ECACC Technical Report:

Vulnerability and Capacity Assessment of the Climate Change and Sea-Level Rise Impacts on The Cayman Islands' Tourism Sector

A National Climate Change Committee Report

June 2011

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Preface

As part of the *Enhancing Capacity for Adaptation to Climate Change in the UK Caribbean Overseas Territories* Project in October 2008 the Cayman Islands National Climate Change Committee hosted a training workshop on how to conduct a Vulnerability and Capacity Assessment for climate change issues likely to affect these Islands. Given that the tourism sector formed a common economic pillar in all the Overseas Territories, it was agreed that all the Territories would carry out a climate change VCA on their national tourism sector.

Work on the Cayman Islands' assessment commenced in November 2008 with the first draft of the work plan for a full VCA crafted by the Department of Environment and based on the work plan developed by the British Virgin Islands. Throughout November and December 2008 the work plan was reviewed and revised by the National Climate Change Committee. In wake of hurricane Paloma in 2008 and its affect on Cayman Brac in particular, the Committee discussed revising the unit of analysis for the assessment to only Grand Cayman or even having a solely Seven Mile Beach focus. The Committee continued to grapple with the realities of conducted extensive field work in the Sister Islands and understand how to apply the methodology for a Rapid Assessment (RA) rather than a full VCA. By December 2009 the decision had been taken to attempt a RA on all three islands as sufficient recovery had been made post-Paloma to allow participation by tourism agents in Cayman Brac and Little Cayman. Furthermore, from a Geographical Information System perspective it was thought to be simplest.

Four sub-committees concentrated on carrying out the work of the main VCA components –Knowledge, Attitude & Perception (KAP) survey; National Climate Assessment; Tourism Assessment; and Static Risk Maps. The effort from each sub-committee forms the basis of this report on the *Climate Change Vulnerability and Capacity Assessment of the Cayman Islands' Tourism Sector.*

Members of the Committee engaged in discussion on earlier drafts of this report, with particular emphasis on preliminary results from the sea-level rise scenarios mapping exercise. This assessment is not meant to be exhaustive but serves as a starting point for further investigations on the expected impacts of climate change on the Cayman Islands and identification of additional measures to adapt to or avoid the most adverse effects.

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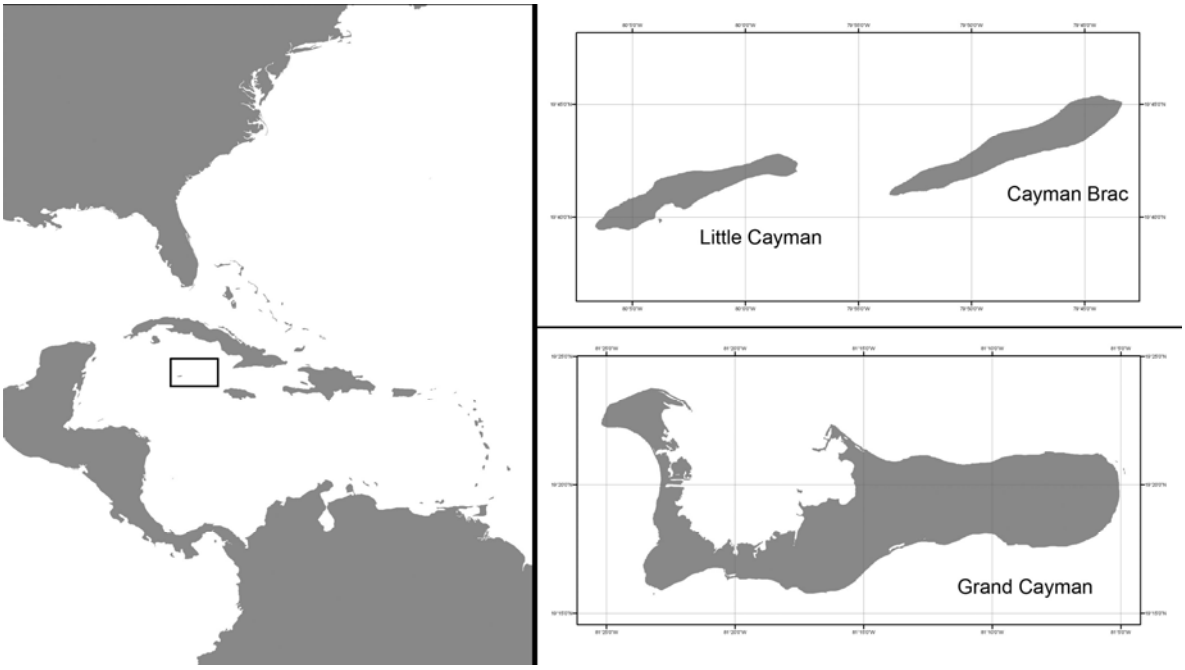
Overview of the Cayman Islands

Physical Characteristics

The Cayman Islands comprise three islands, Grand Cayman, Cayman Brac and Little Cayman, located in the western Caribbean Sea (19º N 81º W) 150 miles south of Cuba, 460 miles southwest of Miami, Florida and 167 miles northwest of Jamaica (Map 1). Totalling only 102 sq miles, these low-lying islands are peaks of the Cayman Ridge which extends from the Sierra Maestra mountain range of Cuba. All three islands are separated from Jamaica by the Cayman Trench, the deepest part of the Caribbean basin at more than 4.5 miles.

Map 1 Cayman Islands Location Map



Grand Cayman

Grand Cayman is the largest island covering 76 sq miles. It hosts the capital city of George Town and district of the same name which is home to 52% of the country's population (2008). The island has an average elevation of 6 ft and maximum height rising to 93 ft in the isolated central. Roughly 79% of Grand Cayman's shoreline is afforded considerable protection from damaging waves and storm surge by fringing reefs.

The North Sound is Grand Cayman's most interesting topographic feature and is an endearing natural characteristic to its 54,287 residents and 1.8 million annual visitors (2008)[1]. A large reef-enclosed lagoon at 35 sq miles, the North Sound was originally fringed with red and black mangrove species, but these areas have given way to canal developments on the western, southern and northeast shores and interiors beyond due to extensive dredging and wetland reclamation. By 1999 approximately 70% of the upland natural wetland and forested areas within the western shores of the North Sound had been lost through alteration and correspondingly 76% of the southern shores had been altered. Within the North Sound itself some 454 acres (22.5 %) of the shallow transitional marine habitat has been altered through dredging for upland wetland reclamation. A number of very small uninhabited cays exist around the island including Sand Cay, Booby Cay and Barkers Cay. Economically and recreationally important areas within the North Sound include the fringing reef, Barkers and Rum Point/Kaibo areas, Stingray City and Sandbar.

Seven Mile Beach along the western coast of Grand Cayman is a major tourism asset. A series of pocket beaches, it is the longest stretch of white sandy beach within the Cayman Islands, which in recent years has developed erosional hot spots as a result of current weather conditions exacerbated by development pressure on storm ridges or in the dynamic zone. Other tourism assets include the historical district of Bodden Town which is home to St. James Pedro Castle, the oldest remaining stone structure in the Cayman Islands. Like George Town, Bodden Town remains one of the fastest growing districts in terms of population and development. Situated in the West Bay region, the Cayman Turtle Farm is not only a major tourism attraction, but holds particular significance for its conservation of the green sea turtle population and the provision of local turtle meat for traditional consumption. While Grand Cayman has a number of large ponds and surrounding wetland systems, only Meagre Bay Pond and Colliers Pond are officially protected as Animal Sanctuaries. Grand Cayman is also home to the Queen Elizabeth II Botanic Park, which, though small in size, showcases a variety of native habitats and floral and faunal species.

Cayman Brac

Grand Cayman is separated from its sister islands of Cayman Brac and Little Cayman by 90 miles. Cayman Brac, 12 miles long and 2 miles at its widest point, covers 15 sq miles and is so named for its central Bluff or ridge of older Cayman Formation dolostone which rises directly from the sea to 150 ft at its highest point at the Island's eastern end. The remainder of Cayman Brac's shoreline is interspersed with ironshore, sandy and rock/rubble pocket beaches typical of storm ridges created along exposed coastlines. The majority of settlements and essential services are on the coast, 18% of which is protected by

[1] ESO 2009. Ch. 11. Population and Vital Statistics and Ch. 14. Tourism. In: *Statistical Compendium 2008*. Economics and Statistics Office, Cayman Islands Government, George Town, Grand Cayman.

reef structures. However relocation of key infrastructural assets (power plant, landfill, roads) and housing developments to the Bluff is starting to occur, displacing agricultural lands and impacting some sensitive habitats and species.

Environmentally important features include Saltwater Pond at Dennis Point, the only Animal Sanctuary on this island, the Brac Parrot Reserve under the ownership of the National Trust, bluff edge habitat on the eastern end of the Island important for nesting Brown Boobies and Tropicbirds, and a variety of other environmentally significant dry forest and wetland areas. Other culturally significant features include various caves which have served as hurricane shelters for many generations of Brackers, as well as home to local species of bats and are part of the island's tourism offering.

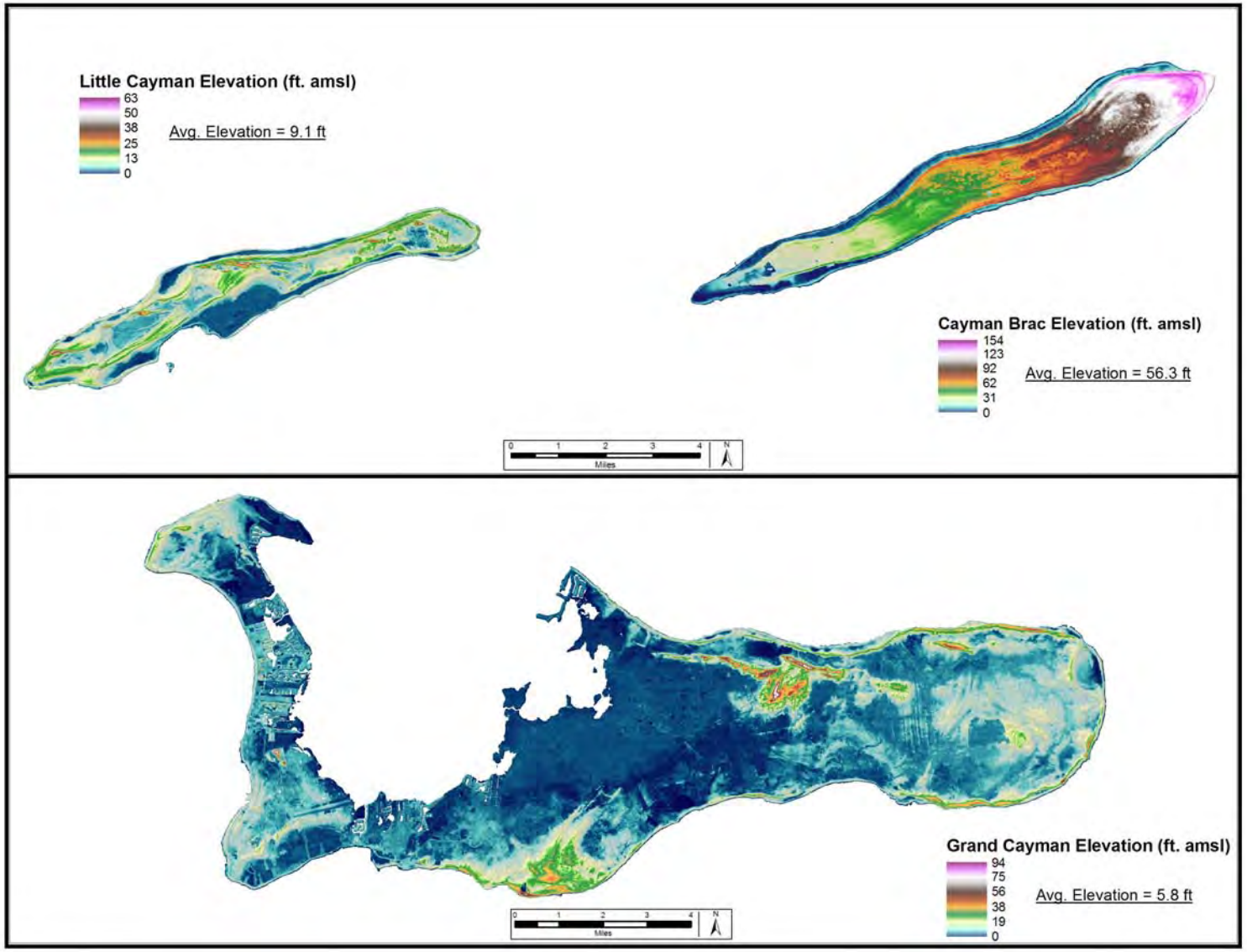
As with the other Islands, Cayman Brac has no river systems. Surface water is limited to brackish and freshwater ponds and associated wetlands. Natural freshwater resources are limited to a few isolated water lenses on all three islands. Rainwater collection for human consumption remains critical in Cayman Brac, unlike Grand Cayman where desalinisation through the reverse osmosis process provides the majority of potable water.

Little Cayman

Lying 5 miles west of Cayman Brac is Little Cayman, covering only 11 sq miles. Having geological and physical characteristics akin to Cayman Brac but with elevations in the eastern portion of the island reaching to just over 40 ft above sea level, this 10 mile long by 1 mile wide-island is the most vulnerable of all three islands with practically all settlement and services situated on the coast. Between 1989 and 1999 the population density (persons per square mile) increased more than three-fold. Blossom Village, with its charming historic church and quaintness, is the only commercial centre on the island. Approximately 76% of Little Cayman is reef-protected. Other natural buffers include beach ridges, coastal mangroves and seagrass beds that also serve to stabilize shorelines and dissipate wave energy.

Little Cayman has a series of tidally influenced coastal ponds and interconnected wetlands along the north and south coasts. The Island's largest pond, the Booby Pond, is protected as an Animal Sanctuary and is the only listed Ramsar site in the Cayman Islands. Owen Island in South Hole Sound and Point of Sand at the southeastern end of the island are two of the most unique and recreationally utilized areas of Little Cayman. Bloody Bay Marine Park near Jackson Point on the north coast is extremely popular with divers which make up the lifeline of tourism on this Island.

Map 2 Elevation of the Cayman Islands



Source: Lands & Survey Department data, Map produced by Department of Environment, 2010

Ecosystems and Natural Resources

Major Habitat Classification

Habitat classifications for all three islands were recently completed under a Darwin Initiative grant and form the basis of the *Cayman Islands National Biodiversity Action Plan 2009*[2]. The following table lists the major marine, coastal and terrestrial habitats of the Cayman Islands.

Table 1 Major Habitat Classifications for the Cayman Islands

MARINE HABITATS	COASTAL HABITATS	TERRESTRIAL HABITATS
Open sea	Maritime cliffs and ironshore	Salt-tolerant succulents
Coral reefs	Sandy beach and cobble	Pools, ponds and mangrove lagoons
Lagoons	Mangrove	Dry shrubland
Seagrass beds	Invasive coastal plants	Forest and woodland
Dredged seabed	Coastal shrubland	Caves
Artificial installations		Farm and grassland
		Urban and man-modified areas

Source: DaCosta-Cottam et al (2009)

Simplified habitat classifications are shown in maps 3, 4 and 5 along with marine and terrestrial protected areas.

Protected Areas

First established in 1986 throughout the Cayman Islands, a system of marine protected areas, known locally as Marine Parks, has afforded marine resource protection to approximately one-third of the islands' total coastal shelf area.
The Marine Parks system encompasses three major zones to accommodate different types and levels of use:

- **Environmental Zone** - The highest level of protection. Only one of these zones has been established on Grand Cayman, which constitutes 4,169 acres of mangrove and seagrass. Unique to only this zone is the extension of the protection inland by approximately 1000 feet to include tidally flooded coastal mangrove.

[2] DaCosta-Cottam, M., Olynik, J., Blumenthal, J., Godbeer, K.D., Gibb, J., Bothwell, J., Burton, F.J., Bradley, P.E., Band, A., Austin, T., Bush, P., Johnson, B.J., Hurlston, L., Bishop, L., McCoy, C., Parsons, G., Kirkconnell, J., Halford, S. and Ebanks-Petrie, G. (2009). Cayman Islands National Biodiversity Action Plan 2009. Cayman Islands Government. Department of Environment.

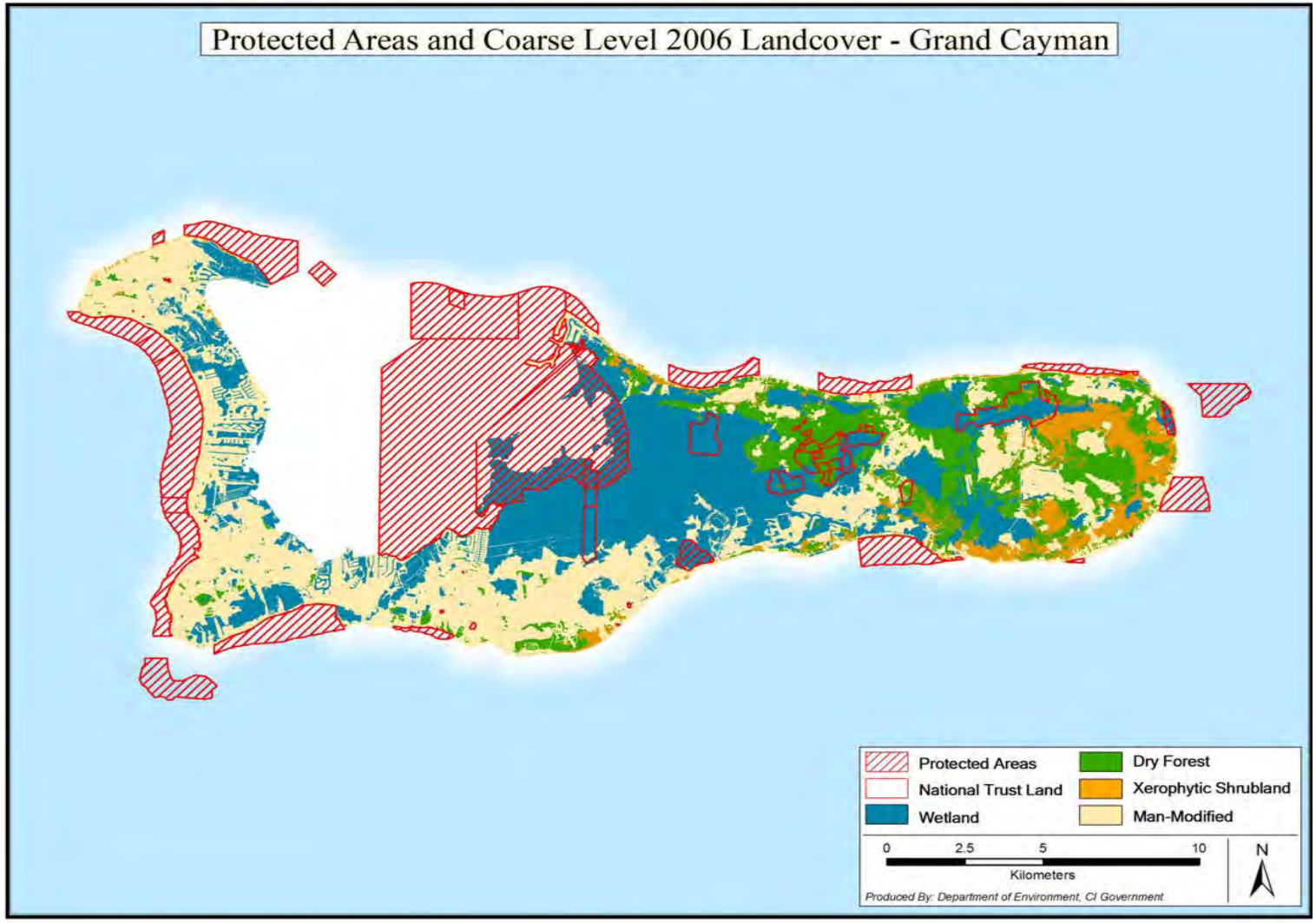
- **Marine Park Zones** - Represent the next level of protection. Watersports activities are permitted, but anchoring of vessels larger than 60 ft is not allowed. A total of 3,677 acres of Marine Parks are found on all three islands but this protection does not extend to any of the neighbouring coastal habitats.

- **Replenishment Zones** - Essentially fisheries management zones found on all three island, encompassing a total of 12,886 acres of lagoon and shallow reef habitat. These zones provide protection to culturally important conch (*Strombus gigas*) and lobster (*Panulirus argus*) populations.

Superimposed within the Marine Parks system, Wild Life Interaction Zones and No Diving Zones have recently been developed to address and manage user conflicts. In addition, important spawning aggregation sites (SPAGS) for the Nassau grouper (*Epinephelus striatus*) are also designated.

Comparatively, terrestrial protection is limited to four Crown-owned mangrove coastal ponds and their surrounding buffer habitat totalling 341 acres which have been declared Animal Sanctuaries. Additionally, approximately 3,109 acres of ecologically or culturally key terrestrial areas on all three islands has been purchased or secured by the National Trust for the Cayman Islands. This acreage is declared inalienable for the people of the Cayman Islands, indirectly affording it a measure of protection through private ownership and a commitment to manage these areas in their natural state.

Map 3 Habitat Classifications and Protected Areas for Grand Cayman

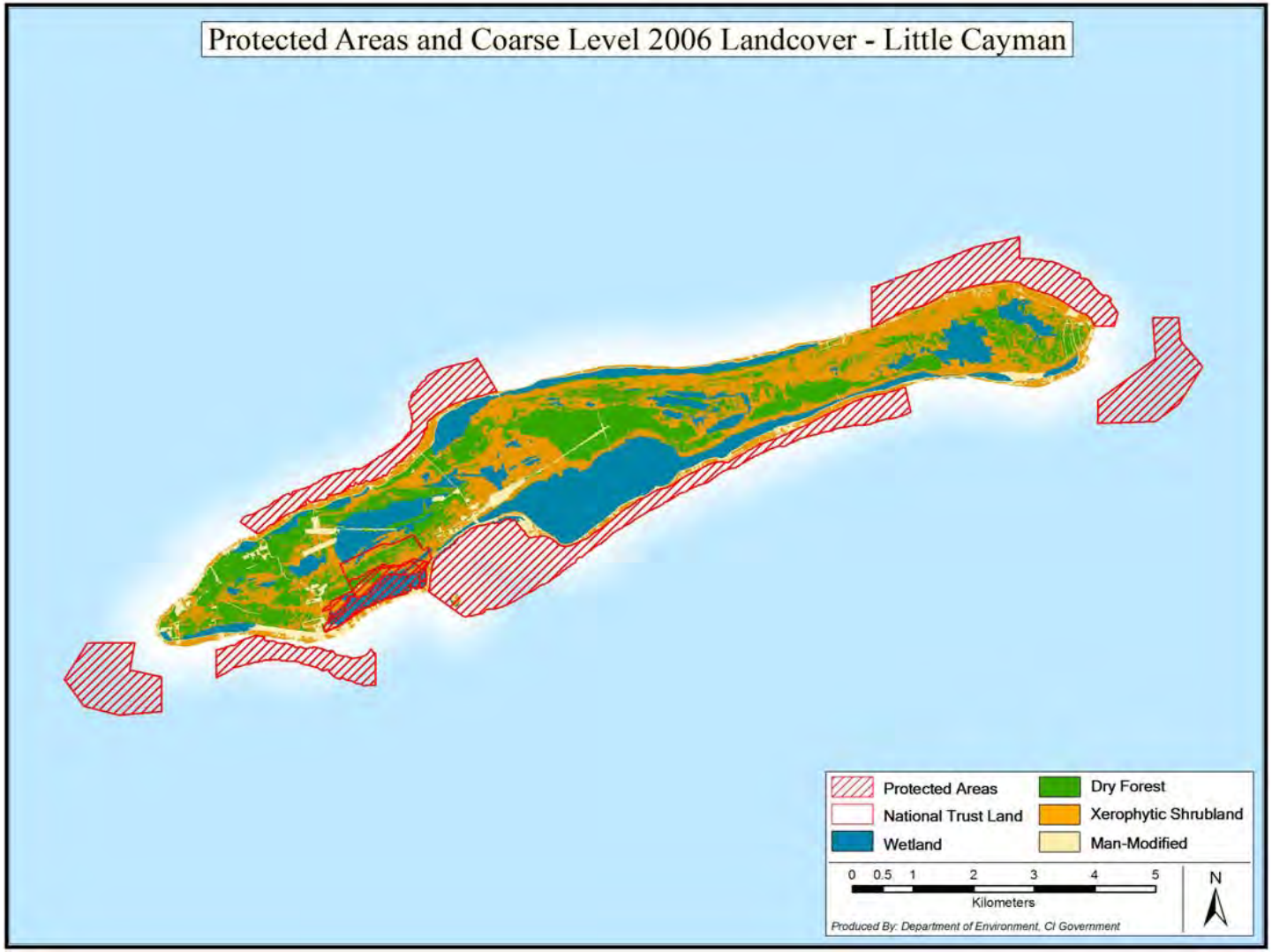


Source: Cayman Islands Department of Environment, 2010

Map 4 Habitat Classifications and Protected Areas for Cayman Brac

Source: Cayman Islands Department of Environment, 2010

Map 5 Habitat Classifications and Protected Areas for Little Cayman



Source: Cayman Islands Department of Environment, 2010

Economy

The Cayman Islands, a country of 52,830 people (2009), has enjoyed one of the highest standards of living in the Western Hemisphere with a gross domestic product (GDP) per capita of CI$44,197 in 2009. The Islands have witnessed tremendous economic growth from the development of financial services in the late 1960s and tourism in the early 1970s as the key foreign exchange earning sectors.

Economic success has been accompanied by rapid population growth - an annual rate of over 4% since the 1980s - due to an influx of non-Caymanians to service the finance and tourism sectors[3], which employed 10.1% and 11.4% of the total 2008 workforce, respectively[4].

Construction and real estate activities round out the main economic sectors in the Cayman Islands and are tied to both key sectors but also driven by demands from an ever growing population.

The narrow revenue base from these economic activities at the best of times must provide public services that citizens have come to expect as well as fund new capital projects made necessary by an expanding population. Like many small island developing states, recessionary periods prove extremely difficult for these Islands to withstand as they suffer diseconomies of scale and lack widespread economic diversification. The current global recession has significantly impacted all sectors of the Cayman Islands economy, with a further deepening perhaps yet to come. This will have serious implications for Government's prioritization of climate change issues amidst addressing immediate economic woes.

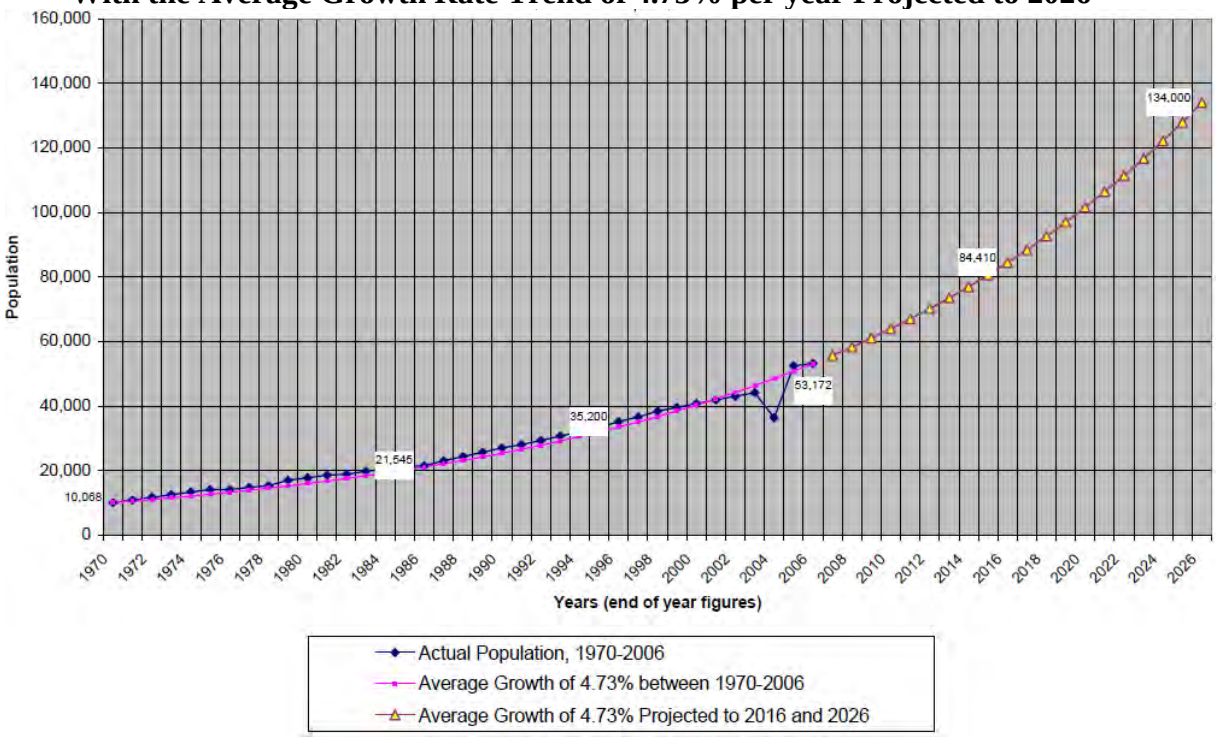
Population Centres & Critical Infrastructure

Population growth in the Cayman Islands since 1970 has been at an unprecedented rate not often seen in a single generation. The Islands experienced a 428% increase in population between 1970 and 2006, at an average rate of 4.73% per year. At this rate, with all other socio-economic trends being equal, the Islands could reach a population of 134,000 by 2026 (Figure 1)[5]. This could have widespread implications for many areas of government policy including climate change adaptation: from the siting of new public infrastructure

[3] ESO, 2009. Ch. 11. Population and Vital Statistics. In: *Statistical Compendium 2008*. Economics and Statistics Office, Cayman Islands Government, George Town, Grand Cayman.
[4] ESO, 2009. The Cayman Islands' Labour Force Survey Report Fall 2008. Economics and Statistics Office, Cayman Islands Government, George Town, Grand Cayman, April 2009.
[5] Pedley, P., 2007. Population Scenarios: Past Trends and Future Possibilities. Policy Brief 05/07. Prepared for the Chief Secretary and The Portfolio of Internal and External Affairs, December 2007.

and communities to the capacity of the healthcare system to respond to various climate and non-climate related cases.

Figure 1 Population of the Cayman Islands, 1970-2006
With the Average Growth Rate Trend of 4.73% per year Projected to 2026

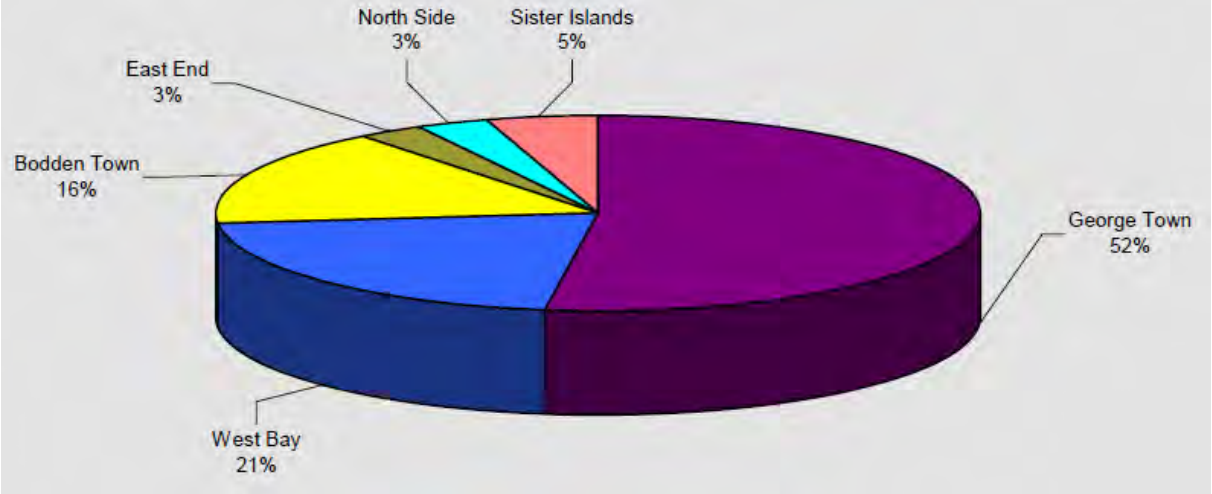


Source: Pedley (2007)[6]

The majority of the population is concentrated in the districts of George Town, West Bay and Bodden Town (Figure 2). While the Sister Islands' population and density per square mile has increased over the same period, its share of the overall Cayman Islands population continues to decrease, much like North Side and East End districts.

[6] Pedley, P., 2007. Population Scenarios: Past Trends and Future Possibilities. Policy Brief 05/07. Prepared for the Chief Secretary and The Portfolio of Internal and External Affairs, December 2007.

Figure 2 Population by District, 2008



Source: ESO (2009) Statistical Compendium 2008

The National Assessment of Living Conditions (NALC) assessed the welfare of the Cayman Islands' population in 2006/2007: 3.7% of the population (1955 individuals) or 3.1% of households (575 households) were found to be living below the vulnerability line[7]. The highest level of income vulnerability is in Cayman Brac.

As with most small islands, critical infrastructure (sea ports, airports, major arterials, fuel terminals, utilities, emergency response and key government facilities,) and economic activities that support the main population centres have developed linearly along or within close proximity to the coast, many in hazard-prone areas. The chapter on Country Vulnerability and Risk Profiles details the existing threat from present-day climate hazards such as flooding from hurricanes, storm surges and high winds and offers extensive spatial analyses of the impacts of projected sea-level rise on critical infrastructure and other physical assets within all three Cayman Islands.

[7] Kairi Consultants Ltd., 2008. *Cayman Islands National Assessment of Living Conditions 2006/2007: Volume I Main Report.* Caribbean Development Bank, April 2008.

Knowledge, Attitude and Perception (KAP) survey

Introduction

The Cayman Islands Climate Change survey for the Tourism Sector was designed to give the National Climate Change Committee (NCCC) an idea of how the tourism sector perceives climate change, the present and future vulnerability of this sector to climate change issues, and the present and future capability of the subsectors to deal with and adapt to natural disasters and weather related hazards brought about by climate change. The survey is broken down into 6 parts: demographic information, general climate change questions, media use, business profile, climate change impacts, and climate change adaptations. This chapter provides a summary of the results and brief analysis of the survey responses. A complete survey report can be found in Appendix 1.

Results

Out of 100 businesses expected to participate in the survey 45 filled out the questionnaire of which only 40 (88.9%) surveys where considered complete. This could allow the results to have unintentional bias and be skewed. Some questions were skipped either due to human error (unintentional missing of question) or due to the fact that the person answering did not have the knowledge or the authority to release the information.

Analysis

The survey was focused on the tourism sector so it was intended to cover all subsectors: accommodations, attractions, restaurants, retail/gift shop, transportation and water sport activities. However, only a select few responded to the survey. From the responses, it would appear that the most numerous tourism business in the Cayman Islands is the one related to accommodations at 36.5%, followed by water sports at 34.1%. Responses from restaurants accounted for 9.8%, while attractions and retail/gift shop represented 7.3% and 7.3%, respectively. At 4.9% of the responses, the transportation subsector does not represent a large percentage of the tourism sector in this survey. It should be borne in mind that the sample size was small (less than half the anticipated respondents), and the survey was not filled out in the same proportions for all the subsectors. Nevertheless, this result correlates with the opinions that the tourists come to the Cayman Islands for diving and other marine recreation, the climate and beach front hotels.

The majority of surveys were completed by the manager or owner of the establishment surveyed. In some cases the respondent was other staff. It is assumed that this influenced the answers or lack of response to certain kinds of information. For example, blank or no response was frequently given for the following questions: are climate change issues incorporated in your business plan?; what is the estimated recovery cost from previous impacts?; and what percentage of your annual operational budget is anticipated to protect your business from different threats? For these incomplete questions, it was assumed that the person who filled out the survey form was not the one that takes the decisions in the company.

The size of the workforce for the tourism businesses surveyed fluctuates from 2 to 800 employees. The mode workforce size, or the number which appears most often, is 25 employees. The median workforce size, or the middle number in a sorted list of numbers, is 14 employees. And the mean, or average on the workforce, is 52 employees. However the average workforce is skewed as some businesses are bigger than the others; there are businesses with only 2 employees in contrast with other that have 800. This bias also applies for all the subsectors. For example, the accommodation subsector surveyed has a total workforce of 1684 employees, compared with transportation that only has 21.

Generally, the participants believe that the Cayman Islands Government is the primary entity responsible for addressing climate change. This was reflected in the answers given by each subsector. For instance, 100% of the restaurant and transportation subsector respondents think the CI Government bears the responsibility compared to 70% in the watersports subsector, while 67% of the attractions subsector would agree with local Government. The other subsectors chose local Government 50% of the time. They also included, in small percentile, the UK Government and Business/industry. In terms of Other entities having responsibility for addressing climate change, ‘All of Us’ was amongst the responses suggested.

Most of the respondents (51.3%) considered their businesses to be ‘a great deal’ at risk or vulnerable to climate change, succeeded by ‘somewhat’ at risk with 38.5%. Only 10.3% considered their businesses’ level of risk to climate change to be ‘hardly at all.’ Despite the overwhelming concern for business vulnerability, 60.5% of respondents noted that climate change issues are not currently incorporated in their business plans. Slightly more than a fifth (21.1%) of the businesses surveyed has incorporated climate change considerations into their plans. Of the 18.4% that responded ‘do not know’ or are not sure, it is assumed that the respondents lacked the pertinent information to complete this question. Responses to this question were mostly provided by the accommodation subsector where 46.2% of those businesses claim they have planned for climate change.

The total estimated recovery cost of damages that the businesses have incurred from exposure to different kinds of impacts from weather-related events is CI$5,685,000. 'Damage to business property' and 'loss of income through temporary closure of the business' top the list in terms of expense with an average cost of CI$296,333 and CI$139,083, respectively. The next expensive recovery costs were found to be from 'no work for employees' at an average of CI$43,833 and 'loss of income through temporary closure of supporting businesses' (e.g. hotels, restaurants, tours) averaged CI$26,250. Roughly CI$16,667 was the average cost resulting from 'negative impact on image and reputation', while 'loss of income through degradation of natural resources & sites of operation' (e.g. health of coral reefs, fisheries, etc.) generated an average recovery cost of CI$10,000. Finally, the less expensive impacts, but not the least important, are 'employees left permanently' and 'loss of access to sites of operation' (e.g. attractions, dive sites etc.), both with CI$5,000 recovery cost each, and the 'business had to be relocated' costing CI$3,500.

It is important to clarify that only 14 out of 45 surveys had this question answered, and not all of the respondents gave full information about the recovery cost for all the impacts, even though they were affected by them. To emphasize, when this cost is analyzed by each subsector, the attractions subsector was the one that experienced the most expensive total recovery cost at CI$2,205,500, even though only 3 attraction businesses took the survey and only 2 of those answered this question. By comparison, the estimated cost of damages to the accommodation subsector was CI$2,040,000, with only 7 of 15 respondents for this subsector answered this question.

It is important to note that with 15.4% of the responses the percentage of respondents' annual operational budget over the next 3 to 5 years anticipated to protect their businesses from different threats is never more than 25%. The majority of businesses surveyed have less than 5% allocated for disaster preparedness or climate change adaptation, while 17.9% of businesses have up to 10% set aside in their operational budget for protective measures. The remaining participants either do not know (30.8%) or do not have (2.6%) a budget to protect their businesses from future threats. This was the case with the transportation subsector in particular.

Breakdown of the Individual Subsectors

Table 2 Responses to the KAP Survey by Individual Sub-sectors

	Accommodation	Watersports	Restaurant	Attraction	Retail / Gift shop	Transportation
Total Businesses	15	14	4	3	3	2
Respondent's role in the business (%)						
Owner	40	**53.8**	50		33.3	50
Manager	**53.3**	38.5	50	**100**	33.3	
Operator	60	7.7			33.3	
Other Staff						50
Workforce's size (# of employees)						
Total	1684	121	115	82	21	40
Average	120	9	29	27	7	20
Primary responsibility for addressing climate change (%)						
Cayman Islands Government	**50**	**70**	**100**	**66.7**	**50**	**100**
UK Government				33.3	25	
Business / Industry					25	
Community organizations		10				
Private Citizens	7.1					
All of us	42.9	20				
Business' risk or vulnerability to climate change (%)						
A great deal	**46.2**	33.3	**50**	**100**	**66.7**	**100**
Somewhat	**46.2**	**58.3**	25		33.3	
Hardly at all	7.7	8.3	25			
Never thought about it						
Are climate change issues incorporated in your business plan?						

Yes	**46.2**	8.3			33.3	
No	38.5	**75**	100	**66.7**	33.3	100
Do not know / not sure	15.4	16.7		33.1	33.3	
Answered questions	13	12	4	3	3	1
Estimated cost of the recovery time experienced from impacts Total ($)	2,040,000	1,440,000		2,205,000		
Answered questions	7	5		2		
Percentage of the annual operational budget over the next 3-5 years anticipate spending to protect businesses from threats						
None		7.7				
Under 5%	**53.8**	**30.8**	25	33.3		
Up to 10%	23.1	15.4		**66.7**		
Up to 25%	15.4	15.4	25		33.3	
Up to 50%						
Up to 75%						
Over 75%						
Do not know	7.7	**30.8**	**50**		**66.7**	**100**
Answered questions	13	13	4	3	3	1

Source: Department of Environment, 2010

National Climate Assessment

The following is a synopsis of changes in observed and forecast weather and climate variables for the Cayman Islands. The full report can be found in Appendix 2. The PRECIS regional climate model (RCM) was utilized to produce predictions for Temperature (maximum, average and minimum), Relative Humidity, Rainfall, Wind Speed and Sea-Level Rise for the Cayman Islands from 2011 to 2099.

In comparing the observed changes in temperature with the forecast change we find that the temperature forecast calls for a slower rate of temperature increase than what has been observed over the past 39 years. A similar conclusion applies to the forecast maximum temperature, minimum temperature and relative humidity. When comparisons are carried out on wind speeds it is noted that the observed wind speeds have increased slightly while the forecast is for a decrease in wind speed. Each change in variable and associated implications are further explored below.

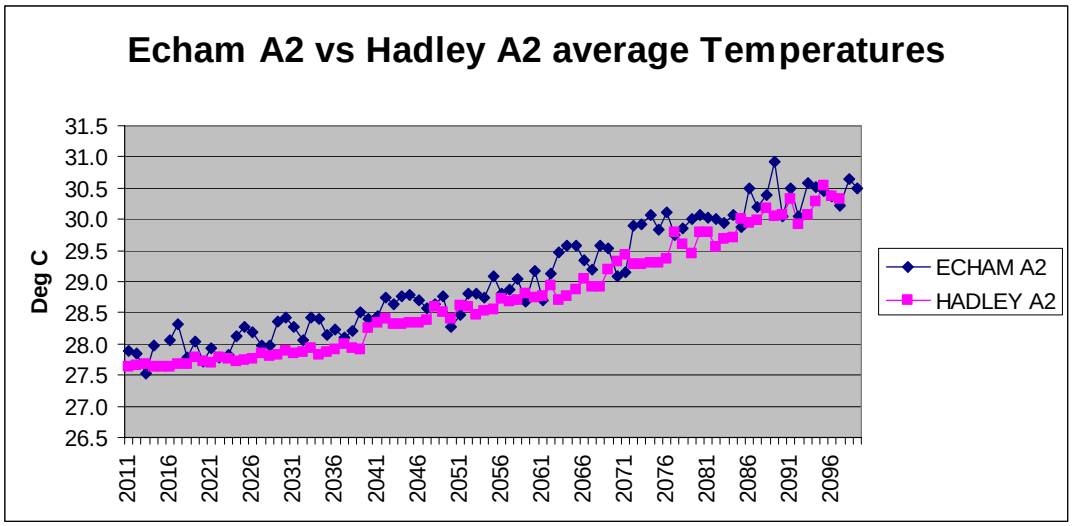
Additionally, a brief discussion on observed sea surface temperatures and water temperature at depth is provided.

Surface Temperature

The temperatures for the Cayman Islands were recorded by the National Weather Service at the Owen Roberts International Airport. The historic temperature record from 1971 to 2009 was compared to projected temperatures from 2011 to 2099.

In the 39 years between 1971 and 2009, the Cayman Islands have experienced an annual average temperature increase of 2.2°C or 0.06°C per year, with temperature ranging from approximately 26.3°C to 28.5°C for this period. Model results show that between 2011 and 2099 a further increase of 2.0°C to 2.7°C or 0.02°C to 0.03°C per year is expected, with temperature ranging from 27.8°C in 2011 to 30.5°C by 2099.

Figure 3 Average Annual Temperature, 2011-2099



Source: National Weather Service, 2010

The historical record shows the average maximum temperature increased 0.4°C from 30.1°C in 1971 to 30.5°C in 2009 or 0.01°C per year. By 2099 this increase could be as much as 2.8°C at a rate of 0.03°C per year, or a change from 28.2°C to 31°C.

As with other parts of the Caribbean, the average minimum temperature in the Cayman Islands has also increased in the last 39 years by 2.9°C, or a change from 22.3°C to 25.2°C. In 2011 the average minimum temperature is expected rise to 27.6°C and likely to be 30.2°C by 2099, representing a further increase of 1.7°C to 2.6°C.

Implications:

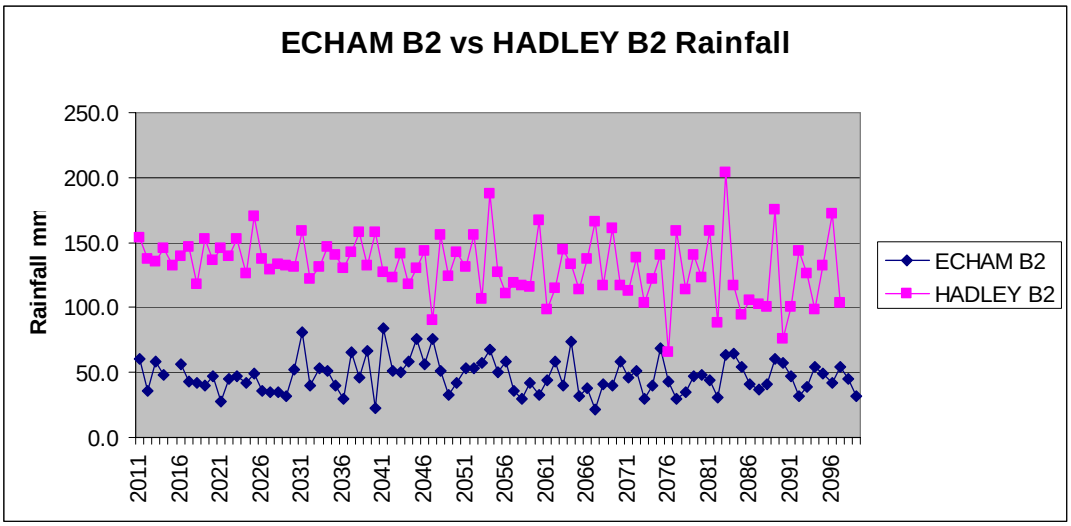
- **Increased evaporation rates affecting freshwater aquifer recharge. This in turn affects the availability of potable water abstracted from local aquifers for the majority of the tourism, commercial, industrial and residential areas.**
- **General discomfort from higher maximum temperatures and potential for increased incidents of heat stroke, especially amongst tourist and recently resident populations.**
- **With higher minimum temperatures, even outdoor night-time events could become uncomfortable and thus less frequently planned.**
- **Shortening the incubation period for the parasite that causes dengue fever and creates the potential for higher transmission rates. This may necessitate greater allocation of resources to control disease-carrying mosquitoes as well as general nuisance species.**

Rainfall

The rainfall for the Cayman Islands recorded by the National Weather Service at the Owen Roberts International Airport was from 1957 to 2008 and has been compared with projections for 2011 to 2009.

The historic trend for rainfall in the Cayman Islands mirrors that found in the region. Within the islands, annual rainfall totals decreased 32.8 mm (2 inches) in the 51 years between 1957 and 2008, at a rate of 0.66 mm (0.04 inches) per year. The predicted change from 2011 to 2099 is for a further decrease of between 10 and 50 mm in annual rainfall totals depending on the Global Climate Model used in the PRECIS model run.

Figure 4 Average Annual Rainfall, 2011-2099



Source: National Weather Service, 2010

Implications:

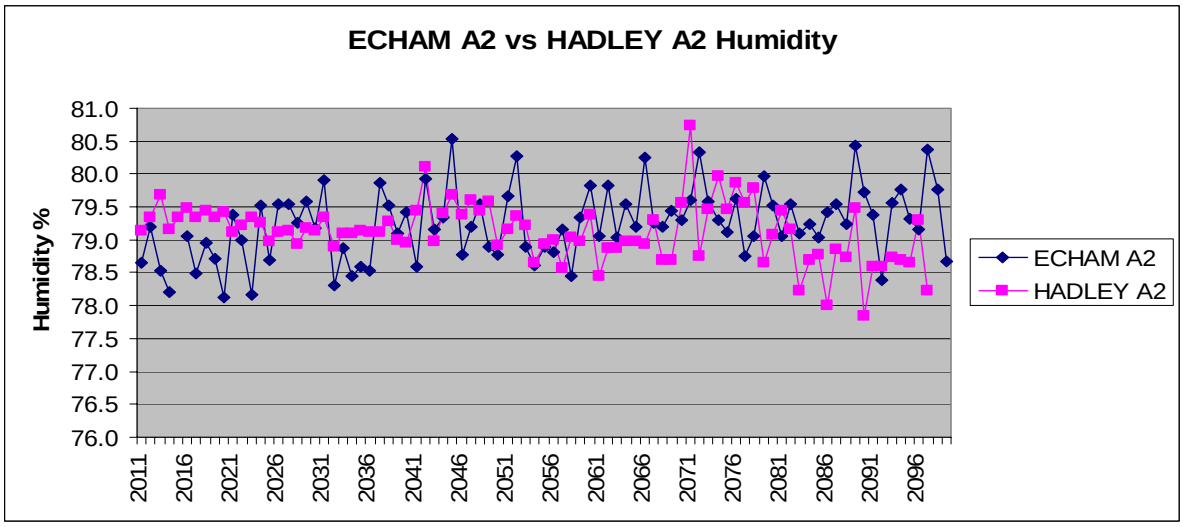
- **Potential for more frequent drought conditions which affect crops and livestock, especially in the eastern districts of all three islands. This could mean the need for increased well-pumping and storage capacity.**
- **Affect recharge rates of freshwater lens in all three islands and reduced amount of water collected in cisterns by approximately 7.2% of the total population[8]. To offset such losses, increased desalinated water production would be required to be current and future population levels and economic activity (e.g. tourism) with associated rise in energy (currently diesel fuel) requirements and costs, and ultimately greenhouse gas emissions related to this and other sectors.**

[8] Cayman Islands National Survey of Living Conditions, 2007

Humidity

The changes in the relative humidity recorded from 1978 to 2009 by the National Weather Service at the Owen Roberts International Airport reveals an increase in relative humidity of 1% in 31 years from approximately 76% to 77 %. Little to no change is expected in relative humidity between 2011 and 2079, remaining fairly constant around 79%.

Figure 5 Average Annual Humidity, 2011-2099



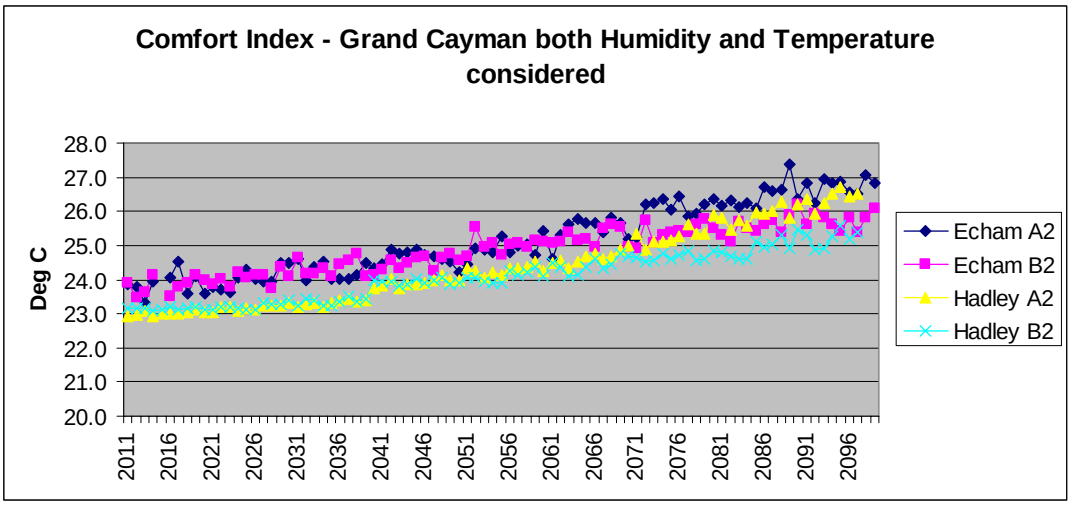
Source: National Weather Service, 2010

Comfort Index

Outputs of temperature and humidity were combined to produce a comfort index, which gives a rough idea of how "comfortable" one feels due to excess temperature and humidity (25°C is the threshold at which it is considered comfortable or ideal to live).

The estimated variation in the comfort index between 2011 and 2096, taking only humidity, shows an increase from approximately 26.3°C to 28.5°C. Taking into consideration both relative humidity and temperature reveals an increase from approximately 23.5°C to 26.3°C. As a result, the total increase ranges from 2.2°C to 2.8°C.

Figure 6 Average Annual Comfort Index, 2011-2099



Source: National Weather Service, 2010

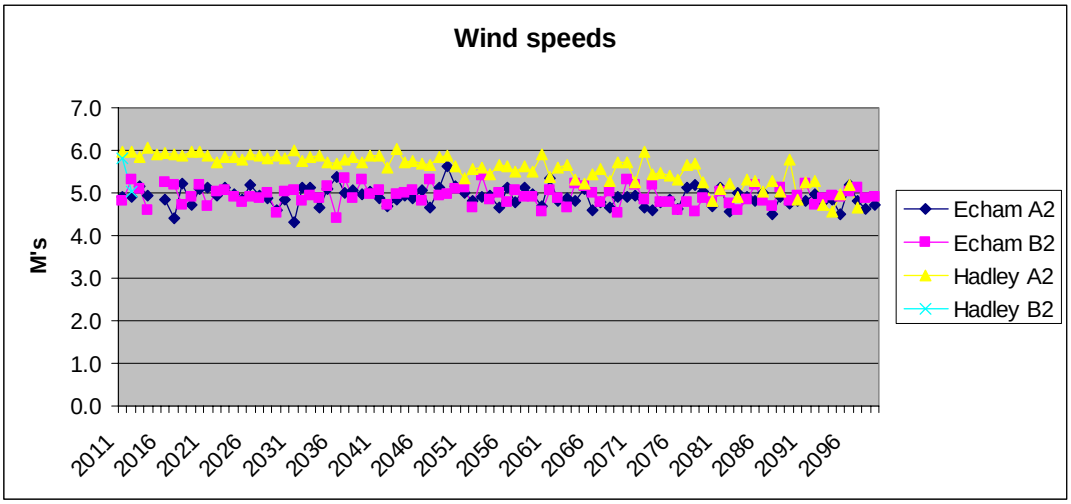
Implications:

- **Increased discomfort for tourists, especially during hot and humid summer months which is typically the slow season resulting in more resource allocation to increasing air conditioning capacity at hotels, guest houses, condos, restaurants, conference centres and public facilities.**
- **Restaurants reliant on large outdoor seating areas may suffer reduced patronage.**
- **Over time, tourists may opt to vacation elsewhere in the region (e.g. mountainous islands with constant cool breezes) or outside of the Caribbean region entirely.**
- **Further development of sports tourism potentially affected by rising comfort index and the unpredictability of unsettled weather. Use index to plan sporting events for certain times of the year.**

Wind Speed

Average wind speed between 1988 and 2009 increased from approximately 3.8 meters per sec to 5.1 meters per sec. This is an increase of 1.3 meters per sec in 22 years. In contrast, forecast models of average wind speed reveal a decrease from approximately 5.5 meters per sec in 2011 to 5.0 meters per sec in 2099, which is a decrease of 0.5 meters per sec.

Figure 7 Average Annual Wind Speed, 2011-2099



Source: National Weather Service, 2010

Implications:

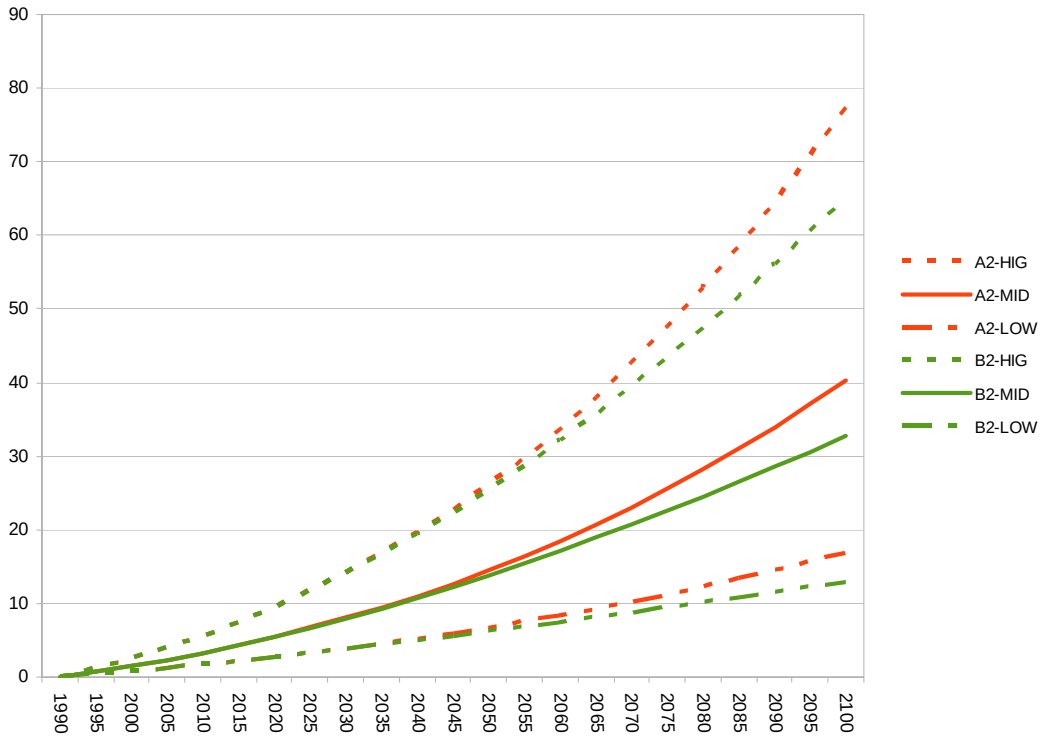
- **Could affect potential development or expansion of harnessing wind energy for power generation causing possible reduction in efficiencies at installed systems or loss of consumer and/or investor confidence in this technology. This could potentially stifle planned or contracted wind-generated electricity schemes and impact future economic development reliant on such generation.**

Sea-Level Rise

Cayman Islands annual tide data from 1976 to 1988 showed a correlation with regional trends indicating that the islands are geologically stable and any relative changes in sea levels are actually sea-level rise rather than land subsidence[9]. Estimates of future sea-level rise utilizing the Model for the Assessment of Greenhouse-gas Induced Climate Change (MAGICC) revealed an increase of 12 cm (0.4 ft) to 80 cm (2.6 ft) in sea levels by 2100 from a 1990 baseline. This is a rise of approximately 0.14 cm to 0.91 cm per year.

[9] Burton, F.J. 2009. Personal communication, 26 Sept 2009.

Figure 8 Sea-Level Rise Estimates Relative to 1990



Source: National Weather Service, 2010

Implications:

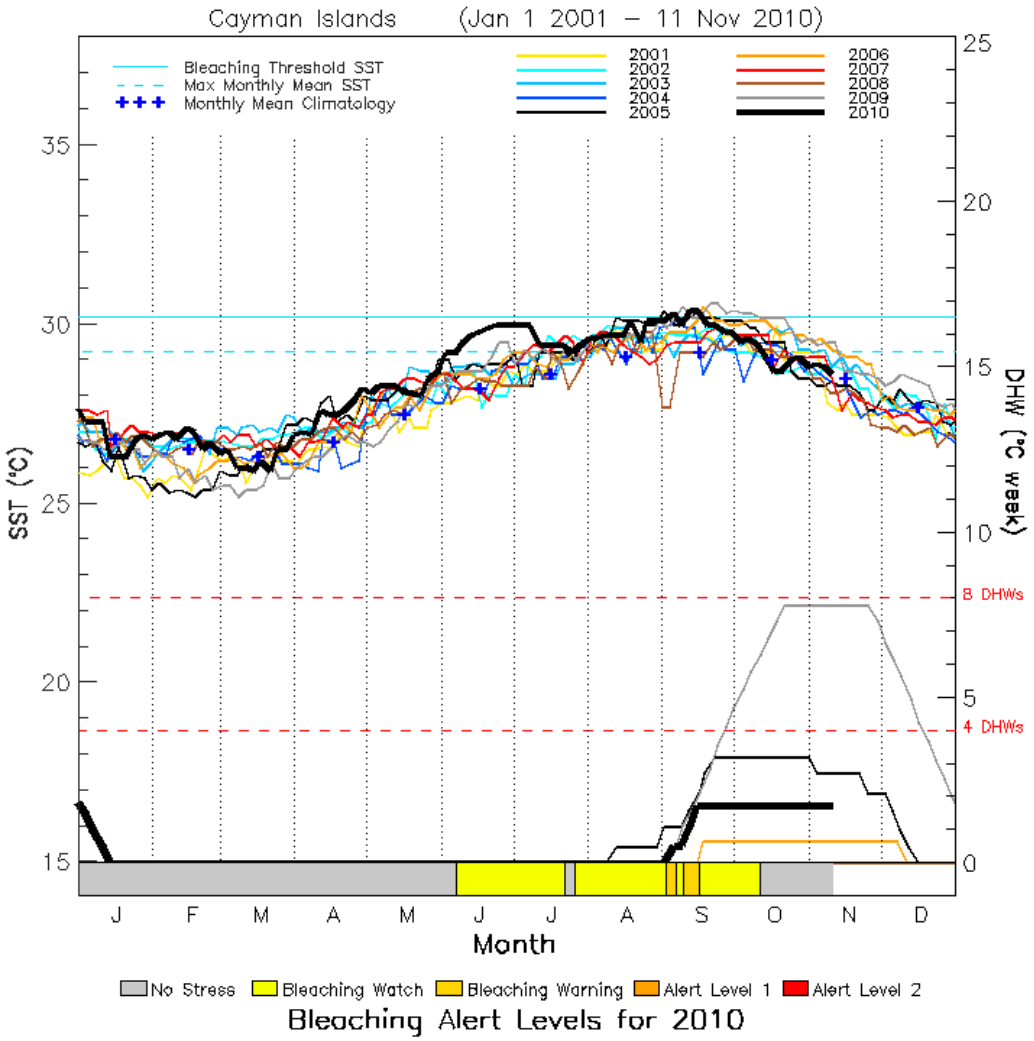
- **Salt water intrusion of wells, some of which are still relied upon for potable and non-potable water use by 7.6% of the total population[10] as well as the agricultural sector. Salinization could potentially affect human health, livestock and some crops.**
- **Increased effect of storm surge atop increased sea level will lead to greater coastal flooding and in turn loss of coastal roads, buildings and critical infrastructure for tourism, the economic cost of which is estimated in Risk Profile building values map and analysis.**
- **Loss of recreational areas and coastal real estate such as beaches which also serve as coastal defences.**

Sea Surface Temperatures

The graph below shows the maximum daily sea surface temperatures (SST) from January 2001 to November 2010. While it does not show any significant upward trend in the raw data although that is apparently what is happening. It does however show how consistently close to the temperature threshold of regional corals the seas around the Cayman Islands have been in this 9 year period.

[10] Cayman Islands National Survey of Living Conditions, 2007

Figure 9 Maximum Daily Sea Surface Temperatures, 2001-2010



Source: NOAA

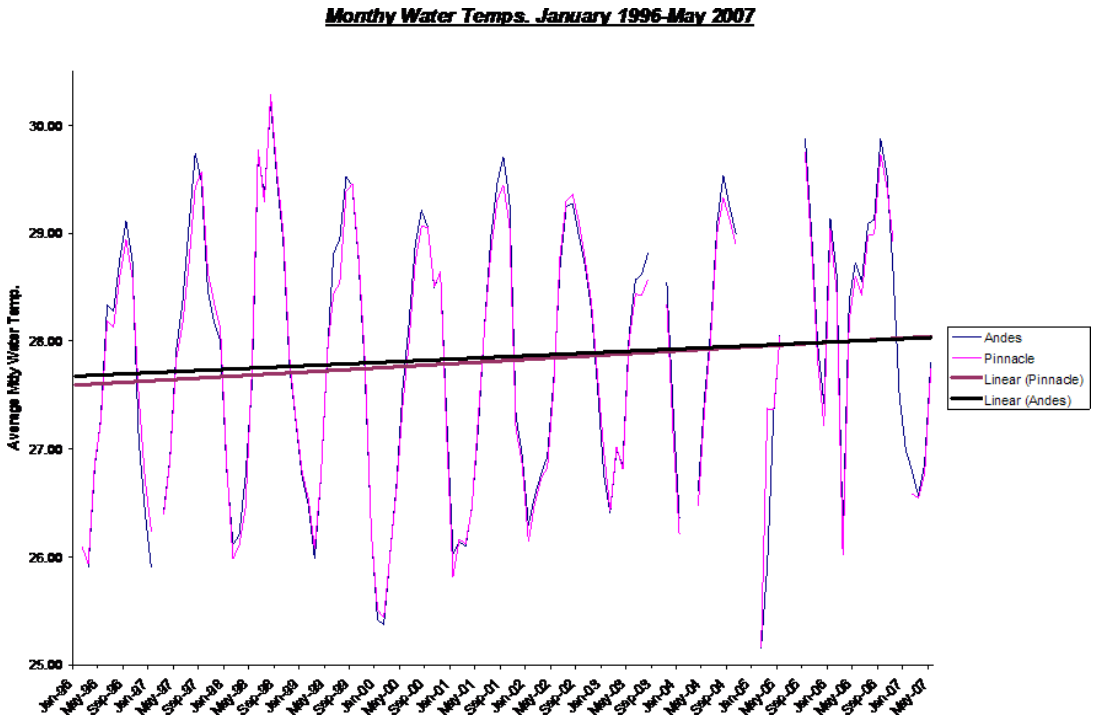
Implications:

- **Potential for stronger hurricanes and coral bleaching of shallow water species, both of which directly and indirectly affect reef resiliency and overall reef health which in turn could permanently or temporarily disrupt the local dive and watersports sectors.**

Water Temperature at Depth

The following graph shows the monthly water temperatures recorded at 10m depth at two dive sites along Grand Cayman's northern coast from January 1996 to May 2007.

