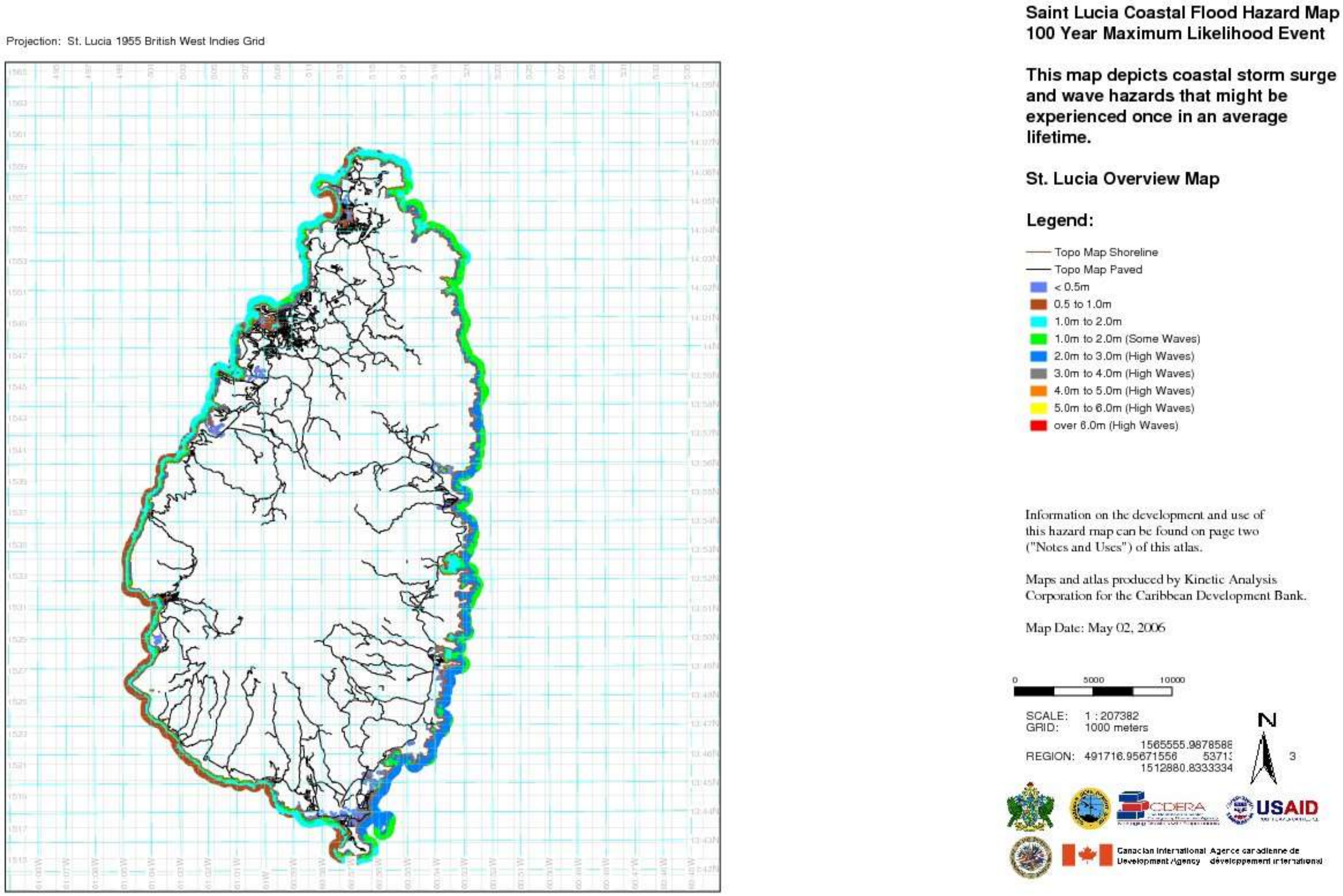

Figure 2.1 - 1 in 100-Year Coastal Flood Hazard Map

Source: Kinetic Analysis Corporation. 2006b

Table 2.3 - Summary of School Elevation and Coastal Flooding Predictions Including Sea Level Rise (SLR)

School	Elevation from Geonode DTM (m)	1 in 100-year Coastal Flood Level (m)	School Impacted by a 4 m Storm Surge	School Impacted by a 4 m Storm Surge Plus 1.1 m Sea Level Rise
Ave Maria Infant	5	1-2	Not impacted	Impacted
Ave Maria Primary	5	1-2	Not impacted	Impacted
Balata Combined	35	No hazard	Not impacted	Not impacted
Bexon Primary	22	No hazard	Not impacted	Not impacted
Corinth Secondary	15	1-2	Not impacted	Not impacted
Desruisseaux Combined	135	No hazard	Not impacted	Not impacted
Fond Assau Combined	63	No hazard	Not impacted	Not impacted
Micoud Primary	24	2-3	Not impacted	Not impacted
Patience Combined	88	No hazard	Not impacted	Not impacted
Saltibus Combined	278	No hazard	Not impacted	Not impacted
Vieux-Fort Infant	11	2-3	Not impacted	Not impacted
Vieux-Fort Primary	4	2-3	Impacted	Impacted