Figure 10 Monthly Water Temperature at 10m depth, 1996-2007



Source: Department of Environment

Implications:

- **Degradation of reef health and by association fish abundance and/or diversity could have implications for revenues from dive and watersports tourism as well as impact livelihoods from subsistence fishing. (The latter activity is small but growing as the portion of the population reliant upon this anecdotally has increased, especially given the effects of this long global recession, i.e. loss of jobs and the corresponding purchasing power for food.)**

Hurricanes

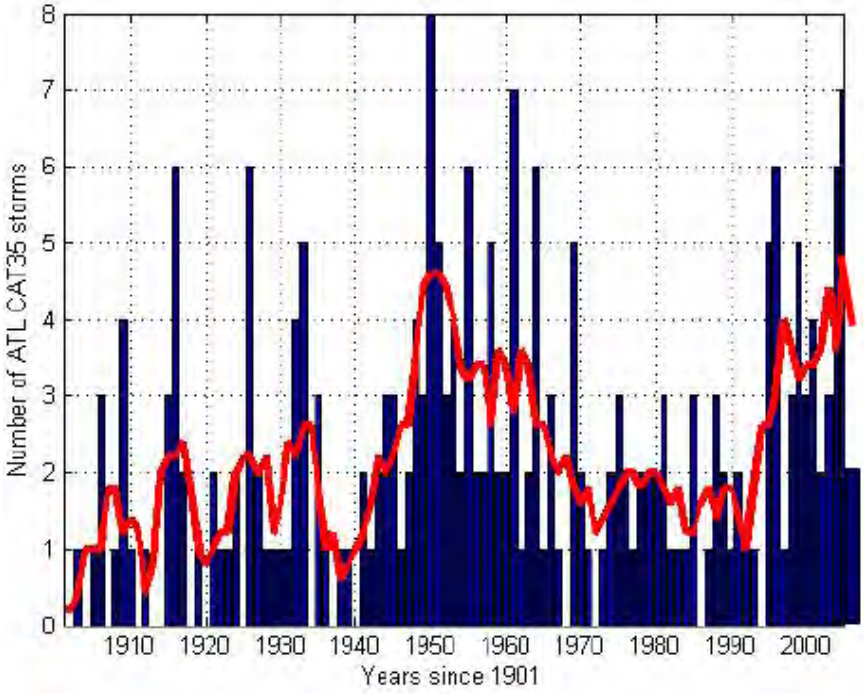
The Cayman Islands experienced 74 total storms between 1852 and 2008 with nine major storms (category 3 or higher) directly impacting the Islands (Appendix 3). This gives a return period of 17 years for major hurricanes. Records indicate that no category 5 hurricane has directly hit the Cayman Islands but the last four major storms have all been of category 4 strength with Hurricane Ivan's gusting wind speed of 165 mph being the strongest direct hit.

Since 1995 the number of category 3 to 5 hurricanes in the Atlantic Basin is twice the 1970-1995 average due to steady rise in equatorial sea surface temperatures (SSTs) (Figure 11)[11]. Between 2000 and 2009 there have been eight hurricanes reaching category 5 intensity; a number never before observed in a 10-year period[12]. A record shattering 2005 Atlantic hurricane season saw the most named storms (28 in all), most hurricanes (13), and most category 5 storms. No consensus among the scientific community has been reached on whether the frequency of hurricanes will increase in future, however there is general agreement that more category 4 and 5 storms is likely to occur. These systems will bring heavier rainfall and greater peak wind intensities than presently experienced.

Observational data show a change in the tracking of hurricanes, such as the increase in late season systems that develop in the western Caribbean and move eastward. Many hurricanes including those reaching category 5 intensity have formed south and west of Grand Cayman and tracked north and northeastward to threaten the Cayman Islands[13]. West to east tracking storms tend to move faster, testing regional early warning systems and preparedness and response plans. Hurricanes such as Wilma which intensified from a tropical storm to a category 5 hurricane in 24 hours are expected to become more common[14].

[11] Muir-Wood, R., 2008. "Climate Change & the Cayman Islands – Building Resilience." Presentation to Cayman Business Outlook, January 17th 2008.
[12] Nurse, L. Senior Lecturer, Centre for Resource Management and Environmental Studies, UWI, Barbados. Personal communication, 23 February 2010.
[13] Trotz, N., 2008. Vulnerability and Capacity Assessment Workshop, Grand Cayman, Cayman Islands, 21-22 October 2008.
[14] Trotz, N., 2008. ProVention/ IFRC Caribbean Workshop on" Climate Change Community Resiliency in the Caribbean." Port of Spain, Trinidad, February 8 2008.

Figure 11 Category 3 to 5 Atlantic Basin Hurricanes, 1901-2005 and 5-Year Running Average



Source: Risk Management Solutions (2007) in Muir-Wood (2008)[15]

[15] Muir-Wood, R., 2008. "Climate Change & the Cayman Islands – Building Resilience." Presentation to Cayman Business Outlook 2008, January 17th 2008.

Tourism Assessment

Macroeconomic variables

Tourism and financial services underpin the Cayman Islands' economy. Over the last seven years, tourists have spent on average US$524 million (stay-over and cruise) in the Cayman Islands, equivalent to nearly US$17,000 for every resident. This is a major contribution to the local economy, supporting a wide range of businesses and generating employment opportunities for Caymanians and expatriates. In 2007 those directly and indirectly employed in travel and tourism activities were 8,600 persons, representing nearly 28% of total employment.

According to the World Travel and Tourism Council (WTTC), in 2010 the Cayman Islands is expected to generate CI$515 million (US$618 million) towards the Gross Domestic Product (GDP) from travel and tourism activities alone. From this estimation the WTTC has predicted that of the CI$515 million, direct industry contribution will be CI$123 million (US$147 million) which is equivalent to 5.5 % of the total GDP. The direct industry employment is estimated to be 2,400 jobs, representing 7.8% of all jobs (8,200) from this sector which accounts for 26.3% of total jobs available within the economy. Both directly and indirectly the tourism sector is expected to generate 22.3% or CI$274 million (US$329 million) of total exports through earnings from international visitors. Capital investment in travel and tourism is estimated at CI$238 million (US$286 million) or 47.4% of total investment in 2010[16].

The economy is forecast to achieve annualized real growth by 2020 of 3.1% to CI$909 million with roughly the same percentage of employment contribution as in 2007, equivalent to 9,500 jobs. Given the large expatriate workforce in this and other sectors, the Islands have now become and are expected to remain a source for remittances to populations in countries around the world.

Trends in the national Tourism sector

A review of the trends in the national tourism and travel sector perhaps reflect regional declines in tourism activity as a result of the deep global economic recession. Furthermore, catastrophic hurricanes have been shown to place these island economies at risk of reduced earnings in the short to medium term.

The following table shows total visitor arrivals to the Cayman Islands between 1996 and 2008.

[16] World Travel and Tourism Council, 2010. Travel and Tourism Economic Impact 2010: Cayman Islands.

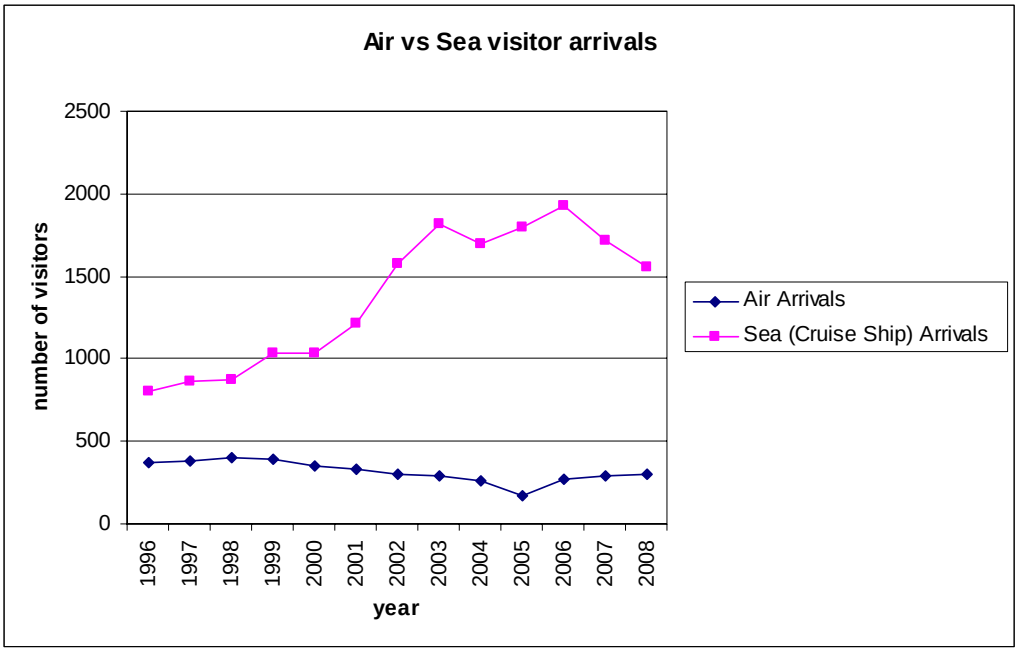
Table 3 Visitor arrivals in the Cayman Islands, 1996-2008

Year	Air Arrivals		Sea (Cruise Ship) Arrivals		
	Vistiors ('000)	Percent Change	Ship Calls	Visitors ('000)	Percent change
1996	373.2	3.1	525	800.3	17.2
1997	381.2	2.1	572	866.6	8.3
1998	404.2	6.0	518	871.4	0.6
1999	394.7	(2.4)	623	1,035.5	18.8
2000	354.1	(10.3)	612	1,030.9	(0.4)
2001	334.1	(5.7)	711	1,214.8	17.8
2002	302.8	(9.4)	732	1,574.8	29.6
2003	293.5	(3.1)	825	1,819.0	15.5
2004	259.9	(11.4)	732	1,693.3	(6.9)
2005	167.8	(35.4)	734	1,799.0	6.2
2006	267.3	59.3	802	1,930.1	7.3
2007	291.5	9.1	657	1,715.7	(11.1)
2008	302.9	3.9	570	1,553.1	(19.5)

Source: ESO (2009) Statistical Compendium 2008

During the period from 1999 to 2005 the number of visitors arriving by air decreased year upon year. The opposite is true for cruise ship arrivals except in 2004 which can be attributed to Hurricane Ivan (Figure 12). Between 2005 and 2008 the number of air arrival passengers started to increase while cruise ship arrivals peaked in 2006 after which a noticeable decline continued throughout 2008.

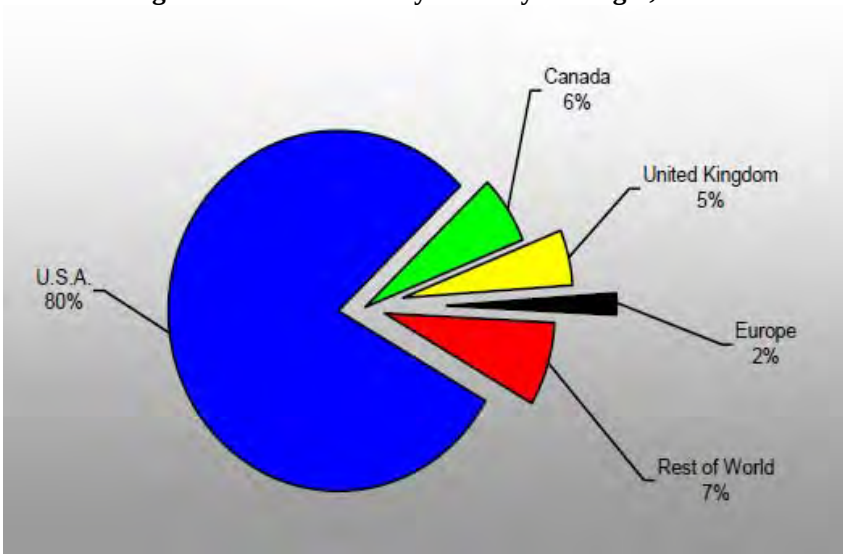
Figure 12 Air & Sea Visitor Arrivals, 1996-2008



Source: ESO (2009) Statistical Compendium 2008

In 2008, 6% of air arrival visitors were from Canada, 5% from the United Kingdom & Ireland, 2% from Continental Europe, approximately 79.5% from the United States of America, and the remaining 7.5% from the rest of the world (Figure 13).

Figure 13 Air Arrivals by Country of Origin, 2008



Source: ESO (2009) Statistical Compendium 2008

Average expenditure per stay-over visitor per night in 2008 was CI$162.44 while total spending for cruise ship passengers was estimated at CI$101.13.

Accommodation in the Cayman Islands ranges from budget self-catering apartments to luxury five-star resorts. A total of 4,484 bedrooms remained in operation as at year-end in 2008 which surpassed the previous figure of 3,907. Similarly, the total number of licensed tourism accommodation properties increased from 178 to 236 in 2007. At the start of the winter tourist season (December) 2009, there were a total of 4,563 rooms available for rent by visitors. These rooms were broken down into the following: 438 within the category of villas and guesthouses; 2,094 within the category of apartments and condos category; and 2,031 rooms within the hotel sector (Appendix 4).

The occupancy rate in 2008 was 62.2% for hotels and 44.0% apartments, and the average length of stay was 4.5 days for a hotel and 6.4 days for an apartment. The occupancy rate slightly increased compared to that of 2007 but the average length of stay has decreased (See Table 4). Actual use of accommodation improved as the average hotel occupancy rate rose slightly from 61.7% in 2007 to 62.2% in 2008. Apartments/condominiums occupancy rates also increased from 41.5% to 44.0%. Therefore with respect to the average length of stay at local establishments, this contracted for both hotels and apartments/condos from 4.7 days in 2007 to 4.5 days from 6.7 in 2007 to 6.4 days, respectively.

Table 4 Occupancy Rates and Length of Stay, 1990-2008

Year	Occupancy Rates (%)[1]		Average Length of Stay (days)[2]	
	Hotels	Apartments	Hotels	Apartments
1990	69.2	58.2	5.0	6.4
1991	61.2	53.6	4.9	6.5
1992	61.3	48.5	4.8	6.4
1993	71.3	52.7	5.0	6.9
1994	76.9	55.4	4.9	6.9
1995	75.3	53.9	4.7	6.8
1996	66.1	51.0	4.6	7.3
1997	66.9	48.2	4.8	7.0
1998	73.1	52.3	5.0	7.0
1999	71.8	46.9	4.7	5.8
2000	62.4	46.8	4.6	7.0
2001	55.3	43.1	4.5	7.3
2002	50.6	40.2	4.8	7.3
2003	51.2	37.7	4.7	7.4
2004	61.7	43.1	4.9	6.8
2005	55.8	46.0	4.9	6.7
2006	59.4	40.7	4.5	6.6
2007	61.7	42.5	4.7	6.7
2008	62.2	44.0	4.5	6.4
2008				
January	70.0	52.5	4.8	7.0
February	72.6	61.0	4.5	7.5
March	79.4	62.5	4.3	6.6
April	78.2	50.2	4.4	4.0
May	65.3	43.5	4.4	5.8
June	63.3	48.5	4.2	6.3
July	66.1	45.4	4.6	7.0
August	55.1	33.5	4.8	6.3
September	34.0	19.4	4.1	5.2
October	40.9	26.7	4.5	7.0
November	55.9	38.7	4.2	7.4
December	66.1	45.7	4.7	7.0

Notes:

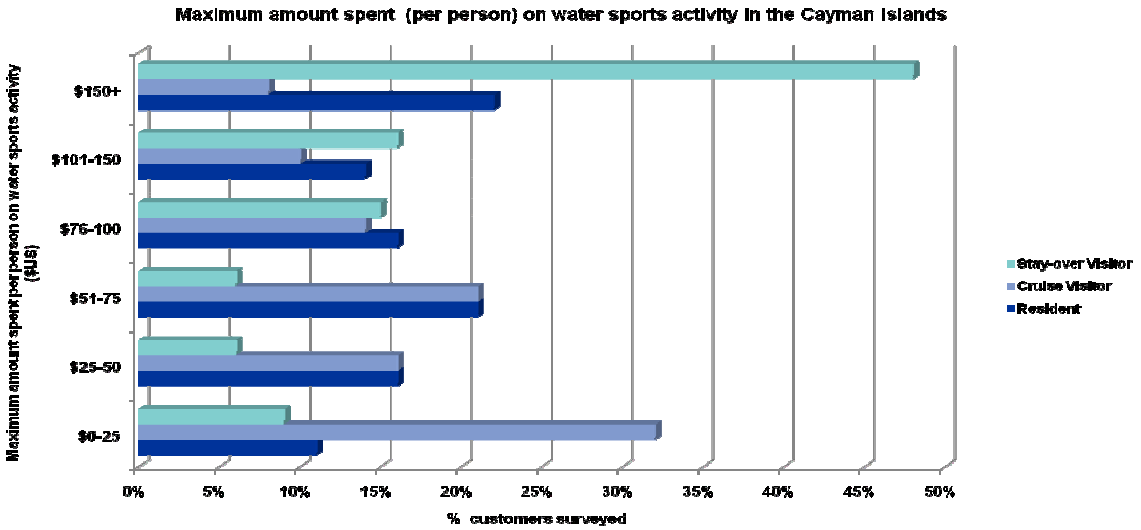
[1] Occupancy rates are based on "number of rooms nights sold" divided by "number of room nights available". Apartment figures are based on unit occupancy.

[2] Length of stay is based on "number of room nights sold" divided by "number of check-in".

Source: ESO (2009) Statistical Compendium 2008

Of those surveyed in 2008, 48% of stay-over visitors, 22% of residents and 8% cruise visitors spent US$150 or more per person on water sports activity (Figure 14).

Figure 14 Customer Willingness to Spend on Water Sports Activity, 2008



Source: Department of Tourism Water Sports Market Demand Survey, 2008

Grand Cayman offers full service water sports activities with 95% of business being stay-over visitors. Cayman Brac receives 75% repeat customers who come primarily for in diving and snorkeling while diving and fishing activities are mostly taken up by visitors to Little Cayman[17]. Dive pressure on popular sites has been raised as a risk to the sustainability of the current industry in the absence of proper management and regulations in terms of carrying capacity per dive site.

A heavy reliance on the US customer based makes the Cayman Islands particularly susceptible to influences affecting that market. For example, higher fuel prices will inevitably be reflected in the cost of travel to these Islands. While it is left to be seen, some in the region fear summer destinations in the US will become more attractive and reduce the volume of travel to the Caribbean during the critical low season when temperatures may be unbearable for North American visitors.

Expectations regarding the future development of the Tourism sector

For many years plans have been underway to construct a cruise ship berthing facility in George Town to revive the flailing industry locally. International airports on both Grand Cayman and Cayman Brac are in need of upgrading to accommodate Government and industry desires to increase the destination's market share of European visitors and flights from other long haul ports. This would also necessitate expansion of the runway at Owen Roberts airport on Grand Cayman. Government is exploring public-private ventures to get these very large capital projects underway. In

[17] Deloitte, 2008. *Cayman Islands Department of Tourism Water Sports Market Assessment*, Department of Tourism, November 26th 2008.

addition, a privately financed bulk cargo and storage development with cruise berthing facilities is proposed in East End on Grand Cayman which would see operations turned over to Government statutory entities in the future. Opposition to the latter project in particular include concerns over bringing the sea further inland and the potential for increased wave action. Climate change risk should be integrated in environmental impact statements for all of these large-scale projects to ensure that any negative effects associated with climate change and sea-level rise are avoided or reasonably mitigated, i.e. 'climate-proof' these facilities. This in turn will protect the massive investments in these projects and enhance the climate resiliency of critical infrastructure upon which the tourism sector is highly dependent.

For years the Cayman Islands has won international accolades and awards for having the best beaches and rated highest in customer satisfaction for diving and snorkeling. Tourism authorities are eager to diversify the traditional 'sun, sand and sea' products by developing niche markets such as wreck diving. The recent sinking of the USS Kittiwake is Grand Cayman's newest wreck attraction which some believe will relieve dive pressure on the natural coral reefs that are threatened by increasing sea temperatures and ocean acidification. There has also been a noted upturn in underwater photography and technical diving activities that could be further developed as niche markets.

Hosting destination weddings has become a key niche market for the Cayman Islands with success thus featured in international television and print media. Local professionals and businesses are gearing up to make these Islands the best in the Caribbean for custom, luxury weddings. Not surprisingly, a wedding destination is very reliant on its natural beauty and aesthetics of its built environment, both of which can be severely impacted by catastrophic storm events such as that witnessed for years after the passage of hurricanes Ivan and Paloma. Therefore, understanding the natural threats to this burgeoning market in the face of changing climatic conditions and managing the risks is incredibly important to the further development of this market.

In line with recommendations from the National Tourism Management Plan 2009-2013 and National Strategic Plan 1999-2008 ('Vision 2008'), adventure tourism and nature tourism are being promoted in Cayman Brac and Little Cayman, respectively. As with destination weddings, these niche markets rely heavily on pristine, well-managed environmental and natural resources which can be affected by a variety of changes in climatic conditions. There is perhaps less in the way of 'climate-proofing' this sub-sector.

Financial, human & institutional capacity to deal with/adapt to disasters and other climate change impacts

The Cayman Islands has a Strategic Framework for Disaster Risk Management administered by the Hazard Management Cayman Islands agency. This framework is intended to be the primary strategic tool for management of hazards that threaten the Cayman Islands, including the many threats presented by climate change. It is intended to capture the vision for disaster risk reduction and management and to guide the national risk management program and government policies, roles and

responsibilities. The engagement of all residents of the Cayman Islands in risk management is a key objective as is involving multiple agencies in taking a proactive all-hazard approach to managing risk. The strategy also seeks to align the country's approach with regional and international norms, including locally adapting best practices, which will serve well for enhancing national and sectoral climate resiliency.

Central Government allocated CI$1,323,705 to National Disaster Preparedness and Responses and CI$418,466 appropriated for Disaster Tolerant Central Information Technology Infrastructure in the 2009/10 budget. However reserve funds for dealing with natural disasters have been inadequate, requiring additional sources. One such source was the Cayman Islands National Recovery Fund (CINRF) established in the aftermath of Hurricane Ivan to receive various on and off island donations to assist with relief and reconstruction efforts for the injured, homeless, and destitute, many of whom were uninsured. The trust received a $7 million EU grant for Hurricane Ivan recovery. Following the devastation of Hurricane Paloma in 2008 some $1.2 million was allocated from the fund for restoration efforts in Cayman Brac and Little Cayman. The Board of Trustees intended for the CINRF to have an ongoing presence in the Islands, not just in the aftermath of disaster, by implementing projects to enhance the resiliency of communities through prevention measures such as education on home improvements and designing for resiliency, and ensuring homeowners have adequate insurance[18].

The amount appropriated for 2010/11 to the Ministry of Finance, Tourism and Development to fund Tourism related activities is CI$27,157,548[19]. This allocation does not include specific programmatic funding for increasing climate resiliency in the tourism sector even though Tourism managers foresee declining economic capacity within the sector from the increased threat of storms and resultant damage to the tourism plant[20]. The economic burden of climate change impacts to tourism is thought to necessitate Government partnering with others to share future risk.

By comparison, a portion of the CI$216,742 designed in the current budget under the Broad Outcome 'Addressing Energy and the Environment' to the Ministry of Health, Environment, Youth, Sports and Culture is for national climate change adaptation and mitigation planning[21]. Climate change adaptation planning to date has primarily fallen under the purview of the public-private National Climate Change Committee chaired by the Department of Environment which is tasked with developing a climate change policy and set of action plans. Work has been ongoing since late 2007 through the UK-funded Enhancing Capacity to Climate Change (ECACC) Project, and has thus far served to strengthen inter-agency co-operation and initiate dialogue at the various level within government and with private sector associations and businesses. *Achieving Low-Carbon Climate-Resilient Development – the Cayman Islands' Climate Change Policy* has been finalized for submission to Cabinet by mid-2011. It outlines consensus-based interventions to be implemented over the next 5 years aimed at, among other things, creating a more environmentally responsible tourism

[18] Finley Josephs, CINRF Executive Director, "Daybreak", Cayman27, 28 October 2009.
[19] Bill for a Law to Appropriate Executive Financial Transaction for the Financial Year Ending 30 June 2010 (the Appropriation (July 2009 to June 2010) Law, 2009)
[20] DOE, 2009. Comment by Gloria McField-Nixon. In: Minutes of Ministry of Tourism Stakeholder Consultation, 23 January 2009.
[21] Cayman Islands Government, *2010/11Annual Plan and Estimates*

industry and enhancing the resilience of tourism infrastructure and facilities to climate change impacts. In addition, a public education and outreach strategy was initiated during the policy's development and is intended to continue in tandem with its implementation.

The KAP survey conducted on the tourism sector as part of this vulnerability and capacity assessment showed that in terms of

- **Financial capacity**: Roughly two thirds of businesses surveyed utilized general insurance as the primary protective measure from the impacts associated with natural hazards, while just under one third of companies had business continuity insurance. A third of the companies stated they would spend up to 5% percentage of their annual budget over next 3 to 5 years on protecting the business from future threats, while almost another third did not know what percentage, if any, would be designated for such purpose. Only 15.4% of the businesses were prepared to spend up to a quarter of the budget to implement coping and/or adaptive measures, while 2.6% of companies surveyed did not intend to have a budget line item for adaptation.

- **Human capacity**: Less than half of companies surveyed had instituted staff training on disaster response and management in order to protect their businesses from the types of impacts previously experienced. Half of the companies stated that they are challenged by limited access to information on suitable adaptation measures for their businesses. While a third find the absence of human resources with necessary skills and expertise within their company to be hindering their ability to effectively implement protective measures against future threats.

- **Institutional capacity**: For most respondents, the Cayman Islands Government bears the responsibility in the country for addressing climate change issues. This lack of accountability in the industry is reflected in the fact that roughly a fifth of businesses had actually incorporated climate change considerations into their business plans. Encouragingly, half of the companies have disaster management and response plans, while just over a quarter have business continuity plans. Half of the businesses stated that the challenge to implement suitable protective measures was that the necessary technology to do so was cost prohibitive.

Distribution of all Tourism assets in relation to hazard zones and value of assets

Typical of most Caribbean islands, the majority of tourism assets in the Cayman Islands, and critical infrastructure the industry relies upon, are located within the vulnerable coastal zone. Within this document, an extensive set of static risk maps showing the vulnerability of existing accommodation, critical facilities, roads and other tourism infrastructure to flooding from rainfall events and hurricanes, as well as impacts from anticipated sea-level rise.

Structural integrity of private assets and public infrastructure critical to Tourism

Young and Gibbs' 2005 assessment[22] of Hurricane Ivan's impact on Grand Cayman found that structures built to the Cayman Building Code – comparable to strong codes in the south and southeast USA - weathered hurricane winds (135 mph sustained, 165 mph gusts) very well. Older unreinforced masonry buildings were far more vulnerable to wind damage. Loss of roofs and roof coverings from wind, rainwater ingress through plastic box-eaves and wave-induced flooding of ground floors were among the foremost damage categories. Damage to code-compliant buildings was mainly non-structural or a result of siting issues, i.e. coastal properties devastated by wave action. The accommodation sector fared well structurally however given their predominantly coastal locations, especially on exposed sections of west, south and east coasts, suffered severe damage to ground floor units from storm surge flooding, or incurred significant losses resulting from rainwater ingress to upper floors.

New critical infrastructure such as hurricane shelters, hospitals and schools, are required to be constructed to withstand a category 5 hurricane. For the most part, these facilities in Grand Cayman performed well structurally during Hurricane Ivan. Similarly roads are built to good standards in the Cayman Islands, although some on Grand Cayman's south coast proved particularly vulnerable to Ivan's storm surge and waves and have been reinforced by seawalls or realigned further inland for added protection. For fiscal year 2009/10 CI$100,000 was allocated from Government coffers to the National Roads Authority for Storm Water Management and Mitigation of Tidal Inundation to address existing issues. Telecommunications cables and water lines buried next to roads that suffered surge and wave impact were similarly affected and had to be replaced lengthening service disruption. Even pre-stressed concrete electricity distribution poles broke under Ivan's battering winds. However this technology has not been abandoned. Despite these issues, Grand Cayman is considered to have excellent infrastructure resilience.

Hurricane Paloma, with sustained winds of 145 mph, passed directly over the Sister Islands in 2008, severely impacting infrastructure and causing over CI$8 million in damages to hotel buildings alone[23]. Paloma's intense wind caused 90% of all buildings on Cayman Brac to suffer varying degrees of damage, and loss of roofs at some hotels and structural damage at others. As a result Cayman Brac's total room stock was withdrawn from operations for the entire high tourist season. By comparison, Little Cayman's hotels suffered only minor damage to roofs and once electricity restoration and road clearance was complete were in operation 3 weeks after the passage of the hurricane. Government buildings comprised the largest affected infrastructure subsector in Cayman Brac, suffering mainly roof and some structural damage largely due to lack of enforcement of approved building standards.

[22] Young, S. and T. Gibbs, 2005. *Impact of Hurricane Ivan in Grand Cayman: A technical review of the hazards and their effects*. Prepared for the UK Department for International Development, 18 February 2005.
[23] ECLAC 2009. *Cayman Islands: Macro Socio-economic Assessment of the Damage and Losses Caused by Hurricane Paloma*. LC/CAR/L.193. ECLAC and UNDP, 2 April 2009.

Cultural tourism assets such as heritage sites and architecturally important home styles throughout the Cayman Islands are wooden structures at great risk from wind damage. Many of these are located in Cayman Brac and historic centres on Grand Cayman. Higher intensity storms anticipated in future will continue to pose a threat to these structures requiring constant restoration and safeguarding of these assets.

Photo 1 Roof damaged Caymanian-style home from Hurricane Paloma, Cayman Brac, November 2008. ***Credit: Unknown***

Past economic losses from storms and hurricanes

Direct hits from hurricanes have had devastating socio-economic consequences on the Cayman Islands. Table 5 highlights damages and losses from the most costly events such as Hurricane Ivan in 2004 - locally referred to as 'Ivan the Terrible' – which severely impacted the southern and eastern coasts of Grand Cayman leaving total losses of CI$2.8 billion in its wake. This represented 183% of the country's GDP in 2003 and is by far the most devastating hurricane to hit the Cayman Islands[24]. Hurricane Paloma - the second strongest November Atlantic hurricane on record - caused total losses of CI$154 million with the passage of its eyewall over the eastern end of Cayman Brac[25].

However hurricanes do not have to directly hit the Cayman Islands to cause substantial impact. Large cyclones that produced destructive storm surges and wave action such as late-season Category 4 Michelle passed 130 miles west of Grand Cayman in 2001 causing US$28 million (CI$22.4) in damages[26].

[24] ECLAC 2005. *The Impact of Hurricane Ivan in the Cayman Islands*. LC/CAR/L.25. ECLAC and UNDP, 10 January 2005.
[25] ECLAC, 2009.
[26] Beven, J., 2002. *Tropical Cyclone Report: Hurricane Micelle 29 October – 5 November 2001*. National Hurricane Center, 23 January 2002.

Table 5 Losses from hurricanes and tropical storms affecting the Cayman Islands

Year	Hurricane	Category	CPA (statute miles)	Loss (CI$M)	Percentage of GDP (Year)
1988	Gilbert	IV	24 to GCM	16	N/A
2001	Michelle	IV	130 to GCM	22	1.5 (2001)
2004	Ivan	IV	22 to GCM	2,800	183.0 (2003)
2008	Paloma	IV	9 to LYC	154	7.4 (2008)

N/A = Not Available
CPA = Closest Point of Approach (has to be below 75 statute miles to be considered a direct hit)

Source: Hurlston-McKenzie et al (2010)[27]

Meteorological analysis suggests that Ivan was a 1 in 100-year storm event and is not the worst-case scenario for Grand Cayman as it passed to the south rather than directly over the east end of the island. A 100-year storm could be succeeded by another 100-year event the following year and not necessarily 99 years in the future. The Cayman Islands' extraordinary population growth over the last four decades and the extent of infrastructure at risk resulted in severe economic impact from Ivan, the likes of which may be more frequent as global climate change is expected to influence the development of more south-tracking systems such as Ivan[28].

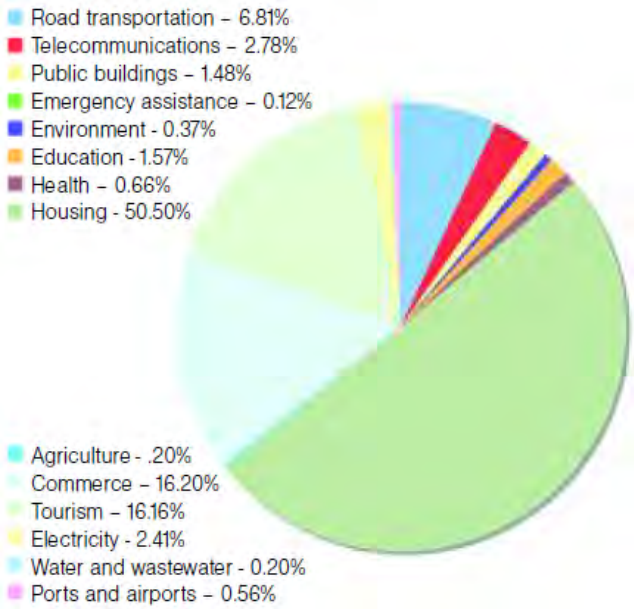
Damage to Tourism Plant

The tourism sector incurred roughly 16% of the total losses resulting from Hurricane Ivan (Figure 15). This translated to CI$281.5 million in damages to hotels and condos from storm surge-induced flooding (75% of the damage cost) and wind damage, permanently withdrawing room stock as some properties have not reopened or have been diverted to other uses, e.g. residential housing[29].

The indirect impact of hurricanes in terms of lost revenue starts with preparation activities and continues through down time for rebuilding. In the case of Ivan, loss of stay-over tourism in 2004 was CI$72 million which extended into 2005. While hotels have loss of business insurance to compensate for lost room rentals during this time, few condos, apartments and guesthouses have such a safety net which, coupled with a high level of underinsurance affecting the ability to undertake repairs, could lead to permanent business closures[30]. Many tourism properties have strata arrangements which can further delay reopening due to insurance settlement and reconstruction issues. The next major hurricane has implications for insurance coverage, particularly with the possible threat of uninsurability looming over the Cayman Islands.

[27] Hurlston-McKenzie, L-A *et al*, 2010. *Climate Change Issues for the Cayman Islands: Towards A Climate Change Policy*. A Technical Report of the National Climate Change Committee, November 2010.
[28] Young and Gibbs, 2005.
[29] ECLAC, 2005
[30] ECLAC, 2005.

Figure 15 Damages and Losses in the Cayman Islands from Hurricane Ivan, 2004



Source: Brown (2008)[31]

Indirect damages from a decline in cruise tourism included loss of port fees and visitor expenditure during closure of port facilities and the rebuilding of tourism infrastructure (ground transport, restaurants, attractions, etc.). No cruise ships visited between 9 September and 1 November 2004 as a result of direct damages to the port and facilities that support cruise ship activities, resulting in CI$25 million lost revenue from cruise tourism.

Overall visitor expenditure in 2004 was CI$435 million which dropped to CI$294 million the following year, demonstrating the hurricane's devastating impact on this sector. By 2006 visitor revenue was CI$424 million, near pre-Ivan levels, a testament to the resiliency and rapid recovery of the sector and its key businesses. However, the Ivan experience is sobering considering this level of exposure to even more severe category 4 and 5 hurricanes may become the norm (in La Niña years).

Damage to Tourism Product

As the Cayman Islands' tourism product is primarily built around 'sun, sand and sea' and thus reliant on natural attractions such as beaches, coral reefs and fisheries, the degradation or loss of these assets from beach erosion, coastal land loss and coral bleaching is of tremendous concern. For years a few properties at erosion 'hot spots' on Seven Mile Beach (SMB) have had to contend with temporary and sometimes extensive beach losses, and the cost of continually rebuilding damaged facilities (e.g. seawalls, swimming pools, cabanas) located too close to the sea. After Hurricane

[31] Brown, N., 2008. *Climate Change in the UK Overseas Territories: An Overview of the Science, Policy and You*. Joint Nature Conservation Council, Peterborough, UK.

Ivan, Government undertook a beach renourishment project at the southern end of SMB at the cost of CI$220,000 for 7,000 cubic yards (2,000 cy of which was from Government's own stockpile). This was just one of many attempts by properties along this section of beach that has had to be implemented.

Photo 2 Post-hurricane Ivan beach renourishment project at southern end of Seven Mile Beach, 2005. ***Credits: DOE***

The Beach Review and Assessment Committee (BRAC) Report 2003 addressed beach nourishment needs and requisite contingency planning for Seven Mile Beach specifically in relation to continued beach retreat resulting from sea-level rise and major hurricanes. Despite Government and the tourism sector being aware of the extent of lost revenue from serious beach erosion on SMB, to date no funding sources have been identified to draft and implement contingency plans which identify sources and stockpile locations of equivalent beach quality sand, appropriate placement methodology, etc.[32]. Cancun after hurricane Wilma is a good example of huge beach nourishment efforts that will likely have to be continued on a regular basis, and the situation may be similar for SMB[33]. If that is the case then funding sources for this and other adaptation and contingency measures need to be identified sooner rather than later.

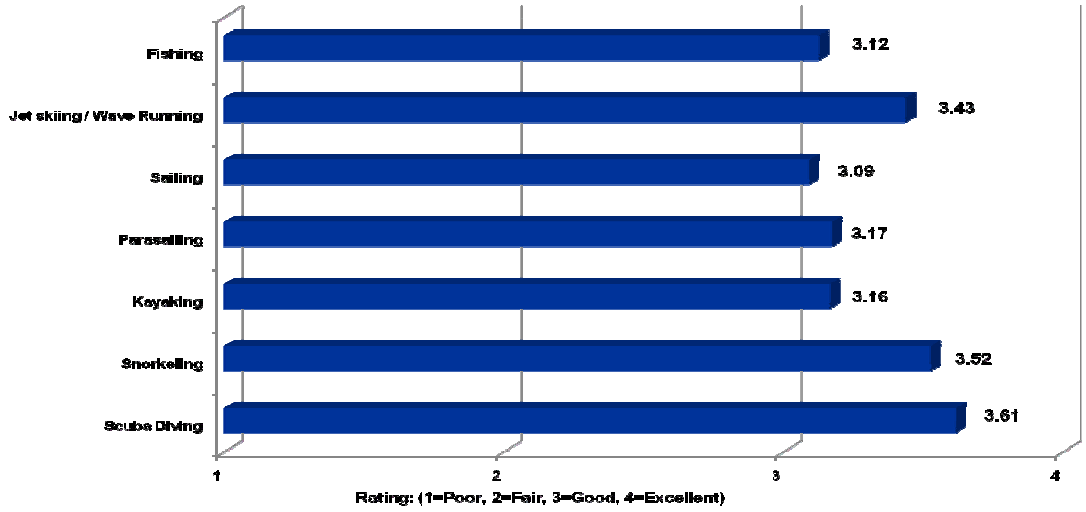
Public-private commitment and resources are needed to address this issue. Possible Government funding sources include taxes derived from travel although there is a need to clarify how these funds are utilized, which requires dialogue with the Portfolio of Finance[34]. However climate change is admittedly not a high priority; when it comes to budgeting it is the first to be cut in terms of financing programmes[35]. For effective adaptation Government must get away from viewing climate change as a "programme" but rather a fact of life, otherwise the budget dilemma will be resolved

[32] DOE, 2009. Comments by Gina Ebanks-Petrie. In: Minutes of 2nd Meeting of the NCCAWG, 18 January 2008.
[33] DOE, 2009. Comment by Dr. Robert Muir-Wood. In: In: Minutes of 2nd Meeting of the NCCAWG, 18 January 2008.
[34] DOE, 2009. Comment by Gloria McField-Nixon. In: Minutes of Ministry of Tourism Stakeholder Consultation, 23 January 2009.
[35] DOE, 2009. Comment by Ronnie Dunn. In: Minutes of Ministry of Finance Stakeholder Consultation, 23 January 2009.

through the cost of inaction[36]. A Stern-type review for the Overseas Territories would be useful to finance departments and budget managers in translating the risks and impacts from climate change science into dollars and cents.

Product quality tied to environmental conditions that do not meet visitors' expectations has been assessed in other Caribbean tourism destinations. A study in Barbados showed tourists' reduced willingness to pay for erosion-impacted beaches[37]. Similarly, willingness to pay for diving on coral-bleached reefs decreased in Bonaire[38]. Currently overall customer satisfaction with the scuba diving, snorkeling and fishing products in the Cayman Islands rates highly - 3.61, 3.52 and 3.12, respectively out of 4 (Figure 16)[39]. It is not known if or how much revenue from these activities may have been lost locally from severe bleaching events like that witnessed in 1998 and 2009 or from the wider ecological implications on local fisheries. However, it is clear that without proper management of diving pressure, nutrient loading and other anthropogenic stressors on these systems, the quality and rating of marine attractions will decline[40] – a risk the Cayman Islands can ill afford even without the threat of climate change.

Figure 16 Customer Satisfaction with the Cayman Islands' Water Sports Product, 2008



Source: Department of Tourism Water Sports Market Demand Survey, 2008

Other attractions and tourism activities at risk include Stingray City-Sandbar tours which are currently affected by unsettled weather conditions and in recent years more frequent closures of these sites for safety reasons (Table 6). While these

[36] DOE, 2009. Comment by Gina Ebanks-Petrie. In: Minutes of Ministry of Finance Stakeholder Consultation, 23 January 2009.
[37] Uyarra, M.C., I.M. Cote, J.A. Gill, R.R.T. Tinch, D. Viner, and A.R. Watkinson, 2005. Island-specific preferences of tourist for environmental features: implications for tourism-dependent states. *Environmental Conservation* (32): 11-19.
[38] Uyarra et al, 2005.
[39] Deloitte, 2008. Water Sports Market Assessment, November 26, 2008.
[40] Deloitte, 2008.

occurrences primarily affect lost revenue to charter boat operators, there are knock-on effects for ground transport and other sub-sectors. Structural damage or temporary closures to some land-based sites are climate risk factors. Hurricane Ivan badly affected natural attractions in some areas of the Botanic Park and devastated the great house at Pedro St. James which did not open for some time. As with the accommodation sector, delays due to insurance settlements and difficulties in finding qualified contractors to start repair work is a concern, particularly for the very vulnerable National Museum building which requires the involvement of specialists in historical building conservation and rehabilitation.

Table 6 Potential Climate Change Impacts on Tourism Infrastructure and Amenities

Attraction at Risk	Effect of Climate Change	Impact on Attraction
Stingray City / Sandbar	• Sea level rise • Increased storminess; change in wind patterns	• Deeper sites, ability to stand at Sand Bar reduced • Reduced no. of trips due to sea state conditions
Beaches	• Sea level rise	• Reduced area, overcrowding, user conflicts
Dive tourism	• Sea level rise • Increased storminess • Stronger hurricanes • Increased sea temperatures	• Deeper sites • Reduced no. of trips • Physical damage to reefs • Coral bleaching, die-off or disease
Botanic Park	• Increased drought • Wind damage • Increased temperature	• Irrigation issues • Reduced site attractiveness • Risk of heat stress to visitors
Blow Holes	• Sea level rise	• Submerged cavities, no dramatic pictures
Hell	• Increased rainfall intensity	• Flooding
Pedro St. James	• Increased storm intensity, wind and rainfall	• Flooding, wind-borne debris, damage to structures & property • Event cancellations
Cayman Turtle Farm	• Increased storm intensity, wind and rainfall • Increased temperature	• Flooding, damage to structures & exhibits • Water quality affected within turtle & other enclosures
CI National Museum	• Sea level rise, increased storminess, storm surge and hurricanes	• Damage to structures & property from flooding and wind-borne debris
Pirates Weeks Festival	• Increased storminess, rainfall	• Event cancellations
Maritime Heritage Trail	• Stronger hurricanes, wave action • Change in wind patterns	• Destruction, dislodgement or burial of historic shipwrecks and artefacts
Heritage Sites (Lighthouses, Mission House)	• Increased storm intensity, wind and rainfall • More intense rainfall events • Higher temperatures	• Wind and water damage • Flooding • Terminate, deterioration of structures

Source: Hurlston-McKenzie et al (2010)

While product diversification has started to take place, which is a good adaptive measure, some of the niche tourism being explored (e.g. outdoor music and culinary events) is still very weather dependent, especially if large indoor facilities do not exist to accommodate them. In recent years event postponements or cancellations have become more common, with the annual Pirates Week festival now held in November instead of October due to rainy weather, Taste of Cayman postponed for months for similar reasons, and Art@Governors 2009 postponed by one month due to wind conditions associated with a strong Nor'wester.

Some tourism managers fear the Caribbean is being perceived as an unsafe destination for weather hazards and believe that regional tourism interests will have to collaborate to address this perception in key markets[41]. Even those who do travel to the region can become a liability. As travel insurance does not cover "acts of God," some costs were borne by overseas tour operators to fly tourists back home during Hurricane Ivan[42]. Government's capacity to continue expensive airlift operations before and after a storm is becoming stretched, especially in an economic decline. The Ivan experience has also shown that sectors such as tourism and financial services which employ significant numbers of expatriate workers need to participate in shelter and evacuation planning processes, and develop a coordinated plan to cover this activity with the national emergency agency in future events[43].

Future economic losses

From storms and hurricanes

Since 1990 the Cayman Islands has had hurricane damages averaging 10-15% of GDP[44]. Hurricane Ivan's total impact on the economy in 2004 was CI$2.8 billion, or 183% of GDP in 2003, the highest ever UN ECLAC has encountered in the region. With ever-growing infrastructure exposed to stronger hurricanes expected, it is likely damages and losses to this extent may become more common place.

In a 2008 Tuft University study the costs for the Cayman Islands associated with increased hurricane damages, loss of tourism revenue and infrastructural damages due to sea level rise by

Photo 3 Tropical Storm Warning Flags. ***Credits: HMCI***

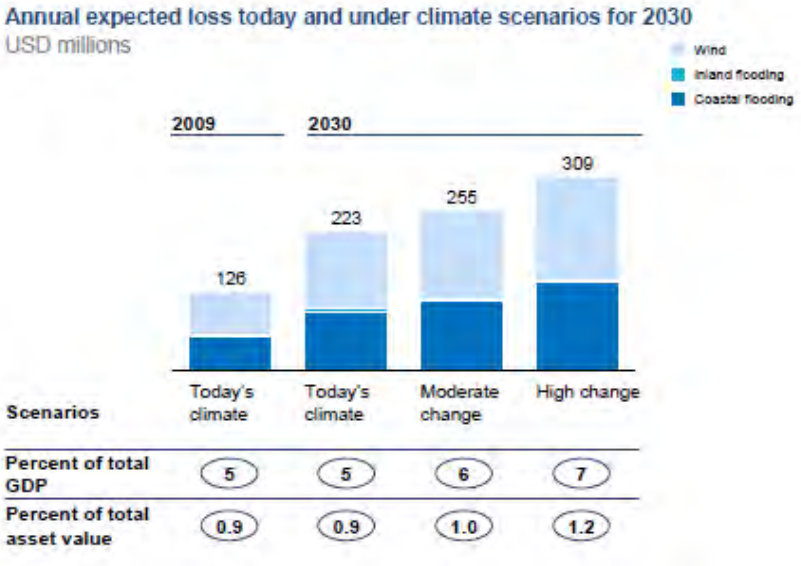
[41] DOE, 2009. Comment by Gloria McField-Nixon. In: Minutes of Ministry of Tourism Stakeholder Consultation, 23 January 2009.
[42] BBC News Online. "Travel firms count cost of Ivan," 12 September 2004
[43] McCarthy, G., 2005. "Resilience Through Recovery." A Presentation by the Hon. Chief Secretary of the Cayman Islands to the Deputy Governors and Chief Secretaries Conference, Bermuda, May 2005.
[44] Bueno, R., C. Herzfeld, E. Stanton and F. Ackerman, 2008. *The Caribbean and Climate Change: The Costs of Inaction*. Stockholm Environment Institute, US Center and Global Development and Environment Institute, Tufts University, May 2008.

2025 was estimated at 8.8% of GDP, 20.1% of GDP by 2050, and 53.4% of GDP by the year 2100[45].

The Cayman Islands was included in another study under The Caribbean Catastrophe Risk Insurance Facility's *Economics of Climate Adaptation Initiative* conducted in partnership with the McKinsey Group, Caribbean Community Climate Change Centre and UN ECLAC in 2010[46]. Current and future expected losses from three climate risks - hurricane-induced winds, coastal flooding from storm surge and inland flooding from both hurricanes and tropical systems - for three climate scenarios using global and regional circulation models based on IPCC SRES A2 were assessed. The potential loss was then estimated using an approach similar to that applied for calculating insurance premiums. The current climate risk for the Cayman Islands is already high - 5% of local GDP - with expected losses of up to 7% by 2030 in the high climate change scenario (Figure 17).

Comparatively, this is one of the highest loss jurisdictions of all the Caribbean countries studied. While the contribution of coastal flooding from storm surge remains at about 45% of the total damage potential across all scenarios, expected loss nearly triples from US$126 million in 2009 to US$309 million by 2030.

Figure 17 Annual Expected Loss from Climate Risks 2009 and 2030



Source: CCRIF (2010)

[45] Bueno et atl, 2008

[46] CCRIF, 2010. *Enhancing the Climate Risk and Adaptation Fact Base for the Caribbean: preliminary results of the ECA Study*, CCRIF, Grand Cayman, Cayman Islands.

Impact of climate change mitigation policies and consumer behaviour

The Cayman Islands tourism sector's resilience is owed to a loyal repeat visitor base during the high season, mostly from North America. However there is potential for this market share to be eroded due to circumstances beyond local control, namely rising airfares coupled with threats of reduced air service to the region as a result of climate change mitigation regulations and policies from outside the region to safeguard the aviation sector against deepening economic recession. Moves are well advanced to bring aviation emissions from international flights landing in the European Union under regulation and into the formal carbon market by 2012. EU aviation emissions account for 3% of its total CO_2 emissions, and are estimated to double within a decade if not capped. US air carriers Delta and United are thought to have the highest carbon shortfalls under this cap and trade system (the total being 200 million tonnes of CO_2) with 3.5 and 3.3 million tonnes respectively[47]. Airlines that can afford to do so could purchase additional permits from the European market or invest in clean development mechanism projects to offset their carbon shortfalls. Although no similar US regulation is presently proposed, US-owned airlines might have to raise prices generally to cover cost of flying into European cities.

The Cayman Islands has traditionally been an expensive destination to access and could see a downturn in air arrivals as consumers opt to travel to less expensive destinations through short-haul flights or using "greener" modes of transport (car or train). More frequent warmer mid-latitude winter temperatures could see even loyal repeat visitors chose cheaper vacations closer to home. While resorts are already targeting the off-season traveller looking for a better experience at an attractive rate, the hotter days, heat waves and unpredictable extremes of this time of year may affect comfort levels of visitors to the region or their health whilst here placing increased demands on the health care system.

Local tourism managers are also concerned that if an aviation tax is not tied to specific project funding, informed consumers will find this objectionable and their choice of a more transparent destination will affect revenue for local programmes. Thus Governments pursuing transitions to low-carbon economies should find other mechanisms to curb consumer behaviour apart from taxation[48]. While the Cayman Islands is actively looking both at Central America (specifically Panama) and eventually South America as secondary markets[49], this could have implications for the spread of malaria and dengue from inter-regional travel.

[47] Voosen, P., 2009. "Airlines will be first US industry to confront cap and trade," Greenwire, 12 August 2009.
[48] DOE, 2009. Comment by Gloria McField-Nixon. In: Minutes of Ministry of Tourism Stakeholder Consultation, 23 January 2009.
[49] Knipp, S., 2009. "Tourism sector cautiously optimistic," Cayman Net News, February 20, 2009.

Country Vulnerability and Risk Profiles

Country vulnerability and risk profiling is considered in this chapter using studies conducted to date on current climate hazards that threaten the Cayman Islands. A historic view of inland flooding from rainfall and the extent of primarily storm surge-flooding from Hurricane Ivan on Grand Cayman are presented in light of similar climatic events and associated impacts occurring in the future. Finally, the physical and socio-economic impacts of projected sea-level rise are portrayed in this section through an extensive array of static risk maps and accompanying tables.

Present-Day Vulnerability

Current Vulnerability of Grand Cayman to Natural Hazards

Areas on Grand Cayman vulnerable to present-day climate hazards such as flooding from hurricanes, storm surges and high winds were identified in a preliminary vulnerability assessment conducted by the Natural Disasters Assessment Consulting Group in 2009[50] and ranked in relation to level of exposure of these hazards (Table 7). Map 6 is a geographical representation of the level of exposure to these hazards and the level of physical vulnerability of the critical infrastructure identified in the assessment. No similar assessments have been conducted for Cayman Brac or Little Cayman to date.

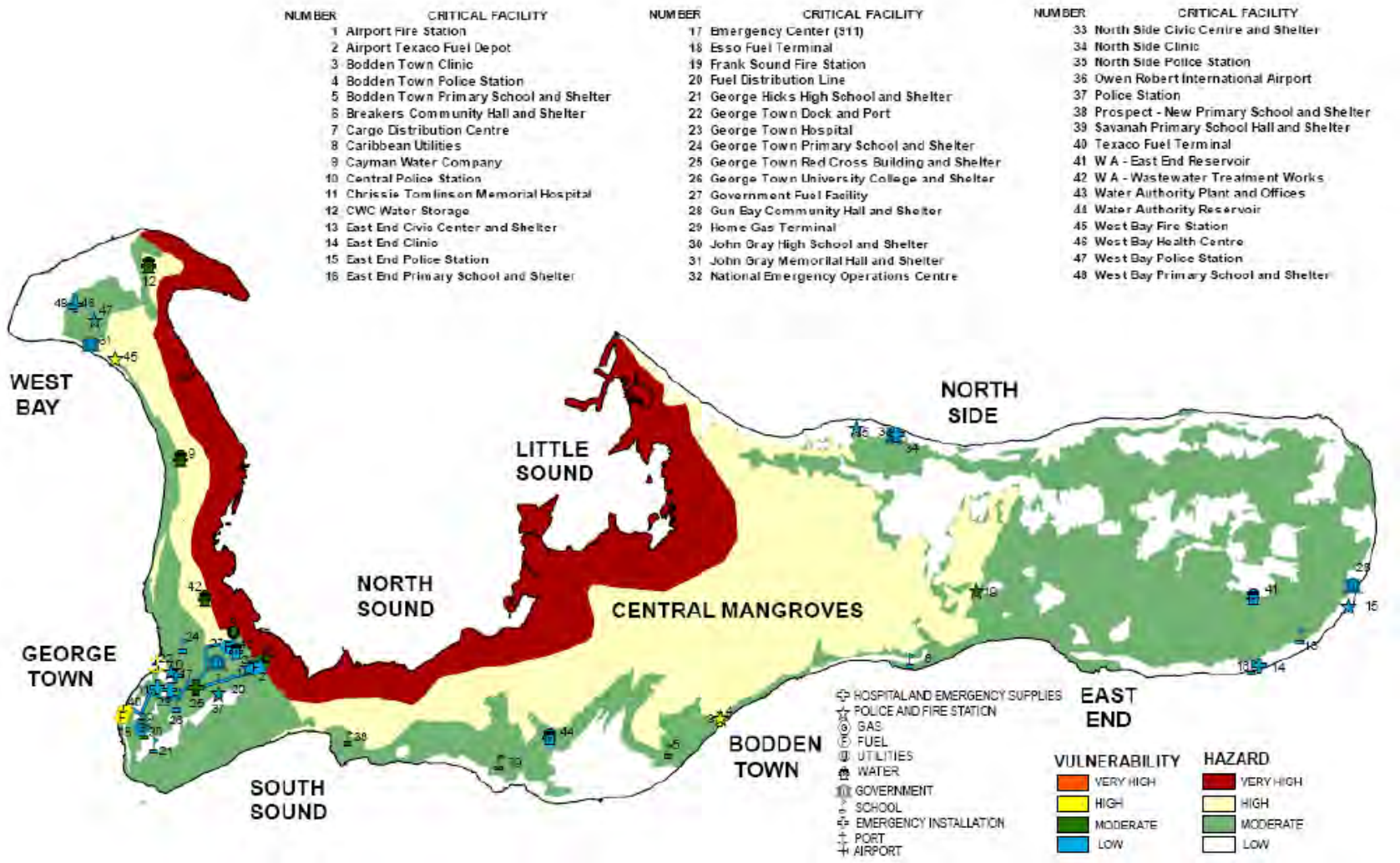
Table 7 Areas and Level of Exposure to Natural Hazards in Grand Cayman

Area	Level of Exposure
Area 1: North Sound-Little Sound-Eastern West Bay	Very High
Area 2: Central Mangroves-Central Bodden Town-Central George Town and West Bay	High
Area 3: Northwestern West Bay-Western Georgetown-Bodden Town-East End-North Side	Moderate
Area 4: Remainder of the island	Low

Source: NDAC (2009)

[50] National Disasters Assessment Consulting Group, 2009. Preliminary Vulnerability Assessment of Grand Cayman, Cayman Islands. A Report to the Government of the Cayman Islands, June 2009.

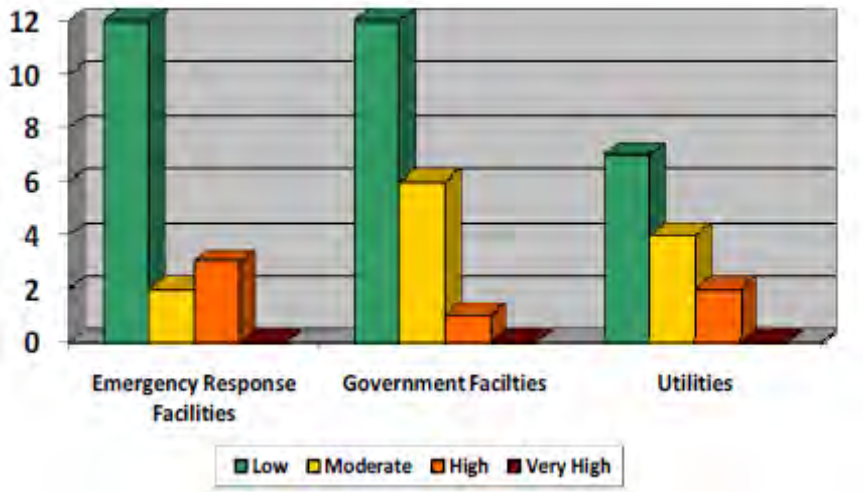
Map 6 Areas showing the vulnerability and exposure of critical facilities to natural hazards in Grand Cayman



Source: National Disaster Assessment Consulting Group (2009)

It is interesting to note that the majority of the 48 critical facilities identified have a low level of vulnerability (Figure 18). Those emergency response facilities with a high level of vulnerability include the West Bay Fire Station, Bodden Town Clinic and Bodden Town Police station. The only Government facility with a high level of vulnerability is the George Town dock and port. Two utilities are similarly categorized and are the Texaco and ESSO fuel terminals.

Figure 18 Percentage of the Level of Vulnerability of Critical Facilities on Grand Cayman



Low Vulnerability	Low exposure to any of the identified main hazards at the Cayman Islands. The critical facility is located inland and well above sea level.
Moderate Vulnerability	Moderate exposure to at least floods and storm surges. The facility is located in a zone that is impacted by hurricane categories 4 and 5 that take place approximately every 100 years.
High Vulnerability	High exposure to at least floods and storm surges and to a lesser degree to tsunamis. The facility is located in an area exposed to hurricanes of category 3 (and above) that hit the islands once every 9.06 years.
Very High Vulnerability	Very high exposure to floods and storm surges and to a lesser degree to tsunamis. The facilities located in a zone where coastal flooding and wave action are the highest during hurricanes of categories 1 and 2 (and above). On average these kinds of hurricanes hit the Cayman Islands every 2.23 years.

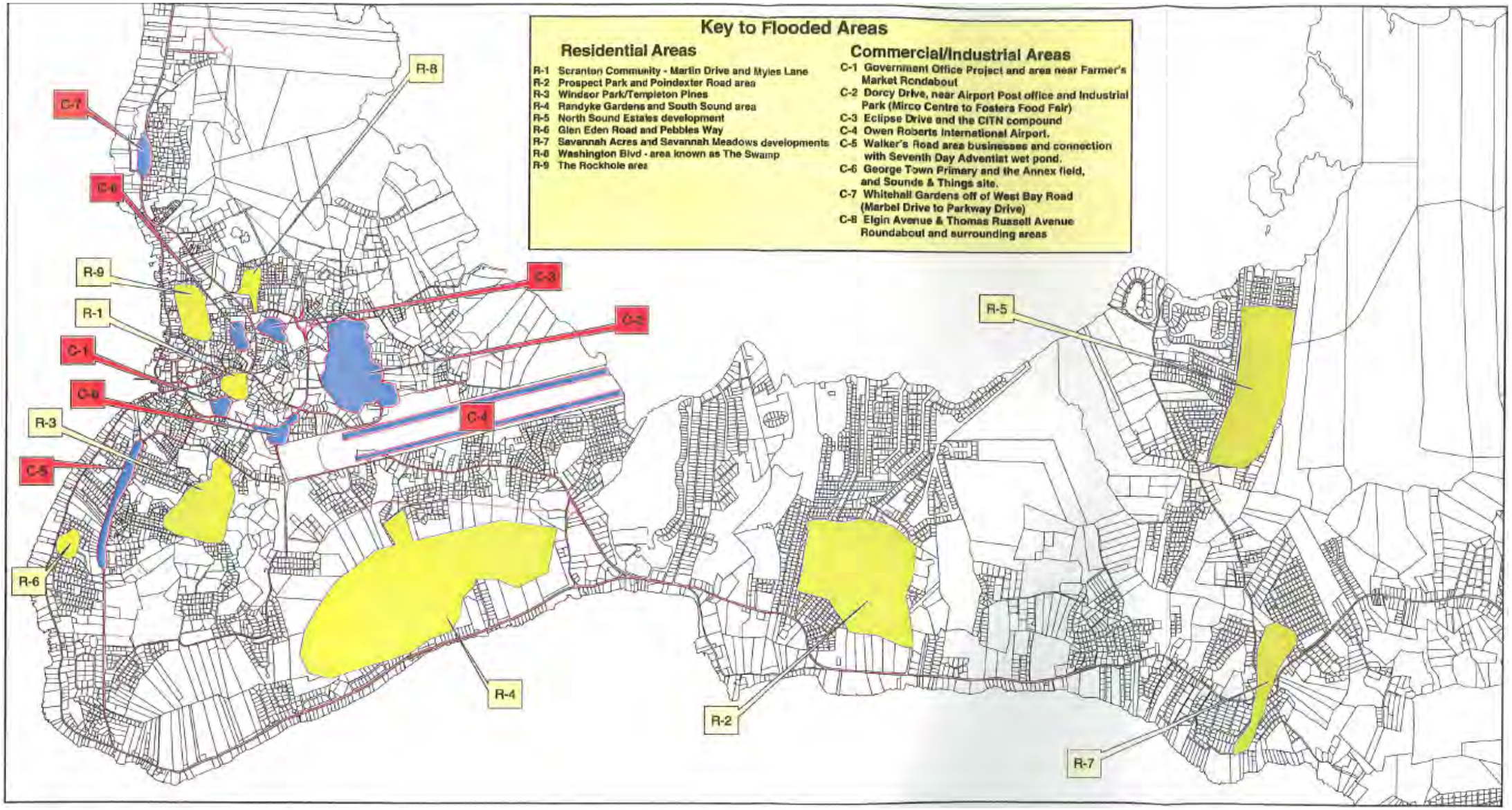
Source: NDAC (2009)

Inland Flooding From Rainfall on Grand Cayman

Inland flooding resulting from moderate to heavy rainfall events is quite common and predictable in many areas on Grand Cayman under current climatic conditions. Climate change is expected to bring heavier rainfall incidents thus exacerbating the impact on existing hot spots and will likely create new areas of flooding concern if left unmitigated.

The following map illustrates key areas on Grand Cayman prone to flooding and has been reproduced from the Stormwater Management Committee (SWMC) Report, October 9, 2003. It is important to note that given the date of this report, some of the commercial/industrial areas typically affected by flooding have since been addressed. However, a good portion of the residential areas identified have yet to receive corrective action.

Map 7 Areas of Inland Flooding from Rainfall on Grand Cayman Identified by the SWMC, Oct. 2003



Flooding from Hurricane Ivan on Grand Cayman

Climate change is expected to increase the intensity of hurricanes, which means the Cayman Islands will likely experience heavier rainfall and wind speeds associated with the passage of category 3, 4 and 5 hurricanes in the future. An historic event such as Hurricane Ivan in 2004

According to Young and Gibb (2005), the severity of impact was due to Grand Cayman being under an increasingly intense outer eyewall which allowed for increasing wind speed. Sustained winds of 135 mph (a low to moderate Category 4 storm) and gusts to over 165 mph caused catastrophic structural damage to old, poorly designed, long-spanned galvanized roofs or other roof types with flawed design or construction. Homes and commercial buildings built to code weathered hurricane winds very well. However with maximum wind speed increases of 5%, 10%, 15% (corresponding to 1, 2, and 3°C sea-surface temperature rises respectively) expected in future, insured losses from hurricanes are set to increase exponentially (Clark, 1997), e.g. if maximum wind speeds are 15% higher, insured wind losses would more than double.

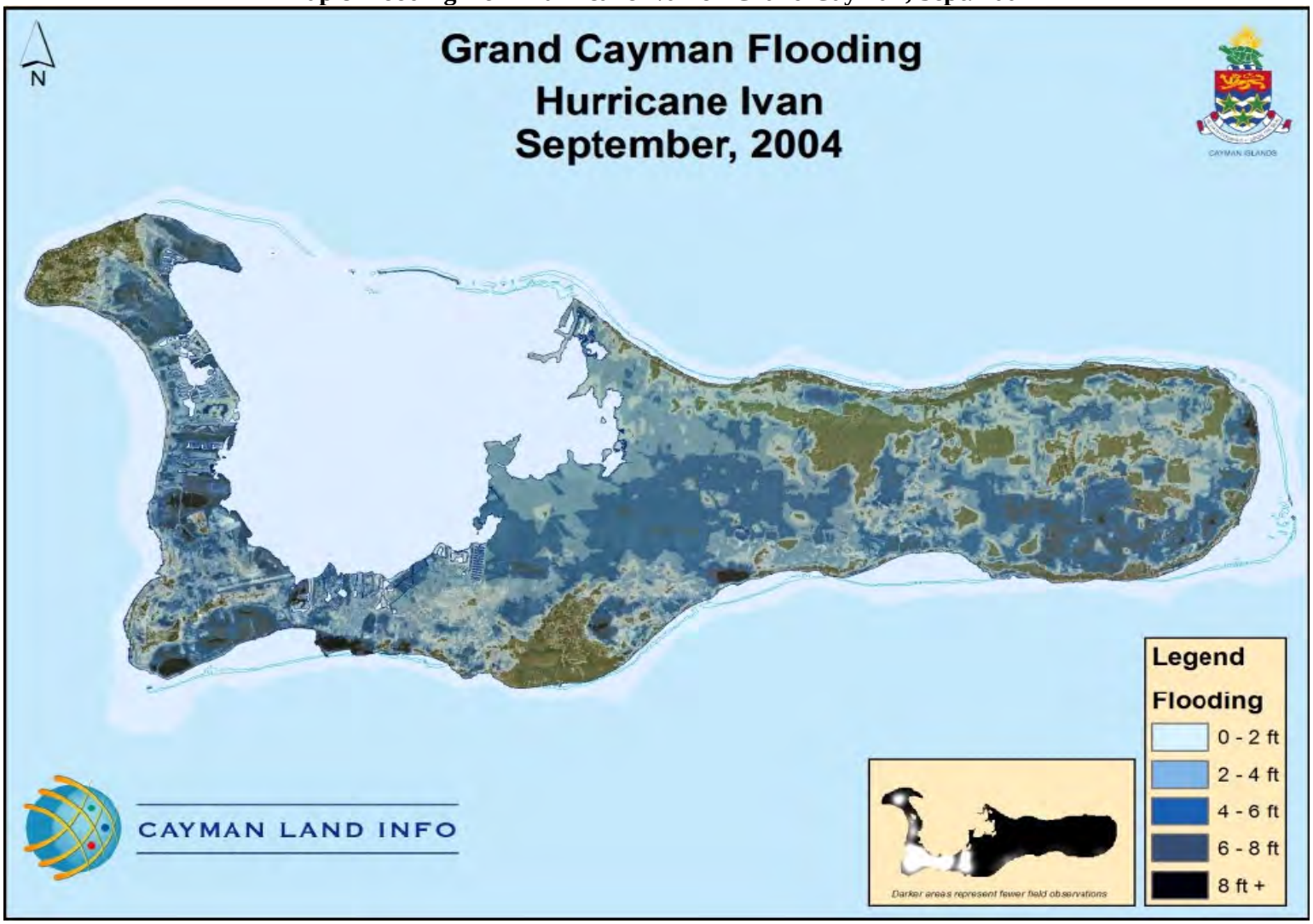
Ivan was an unusually slow-moving hurricane (5 mm per hour) by the time it reached Grand Cayman, dumping 16.5 inches of rain at a peak rate of 1.5 inches (38 mm) per hour. Many low-lying areas could not handle the deluge. More significantly, storm surge flooding reached 9 ft above sea level. Wave damage at 20 ft above sea level where no reef protection existed was catastrophic (e.g. at Mariner's Cove and Ocean Club)[51].

The monetary loss from Ivan water damage far outstripped that for wind damage. Flood damage was not catastrophic but widespread, with over 70% of Grand Cayman flooded from a few inches to as much as 10 ft (Map 8)[52]. Ivan caused CI$281.5 million in damages to hotels and condos from storm surge-induced flooding (75% of the damage cost) and wind damage, permanently withdrawing room stock as some properties have not reopened or have been diverted to other uses, e.g. residential housing[53]. Loss of stay over tourism in 2004 as a result of Ivan was CI$72 million which extended into 2005.

[51] Young and Gibbs, 2005
[52] Simpson, Robson & Smith, 2008
[53] ECLAC, 2005

Photo 4 Depth and extent of flood water a day after the passage of Hurricane Ivan, 13 September 2004. ***Credit: Unknown.***

Map 8 Flooding from Hurricane Ivan on Grand Cayman, Sept. 2004



Source: Simpson, Robson & Smith, 2009

Impact of Hurricane Paloma on the Sister Islands

In November 2008 Hurricane Paloma passed directly over Little Cayman and Cayman Brac as a category 4 tropical cyclone with maximum sustained wind speeds of 145 mph, giving it the status as the second most intense system of that season and causing severe infrastructural damage to the Sister Islands[54]. Paloma was a southwest to northeast moving system, typical of late-season storms which are predicted to become more frequent events in the future. The system dropped 17.77 inches of rainfall on Cayman Brac, and by comparison only 6.05 inches on Grand Cayman. While Little Cayman reported a storm surge between 2 ft and 4 ft, the Brac experienced a 4 ft to 8 ft storm surge.

While the hurricane impacted a fraction of the Cayman Islands population, those hardest hit resided on Cayman Brac with 97% of its population affected in some way. The Sister Islands combined has the highest percentage of poor (7%) and vulnerable (4%) of all the districts.

The total impact of Hurricane Paloma on the Cayman Islands was CI$154.4 million, equivalent to 7.4% of GDP, or roughly CI$57,295 per capita of the Sister Islands combined. Such an impact represented over one third of exports of goods and services and 73% of government debt. The largest economic sector hit was tourism which incurred damages and losses of CI$13.4 million or 8.7% of the total impact, chiefly the result of 100% of room stock (hotels, guest houses, condos and villas) being affected. This succeeded in crippling the Cayman Brac economy for many months afterward.

Photo 5a and b Boardwalk in Brac Parrot Reserve before (July 2008) and after (November 2008) Hurricane Paloma, Cayman Brac. ***Credits: Kristan D. Godbeer***

[54] ECLAC, 2009. *Cayman Islands: Macro Socio-Economic Assessment of the Damages and Loses Caused by Hurricane Paloma*. LC/CAR/L.193, 2 April 2009.

A pictorial representation of the type and extent of physical damage (mostly wind) to the social, economic and environmental sectors on Cayman Brac associated with Hurricane Paloma is presented above and below.

Photo 6a-h Images of roof-damaged buildings and flooded streets from Hurricane Paloma, Cayman Brac, November 2008. ***Credits: various unknown***

Sea-Level Rise Static Risk Maps

As noted in the National Climate Assessment chapter, an increase (from the 1990 baseline) of 12 cm to 80 cm (0.12 m - 0.8 m) in sea level is expected by 2100, representing a rise of approximately 0.14 cm to 0.91 cm per year. The potential impacts of projected sea-level rise (SLR) scenarios for the three Cayman Islands and the Seven Mile Beach Area specifically were mapped by the Department of Environment (DOE) with assistance from the Department of Lands and Survey (L&S) as well as Hazard Management Cayman Islands (HMCI), all within the Cayman Islands Government.

Sea-level rise scenarios of 0.25 meters (0.82 feet), 0.5 meters (1.64 feet), 0.75 meters (2.46 feet), and 1 meter (3.28 feet) were used to complete this exercise. ArcGIS Desktop 9.3 with the Spatial Analyst extension was utilized for all mapping and geoprocessing of data. The DOE is fortunate to have created and have access to a wide variety of high quality spatial data in order to complete this project.

Mapping and resulting data tables were created using the following spatial datasets;

- Digital Terrain Model (DTM) – 1.5 ft grid cell size. Created in 2008 by L&S consultants and derived from Light Detection and Ranging (LIDAR) remote sensing technology. Used to develop sea level rise scenarios.
- Districts – Dataset housed by L&S
- Buildings – Dataset developed and maintained by L&S. Updated regularly
- Building Values – Dataset developed and maintained by L&S. Current data

- Utilities – Dataset housed by L&S. Updated regularly
- Roads – Dataset developed and maintained by L&S. Updated Regularly
- Critical Infrastructure and Areas – Dataset compiled by HMCI using L&S original data.
- Landcover – Terrestrial landcover classification created using 2006 quickbird satellite imagery and completed in 2009. Broadly classified utilizing the Vegetation Classification for the Cayman Islands (Burton, 2008).
- Planning Zones (Grand Cayman) - Developed by the Department of Planning, Cayman Islands government and housed by L&S.

Methods, Notes and Recommendations for Future Work

Digital Terrain Model

As noted previously, this dataset was created using LIDAR data collected in 2008 and as a result it is a very accurate elevation dataset. In its original format it is at a resolution of 1.5 foot grid cell size. This raster (image) dataset needed to be converted to a vector (polygon) format in order to be able to overlay with the rest of the data. The method to achieve this was to first reclassify the raster in order to separate all values that were below the different sea level rise scenarios (ie/ all values in the original raster below 0.25 meters were distinguished). The resulting raster was then converted to a polygon (vector) format and values greater than each SLR scenario were removed. Finally, this polygon dataset was dissolved so that there was a single, multi-part polygon representing each of the four SLR scenarios.

1. Notes and recommendations: As a result of the very fine resolution of the DTM, the file size was very large. It was not possible to work with the original data at the resolution (computationally too intensive for our computers). Due to this fact the DTM was 'resampled' so that the resolution was now 10 foot grid cells. It is a recommendation that for future work, a more capable computer could be used to produce the SLR scenario polygons utilizing the data in its original format.

Districts

The original districts dataset was slightly altered to include areas of other datasets that were created using a coastline that extended beyond that which the districts dataset was created with. This ensured that all other data could have a district assigned to it.

Buildings

The original buildings dataset has as one of its attributes a 'building class' designation. Each building on the islands is assigned a class that correlates to its use. The buildings dataset was spatially joined with the Districts dataset in order to determine which district each building lies. This resulting data layer was

then intersected with each of the four SLR scenarios. Results were exported to form new data layers representing all buildings that would be affected by each SLR scenario.

2. Notes and recommendations: There were a small number of buildings in the original dataset that did not have a building class associated with them and were deleted prior to analysis. There were also buildings showing up spatially that were in the planning stage and hadn't been built as yet. These were included in the analysis but it is recommended for future work that these buildings be filtered out before performing the analysis.

Building Values

Values for the majority of the buildings on the islands were determined by the valuation section of L&S and a spatial dataset was created. For specific methods used to determine building values contact L&S. Each of the buildings has a building class assigned. This dataset was spatially joined with the Districts dataset and the result was intersected with each of the four SLR scenarios. Results were exported to form new data layers representing all buildings that have values assigned which would be affected by each SLR scenario.

Utilities

The original utilities dataset consisted of polyline features representing all electrical lines as well as water and sewer lines. It was determined that electrical lines would not practically be affected by SLR and they were removed from the dataset. This dataset was spatially joined with the Districts dataset and the result was clipped to each of the four SLR scenarios. Results were exported to form new data layers representing the length of utility lines which would be affected by each SLR scenario.

3. Notes and recommendations: Utility line data currently exists only for Grand Cayman. Future work would benefit from utility data from the sister islands included.

Roads

Roads in the Cayman Islands have been mapped and road class's assigned to each section of road. This dataset was spatially joined with the Districts dataset and the result was clipped to each of the four SLR scenarios. Results were exported to form new data layers representing the length of roads which would be affected by each SLR scenario.

4. Notes and recommendations: Dike roads and various access roads are not included in the roads dataset as it exists and were not included in the analysis. Future work would benefit from including these roads in the analysis.

Critical Infrastructure and Areas

A dataset of what is deemed to be 'critical infrastructure and areas' in the event of a natural disaster was compiled by HMCI. This dataset was spatially joined with the Districts dataset and the result was intersected with each of the four SLR

scenarios. Results were exported to form new data layers representing the buildings and/or areas which would be affected by each SLR scenario.

5. Notes and recommendations: The areas contained in this dataset (ie/ helicopter landing areas, parking, etc.) were created by the DoE during the mapping exercise. It is recommended that polygons are created by HMCI that reflect exact locations for these areas for future work.

Landcover

A terrestrial landcover classification was completed in 2009 for the three Cayman Islands. For a description of the habitat classification used refer to the Habitat Action Plan, part of the Department of Environment's National Biodiversity Action Plan. This dataset was spatially joined with the Districts dataset and the result was clipped to each of the four SLR scenarios. Results were exported to form new data layers representing the area of each landcover class which would be affected by each SLR scenario.

6. Notes and recommendations: As part of the terrestrial mapping exercise, a fine scale shoreline substrate composition mapping project was completed. Due to the fact that a 10 foot grid cell size was used for the SLR scenario mapping, such a relatively small feature such as shorelines was not able to be reliably mapped. It is a recommendation for future work that the finer scale (1.5 foot grid cell size) elevation data be used and the resulting SLR scenarios be clipped to the shoreline data to get a fine-scale account of what areas would be affected.

Planning Zones

Planning zones have been developed for Grand Cayman which outline designated uses for each area. This dataset was spatially joined with the Districts dataset and the result was clipped to each of the four SLR scenarios. Results were exported to form new data layers representing the area of planning zones which would be affected by each SLR scenario.

7. Notes and recommendations: The planning zones were created using an old version of parcel boundaries and do not line up well with an established shoreline. It is recommended that for future work, this difference in spatial extents be remedied.

Map 9 Grand Cayman Roads Affected by Sea-Level Rise

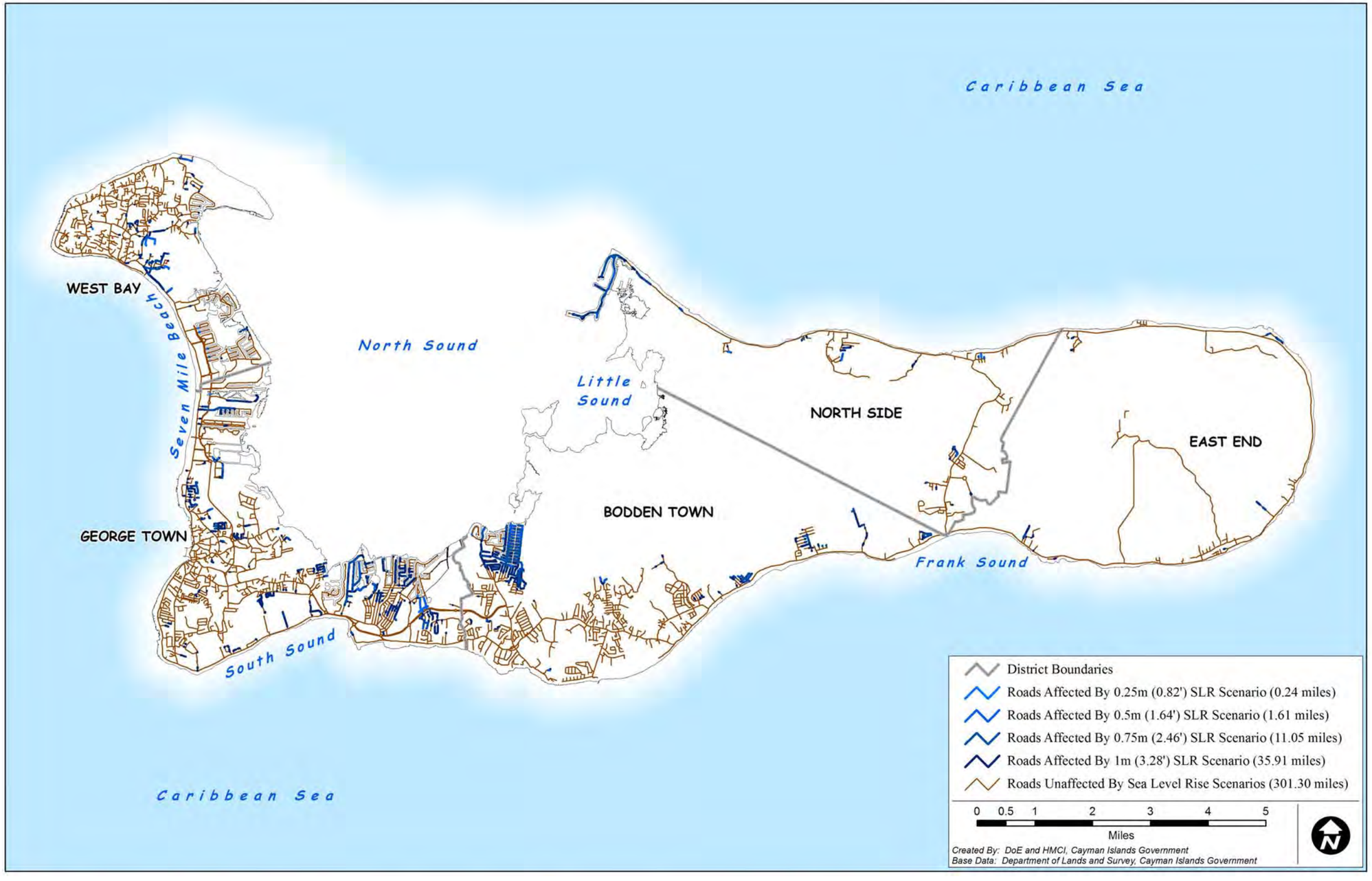


Table 8 Grand Cayman Road Infrastructure Affected by Sea-Level Rise Scenarios

All Roads By District/Road Class				0.25m SLR			0.5m SLR			0.75m SLR			1m SLR		
DISTRICT	ROADCLASS	Feet	Miles	Feet	Miles	% Affected	Feet	Miles	% Affected	Feet	Miles	% Affected	Feet	Miles	% Affected
Bodden Town	Access	4810.57	0.91			0.000%			0.000%			0.000%			0.000%
Bodden Town	Primary	75934.29	14.38			0.000%	7.89	0.00	0.010%	852.01	0.16	1.122%	3555.68	0.67	4.683%
Bodden Town	Secondary	305435.51	57.85	50.34	0.01	0.016%	1203.17	0.23	0.394%	14544.67	2.75	4.762%	40919.99	7.75	13.397%
Bodden Town	Unclassified	14551.12	2.76			0.000%	109.93	0.02	0.755%	2044.72	0.39	14.052%	6191.16	1.17	42.548%
Bodden Town	Unpaved	51775.81	9.81			0.000%	809.92	0.15	1.564%	6536.23	1.24	12.624%	15392.30	2.92	29.729%
East End	Primary	76115.75	14.42			0.000%			0.000%			0.000%			0.000%
East End	Secondary	40001.25	7.58			0.000%			0.000%	153.71	0.03	0.384%	1986.64	0.38	4.966%
East End	Unclassified	9446.94	1.79			0.000%			0.000%	57.14	0.01	0.605%	572.43	0.11	6.059%
East End	Unpaved	25766.04	4.88			0.000%			0.000%	542.77	0.10	2.107%	1127.97	0.21	4.378%
George Town	Access	6074.16	1.15	0.76	0.00	0.012%	157.18	0.03	2.588%	913.47	0.17	15.039%	3251.05	0.62	53.523%
George Town	Primary	215645.07	40.84	80.59	0.02	0.037%	90.67	0.02	0.042%	100.87	0.02	0.047%	535.35	0.10	0.248%
George Town	Secondary	450858.46	85.39	408.22	0.08	0.091%	2180.98	0.41	0.484%	14090.66	2.67	3.125%	70427.66	13.34	15.621%
George Town	Unclassified	2713.56	0.51			0.000%	12.01	0.00	0.443%	43.33	0.01	1.597%	54.76	0.01	2.018%
George Town	Unpaved	16092.16	3.05			0.000%	53.39	0.01	0.332%	1289.59	0.24	8.014%	3918.51	0.74	24.350%
George Town	temp	1347.89	0.26			0.000%			0.000%	10.01	0.00	0.743%	331.21	0.06	24.572%
North Side	Primary	70604.22	13.37			0.000%	467.52	0.09	0.662%	5089.80	0.96	7.209%	9171.70	1.74	12.990%
North Side	Secondary	61532.02	11.65	39.29	0.01	0.064%	209.43	0.04	0.340%	3941.06	0.75	6.405%	11233.76	2.13	18.257%
North Side	Unclassified	652.35	0.12			0.000%			0.000%			0.000%			0.000%
North Side	Unpaved	16986.42	3.22	174.20	0.03	1.026%	312.95	0.06	1.842%	932.44	0.18	5.489%	1326.79	0.25	7.811%
West Bay	Access	79.51	0.02			0.000%			0.000%			0.000%			0.000%
West Bay	Primary	88305.62	16.72			0.000%			0.000%	496.01	0.09	0.562%	5096.29	0.97	5.771%
West Bay	Secondary	228215.15	43.22	103.79	0.02	0.045%	402.69	0.08	0.176%	2746.49	0.52	1.203%	8895.50	1.68	3.898%
West Bay	Unclassified	7060.71	1.34	378.46	0.07	5.360%	1454.67	0.28	20.602%	2490.39	0.47	35.271%	2888.95	0.55	40.916%
West Bay	Unpaved	10467.69	1.98	24.52	0.00	0.234%	1053.57	0.20	10.065%	1460.65	0.28	13.954%	2732.86	0.52	26.108%

ALL ROADS BY DISTRICT			0.25m SLR			0.5m SLR			0.75m SLR			1m SLR		
DISTRICT	Feet	Miles	Feet	Miles	% Affected	Feet	Miles	% Affected	Feet	Miles	% Affected	Feet	Miles	% Affected
Bodden Town	452507.31	85.70	50.34	0.01	0.011%	2130.90	0.40	0.471%	23977.63	4.54	5.299%	66059.14	12.51	14.598%
East End	151329.98	28.66	0.00	0.00	0.000%	0.00	0.00	0.000%	753.62	0.14	0.498%	3687.03	0.70	2.436%
George Town	692731.31	131.20	489.57	0.09	0.071%	2494.23	0.47	0.360%	16447.93	3.12	2.374%	78518.54	14.87	11.335%
North Side	149775.00	28.37	213.49	0.04	0.143%	989.90	0.19	0.661%	9963.29	1.89	6.652%	21732.25	4.12	14.510%
West Bay	334128.69	63.28	506.77	0.10	0.152%	2910.93	0.55	0.871%	7193.54	1.36	2.153%	19613.59	3.71	5.870%

ALL ROADS		0.25m SLR			0.5m SLR			0.75m SLR			1m SLR		
Feet	Miles	Feet	Miles	% Affected	Feet	Miles	% Affected	Feet	Miles	% Affected	Feet	Miles	% Affected
1780472.291	337.2105911	1260.17	0.24	0.071%	8525.97	1.61	0.479%	58336.01	11.05	3.276%	189610.55	35.91	10.649%

An analysis by district shows that George Town in comparison has the largest amount of linear miles of road. East End roads are not affected by SLR below 0.75m (2.5ft), and less than 2.5% are affected by 1m (3.3ft) SLR. Roughly 15% of roads in Bodden Town and North Side will be affected by 1m rise in sea level.

From an island perspective, the road infrastructure will cope with a 0.5m SLR with only 0.5% of all roads affected. At 0.75m, near the upper end of the expected SLR (0.8m or 2.6ft), the affect of this rise starts to have a more significant impact on the island's road network, just over 3% of all roads. However, there is a considerable increase in the amount of infrastructure impacted between the 0.75m and 1m SLR scenarios, with almost 11% of the current (2010) road infrastructure affected by the a 1m rise.

Map 10 Grand Cayman Buildings Affected by Sea-Level Rise

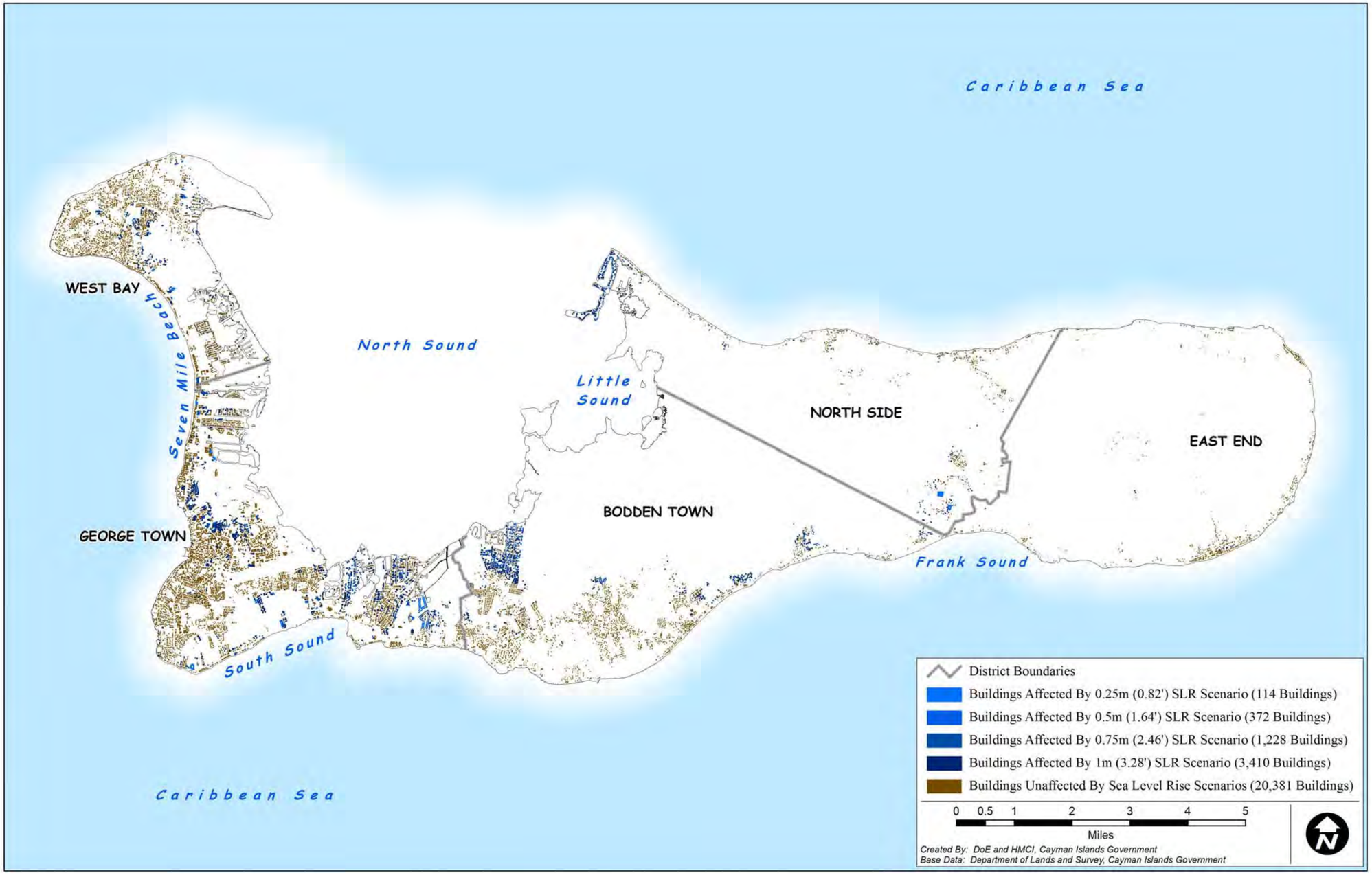


Table 9 Grand Cayman Buildings Affected by Sea-Level Rise Scenarios

		Buildings Affected By							
All Buildings		**0.25m SLR**		**0.50m SLR**		**0.75m SLR**		**1.0m SLR**	
Building Class / District	**# of Buildings**	**# of Buildings**	**% of Total**	**# of Buildings**	**% of Total**	**# of Buildings**	**% of Total**	**# of Buildings**	**% of Total**
Apartment/Condo Bodden Town	306	2	0.654%	3	0.980%	19	6.209%	55	17.974%
Apartment/Condo East End	41		0.000%		0.000%		0.000%		0.000%
Apartment/Condo George Town	1979	9	0.455%	30	1.516%	70	3.537%	273	13.795%
Apartment/Condo North Side	135	3	2.222%	9	6.667%	35	25.926%	56	41.481%
Apartment/Condo West Bay	592	7	1.182%	19	3.209%	35	5.912%	64	10.811%
Education/Religion Bodden Town	25		0.000%		0.000%		0.000%		0.000%
Education/Religion East End	11		0.000%		0.000%		0.000%		0.000%
Education/Religion George Town	190		0.000%		0.000%	2	1.053%	14	7.368%
Education/Religion North Side	11	1	9.091%	1	9.091%	1	9.091%	1	9.091%
Education/Religion West Bay	44		0.000%		0.000%	1	2.273%	3	6.818%
Government/Civic Bodden Town	53		0.000%		0.000%		0.000%		0.000%
Government/Civic East End	13		0.000%		0.000%		0.000%		0.000%
Government/Civic George Town	102		0.000%	1	0.980%	4	3.922%	6	5.882%
Government/Civic North Side	13		0.000%		0.000%		0.000%		0.000%
Government/Civic West Bay	19		0.000%		0.000%	1	5.263%	2	10.526%
Hotel/Tourism/Leisure Bodden Town	10		0.000%		0.000%		0.000%	1	10.000%
Hotel/Tourism/Leisure East End	72		0.000%		0.000%	2	2.778%	2	2.778%
Hotel/Tourism/Leisure George Town	154	2	1.299%	2	1.299%	14	9.091%	24	15.584%
Hotel/Tourism/Leisure North Side	31	1	3.226%	4	12.903%	16	51.613%	19	61.290%
Hotel/Tourism/Leisure West Bay	74		0.000%		0.000%	8	10.811%	12	16.216%
Industrial Bodden Town	8		0.000%		0.000%	1	12.500%	3	37.500%
Industrial East End	2		0.000%		0.000%		0.000%		0.000%
Industrial George Town	138	1	0.725%	2	1.449%	5	3.623%	17	12.319%
Industrial North Side	3		0.000%	1	33.333%	1	33.333%	2	66.667%
Mixed Use Bodden Town	5		0.000%		0.000%		0.000%		0.000%
Mixed Use East End	1		0.000%		0.000%		0.000%		0.000%
Mixed Use George Town	16		0.000%		0.000%	1	6.250%	7	43.750%
Mixed Use West Bay	4		0.000%		0.000%		0.000%	1	25.000%
Non-Addressable Bodden Town	1679	5	0.298%	21	1.251%	99	5.896%	264	15.724%
Non-Addressable East End	485		0.000%	3	0.619%	9	1.856%	20	4.124%

Non-Addressable George Town	2694	16	0.594%	39	1.448%	159	5.902%	480	17.817%
Non-Addressable North Side	482	3	0.622%	11	2.282%	41	8.506%	88	18.257%
Non-Addressable West Bay	1714	1	0.058%	10	0.583%	41	2.392%	133	7.760%
Residential Bodden Town	3117	7	0.225%	57	1.829%	230	7.379%	595	19.089%
Residential East End	620		0.000%		0.000%	5	0.806%	17	2.742%
Residential George Town	3956	44	1.112%	119	3.008%	264	6.673%	757	19.135%
Residential North Side	782	4	0.512%	15	1.918%	72	9.207%	175	22.379%
Residential West Bay	2771	2	0.072%	8	0.289%	37	1.335%	162	5.846%
Restaurant/Bar Bodden Town	8		0.000%		0.000%	1	12.500%	1	12.500%
Restaurant/Bar East End	7		0.000%		0.000%		0.000%		0.000%
Restaurant/Bar George Town	96	2	2.083%	2	2.083%	4	4.167%	8	8.333%
Restaurant/Bar North Side	3		0.000%		0.000%	1	33.333%	2	66.667%
Restaurant/Bar West Bay	31	1	3.226%	2	6.452%	4	12.903%	6	19.355%
Retail/Commercial/Professional Bodden Town	39		0.000%		0.000%		0.000%	1	2.564%
Retail/Commercial/Professional East End	22		0.000%		0.000%		0.000%	1	4.545%
Retail/Commercial/Professional George Town	773	2	0.259%	6	0.776%	18	2.329%	74	9.573%
Retail/Commercial/Professional North Side	13		0.000%		0.000%	1	7.692%	2	15.385%
Retail/Commercial/Professional West Bay	85		0.000%	2	2.353%	6	7.059%	10	11.765%
Unclassified Bodden Town	54		0.000%	1	1.852%	7	12.963%	10	18.519%
Unclassified East End	6		0.000%		0.000%		0.000%	1	16.667%
Unclassified George Town	118		0.000%	2	1.695%	9	7.627%	25	21.186%
Unclassified North Side	10		0.000%		0.000%		0.000%	2	20.000%
Unclassified West Bay	34		0.000%		0.000%	1	2.941%	2	5.882%
Utility Bodden Town	14		0.000%		0.000%		0.000%	1	7.143%
Utility East End	18		0.000%		0.000%		0.000%	1	5.556%
Utility George Town	68		0.000%		0.000%		0.000%	4	5.882%
Utility North Side	13		0.000%	1	7.692%	1	7.692%	3	23.077%
Utility West Bay	27	1	3.704%	1	3.704%	2	7.407%	3	11.111%

All Buildings		Buildings Affected By							
		0.25m SLR		0.50m SLR		0.75m SLR		1.0m SLR	
Building Class	# of Buildings	# of Buildings	% of Total	# of Buildings	% of Total	# of Buildings	% of Total	# of Buildings	% of Total
Apartment/Condo	3053	21	0.688%	61	1.998%	159	5.208%	448	14.674%
Education/Religion	281	1	0.356%	1	0.356%	4	1.423%	18	6.406%
Government/Civic	200	0	0.000%	1	0.500%	5	2.500%	8	4.000%
Hotel/Tourism/Leisure	341	3	0.880%	6	1.760%	40	11.730%	58	17.009%
Industrial	151	1	0.662%	3	1.987%	7	4.636%	22	14.570%
Mixed Use	26	0	0.000%	0	0.000%	1	3.846%	8	30.769%
Non-Addressable	7054	25	0.354%	84	1.191%	349	4.948%	985	13.964%
Residential	11246	57	0.507%	199	1.770%	608	5.406%	1706	15.170%
Restaurant/Bar	145	3	2.069%	4	2.759%	10	6.897%	17	11.724%
Retail/Commercial/Professional	932	2	0.215%	8	0.858%	25	2.682%	88	9.442%
Unclassified	222	0	0.000%	3	1.351%	17	7.658%	40	18.018%
Utility	140	1	0.714%	2	1.429%	3	2.143%	12	8.571%

		Buildings Affected By							
		0.25m SLR		0.50m SLR		0.75m SLR		1.0m SLR	
Grand Cayman Buildings	# of Buildings	# of Buildings	% of Total	# of Buildings	% of Total	# of Buildings	% of Total	# of Buildings	% of Total
All Buildings	23791	114	0.479%	372	1.564%	1228	5.162%	3410	14.333%

Note: Figures in these tables represent all buildings constructed or with valid building permits up to 2010.

A SLR of 0.25m (0.8ft) affects less than 0.5% of all buildings (2010 data) on Grand Cayman; including 3 hotels and 3 restaurants. This scenario exceeds the low range of SLR anticipated (0.12 m or 0.4 ft).

By the high range of SLR expected, 0.8m (2.6 ft), only 5% of all buildings on the island would be affected; but includes 40 hotel/tourism properties and at least 10 restaurants/bars, or nearly 12% and 7% of the building stock in each category respectively.

An additional rise of 20cm represented by the 1m SLR scenario shows a sizable increase in the number of total buildings (14.3%) affected when compared to the previous scenario; with 58 buildings for tourism use and 17 restaurants or bars impacted.

Map 11 Grand Cayman Building Values Affected by Sea-Level Rise

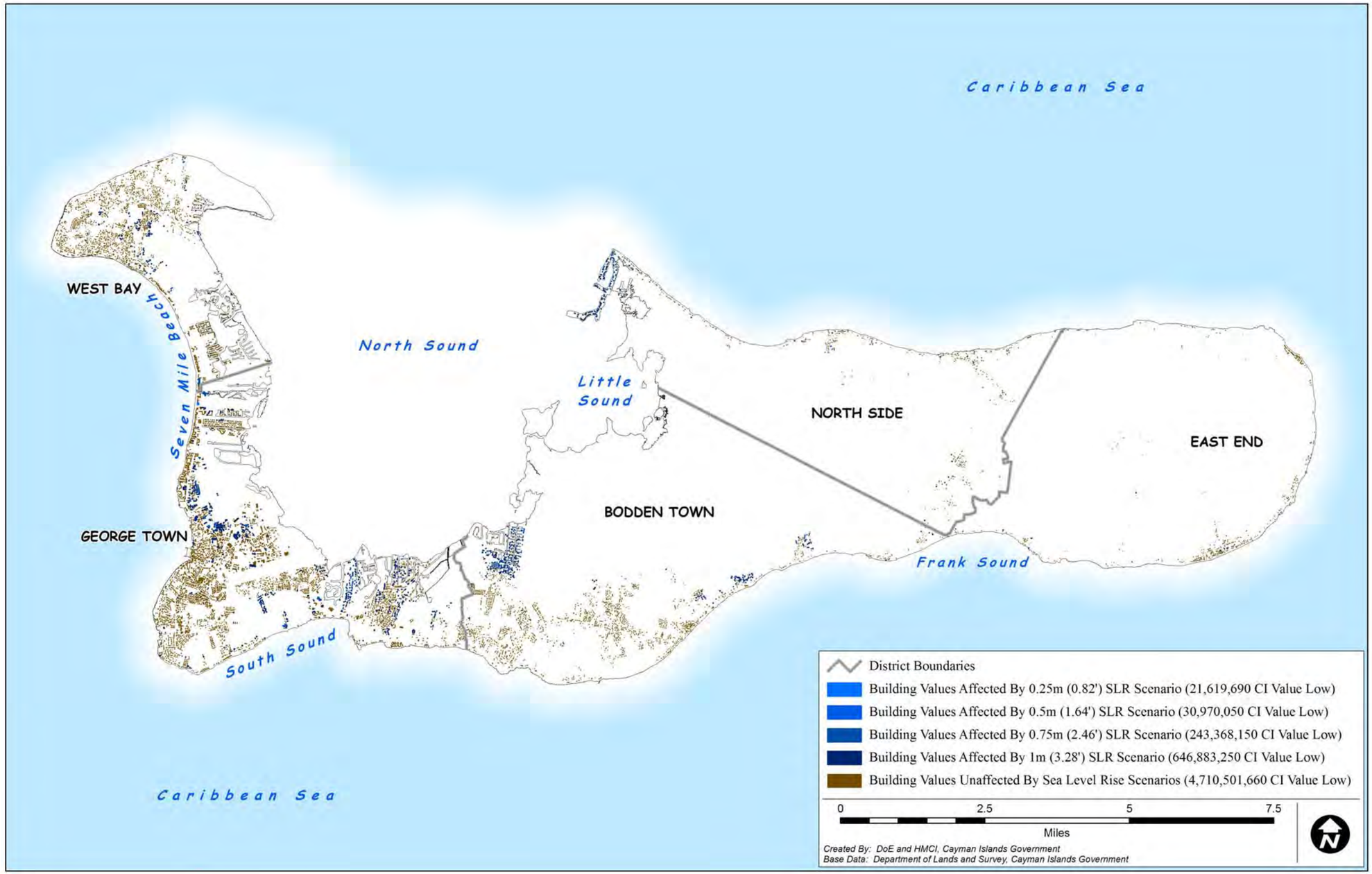


Table 10 Grand Cayman Value of Buildings Affected by Sea-Level Rise Scenarios

	All Buildings			Buildings Affected By										
				0.25m SLR			0.5m SLR			0.75m SLR			1.0m SLR		
Building Class / DISTRICT	# of Bldgs	CI Very Low	CI Very High	# of Bldgs	CI Very Low	CI Very High	# of Bldgs	CI Very Low	CI Very High	# of Bldgs	CI Very Low	CI Very High	# of Bldgs	CI Very Low	CI Very High
Apartment/Condo BODDEN TOWN	129	$45,064,580	$60,553,250							4	$725,200	$906,500	13	$3,224,480	$4,199,600
Apartment/Condo EAST END	24	$8,619,960	$12,186,660												
Apartment/Condo GEORGE TOWN	1595	$1,169,370,825	$1,643,984,740	1	$19,351,200	$29,026,800	5	$20,532,200	$30,798,300	22	$25,311,900	$37,417,050	188	$104,807,230	$149,131,900
Apartment/Condo NORTH SIDE	88	$47,360,120	$67,963,400							23	$8,565,650	$12,674,950	41	$19,117,200	$27,333,300
Apartment/Condo WEST BAY	447	$395,708,630	$548,115,025				1	$586,200	$879,300	6	$2,430,640	$3,497,900	18	$10,985,350	$15,205,700
Education/Religion BODDEN TOWN	19	$11,509,600	$15,974,740												
Education/Religion EAST END	10	$6,978,240	$9,464,840												
Education/Religion GEORGE TOWN	179	$186,349,200	$249,122,240							3	$2,967,640	$3,988,360	22	$37,220,840	$50,107,000
Education/Religion NORTH SIDE	8	$3,483,420	$4,776,990												
Education/Religion WEST BAY	25	$16,081,050	$22,307,060							1	$709,440	$945,920	2	$938,640	$1,251,520
Government/Civic BODDEN TOWN	40	$12,212,680	$17,600,080												
Government/Civic EAST END	8	$2,750,960	$3,620,680												
Government/Civic GEORGE TOWN	78	$134,706,080	$179,128,600							1	$190,000	$285,000	2	$402,480	$603,720
Government/Civic NORTH SIDE	11	$3,807,400	$5,251,800												
Government/Civic WEST BAY	13	$3,183,460	$4,600,990							1	$32,270	$46,100	2	$548,510	$734,420
Hotel/Tourism/Leisure BODDEN TOWN	9	$2,905,600	$3,863,840										1	$122,920	$175,600
Hotel/Tourism/Leisure EAST END	25	$72,465,560	$101,851,250												
Hotel/Tourism/Leisure GEORGE TOWN	83	$196,914,180	$269,254,090	1	$776,760	$970,950	1	$776,760	$970,950	7	$68,837,750	$92,184,050	12	$70,353,190	$94,125,810
Hotel/Tourism/Leisure NORTH SIDE	13	$3,597,760	$4,581,215							3	$513,080	$642,000	5	$1,902,840	$2,373,450
Hotel/Tourism/Leisure WEST BAY	19	$68,505,330	$94,009,750							1	$43,728,750	$58,305,000	4	$44,671,520	$59,519,540
Industrial GEORGE TOWN	81	$40,130,110	$53,448,760				1	$256,550	$384,825	3	$1,018,350	$1,422,125	14	$5,920,025	$8,047,075
Industrial NORTH SIDE	3	$462,500	$657,150				1	$36,150	$54,225	1	$36,150	$54,225	2	$242,900	$364,350
Mixed Use GEORGE TOWN	1	$500,600	$600,720												
Residential BODDEN TOWN	2197	$507,070,630	$710,138,210				13	$2,365,050	$3,260,820	115	$23,408,790	$32,257,500	336	$65,973,520	$91,240,420
Residential EAST END	465	$100,466,570	$138,498,890							3	$482,480	$652,640	14	$1,940,940	$2,678,220
Residential GEORGE TOWN	3222	$862,440,690	$1,200,189,840	1	$328,720	$469,600	8	$3,007,580	$4,187,910	102	$28,455,620	$39,577,130	468	$127,130,570	$178,355,190
Residential NORTH SIDE	581	$162,601,950	$228,283,640	2	$317,620	$418,450	8	$2,098,520	$2,733,620	45	$19,767,740	$28,581,380	115	$51,915,170	$76,555,450
Residential WEST BAY	2304	$500,792,010	$717,071,480				2	$233,180	$324,410	21	$5,166,410	$7,077,230	110	$25,260,860	$35,348,130
Restaurant/Bar BODDEN TOWN	5	$1,126,120	$1,458,320							1	$658,100	$789,720	1	$658,100	$789,720
Restaurant/Bar EAST END	4	$875,790	$1,140,180												
Restaurant/Bar GEORGE TOWN	68	$25,113,270	$32,097,180	1	$89,810	$128,300	1	$89,810	$128,300	1	$89,810	$128,300	4	$1,554,610	$1,939,500
Restaurant/Bar NORTH SIDE	4	$1,995,210	$2,530,190							1	$280,070	$400,100	2	$1,578,570	$1,958,300
Restaurant/Bar WEST BAY	14	$8,070,560	$10,921,120	1	$755,580	$1,079,400	1	$755,580	$1,079,400	2	$997,920	$1,425,600	4	$1,858,360	$2,654,800
Retail/Commercial/Professional BODDEN TOWN	31	$6,948,660	$9,161,840										1	$190,330	$271,900
Retail/Commercial/Professional EAST END	15	$3,437,020	$4,324,095										1	$183,600	$220,320
Retail/Commercial/Professional GEORGE TOWN	614	$675,932,685	$846,759,370							8	$7,801,120	$10,350,180	49	$66,270,950	$82,713,470
Retail/Commercial/Professional NORTH SIDE	13	$2,166,950	$2,834,020							1	$292,700	$351,240	2	$405,400	$486,480
Retail/Commercial/Professional WEST BAY	54	$32,304,650	$41,466,660				2	$232,470	$332,100	4	$900,570	$1,156,380	7	$1,433,270	$1,917,380
Unclassified GEORGE TOWN	2	$808,150	$1,154,500												
Utility BODDEN TOWN	6	$683,640	$1,011,150												
Utility EAST END	5	$872,185	$1,210,625												
Utility GEORGE TOWN	29	$27,577,625	$37,319,355												

Utility NORTH SIDE	6	$893,825	$1,189,220							1	$70,875	$94,500
Utility WEST BAY	8	$2,538,875	$3,512,530									

	All Buildings			Buildings Affected By											
				0.25m SLR			0.5m SLR			0.75m SLR			1.0m SLR		
Building Class	# of Bldgs	CI Very Low	CI Very High	# of Bldgs	CI Very Low	CI Very High	# of Bldgs	CI Very Low	CI Very High	# of Bldgs	CI Very Low	CI Very High	# of Bldgs	CI Very Low	CI Very High
Apartment/Condo	2283	$1,666,124,115	$2,332,803,075	1	$19,351,200	$29,026,800	6	$21,118,400	$31,677,600	55	$37,033,390	$54,496,400	260	$138,134,260	$195,870,500
Education/Religion	241	$224,401,510	$301,645,870	0	$0	$0	0	$0	$0	4	$3,677,080	$4,934,280	24	$38,159,480	$51,358,520
Government/Civic	150	$156,660,580	$210,202,150	0	$0	$0	0	$0	$0	2	$222,270	$331,100	4	$950,990	$1,338,140
Hotel/Tourism/Leisure	149	$344,388,430	$473,560,145	1	$776,760	$970,950	1	$776,760	$970,950	11	$113,079,580	$151,131,050	22	$117,050,470	$156,194,400
Industrial	84	$40,592,610	$54,105,910	0	$0	$0	2	$292,700	$439,050	4	$1,054,500	$1,476,350	16	$6,162,925	$8,411,425
Mixed Use	1	$500,600	$600,720	0	$0	$0	0	$0	$0	0	$0	$0	0	$0	$0
Residential	8769	$2,133,371,850	$2,994,182,060	3	$646,340	$888,050	31	$7,704,330	$10,506,760	286	$77,281,040	$108,145,880	1043	$272,221,060	$384,177,410
Restaurant/Bar	95	$37,180,950	$48,146,990	2	$845,390	$1,207,700	2	$845,390	$1,207,700	5	$2,025,900	$2,743,720	11	$5,649,640	$7,342,320
Retail/Commercial/Professional	727	$720,789,965	$904,545,985	0	$0	$0	2	$232,470	$332,100	13	$8,994,390	$11,857,800	60	$68,483,550	$85,609,550
Unclassified	2	$808,150	$1,154,500	0	$0	$0	0	$0	$0	0	$0	$0	0	$0	$0
Utility	54	$32,566,150	$44,242,880	0	$0	$0	0	$0	$0	0	$0	$0	1	$70,875	$94,500

				Buildings Affected By											
				0.25m SLR			0.5m SLR			0.75m SLR			1.0m SLR		
Grand Cayman Buildings	# of Bldgs	CI Very Low	CI Very High	# of Bldgs	CI Very Low	CI Very High	# of Bldgs	CI Very Low	CI Very High	# of Bldgs	CI Very Low	CI Very High	# of Bldgs	CI Very Low	CI Very High
All Buildings	12555	$5,357,384,910	$7,365,190,285	7	$21,619,690	$32,093,500	44	$30,970,050	$45,134,160	380	$243,368,150	$335,116,580	1441	$646,883,250	$890,396,765

Note: Valuation figures in these tables represent only buildings constructed by 2008, and do not include ancillary structures.

Only 7 buildings in total would be affected by a 0.25m SLR with an estimated damage or loss value ranging from $21,619,690 to $32,093,500. An analysis by building class indicates at least 1 hotel in George Town valued between $776,760 and $970,950 would be affected, in addition to 2 restaurants or bars with combined value of $854,390 to $1.2 million.

As would be expected, the upper mid-range SLR of 0.75m shows a significant increase in the number of buildings affected (380). Whilst the majority of these are in the residential sector, 11 hotel/tourism class buildings and 5 restaurants/bars are impacted representing between $115 and $154 million in damages.

An additional 25cm rise in sea level represented by the 1m SLR scenario indicates a 20-fold increase over the 0.25m SLR scenario in the number of hotels or tourism facilities affected, accounting for some $156 million in total damages. There is a 5-fold increase in the number of restaurants and bars impacted, which equates to upwards of $7 million should total loss occur.

Map 12 Grand Cayman Utilities Affected by Sea-Level Rise

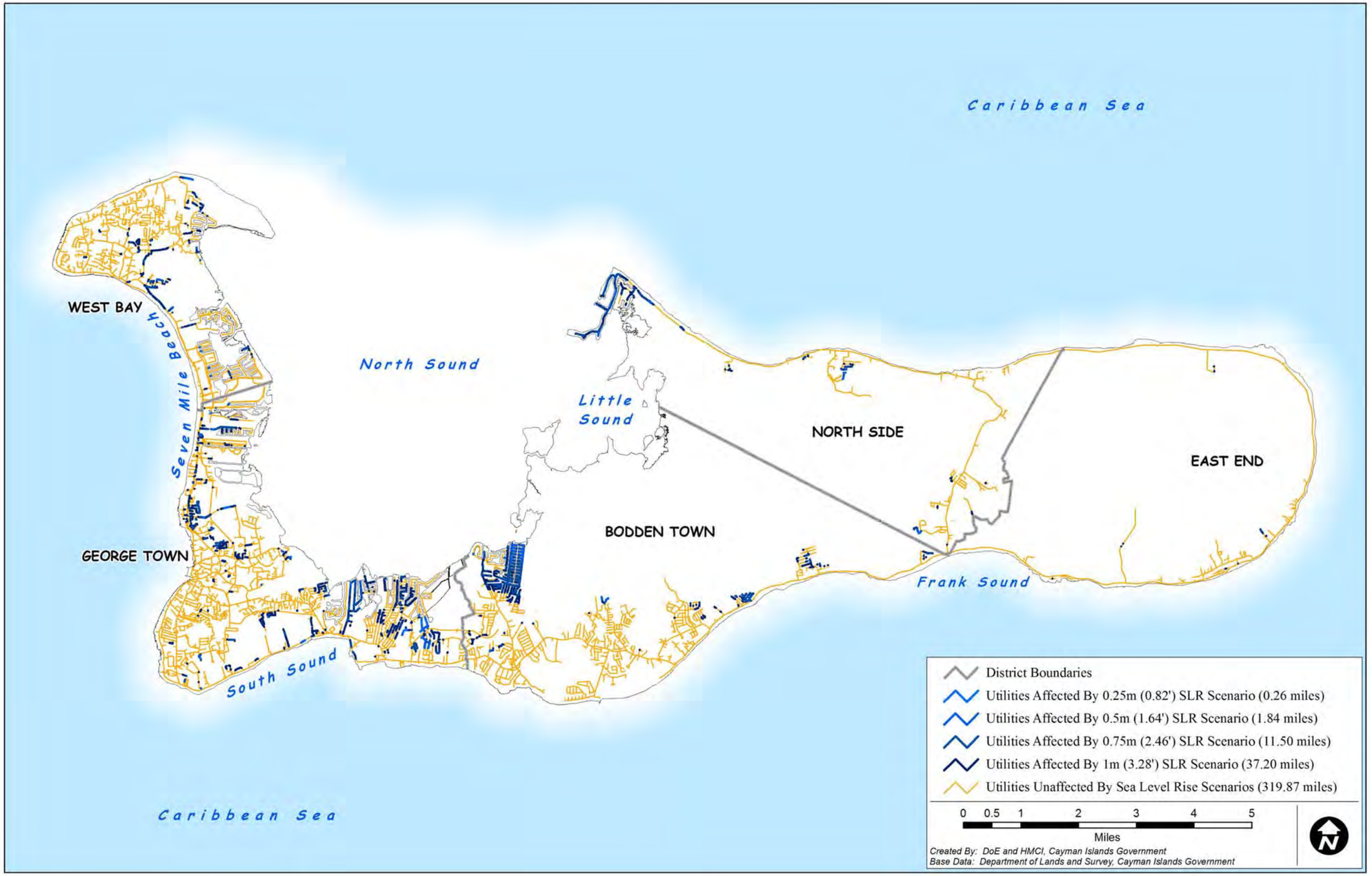


Table 11 Grand Cayman Utilities Affected by Sea-Level Rise Scenarios

			Utilities Affected By											
	All Utilities		0.25m SLR			0.50m SLR			0.75m SLR			1.0m SLR		
District / Line Type / Company	Length (ft)	Length (miles)	Length (ft)	Length (miles)	% of Total	Length (ft)	Length (miles)	% of Total	Length (ft)	Length (miles)	% of Total	Length (ft)	Length (miles)	% of Total
Bodden Town WATER WA	441,364.39	83.59	116.45	0.02	0.03%	3,290.57	0.62	0.75%	23,488.80	4.45	5.32%	58,829.58	11.14	13.33%
East End WATER WA	116,709.13	22.10	0.00	0.00	0.00%	0.00	0.00	0.00%	65.30	0.01	0.06%	362.74	0.07	0.31%
George Town SEWER CWC	67,861.17	12.85	28.61	0.01	0.04%	502.11	0.10	0.74%	1,103.64	0.21	1.63%	8,070.65	1.53	11.89%
George Town WATER CWC	103,344.46	19.57	44.77	0.01	0.04%	194.13	0.04	0.19%	3,567.83	0.68	3.45%	14,916.19	2.83	14.43%
George Town WATER WA	645,144.31	122.19	992.11	0.19	0.15%	3,724.75	0.71	0.58%	17,060.66	3.23	2.64%	71,169.39	13.48	11.03%
North Side WATER WA	145,920.24	27.64	28.60	0.01	0.02%	1,140.21	0.22	0.78%	10,770.25	2.04	7.38%	24,250.69	4.59	16.62%
West Bay SEWER CWC	36,685.02	6.95	31.16	0.01	0.08%	48.86	0.01	0.13%	159.11	0.03	0.43%	530.50	0.10	1.45%
West Bay WATER CWC	328,285.00	62.18	115.32	0.02	0.04%	822.75	0.16	0.25%	4,496.30	0.85	1.37%	18,273.12	3.46	5.57%

			Utilities Affected By											
	All Utilities		0.25m SLR			0.50m SLR			0.75m SLR			1.0m SLR		
Line Type / Company	Length (ft)	Length (miles)	Length (ft)	Length (miles)	% of Total	Length (ft)	Length (miles)	% of Total	Length (ft)	Length (miles)	% of Total	Length (ft)	Length (miles)	% of Total
WATER WA	1,349,138.07	255.52	1,137.16	0.22	0.08%	8,155.53	1.54	0.60%	51,385.01	9.73	3.81%	154,612.40	29.28	11.46%
SEWER CWC	104,546.19	19.80	59.77	0.01	0.06%	550.97	0.10	0.53%	1,262.75	0.24	1.21%	8,601.14	1.63	8.23%
WATER CWC	431,629.46	81.75	160.09	0.03	0.04%	1,016.88	0.19	0.24%	8,064.13	1.53	1.87%	33,189.31	6.29	7.69%

			Utilities Affected By											
	All Utilities		0.25m SLR			0.50m SLR			0.75m SLR			1.0m SLR		
Grand Cayman Utilities	Length (ft)	Length (miles)	Length (ft)	Length (miles)	% of Total	Length (ft)	Length (miles)	% of Total	Length (ft)	Length (miles)	% of Total	Length (ft)	Length (miles)	% of Total
Grand Cayman Utilities	1,885,313.72	357.07	1,357.01	0.26	0.07%	9,723.38	1.84	0.52%	60,711.90	11.50	3.22%	196,402.86	37.20	10.42%

Map 13 Grand Cayman Critical Infrastructure Affected by Sea-Level Rise

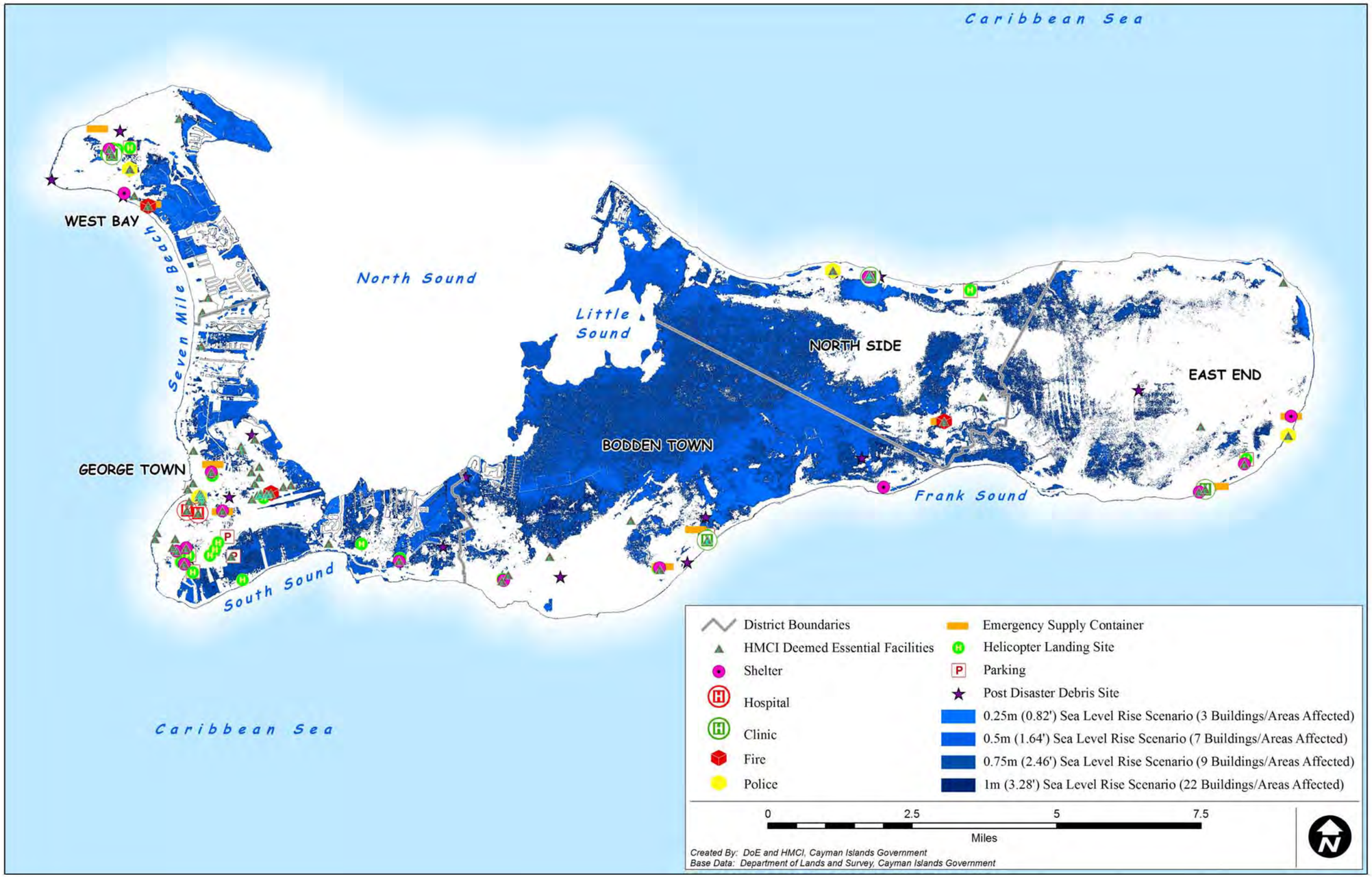


Table 12 Grand Cayman Critical Infrastructure Affected by Sea-Level Rise Scenarios

		Buildings and Areas Affected By							
All Buildings and Areas		**0.25m SLR**		**0.50m SLR**		**0.75m SLR**		**1.0m SLR**	
Building/Area Type	**# of Bldgs/Areas**	**# of Bldgs/Areas**	**% of Total**	**# of Bldgs/Areas**	**% of Total**	**# of Bldgs/Areas**	**% of Total**	**# of Bldgs/Areas**	**% of Total**
Clinic	4								
Emergency Supply Container	9	1	11.11%	1	11.11%	1	11.11%	3	33.33%
Fire	3							1	33.33%
Helicopter Landing Site	16					1	6.25%	4	25.00%
HMCI Deemed Essential Facilities	109							4	3.67%
Hospital	2								
Parking	11			1	9.09%	1	9.09%	2	18.18%
Police	5								
Post Disaster Debris Site	16	2	12.50%	5	31.25%	6	37.50%	8	50.00%
Shelter	15								

		Buildings and Areas Affected By							
All Buildings and Areas		**0.25m SLR**		**0.50m SLR**		**0.75m SLR**		**1.0m SLR**	
All Buildings and Areas	**# of Bldgs/Areas**	**# of Bldgs/Areas**	**% of Total**	**# of Bldgs/Areas**	**% of Total**	**# of Bldgs/Areas**	**% of Total**	**# of Bldgs/Areas**	**% of Total**
All Buildings and Areas	190	3	1.58%	7	3.68%	9	4.74%	22	11.58%

Under the 0.25m SLR scenario 1 emergency supply container and 2 post-disaster debris sites on Grand Cayman would be impacted in some way. The cost of immediately relocating these facilities to less vulnerable areas is minimal.

A total of 22 critical infrastructure facilities, at least one in almost every category, would be impacted under the 1m SLR scenario. The greatest number of facilities affected would be the post-disaster debris sites (8), followed by helicopter landing sites (4) and HMCI essential facilities (4). Plans should get underway to address the vulnerability of this infrastructure by relocating to less risk-prone areas or fortifying against sea-level rise and flooding.