***Source**: Data from Physical Planning Department (4m storm surge scenario), CHARIM Geonode (DTM), Oppenheimer et al 2019 (1.1m SLR scenario, and Kinetic Analysis Corporation. 2006b (1 in 100-year flood level). Schools with 'no hazard' are inland.*

3.0 Climate Change Ranking

The specific requirement under Deliverable 3.1 is to select and rank the most climate change vulnerable areas and schools. In so doing, it was necessary to develop a combined score for each school, based on the measured susceptibility of the immediate vicinity of the schools. This combined score was then used to rank the schools on the basis of climate change impacts.

3.1 Ranking and Selection Criteria Consultations

The Coronavirus Pandemic and the associated COVID-19 protocols instituted to mitigate its impacts adversely affected the convening of the key stakeholders to finalizing the election criteria and ranking of the schools. To circumvent the lengthy delay on the consultancy, discussions were held with NDE officials on the conduct of preliminary ranking by ECMC. The results of the ranking were presented to key stakeholders at a virtual consultation held on June 1, 2021. After articulating the requirements of the TOR, the five hazards considered and the findings of the Rapid CVA, there was total consensus among the key stakeholders present. These stakeholders and their official positions are identified as follows:

Bernez Khodra	MEIGRSD/Saint Lucia National Emergency Management Organisation (NEMO) – School Safety Officer/Liaison Officer
Fiona Phillip-Mayer, PhD.	MEIGRSD, GOSL/NDE – Chief Education Officer
Kendall Khodra	MEIGRSD, GOSL/NDE – Deputy Permanent Secretary

Dawson Ragunanan	MEIGRSD, GOSL/NDE – Deputy Chief Education Officer-Instruction
Kay Clarke Nicholas	MEIGRSD, GOSL/NDE – District VII Education Officer
Steven Auguste	MEIGRSD, GOSL/NDE – District VI Education Officer
Francellette Laurencin	MEIGRSD, GOSL/NDE – District III Education Officer
Keifa Breen	MEIGRSD, GOSL/NDE – Corporate Planning
Tracy Dolcy	MEIGRSD, GOSL/NDE – Corporate Planning
Adey Paul	MEIGRSD, GOSL/NDE – Principal of Ciceron Secondary School (District IV Education Officer Representative)

3.2 Summary of Results and Ranking

The scoring system for each hazard is provided in Table 3.1 below and Table 3.2 provides a summary of the hazards associated with each school. Where a school area intersects more than one hazard class, the upper hazard class was selected for the summary table, to provide some measure of conservatism in respect of the hazard modelling and mapping uncertainties. Additionally, when a school is within 100 m of a higher band of hazard class, the upper band was selected to account for mapping and modelling uncertainties in the interest of conservatism. ECMC's knowledge of the current exposure of the school was also taken into account (see comments in Table 3.2). However, the interpretation of the maps using knowledge of the local situation and the limitations of the data enabled a more appropriate hazard scoring mechanism to be used. Both the maps and Table 3.2 must be used in conjunction with each other.

Table 3.2 also provides an average hazard score for each school, and a ranking of the schools based on the average hazard score. The ranking has been colour coded into three classes, the top four most exposed schools, the central four schools and the four least exposed schools. To assist in providing validation and supporting documentation for the ranking, the following documents were included in the Rapid CVA Report as appendices:

- Appendix A – National overview hazard maps for Wind, Drought, Flood, Landslide and general overview;
- Appendix B – Landslide hazard maps for each school;
- Appendix C – Flood hazard maps for each school;
- Appendix D – Wind hazard maps for north and south Saint Lucia.