Map 14 Grand Cayman Land Use Zones Affected by Sea-Level Rise

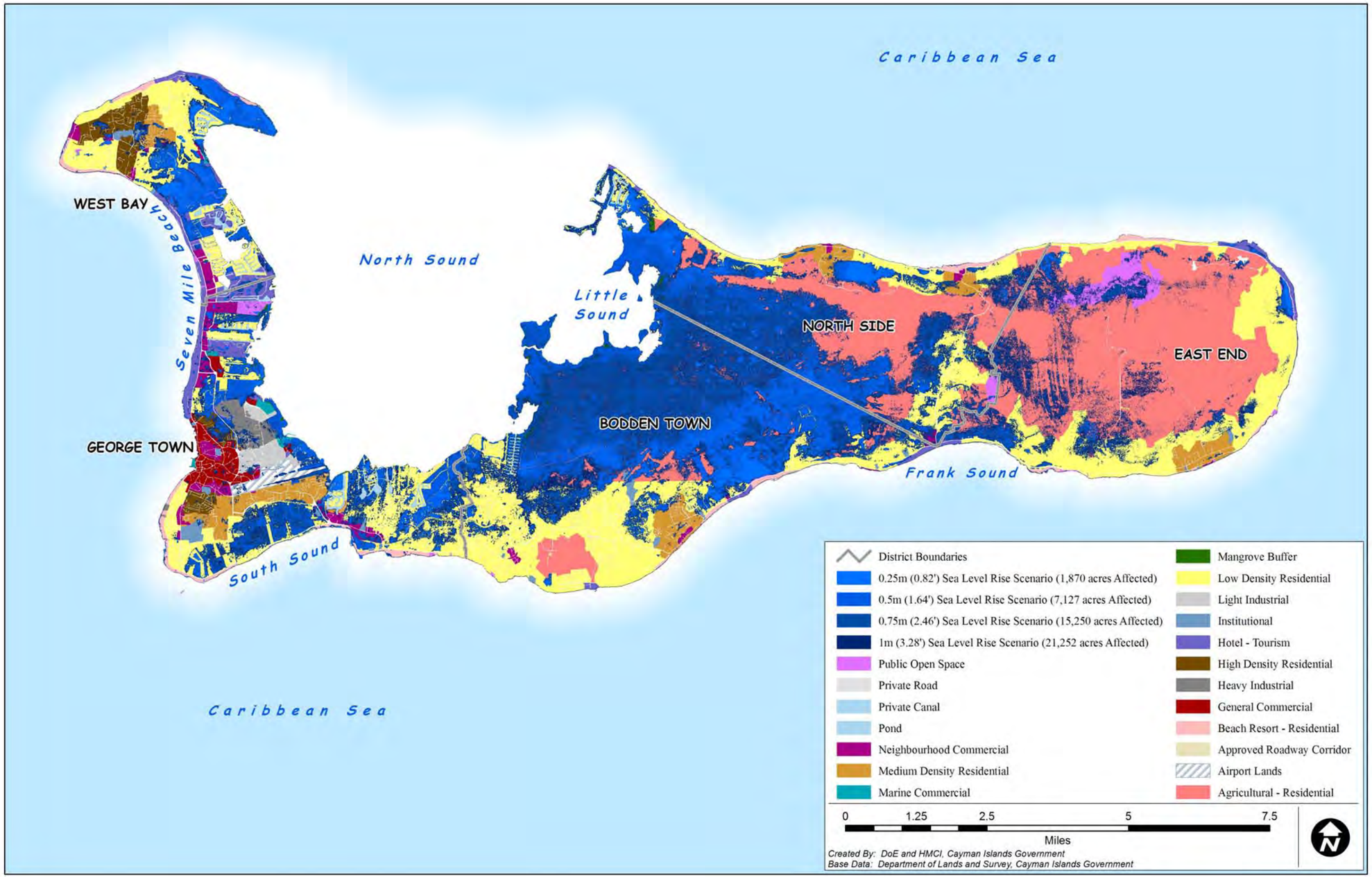


Table 13 Grand Cayman Land Use Zones Affected by Sea-Level Rise

		Planning Zones Affected By							
Planning Zone		0.25m SLR		0.50m SLR		0.75m SLR		1.0m SLR	
District / Planning Zone	Area (acres)	Area (acres)	% of Total	Area (acres)	% of Total	Area (acres)	% of Total	Area (acres)	% of Total
Bodden Town Agricultural/Residential	7203.928	488.502	6.78%	2134.285	29.63%	5273.053	73.20%	6380.321	88.57%
Bodden Town Approved Roadway Corridor	0.783	0	0.00%	0	0.00%	0	0.00%	0.000	0.00%
Bodden Town Beach Resort/Residential	63.452	0.345	0.54%	1.010	1.59%	2.012	3.17%	3.366	5.30%
Bodden Town Hotel/Tourism	74.624	0.639	0.86%	3.223	4.32%	5.907	7.92%	10.286	13.78%
Bodden Town Institutional	95.242	0.562	0.59%	6.717	7.05%	10.438	10.96%	15.963	16.76%
Bodden Town Low Density Residential	4745.923	128.739	2.71%	546.683	11.52%	1055.294	22.24%	1658.854	34.95%
Bodden Town Mangrove Buffer	991.500	12.833	1.29%	380.036	38.33%	848.934	85.62%	959.294	96.75%
Bodden Town Medium Density Residential	325.223	0.129	0.04%	10.247	3.15%	18.339	5.64%	33.217	10.21%
Bodden Town Neighbourhood Commercial	50.256	0.037	0.07%	0.169	0.34%	1.583	3.15%	4.684	9.32%
Bodden Town Ponds	114.582	110.250	96.22%	113.292	98.87%	114.239	99.70%	114.455	99.89%
Bodden Town Private Canals	20.727	0.083	0.40%	0.238	1.15%	0.402	1.94%	0.552	2.66%
Bodden Town Private Roads	163.533	0.097	0.06%	0.680	0.42%	3.898	2.38%	18.092	11.06%
Bodden Town Public Open Space	73.944	16.333	22.09%	51.886	70.17%	63.696	86.14%	65.931	89.16%
East End Agricultural/Residential	8579.097	9.796	0.11%	79.292	0.92%	433.682	5.06%	1656.062	19.30%
East End Beach Resort/Residential	75.672	0.575	0.76%	1.772	2.34%	3.672	4.85%	6.261	8.27%
East End Hotel/Tourism	141.396	3.407	2.41%	12.820	9.07%	26.429	18.69%	37.077	26.22%
East End Institutional	15.777	0.002	0.01%	0.011	0.07%	0.097	0.61%	1.208	7.66%
East End Low Density Residential	2919.873	6.344	0.22%	34.296	1.17%	148.919	5.10%	444.721	15.23%
East End Medium Density Residential	248.438	0.016	0.01%	0.394	0.16%	2.246	0.90%	5.193	2.09%
East End Neighbourhood Commercial	3.724	0.014	0.37%	0.225	6.04%	0.478	12.85%	0.613	16.46%
East End Ponds	26.584	19.285	72.54%	24.733	93.04%	25.764	96.92%	26.157	98.39%
East End Private Roads	22.436	0	0.00%	0	0.00%	0.160	0.72%	0.882	3.93%
East End Public Open Space	736.088	3.459	0.47%	21.401	2.91%	105.208	14.29%	268.552	36.48%
George Town Airport Lands	289.444	1.752	0.61%	16.828	5.81%	48.980	16.92%	83.259	28.77%
George Town Approved Roadway Corridor	12.029	0.000	0.00%	0.067	0.55%	0.331	2.75%	2.844	23.64%
George Town Beach Resort/Residential	185.973	6.677	3.59%	13.347	7.18%	21.282	11.44%	30.777	16.55%
George Town General Commercial	461.345	2.971	0.64%	13.706	2.97%	27.386	5.94%	51.910	11.25%
George Town Heavy Industrial	350.038	2.913	0.83%	30.106	8.60%	56.429	16.12%	98.846	28.24%
George Town High Density Residential	245.417	2.909	1.19%	28.092	11.45%	50.350	20.52%	79.337	32.33%
George Town Hotel/Tourism	427.464	9.588	2.24%	19.162	4.48%	42.471	9.94%	62.859	14.71%
George Town Institutional	140.616	0.600	0.43%	5.013	3.57%	8.436	6.00%	17.338	12.33%
George Town Light Industrial	302.276	7.812	2.58%	22.406	7.41%	41.354	13.68%	58.216	19.26%
George Town Low Density Residential	3610.164	127.066	3.52%	716.281	19.84%	1445.054	40.03%	2050.158	56.79%
George Town Mangrove Buffer	140.939	28.845	20.47%	89.215	63.30%	110.094	78.12%	120.312	85.36%
George Town Marine Commercial	93.222	10.937	11.73%	14.502	15.56%	18.327	19.66%	26.516	28.44%
George Town Medium Density Residential	552.345	0.345	0.06%	6.043	1.09%	17.077	3.09%	41.994	7.60%
George Town Neighbourhood Commercial	484.255	5.531	1.14%	32.254	6.66%	66.589	13.75%	113.510	23.44%
George Town Private Canals	172.494	2.056	1.19%	3.558	2.06%	4.953	2.87%	6.042	3.50%
George Town Private Roads	178.517	0.865	0.48%	3.579	2.00%	13.498	7.56%	40.531	22.70%
George Town Public Open Space	92.743	3.241	3.50%	7.890	8.51%	11.510	12.41%	16.099	17.36%
North Side Agricultural/Residential	6420.996	213.045	3.32%	1098.748	17.11%	2817.376	43.88%	3651.367	56.87%
North Side Approved Roadway Corridor	8.470	0.174	2.06%	0.804	9.49%	1.697	20.03%	4.773	56.35%
North Side Beach Resort/Residential	60.099	0.563	0.94%	1.642	2.73%	2.948	4.90%	4.400	7.32%
North Side Hotel/Tourism	14.634	0.277	1.89%	0.597	4.08%	1.364	9.32%	4.796	32.77%

North Side Institutional	6.536	0	0.00%	0.004	0.06%	0.156	2.38%	1.481	22.66%
North Side Low Density Residential	2130.383	58.059	2.73%	253.786	11.91%	588.352	27.62%	944.926	44.35%
North Side Mangrove Buffer	366.284	24.125	6.59%	227.862	62.21%	319.485	87.22%	342.946	93.63%
North Side Medium Density Residential	374.623	3.564	0.95%	18.812	5.02%	44.587	11.90%	77.478	20.68%
North Side Neighbourhood Commercial	74.236	0.222	0.30%	3.106	4.18%	18.600	25.06%	31.824	42.87%
North Side Ponds	141.596	105.394	74.43%	138.712	97.96%	141.459	99.90%	141.591	100.00%
North Side Private Canals	34.672	0.750	2.16%	1.309	3.78%	1.718	4.95%	1.949	5.62%
North Side Private Roads	46.820	0.031	0.07%	0.279	0.60%	1.786	3.81%	8.006	17.10%
North Side Public Open Space	6.399	0.135	2.11%	0.740	11.57%	2.850	44.53%	3.285	51.33%
West Bay Approved Roadway Corridor	2.309	0	0.00%	0.004	0.16%	0.060	2.61%	0.190	8.23%
West Bay Beach Resort/Residential	107.145	4.428	4.13%	8.817	8.23%	12.238	11.42%	16.268	15.18%
West Bay High Density Residential	448.252	0.746	0.17%	3.333	0.74%	15.776	3.52%	37.933	8.46%
West Bay Hotel/Tourism	787.314	174.001	22.10%	330.577	41.99%	399.245	50.71%	451.139	57.30%
West Bay Institutional	54.498	0.931	1.71%	2.718	4.99%	6.324	11.60%	10.188	18.69%
West Bay Low Density Residential	1861.675	204.838	11.00%	415.136	22.30%	520.977	27.98%	627.033	33.68%
West Bay Mangrove Buffer	80.427	19.151	23.81%	59.742	74.28%	70.228	87.32%	72.792	90.51%
West Bay Marine Commercial	16.631	1.727	10.38%	4.572	27.49%	6.657	40.03%	9.820	59.05%
West Bay Medium Density Residential	174.461	1.261	0.72%	3.676	2.11%	13.126	7.52%	39.150	22.44%
West Bay Neighbourhood Commercial	162.652	1.901	1.17%	5.835	3.59%	17.488	10.75%	28.235	17.36%
West Bay Ponds	7.961	6.351	79.77%	6.660	83.66%	6.890	86.54%	7.166	90.01%
West Bay Private Canals	105.941	0.529	0.50%	1.017	0.96%	1.480	1.40%	2.313	2.18%
West Bay Private Roads	133.354	0.290	0.22%	0.679	0.51%	1.944	1.46%	6.495	4.87%
West Bay Public Open Space	130.887	32.233	24.63%	91.876	70.20%	106.652	81.48%	111.886	85.48%

Continued Table 13 Grand Cayman Land Use Zones Affected by Sea-Level Rise

		Planning Zones Affected By							
Planning Zone		0.25m SLR		0.50m SLR		0.75m SLR		1.0m SLR	
Planning Zone	Area (acres)	Area (acres)	% of Total	Area (acres)	% of Total	Area (acres)	% of Total	Area (acres)	% of Total
Agricultural/Residential	22204.021	711.342	3.20%	3312.325	14.92%	8524.110	38.39%	11687.750	52.64%
Airport Lands	289.444	1.752	0.61%	16.828	5.81%	48.980	16.92%	83.259	28.77%
Approved Roadway Corridor	23.590	0.174	0.74%	0.874	3.71%	2.087	8.85%	7.807	33.09%
Beach Resort/Residential	492.342	12.588	2.56%	26.589	5.40%	42.150	8.56%	61.072	12.40%
General Commercial	461.345	2.971	0.64%	13.706	2.97%	27.386	5.94%	51.910	11.25%
Heavy Industrial	350.038	2.913	0.83%	30.106	8.60%	56.429	16.12%	98.846	28.24%
High Density Residential	693.668	3.656	0.53%	31.425	4.53%	66.126	9.53%	117.270	16.91%
Hotel/Tourism	1445.432	187.912	13.00%	366.379	25.35%	475.417	32.89%	566.157	39.17%
Institutional	312.669	2.095	0.67%	14.464	4.63%	25.450	8.14%	46.179	14.77%
Light Industrial	302.276	7.812	2.58%	22.406	7.41%	41.354	13.68%	58.216	19.26%
Low Density Residential	15268.017	525.046	3.44%	1966.182	12.88%	3758.596	24.62%	5725.692	37.50%
Mangrove Buffer	1579.150	84.954	5.38%	756.853	47.93%	1348.741	85.41%	1495.343	94.69%
Marine Commercial	109.853	12.664	11.53%	19.074	17.36%	24.984	22.74%	36.337	33.08%
Medium Density Residential	1675.091	5.316	0.32%	39.172	2.34%	95.374	5.69%	197.031	11.76%
Neighbourhood Commercial	775.123	7.704	0.99%	41.590	5.37%	104.739	13.51%	178.866	23.08%
Ponds	290.722	241.279	82.99%	283.397	97.48%	288.351	99.18%	289.369	99.53%
Private Canals	333.835	3.418	1.02%	6.122	1.83%	8.553	2.56%	10.855	3.25%
Private Roads	544.659	1.282	0.24%	5.217	0.96%	21.287	3.91%	74.005	13.59%
Public Open Space	1040.062	55.402	5.33%	173.794	16.71%	289.916	27.87%	465.752	44.78%

		Planning Zones Affected By							
All Planning Zones		0.25m SLR		0.50m SLR		0.75m SLR		1.0m SLR	
All Planning Zones	Area (acres)	Area (acres)	% of Total	Area (acres)	% of Total	Area (acres)	% of Total	Area (acres)	% of Total
All Planning Zones	48191.334	1870.280	3.88%	7126.503	14.79%	15250.030	31.64%	21251.715	44.10%

Under the 0.25m SLR scenario, 13% of all land currently zoned hotel/Tourism is in some way affected. Roughly 39% of all Hotel/Tourism land use is impacted by a 1m SLR.

Nearly 4% of all land zoned is affected by a 0.25m SLR, while a 1m SLR affects some 44% of all land zoned.

Map 15 Grand Cayman Land Cover and Environmental Resources Affected by Sea-Level Rise

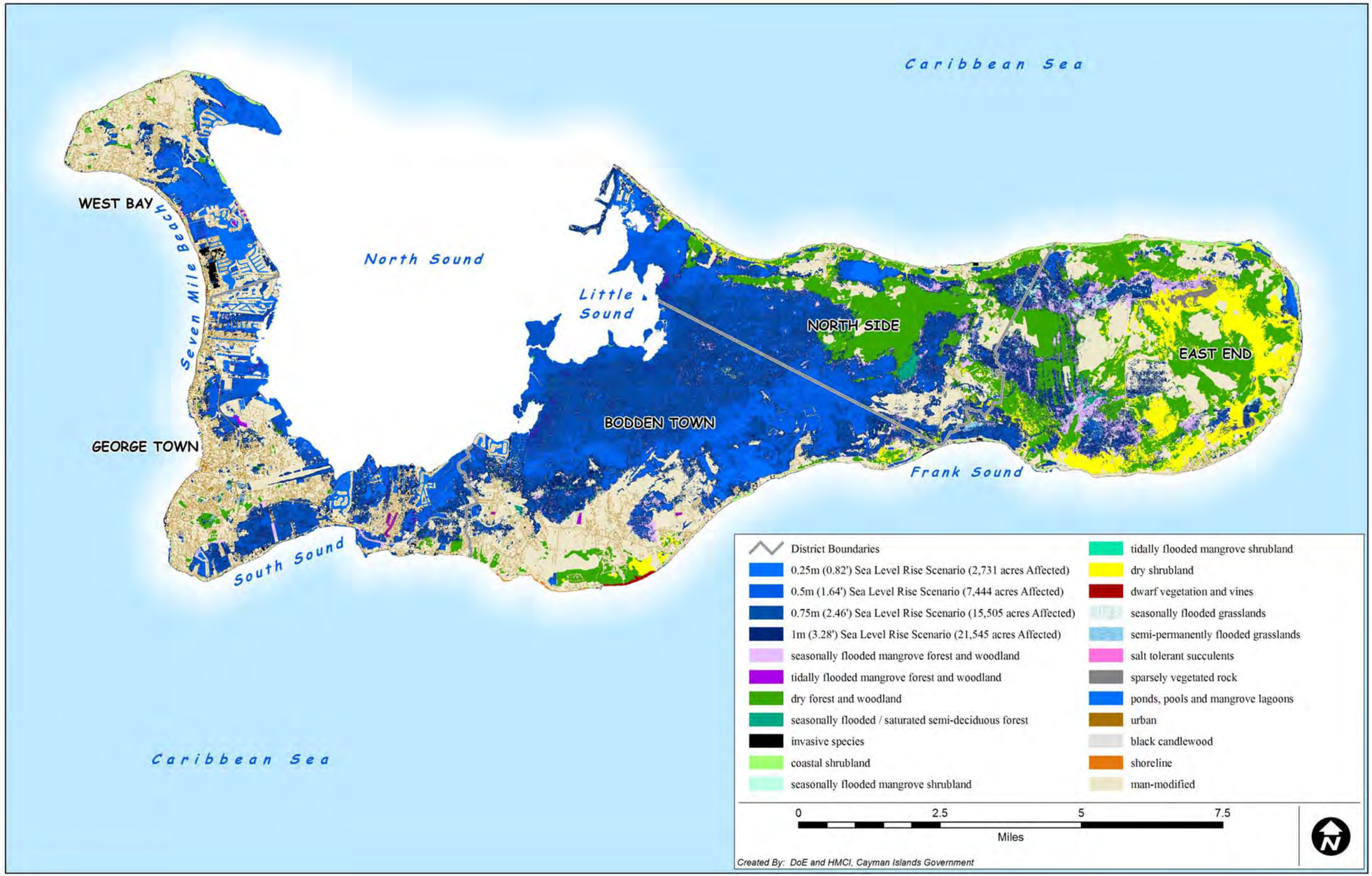


Table 14 Grand Cayman Land Cover and Environmental Resources Affected by Sea-Level Rise Scenarios

		Landcover Affected By							
All Landcover		0.25m SLR		0.50m SLR		0.75m SLR		1.0m SLR	
District / Landcover Class	Area (acres)	Area (acres)	% of Total	Area (acres)	% of Total	Area (acres)	% of Total	Area (acres)	% of Total
Bodden Town coastal shrubland	29.311	0.000	0.00%	0.023	0.08%	0.254	0.86%	1.279	4.36%
Bodden Town dry forest and woodland	407.253	0.013	0.00%	0.254	0.06%	3.916	0.96%	11.863	2.91%
Bodden Town dry shrubland	156.445	1.480	0.95%	4.548	2.91%	12.281	7.85%	24.265	15.51%
Bodden Town dwarf vegetation and vines	26.590	0.001	0.00%	0.001	0.01%	0.002	0.01%	0.003	0.01%
Bodden Town invasive species	43.088	0.535	1.24%	3.634	8.43%	14.559	33.79%	21.641	50.22%
Bodden Town man-modified	5049.896	48.590	0.96%	268.942	5.33%	884.490	17.52%	1616.379	32.01%
Bodden Town ponds, pools and mangrove lagoons	567.601	306.997	54.09%	536.470	94.52%	560.056	98.67%	564.563	99.46%
Bodden Town salt tolerant succulents	13.015	0.317	2.44%	2.345	18.02%	10.723	82.39%	12.878	98.95%
Bodden Town seasonally flooded / saturated semi-deciduous forest	52.361	0.094	0.18%	2.075	3.96%	11.361	21.70%	33.095	63.21%
Bodden Town seasonally flooded mangrove forest and woodland	5824.304	381.668	6.55%	1973.053	33.88%	4725.659	81.14%	5595.271	96.07%
Bodden Town seasonally flooded mangrove shrubland	214.675	3.462	1.61%	45.682	21.28%	164.099	76.44%	203.729	94.90%
Bodden Town semi-permanently flooded grasslands V.A.1.N.h	5.467	0.612	11.19%	1.878	34.34%	4.673	85.49%	4.983	91.16%
Bodden Town shoreline	39.294	6.623	16.86%	5.160	13.13%	8.658	22.03%	11.849	30.15%
Bodden Town tidally flooded mangrove forest and woodland	964.130	23.147	2.40%	324.533	33.66%	815.862	84.62%	930.071	96.47%
Bodden Town tidally flooded mangrove shrubland	287.664	59.230	20.59%	116.663	40.56%	238.516	82.91%	279.003	96.99%
Bodden Town urban	384.937	0.695	0.18%	3.077	0.80%	18.200	4.73%	50.684	13.17%
East End black candlewood	4.476	0.000	0.00%	0.000	0.00%	0.000	0.00%	0.000	0.00%
East End coastal shrubland	107.251	0.928	0.87%	2.195	2.05%	3.431	3.20%	4.966	4.63%
East End dry forest and woodland	4136.219	0.038	0.00%	0.907	0.02%	24.562	0.59%	266.140	6.43%
East End dry shrubland	2548.154	0.271	0.01%	2.064	0.08%	25.357	1.00%	163.348	6.41%
East End invasive species	17.206	0.930	5.40%	1.143	6.64%	2.168	12.60%	3.742	21.75%
East End man-modified	3180.942	1.688	0.05%	24.629	0.77%	140.613	4.42%	443.668	13.95%
East End ponds, pools and mangrove lagoons	135.680	32.725	24.12%	79.096	58.30%	125.766	92.69%	132.704	97.81%
East End seasonally flooded / saturated semi-deciduous forest	31.936	0.000	0.00%	0.000	0.00%	0.010	0.03%	4.761	14.91%
East End seasonally flooded grasslands V.A.1.N.g	99.597	0.010	0.01%	0.492	0.49%	31.964	32.09%	74.200	74.50%
East End seasonally flooded mangrove forest and woodland	1912.343	5.046	0.26%	49.899	2.61%	300.650	15.72%	1068.218	55.86%
East End seasonally flooded mangrove shrubland	369.617	0.353	0.10%	7.637	2.07%	71.169	19.25%	221.613	59.96%
East End semi-permanently flooded grasslands V.A.1.N.h	58.527	0.008	0.01%	1.458	2.49%	7.891	13.48%	29.416	50.26%
East End shoreline	42.404	11.542	27.22%	10.700	25.23%	17.697	41.74%	24.104	56.84%
East End sparsely vegetated rock	146.822	0.003	0.00%	0.056	0.04%	3.520	2.40%	20.228	13.78%
East End urban	102.196	0.000	0.00%	0.072	0.07%	0.452	0.44%	1.509	1.48%
George Town coastal shrubland	6.835	0.001	0.02%	0.022	0.33%	0.118	1.72%	0.235	3.43%
George Town dry forest and woodland	188.997	0.023	0.01%	0.945	0.50%	8.074	4.27%	28.973	15.33%
George Town invasive species	129.407	2.056	1.59%	7.798	6.03%	25.352	19.59%	52.845	40.84%
George Town man-modified	4594.955	42.953	0.93%	172.998	3.76%	505.987	11.01%	1079.262	23.49%
George Town ponds, pools and mangrove lagoons	230.649	86.589	37.54%	169.622	73.54%	201.073	87.18%	210.188	91.13%
George Town seasonally flooded mangrove forest and woodland	843.271	15.390	1.83%	203.278	24.11%	583.106	69.15%	754.534	89.48%
George Town semi-permanently flooded grasslands V.A.1.N.h	40.153	0.286	0.71%	1.500	3.74%	6.069	15.11%	18.140	45.18%
George Town shoreline	53.066	12.747	24.02%	15.073	28.40%	22.370	42.15%	29.999	56.53%
George Town tidally flooded mangrove forest and woodland	749.672	84.113	11.22%	461.151	61.51%	635.878	84.82%	695.554	92.78%
George Town tidally flooded mangrove shrubland	5.268	3.454	65.57%	3.113	59.10%	4.638	88.04%	5.142	97.60%
George Town urban	866.362	0.856	0.10%	2.968	0.34%	18.429	2.13%	74.452	8.59%
North Side coastal shrubland	60.040	0.018	0.03%	0.052	0.09%	0.202	0.34%	0.416	0.69%
North Side dry forest and woodland	2567.180	1.235	0.05%	16.972	0.66%	117.105	4.56%	314.307	12.24%

North Side dry shrubland	269.011	4.757	1.77%	38.590	14.35%	78.741	29.27%	118.005	43.87%
North Side invasive species	25.250	1.352	5.35%	1.838	7.28%	4.938	19.56%	9.398	37.22%
North Side man-modified	2012.137	8.038	0.40%	47.674	2.37%	215.500	10.71%	495.066	24.60%
North Side ponds, pools and mangrove lagoons	268.918	154.803	57.57%	240.045	89.26%	263.875	98.12%	267.810	99.59%
North Side salt tolerant succulents	12.143	0.173	1.42%	1.162	9.57%	4.216	34.72%	9.284	76.46%
North Side seasonally flooded / saturated semi-deciduous forest	79.944	0.000	0.00%	0.051	0.06%	1.810	2.26%	10.298	12.88%
North Side seasonally flooded mangrove forest and woodland	3597.664	137.499	3.82%	954.129	26.52%	2651.213	73.69%	3313.008	92.09%
North Side seasonally flooded mangrove shrubland	113.038	0.547	0.48%	6.290	5.56%	39.600	35.03%	85.257	75.42%
North Side semi-permanently flooded grasslands V.A.1.N.h	7.040	0.940	13.36%	2.182	31.00%	4.618	65.59%	6.165	87.57%
North Side shoreline	37.242	13.415	36.02%	14.573	39.13%	21.478	57.67%	26.818	72.01%
North Side sparsely vegetated rock	0.474	0.026	5.48%	0.141	29.74%	0.306	64.52%	0.389	82.18%
North Side tidally flooded mangrove forest and woodland	462.198	68.662	14.86%	326.286	70.59%	431.555	93.37%	452.945	98.00%
North Side tidally flooded mangrove shrubland	160.720	66.678	41.49%	124.371	77.38%	150.080	93.38%	155.370	96.67%
North Side urban	107.267	0.476	0.44%	1.399	1.30%	7.284	6.79%	16.784	15.65%
West Bay coastal shrubland	64.489	0.201	0.31%	1.290	2.00%	3.041	4.72%	5.554	8.61%
West Bay dry forest and woodland	67.673	0.090	0.13%	0.959	1.42%	5.094	7.53%	11.599	17.14%
West Bay invasive species	111.333	1.176	1.06%	2.471	2.22%	5.770	5.18%	11.520	10.35%
West Bay man-modified	2504.979	54.171	2.16%	166.159	6.63%	298.770	11.93%	486.952	19.44%
West Bay ponds, pools and mangrove lagoons	195.077	157.506	80.74%	172.258	88.30%	187.179	95.95%	191.090	97.96%
West Bay salt tolerant succulents	8.431	1.490	17.67%	6.031	71.54%	7.570	89.79%	8.145	96.61%
West Bay seasonally flooded mangrove forest and woodland	0.687	0.000	0.00%	0.003	0.38%	0.419	61.00%	0.625	91.00%
West Bay semi-permanently flooded grasslands V.A.1.N.h	11.467	2.368	20.65%	6.325	55.16%	9.277	80.90%	10.802	94.20%
West Bay shoreline	63.076	14.325	22.71%	15.244	24.17%	22.871	36.26%	31.063	49.25%
West Bay sparsely vegetated rock	6.063	3.011	49.67%	4.186	69.05%	4.992	82.34%	5.479	90.38%
West Bay tidally flooded mangrove forest and woodland	660.419	233.636	35.38%	559.565	84.73%	626.627	94.88%	642.349	97.26%
West Bay tidally flooded mangrove shrubland	17.217	7.838	45.52%	13.777	80.02%	16.710	97.06%	17.093	99.28%
West Bay urban	377.884	2.289	0.61%	12.298	3.25%	24.171	6.40%	40.479	10.71%

Continued Table 14 Grand Cayman Land Cover and Environmental Resources Affected by Sea-Level Rise Scenarios

		Landcover Affected By							
All Landcover		0.25m SLR		0.50m SLR		0.75m SLR		1.0m SLR	
Landcover Class	Area (acres)	Area (acres)	% of Total	Area (acres)	% of Total	Area (acres)	% of Total	Area (acres)	% of Total
black candlewood	4.476	0.000	0.00%	0.000	0.00%	0.000	0.00%	0.000	0.00%
coastal shrubland	267.926	1.149	0.43%	3.582	1.34%	7.046	2.63%	12.450	4.65%
dry forest and woodland	7367.323	1.399	0.02%	20.038	0.27%	158.750	2.15%	632.881	8.59%
dry shrubland	2973.609	6.508	0.22%	45.202	1.52%	116.379	3.91%	305.618	10.28%
dwarf vegetation and vines	26.590	0.001	0.00%	0.001	0.01%	0.002	0.01%	0.003	0.01%
invasive species	326.285	6.048	1.85%	16.884	5.17%	52.787	16.18%	99.146	30.39%
man-modified	17342.909	155.439	0.90%	680.401	3.92%	2045.360	11.79%	4121.326	23.76%
ponds, pools and mangrove lagoons	1397.924	738.621	52.84%	1197.490	85.66%	1337.949	95.71%	1366.355	97.74%
salt tolerant succulents	33.589	1.980	5.89%	9.539	28.40%	22.510	67.02%	30.307	90.23%
seasonally flooded / saturated semi-deciduous forest	164.241	0.094	0.06%	2.127	1.29%	13.180	8.02%	48.154	29.32%
seasonally flooded grasslands V.A.1.N.g	99.597	0.010	0.01%	0.492	0.49%	31.964	32.09%	74.200	74.50%
seasonally flooded mangrove forest and woodland	12178.270	539.603	4.43%	3180.363	26.12%	8261.047	67.83%	10731.658	88.12%
seasonally flooded mangrove shrubland	697.330	4.362	0.63%	59.609	8.55%	274.867	39.42%	510.598	73.22%
semi-permanently flooded grasslands V.A.1.N.h	122.654	4.215	3.44%	13.344	10.88%	32.529	26.52%	69.507	56.67%
shoreline	235.082	58.652	24.95%	60.749	25.84%	93.073	39.59%	123.833	52.68%
sparsely vegetated rock	153.359	3.040	1.98%	4.383	2.86%	8.817	5.75%	26.097	17.02%
tidally flooded mangrove forest and woodland	2836.418	409.559	14.44%	1671.536	58.93%	2509.922	88.49%	2720.919	95.93%
tidally flooded mangrove shrubland	470.870	137.200	29.14%	257.925	54.78%	409.944	87.06%	456.609	96.97%
urban	1838.645	4.317	0.23%	19.814	1.08%	68.535	3.73%	183.908	10.00%

		Landcover Affected By							
All Landcover		0.25m SLR		0.50m SLR		0.75m SLR		1.0m SLR	
All Landcover	Area (acres)	Area (acres)	% of Total	Area (acres)	% of Total	Area (acres)	% of Total	Area (acres)	% of Total
All Landcover	48537.096	2731.498	5.63%	7443.915	15.34%	15504.636	31.94%	21545.140	44.39%

Nearly a quarter of all shoreline on Grand Cayman is currently affected by a 0.25m SLR. Encouragingly, less than 1% of urban space currently occupying the island is affected under this scenario.

A 1m SLR unfortunately sees the percentage of shoreline inundated jump to over 50%. Urbanized areas affected under this scenario account for 10% of this category.

Overall, 44% of all land cover on Grand Cayman is affected by a 1m rise in sea level.

Map 16 Seven Mile Beach Area Roads Affected by Sea-Level Rise

Map 17 Seven Mile Beach Area Utilities Affected by Sea-Level Rise

Table 15 Seven Mile Beach Roads Affected by Sea-Level Rise Scenarios

		Roads Affected By							
All Roads By Road Class		0.25m SLR		0.5m SLR		0.75m SLR		1m SLR	
Road Class	Feet	Feet	% Affected	Feet	% Affected	Feet	% Affected	Feet	% Affected
Access	351.23								
Primary	62,864.08	80.59	0.13%	90.67	0.14%	144.45	0.23%	1,914.58	3.05%
Secondary	150,493.43	175.95	0.12%	559.44	0.37%	4,656.41	3.09%	17,001.83	11.30%
temp	1,347.89					10.01	0.74%	331.21	24.57%
Unclassified	1,195.87					191.43	16.01%	437.26	36.56%
Unpaved	1,487.41	14.86	1.00%	487.25	32.76%	764.38	51.39%	1,389.96	93.45%

		Roads Affected By							
All Roads Seven Mile Beach Area		0.25m SLR		0.5m SLR		0.75m SLR		1m SLR	
Roads	Feet	Feet	% Affected	Feet	% Affected	Feet	% Affected	Feet	% Affected
Seven Mile Beach Area Roads	217,739.91	271.40	0.12%	1,137.35	0.52%	5,766.68	2.65%	21,074.83	9.68%

Only 3% of existing primary roads and 11% of secondary roads within the SMB corridor are expected to be affected by a 1m SLR, respectively. The majority of currently unpaved roads (93%) will be most impacted by this level of sea rise.

Table 16 Seven Mile Beach Utilities Affected by Sea-Level Rise Scenarios

			Utilities Affected By							
All Utilities			0.25m SLR		0.50m SLR		0.75m SLR		1.0m SLR	
Line Type	Company	Length (ft)	Length (ft)	% of Total	Length (ft)	% of Total	Length (ft)	% of Total	Length (ft)	% of Total
SEWER	CWC	104,237.63	59.77	0.06%	550.97	0.53%	1,262.75	1.21%	8,601.20	8.25%
WATER	CWC	186,591.57	137.31	0.07%	477.74	0.26%	4,351.21	2.33%	18,313.66	9.81%
WATER	WA	13,150.67			45.92	0.35%	425.61	3.24%	1,238.41	9.42%

		Utilities Affected By							
All Utilities		0.25m SLR		0.50m SLR		0.75m SLR		1.0m SLR	
Seven Mile Beach Area Utilities	Length (ft)	Length (ft)	% of Total	Length (ft)	% of Total	Length (ft)	% of Total	Length (ft)	% of Total
Seven Mile Beach Area Utilities	303,979.87	197.08	0.06%	1,074.63	0.35%	6,039.57	1.99%	28,153.28	9.26%

Map 18 Seven Mile Beach Area Critical Infrastructure Affected by Sea-Level Rise

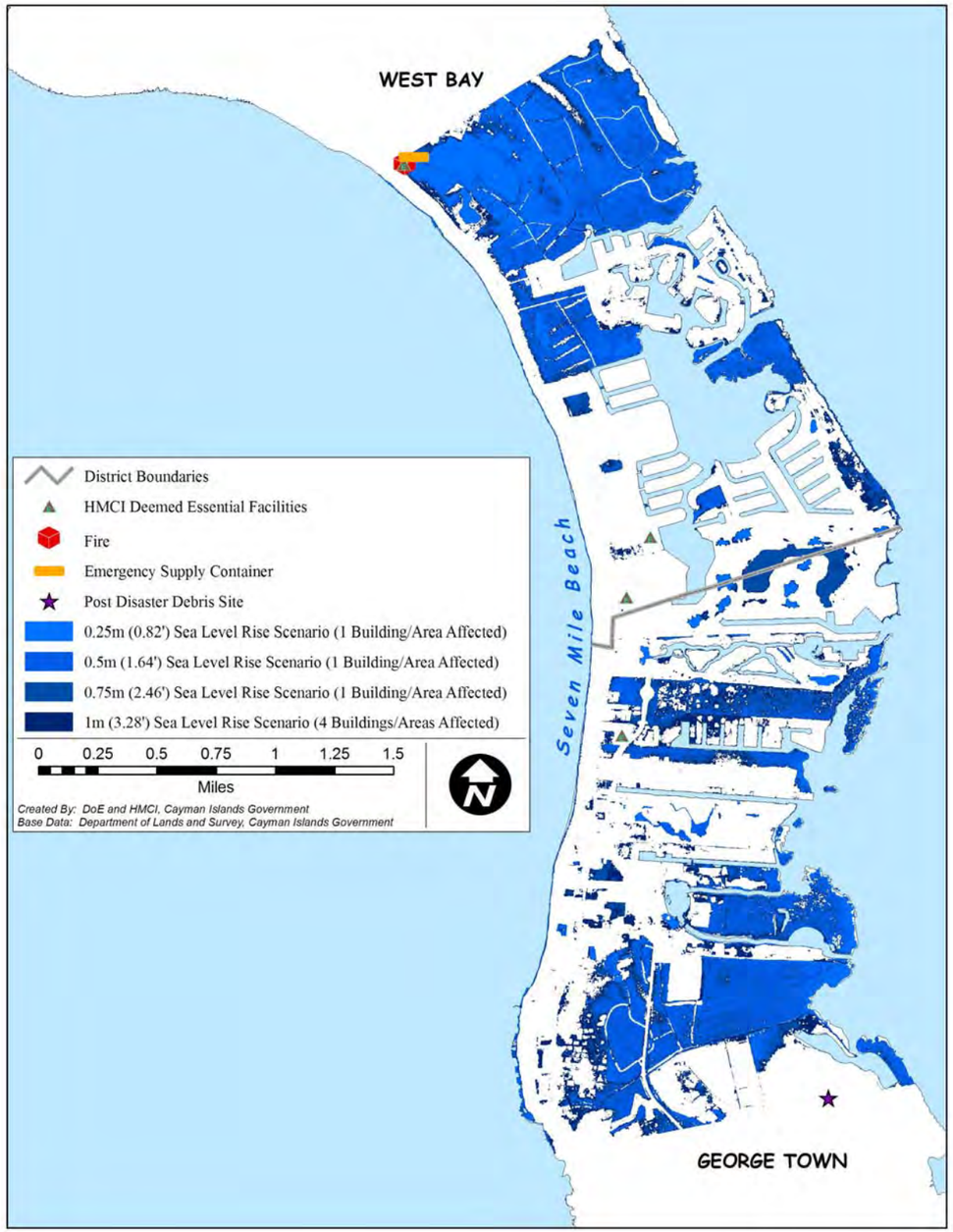


Table 17 Seven Mile Beach Critical Infrastructure Affected by Sea-Level Rise Scenarios

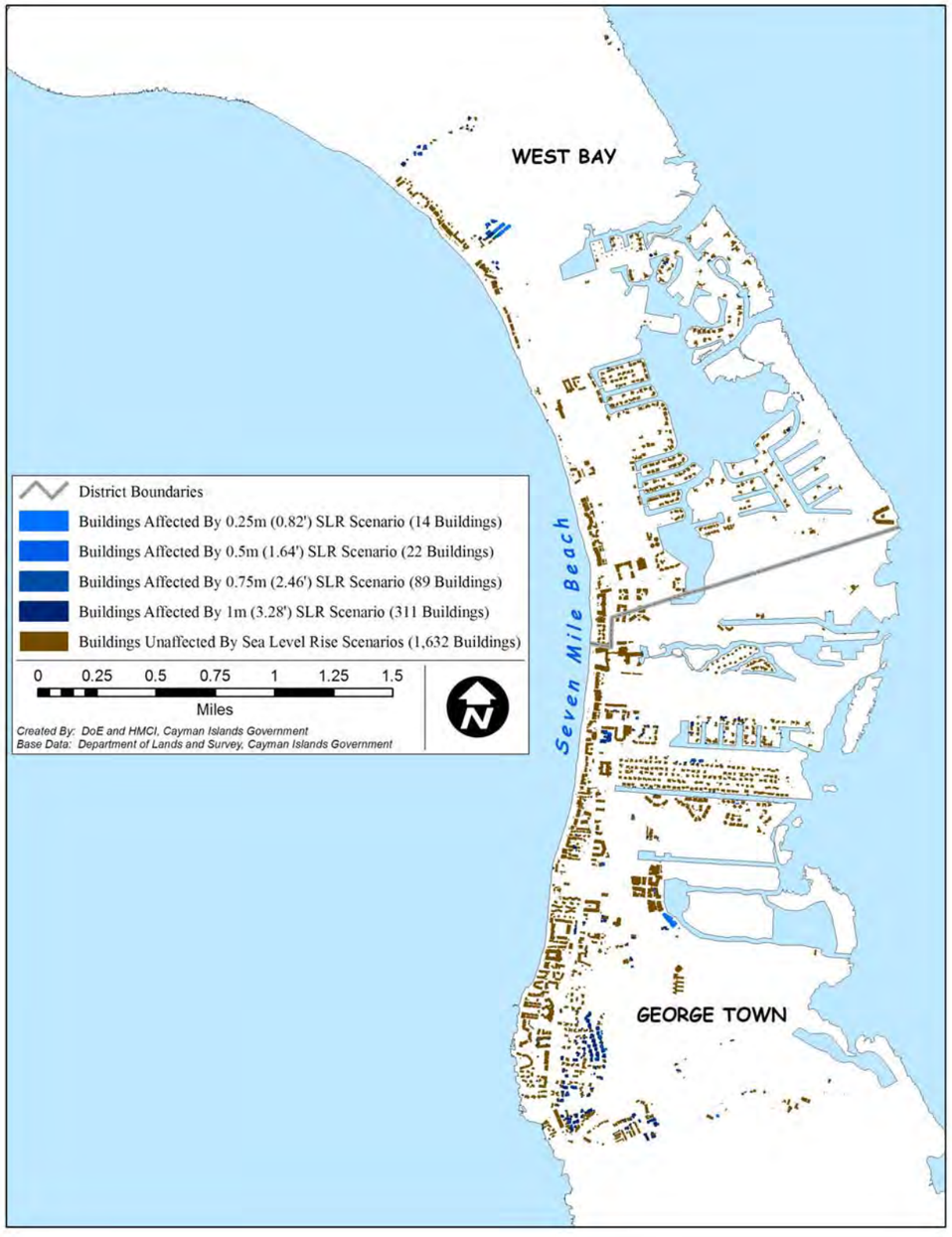
		Buildings and Areas Affected By							
All Buildings and Areas		**0.25m SLR**		**0.50m SLR**		**0.75m SLR**		**1.0m SLR**	
Building/Area Type	**# of Bldgs/Areas**	**# of Bldgs/Areas**	**% of Total**	**# of Bldgs/Areas**	**% of Total**	**# of Bldgs/Areas**	**% of Total**	**# of Bldgs/Areas**	**% of Total**
Emergency Supply Container	1	1	100.00%	1	100.00%	1	100.00%	1	100.00%
Fire	1							1	100.00%
HMCI Deemed Essential Facilities	9							1	11.11%
Post Disaster Debris Site	1							1	100.00%

		Buildings and Areas Affected By							
All Buildings and Areas		**0.25m SLR**		**0.50m SLR**		**0.75m SLR**		**1.0m SLR**	
All Buildings and Areas	**# of Bldgs/Areas**	**# of Bldgs/Areas**	**% of Total**	**# of Bldgs/Areas**	**% of Total**	**# of Bldgs/Areas**	**% of Total**	**# of Bldgs/Areas**	**% of Total**
All Buildings and Areas	12	1		1		1		4	33.33%

Encouragingly, only one critical infrastructure within the SMB corridor is affected by a 0.25m SLR; that being an emergency supply container which can be easily relocated.

However under the 1m SLR scenario, the amount of facilities affected along SMB increases to four; one in each infrastructure category or a third of all critical infrastructure currently in place.

Map 19 Seven Mile Beach Area Buildings Affected by Sea-Level Rise



Map 20 Seven Mile Beach Area Building Values Affected by Sea-Level Rise

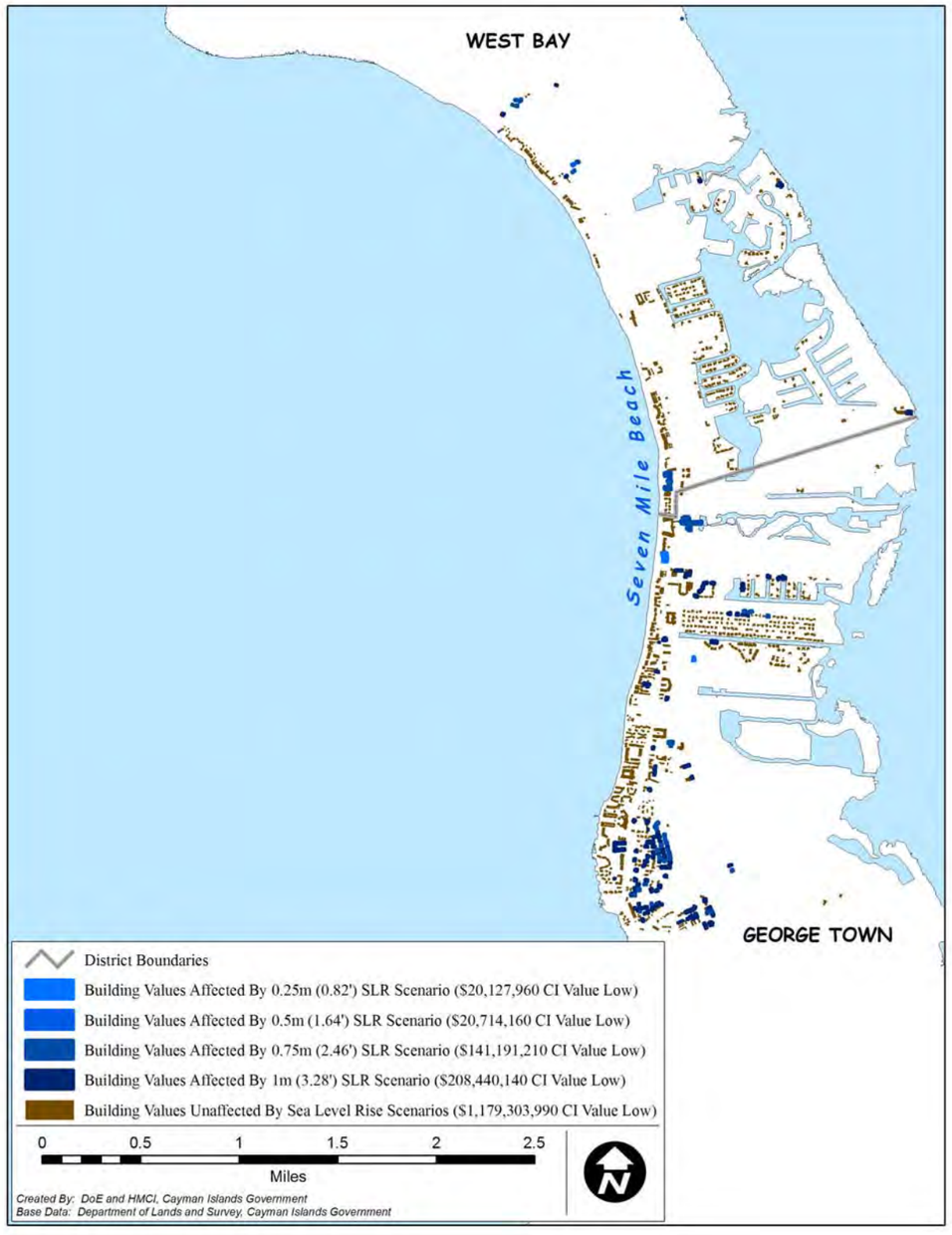


Table 18 Seven Mile Beach Buildings Affected by Sea-Level Rise Scenarios

		Buildings Affected By							
All Buildings		**0.25m SLR**		**0.50m SLR**		**0.75m SLR**		**1.0m SLR**	
Building Class	**# of Buildings**	**# of Buildings**	**% of Total**	**# of Buildings**	**% of Total**	**# of Buildings**	**% of Total**	**# of Buildings**	**% of Total**
Apartment/Condo	495	5	1.01%	7	1.41%	13	2.63%	52	10.51%
Education/Religion	8								
Government/Civic	11					2	18.18%	4	36.36%
Hotel/Tourism/Leisure	88	1	1.14%	1	1.14%	4	4.55%	7	7.95%
Industrial	10	1	10.00%	1	10.00%	1	10.00%	2	20.00%
Mixed Use	15					1	6.67%	6	40.00%
Non-Addressable	525	4	0.76%	8	1.52%	30	5.71%	95	18.10%
Residential	584					25	4.28%	108	18.49%
Restaurant/Bar	42					2	4.76%	4	9.52%
Retail/Commercial/Professional	113	2	1.77%	4	3.54%	7	6.19%	22	19.47%
Unclassified	23					2	8.70%	6	26.09%
Utility	29	1	3.45%	1	3.45%	2	6.90%	5	17.24%

		Buildings Affected By							
All Buildings		**0.25m SLR**		**0.50m SLR**		**0.75m SLR**		**1.0m SLR**	
Seven Mile Beach Area Buildings	**# of Buildings**	**# of Buildings**	**% of Total**	**# of Buildings**	**% of Total**	**# of Buildings**	**% of Total**	**# of Buildings**	**% of Total**
Seven Mile Beach Area Buildings	1943	14	0.72%	22	1.13%	89	4.58%	311	16.01%

Note: Figures in these tables represent all buildings constructed or with valid building permits up to 2010.

With a 0.25m SLR on hotel/tourism property is affected out of 88 possible properties. Encouragingly, no restaurants/bars are impacted under this scenario.

However under a 1m SLR scenario, 7 hotel/tourism properties or roughly 8% of the total properties in this category suffer some sort of impact, while 4 restaurants/bars or 9.5% of all such establishments are impacted.

Table 19 Seven Mile Beach Building Values Affected by Sea-Level Rise Scenarios

	All Buildings			Buildings Affected By 0.25m SLR			0.5m SLR			0.75m SLR			1.0m SLR		
Building Class	**# of Buildings**	**CI Value Low**	**CI Value High**	**# of Buildings**	**CI Value Low**	**CI Value High**	**# of Buildings**	**CI Value Low**	**CI Value High**	**# of Buildings**	**CI Value Low**	**CI Value High**	**# of Buildings**	**CI Value Low**	**CI Value High**
Apartment/Condo	423	$772,983,645	$1,065,037,440	1	$19,351,200	$29,026,800	2	$19,937,400	$29,906,100	7	$22,870,860	$34,166,350	41	$51,875,410	$75,172,050
Education/Religion	6	$13,627,240	$18,195,960												
Government/Civic	8	$2,369,930	$3,461,050							2	$222,270	$331,100	4	$950,990	$1,338,140
Hotel/Tourism/Leisure	39	$231,757,590	$318,170,610	1	$776,760	$970,950	1	$776,760	$970,950	3	$107,682,810	$143,512,350	4	$107,713,820	$143,556,650
Industrial	2	$1,234,750	$1,694,175										1	$287,050	$430,575
Residential	478	$251,105,070	$367,052,540							23	$9,456,410	$13,030,160	87	$38,325,470	$54,232,800
Restaurant/Bar	21	$13,007,530	$16,350,280										2	$1,231,000	$1,477,200
Retail/Commercial/Professional	53	$100,249,950	$123,356,540							1	$958,860	$1,369,800	9	$8,056,400	$10,143,360
Utility	3	$1,408,425	$1,877,900												

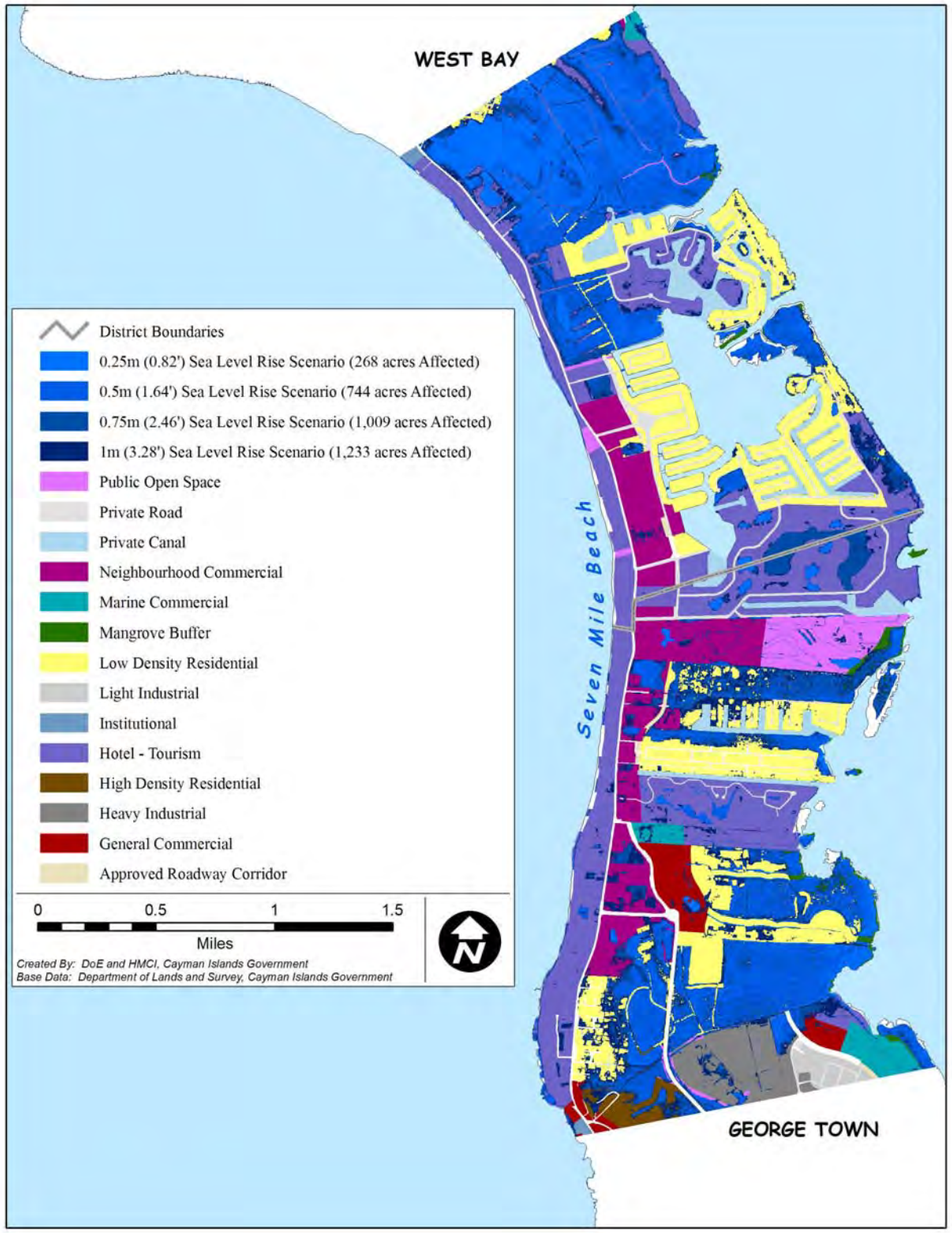
	All Buildings			Buildings Affected By 0.25m SLR			0.5m SLR			0.75m SLR			1.0m SLR		
Seven Mile Beach Area Buildings	**# of Buildings**	**CI Value Low**	**CI Value High**	**# of Buildings**	**CI Value Low**	**CI Value High**	**# of Buildings**	**CI Value Low**	**CI Value High**	**# of Buildings**	**CI Value Low**	**CI Value High**	**# of Buildings**	**CI Value Low**	**CI Value High**
Seven Mile Beach Area Buildings With Values Assigned	1,033	$1,387,744,130	$1,915,196,495	2	$20,127,960	$29,997,750	3	$20,714,160	$30,877,050	36	$141,191,210	$192,409,760	148	$208,440,140	$286,350,775

Note: Valuation figures in these tables represent only buildings constructed by 2008, and do not include ancillary structures.

The value associated with the potential loss of the hotel/tourism property affected by a 0.25m SLR ranges from $776, 760 to $970,950. The four properties affected by a 1m SLR could equate to as much as $144 million should total loss occur.

Although only 2 restaurants/bars are impacted under the 1m SLR scenario, total loss of these structures could range between $1.2 million and nearly $1.5 million.

Map 21 Seven Mile Beach Area Land Use Affected by Sea-Level Rise



Map 22 Seven Mile Beach Area Land Cover Affected by Sea-Level Rise

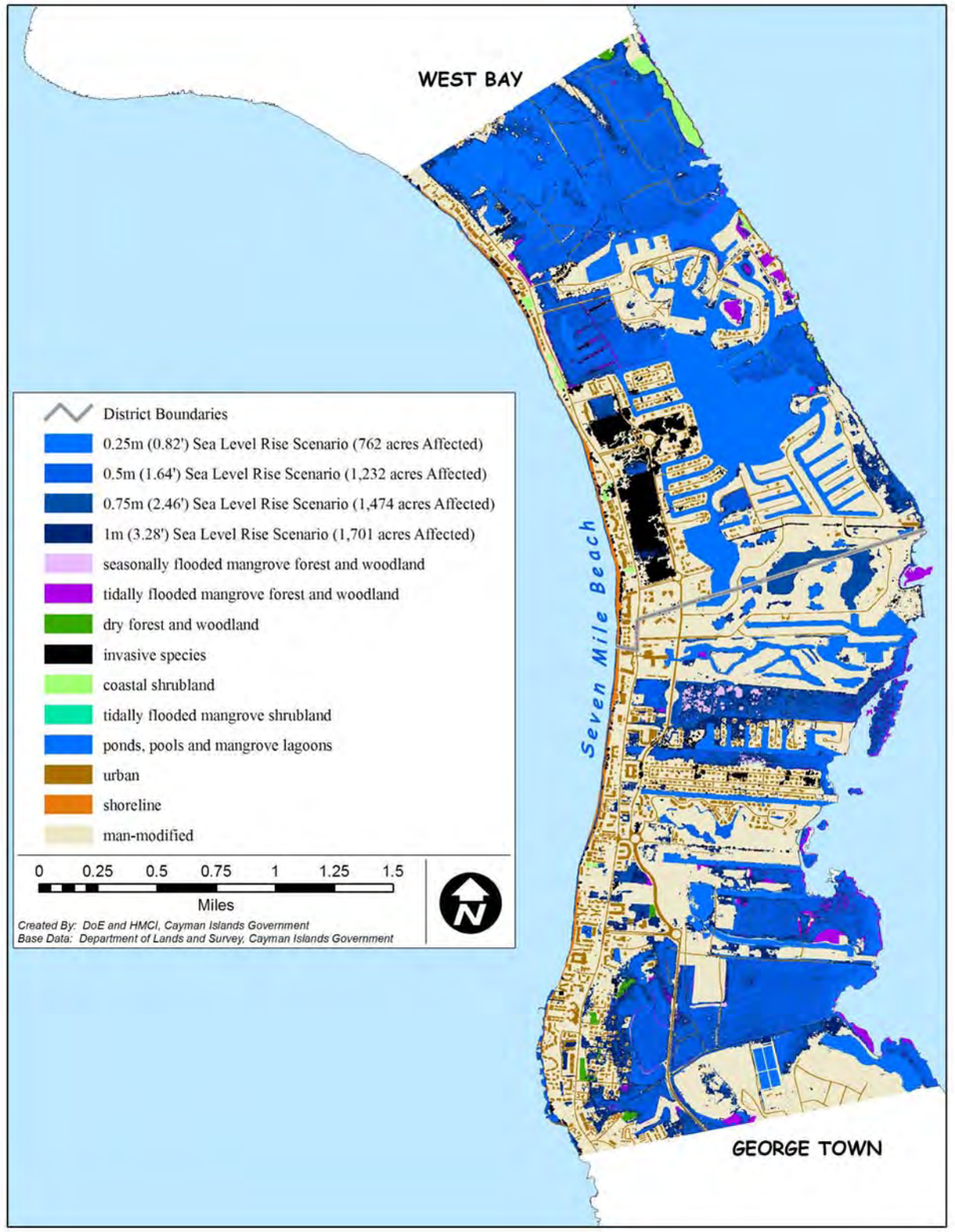


Table 20 Seven Mile Beach Area Land Use Affected by Sea-Level Rise Scenarios

Planning Zone		Planning Zones Affected By							
		0.25m SLR		0.50m SLR		0.75m SLR		1.0m SLR	
Planning Zone	Area (acres)	Area (acres)	% of Total	Area (acres)	% of Total	Area (acres)	% of Total	Area (acres)	% of Total
Approved Roadway Corridor	5.13					0.00	0.01%	0.00	0.05%
General Commercial	64.23	1.58	2.47%	2.95	4.60%	5.82	9.06%	9.54	14.85%
Heavy Industrial	98.94	2.00	2.02%	7.61	7.69%	11.40	11.53%	19.30	19.51%
High Density Residential	57.96	1.83	3.16%	15.92	27.46%	24.85	42.87%	33.90	58.49%
Hotel - Tourism	1089.25	157.29	14.44%	297.04	27.27%	382.43	35.11%	449.28	41.25%
Institutional	7.27	0.16	2.22%	0.50	6.90%	1.09	14.93%	1.92	26.44%
Light Industrial	20.53							0.00	0.01%
Low Density Residential	942.59	53.92	5.72%	256.30	27.19%	369.93	39.25%	458.56	48.65%
Mangrove Buffer	142.33	28.30	19.88%	92.07	64.69%	114.19	80.23%	123.38	86.69%
Marine Commercial	44.41	0.12	0.28%	0.50	1.13%	1.07	2.42%	3.17	7.15%
Neighbourhood Commercial	286.51	4.16	1.45%	18.60	6.49%	33.33	11.63%	57.97	20.23%
Private Canal	133.18	0.55	0.41%	1.79	1.35%	2.85	2.14%	3.85	2.89%
Private Road	95.86	0.29	0.30%	0.62	0.65%	2.86	2.98%	7.20	7.51%
Public Open Space	140.66	17.73	12.61%	49.88	35.46%	59.29	42.15%	64.92	46.16%

Planning Zone		Planning Zones Affected By							
		0.25m SLR		0.50m SLR		0.75m SLR		1.0m SLR	
Seven Mile Beach Area Planning Zones	Area (acres)	Area (acres)	% of Total	Area (acres)	% of Total	Area (acres)	% of Total	Area (acres)	% of Total
Seven Mile Beach Area Planning Zones	3128.85	267.93	8.56%	743.80	23.77%	1009.12	32.25%	1233.01	39.41%

Under the 0.25m SLR scenario, 157 acres or 14% of all land currently zoned Hotel/Tourism within the Seven Mile Beach corridor is affected.

Nearly 450 acres or 41% of Hotel/Tourism zoning is affected by a 1m rise in sea level.

Table 21 Seven Mile Beach Area Land Cover and Environmental Resources Affected by Sea-Level Rise Scenarios

All Landcover		Landcover Affected By							
		0.25m SLR		0.50m SLR		0.75m SLR		1.0m SLR	
Landcover Class	Area (acres)	Area (acres)	% of Total	Area (acres)	% of Total	Area (acres)	% of Total	Area (acres)	% of Total
seasonally flooded mangrove forest and woodland	69.99	0.62	0.89%	19.99	28.56%	45.26	64.67%	60.03	85.77%
tidally flooded mangrove forest and woodland	671.93	135.86	20.22%	477.79	71.11%	590.33	87.86%	622.83	92.69%
dry forest and woodland	10.26	0.00	0.00%	0.00	0.01%	0.26	2.57%	2.52	24.57%
invasive species	119.25	0.59	0.50%	2.23	1.87%	6.65	5.57%	14.86	12.46%
coastal shrubland	20.77	0.03	0.15%	0.54	2.62%	1.34	6.46%	2.80	13.48%
tidally flooded mangrove shrubland	17.53	4.01	22.89%	13.78	78.58%	16.71	95.31%	17.09	97.50%
ponds, pools and mangrove lagoons	578.91	578.91	100.00%	578.91	100.00%	578.91	100.00%	578.91	100.00%
urban	249.30	1.22	0.49%	3.22	1.29%	9.36	3.75%	24.47	9.82%
shoreline	47.25	4.14	8.76%	9.63	20.39%	14.73	31.18%	19.42	41.10%
man-modified	1654.81	36.90	2.23%	125.57	7.59%	210.44	12.72%	358.02	21.64%

All Landcover		Landcover Affected By							
		0.25m SLR		0.50m SLR		0.75m SLR		1.0m SLR	
Seven Mile Beach Area Landcover	Area (acres)	Area (acres)	% of Total	Area (acres)	% of Total	Area (acres)	% of Total	Area (acres)	% of Total
Seven Mile Beach Area Landcover	3440.01	762.28	22.16%	1231.66	35.80%	1473.99	42.85%	1700.95	49.45%

While 100% of existing ponds, pools and mangrove lagoons would be flooded by a 0.25m SLR, only 0.5% (1.22 acres) of urbanized land within the SMB corridor would be impacted. Nearly 9% (4.14 acres) of the shoreline is affected.

Roughly 24 acres or nearly 10% of urban space is affected by a 1m rise in sea level, while just over 19 acres or 41% of all shoreline along SMB is impacted.

Overall, nearly 50% of all land cover within the SMB corridor would be affected by a 1m rise in sea level.

Map 23 Cayman Brac Roads Affected by Sea-Level Rise

Table 22 Cayman Brac Road Infrastructure Affected by Sea-Level Rise Scenarios

		Roads Affected By							
All Roads By Road class		**0.25m SLR**		**0.5m SLR**		**0.75m SLR**		**1m SLR**	
Road class	**Feet**	**Feet**	**% Affected**	**Feet**	**% Affected**	**Feet**	**% Affected**	**Feet**	**% Affected**
Primary	131122.19	0.00	0.00%	2301.33	1.76%	6683.02	5.10%	9157.56	6.98%
Proposed	471.28	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%
Secondary	87930.72	0.00	0.00%	348.88	0.40%	709.35	0.81%	3060.70	3.48%
Unpaved	127343.34	44.14	0.03%	117.82	0.09%	448.53	0.35%	1926.36	1.51%

		Roads Affected By							
All Roads		**0.25m SLR**		**0.5m SLR**		**0.75m SLR**		**1m SLR**	
All Roads	**Feet**	**Feet**	**% Affected**	**Feet**	**% Affected**	**Feet**	**% Affected**	**Feet**	**% Affected**
All Roads	346867.53	44.14	0.01%	2768.03	0.80%	7840.90	2.26%	14144.62	4.08%

Only unpaved roads are minimally affected by a 0.25m SLR. Even under a 1m SLR scenario, less than 2% of all unpaved roads in Cayman Brac are affected.

Facing a 1m SLR would see nearly 7% of all primary roads in Cayman Brac affected in some way, while less than 4% of secondary roads would be impacted.

Map 24 Cayman Brac Critical Infrastructure Affected by Sea-Level Rise

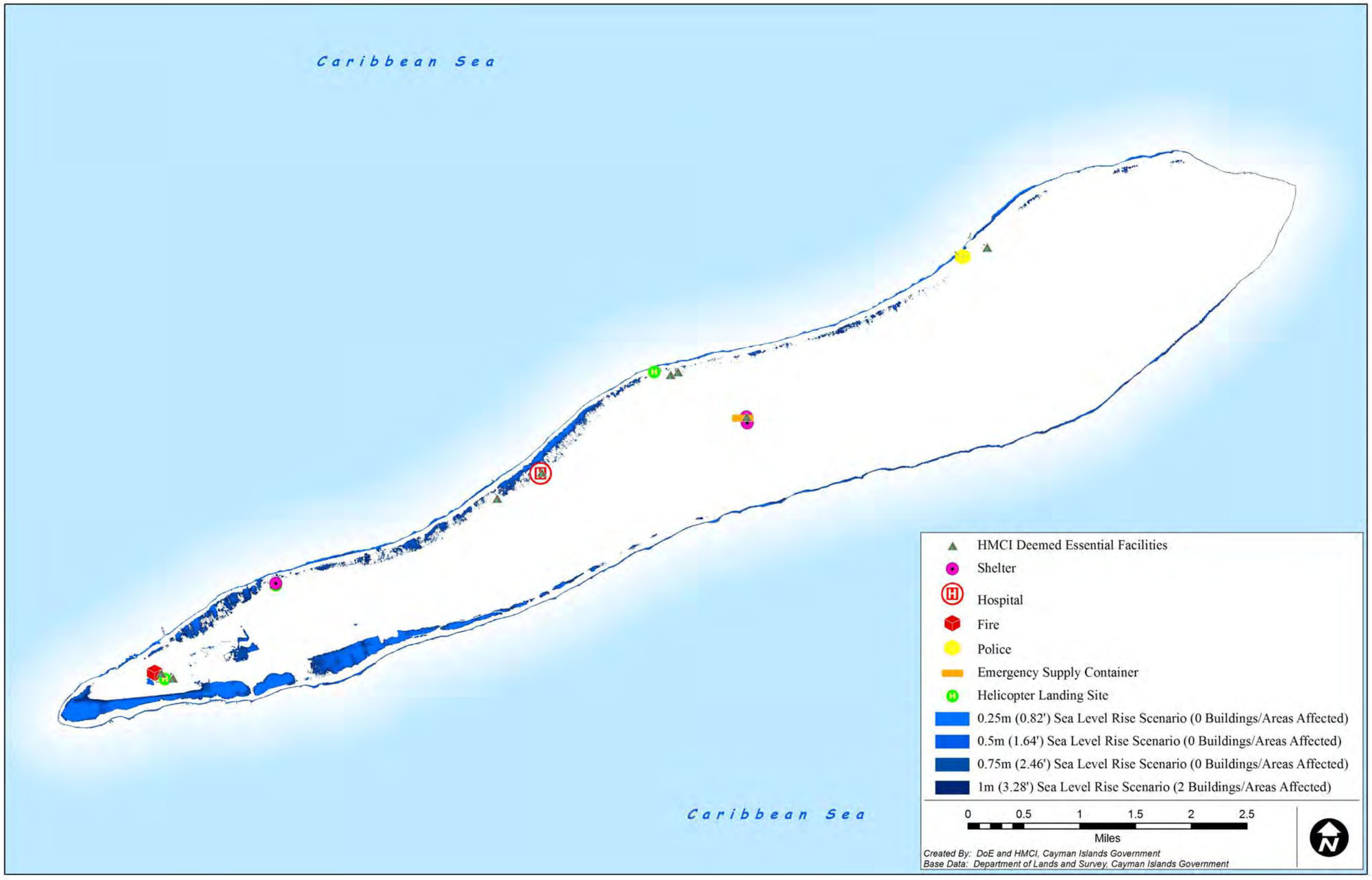


Table 23 Cayman Brac Critical Infrastructure Affected by Sea-Level Rise Scenarios

		Buildings and Areas Affected By							
All Buildings and Areas		**0.25m SLR**		**0.50m SLR**		**0.75m SLR**		**1.0m SLR**	
Building/Area Type	**# of Bldgs/Areas**	**# of Bldgs/Areas**	**% of Total**	**# of Bldgs/Areas**	**% of Total**	**# of Bldgs/Areas**	**% of Total**	**# of Bldgs/Areas**	**% of Total**
Emergency Supply Container	1								
Fire	1								
Helicopter Landing Site	3								
HMCI Deemed Essential Facilities	30							2	6.67%
Hospital	5								
Police	1								
Shelter	3								

		Buildings and Areas Affected By							
All Buildings and Areas		**0.25m SLR**		**0.50m SLR**		**0.75m SLR**		**1.0m SLR**	
All Buildings and Areas	**# of Bldgs/Areas**	**# of Bldgs/Areas**	**% of Total**	**# of Bldgs/Areas**	**% of Total**	**# of Bldgs/Areas**	**% of Total**	**# of Bldgs/Areas**	**% of Total**
All Buildings and Areas	44							2	4.55%

Only two facilities deemed essential by Hazard Management Cayman Islands are expected to be affected by any of the scenarios, that being a 1m. The exposure of this facility to such a climate change risk should be readily addressed to the vulnerability of Cayman Brac's critical infrastructure.

Map 25 Cayman Brac Buildings Affected by Sea-Level Rise

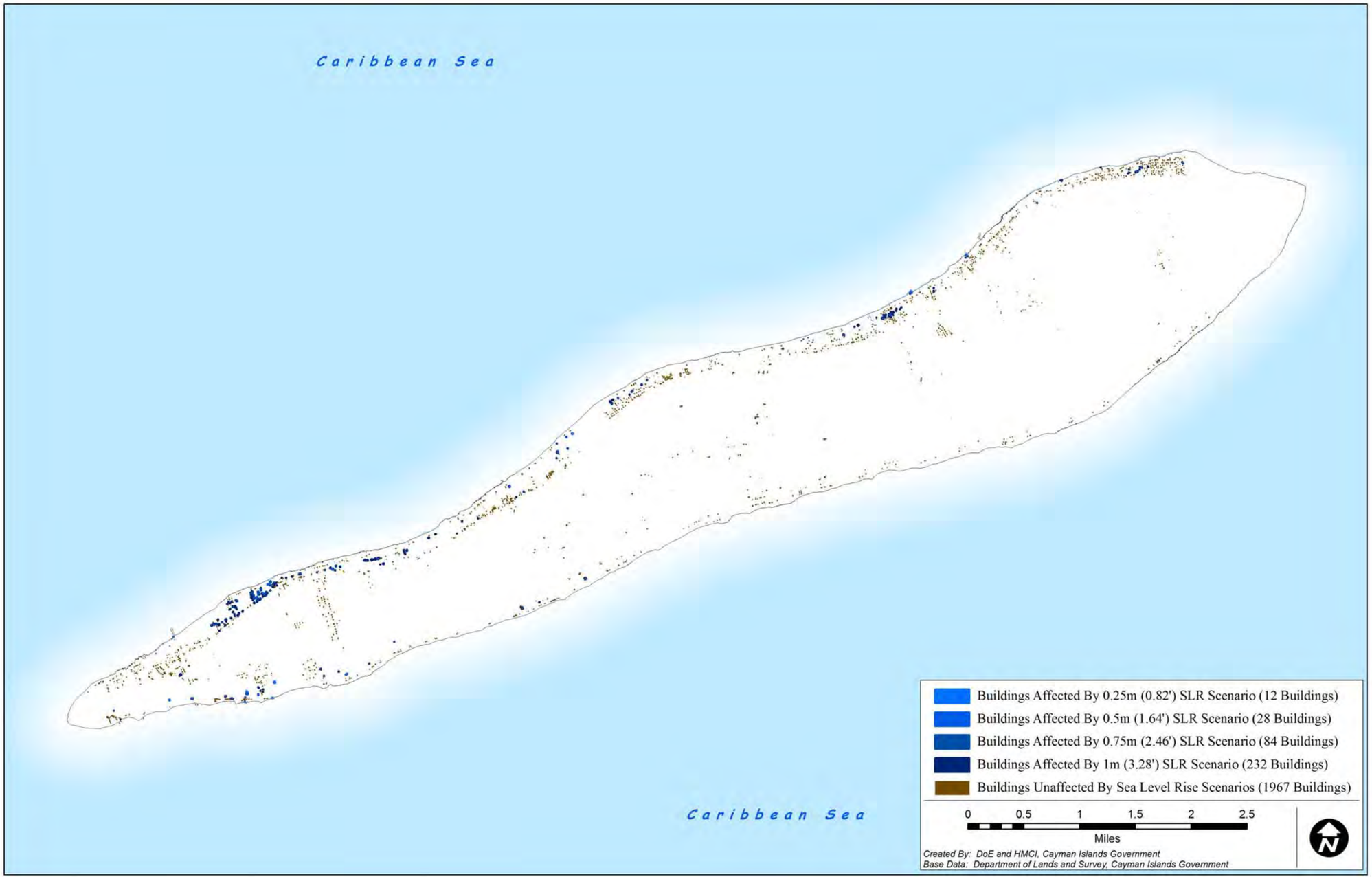


Table 24 Cayman Brac Buildings Affected by Sea-Level Rise Scenarios

		Buildings Affected By							
All Buildings		**0.25m SLR**		**0.50m SLR**		**0.75m SLR**		**1.0m SLR**	
Building Class	**# of Buildings**	**# of Buildings**	**% of Total**	**# of Buildings**	**% of Total**	**# of Buildings**	**% of Total**	**# of Buildings**	**% of Total**
Apartment/Condo	48	0	0.00%	1	2.08%	3	6.25%	6	12.50%
Education/Religion	34	0	0.00%	0	0.00%	0	0.00%	1	2.94%
Government/Civic	42	0	0.00%	0	0.00%	0	0.00%	1	2.38%
Hotel/Tourism/Leisure	20	1	5.00%	1	5.00%	1	5.00%	3	15.00%
Industrial	11	0	0.00%	0	0.00%	0	0.00%	2	18.18%
Non-Addressable	47	0	0.00%	0	0.00%	2	4.26%	5	10.64%
Residential	1067	1	0.09%	9	0.84%	38	3.56%	117	10.97%
Restaurant/Bar	10	1	10.00%	1	10.00%	3	30.00%	3	30.00%
Retail/Commercial/Professional	64	0	0.00%	3	4.69%	5	7.81%	14	21.88%
Unclassified	840	9	1.07%	13	1.55%	32	3.81%	78	9.29%
Utility	16	0	0.00%	0	0.00%	0	0.00%	2	12.50%

		Buildings Affected By							
All Buildings		**0.25m SLR**		**0.50m SLR**		**0.75m SLR**		**1.0m SLR**	
All Buildings	**# of Buildings**	**# of Buildings**	**% of Total**	**# of Buildings**	**% of Total**	**# of Buildings**	**% of Total**	**# of Buildings**	**% of Total**
All Buildings	2199	12	0.55%	28	1.27%	84	3.82%	232	10.55%

Note: Figures in these tables represent all buildings constructed or with valid building permits up to 2010.

Within the tourism sector, one hotel/tourism property and one restaurant/bar are affected by a 0.25m rise in sea level.

Given a potential 1m SLR, each category has 3 properties that are affected, representing 15% of the hotel/tourism stock and 30% of the restaurant/bar stock on Cayman Brac in 2010.

Map 26 Cayman Brac Building Values Affected by Sea-Level Rise

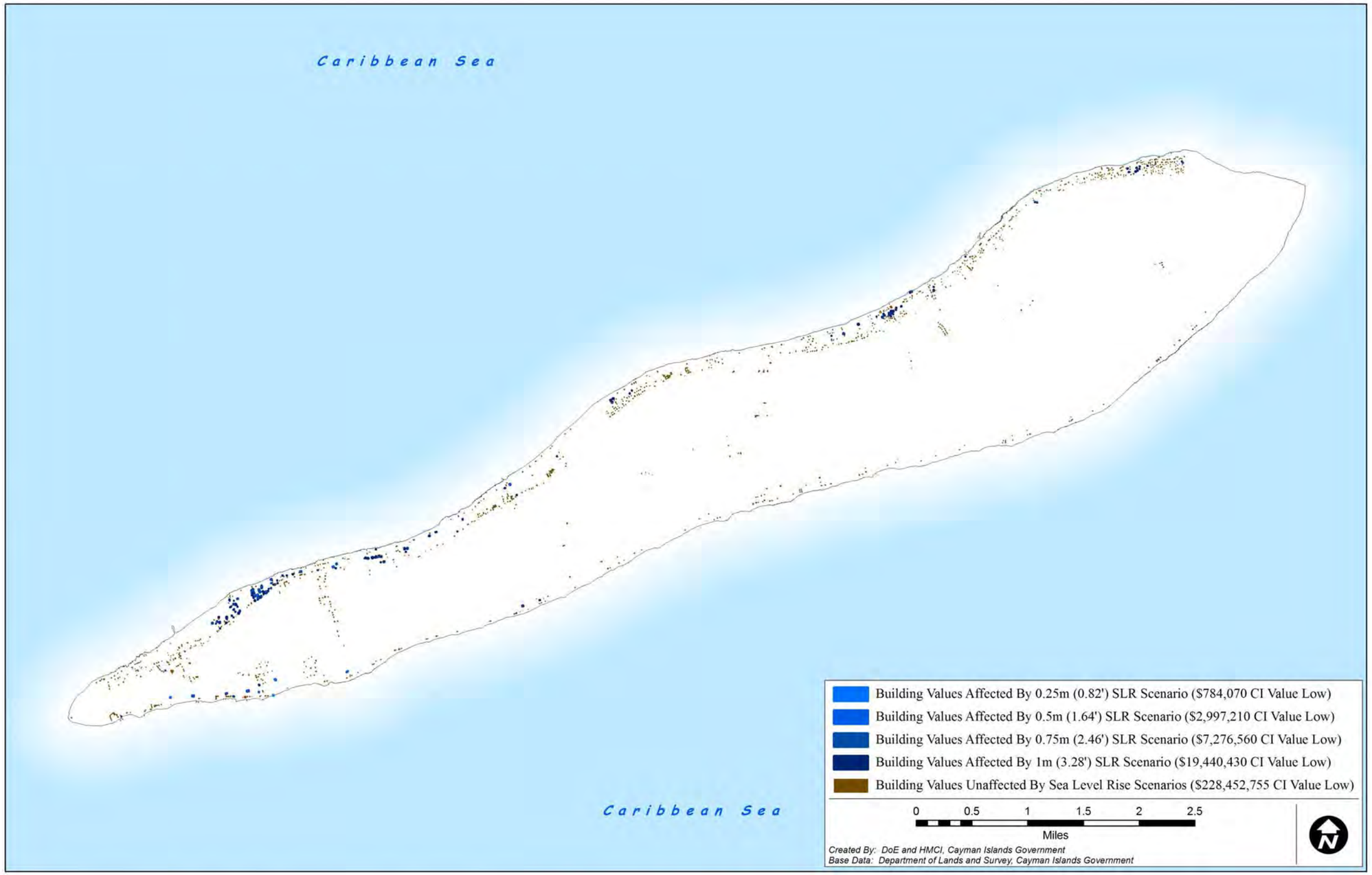


Table 25 Cayman Brac Value of Buildings Affected by Sea-Level Rise Scenarios

	All Buildings			Buildings Affected By 0.25 SLR			0.5 SLR			0.75 SLR			1.0 SLR		
Building Class	# of Bldgs	CI Value Low	CI Value High	# of Bldgs	CI Value Low	CI Value High	# of Bldgs	CI Value Low	CI Value High	# of Bldgs	CI Value Low	CI Value High	# of Bldgs	CI Value Low	CI Value High
Apartment/Condo	46	$20,187,520	$29,067,300	0	$0	$0	1	$773,400	$1,160,100	3	$1,097,880	$1,565,700	6	$1,966,840	$2,723,400
Education/Religion	29	$13,331,120	$18,676,240	0	$0	$0	0	$0	$0	0	$0	$0	1	$53,680	$80,520
Government/Civic	33	$19,412,160	$26,878,400	0	$0	$0	0	$0	$0	0	$0	$0	1	$34,400	$51,600
Hotel/Tourism/Leisure	15	$11,714,180	$17,348,550	1	$82,390	$117,700	1	$82,390	$117,700	1	$82,390	$117,700	2	$282,660	$403,800
Industrial	6	$757,375	$1,061,125	0	$0	$0	0	$0	$0	0	$0	$0	2	$177,450	$266,175
Residential	982	$161,484,840	$225,323,470	1	$426,370	$609,100	4	$1,128,730	$1,575,250	29	$4,305,760	$6,025,420	107	$13,957,120	$19,593,670
Restaurant/Bar	9	$1,331,540	$1,863,160	1	$275,310	$393,300	1	$275,310	$393,300	3	$710,990	$1,015,700	3	$710,990	$1,015,700
Retail/Commercial/Professional	58	$18,785,460	$24,770,000	0	$0	$0	3	$737,380	$1,053,400	5	$1,079,540	$1,542,200	13	$2,257,290	$3,224,700
Unclassified	1	$110,040	$157,200	0	$0	$0	0	$0	$0	0	$0	$0	0	$0	$0
Utility	9	$778,950	$1,168,425	0	$0	$0	0	$0	$0	0	$0	$0	0	$0	$0

	All Buildings			Buildings Affected By 0.25 SLR			0.5 SLR			0.75 SLR			1.0 SLR		
All Buildings	# of Bldgs	CI Value Low	CI Value High	# of Bldgs	CI Value Low	CI Value High	# of Bldgs	CI Value Low	CI Value High	# of Bldgs	CI Value Low	CI Value High	# of Bldgs	CI Value Low	CI Value High
All Buildings	1,188	$247,893,185	$346,313,870	3	$784,070	$1,120,100	10	$2,997,210	$4,299,750	41	$7,276,560	$10,266,720	135	$19,440,430	$27,359,565

Note: Valuation figures in these tables represent only buildings constructed by 2008, and do not include ancillary structures.

The total loss of the one hotel/tourism property under the 0.25m SLR scenario would range between $82,390 and $117,700. The sole restaurant/bar impacted under this scenario is valued at $275-393 thousand.

Under the 1m scenario, the total number of properties affected do not increase significantly, however the estimated values of rise substantially if total loss were to occur. The two hotel/tourism properties could register a total loss of nearly $404,000 while the 3 restaurant/bars impacted by a 1m rise in sea level could equate to a total loss of just over $1 million.

Map 27 Cayman Brac Land Cover and Environmental Resources Affected by Sea-Level Rise

Table 26 Cayman Brac Land Cover and Environmental Resources Affected by Sea-Level Rise Scenarios

All Landcover		Landcover Affected By							
		0.25m SLR		0.50m SLR		0.75m SLR		1.0m SLR	
Landcover Class	Area (acres)	Area (acres)	% of Total	Area (acres)	% of Total	Area (acres)	% of Total	Area (acres)	% of Total
seasonally flooded mangrove forest and woodland	23.42	18.92	80.78%	21.47	91.63%	22.62	96.57%	23.00	98.21%
xeromorphic semi-deciduous forest	4558.82	0.80	0.02%	1.76	0.04%	3.26	0.07%	5.78	0.13%
invasive species	14.45	0.28	1.95%	0.67	4.65%	1.12	7.76%	1.99	13.81%
coastal shrubland	208.09	3.27	1.57%	6.87	3.30%	11.42	5.49%	16.82	8.08%
seasonally flooded mangrove shrubland	19.32	10.76	55.69%	15.34	79.38%	17.89	92.62%	18.76	97.11%
dry shrubland	391.17	6.67	1.71%	21.04	5.38%	34.00	8.69%	41.44	10.59%
dwarf vegetation and vines	50.57	0.36	0.71%	0.38	0.75%	0.39	0.76%	0.40	0.79%
seasonally flooded grasslands V.A.1.N.g	1.32	0.97	72.91%	1.29	97.66%	1.30	98.42%	1.31	99.25%
semi-permanently flooded grasslands V.A.1.N.h	0.17	0.05	28.79%	0.12	67.10%	0.13	72.27%	0.14	77.36%
water	53.00	52.46	98.98%	52.74	99.50%	52.91	99.83%	52.99	99.97%
urban	262.01	0.13	0.05%	2.17	0.83%	6.97	2.66%	14.98	5.72%
dry lakebed	34.20	29.57	86.48%	32.34	94.58%	33.89	99.09%	34.11	99.75%
shoreline	233.87	44.41	18.99%	72.68	31.08%	101.15	43.25%	127.76	54.63%
man-modified	3656.54	25.49	0.70%	79.06	2.16%	169.34	4.63%	285.28	7.80%

All Landcover		Landcover Affected By							
		0.25m SLR		0.50m SLR		0.75m SLR		1.0m SLR	
All Landcover	Area (acres)	Area (acres)	% of Total	Area (acres)	% of Total	Area (acres)	% of Total	Area (acres)	% of Total
All Landcover	9506.98	194.15	2.04%	307.93	3.24%	456.40	4.80%	624.77	6.57%

Not surprisingly, a 0.25m SLR affects much less than 1% of the currently urbanized area of Cayman Brac. This figure jumps to nearly 6% or 15 acres of urban space lost to or impacted by a 1m rise in sea level.

Currently 19% or over 44 acres of the shoreline would be impacted by a 0.25m SLR. However under a 1m SLR scenario, nearly 128 acres or 55% of shoreline would be affected.

Although not large acreages, the proportion of loss for seasonally flooded mangrove forest (23 acres or 98%) and seasonally flooded mangrove shrubland (18.76 acres or 97%) are the effects of a 1m SLR.

Overall, less than 7% of total land cover of Cayman Brac would be affected by a 1m rise in sea level.

Map 28 Little Cayman Roads Affected by Sea-Level Rise

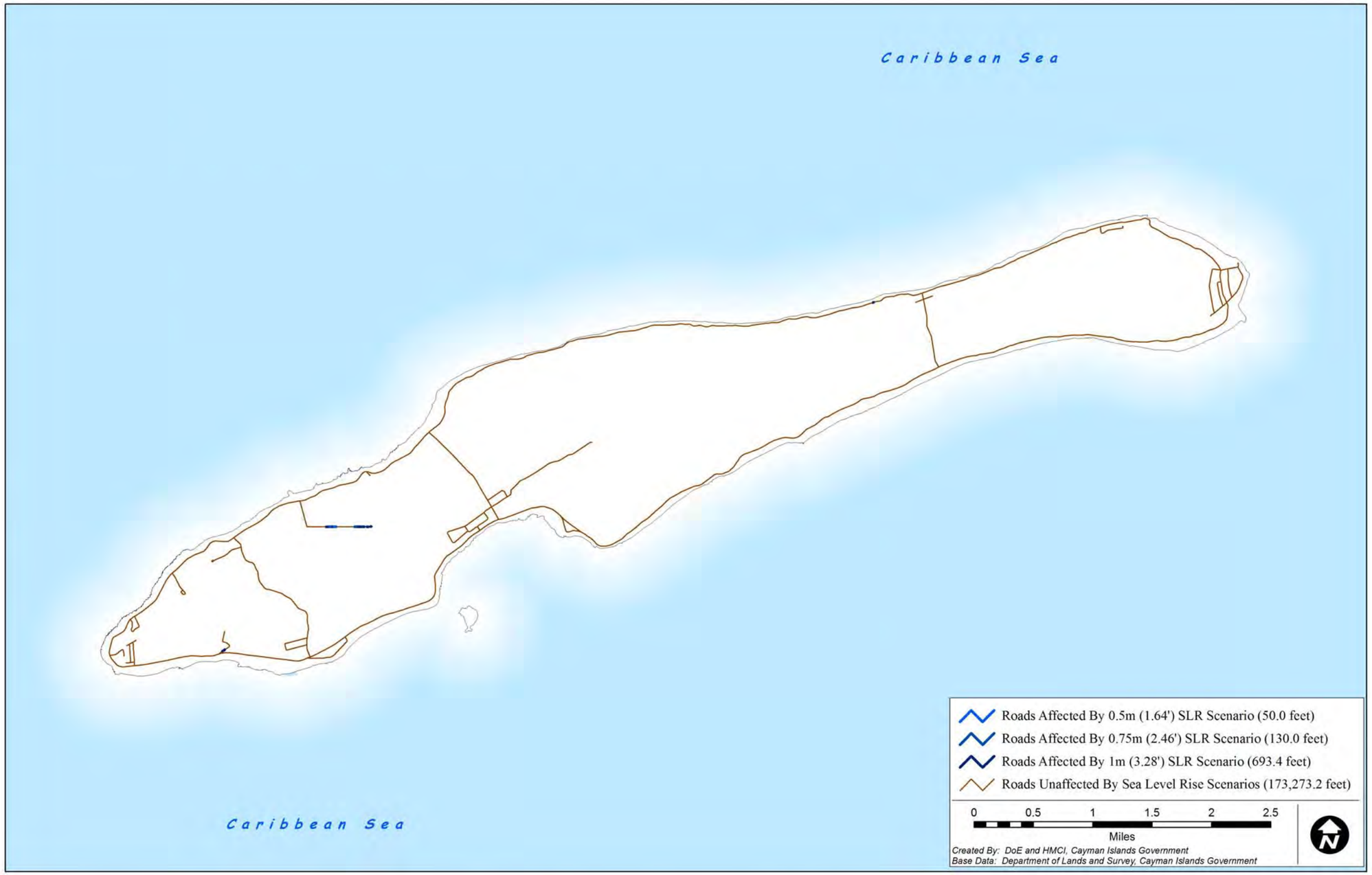


Table 27 Little Cayman Road Infrastructure Affected by Sea-Level Rise Scenarios

		Roads Affected By							
All Roads By Roadclass		0.25m SLR		0.5m SLR		0.75m SLR		1m SLR	
Roadclass	Feet	Feet	% Affected	Feet	% Affected	Feet	% Affected	Feet	% Affected
Primary	47714.87	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%
Secondary	7693.51	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%
Unclassified	13717.14	0.00	0.00%	0.00	0.00%	0.00	0.00%	61.99	0.45%
Unpaved	104841.11	0.00	0.00%	50.00	0.05%	130.00	0.12%	631.44	0.60%

		Roads Affected By							
All Roads		0.25m SLR		0.5m SLR		0.75m SLR		1m SLR	
All Roads	Feet	Feet	% Affected	Feet	% Affected	Feet	% Affected	Feet	% Affected
All Roads	173966.62	0.00	0.00%	50.00	0.03%	130.00	0.07%	693.43	0.40%

Due to the limited amount of road infrastructure that currently exists in Little Cayman, less than half a percent of all roads would be impacted, by a 1m SLR.

Of that affected, no primary or secondary infrastructure is affected; only a very small portion of unpaved and unclassified roads.

Map 29 Little Cayman Critical Infrastructure Affected by Sea-Level Rise

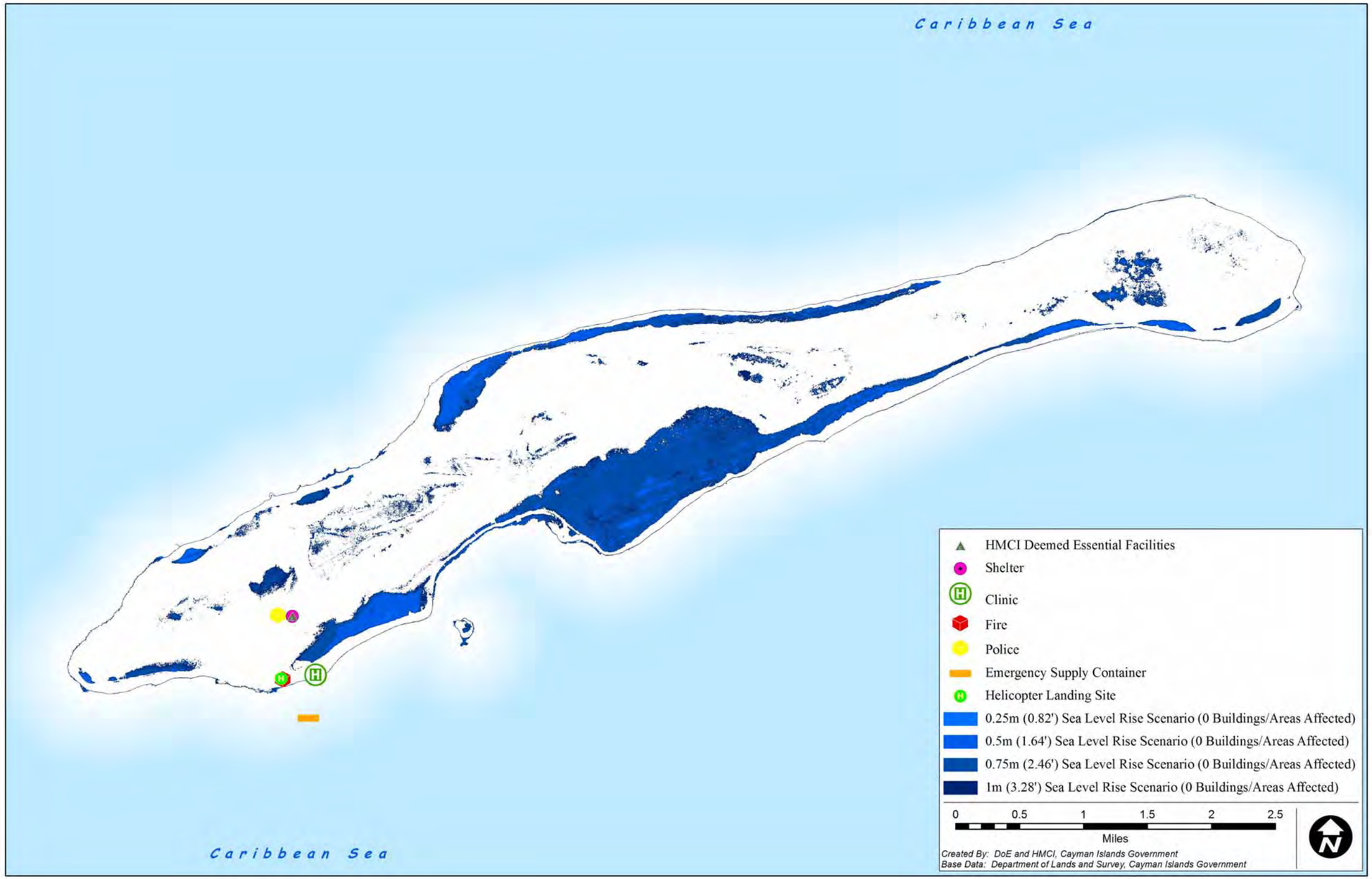


Table 28 Little Cayman Critical Infrastructure Affected by Sea-Level Rise Scenarios

		Buildings and Areas Affected By							
All Buildings and Areas		**0.25m SLR**		**0.50m SLR**		**0.75m SLR**		**1.0m SLR**	
Building/Area Type	**# of Bldgs/Areas**	**# of Bldgs/Areas**	**% of Total**	**# of Bldgs/Areas**	**% of Total**	**# of Bldgs/Areas**	**% of Total**	**# of Bldgs/Areas**	**% of Total**
Clinic	1								
Emergency Supply Container	1								
Fire	1								
Helicopter Landing Site	1								
HMCI Deemed Essential Facilities	1								
Police	1								
Shelter	1								

		Buildings and Areas Affected By							
All Buildings and Areas		**0.25m SLR**		**0.50m SLR**		**0.75m SLR**		**1.0m SLR**	
All Buildings and Areas	**# of Bldgs/Areas**	**# of Bldgs/Areas**	**% of Total**	**# of Bldgs/Areas**	**% of Total**	**# of Bldgs/Areas**	**% of Total**	**# of Bldgs/Areas**	**% of Total**
All Buildings and Areas	7								

Encouragingly, none of the 7 critical infrastructure facilities currently situated on Little Cayman are vulnerable to any of the SLR scenarios. It is hoped that as the island continues to develop, new critical infrastructure is properly planned to take the risk of sea level into consideration.

Map 30 Little Cayman Buildings Affected by Sea-Level Rise

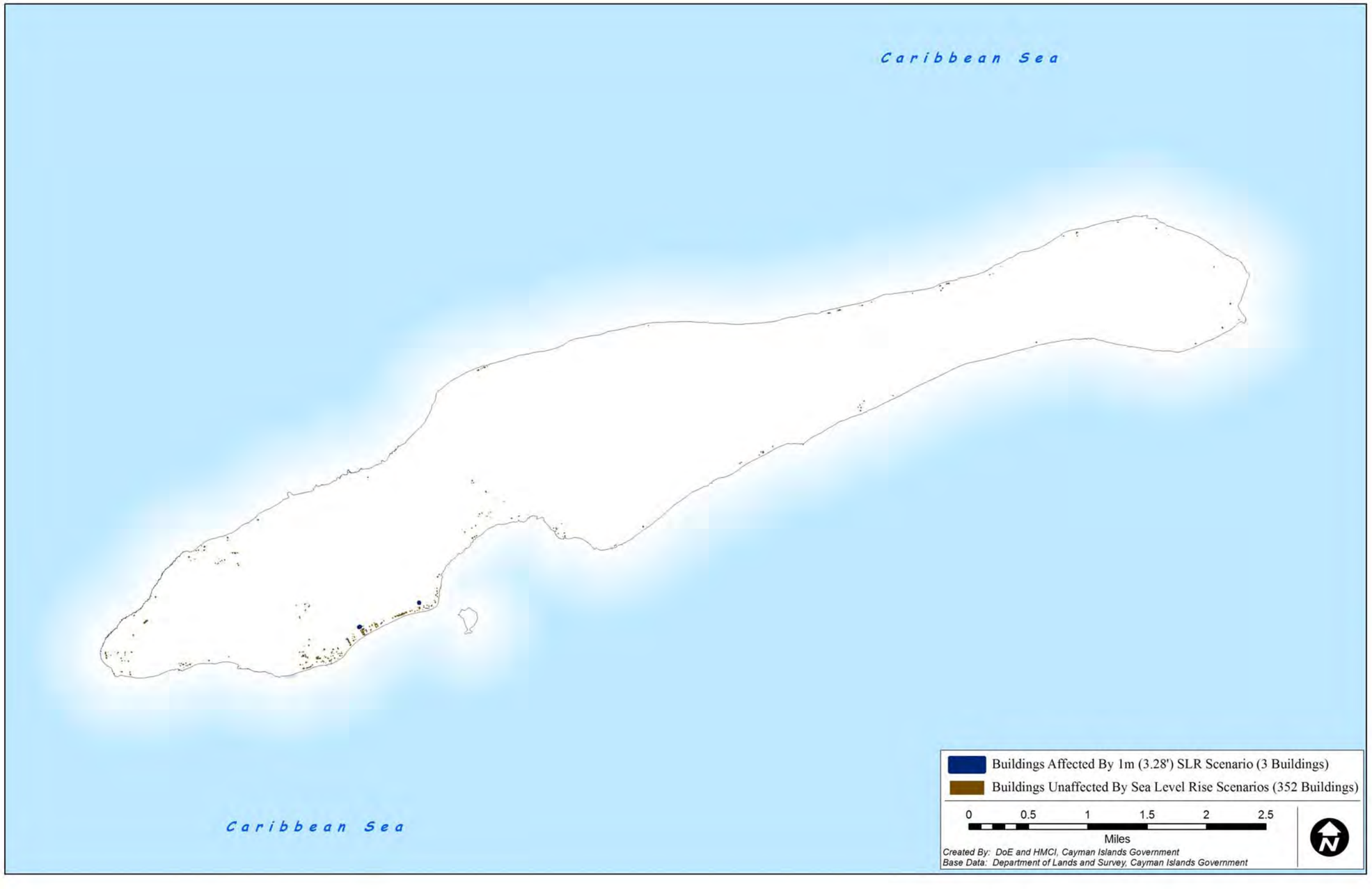


Table 29 Little Cayman Buildings Affected by Sea-Level Rise Scenarios

All Buildings		Buildings Affected By							
		0.25m SLR		0.50m SLR		0.75m SLR		1.0m SLR	
All Buildings	# of Buildings	# of Buildings	% of Total	# of Buildings	% of Total	# of Buildings	% of Total	# of Buildings	% of Total
Apartment/Condo	45	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Education/Religion	2	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Government/Civic	15	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Hotel/Tourism/Leisure	25	0	0.00%	0	0.00%	0	0.00%	2	8.00%
Industrial	1	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Non-Addressable	125	0	0.00%	0	0.00%	0	0.00%	1	0.80%
Residential	129	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Restaurant/Bar	3	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Retail/Commercial/Professional	5	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Unclassified	2	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Utility	3	0	0.00%	0	0.00%	0	0.00%	0	0.00%

All Buildings		Buildings Affected By							
		0.25m SLR		0.50m SLR		0.75m SLR		1.0m SLR	
All Buildings	# of Buildings	# of Buildings	% of Total	# of Buildings	% of Total	# of Buildings	% of Total	# of Buildings	% of Total
All Buildings	355	0	0.00%	0	0.00%	0	0.00%	3	0.85%

Note: Figures in these tables represent all buildings constructed or with valid building permits up to 2010.

Of the 25 properties in the hotel/tourism category, only 2 or 8% are expected to be affected by the highest sea level rise scenario studied (1m). In fact, only 3 buildings out of the current Little Cayman building stock of 355 are impacted at all.

It is encouraging that no restaurants/bars are vulnerable to even a 1m SLR. Indeed this is the case with the majority of other building type categories.

Map 31 Little Cayman Building Values Affected by Sea-Level Rise

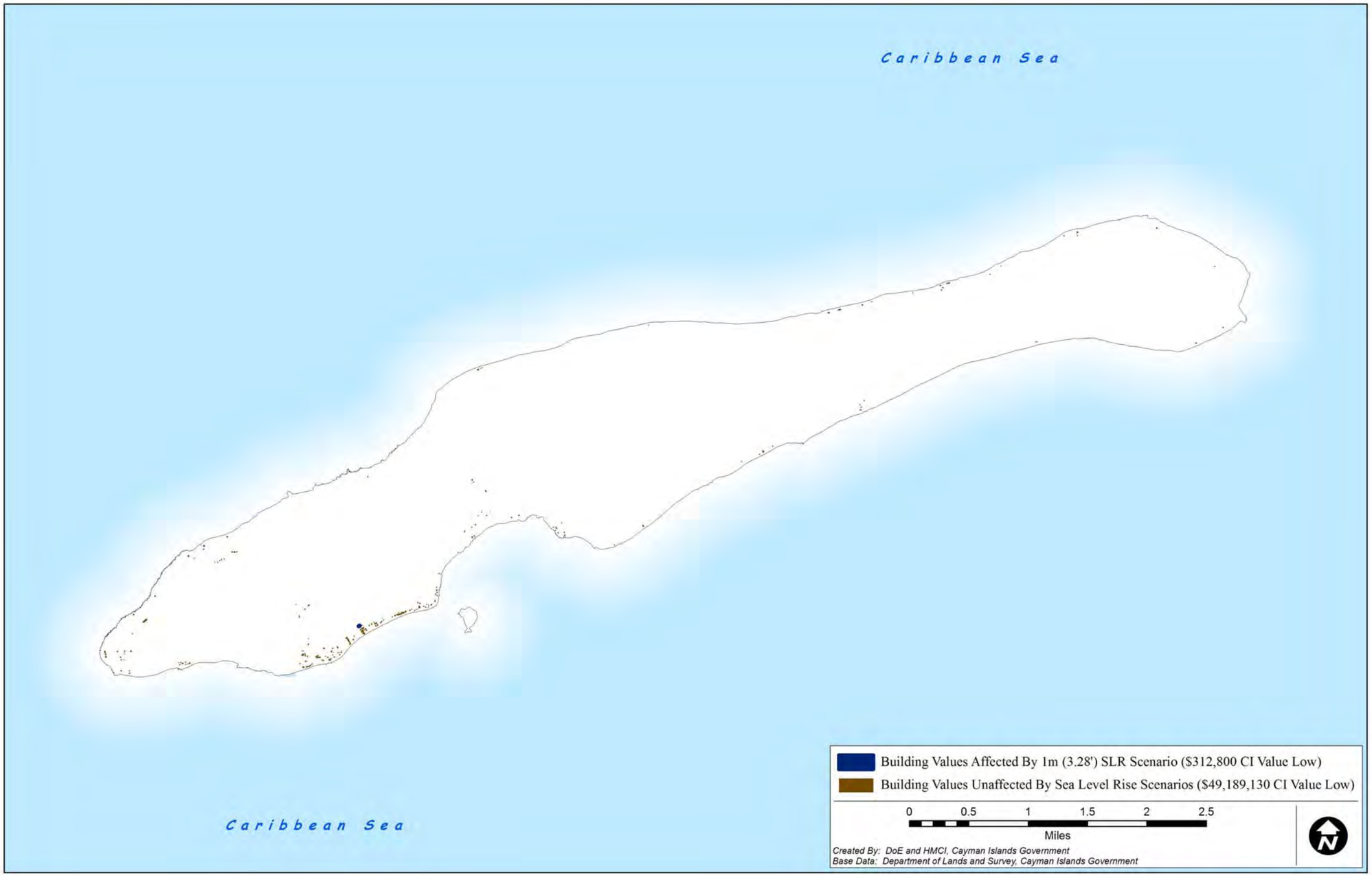


Table 30 Little Cayman Value of Buildings Affected by Sea-Level Rise

	All Buildings			1.0m SLR		
Building Class	# of Buildings	CI Value Low	CI Value High	# of Buildings	CI Value Low	CI Value High
Apartment/Condo	44	$16,068,590	$22,562,800			
Education/Religion	2	$803,960	$1,078,080			
Government/Civic	14	$2,042,500	$2,888,920			
Hotel/Tourism/Leisure	25	$5,353,180	$7,634,500	2	$312,800	$469,200
Industrial	1	$182,250	$273,375			
Residential	106	$20,686,470	$28,600,350			
Restaurant/Bar	3	$500,220	$714,600			
Retail/Commercial/Professional	5	$3,553,010	$4,453,100			
Utility	3	$311,750	$467,625			

	All Buildings			1.0m SLR		
All Buildings	# of Buildings	CI Value Low	CI Value High	# of Buildings	CI Value Low	CI Value High
All Buildings	203	$49,501,930	$68,673,350	2	$312,800	$469,200

Note: Valuation figures in these tables represent only buildings constructed by 2008, and do not include ancillary structures.

Of the total buildings in the database, only 2 used for hotel/tourism activities are affected by the 1m SLR scenario with estimated loss values in 2008 of between $312,800 to $469,200.

Again, owing to the limited development currently in existence on Little Cayman, no restaurants/bars are vulnerable to even a 1m SLR and therefore do not incur any loss estimates. Indeed this is the case with the majority of other building type categories.

Map 32 Little Cayman Land Cover and Environmental Resources Affected by Sea-Level Rise

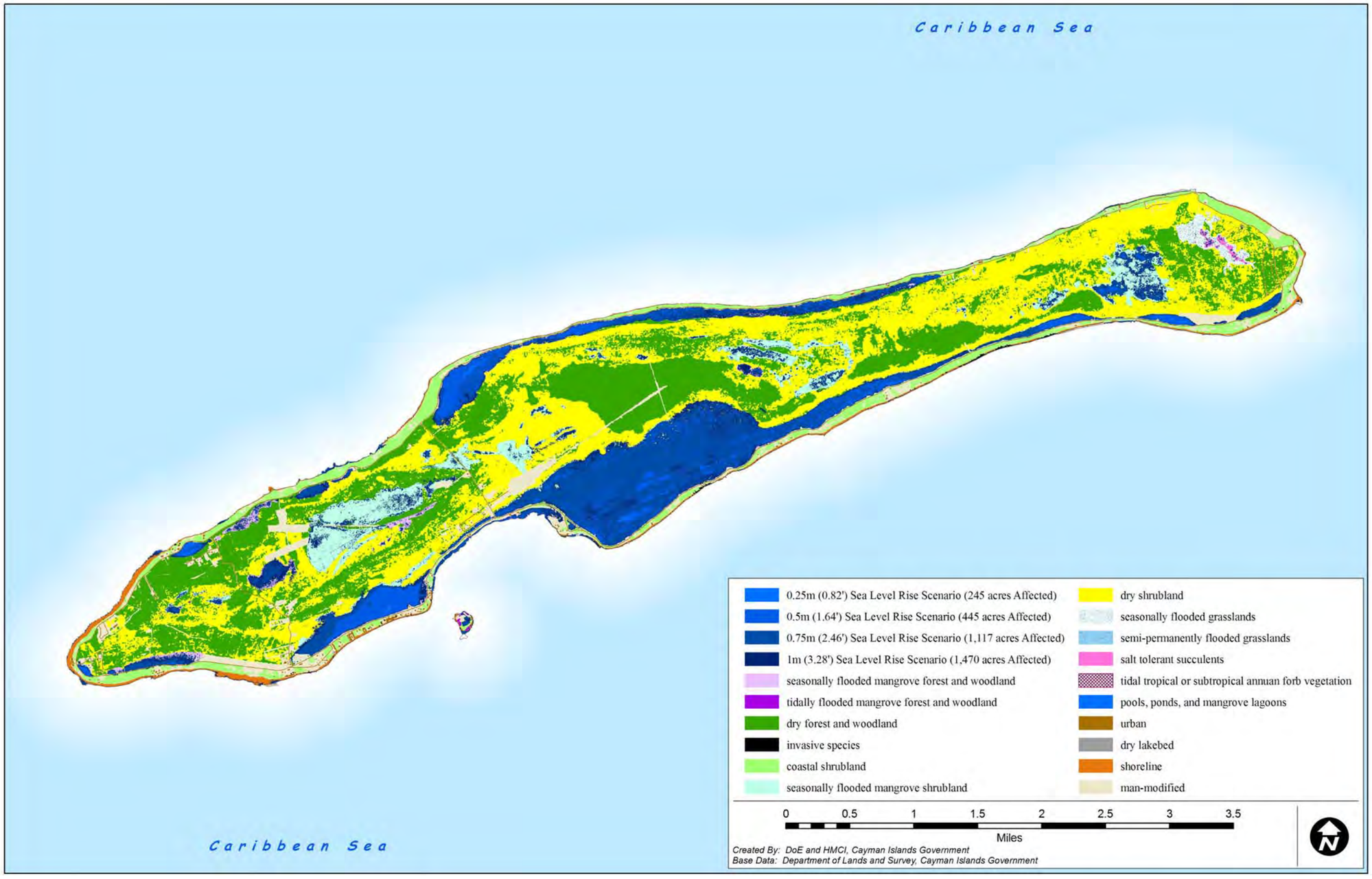


Table 31 Little Cayman Land Cover and Environmental Resources Affected By Sea-Level Rise

		Landcover Affected By							
All Landcover		0.25m SLR		0.50m SLR		0.75m SLR		1.0m SLR	
Landcover Class	Area (acres)	Area (acres)	% of Total	Area (acres)	% of Total	Area (acres)	% of Total	Area (acres)	% of Total
seasonally flooded mangrove forest and woodland	464.19	1.48	0.32%	59.37	12.79%	300.86	64.81%	407.69	87.83%
tidally flooded mangrove forest and woodland	18.46	0.01	0.06%	3.05	16.53%	13.37	72.45%	16.30	88.28%
dry forest and woodland	1926.60	0.00	0.00%	0.01	0.00%	1.02	0.05%	12.27	0.64%
invasive species	7.72	0.00	0.00%	0.00	0.06%	0.38	4.97%	0.86	11.11%
coastal shrubland	400.79	0.00	0.00%	0.08	0.02%	2.43	0.61%	8.83	2.20%
seasonally flooded mangrove shrubland	700.00	0.11	0.02%	19.52	2.79%	152.96	21.85%	310.78	44.40%
dry shrubland	2247.53	0.00	0.00%	0.01	0.00%	0.81	0.04%	19.65	0.87%
seasonally flooded grasslands	50.50	0.00	0.00%	0.00	0.01%	0.02	0.04%	1.40	2.77%
semi-permanently flooded grasslands V.A.1.N.h	1.99	0.00	0.00%	0.00	0.00%	0.09	4.57%	0.90	45.20%
salt tolerant succulents	9.25	0.00	0.00%	0.00	0.00%	0.13	1.38%	1.61	17.37%
tidal tropical or subtropical annuan forb vegetation	0.61	0.00	0.00%	0.00	0.00%	0.59	96.80%	0.61	100.00%
pools, ponds, and mangrove lagoons	241.31	9.53	3.95%	122.15	50.62%	227.59	94.32%	240.24	99.56%
urban	97.57	0.00	0.00%	0.00	0.00%	0.01	0.01%	0.19	0.20%
dry lakebed	413.06	1.93	0.47%	119.28	28.88%	385.73	93.38%	406.03	98.30%
shoreline	140.41	0.05	0.04%	1.85	1.32%	15.15	10.79%	30.68	21.85%
man-modified	402.97	0.00	0.00%	0.25	0.06%	2.06	0.51%	10.71	2.66%

		Landcover Affected By							
All Landcover		0.25m SLR		0.50m SLR		0.75m SLR		1.0m SLR	
All Landcover	Area (acres)	Area (acres)	% of Total	Area (acres)	% of Total	Area (acres)	% of Total	Area (acres)	% of Total
All Landcover	7122.98	13.11	0.18%	325.58	4.57%	1103.22	15.49%	1468.74	20.62%

Owing to the small proportion of land currently urbanized in Little Cayman, even a 1m SLR does not create a significant impact. However, this might not be the case by 2100 if development proceeds at a much more rapid pace.

The shoreline is hardly affected under the 0.25m SLR scenario. Roughly 22% of the existing shoreline would be impacted by a 1m SLR.

Not many natural habitats are affected by the sea level rises of 0.25m or 0.50m. However among the most significant habitat loss under the 1m SLR scenario is to seasonally flooded mangrove forest and tidally flooded mangrove forest, each at roughly 88% of their total areas.

Overall, roughly a fifth of Little Cayman land cover would be impacted by a 1m rise in sea level.

Gap Analysis

This VCA conducted on the Cayman Islands tourism sector comprised four main components: KAP Survey, Climate Assessment, Tourism Assessment and Static Risk Mapping to produce country vulnerability and risk profiles. The following section highlights some of the limitations of this report in terms of barriers or challenges encountered during the implementation of the VCA methodology and gaps to be addressed in future assessments.

KAP Survey

1. Survey sample size could be larger although it did represent nearly 50% of the businesses targeted for this assessment. Subsequent assessments should aim to not only increase the total number of companies surveyed but represent a wider proportion of businesses within each subsector.
2. Mode of survey delivery will have to be better tailored to type of businesses surveyed. For example, most managers can receive and respond to the questionnaire electronically using either a Word version or through Survey Monkey, however taxi drivers, retail staff or watersports operators need to be reached through in-person interviews. The latter survey mode requires more human resources and is a lengthier process of data collection.
3. Questionnaire could be redesigned so that there is a designated section for operations managers or owners to complete specific questions on the financial implications of past events and the capacity of businesses to sustain similar hazards in future.

Climate Assessment

4. Global baseline data and projections were used for sea-level rise (SLR) scenarios. Future assessments should better characterize local historic and currently observed sea-level rise from various on-island sources. This may involve properly accounting for wind influence in the tide records as the National Climate Committee noted that the Cayman Islands data has been shown to have a degree of error from the Galveston benchmark.
5. Rainfall accumulation data, especially number of days with heavy rainfall, is collected by the National Weather Service but no analysis has been performed and was therefore not included in this VCA. Such analysis should be included in future assessments.
6. Trends that appear in daily or monthly data sets are masked when presented as annual totals.
7. Anecdotal information should be used in future assessments to supplement empirical data as it can provide a more complete picture of trends and place a human perspective on impacts. For example, laymen observations of a decrease in nor'westers (cold fronts) in recent years could prove significant as these systems have typically facilitated replenishment of beach resources along

Seven Mile Beach, the country's primary tourism asset, which is prone to erosion from summer storms and retreat from SLR.

Tourism Assessment

8. Information on future changes and trends in national, regional and global tourism and travel was requested but not received prior to the finalization of this report owing to a lack of prioritorization and ownership of the process by tourism authorities.
9. No information existed on past economic losses from droughts of which there have only been four officially recorded and therefore no future estimates were provided.
10. UN ECLAC reports were critical in providing loss estimates from hurricanes for the tourism sector, giving an indication of expected losses from future storms especially in the accommodation subsector. However more statistical data on other subsectors (watersports, attractions, restaurants) is needed to fully quantify the existing value of tourism activities to the country's GDP and hence the expected losses to these subsectors from climate-related events.
11. The economic value of water sports activities to the Cayman Islands' tourism sector was calculated in 2008. Periodic assessments to re-evaluate and update this information should be made in an attempt to characterize the economic contribution of coral reefs, mangroves and beach resources to the watersports and attractions subsectors. This metric may also indirectly serve to gauge whether long-term impacts of climate change on these natural systems are having any effect on whether tourists still choose to participate in activities reliant upon their comparative health and quality of the product. Much of the data could be gathered through the Department of Tourism exit surveys.

Static Risk Mapping

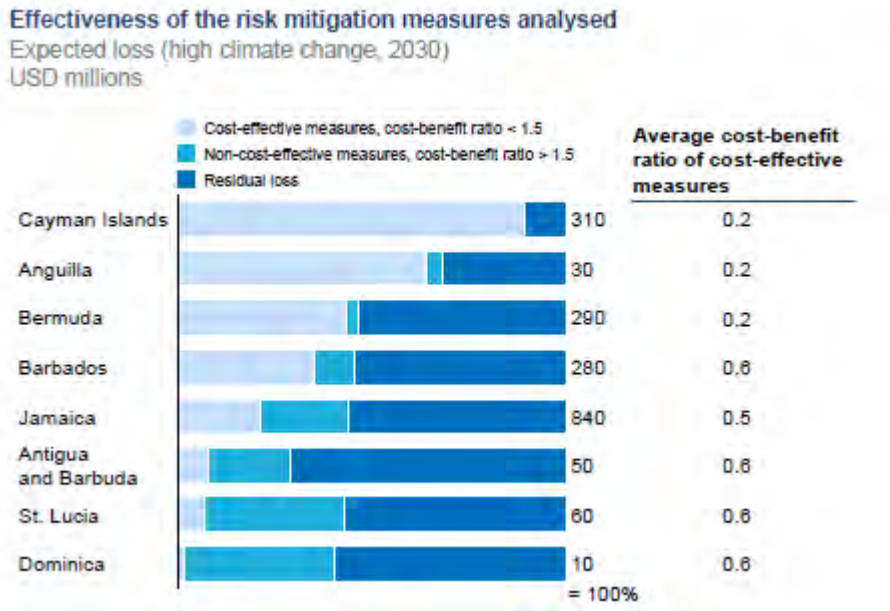
12. Not all climate-related hazards have been fully assessed in terms of projected impacts. Only the risk from future sea-level rise (SLR) has been mapped and represent straightforward inundation of the land mass, not the impacts compounded by rise in water table or saturation rates as a result of SLR, e.g. more rapid overland flow, reduced well capacity and overflow of septic systems.
13. Historical inland flooding from rainfall events and storm surge flooding from hurricanes have been presented, with no future projections of these risks attempted. It is understood that flood maps are among the list of outputs from the EU-funded Regional Risk Reduction Initiative (R3i), a quantitative hazard assessment currently being undertaken and locally managed by Hazard Management Cayman Islands. Efforts should be taken to avoid duplication of the hazard risk mapping conducted under this VCA but rather complement it and fill the gaps identified.
14. Sea-level rise scenarios presented do not include a storm surge component. Subsequent generation of maps should include this correction.

15. SLR scenarios represent what pertains in a 2010 reality and do not reflect population growth and build-out of communities and infrastructure to 2100. The percentage of buildings older than 50 years that would reasonably not be present at the end of the century has not been discounted from the hazard mapping. Build-out scenarios based on economic and population growth trends should be developed so that the next generation of hazard mapping better captures the extent of vulnerable communities, businesses and critical infrastructure. Similarly, the value of buildings affected in each scenario presented pertains to 2008 valuation assessments and does not include inflation or a discount rate to 2100.
16. The economic impact of the sea-level rise scenarios reflect building values only and do not include the asset value of the land itself.
17. An *Atlas of Predictive Hurricane Risk & Impact Scenarios* has been compiled by the Lands & Survey Department indicating wind, wave and surge impacts o the land mass of the Cayman Islands by systems approaching from multiple directions and various speeds. However the VCA project team did not have access to the raw data therefore no new GIS data (e.g. buildings database) could be overlayed to conduct detailed analysis. It is understood that discussions are underway to update the atlas based on SLR projections to take into account climate change. Such an exercise would complement efforts to capture the vulnerability of these islands to an assortment of future cyclone scenarios.

Adaptation and Mitigation Analysis

The most compelling reasons for adaptation is explained in a 2010 report entitled the *Economics of Climate Change Adaptation in the Caribbean.* Figure 19 demonstrates that the Cayman Islands can avoid up to 89% of the expected loss from climate change by implementing cost-effective adaptation measures. The benefits – that is, the averted losses – and the costs were quantified and a cost-benefit ratio was computed, which accounted for cost of capital, investment costs and operating costs. Measures with a cost-benefit ratio below 1.5 were considered to be 'cost-effective' across all countries in the study. With an average ratio at 0.2, it is clear that the Cayman Islands is in a good position to cost-effectively avert significant loss through risk mitigation measures (adaptation), with the small residual risk addressed through the purchase of risk transfer solutions (insurance, etc.).

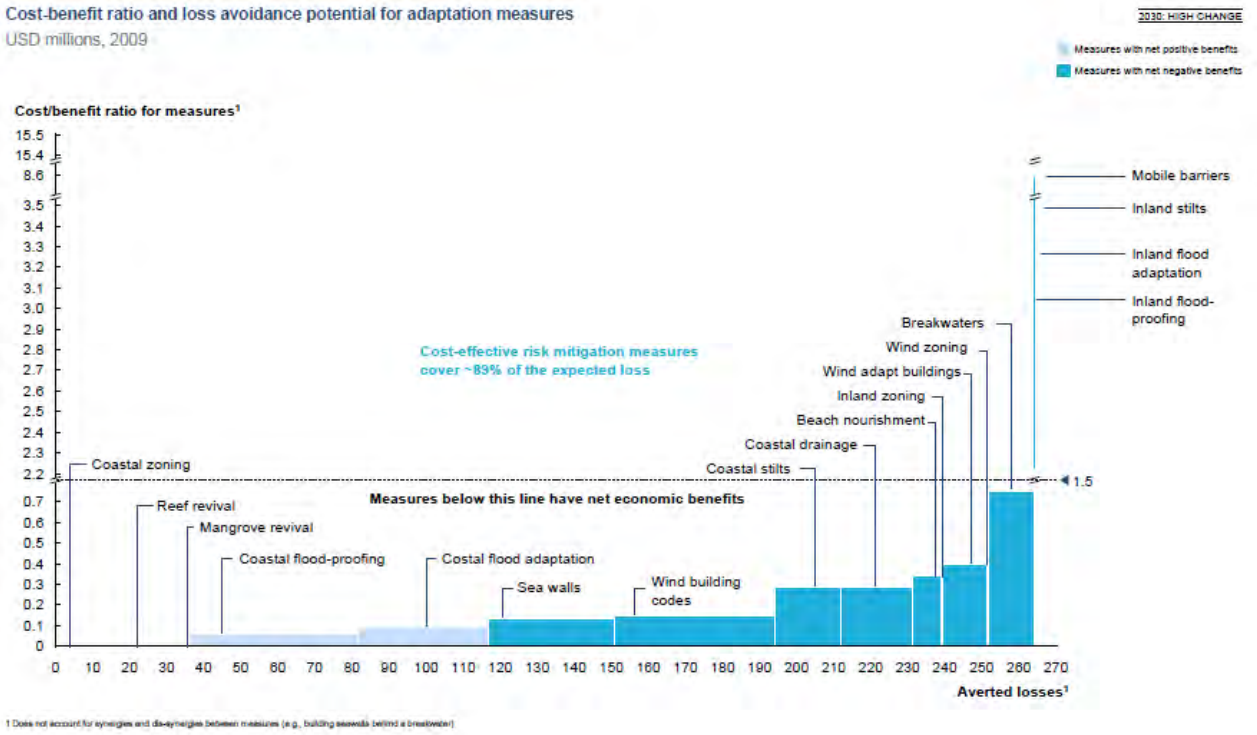
Figure 19 Cost Effectiveness of Adaptation in the Cayman Islands



Source: CCRIF (2010)

The types of adaptation measures and the loss avoidance achieved by each are shown in Figure 20. Measures range from environmental rehabilitation, land use planning and building regulation, to hard and soft engineering solutions. Coastal flooding-proofing and coastal flood adaptation measures have net positive benefits as they address the majority of the climate threat and total damage to these very low-lying islands.

Figure 20 Loss Avoidance Potential of Adaptation Measures in the Cayman Islands



Source: CCRIF (2010)

Achieving climate resiliency in the Caribbean is thought to be most cost-effective when coupled with low-carbon development and other greenhouse gas mitigation measures. Such an integrated policy approach has been proposed for the Cayman Islands in a Climate Change Policy – *Achieving a Low-Carbon Climate-Resilient Economy*. This Policy developed by the National Climate Change Committee in concert with multi-stakeholder groups is expected to be implemented over the next 5 years.

The following adaptation and mitigation initiatives are recommended for implementation within the next 3 to 5 years to address the primary vulnerabilities and risks identified in this VCA, namely coastal flooding and impacts to physical assets within the coastal zone. The most appropriate entry points for the interventions in terms of decision-making and implementation have been suggested.

Adaptation Measures

1. Coastal construction setbacks

Undertake a comprehensive analysis of coastal construction setbacks for all three islands with the aim to mitigate coastal flooding from storm surge and wave action impacts. Develop and implement Coastal Construction Setback Category Maps for each island indicating site-specific setback distances for new or rebuilt construction. Enact complementary regulations and policies for coastal zone construction (e.g. no-build areas, wash-through ground floors, revised building heights, etc.). These recommendations are consistent with those made by the Beach Review and Assessment Committee (2003) and Young & Gibbs (2005).

Box 1 Adaptation Intervention 1: Coastal Construction Setbacks

Entry Point	Details	Implementing Agency
Coastal Construction Setback Category Maps	Determine appropriate coastal setbacks, create maps for each island and propose relevant amendments to legislation	Working group: Planning Dept, Dept of Environment, Lands & Survey, Hazard Management Cayman Islands
Development & Planning Regulations	Revise legislation accordingly to enact new setback categories and other supporting regulations	Planning Dept, Central Planning Authority, Development Control Board, Ministry of Development, Cabinet, Legislative Assembly
Industry and public awareness	Develop suitable informational material for use by the design and construction community and general public to understand new setback requirements	Planning Dept, GIS
Compliance and enforcement	Ensure new or rebuilt structures are designed and constructed to revised setback regulations	Planning Dept, Central Planning Authority, Development Control Board

2. Strategic Beach Management Plan

Develop and implement a Strategic Beach Management Plan per the BRAC Report which was tabled and accepted in the Legislative Assembly in 2003. The purpose of this strategic effort is to plan and be prepared for contingencies such as erosion resulting from the passage of hurricanes or storms that strip commercially important beaches of sand resources. A specific strategy should be developed to mitigate impacts to Seven Mile Beach. Establish a designated Beach Management Fund to finance the plan with initial seed money from Government reserves supplemented by private sector/stakeholder contributions and other appropriate funding mechanisms.

Box 2 Adaptation Intervention 2: Strategic Beach Management Plan

Entry Point	Details	Implementing Agency
Strategic Beach Management Plan	Develop Plan in accordance with recommendations proposed by the BRAC regarding pre-planning logistics (e.g. stockpiling), etc. Determine agencies responsible for certain aspects of the Plan. Amend or create relevant authorizing legislation where necessary.	Working group: Planning Dept, Dept of Environment, Lands & Survey, Hazard Management Cayman Islands
Beach Management Fund	Establish fund through relevant legislation and other mechanisms to ensure money is ring-fenced for the sole purpose of funding the Plan	Ministry of Finance, Tourism & Development, Legal Dept, Cabinet, Legislative Assembly, Cayman Islands Tourism Association
Industry and public awareness	Develop suitable informational material for use by the tourism industry in general and specific stakeholders	Ministry of Finance, Tourism & Development, GIS
Compliance and enforcement	Ensure new development or rebuilt structures are designed and constructed in accordance with the Plan (e.g. preserve access to/along the beach, etc.)	Planning Dept, Central Planning Authority

3. Adaptation planning in the tourism sector

In conjunction with the Public Education & Outreach Strategy designed to accompany the development and implementation of the national Climate Change Policy, ensure a specific strategy exists for engaging various stakeholders within the tourism sector in climate change adaptation planning and implementation.

Box 3 Adaptation Intervention 3: Engagement of the tourism sector

Entry Point	Details	Implementing Agency
Tourism PEO Strategy	Develop a strategy designed to increase awareness of climate change impacts to the tourism sector, in particular create and maintain a dedicated climate change website for the Cayman Islands	National Climate Change Committee PEO Working group (GIS, DOT, DOE), Cayman Islands Tourism Association (CITA), Chamber of Commerce
PEO Action Plans and Implementing Activities	Implement programmes geared at full engagement of tourism businesses, product providers and educators in assessing their vulnerability to climate change, current coping mechanisms and requirements for adaptation to future impacts	GIS, DOT, DOE, CITA, Chamber of Commerce, University College of the Cayman Islands, CITN, Cayman Free Press, Cayman Net News

Industry assistance	Based on feedback from various outreach activities and surveying techniques, develop incentives, financing programmes and technical assistance to enhance climate resiliency of individual businesses throughout the industry	Ministry of Finance, Tourism & Development, DOT, CITA, Chamber of Commerce

Mitigation Measures

4. Low-carbon climate-resilient tourism sector

Enact recommendations from the National Energy Policy aimed at reducing energy consumption in the building sector, whilst enhancing the resilience of the physical tourism plant. Measures include adapting the International Building Code and International Energy Code to local code, and codifying other means to increase the passive survivability of buildings and infrastructure critical for tourism (e.g. off-grid power, water efficiency). Ensure accompanying policies and incentives are in place to assist the industry with implementing mandatory measures and engaging in voluntary programmes.

Box 4 Mitigation Initiative: Energy efficient, climate-resilient tourism sector

Entry Point	Details	Implementing Agency
National Energy Policy	Finalize the National Energy Policy and implementation plan	National Energy Policy Committee
Building Code, and Sustainable Design and Land Use policies	Enact energy efficiency building code, and integrate sustainable design and land use policies into current planning processes to ensure climate-resilient tourism development and greenhouse gas emission reductions from this sector	National Energy Policy Construction, Buildings & Land Use Subcommittee.
Industry and public awareness	Develop suitable informational material for use by the design and construction community and general public to understand new code requirements and policies	National Energy Policy PR Subcommittee, Planning Dept, GIS
Code Compliance and Enforcement	Ensure new or rebuilt structures are designed and constructed to revised code	Planning Dept, Central Planning Authority, Development Control Board
Industry assistance	Develop incentives, financing programmes and technical assistance to enhance energy efficiency and climate resiliency of the tourism sector, with pubic-private partnership programmes geared at retrofitting the existing building stock	Ministry of Finance, Ministry of Works, Electricity Regulatory Authority, DOT, CITA, Chamber of Commerce, CUC, Cayman Brac Power & Light

Conclusions and Recommendations

This assessment clearly shows the current physical vulnerability of the Cayman Islands' tourism plant to coastal and inland flooding given the extremely low-lying nature of these islands. Damages and losses from past storms and hurricanes have primarily been from storm surge flooding and wave action along exposed coastlines. Hotels and condos incurred damages of CI$282 million from Hurricane Ivan, nearly 75% of which was due to storm surge-induced flooding, and resulted in the permanent withdrawal of some room stock as a few properties have never reopened. Losses to stay-over tourism alone was CI$72 million and an additional CI$25 million lost revenue from cruise tourism. That Ivan - a category 4, 1-in-100 year storm - is not considered the worst-case scenario for these islands is sobering. With ever-growing infrastructure exposed to stronger hurricanes, it is likely damages and losses to this extent may become more common. By 2025 increased hurricane costs, lost tourism revenue and infrastructural damages from sea-level rise are estimated at nearly 9% of Cayman Islands' GDP, rising to over 53% of GDP by the year 2100.

At present insurance is the main coping mechanism for recovering losses from weather and climate related hazards. However the next major hurricane may have serious implications for future insurance coverage in the Cayman Islands. As evidenced after Hurricane Ivan, insurance premiums have become too high for some residents and businesses to maintain policies thus increasing their economic vulnerability to future events. Perhaps more worrying, climate change and insurance experts predict that given the extent of high risk assets in the Cayman Islands there is a distinct threat of the jurisdiction losing its eligibility for insurance coverage. It is not sufficient for Government to protect its own assets and assist those social sectors that cannot obtain or afford coverage. Nor is the ability to spread catastrophic risk for the tourism plant and other critical infrastructure like roads and vulnerable utilities through regional programmes an adequate safety net. Coupled with the woefully inadequate national disaster reserve fund, it is evident that more progressive solutions are needed in terms of adaptation interventions to reduce current exposure and vulnerability within the tourism sector.

> ***The Cayman Islands must reduce the risks to physical assets and associated losses through proactive, cost-effective measures aimed at averting damage from storm surge flooding and wave action, and improving its standing in the reinsurance industry. Measures include climate-proofing existing structures and appropriately designing and siting new tourism facilities and redevelopment projects.***
>
> ***The jurisdiction should utilize a variety of planning tools to identify and mitigate future vulnerabilities and levels of risk to the sector, including but not limited to 1) generating scenarios using insurance industry models with local insurance data, relevant tourism statistics and geographical information systems databases as inputs, and 2) integrating climate change projections for the Caribbean region with environmental impact assessments for new development.***

As residents of extremely low-lying islands, most people are understandably concerned with the threat of sea-level rise. Overall the primary road networks, the majority of which are coastal, are not as susceptible to sea-level rise as would initially be expected. Perhaps counter intuitively, even with a 1m SLR, less than 1% of roads and no present-day critical infrastructure in Little Cayman is threatened. This suggests there is time to address the vulnerable sections of the network and reduce risks accordingly.

> ***Allocating a percentage of vehicle licence fees could fund road realignment or shoreline stabilization and reinforcement projects where needed.***

The principal tourism area of Seven Mile Beach is hardly compromised by a 0.25m SLR with only one hotel and one condo complex affected, and having a total loss value of CI$30 million. There is a small difference between the 0.75m SLR scenario (the likelihood) and the 1m SLR in terms of the potential affect and corresponding value of the tourism plant strictly speaking (hotels, restaurants). However, when other physical assets that make up the plant are considered, e.g. condominium units and retail outfits, the value of potential damages significantly increases from one scenario to the next, CI$192 million to CI$286 million for 36 versus 148 structures impacted.

> ***The Government and the tourism sector should plan for a 1m rise in sea level given the wider benefits by doing so such as the protection of a larger number of assets and averting a significant amount of the socio-economic losses anticipated from coastal and inland flooding and other impacts associated with sea-level rise.***

> ***In conjunction with the tourism sector, Government should develop and fund a Beach Contingency Plan to implement when needed with particular emphasis on Seven Mile Beach and other commercially and recreationally important beach assets.***

In Cayman Brac wind damage may be more of a concern than flooding given the unique geology of the island. With the exception of two facilities, essential services already appear to be placed in areas not prone to sea-level rise risk. As the tourism plant in the Sister Islands is much smaller than Grand Cayman presently, so too are the number and value of assets at risk from all SLR scenarios run. Even at 1m SLR, the loss of two tourism facilities in Cayman Brac and Little Cayman each, at a cost of CI$404,000 and $469,000 respectively, is manageable to address in terms of appropriate adaptation measures. However, it must be borne in mind that the present vulnerability of the Cayman Islands represented in the sea-level rise scenarios generated in this assessment does comprehensively reflect the extent of vulnerability in the year 2100 as the tourism plant and infrastructure is expected to increase beyond what physically pertains in the baseline year(s) assessed (2008, 2010). Similarly, none of the SLR scenarios consider the effect of additional storm surge hazard.