Table 3.1 - Hazard Scoring Criteria

Score	Landslide	Fluvial Flooding	Wind Speed	Drought	Sea Level Rise/Coastal Hazards
1	Low susceptibility	Very low flood hazard susceptibility (Predicted to flood less frequently than a 1 in 50-year return period storm event).	Very low wind hazard susceptibility (between 30-35 m/s wind speed; 100-year maximum likelihood event).	Very low (low flows resulting in demand restrictions have never been experienced in this system).	No impact – combined 1.1 metre Sea Level Rise and a 4 metre storm surge will have no impact due to high elevation of school above sea-level.
2	Not applicable	Low flood hazard susceptibility (Predicted to flood for events between 1:20 and 1 in 50 year-return period).	Low wind speed hazard susceptibility (between 35 to 40 m/s; 1 in 100-year maximum likelihood event).	Low (low flows result in demand restrictions implemented less than once in 5 years).	Not applicable.
3	Moderate susceptibility	Moderate flood hazard susceptibility (Predicted to flood for events between 1:10 and 1:20 year return period).	Moderate wind speed hazard (between 40 to 45 m/s; 1 in 100-year maximum likelihood event).	Medium (low flows result in demand restrictions implemented once every 1 to 5 years).	Future impact only – combined 1.1-metre Sea Level Rise and a 4-metre storm surge will have an impact due to low elevation of school above sea-level.
4	Not applicable	High flood hazard susceptibility (Predicted to flood for events between 1:5 and 1:10 year return period).	High wind speed hazard (between 45 to 50 m/s; 1 in 100-year maximum likelihood event).	High (low flows result in demand restrictions implemented typically once per dry season on average).	Not applicable.
5	High susceptibility	Very high flood hazard susceptibility (Predicted to flood for events of 1:5 years or more frequent).	Very high wind speed hazard (50-55m/s; 1 in 100-year maximum likelihood event).	Very high (low flows result in demand restrictions implemented multiple times each dry season).	High impact – a 4-metre storm surge will have an impact due to low elevation of school above sea-level.

Table 3.2 - Summary of Hazards Associated with each School

School	Landslide	Fluvial Flooding	Wind Speed	Drought	Sea Level Rise	Average Score	School Average Hazard Rank	Comments (provided by ECMC based on local knowledge)
Ave Maria Infant	1	5	3	1	3	2.6	3	In centre of Castries which is known to flood. Located in fairly open country
Ave Maria Primary	1	5	3	1	3	2.6	3	In centre of Castries which is known to flood, located in a fairly open area
Balata Combined	3	3	2	2	1	2.6	3	Very inland and near a river
Bexon Primary	3	3	1	1	1	2.2	7	Known to be in a flood plain. The hill to the east can be a concern
Corinth Secondary	1	5	3	1	1	1.8	11	In a low-lying area, near a river, and is known to have drainage issues. Located in open country
Desruisseaux Combined	1	1	4	2	1	1.8	11	In the south, elevated and exposed. Water shortage is a known concern
Fond Assau Combined,	1	1	4	3	1	2	9	Within an agricultural zone and on the upper slopes of a narrow valley
Micoud Primary	3	1	4	2	1	2.2	7	In the southeast and elevated topography. Supply of water is known to be an issue
Patience Combined	3	1	4	3	1	2.4	6	In the southeast and elevated topography. Supply of water is known to be an issue
Saltibus Combined	5	1	4	4	1	3	2	At a high elevation, with the Saltibus River being a water source
Vieux-Fort Infant	1	1	4	1	1	2	9	In the south of the island which is extremely flat and known to have water problems
Vieux-Fort Primary	1	1	4	3	5	3.6	1	In the south of the Island which is extremely flat and known to have water supply problems

4.0 Conclusion and Summary Ranking

Consistent with the requirements of the TOR, the schools' climate vulnerability was evaluated against the five hazards; Landslides; Fluvial flooding; Coastal flooding and Sea Level Rise; Droughts; and Wind speed/Hurricanes. Despite the challenges of obtaining data to undertake the mapping of the hazards, a basis for ranking the twelve schools was developed. Although some qualitative evaluation was utilised, ECMC and its team of experts are confident that the ranking presented in Table 4.1 reflects a correct representation of the relative susceptibility of the schools to the five hazards which were assessed.

The results indicate that Vieux Fort Primary School is ranked number one as being most susceptible to climate change impacts, whereas both Desruisseaux Combined and Corinth Secondary Schools ranked 11th. As indicated in Table 4.1, Saltibus is ranked as the second most susceptible to climate change impacts followed by the Ave Maria Infant, Ave Maria Primary, and Balata Combined schools. Micoud Primary and Bexon Primary Schools had the same rank of seventh, while Fond Assau Combined and Vieux Fort Infant, both ranked ninth.

Table 4.1 - Ranking of Schools on the basis of Climate Change

Number	School	School Average Hazard Rank
1	Vieux-Fort Primary	1
2	Saltibus Combined	2
3	Ave Maria Infant	3
4	Ave Maria Primary	3
5	Balata Combined	3
6	Patience Combined	6
7	Micoud Primary	7
8	Bexon Primary	7
9	Fond Assau Combined	9
10	Vieux-Fort Infant	9
11	Corinth Secondary	11
12	Desruisseaux Combined	11