> ***Use TAOS storm surge model or other tool to develop hazard maps that incorporate anticipated sea-level rise to more accurately delineate future risk prone areas and inform new coastal construction setbacks and no-build area designations.***

Develop build-out scenarios based on historic development patterns, realistic economic growth and population increase estimates.

Use hazard maps and build-out scenarios in national and sectoral planning to appropriately site new development and tourism facilities, and set new design and construction regulations for development that may be sited in risk-prone areas where absolutely necessary.

The Islands face a future of warmer temperatures coupled with a reduction in cooling winds. Overall this is could mean a less hospitable tourism destination, and not as ideal as the local industry would like for hosting destination weddings or international sporting events. Mitigating measures will be needed to ensure that visitors' stays on the islands remain comfortable and affordable. This may involve increasing the cooling systems at existing facilities or ensuring that they operate more efficiently as well as providing public cooling stations and more shaded areas for heat stroke-prone visitors.

Government should provide programmes to help fund energy efficient retrofits for existing buildings and incentivize planned tourism developments to exceed efficiency requirements of the new building energy code.

Per the Climate Change Policy recommendations, establish a Climate Change Trust Fund, a portion of which would finance suitable adaptation and mitigation projects to facilitate the transition to a low-carbon climate-resilient tourism sector.

The tourism sector has experienced the physical devastation and economic crippling of hurricanes Ivan and Paloma in recent years, neither of which are the worst-case scenarios for the future. While the majority of businesses are very concerned about the implications of climate change on their businesses and do not believe the Cayman Islands is prepared for challenges it presents, most companies do not see it as their responsibility to tackle this issue and have not incorporated it into their operational planning. Behavioural and attitudinal shifts are needed within the tourism industry to address the current lack of ownership of climate change adaptation action at the individual business level. Informational and technical assistance on appropriate preventative measures is needed which may go a long way toward increasing action in this sector.

Develop and implement Public Education and Outreach material disseminated through various local media geared at delivering key messages to tourism providers on anticipated climate change impacts to the sector and suitable adaptation measures to reduce vulnerability.

Incentivize adaptation planning and practices within the tourism sector through financial inducements, knowledge and training programmes, and appropriate disincentives.

Appendix 1 KAP Survey Analysis

REPORT ON THE RESPONSE TO THE CAYMAN ISLANDS CLIMATE CHANGE SURVEY FOR THE TOURISM SECTOR

Introduction

The Cayman Islands Climate Change survey for the Tourism Sector was designed to give the Cayman Islands National Climate Change Committee (NCCC) an idea of how the tourism sector perceives climate change, the present and future vulnerability of this sector to climate change issues. The survey is broken down into 6 parts; demographic information, general climate change questions, media use, business profile, Climate change impacts, and climate change adaptations.

Methodology

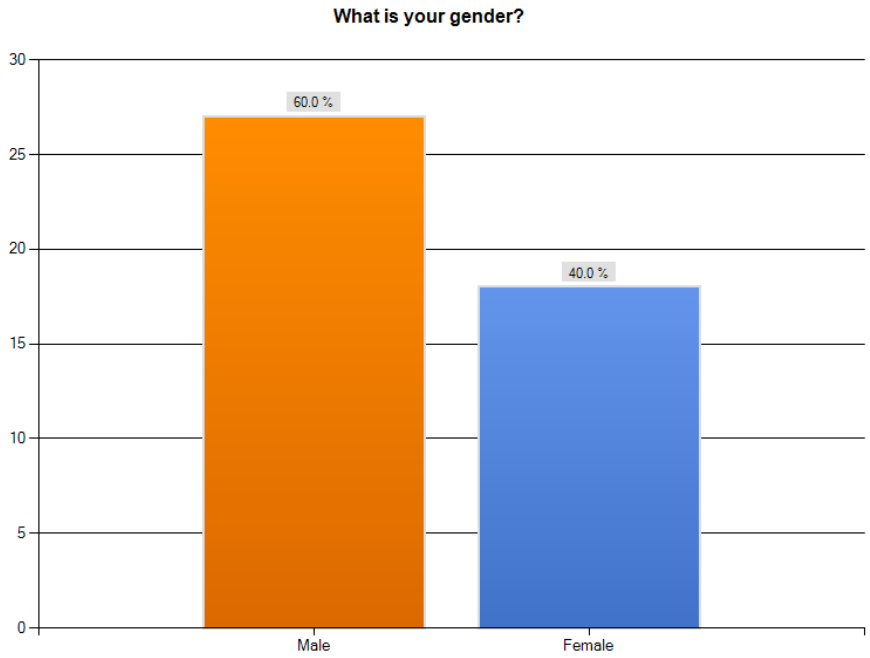
The Survey was distributed to approximately 100 businesses within the Cayman Islands tourism sector using Cayman Islands Tourism Association and Sister Islands Tourism Association distribution lists, and assistance from the Cayman Islands Department of Tourism. The survey was completed either online (via a link to Survey Monkey) or hard copy. The hard copy version was then entered into Survey Monkey so that analysis of the total responses was easier to conduct.

Results

Out of 100 businesses that were expected to complete the survey only 45 actually filled out the survey of which only 40 (88.9%) surveys where completed; which could allow the results to have unintentional bias and be skewed. Some questions were skipped either due to human error (unintentional missing of question) or due to the fact that person answering did not have the knowledge of or the authority to release the information.

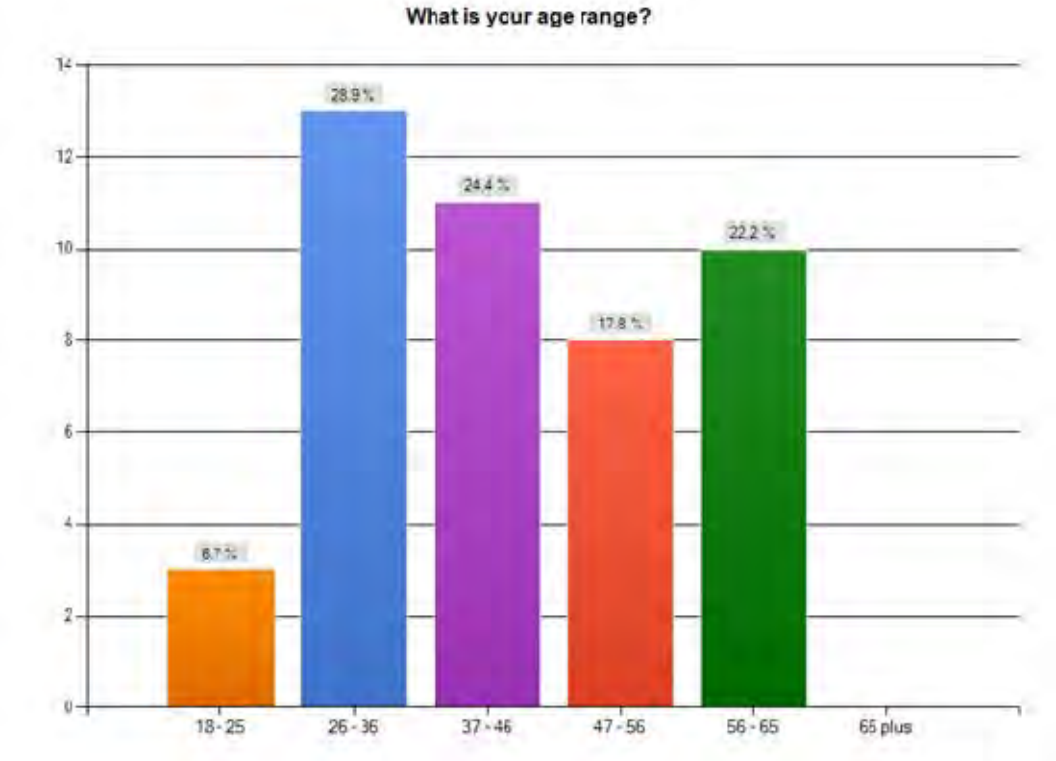
1. Demographics

1.1. Gender



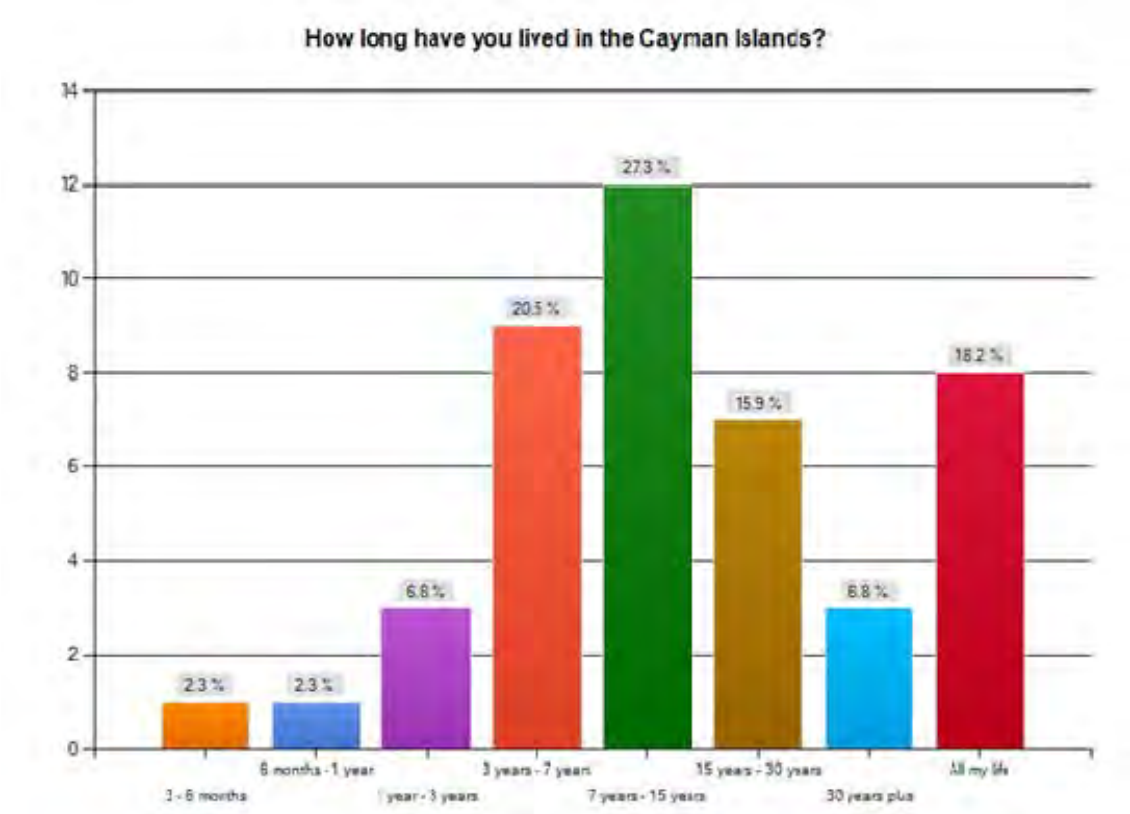
Out of 45 interviewees, 60% is male and 40% is female.

1.2. Age Range



The majority of participants fell into the 26 to 36 years old, with a total of 28.9% followed by 37 to 46 years old age range at 24.4%. 22.2% of the respondents fell in the 56 to 65 years old age range. Followed by, 17.8% in the 47 to 56 years old range. Finally, the 18 to 25 years old age range at 6.7% of all respondents.

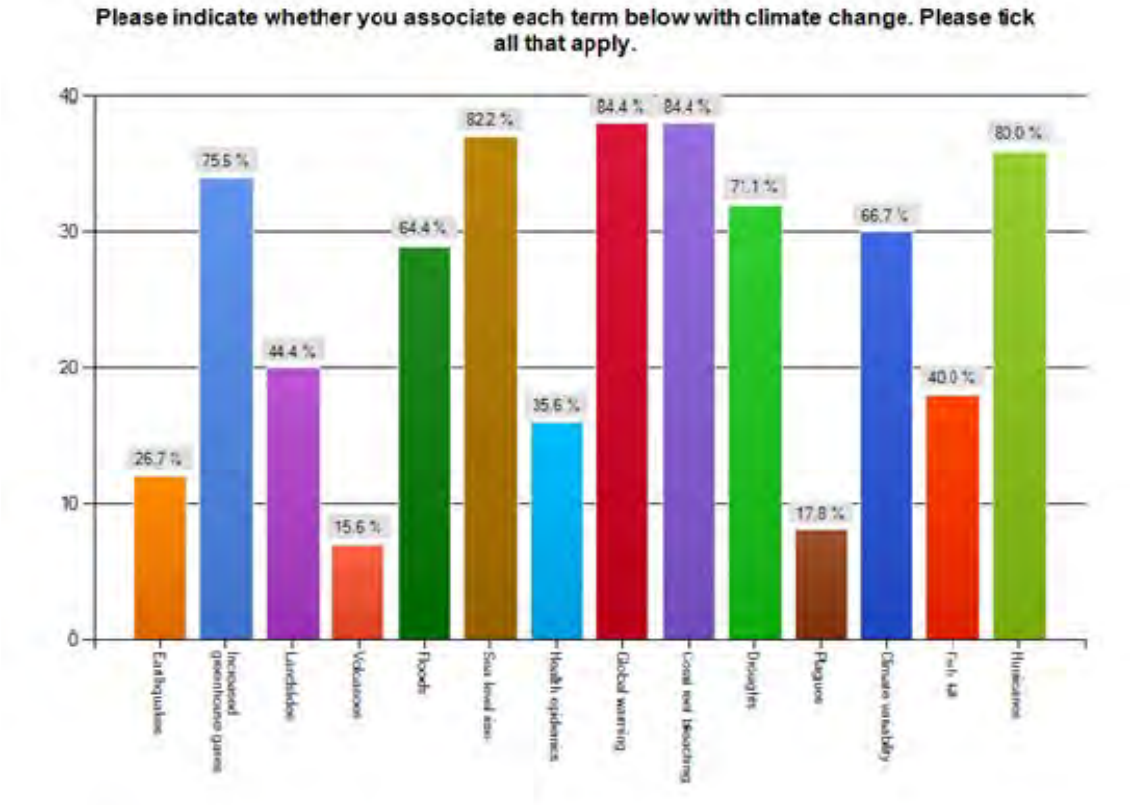
1.3. Length of residency in the Cayman Islands



27.3% of 45 participants have lived in the Cayman Islands between 7 to 15 years. Followed by 20.5% lived here 3 to 7 years. 18.2% have lived their whole life in the Island. 15.9% have resided in the Islands between 15 to 30 years. 6.8% have lived here between 1 to 3, or more than 30 years. And 2.3% of the interviewed have resided here either 3 to 6 months or 6 months to 1 year.

2. General Climate Change Questions

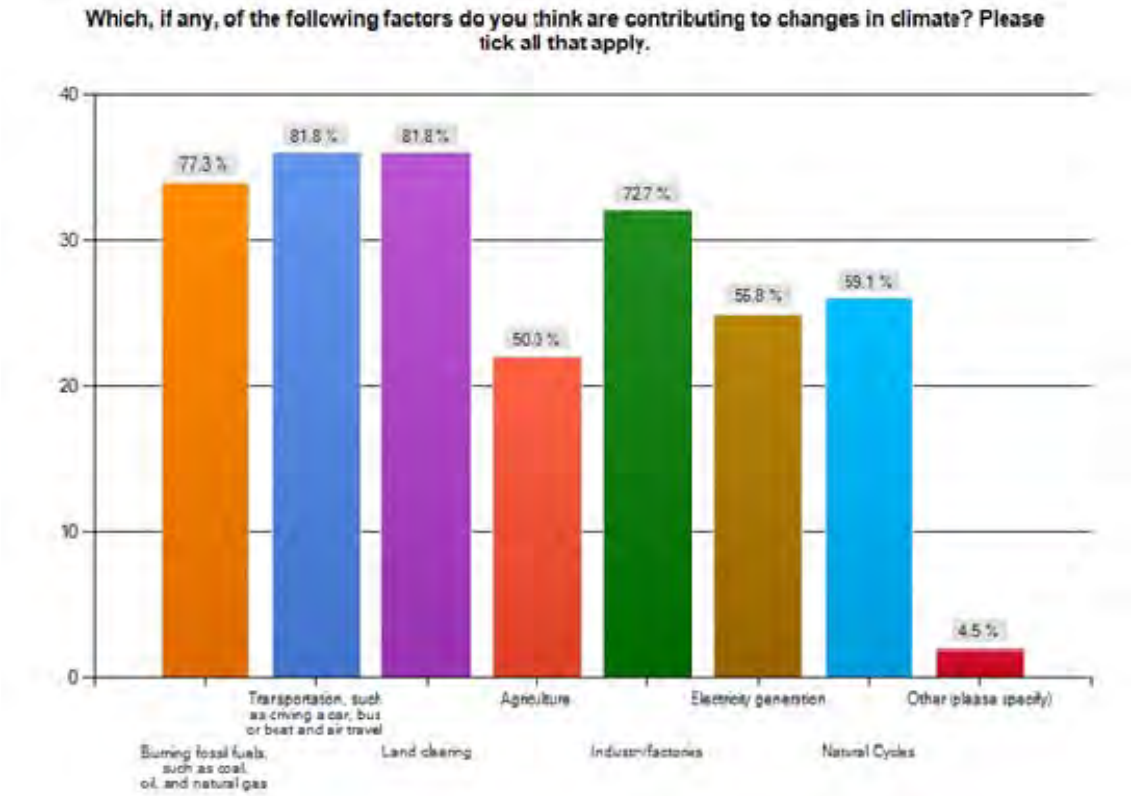
2.1. What impacts do people associate with climate change



Answered questions: 45
Skipped questions: 0

According to the results, for most of the participants, climate change is typically associated with global warming and coral reef bleaching, both with a total of 84.4%. 82.2% of the respondents considered the rise in the sea level as one of the impacts having some relevance to climate change. Hurricanes elicited 80.0% of the responses, while increased greenhouse gases (75.6%), droughts (71.1%), climate variability (66.7%) and floods (64.4%) draw the larger number of responses. This could be because those are the most common impacts that have occurred in the Cayman Islands. Followed by landslides with 44.4%, fish kill at 40%, health epidemics with 35.6% and earthquakes at 26.7%. Plagues and volcanoes were linked to climate change by 17.8% and 15.6% of the respondents.

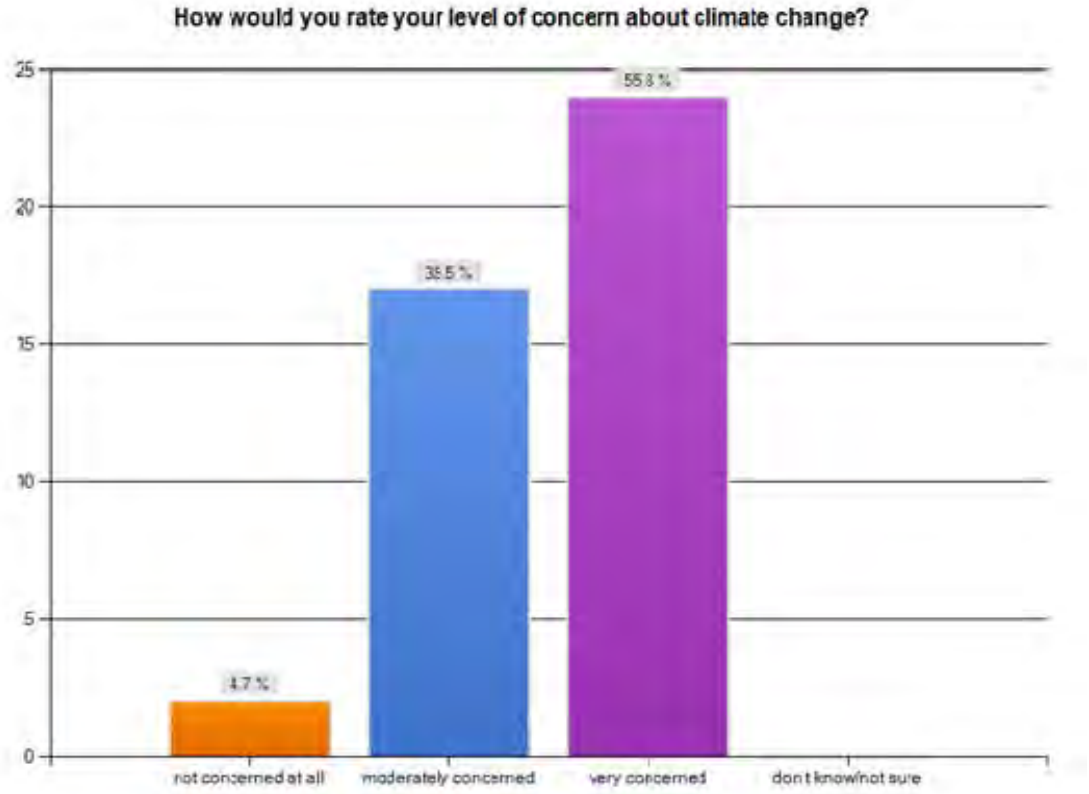
2.2. Factors contributing to climate change



Answered questions: 44
Skipped questions: 1

The majority of respondents agree that the main factors contributing to changes in climate are transportation (such as driving a car, bus or boat and air travel) and land clearing, both with a total of 81.8%. These are followed by burning fossil fuels (coal, oil and natural gas) with 77.3%, Industry/factories at 72.7%. For the respondents, natural cycles only contribute to climate change with a 59.1%. Electricity generation score with 56.8%, and activities related to Agriculture represents 50% of the contribution to changes in climate. Another of the responses includes chemical trails from planes and natural progression and developing of wetlands as a contributing factor.

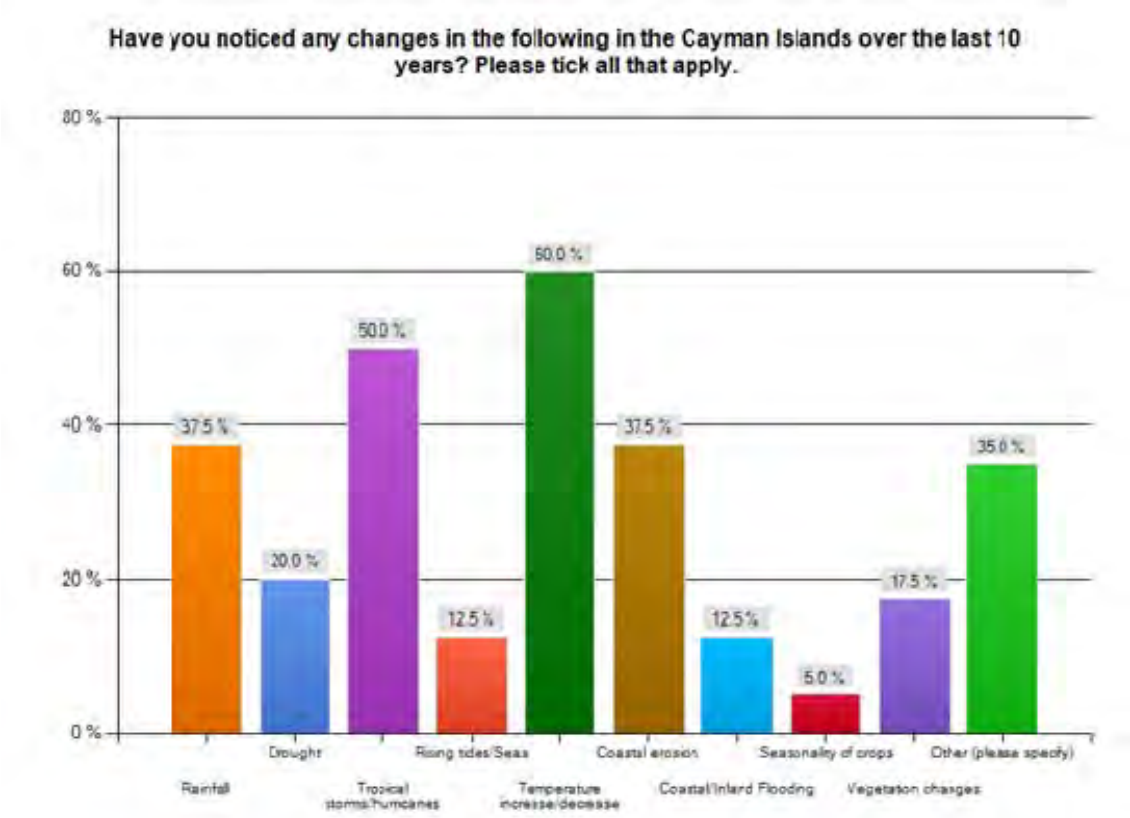
2.3. Level of concern in regards to Climate Change



Answered questions: 43
Skipped questions: 2

From the given responses, is clear to see that the majority of participants (55.8%) are very concerned about climate change, and over a third are moderately concerned (39.5%). 4.7% of the respondents indicated that they were not concerned at all about climate change. This result helps at the moment that any action concerned with climate change could be easily adopted by the people in the Cayman Islands.

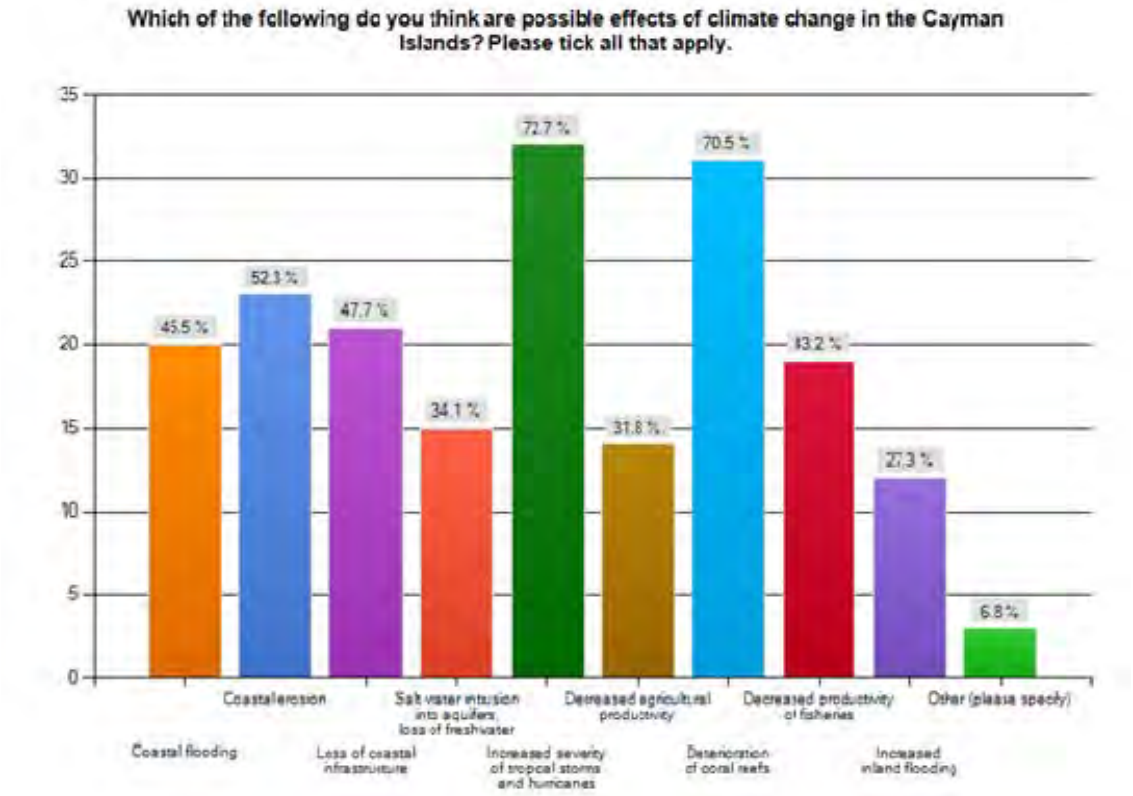
2.4. Changes due to climate change over the last 10 years



Answered questions: 40
Skipped questions: 5

The major changes that the participants have noticed in the Cayman Islands over the last 10 years is the variation in the temperature that is due to both, increase and decrease, with a total of 60%. Succeeded by, tropical storms/hurricanes, with 50%. 37.5% of the responses include changes in the rainfall and coastal erosion. 35% of the respondents also included some other responses such as: coral bleaching, impression that the sea is higher, and that there are more tropical storms than before, increase in the humidity level, Sea Surface Temperature (SST) increase, wave patterns impacting shore diving, more mosquitoes and more jelly fish washing up on the beaches, lack of marine life and coral, and this past 2009 winter seemed to be longer, but the coastal erosion it was felt is more to be blamed on the people who have not yet realized that the mangroves are there for a reason. Drought and vegetation changes, score at 20% and 17.5% respectively. Rising tides/seas, coastal/Inland flooding, both at 12.5% and seasonality of crops, 5%, are some of the other changes noticed in the Island. However, additional comments were given noting that “no wonder there is flooding in newly developed housing areas on Grand Cayman which flood all of the time. Nature is just doing what it has done in the past.”

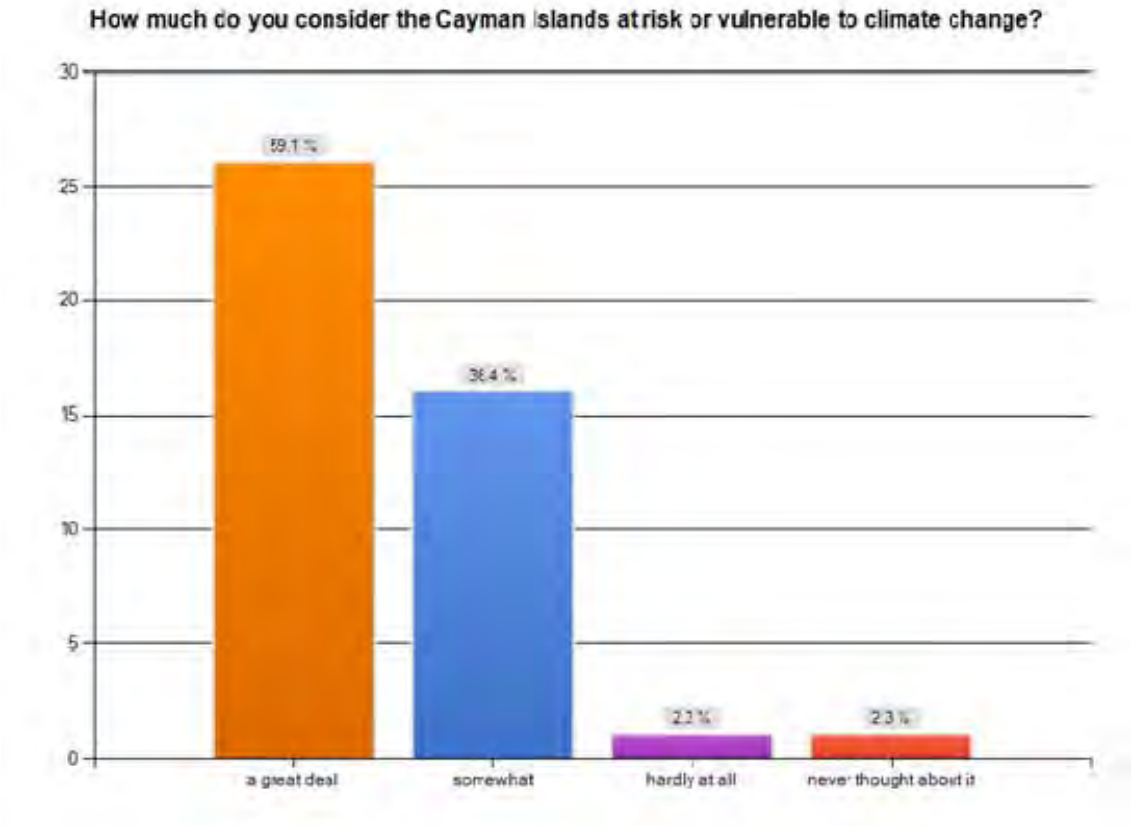
2.5. Effects of climate changes in the Cayman Islands



Answered questions: 44
Skipped questions: 1

For the respondents, the most important effect of climate change in the Cayman Islands is the increase in the severity of tropical storms and hurricanes with responses at a compelling 72.7%. The deterioration of coral reefs was answered by 70.5% of the respondents. Coastal erosion represented 52.3%, followed by loss of coastal infrastructure with 47.5% of the responses. Coastal flooding and decreased productivity of fisheries were scored 45.5% and 43.2% correspondingly. Succeeded by salt water intrusion into aquifers, loss of freshwater (34.1%) and decreased agricultural productivity (31.8%). Increased flooding, as an effect of climate change in the Cayman Islands, registered 27.3% of respondents. Others specified “that factors are outside Cayman and on a large scale and again most of these things are affected by man not caring about the environment and doing what he pleases because it's ‘their country’, as well as, decreased in rainfall which equals less fresh water".

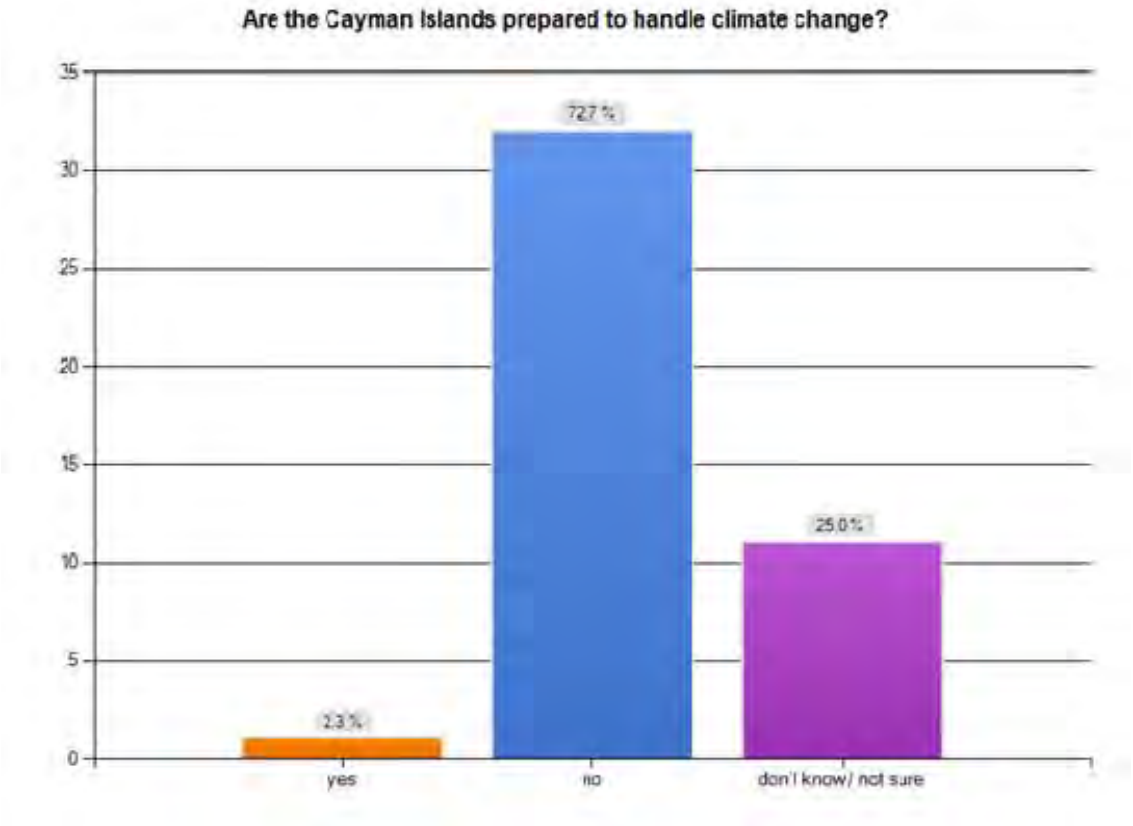
2.6. Perception of risk of Climate Change to Cayman Islands



Answered questions: 44
Skipped questions: 1

More that half (59.1%) of the survey respondents considered the Cayman Islands to be a great deal of risk or vulnerable to climate change, while 36.4% believe that the Cayman Islands is somewhat at risk or vulnerable. And only 2.3% considered hardly at all, or never thought about it.

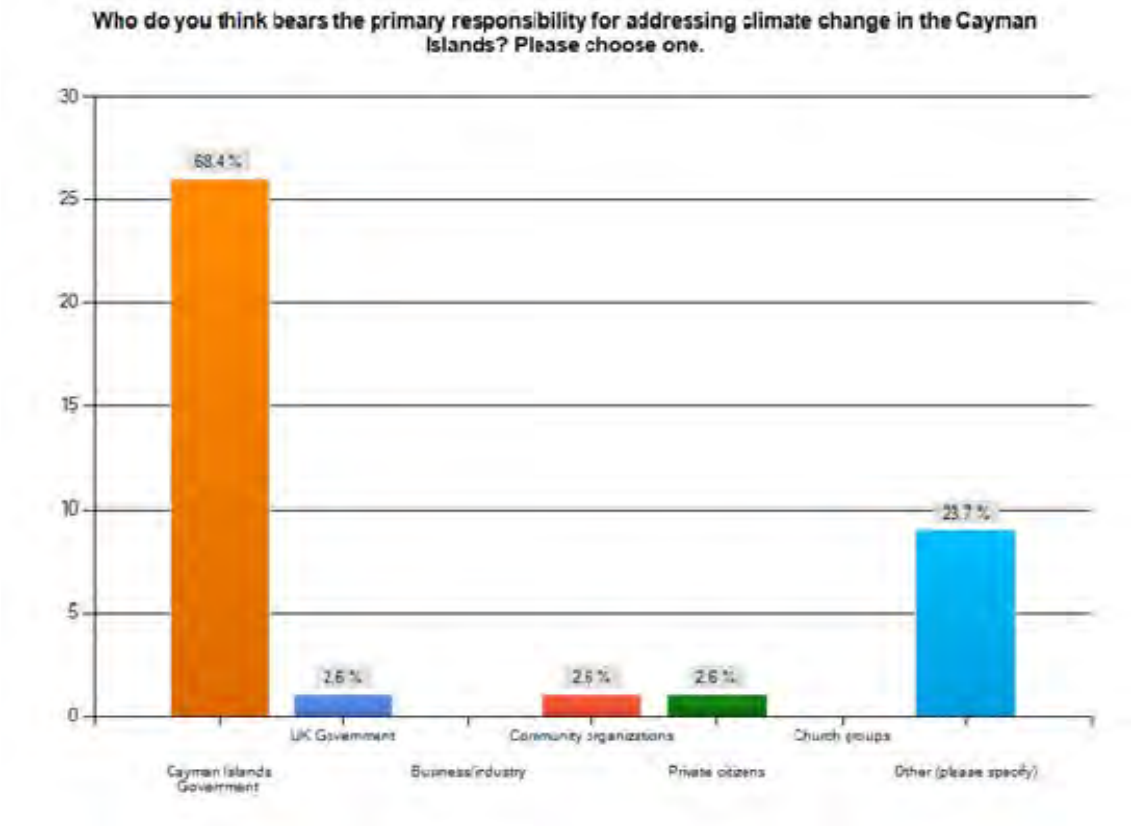
2.7. Is the Cayman Islands prepared to handle Climate Change



Answered questions: 44
Skipped questions: 1

An overwhelming 72.7% of survey respondents believe the Cayman Islands is not prepared to handle climate change. 25% do not know or are not sure about the preparedness capacity of the Islands. And only the 2.3% believe that the Cayman Islands is prepared.

2.8. Who bears the primary responsibility for addressing climate change?



Answered questions: 38
Skipped questions: 7

Most of the participants, 68.4%, believe that the Government of the Cayman Islands is the responsible for addressing climate change. Some 23.7% of the responses considered Other entities or modes of cooperation than those available for selection in relation to this issue, stating responsibility should be shared among everyone, because “all of us need to take part in preserving the environment. If that is destroyed, the islands are destroyed”. The remaining responses showed responsibility divided equally (2.6% respectively) among the UK government, community organizations and private citizens. Interestingly, for a survey of tourism sector businesses, not one respondent considered the responsibility of business/industry to address climate change in the Cayman Islands.

2.9. Preparation for climate change

Respondents gave a wide range of responses when asked what proposed actions could be taken in terms of preparation for climate change. The majority of responses below focus on climate change mitigation rather than adaptation options:

- Government should take a serious look at this matter as soon as possible.
- More recycling. Solar power.

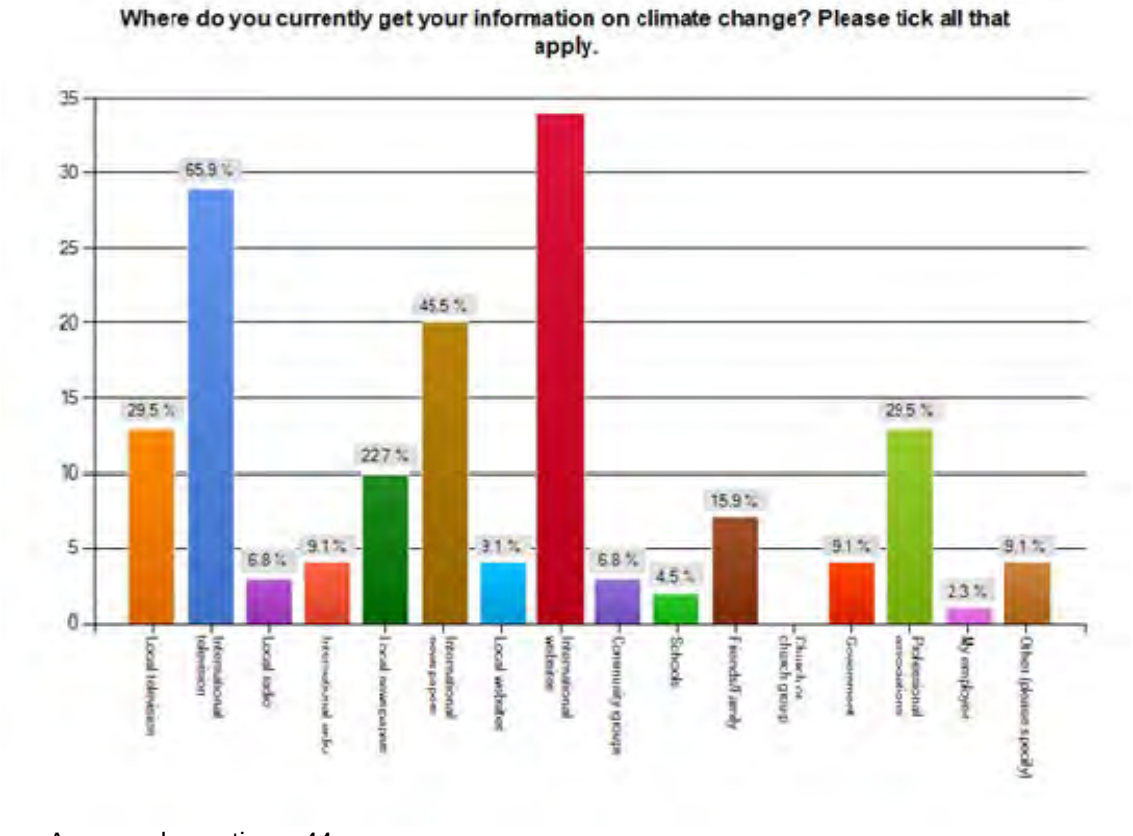
- People need to be more educated on the fragileness of our marine parks. Fishing in Marine Parks needs to be addressed.
- Build on stilts.
- If sea level does rise the Cayman Islands will need to create a sea wall around the island or move it will be huge cost.
- Upgrade recycling, engage internationally, tighten auto emissions and other air standards.
- Higher taxation on importing cars and considering the possibility of carbon tax. More preservation initiatives need to be devised for protection of on island and fragile aquatic ecosystems, especially coral reefs on the west side of the island.
- Decrease pollution, less use of plastics and disposables, fuel efficient cars, less destruction of native vegetation, improved sewage management, decrease use of lawn/yard chemicals and fertilizers-plant native flora, prohibit invasive species.
- Draw up plans based on future projections and adjust plans to cope with new situation. Easy example is to insist on coastal impronments to be built elevated; build all weather transportation corridor throughout the island, to insure movement back and forth; to expand businesses that can benefit from new opportunities; eliminate the landfill.
- Not sure of infrastructure in place, but incentives and tax write for green purchases (washer, dryer, stove) is always a good start.
- Less shore line development, wetland protection.
- A vigorous education drives to inform the public of potential long term effects. This program should be scientific based and not sensational.
- Actually begin to take it seriously, fuel, energy, trash, cars, pollution, sewage, every area of how we live.
- Recycle our garbage. Ban plastic bags all together.
- Alternative energy generation, electric cars on Little Cayman.
- Recycle, reforestation of mangroves and education.
- Reducing or eliminating duty on items that reduce carbon dioxide emissions.
- Improve education at all levels.
- Mass transit rails, re-planting of any vegetation that is removed and the recycling of products.
- Recycling, children awareness, less vehicles, more natural energy resources.
- We do not need all those big houses, plant more trees.
- Grow more trees in Cayman so at least to be able to control temperature to a certain extent.
- Stop talking about it and do something about it.
- Climate Change seminars.
- Community involvement - businesses to residents.
- Net metering from CUC. Get rid of the CORE (Consumer Owned Renewable Energy) program.
- Stricter building codes / limiting human population / legalize & encourage renewable energies – solar, wind, geothermal, biodiesel / limit car importation & usage / limit "disposable" imports (packaging, plastics) / encourage reusing & reducing if we can't recycle :)

- Stricter rules for building construction i.e. certain height above sea level.
- Public awareness, but I know most of the people's mind set here and it seems they feel like it is someone else's problem, and others should take care of them.

Answered questions: 20
Skipped questions: 15

3. MEDIA USE

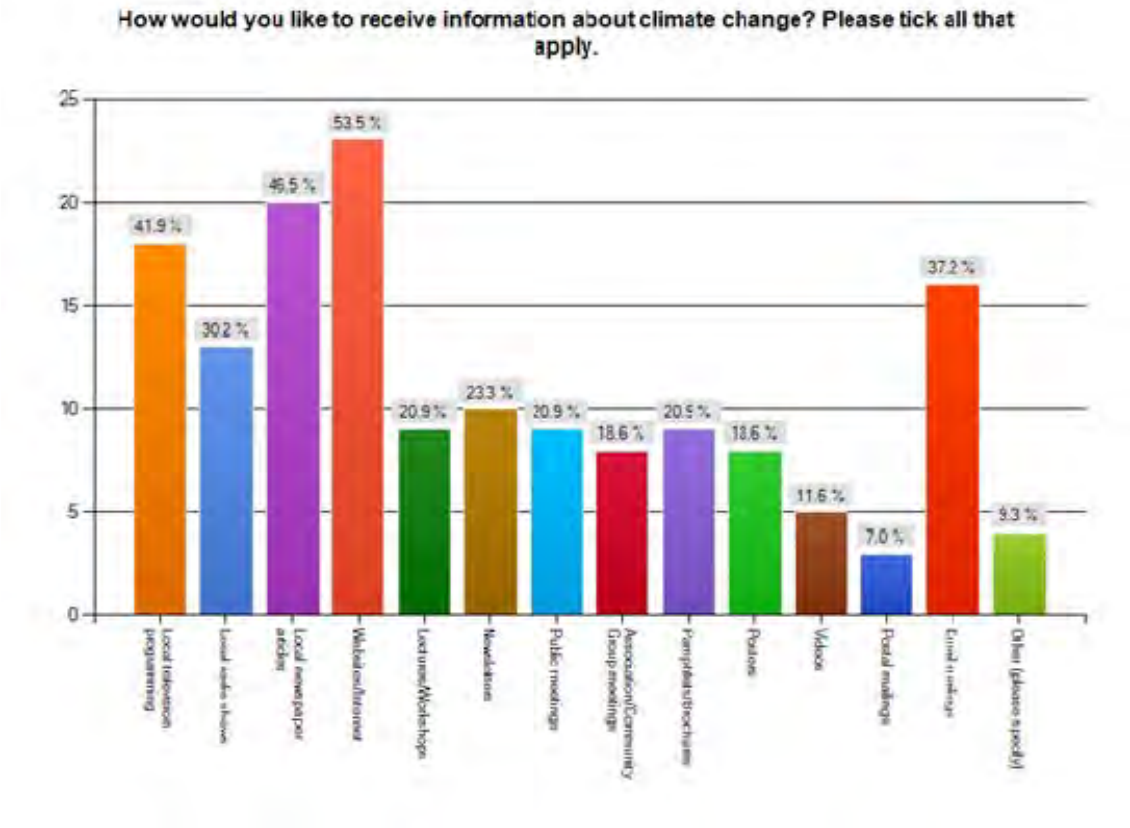
3.1. Current Information sources on Climate Change



Answered questions: 44
Skipped questions: 1

Most of the participants indicated that they received information about climate change through an international source, including websites (77.3%), television (65.9%) and newspapers (45.5%). 29.5% of the interviewed, answered that they received this information through local television, as well from professional associations. 22.7% received the information from local newspapers. They also received information by friends/family with 15.9%. Interestingly, international radio, local website, government and other source, as personal experiences, scientific journals, work colleagues and that they can also see and feel the effects of climate change, score equally with a 9.1% of the responses. Local radio and community groups represent 6.81%. And only a small percent of the information received about climate change comes from schools and the employer, 4.5% and 2.3% respectively.

3.2. How would you like to receive information about climate change? Please tick all that apply.

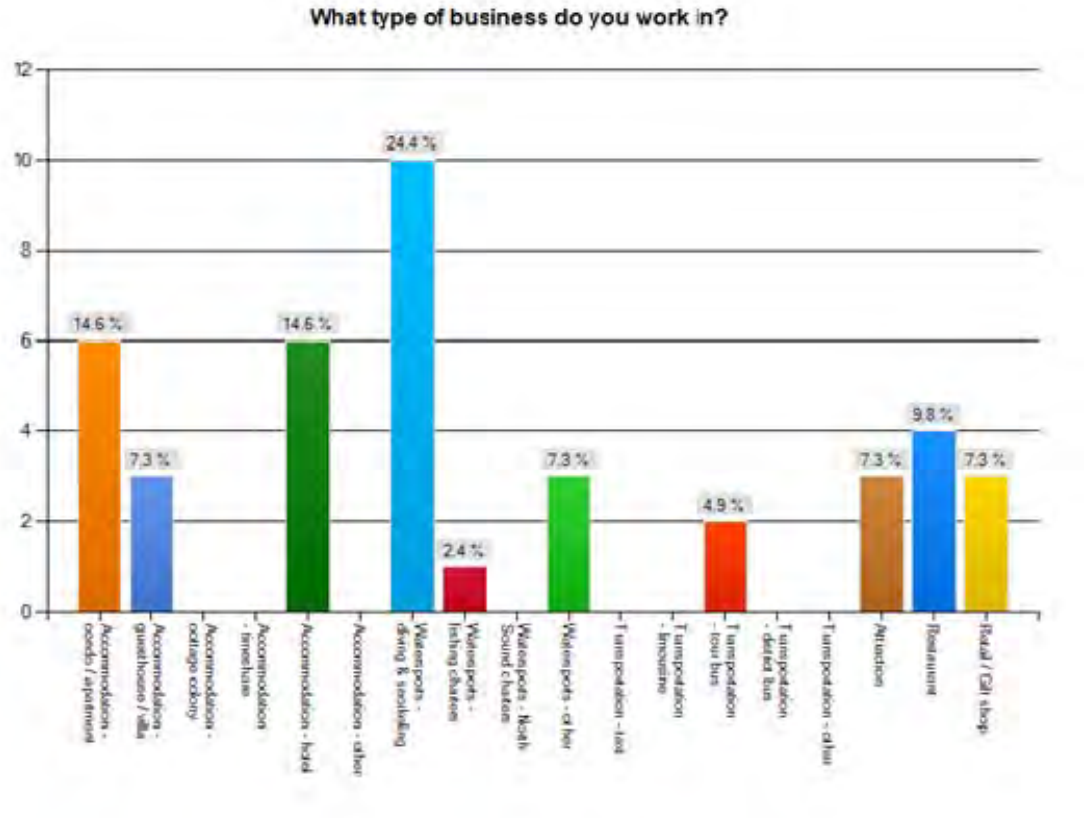


Answered questions: 43
Skipped questions: 2

The vast majority of participants said that they would like to receive information about climate change through Websites/Internet (53.5%) and local newspaper articles (46.5%). Followed by, local television programming, email mailings, local radio shows and newsletters with 41.9%, 37.2%, 30.2% and 23.3% respectively. The 20.9% of the responses scored equally for lectures/workshops, public meetings and pamphlets/brochures, and 18.6% for association/community group meeting and posters, as a media to receive climate change information. 11.6% chose videos. A few interviewees, 9.3%, mentioned that they would also like to receive information from scientific journals, environmental signals, any means that does not use paper for distribution, and to have climate change lectures on the Sister Islands with enough time for the residents to understand the information being presented and the lecturer must have experience giving public talks and have a knowledgeable background in climate change to be able to answer most if not all questions in a way that the public can understand. And only a 7% would like to receive information about climate change through postal mailing.

4. BUSINESS PROFILE

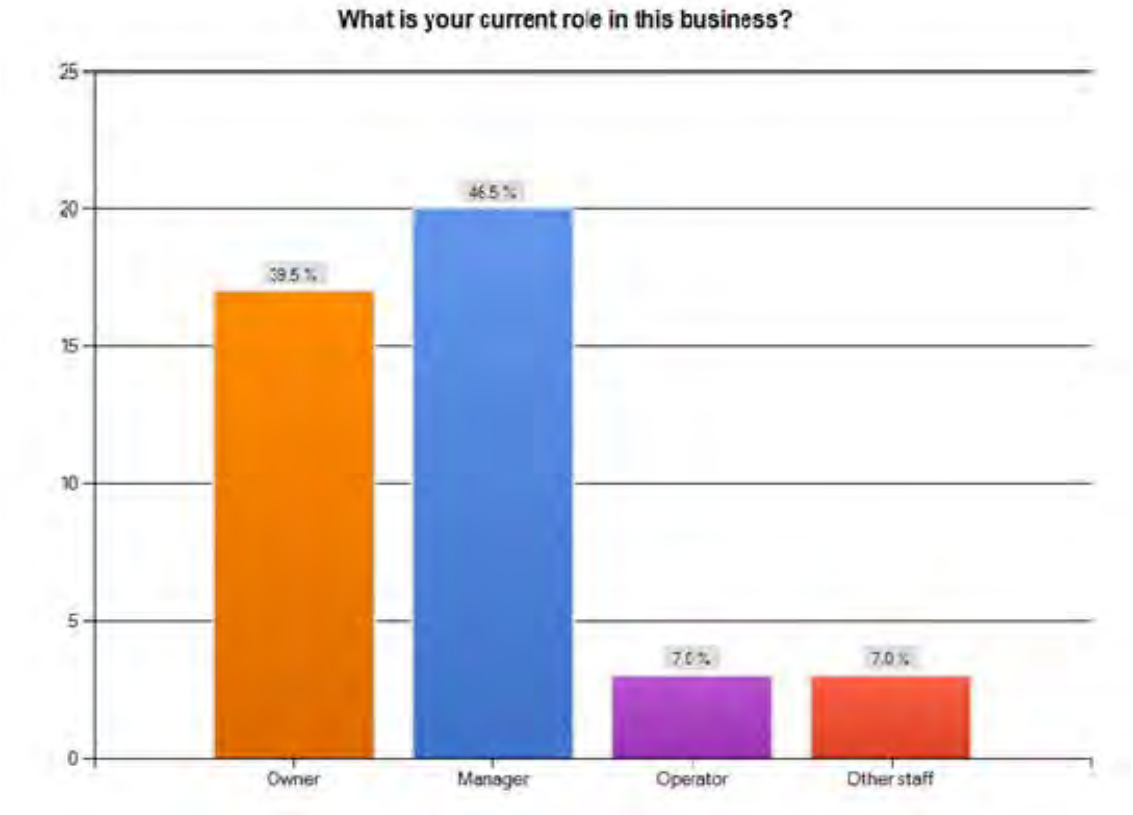
4.1.. What type of business do you work in?



Answered questions: 41
Skipped questions: 4

Most of the participants work in a watersports – diving & snorkelling (24.4%) business, succeeded equally by accommodation in condo/apartment, and hotel at 14.6%. The interviewed that work in restaurants are 9.8%. Followed by accommodation in guesthouse/villa, watersports – other, attraction, and retail/gift shop with 7.3% each. 4.9% works in transportation – tour bus. And only, 2.4% work in watersports – fishing charters. Other places were the participants work are government, CCMI - Coral research, limousine, charters, retail/gift shop/diving/snorkeling/photo instructor, Golf Course and Publishing.

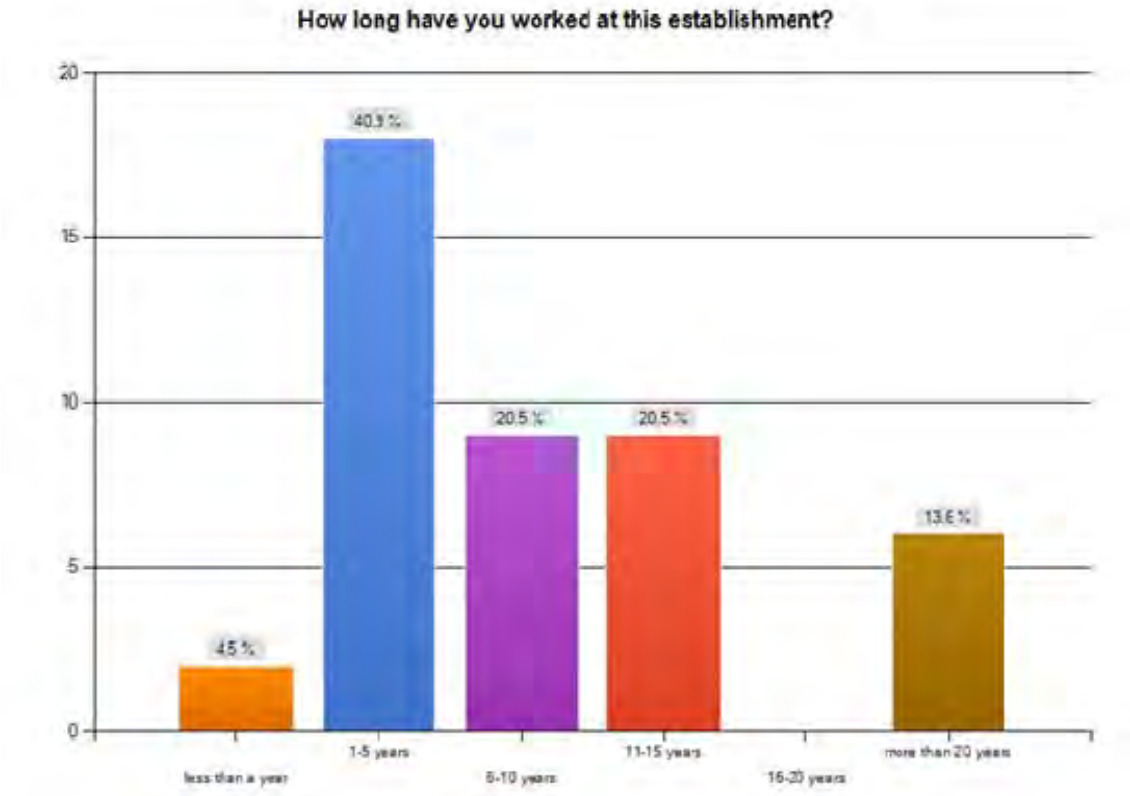
4.2. What is your current role in this business?



Answered questions: 43
Skipped questions: 2

The 46.5% of the participants are managers of the company while 39.5% are the actual owners, 7% are operators (regular staff members) and other staff. This can represent the lack of information in some of the survey. Many times, it is only the owner the one that has complete access to the business information.

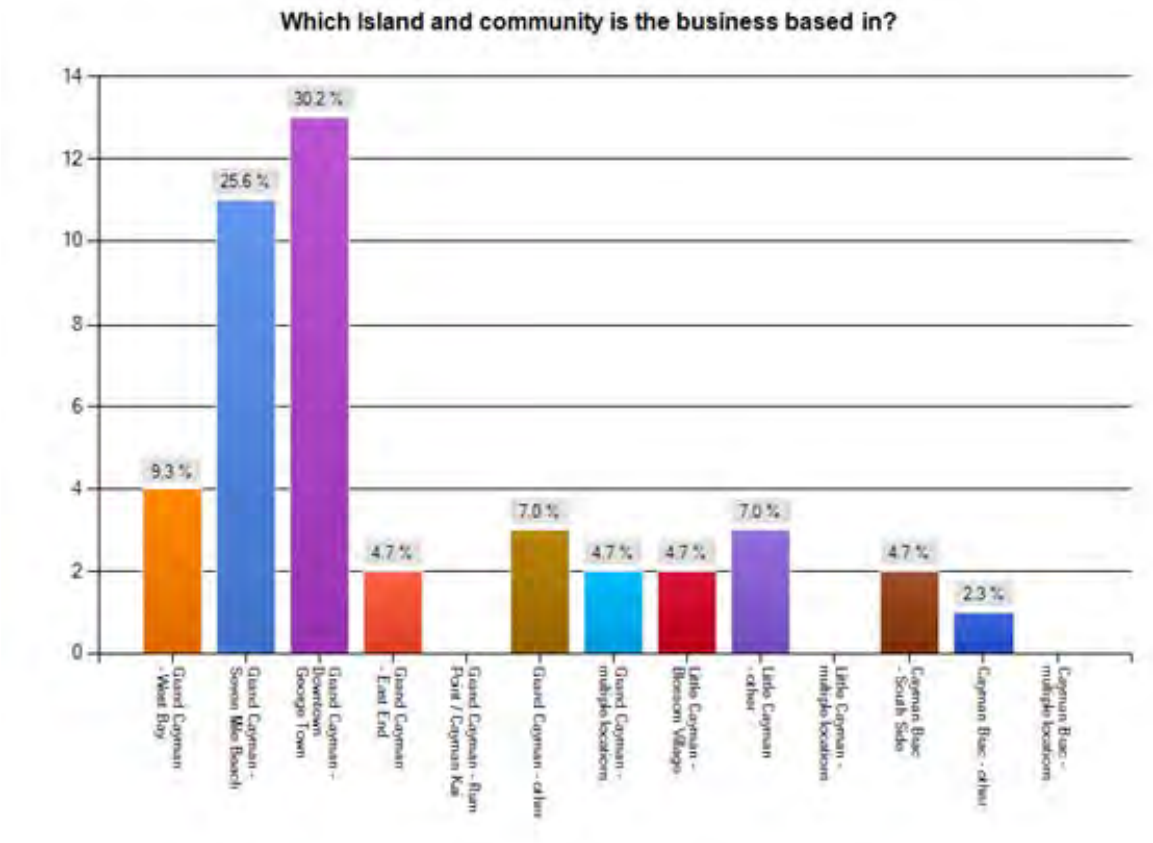
4.3. How long have you worked at this establishment?



Answered questions: 44
Skipped questions: 1

The 40.9% of the participants have worked in the same establishment for 1 to 5 years. 20.5% have worked between 6 to 10 and 11 to 15 years. Followed by, 13.6% more than 20 years, and 4.5% have worked less than a year.

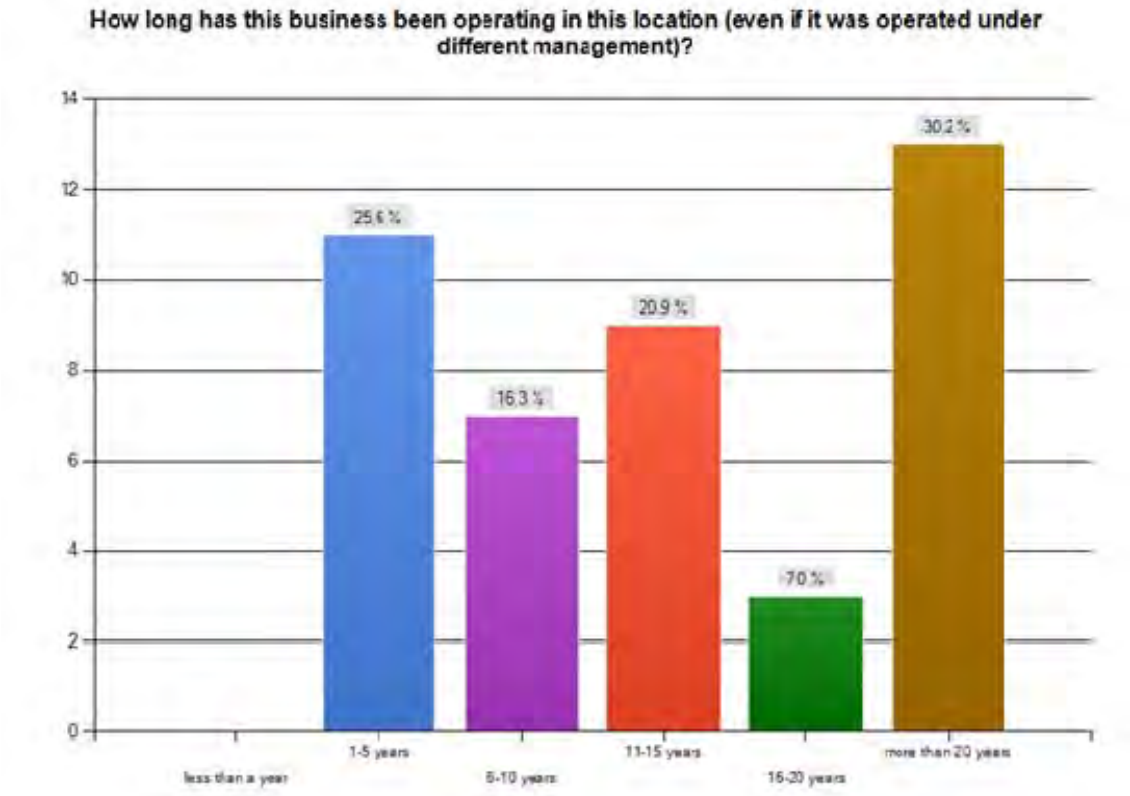
4.4. Which Island and community is the business is based in?



Answered questions: 43
Skipped questions: 2

Most of the businesses are located in Grand Cayman. 30.2% of these are based in downtown George Town. Succeeded by, Seven Mile Beach with 25.6% and West Bay at 9.3%. 7% of the interviewed businesses are located in another place in Grand Cayman and Little Cayman. 4.7% are in Grand Cayman - East End and multiple locations, Little Cayman - Blossom Villages and Cayman Brac – South Side. And only 2.3% are located in Cayman Brac - other.

4.5. The length of Operation the business has in current location



Answered questions: 43
Skipped questions: 2

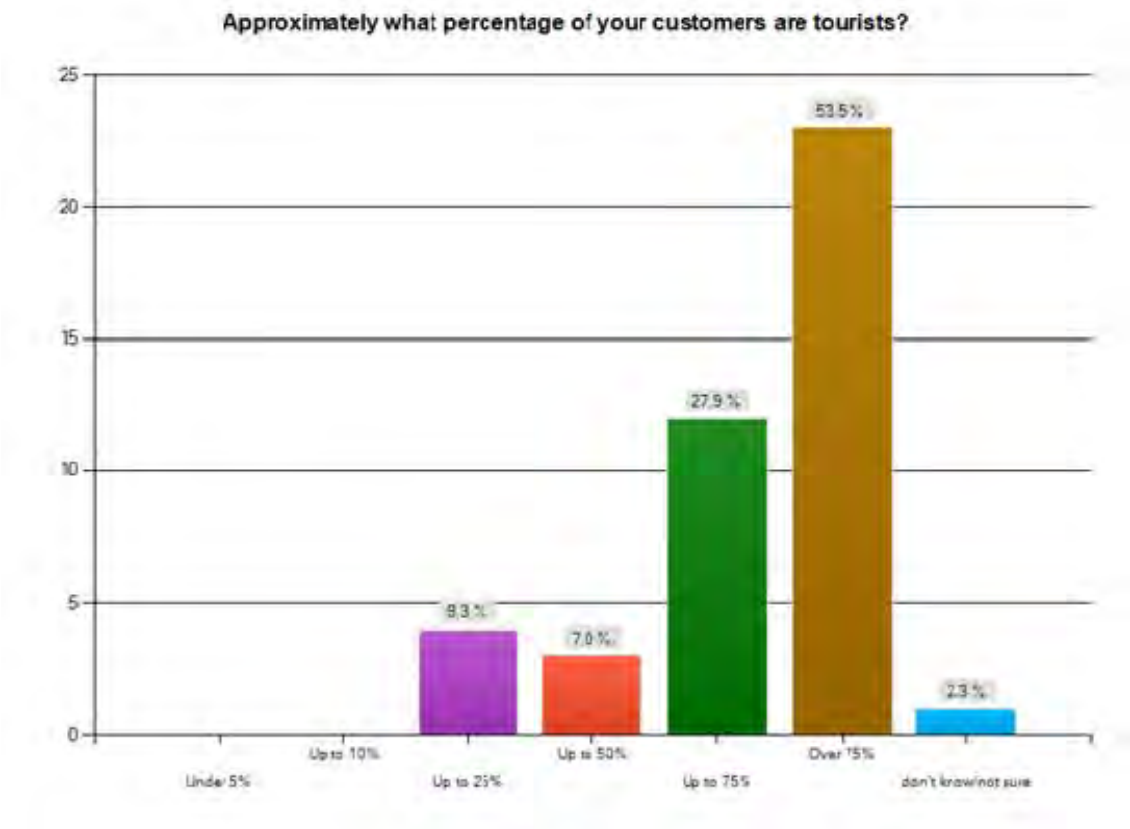
Most of the businesses have been operating in the same location for a long period of time. The 30.2% have operated for more than 20 years, 25.6% between 1 and 5 years. 20.9% have been in the same place 11 to 15 years. 16.3% have the same location from 6 to 10 years. Only 7% of the businesses have been located in the same place between 16 to 20 years.

4.6. Size of work force

The size of the work force range goes from 2 to 800 employees. The mode work force size, or the number which appears most often, is 25 employees. The median work force size, or the middle number in a sorted list of numbers, is 14 employees. And the mean, or average on the work force, is 52 employees. However the average work force is skewed as some businesses are bigger than the others. There are businesses with only 2 employees in contrast with other that have 800. We can then see how the work force size average has become skewed.

Answered questions: 42
Skipped questions: 3

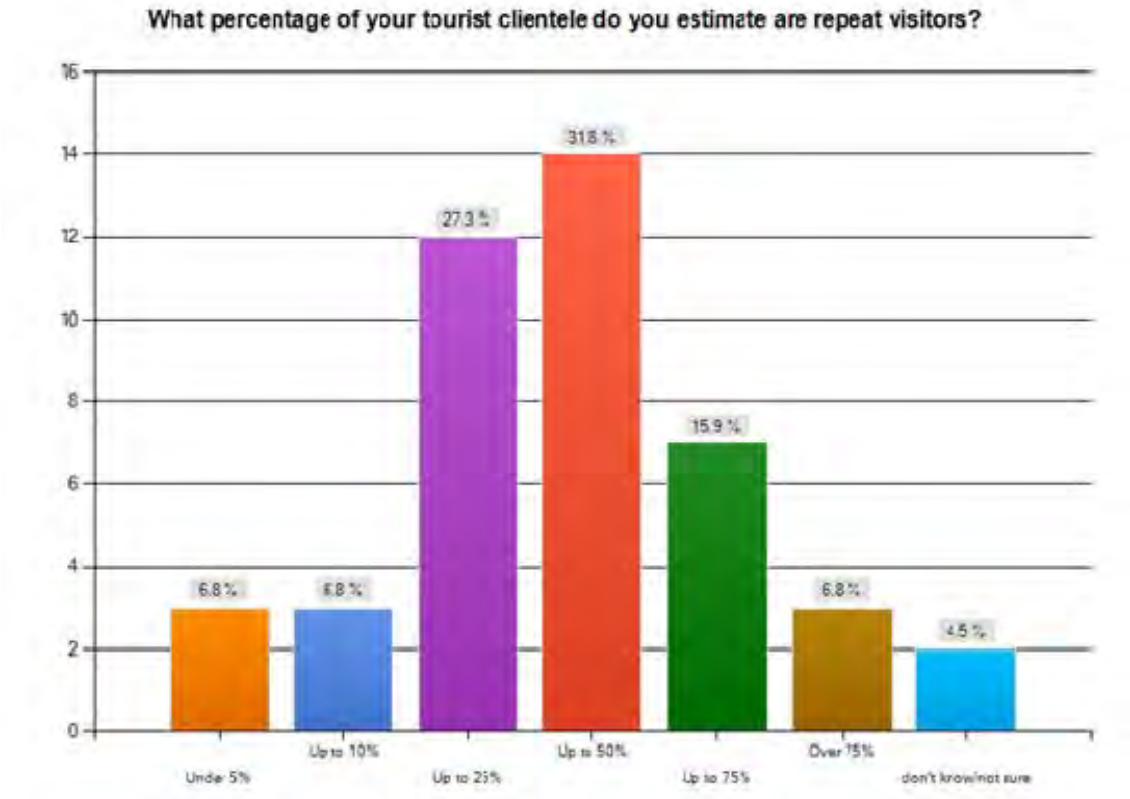
4.7. The percentage of current customers which are tourists



Answered questions: 43
Skipped questions: 2

About 53.5% of businesses in the tourism industry have over 75% of their customers being tourists. 27.9% of the businesses only have up to 75% tourist customers, 9.3% have up to 25% tourist and 7% only have up to 25% tourist customers. 2.3% do not know/ no sure about the percentage of current costumers that are tourists.

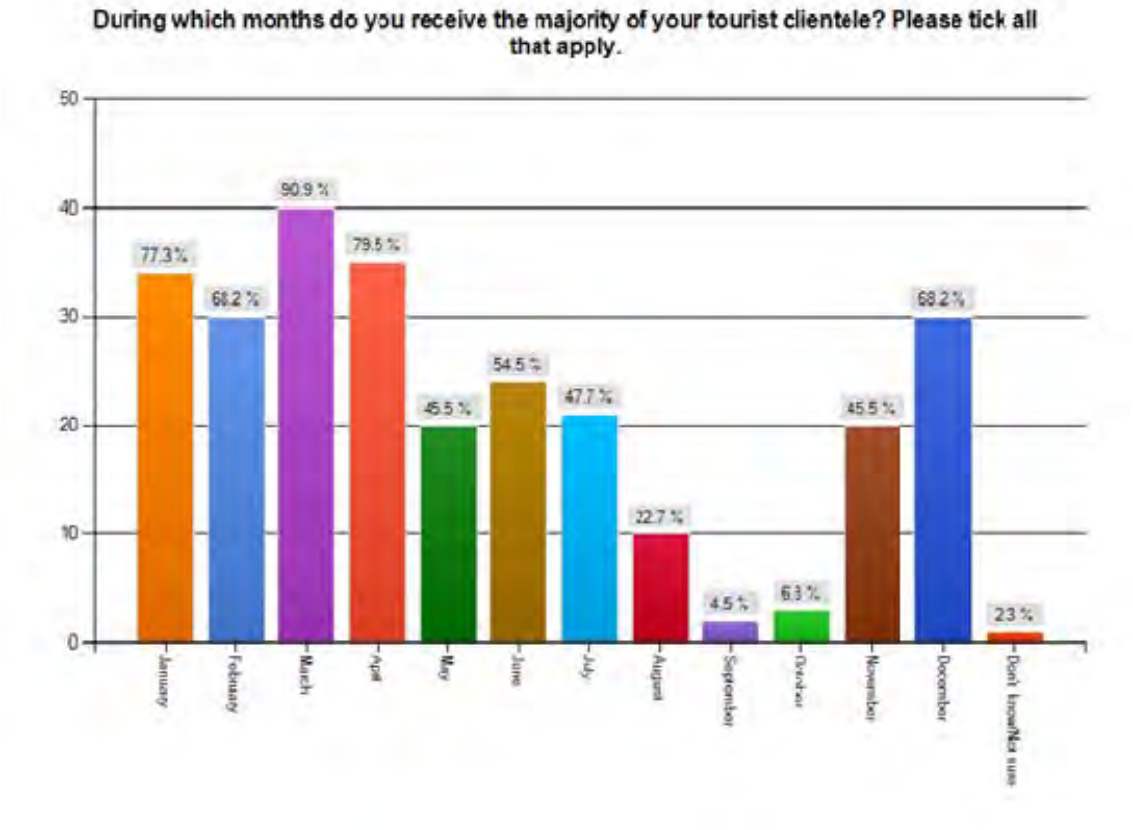
4.8. The percentage of repeated tourist clientele



Answered questions: 44
Skipped questions: 1

Most of the tourist clientele that the tourism industry has are repeated visitors. The 31.8% of the customers are repeated visitor with up to 50%, followed by the 17.3% up to 25%. 15.9% are up to 75%. 6.8% of the repeated clientele is either under 5%, up to 10% or over 75%. 4.5% do not know or not sure about which is the percentage of repeated tourist clientele.

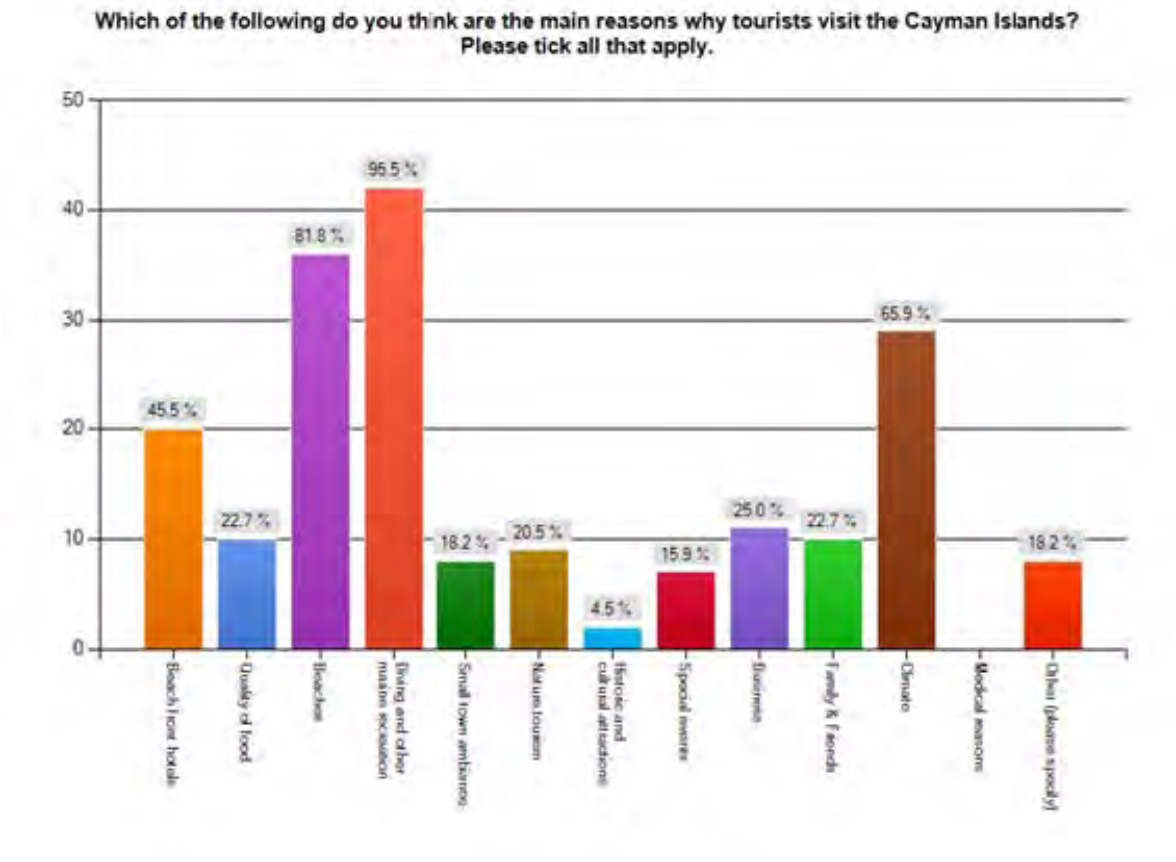
4.9. The months of which business receive the majority of the tourist clientele



Answered questions: 44
Skipped questions: 1

The month of which business receive the majority of the tourist clientele is March with 90.9%, followed by April and January, with 79.5% and 77.3%, respectively. February and December, scored equally at 68.2%. June and July have 54.4% and 47.7%. May and November have 45.5% each. And it has a notable decrease in tourist clientele in the months of August (22.7%), October (6.8%) and September (4.5%).

4.10. The main reasons why tourists visit the Cayman Islands

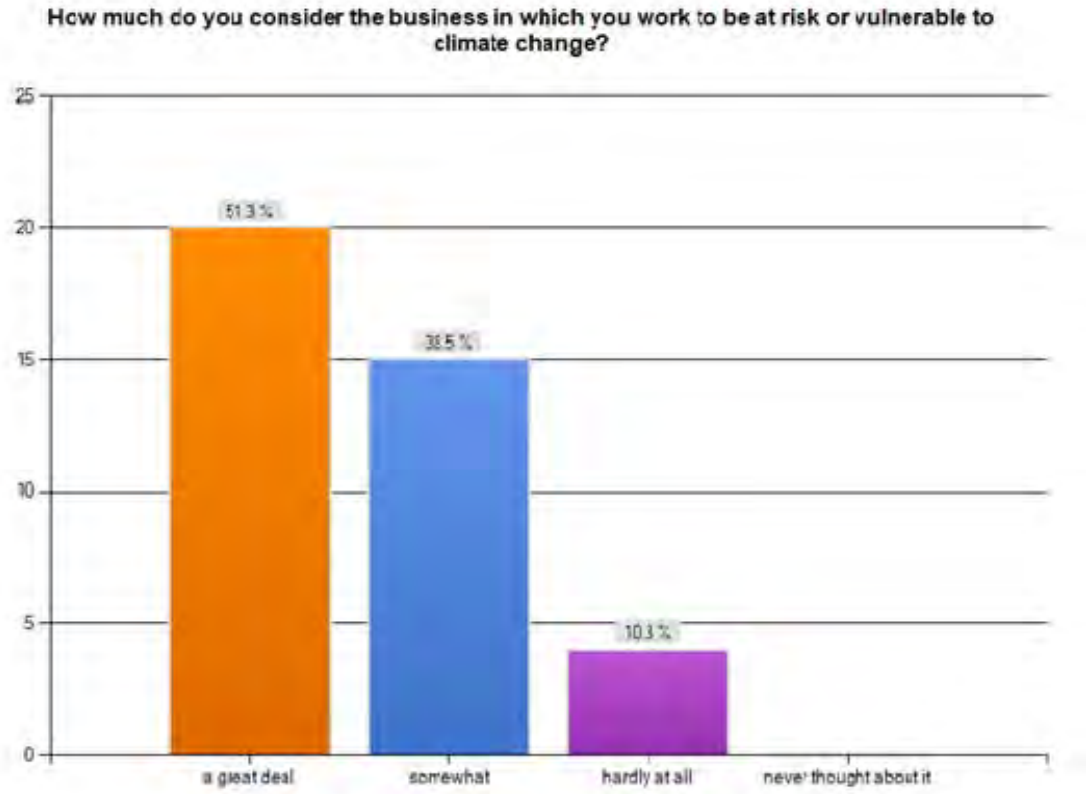


Answered questions: 44
Skipped questions: 1

The majority of the participants believe the main reason that tourists find to visit the Cayman Islands is for diving and other marine recreation, at 95.5%. 81.8% believe it is our beaches, followed by climate with 65.9% and beach front hotels at 45.5%. Business has 25%. Quality of food and family & friends, scored equally at 22.7%. Nature tourism represents 20.5%. 18.2% of the reason to visit the Islands are because its small town ambience, and other reasons as that tourism comes to the Cayman Islands is for underwater photo classes, its friendly people and clean country and the feeling safe, it is close to States, our business caters to divers as in Dive Lodge. The sister island are visited for their peace and quiet. However the DOT needs to change the way they advertise the Brac. i.e. the term "Rugged" I know there is a much better term that can be used for us, Environmental Wonderland, for example. Special events with 15.9%, and historic and cultural attractions with 4.5%, are other reasons that made tourists visit the Cayman Islands.

5. CLIMATE CHANGE IMPACTS

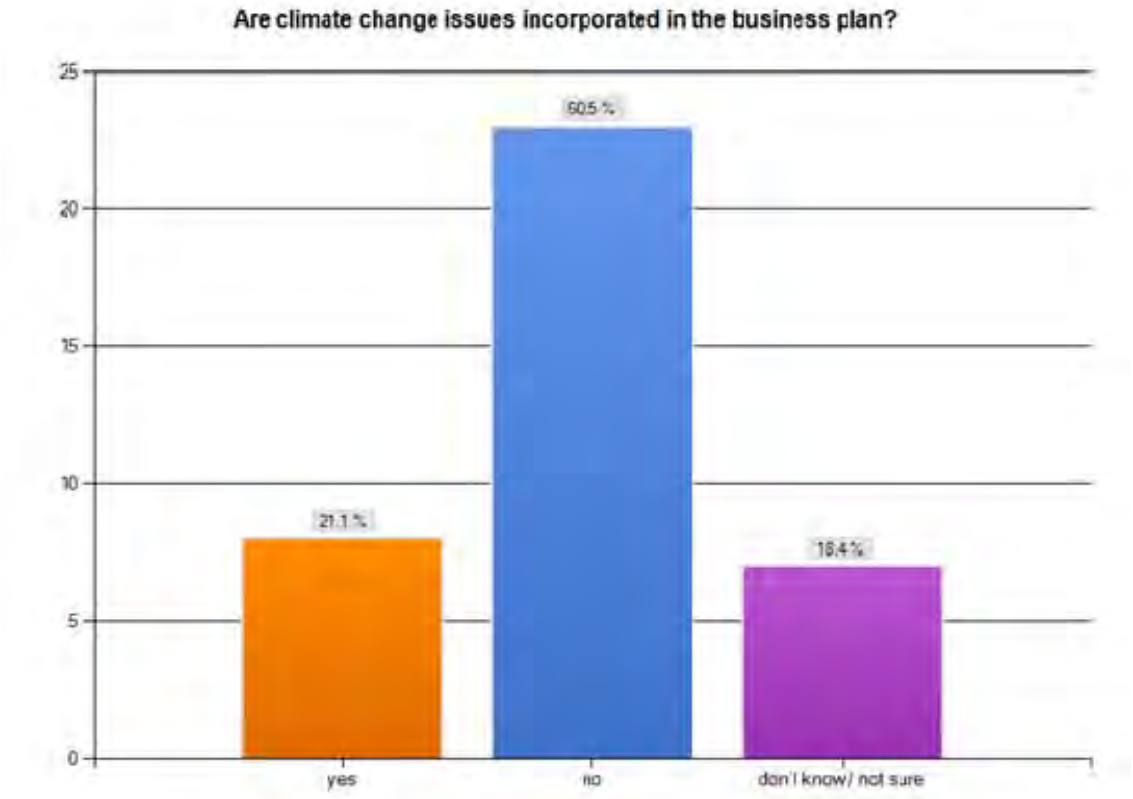
5.1. The business's level of risk or vulnerable to climate change



Answered questions: 39
Skipped questions: 6

Most of the respondents (51.3%) considered their businesses to be a great deal at risk or vulnerable to climate change. This was succeeded by somewhat, with 38.5%. Only 10.3% considered their businesses' level vulnerability to climate change to be hardly at all.

5.2. Are climate change issues incorporated in your business plan?



Answered questions: 38
Skipped questions: 7

For most of the respondents, 60.5%, climate change issues are not incorporated in their business plan. Only 21.1% have incorporated climate change issues in their business plan, and 18.4% do not know or are not sure.

5.3. What level of threat do you think the following pose to this business?

LEVEL OF THREAT					
	HIGH LEVEL	**MEDIUM LEVEL**	**LOW LEVEL**	**NO THREAT**	**DO NOT KNOW**
Flooding from storm surge	**48.70%**	35.90%	12.80%	2.60%	-
Flooding from heavy rainfall	16.20%	27.00%	**45.90%**	10.80%	-
Beach erosion	**31.60%**	23.70%	21.10%	21.10%	2.60%
Hurricanes	**79.50%**	17.90%	2.60%	-	0.00%
Rough seas	**36.80%**	18.40%	34.20%	7.90%	2.60%
Loss of potable water supply	**35.10%**	24.30%	32.40%	8.10%	-
Sea level rise	**31.60%**	**31.60%**	28.90%	7.90%	-
Coral reef bleaching	**53.80%**	20.50%	12.80%	7.70%	5.10%
Disease outbreak e.g. dengue, malaria	**43.20%**	13.50%	27.00%	13.50%	2.70%
Increased air temperature	21.60%	24.30%	**40.50%**	10.80%	2.70%
Loss of coastal vegetation	22.20%	22.20%	**36.10%**	13.90%	5.60%
Loss of electrical supply	**57.90%**	15.80%	15.80%	5.30%	5.30%
Decrease in fish population	**46.20%**	28.20%	17.90%	7.70%	-
Decrease in locally available fruit, vegetables, seafood and meats	11.40%	**28.60%**	**28.60%**	25.70%	5.70%
Increase in cost of imported food	**55.60%**	16.70%	13.90%	11.10%	2.80%

Answered questions: 40
Skipped questions: 5

The level of threat that the following impacts pose to business are in the following order:

High level for:

- Hurricanes with 79.50%.
- Loss of electrical supply with 57.90%.
- Increase in cost of imported food with 55.60%.
- Coral reef bleaching with 53.80%.
- Flooding from storm surge with 48.70%.
- Decrease in fish population with 46.20%.
- Disease outbreak e.g. dengue, malaria with 43.20%.
- Rough seas with 36.80%
- Loss of potable water supply with 35.10%.
- Beach erosion with 31.60%.
- Sea level rise with 31.60%.

Medium Level for:

- Sea level rise with 31.60%. It represents the same percent for high and medium level of threat
- Decrease in locally available fruit, vegetables, seafood and meats with 28.60%.

Low level for:

- Flooding from heavy rainfall with 45.90%
- Increased air temperature with 40.50%
- Loss of coastal vegetation with 36.10%
- Decrease in locally available fruit, vegetables, seafood and meats with 28.60%. It represents the same percent for medium and for low threat.

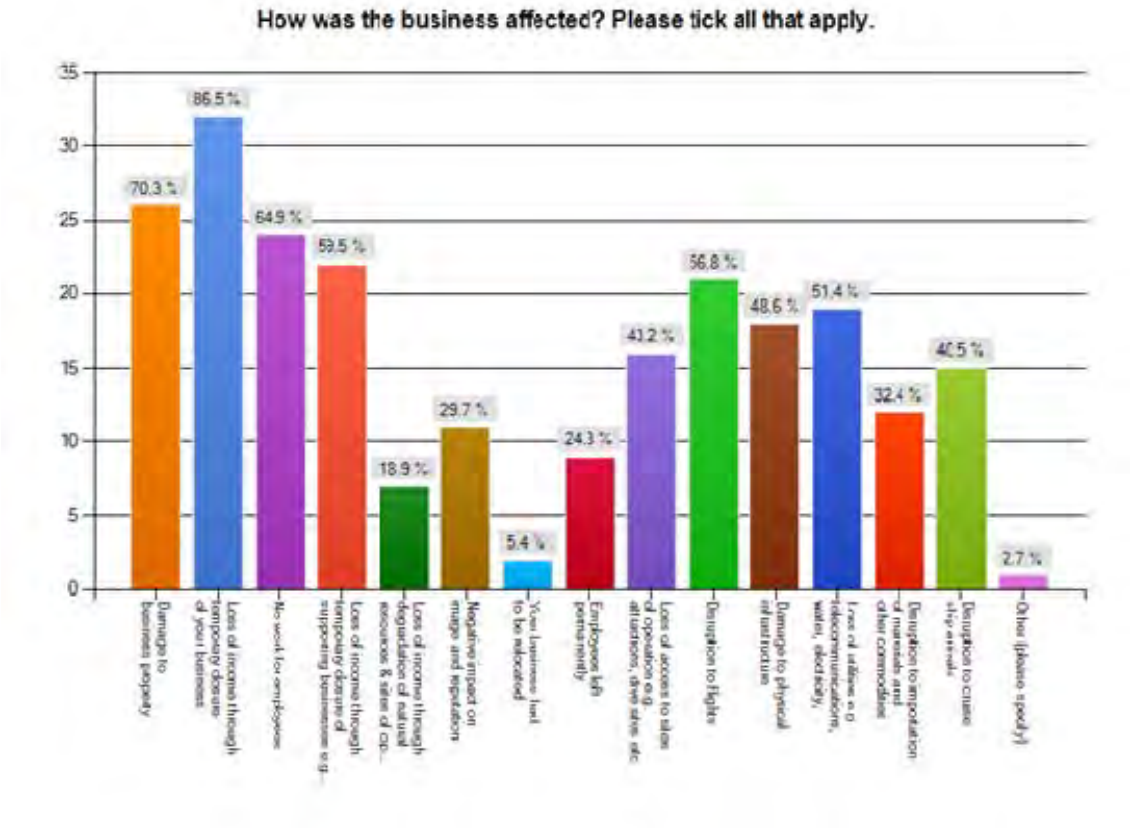
5.4. Has this business ever been affected by any of the following?

	AFFECTED	UNAFFECTED
Flooding from storm surge	**58.80%**	41.20%
Flooding from heavy rainfall	37.50%	**62.50%**
Beach erosion	21.90%	**78.10%**
Hurricanes	**92.10%**	7.90%
Rough seas	**69.40%**	30.60%
Loss of potable water supply	24.10%	**75.90%**
Sea level rise	10.00%	**90.00%**
Coral reef bleaching	44.10%	**55.90%**
Disease outbreak e.g. dengue, malaria	12.90%	**87.10%**
Increased air temperature	13.30%	**86.70%**
Loss of coastal vegetation	16.70%	**83.30%**
Loss of electrical supply	**54.50%**	45.50%
Decrease in fish population	34.40%	**65.60%**
Decrease in locally available fruit, vegetables, seafood and meats	13.80%	**86.20%**
Increase in cost of imported food	**63.30%**	36.70%

Answered questions: 39
Skipped questions: 6

The impacts that had most affected the business are hurricanes with 92.10%, rough seas with 69.40%, increase in cost of imported food by 63.30%, flooding from storm surge with 58.30%, and loss of electrical supply at 54.50%.

5.5. How was the business affected?



Answered questions: 37
Skipped questions: 8

The majority of the businesses affected by the impacts in the question before were mostly influenced by the loss of income through temporary closure of their business by 86.5%. Other impacted areas are damage to business property (70.3%), no work for employees (64.9%), loss of income through temporary closure of supporting business e.g. hotels, restaurants, tours (59.5%), disruption to flights (56.8%), loss of utilities e.g. electricity, telecommunications, water (51.4%). Additional, some of the other consequences were damage to physical infrastructure (48.6%), loss of access to sites of operation e.g. attractions, dive sites etc (43.2%), disruption to cruise ship arrivals (40.5%), disruption to importation of materials and other commodities (32.4%), negative impact on image and reputation (29.7%), employees left permanently (24.3%), loss of income through degradation of natural resources & sites of operation e.g. health of coral reefs, fisheries etc (18.9%), the business had to be relocated (5.4%) and other as the business considered that they would have lost income if they had not been properly insured (2.7%).

5.6. Estimated cost of damages from experienced impacts

ESTIMATED COST EXPERIENCED			
IMPACT	**RESPONSE AVERAGE ($)**	**RESPONSE TOTAL ($)**	**RESPONSES #**
Damage to business property	296,333.30	3,556,000.00	12
Loss of income through temporary closure of your business	139,083.30	1,669,000.00	12
No work for employees	43,833.30	263,000.00	6
Loss of income through temporary closure of supporting businesses e.g. hotels, restaurants, tours	26,250.00	105,000.00	4
Loss of income through degradation of natural resources & sites of operation e.g. health of coral reefs, fisheries etc.	10,000.00	20,000.00	2
Negative impact on image and reputation	16,666.70	50,000.00	3
Your business had to be relocated	3,500.00	7,000.00	2
Employees left permanently	5,000.00	5,000.00	1
Loss of access to sites of operation e.g. attractions, dive sites etc.	5,000.00	10,000.00	2

Answered questions: 14
Skipped questions: 31

Some of the most expensive costs from impacts experienced by businesses to date are damage to business property and loss of income through temporary closure of the business with an average of $296,333.30 and $139,083.30 respectively. The next impacts that have relatively high damages cost are no work for employees ($43,833.30), loss of income through temporary closure of supporting businesses, e.g. hotels, restaurants, tours ($26,250.00), negative impact on image and reputation ($16,666.70), loss of income through degradation of natural resources and sites of operation, e.g. health of coral reefs, fisheries etc. ($10,000.00). Finally, the less expensive impacts, but not the least important, are employees left permanently and loss of access to sites of operation, e.g. attractions, dive sites etc. both with $5,000.00, and the business had to be relocated had a response average of $3,500.00. The total estimated recovery cost for all of the impacts was $5,685,000.00.

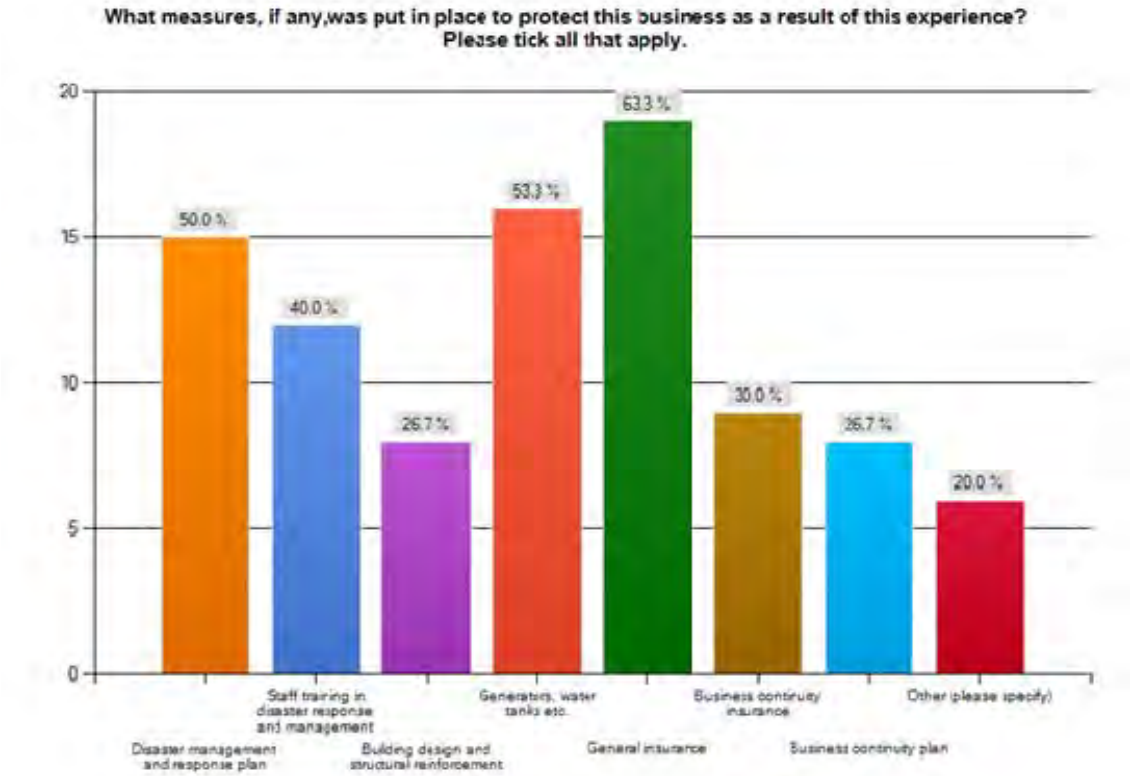
5.7. Estimated recovery time experienced from these impacts

ESTIMATED RECOVERY TIME					
IMPACT	**RECOVERY TIME**				
	1-12 months	**1-2 years**	**3+ years**	**unknown**	**Don't know**
Damage to business property	**52.60%**	10.50%	-	-	36.80%
Loss of income through temporary closure of your business	**52.80%**	8.30%	-	-	38.90%
No work for employees	**54.50%**	3.00%	-	-	42.40%
Loss of income through temporary closure of supporting businesses e.g. hotels, restaurants, tours	35.70%	10.70%	-	3.60%	**50.00%**
Loss of income through degradation of natural resources & sites of operation e.g. health of coral reefs, fisheries etc.	16.70%	-	-	16.70%	**66.70%**
Negative impact on image and reputation	13.00%	4.30%	4.30%	17.40%	**60.90%**
Your business had to be relocated	10.50%	-	-	10.50%	**78.90%**
Employees left permanently	12.50%	-	-	-	**87.50%**
Loss of access to sites of operation e.g. attractions, dive sites etc	25.00%	8.30%	-	4.20%	**62.50%**

Answered questions: 39
Skipped questions: 6

Of the businesses surveyed who noted that 1 to 12 months was the average time taken to recover from the impacts experienced, 54.40% claimed recovery was affected by having no work for employees, loss of income through temporary closure of the business accounted for 52.80% of the down time, while 52.60% said it was damage to business property that hindered their recovery.

5.8. Measures put in place to protect the business as a result of the experience

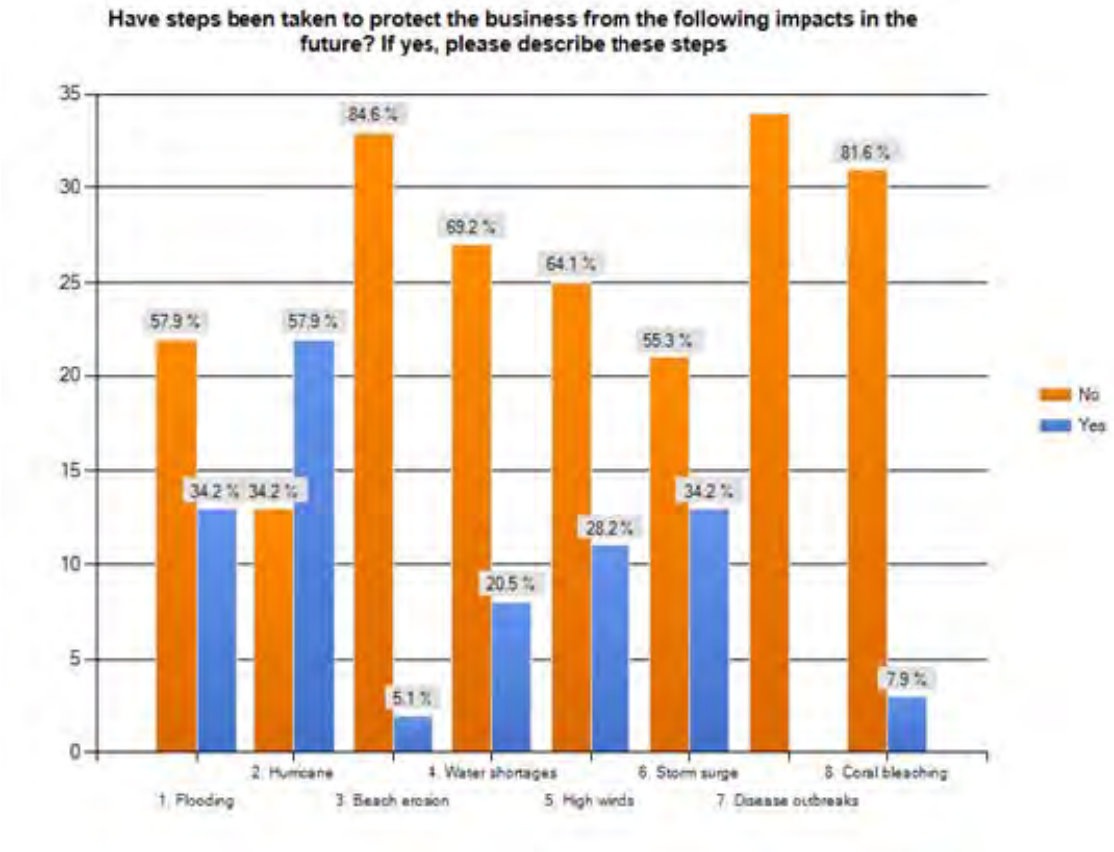


Answered questions: 30
Skipped questions: 15

The majority of the respondents chose general insurance, with 63.3%, as a measure to protect their business as a result of the experience. The next action is to have generators, water, tanks, etc. at 53.3%. Followed by the formulation and implementation of a disaster management and response plan, and staff training in disaster response and management, with 50% and 40% respectively, 30% of the businesses are having continuity with their insurance. Supplementary steps are building design and structural reinforcement, and business continuity plan, both at 26.7%. Additional measures are to have less merchandise in store during hurricane season, become mobile and the implementation of solar power with a 20% of the responses.

6. CLIMATE CHANGE ADAPTATION

6.1. Steps taken to protect the business from impacts in the future



Answered questions: 30
Skipped questions: 15

The actions taken for the interviewees to protect their business are classified by impacts.

1. Flooding: Use of boulders on the beach, to secure the equipment and machinery on higher grounds, have containing wells and leveling grounds, putting in place sand bag, door sealant and barriers, better seals on windows and doors, putting in place storm shutters, raise new buildings, replenishing the sand on the beaches, and proper drainage.

2. Hurricane: Place hurricane shutters, windows, make sure the windows and doors are covered, complete hurricane preparedness plan for all sectors of business, have generators, having stronger lines on boats and better coverage on windows, installation and reinforced moorings, extensive Hurricane/storm surge plan for all employees, building codes made sure the structures were built to code, rebuild after Paloma stronger structure.

3. Beach erosion: Boulders, replenishing sand on beaches.

4. Water shortages: City water, ensure that 300,000 gal tank is full at all times, have many 5 gallon containers- some for each staff, increase monitoring of R.O. and storage space, refurbished cisterns.

5. High winds: Shutters for buildings and keep vegetation trimmed, planned re-design of roof structure, building codes, secure moorings, go Bolt System/impact glass/standing seam roof, becoming mobile has allowed movement to different sites without having to pack up a whole shop to make a tour work because of high winds.

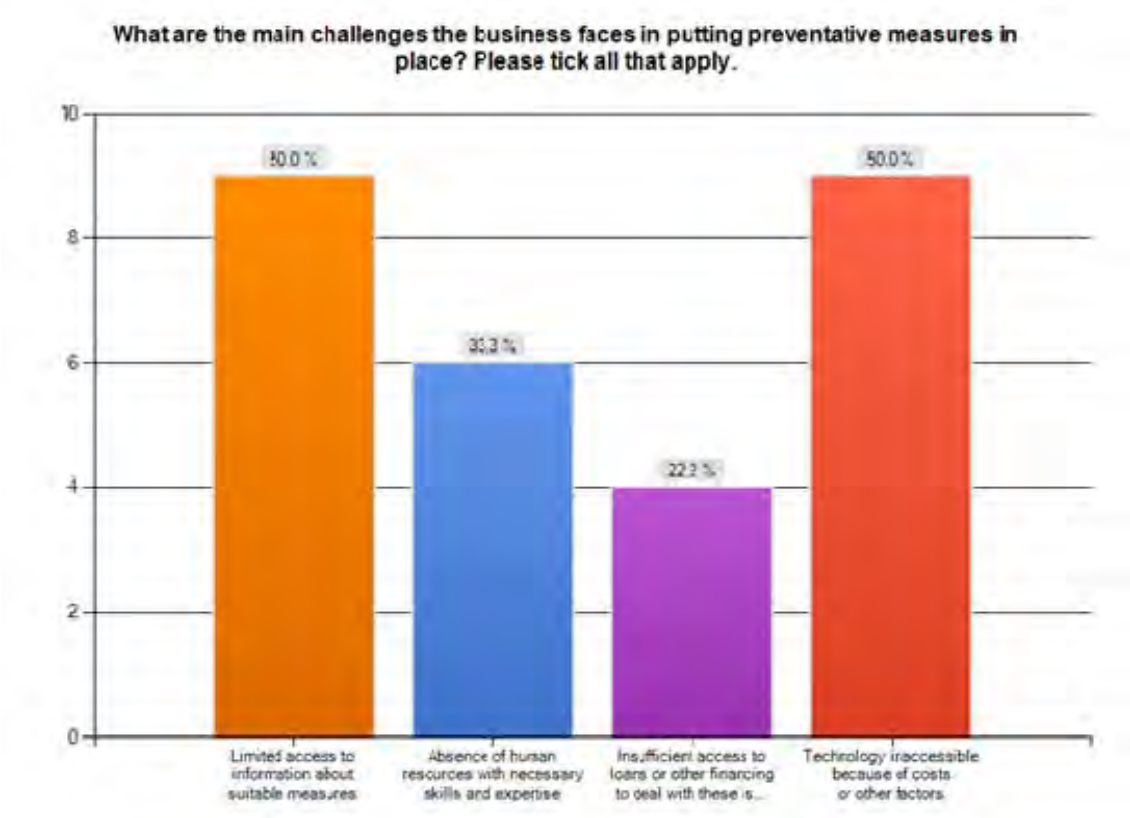
6. Storm surge: Boulders on the beach, put in place breakers, sell the ocean front condo, deconstruct the docks at storm times, have longer lines on boats, put in place storm shutters, we are protected by reef system, installation of hurricane moorings.

7. Disease outbreaks

8. Coral bleaching: Install thermometer to monitor sea temperature; installed at boat, interaction between the Club and CCMI to increase public awareness on a weekly basis through multimedia presentations.

Another action taken for the respondents was to have insurance that cover some of the previous impacts.

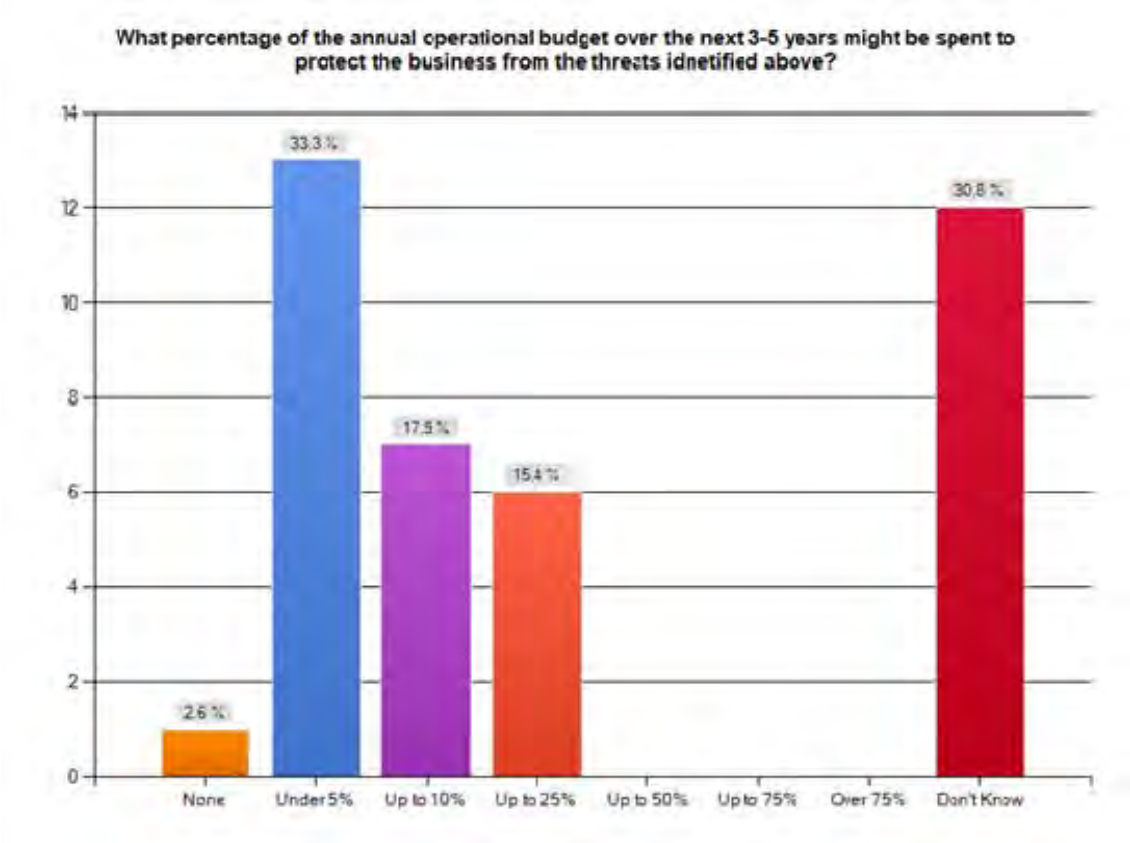
6.2. Main challenges in putting preventative measures in place



Answered questions: 18
Skipped questions: 27

The main challenges that the businesses face in putting preventive measures in place are limited access to information about suitable measures, and technology inaccessible because of costs or other factors, both accounting for 50% of the answers. Other challenges are absence of human resources with necessary skills and expertise by 33.3% and insufficient access to loans or other financing to deal with these issues at 22.2%. The interviewees also find that “the facilities do not lend themselves to further protection, we do not have a choice, we must have preventative measures in place for hurricanes, storm surge, wind, etc., there is no designated/own location to secure our boats, lack of necessary equipment available, and most of the measures have been completed with rebuild” as the challenges that businesses face in order to adopt preventive measures for future threats.

6.3. Percentage of the annual operational budget over the next 3-5 years that is anticipated spending to protect businesses from the threats identified above



Answered questions: 39
Skipped questions: 6

Only 33.3% of the participants have less than 5% of their annual operational budget allocated to protecting their businesses from the threats identified above.17.9% have

up to 10% and 15.4% have up to 25% of their annual operational budget designated for such spending. The remaining participants either do not know (30.8%) or do not have a percentage to protect their businesses (2.6%) for future threats.

6.4. In what ways could the government support your efforts?

The population believes that the government should support their efforts by:

- Increasing the amount of recycling to reduce global warming, funding the use of solar power, doing public spaying and neutering to stop the amount of random cats and dogs on the streets eating and disturbing trash.
- The world needs population control. Our reefs are in greater damage from pollution we are putting in the water than sea level rising, Cayman needs to stop dumping raw sewage along seven mile beach and stop the use of fertilizers on lawns and golf courses.
- Implement preventative measure to avoid and reduce severity of climate change issues.
- Checking if business and homes are secure and if they aren't help then to be prepared and have knowledge of current happenings and procedures.
- passing legislation that could possibly prevent further destruction
- Supporting alternative energy.
- Training and information support.
- Better cruise facilities at Spotts for rough seas in George Town days, cruise information updated through day on port website.
- planning department needs to assess storm surge threats, when neighboring land is allowed to fill and build next to me, I will get a higher flooding as the water builds and goes around this new elevated land,.
- Reduce work permit fees and better support to small businesses (loans).
- Give more information and possible economic support.
- The Government can’t help me other than to increase tourists coming in
- informative and preventative measures,
- provide support on import duties related to hurricanes related preventative measures,
- Net metering, recycling, serious preservation efforts of Caymans wildlife and mangroves.
- Take a step towards making Cayman a more sustainable and eco-friendly place to live and visit.
- I do not feel like it is the Government’s total responsibility to support anyone's efforts. They should be the one' to lead the way.
- Protect the mangroves/coastal Go-Eco Tourism. Guests on island are coming to Cayman for its beauty and tranquility, marine life and diving. There is only one Mangrove Island left on the whole island that is a substantial size that is only made up of the Red Mangroves. The Red Mangroves are the plants/trees that keep the coral reefs full of life. They are the nurseries for 70% of all marine life.

Bioluminescent Bays are only found 11-12 places worldwide. This is something to be protected and made a sail, paddle, or electrical engine only to protect organism. This could and can be a huge tourism income for Grand Cayman. To protect it properly to insure that it stays alive and well for generations to come to enjoy and make a living with. There are No Conservation Laws. They are more like guidelines. How is Cayman to stay protected from development or hurricanes if there are no conservation laws to hold it in place?

- It is not much more it can do, other than stop price gouging after a storm.

Answered questions: 24
Skipped questions: 21

Analysis

Breakdown of the Individual Subsectors

- *Accommodations:*

The survey was filled out by 15 businesses in the accommodations subsector; 6 belong to condominiums/apartment, 3 were guesthouse/villa and 6 were hotels. For the condominiums/apartment we have 1 in each of the following locations, district of West Bay and East End, Seven Mile Beach, Grand Cayman in multiple locations, Cayman Brac on the South Side, and Little Cayman. Of the 3 guesthouse/villas, 2 were located in Little Cayman and 1 in Cayman Brac. Of the 6 hotels; 5 were located in Grand Cayman which 2 were in West Bay, 2 on Seven Mile Beach and 1 in Other location. The other hotel is located in Cayman Brac on the South Side.

For the Condominium/apartments and guesthouse/villas 66.7% are managers that filled out the survey and 33.3% owners, while the hotels it was 50% being the owners and 33.3% being a manger and 16.7% being an operator of the business.

The total workforce for the accommodation subsector is the 1684 employees. The average work force size between all the above accommodations is 120 employees. However, given the types of accommodations the average work force is in fact a skewed as the hotels are generally, and in this case, bigger than the other accommodations while the average work force for condominiums/apartments is 11 and 23 for the guesthouse/villas. The hotel average is 262 we can then see how the workforce size average has become skewed.

For most of the participants in the accommodation subsector, climate change is typically associated with hurricanes and sea level rise by 93.30% for both of them. 86.70% scored equally for global warming, coral reef bleaching and floods. 80% and 70% think that increased greenhouse gases and droughts are related terms with climate change. 60% associated it with climate variability, landslides and fish kill. Health epidemics scored at 40%. Plagues and Earthquakes, both achieved 26.70% and 20% for volcanoes.

Condominiums/apartments
100% of the participants associated sea level rise with climate change. 83.30%, both equally, with floods and hurricanes. 66.70% score equally for increased greenhouse gases, global warming, coral reef bleaching and climate variability. 50% for both, earthquakes and droughts. 33% with volcanoes, health epidemics and fish kill, and 16.70% with landslides and plagues.

Guest house/villa
100% of the participants associated the following terms with climate change: sea level rise, floods, hurricanes, increased greenhouse gases, global warming, coral reef bleaching, droughts and landslides. 33.30% did it with climate variability, earthquakes, volcanoes, health epidemics, fish kill and plagues.

It is also optimistic the level of concern that this subsector has since most of them by 53.3% are very concerned, 40% are moderately concerned and only 6.7% are not concerned at all.

Half of the accommodation subsector thinks that it is the Cayman Islands Government who bears the primary responsibility for addressing climate change, followed closely by Other (everyone) at 42.9%, and only 7.1% believes that private citizens are the responsible.

They also considered their businesses as a great deal and somewhat to be at risk or vulnerable to climate change by 46.2% for both of them, and only 7.7% for hardly at all. Some of the accommodations businesses have climate change as an issue incorporated in their businesses plan by 46.2%, and do not know or not sure at 15.4%. This answer could be selected because the lack of information that some operators have, and were them the ones who filled out the survey.

The estimated cost of damages that this subsector has experienced was approximately $2,040,000. It is necessary to emphasize, that even though the number of responses for this subsector was 15, only 7 of them answered this question.

ESTIMATED RECOVERY COST EXPERIENCED BY THE ACCOMMODATION SUBSECTOR

IMPACT	Average ($)				Response Total ($)	Responses Total #
	Condo / Apartment	Guesthouse / villa	Hotel	Response		
Damage to business property	175,333.33 (3)	**138,333.33** (3)	**110,000** (1)	**150,142.86**	**1,051,000**	7
Loss of income through temporary closure of	**179,666.67** (3)	100,000 (2)	100,000 (1)	139,833.33	839,000	6

your business						
No work for employees	3,000 (1)	50,000 (2)	-	34,333.33	103,000	3
Loss of income through temporary closure of supporting businesses e.g. hotels, restaurants, tours	-	5,000 (2)	-	5,000.00	10,000	2
Loss of income through degradation of natural resources & sites of operation e.g. health of coral reefs, fisheries etc.	-	-	-	-	-	-
Negative impact on image and reputation	30,000.00	-	-	30,000.00	30,000	1
Your business had to be relocated	2,000.00	-	-	2,000.00	2,000	1
Employees left permanently	-	-	-	-	-	-
Loss of access to sites of operation e.g. attractions, dive sites etc	5,000.00	-	-	5,000.00	5,000	1
TOTAL					**2,040,000**	

Note: The numbers in brackets represents the number of responses.

The percentage of the annual operational budget for the accommodation subsector over the next 3 to 5 years anticipated spending to protect the business from the threats of the different impacts identified above are under 5% by 53.8 % of the

respondents, up to 10% by 23.1%, up to 25% by 15.4%, and only 7.7% of the respondents do not know what percentage of the budget is anticipated to protect the businesses in this subsector.

- *Watersports:*

  The survey was filled out by 14 businesses in the watersports subsector; 10 belong to the diving and snorkeling, 1 fishing charters, and 3 other.

  For the diving and snorkeling, owner and manager score equally at 44.4% as the interviewee's role in the business, only 11.1% were an operator. For the fishing charters was the owner the person who answered the survey, and for other 66.7% were owners and 33.3% manager, for a total of 53.7% owner, 38.5% manager and 7.7% operator in the whole watersport subsector.

  The total workforce for this subsector is the 121 employees. The average work force size between is 9 employees. However, given the types of business, the average work force is skewed as some businesses are bigger than the others. The average work force for diving & snorkeling is 10, 1 for the fishing charters and 3 for other. We can see how the workforce size average has become skewed.

  For the watersports subsector, an overwhelming number (70%) believe the Cayman Islands Government bears the primary responsibility for addressing climate change, followed by other (all of us) at 20% and community organizations at 10%.

  They also considered that their businesses are somewhat (58.3%) at risk or vulnerable to climate change, succeeded by a great deal at 33.3% and hardly at all by 8.3%. 75% of these businesses do not have climate change as an issue incorporated in their businesses plan. Only one business (8.3%) has incorporated climate change adaptation measures in its plan, and 16.7% do not know or are not sure.

  The estimated recovery cost from damages that this subsector has experienced was approximately $1,440,000. It is essential to emphasize, that even though 14 was number of surveys filled out by this subsector only 5 of them answered these questions.

ESTIMATED RECOVERY COST EXPERIENCED BY THE WATERSPORT SUBSECTOR						
IMPACT	**Average ($)**				**Response Total ($)**	**Responses Total #**
	Diving & snorkeling	**Fishing charters**	**Other**	**Response**		
Damage to business property	250,000 (1)	**-** -	**125,000** (2)	**166,667**	**500,000**	3

Loss of income through temporary closure of your business	105,000 (2)	-	**140,000** (3)	126,000	630,000	5
No work for employees	60,000 (2)	-	40,000 (1)	53,333	160,000	3
Loss of income through temporary closure of supporting businesses e.g. hotels, restaurants, tours	80,000 (1)	-	15,000 (1)	47,500	95,000	2
Loss of income through degradation of natural resources & sites of operation e.g. health of coral reefs, fisheries etc.	20,000 (1)	-	0 (1)	10,000	20,000	2
Negative impact on image and reputation	20,000 (1)	-	0 (1)	10,000	20,000	2
Your business had to be relocated	5,000 (1)	-	-	5,000	5,000	1
Employees left permanently	5,000 (1)	-	-	5,000	5,000	1
Loss of access to sites of operation e.g. attractions, dive sites etc	5,000 (1)	-	-	5,000	5,000	1
TOTAL					**1,440,000**	

Note: The numbers in brackets represents the number of responses.

For the watersports subsector, the percentage of the annual operational budget over the next 3 to 5 years anticipated spending to protect the business from the threats of the different impacts identified above are equal for under 5% and do not know by 30.8 % of the respondents, up to 25% by 15.4%, up to 10% by 15.4%, an only 7.7% of the respondents for none.

- *Restaurant:*

  The survey was filled out by 4 restaurants. All of them located in Gran Cayman. 3 are in Downtown George Town, represented by 75%, and the other one is in Seven Mile Beach (25%). The survey was answered equally by owners and managers (50%).

  The total workforce for this subsector is the 115 employees. The average work force size between all of them is the 29 employees. However, given the small number of restaurants that answered this survey and the size of the restaurants, some are bigger than others; the average work force is skewed.

  All of the participants on this subsector agree that the Cayman Islands Government bears the primary responsibility for addressing climate change. 50% considered their businesses to be a great deal at risk or vulnerable to climate change by followed equally by somewhat and hardly at all at 25%. But none of them has incorporated climate change issues in their business plan.

  None of these businesses answered the question on the estimated cost of damages that they have experienced from different impacts. Although, they did claim there were affected by some impacts and provided answers in question 5.4.

  Half of the restaurants do not know the percentage of the annual operational budget over the next 3 to 5 years anticipated to be spent to protect the businesses from threats of the different impacts. Only one of the restaurants (25%) has up to 25%, and the other one (25%) under 5% percentage of the budget that is anticipated to protect the businesses.

- *Attraction:*

  The survey was only filled out by 3 businesses in the attraction subsector. All of them are located in Grand Cayman. 1 is in West Bay, other is in Seven Mile Beach and the last one is in Downtown George Town. All the persons that answered the survey are manager. The work force for this subsector is 82, and the average work force size is the 27 employees.

  They think, by 66.7%, it is the Cayman Islands Government who bears the primary responsibility for addressing climate change. Only one (33.3%) believes that is the UK Government has the responsibility.

  All of them considered their businesses to be a great deal at risk or vulnerable to climate change, but none of them have or do not know/not sure climate change issues incorporated in their business plan, at 66.7% and 33.3%, respectively.

The estimated cost of damages that this subsector has experienced was approximately $2,205,000. It is necessary to emphasize, that the respondents only gave the information for these two impacts. However, they marked in the questions before that they were affected for more than two impacts. Only two of the 3 interviewees responded to this question.

ESTIMATED RECOVERY COST EXPERIENCED BY THE ATTRACTION SUBSECTOR				
IMPACT	**Average ($)**		**Response Total ($)**	**Responses Total #**
	Attraction	**Response**		
Damage to business property	**1,002,500** (2)	1,002,500	**2,005,000**	2
Loss of income through temporary closure of your business	200,000 (1)	200,000	200,000	1
TOTAL			**2,205,000**	

Note 1: The numbers in brackets represent the number of responses.

The percentage of the annual operational budget for the attraction subsector over the next 3 to 5 years anticipated spending to protect the business from the threats of the different impacts identified above are up to 10% by 66.7% of the respondents, and 33.3% of the interviewees has under 5%.

- *Retail / Gift shop*

The survey was filled out by 3 businesses in the retail /gift shop subsector. All of them are located in Grand Cayman, 2 in Downtown George Town, and the other one in East End. The role in the business that the persons that answer the survey have is one owner, one manager and one operator by 33.3% for each of them. The total workforce for the businesses in this subsector is the 21 employees, with an average of 7 employees per business.

Half the retail / gift shop subsector thinks that the primary responsibility for addressing climate change in the Cayman Islands is the local Government. Other accounted for the remaining. In this option, participants believe that the responsibility is equally divided between UK Government and the business/ industry.

Roughly two thirds (66.7%) considered their businesses to be at a great deal of risk from climate change, while the remaining (33.3%) felt they were somewhat vulnerable to climate change. But only 33.3% of the business had incorporated climate change issues in their business plans. The other participants either do not have a plan or do not know/not sure by 33.3%, respectively.

The interviewees did not answer how much was the estimated recovery cost of damages that they have experienced. However, they did had impacts as loss of

income through temporary closure of the business, no work for employees, the business had to be relocated and disruption to cruise ship arrivals.

Only one of the business from the retail / gift shop have up to 25 % of the annual operational budget over the next 3 to 5 years anticipated spending to protect the business from the threats of different impacts. The other 2 or 66.7% do not know.

- *Transportation:*

The survey was filled out by 2 businesses in the transportation subsector. Both of them belong to tour bus activities. The person that completed the survey is either the owner or other staff. The total workforce is the 40 employees, with an average of 20 workers in each business.

The transportation subsector thinks that it is the Cayman Islands Government who bears the primary responsibility for addressing climate change, and they also consider their businesses to be a great deal at risk or vulnerable to climate change. But, only one of the businesses answered that they do not have climate change issues incorporated in their business plan. The other business did not answer. We can assume that the person that filled out the form did not have the information available. This could also apply for question 5.7 that refers to the estimated recovery cost of damages that the businesses have experienced because none of the respondents answered it.

Question 6.3 refers to the percentage of anticipated spending to protect the business from the threats of the different impacts over the next 3 to 5 years. For the transportation subsector only one of the business answered, and the person chose the do not know response.

****

The Survey was focused on the tourism sector so it was intended to cover all accommodations, attractions, restaurants, retail-gift shop, transportation and water sport activities. However, only a select few responded to the survey. From the responses, it seems that the most popular tourism business in the Cayman Islands is the one related with accommodations followed by water sports. This correlates with the opinions that the tourists come to the Cayman Islands for diving and other marine recreation, the beaches and the climate, and beach front hotels.

The tourism sector businesses are distributed island wide across all three islands. However, most of the businesses in the tourism sector are located in Grand Cayman in Down Town George Town followed closely by Seven Mile Beach locations. This could be due to the fact that a few companies actually completed the survey and not all recipients.

The survey was mainly taken by managers or owners of the companies. We can assume from the responses that people in these positions are mainly male non-Caymanians. Only a small percent of owners or managers of these businesses we assume are Caymanians.

In general, people in the Cayman Islands have a high level of knowledge regarding climate change. They usually associate climate change with global warming, coral reef bleaching, the rise in the sea level, hurricanes, increased greenhouse gases, droughts, climate variability and floods. This could be due to the fact that those are the most common impacts that have occurred in the Cayman Islands as well as what was perceived from international media sources. However, it is also important to mention that some of the participants associate earthquakes, volcanoes and plagues with climate change, and is in this mix of ideas where we have to clarify and explain to the public what events are actually connected with the term 'climate change.'

It was agreed that the main factors which contribute to the changes in climate are transportation, such as driving a car, bus or boat, land clearing, burning fossil fuels such as coal oil and natural gas, industry and factories, and electricity generation. Only a few considered that climate change is due to the natural climate cycles of the earth such as la Niña, el Niño. It was also interesting that a participant said that chemical trails from planes are a factor in climate change. This point should also be considered when the MRCU (Mosquito Research and Control Unit) does mosquito spraying to see if this can contribute to the climate change issue that we are currently facing in the Cayman Islands.

It is also interesting to see how this tourism sector answered the media use questions. Most of the participants received climate change information through international sources, and not much of this information was being received from local media. In future, the majority would like to be informed through local sources, mostly through local newspaper articles, television programming and radio shows. In that way the information can be more focused on the place that they live, and they will understand better all the concepts and terms related with climate change, as well as they can help in the adoption of different policies and plans.

People who work in the tourism sector are exceedingly concerned about climate change and feel that the Cayman Islands is nowhere near being prepared for its effects. This gives an indication of the level of cooperation amongst tourism practitioners in the development and implementation of a Climate Change Policy and Action Plans for the Cayman Islands.

They are feeling that the most common or most obvious effect of climate on the islands is the increased severity of tropical storms and hurricanes. People within the dive subsector are noticing the deterioration of the coral reefs, as one of the possible effects of climate change, which could have a negative externality on their business as they depend on this resource. However, some of the participants feel that because the

Cayman Islands is so small that what happens on these islands contributes only a little to climate change. But also it is perceived that, even though the Cayman Islands does not significantly contribute to the change in climate, it has a great risk of being affected by it, especially as the islands are not prepared for, or even protected against climate change at the moment.

Most of the businesses stated that they were affected and can be affected by hurricanes, rough seas, increase in cost of imported food, loss of electrical supply, flooding from storm surge and coral reef bleaching. The estimated recovery cost from these impacts was $5,685,000. It is important to emphasize that only 14 respondents answered this question, and not all of the respondents gave complete information about the recovery cost for all the impacts that affected them. As a result of these threats and the expensive recovery cost, the businesses put in place some of the following measures to protect themselves: disaster management and response plan, staff training in disaster response and management, design the building in such a way that it can withstand the threats up to a certain point along with structural reinforcements, have generators and water tanks, ensure that their businesses are fully and correctly insured and have continuity insurance and plan.

Regardless of all their protection efforts and distributing up to 25% of their operational budget to such activities, many feel that the business itself is still underprepared due to limited access to information about suitable measures, technology is inaccessible due to costs and/or other factors, the absence of human resources with necessary skills and expertise, and insufficient access to loans or other financing to deal with these impacts. Because of these challenges many consider that it is the responsibility of the Cayman Islands Government to help put in protective measures for businesses especially since there is hardly any local media coverage on climate change, its impacts and preventive/ protective measures.

Conclusion

Climate change is happening now and businesses are being affected by it in one way or another, some have been more affected than others. It remains clear that people are concerned and believe that they are not ready to face climate change. The Islands' businesses need to become more educated and aware of the impacts of climate change, and it is the local government's responsibility to at least take the first step in implementing educational measures and policies to help combat and brace the islands for impacts from climate change, as well as everyone's responsibility to adopt these measures.

Appendix to KAP Survey Analysis Report

Cayman Islands Climate Change Survey for the Tourism Sector

Date Completed: _____

Business Name: _____

The National Climate Change Working Group is conducting a Vulnerability and Capacity Assessment as part of the *Enhancing Capacity for Adaptation on Climate Change Project* which aims to develop a Climate Change Policy and set of Action Plans for the Cayman Islands. The answers from this survey will assist the Group in understanding the present and future vulnerability of the tourism sector to climate change issues. The questions are geared at assessing:

a. the current level of knowledge regarding climate change;
b. perceptions of the impacts of climate change on the Cayman Islands' tourism sector and associated services; and
c. opinions about what can be done to respond or adapt to climate change

Data generated by the survey will be compiled and analyzed by the National Climate Change Working Group. The survey results will provide the basis for future public awareness programs, climate change activities, and policy development.

The survey has sections dealing with **Demographic Information, General Climate Change Questions, Media Use, Business Profile, Climate Change Impacts and Adaptation.** Please complete the entire survey which will take about 20 minutes of your time.

The results of this survey will be kept anonymous and will be used only in aggregate form.

Your participation is greatly appreciated.

Thank you, in advance, for your responses.

DEMOGRAPHIC INFORMATION

1. What is your gender?

□ Male □ Female

2. What is your age range?

□ 18-25
□ 26-36
□ 37-46
□ 47 - 56
□ 56 – 65
□ 65 plus

3. How long have you lived in the Cayman Islands?

□ 3-6 months
□ 6 months – 1 year
□ 1 year – 3 years
□ 3 years – 7 years
□ 7 years – 15 years
□ 15 years – 30 years
□ 30 years plus
□ All my life

GENERAL CLIMATE CHANGE QUESTIONS

1. Please indicate whether you associate each term below with climate change. Please tick all that apply.

□ Earthquakes
□ Increased greenhouse gases
□ Landslides
□ Volcanoes
□ Floods
□ Sea level rise
□ Health epidemics
□ Global warming
□ Coral reef bleaching
□ Droughts
□ Plagues
□ Climate variability
□ Fish kill
□ Hurricanes

2. Which, if any, of the following factors do you think are contributing to changes in climate? Please tick all that apply.

□ Burning fossil fuels, such as coal, oil, and natural gas
□ Transportation, such as driving a car, bus or boat and air travel
□ Land clearing
□ Agriculture
□ Industry/factories
□ Electricity generation
□ Natural Cycles
□ Other (please specify) ……

3. How would you rate your level of concern about climate change?

- ☐ not concerned at all
- ☐ moderately concerned
- ☐ very concerned
- ☐ don't know/not sure

4. Have you noticed any changes in the following in the Cayman Islands over the last 10 years? Please tick all that apply.

- ☐ Rainfall
- ☐ Drought
- ☐ Tropical storms/Hurricanes
- ☐ Rising tides/Seas
- ☐ Temperature increase/decrease
- ☐ Coastal erosion
- ☐ Flooding
- ☐ Seasonality of crops
- ☐ Vegetation changes
- ☐ Other (please specify) ……

5. Which of the following do you think are possible effects of climate change in the Cayman Islands? Please tick all that apply.

- ☐ Coastal flooding
- ☐ Coastal erosion
- ☐ Loss of coastal infrastructure
- ☐ Salt water intrusion into aquifers, loss of freshwater
- ☐ Increased severity of tropical storms and hurricanes
- ☐ Decreased agricultural productivity
- ☐ Deterioration of coral reefs
- ☐ Decreased productivity of fisheries
- ☐ Increased flooding
- ☐ Other (please specify) ……

6. How much do you consider the Cayman Islands at risk or vulnerable to climate change?

- ☐ a great deal
- ☐ somewhat
- ☐ hardly at all
- ☐ never thought about it

7. Are the Cayman Islands prepared to handle climate change?

- ☐ yes
- ☐ no
- ☐ don't know/not sure

8. Who do you think bears the primary responsibility for addressing climate change? Please tick one.

- ☐ Cayman Islands Government
- ☐ UK government
- ☐ business/industry
- ☐ community organizations
- ☐ private citizens
- ☐ church groups
- ☐ other (please specify)……..

9. If you believe more needs to be done in terms of preparation for climate change, what would you advise?

_____
_____
_____
_____

MEDIA USE

1. Where do you currently get your information on climate change? Please tick all that apply.

- ☐ Local television
- ☐ International television
- ☐ Local radio
- ☐ International radio
- ☐ Local newspapers
- ☐ International newspapers
- ☐ Local websites
- ☐ International websites
- ☐ Community groups
- ☐ Schools
- ☐ Friends/Family
- ☐ Church or church group
- ☐ Government
- ☐ Professional associations
- ☐ My employer
- ☐ Other (please specify) ……

2. How would you like to receive information about climate change? Please tick all that apply.

- ☐ Local television programming
- ☐ Local radio shows
- ☐ Local newspaper articles
- ☐ Websites/Internet
- ☐ Lectures/Workshops
- ☐ Newsletters
- ☐ Public meetings
- ☐ Association/Community Group meetings
- ☐ Pamphlets/Brochures
- ☐ Posters
- ☐ Videos
- ☐ Postal mailings
- ☐ Email mailings
- ☐ Other (please specify) ……

BUSINESS PROFILE

1. What type of business do you work in?

- ☐ **Accommodation**
  - ☐ Condo / Apartment
  - ☐ Guesthouse / villa
  - ☐ Cottage colony
  - ☐ Timeshare
- ☐ **Watersports**
  - ☐ Diving & snorkelling
  - ☐ Fishing Charters
  - ☐ North Sound Charters
  - ☐ Other water sports
- ☐ **Attraction**
- ☐ **Restaurant**
- ☐ **Retail / Gift shop**
- ☐ **Transportation**
  - ☐ Taxi
  - ☐ Limousine
  - ☐ Tour Bus
  - ☐ District Bus
- ☐ **Other** (please specify)…… ……

2. What is your current role in this business?

- Owner
- Manager
- Operator
- Other staff

3. How long have you worked at this establishment?

- less than a year
- 1-5 years
- 6-10 years
- 11-15 years
- 16-20 years
- more than 20 years

4. Which Island and community is the business based in?

- **Grand Cayman**
  - West Bay
  - Seven Mile Beach
  - Downtown George Town
  - East End
  - Rum Point / Cayman Kai
- **Little Cayman**
  - Blossom Village
  - Other……
- **Cayman Brac**
  - South side
  - Other……

5. How long has this business been operating in this location (even if it was operated under different management)?

- less than a year
- 1-5 years
- 6-10 years
- 11-15 years
- 16-20 years
- more than 20 years
- don't know/not sure

6. What is the size of your workforce (number of employees)? _____

7. Approximately what percentage of your customers are tourists?

- Under 5%
- Up to 10%
- Up to 25%
- Up to 50%
- Up to 75%
- Over 75%
- don't know/not sure

8. What percentage of your tourist clientele are repeat visitors?

- Under 5%
- Up to 10%
- Up to 25%
- Up to 50%
- Up to 75%
- Over 75%
- don't know/not sure

9. During which months do you receive the majority of your tourist clientele? Please tick all that apply.

- January
- February
- March
- April
- May
- June
- July
- August
- September
- October
- November
- December
- don't know/not sure

10. Which of the following do you think are the main reasons why tourists visit the Cayman Islands? (Select all that apply)

- Beach front hotels
- Quality of food
- Beaches
- Diving and other marine recreation
- Small town ambience
- Nature tourism
- Historic and cultural attractions
- Special events
- Business
- Family & Friends
- Climate
- Medical reasons
- Other (please specify) ……

CLIMATE CHANGE IMPACTS

1. How much do you consider your business to be at risk or vulnerable to climate change?

- a great deal
- somewhat
- hardly at all
- never thought about it

2. Are climate change issues incorporated in your business plan?

- yes
- no
- don't know/not sure

3. What level of threat do you think the following pose to this business?

	High level	Medium	Low	No threat	Do not know
Flooding from storm surge					
Flooding from heavy rainfall					
Beach erosion					
Hurricanes					
Rough seas					

Loss of potable water supply					
Sea level rise					
Coral reef bleaching					
Disease outbreak					
Increased air temperature					
Loss of coastal vegetation					
Loss of electrical supply					
Decrease in fish population					
Decrease in locally available fruit, vegetables, seafood and meats					
Increase in cost of imported food					

4. Has this business ever been affected by any of the following? Please tick the appropriate box for each impact.

	Affected	Unaffected	Don't Know
Flooding from storm surge			
Flooding from heavy rainfall			
Beach erosion			
Hurricanes			
Rough seas			
Loss of potable water supply			
Sea level rise			
Coral reef bleaching			
Disease outbreak			
Increased air temperature			
Loss of coastal vegetation			
Loss of electrical supply			
Decrease in fish population			
Decrease in locally available fruit, vegetables, seafood and meats			
Increase in cost of imported food			

5. How was the business affected? Please tick all that apply.

	Damage to business property		Employees left permanently
	Loss of income through temporary closure of your business		Disruption to flights
	No work for employees		Damage to physical infrastructure
	Loss of income through temporary		Loss of utilities e.g. electricity,

	closure of supporting businesses e.g. hotels, restaurants, tours		telecommunications, water
☐	Loss of income through degradation of natural resources & sites of operation e.g. health of coral reefs, fisheries etc.	☐	Loss of access to sites of operation e.g. attractions, dive sites etc
☐	Negative impact on image and reputation	☐	Disruption to importation of materials and other commodities
☐	Your business had to be relocated	☐	Disruption to cruise ship arrivals
☐	Don't Know/not sure	☐	Other (please specify) ……

6. Could you provide an idea of the cost of damages you experienced and the time it took to recover from these impacts?

Impact	**Estimated cost experienced**	**Recovery time**			
		1-12 months	1-2 years	3+ years	Recovery time unknown
Damage to business property		☐	☐	☐	☐
Loss of income through temporary closure of your business		☐	☐	☐	☐
No work for employees		☐	☐	☐	☐
Loss of income through temporary closure of supporting businesses e.g. hotels, restaurants, tours		☐	☐	☐	☐
Loss of income through degradation of natural resources & sites of operation e.g. health of coral reefs, fisheries etc.		☐	☐	☐	☐
Loss of access to sites of operation e.g. attractions, dive sites etc		☐	☐	☐	☐
Negative impact on image and reputation		☐	☐	☐	☐

Your business had to be relocated		☐	☐	☐	☐

7. What measures, if any, did you put in place to protect your business as a result of the experience?

☐ Disaster management and response plan
☐ Staff training in disaster response and management
☐ Building design and structural reinforcement
☐ Generators, water tanks etc.
☐ General insurance
☐ Business continuity insurance
☐ Business continuity plan
☐ Other (please specify) ……

CLIMATE CHANGE ADAPTATION

1. Have you taken steps to protect your business from the following impacts in the future?

Flooding	☐ No
	☐ Yes, please elaborate on the measures you have put in place ……..
	☐ Don't know
Hurricane	☐ No
	☐ Yes, please elaborate on the measures you have put in place ……..
	☐ Don't know
Beach erosion	☐ No
	☐ Yes, please elaborate on the measures you have put in place ……..
	☐ Don't know
Water shortages	☐ No
	☐ Yes, please elaborate on the measures you have put in place ……..
	☐ Don't know
High winds	☐ No
	☐ Yes, please elaborate on the measures you have put in place ……..
	☐ Don't know
Storm surge	☐ No
	☐ Yes, please elaborate on the measures you have put in place ……..
	☐ Don't know

Disease outbreaks	☐ No
	☐ Yes, please elaborate on the measures you have put in place ……..
	☐ Don't know
Coral bleaching	☐ No
	☐ Yes, please elaborate on the measures you have put in place ……..
	☐ Don't know

2. What are the main challenges that you face in putting preventative measures in place?

☐ Limited access to information about suitable measures

☐ Absence of human resources with necessary skills and expertise

☐ Insufficient access to loans or other financing to deal with these issues

☐ Technology inaccessible because of costs or other factors

☐ Other (please specify) …….

3. What percentage of your annual operational budget over the next 3-5 years do you anticipate spending to protect your business from the threats identified above?

☐ Under 5%
☐ Up to 10%
☐ Up to 25%
☐ Up to 50%
☐ Up to 75%
☐ Over 75%
☐ Don't know

4. In what ways could the government support your efforts?

_____
_____
_____
_____

Appendix 2 National Climate Assessment

Climate and Weather Assessment for the Cayman Islands

Abstract

The workshop carried out by the team from the Caribbean Community Climate Change Centre (CCCCC), Belize provided the Cayman Islands with specific information on Climate Change in the Islands. The changes from 2011 to 2099 include an increase of 2 to 2.7 deg C for average temperature, 1.8 to 2.8 deg C for the average maximum temperature, 1.7 to 2.6 deg C for the average minimum temperature, 10 to 50 mm decrease in annual rainfall totals, little to no change in relative humidity, 2.2 to 2.8 deg C increase in the comfort index and a 12 to 80 cm increase in sea levels and a decrease in the wind speed from 5.5 meters per second to 5.0 meters per sec.

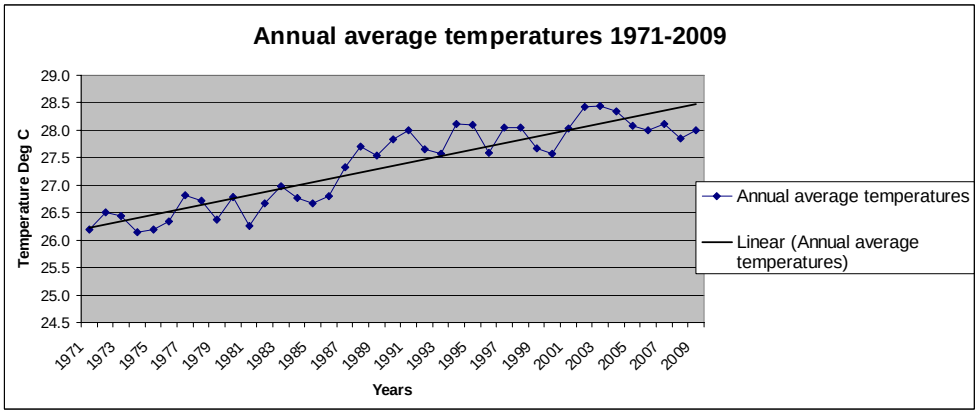
Introduction

A team from the Caribbean Community Climate Change Centre (CCCCC), Belize visited the Cayman Islands to assist with the production of a National Climate and Weather Assessment. The team was composed of Mr Abel Centella and Arnoldo Bezanilla from the Institute of Meteorology in Cuba and Mr Ottis Joslyn from the CCCCC in Belize. The team was supported by Mr Winston Bennett and Dr Ulric Trotz from the CCCCC.

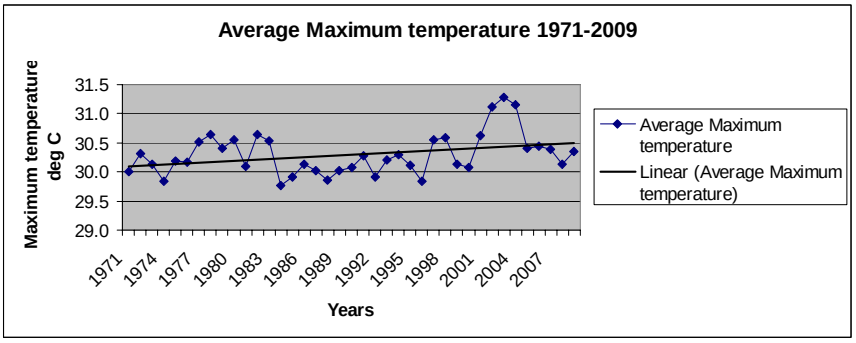
This team produced outputs for future climate of the Cayman Islands using the Hadley PRECIS Regional Climate Model (RCM), forced by the HADCM3 and ECHAM4 Global Climate Model at a resolution of 50 km for the Caribbean with IPCC (Special Report on Emissions Scenarios) SRES A2 and B2 scenarios (See Annex)odel data was assessed by the Cayman Islands National Weather Service (CINWS) staff to determine the impacts, if any, that could be faced by the Cayman Islands in the future**.**

Historical Climate Record for the Cayman Islands

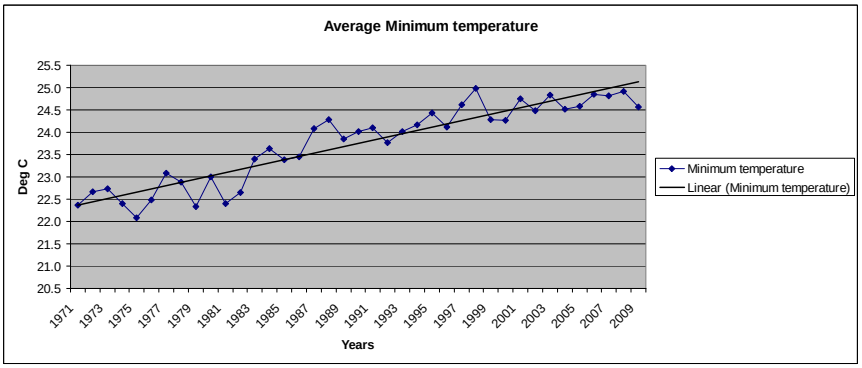
Temperature



An initial investigation of the observed annual average temperatures for the Cayman Islands recorded by the National Weather Service at the Owen Roberts International Airport reveals an increase in temperature from approximately 26.3 deg C in 1971 to 28.5 deg C in 2009. This is an increase of 2.2 deg C in 39 years or 0.06 deg C per year.

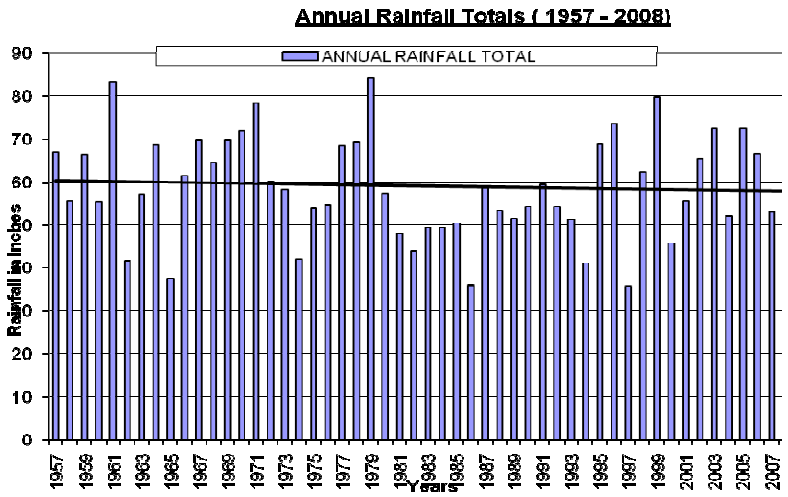


An initial investigation of the observed annual average maximum temperatures for the Cayman Islands recorded by the National Weather Service at the Owen Roberts International Airport reveals an increase in average maximum temperature from approximately 30.1 deg C in 1971 to 30.5 deg C in 2009. This is an increase of 0.4 deg C in 39 years or 0.01 deg C per year.



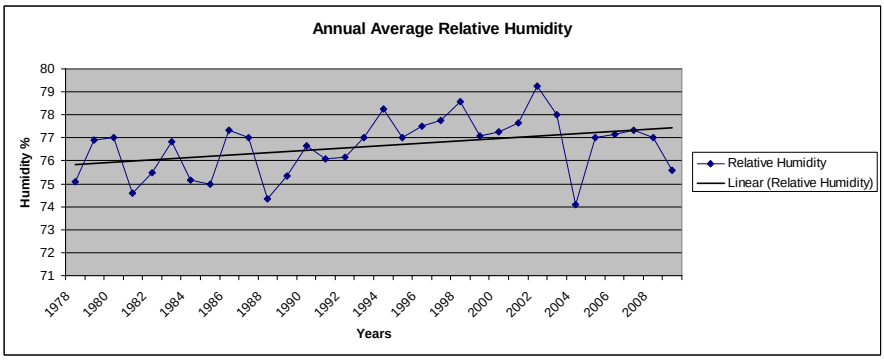
An initial investigation of the observed annual average minimum temperatures for the Cayman Islands recorded by the National Weather Service at the Owen Roberts International Airport reveals an increase in average minimum temperature from approximately 22.3 deg C in 1971 to 25.2 deg C in 2009. This is an increase of 2.9 deg C in 39 years or 0.1 deg C per year.

Rainfall



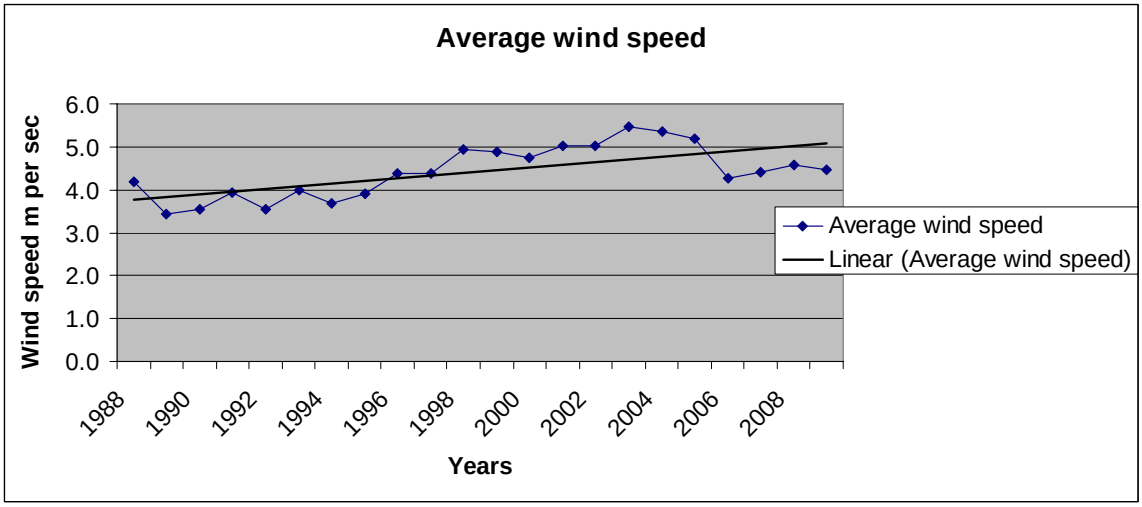
An initial investigation of the observed annual rainfall total for the Cayman Islands recorded by the National Weather Service at the Owen Roberts International Airport reveals a decrease in rainfall from approximately 60 inches in 1957 to 58 inches in 2008. This is a decrease of 2 inches in 51 years or 0.04 inches per year.

Relative Humidity



An initial investigation of the observed annual relative humidity for the Cayman Islands recorded by the National Weather Service at the Owen Roberts International Airport reveals an increase in relative humidity from approximately 76% in 1978 to 77% in 2009. This is an increase of 1% in 31 years or 0.03% per year.

Wind Speed



An initial investigation of the observed annual wind speed for the Cayman Islands recorded by the National Weather Service at the Owen Roberts International Airport reveals an increase in average wind speed from approximately 3.8 meters per sec in 1988 to 5.1 meters per sec in 2009. This is an increase of 1.3 meters per sec in 22 years or 0.06 meters per sec per year.

Methodology

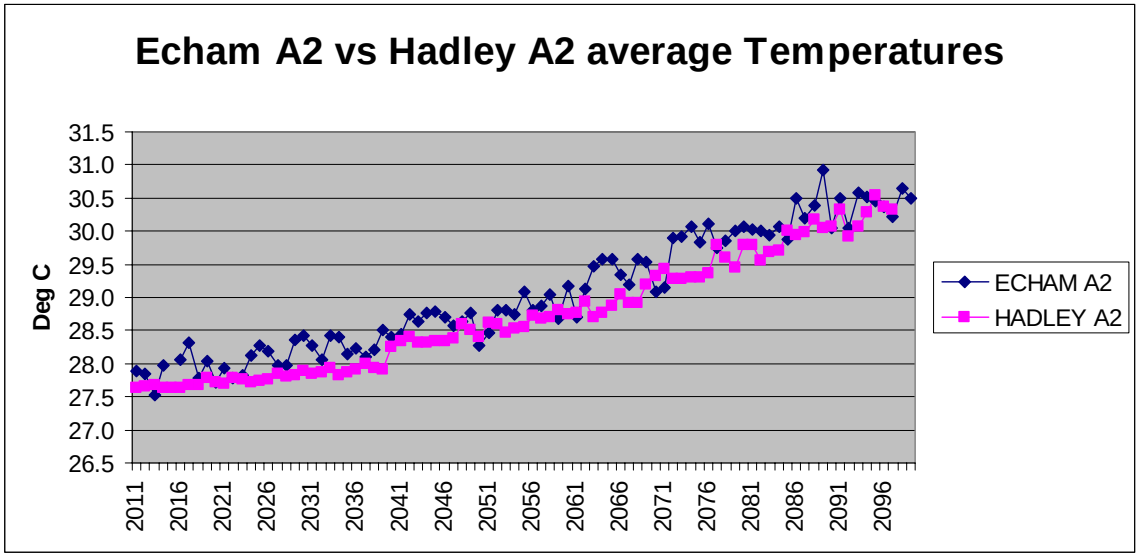
The team utilized the PRECIS regional climate model (RCM) to produce predictions for a number of climate variables for the Cayman Islands. The model variables predicted included Temperature (maximum, average and minimum), Humidity, Rainfall, Winds Speed and Sea-Level Rise.

Two time periods or time slices were used in the simulation experiments of future climate with the HadCM3 forcing (PRECISHadCM3), namely 1961-1990 and 2071-2100. In the case of ECHAM4 (PRECISECHAM4) a single period 1961 to 2100 was used. The period of 1961-1990 is the model's baseline data, and it correlated well with our local observed data for that time period.

Each of the above-mentioned variables, with the exception of Sea-level Rise was compared against the similar scenarios (SRES A2 & B2) from the different models highlighted above. In the case of the ECHAM4 we were able to do a comparison between the model's output with observed data from the Cayman Islands between 1991-2009.

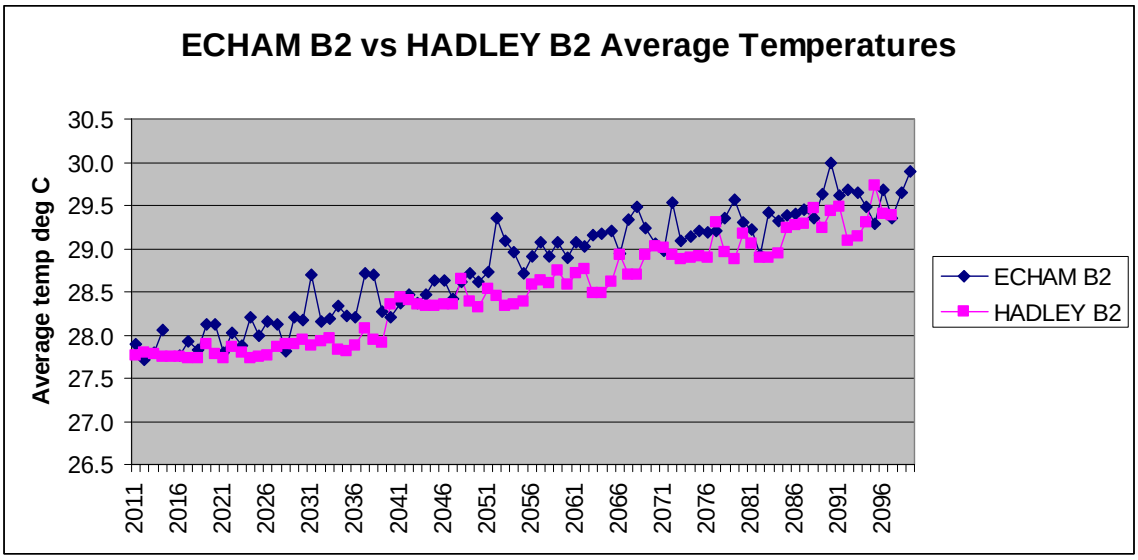
Future trends

Temperature



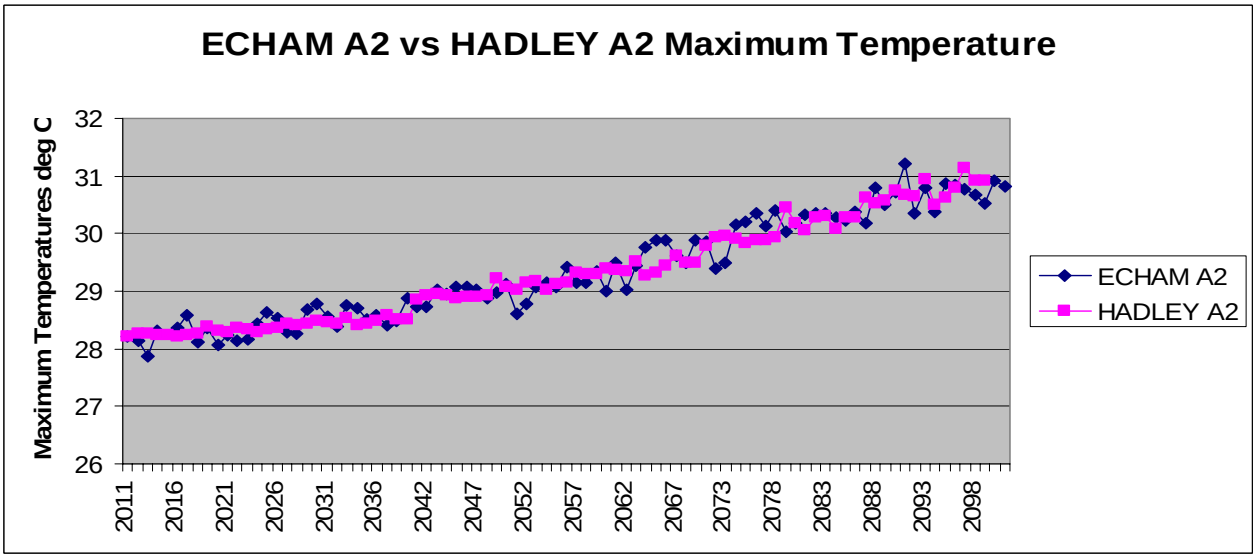
Preliminary investigation from the ECHAM and Hadley models using scenario A2 show an increasing average temperature. The average temperature increases from approximately 27.8 deg C to 30.5 deg C from 2011 to 2099, an increase of 2.7 deg C or 0.03 deg C per year.

The output from the ECHAM as compared with observed temperatures from 1991 to 2009 shows that this Model tends to underestimate average annual temperature, using the monthly data, by about 4 deg C. Both the observed and the model data point to an increase in temperature as noted by the trend line. When the same comparison was carried out for the Hadley the underestimate was 3 deg C.

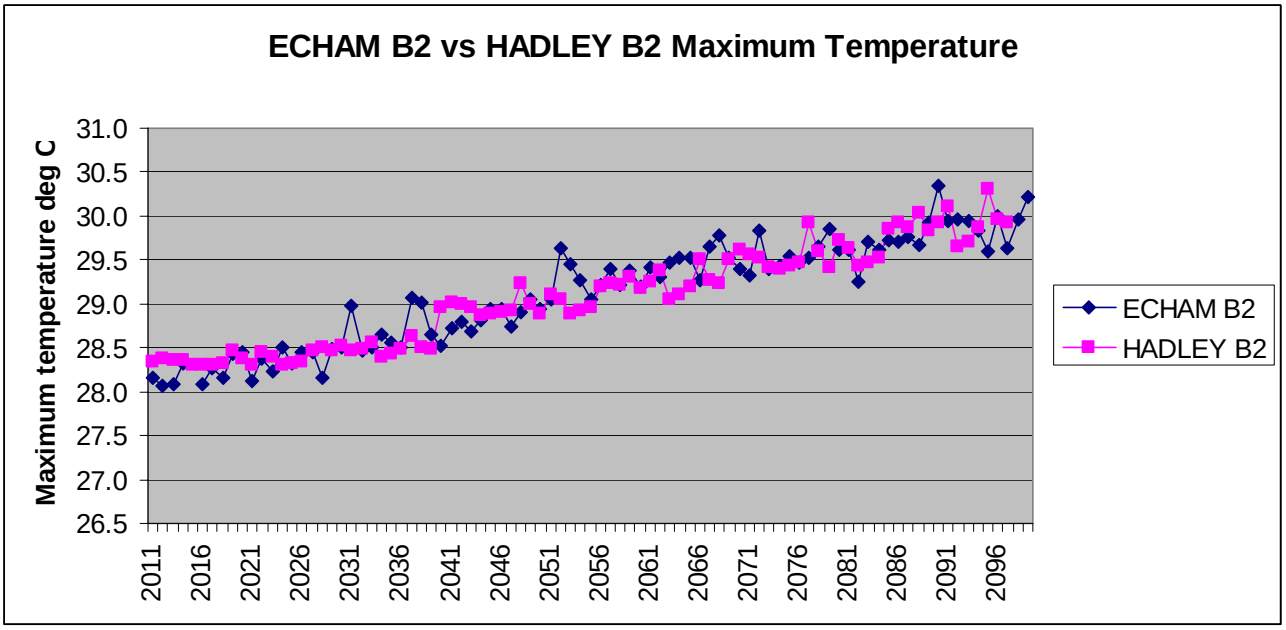


Preliminary investigation from the ECHAM and Hadley models using scenario B2 show an increasing average temperature. The average temperature increases from approximately 27.8 deg C to 29.8 deg C from 2011 to 2099, an increase of 2.0 deg C or 0.02 deg C per year. The ECHAM B2 is observed to be slightly warmer than the Hadley B2.

Maximum Temperature

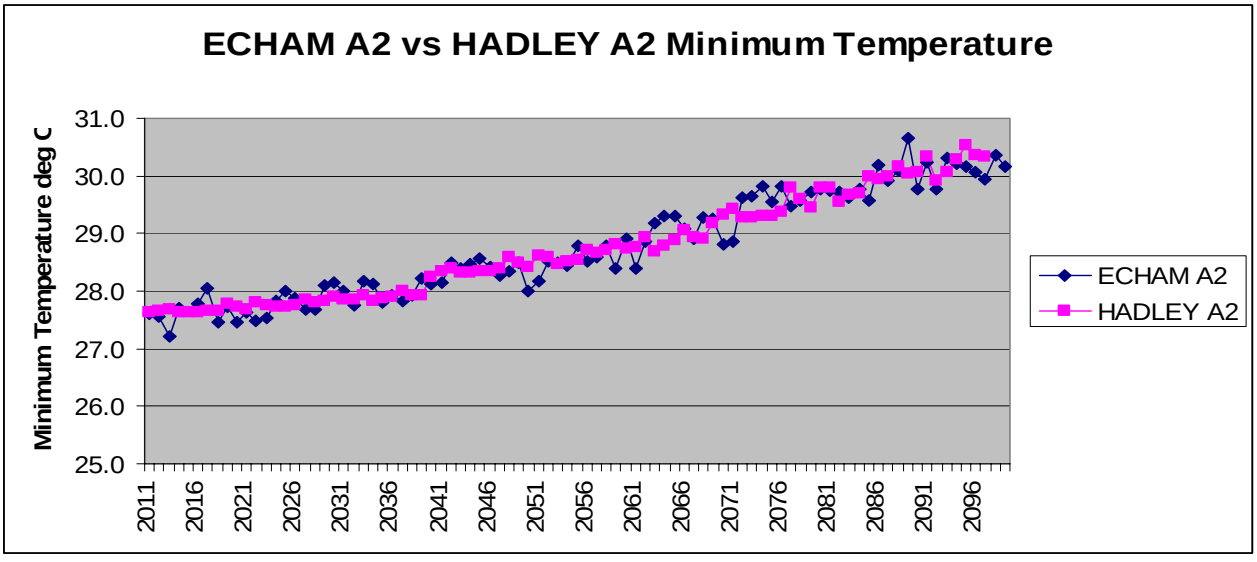


Preliminary investigation from the ECHAM and Hadley models using scenario A2 shows an increasing average maximum temperature. The average maximum temperature increases from approximately 28.2 deg C to 31.0 deg C from 2011 to 2099, an increase of 2.8 deg C or 0.03 deg C per year. There is little to no difference between the models.

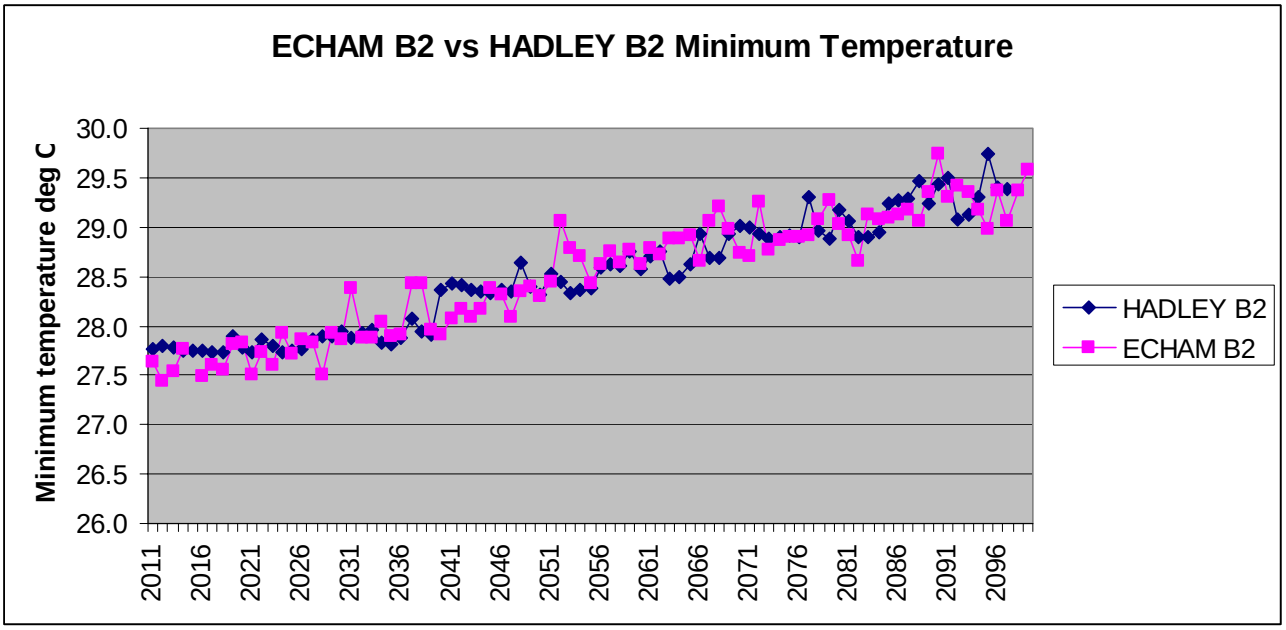


Preliminary investigation from the ECHAM and Hadley models using scenario B2 shows an increasing average maximum temperature. The average maximum temperature increases from approximately 28.3 deg C to 30.1 deg C from 2011 to 2099, an increase of 1.8 deg C or 0.02 deg C per year. There is little to no difference between the models.

Minimum Temperature

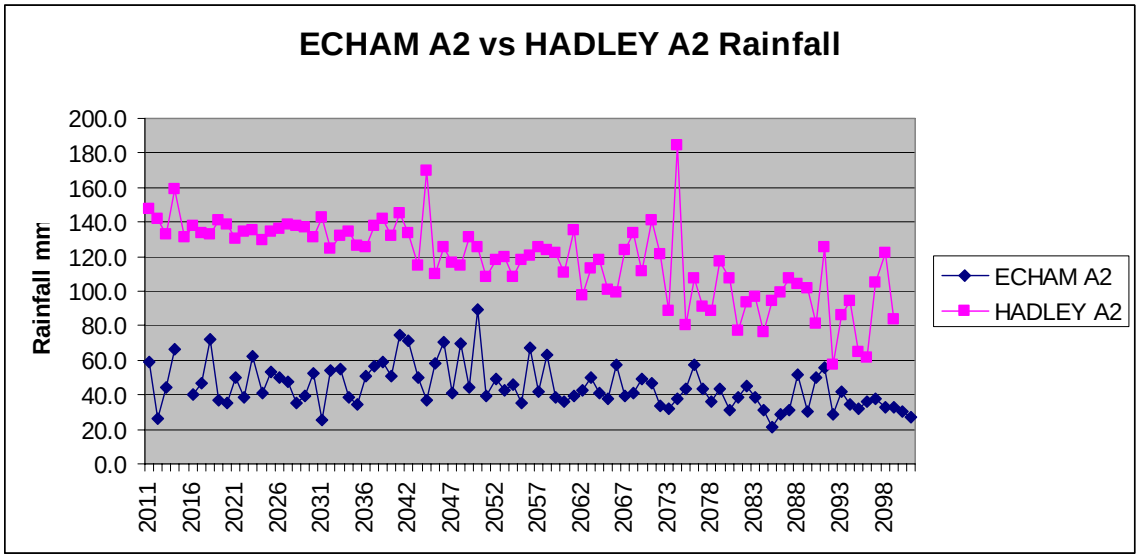


Preliminary investigation from the ECHAM and Hadley models using scenario A2 shows an increasing average minimum temperature. The average minimum temperature increases from approximately 27.6 deg C to 30.2 deg C from 2011 to 2099, an increase of 2.6 deg C or 0.03 deg C per year. There is little to no difference between the models.



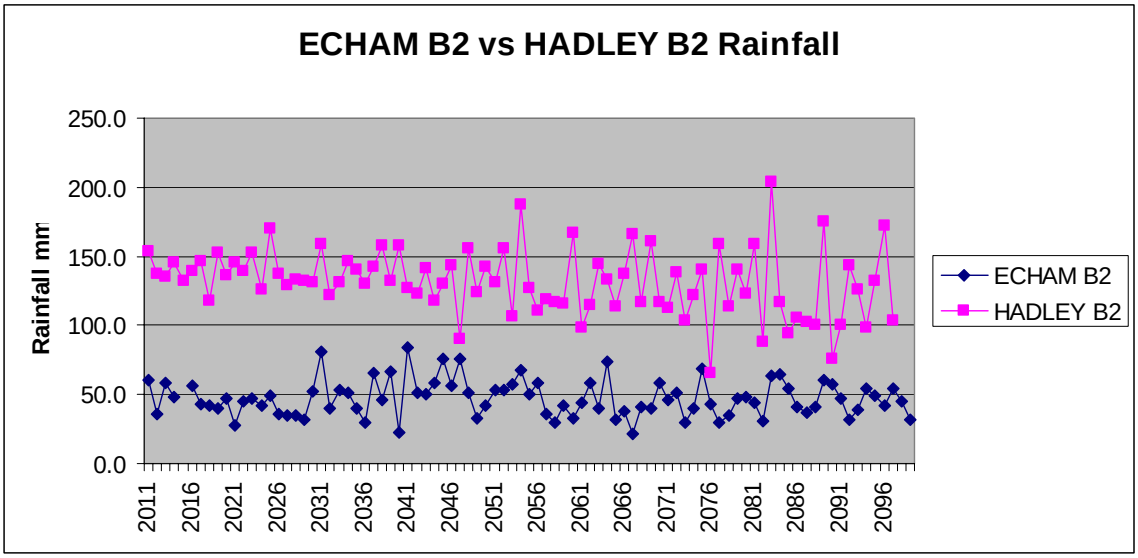
Preliminary investigation from the ECHAM and Hadley models using scenario B2 highlights that there is an increasing average minimum temperature. The average minimum temperature increases from approximately 27.8 deg C to 29.5 deg C from 2011 to 2099, an increase of 1.7 deg C or 0.02 deg C per year. There is little to no difference between the models.

Rainfall



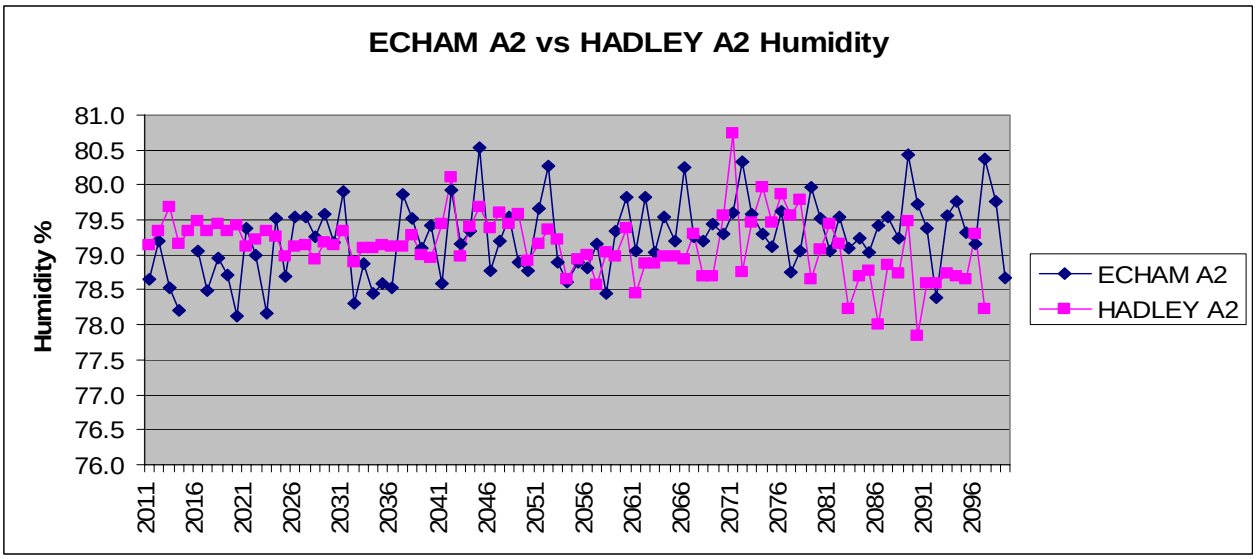
Preliminary investigation using the ECHAM and Hadley models using scenario A2 shows decreasing average Annual Rainfall from 2011 to 2099. It is noted that the Hadley model shows a wetter climate than the ECHAM. The average Annual Rainfall decrease on the ECHAM model

is from approximately 40 mm to 30 mm a reduction of 10 mm or 0.11 mm per year, while the Hadley decreases from 140 mm to 90 mm a decrease of 50 mm or 0.57 mm per year.



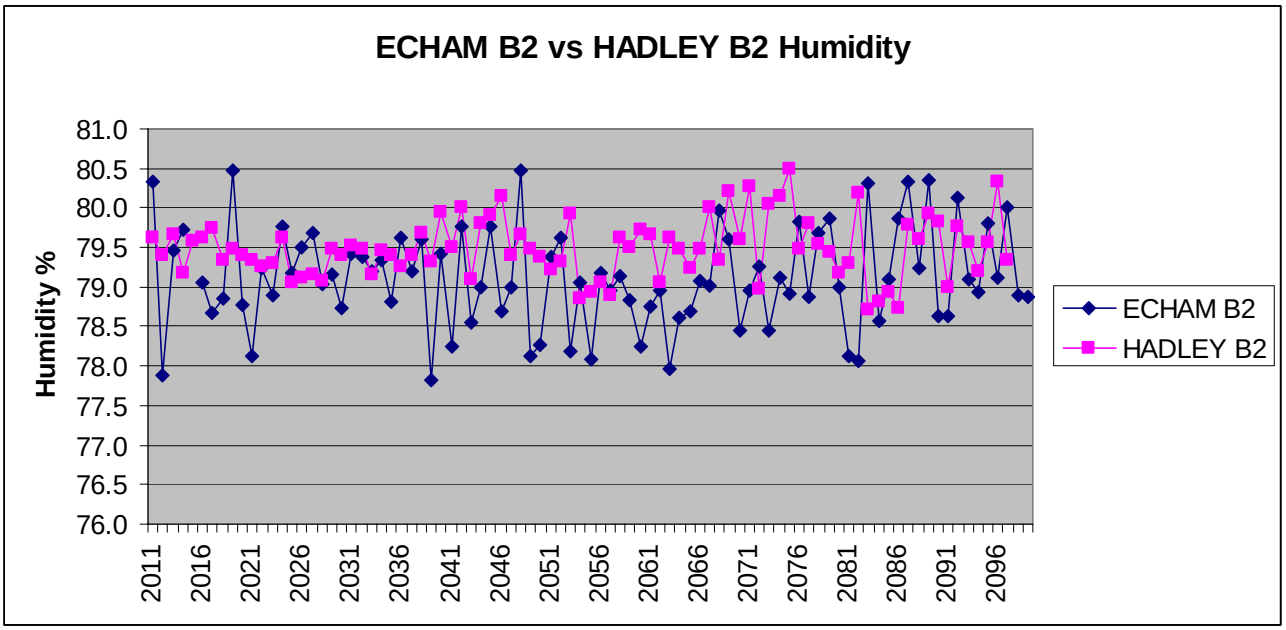
Preliminary investigation using the ECHAM and Hadley models using scenario B2 shows decreasing average Rainfall from 2011 to 2099. It is noted that the Hadley model shows a wetter climate than the ECHAM. The average Rainfall decrease on the ECHAM model is 10 mm a drop from 50 mm to 40 mm or 0.11 mm per year, while the Hadley shows a fall from 150 mm to 130 mm a decrease of 20 mm or 0.23 mm per year.

Humidity



Preliminary investigation both the ECHAM and Hadley models using scenario A2 shows a near constant average Humidity from 2011 to 2099. It is noted that for the most part the models are

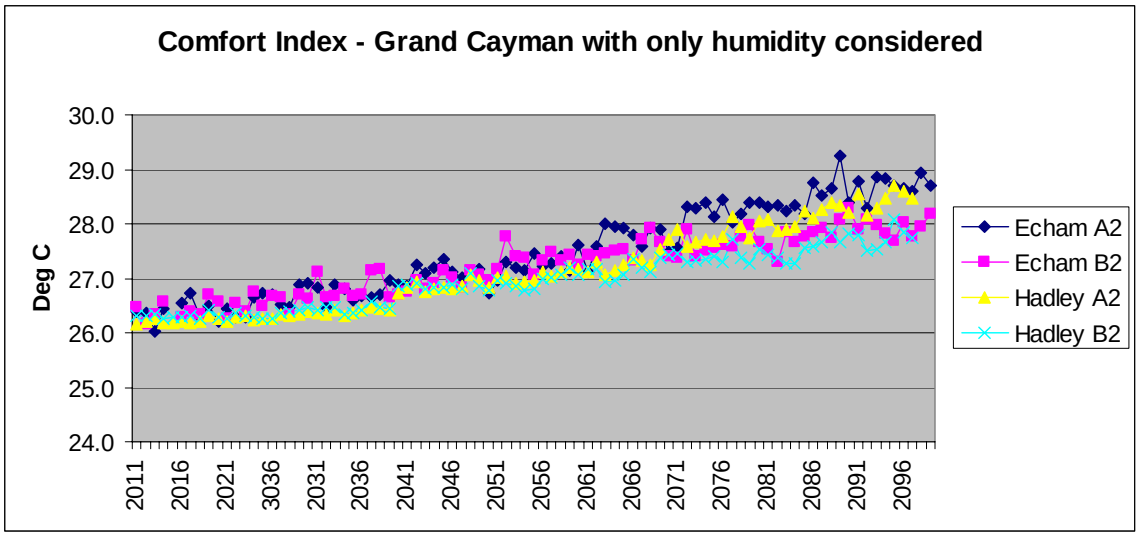
near mirror images until the last 20 years or so when the ECHAM model shows a higher humidity. Humidity starts approximately 79% and remains near constant until the last 20 years where the two models diverge in that the ECHAM shows a slight increase while the Hadley shows a slight decrease.



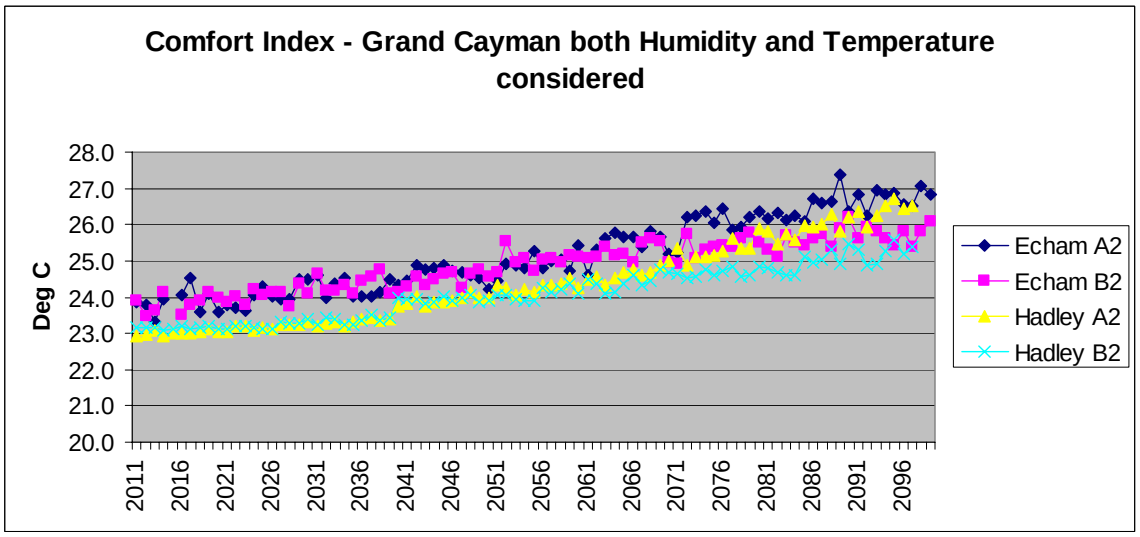
Preliminary investigation of both the ECHAM and Hadley models using scenario B2, shows a near constant average Humidity from 2011 to 2099. It is noted that for the most part the models are near mirror images. Humidity remains around 79% for the period.

Comfort Index

The climate change team took the outputs of temperature and humidity and combined them to produce a comfort index. This index gives a rough idea of how “comfortable” one feels due to excess temperature and humidity (25 degrees Celsius is the threshold at which it is considered comfortable or ideal to live).

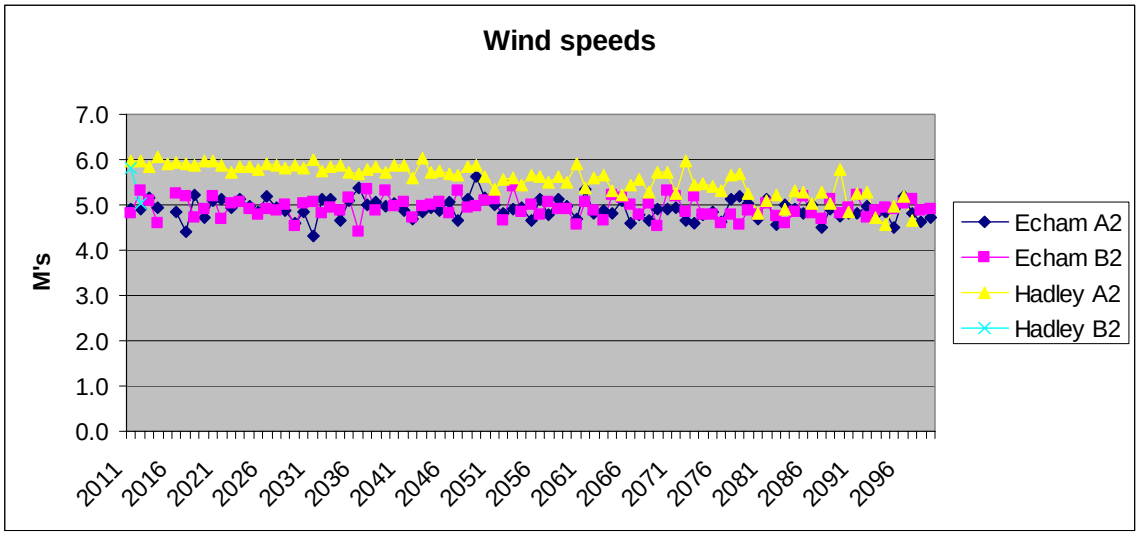


Preliminary investigation of the comfort index outputs only taking into consideration relative humidity by the ECHAM and Hadley models and using both scenario A2 and B2 reveals an increase from 2011 to 2099. The increase was from approximately 26.3 deg C to 28.5 deg C or 2.2 deg C increase. This output would give an increase of 0.03 deg C per year.



Preliminary investigation of the comfort index outputs taking into consideration both relative humidity and temperature by the ECHAM and Hadley models and using both scenario A2 and B2 reveals an increase from 2011 to 2099. The increase was from approximately 23.5 deg C to 26.3 deg C or 2.8 deg C increase. This output would give an increase of 0.03 deg C per year.

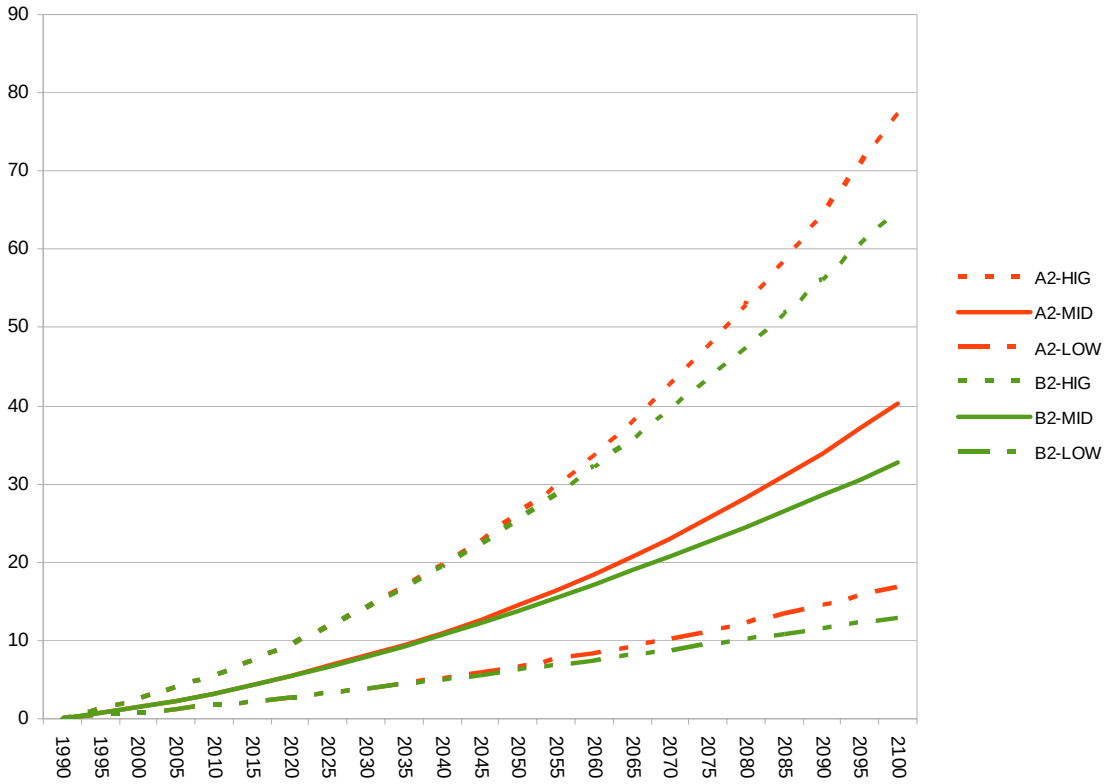
Wind Speeds



Preliminary investigation of the average wind speed outputs by the ECHAM and Hadley models and using both scenario A2 and B2 reveals a decrease from 2011 to 2099. The decrease was from approximately 5.5 meters per sec in 2011 to 5.0 meters per sec in 2099. This is a decrease of 0.5 meters per sec or rate of 0.01 meters per sec per year.

Sea-level rise

One of the most critical potential future impacts is that of sea level rise. The team arrived at estimates of future sea level rise utilizing the Model for the Assessment of Greenhouse-gas Induced Climate Change (MAGICC). The model uses two greenhouse gas emission scenarios (SRES A2 and SRES B2) and by each of these scenarios we use 3 different climate sensitivity levels to capture the uncertainties associated with this parameter.



It is noted that for all scenarios and all sensitivity levels the model shows increasing sea levels. The graph shows a 12 to 80 cm increase in sea levels or approximately 0.14 to 0.91 cm per year.

Conclusions

The workshop carried out by the team from the Caribbean Community Climate Change Centre (CCCCC), Belize provided the Cayman Islands with specific information on Climate Change for the Cayman Islands. Overall, the tendency is for a warmer future climate with decreased annual precipitation, but increasing sea levels.

The changes from 2011 to 2099 include an increase of 2 to 2.7 deg C for average temperature, 1.8 to 2.8 deg C for the average maximum temperature, 1.7 to 2.6 deg C for the average minimum temperature, 10 to 50 mm decrease in annual rainfall totals, little to no change in relative humidity, 2.2 to 2.8 C increase in the comfort index and a 12 to 80 cm increase in sea levels and a decrease in wind speed from 5.5 meters per sec to 5.0 meters per sec.

In comparing the observed changes in temperature with the forecast change we find that the temperature forecast calls for a slower rate of temperature increase than what has been observed over the past 39 years. A similar conclusion applies to the forecast maximum temperature, minimum temperature and relative humidity. When comparisons are carried out on wind speeds it is noted that the observed wind speeds have increased slightly while the forecast is for a decrease in wind speed.

References

Abel Centella and Arnoldo Bezanilla Institute of Meteorology, Cuba and Kenrick R. Leslie, Caribbean Community Climate Change Centre, Belize, *A Study of the Uncertainty in Future Caribbean Climate Using the PRECIS Regional Climate Model*

Annex: IPCC SRES Scenarios

The main characteristics of the four SRES storylines and scenario families

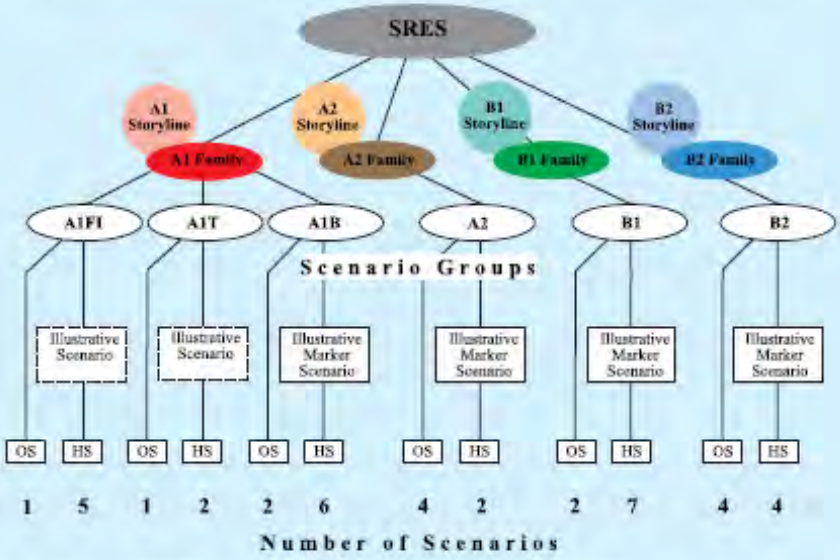


Figure 1: Schematic illustration of SRES scenarios. Four qualitative storylines yield four sets of scenarios called "families": A1, A2, B1, and B2. Altogether 40 SRES scenarios have been developed by six modeling teams. All are equally valid with no assigned probabilities of occurrence. The set of scenarios consists of six scenario groups drawn from the four families: one group each in A2, B1, B2, and three groups within the A1 family, characterizing alternative developments of energy technologies: A1FI (fossil fuel intensive), A1B (balanced), and A1T (predominantly non-fossil fuel). Within each family and group of scenarios, some share "harmonized" assumptions on global population, gross world product, and final energy. These are marked as "HS" for harmonized scenarios. "OS" denotes scenarios that explore uncertainties in driving forces beyond those of the harmonized scenarios. The number of scenarios developed within each category is shown. For each of the six scenario groups an illustrative scenario (which is always harmonized) is provided. Four illustrative marker scenarios, one for each scenario family, were used in draft form in the 1998 SRES open process and are included in revised form in this Report. Two additional illustrative scenarios for the groups A1FI and A1T are also provided and complete a set of six that illustrates all scenario groups. All are equally sound.

By 2100 the world will have changed in ways that are difficult to imagine – as difficult as it would have been at the end of the 19th century to imagine the changes of the 100 years since. Each storyline assumes a distinctly different direction for future developments, such that the four storylines differ in increasingly irreversible ways. Together they describe divergent futures that encompass a significant portion of the underlying uncertainties in the main driving forces. They cover a wide range of key "future" characteristics such as demographic change, economic development, and technological change. For this reason, their plausibility or feasibility should not be considered solely on the basis of an extrapolation of *current* economic, technological, and social trends.

- The A1 storyline and scenario family describes a future world of very rapid economic growth, global population that peaks in mid-century and declines thereafter, and the rapid introduction of new and more efficient technologies. Major underlying themes are convergence among regions, capacity building, and increased cultural and social interactions, with a substantial reduction in regional differences in per capita income. The A1 scenario family develops into three groups that describe alternative directions of technological change in the energy system. The three A1 groups are distinguished by their technological emphasis: fossil intensive (A1FI), non-fossil energy sources (A1T), or a balance across all sources (A1B).[3]

[3] Balanced is defined as not relying too heavily on one particular energy source, on the assumption that similar improvement rates apply to all energy supply and end use technologies.

- The A2 storyline and scenario family describes a very heterogeneous world. The underlying theme is self-reliance and preservation of local identities. Fertility patterns across regions converge very slowly, which results in continuously increasing global population. Economic development is primarily regionally oriented and per capita economic growth and technological change are more fragmented and slower than in other storylines.
- The B1 storyline and scenario family describes a convergent world with the same global population that peaks in mid-century and declines thereafter, as in the A1 storyline, but with rapid changes in economic structures toward a service and information economy, with reductions in material intensity, and the introduction of clean and resource-efficient technologies. The emphasis is on global solutions to economic, social, and environmental sustainability, including improved equity, but without additional climate initiatives.
- The B2 storyline and scenario family describes a world in which the emphasis is on local solutions to economic, social, and environmental sustainability. It is a world with continuously increasing global population at a rate lower than A2, intermediate levels of economic development, and less rapid and more diverse technological change than in the B1 and A1 storylines. While the scenario is also oriented toward environmental protection and social equity, it focuses on local and regional levels.

Source:

Intergovernmental Panel on Climate Change (2000). *Summary for Policymakers: Emissions Scenarios, A Special Report of IPCC Working Group III.*

Appendix 3 Hurricanes and Tropical Storms with Direct Impacts on The Cayman Islands, 1852-2008

Date	Storm	Storm category at CPA	CPA Grand Cayman	CPA Little Cayman	CPA Cayman Brac	Max winds at CPA
7/10/1852	Storm 5	II	74			104
27/9/1857	Storm 4	II	67			96
09/10/1865	Storm 4	II		14	7	104
10/06/1870	Storm 6	I		51	41	77
30/9/1873	Storm 5	TS	51	29	27	46
17/10/1876	Storm 5	II	32			96
13/08/1878	Storm 2	TS				58
19/10/1878	Storm 11	I	8			69
04/10/1879	Storm 6	TS	40	35	48	58
13/10/1879	Storm 5	TS	46			46
07/08/1880	Storm 2	I	69			104
06/27/1886	Storm 3	TS		11	20	58
08/07/1887	Storm 5	TS		65	53	40
10/12/1887	Storm 13	I		46	39	86
5/10/1891	Storm 7	TS	28			52
26/8/1895	Storm 2	I	30			98
20/10/1895	Storm 5	I	41			104
26/9/1896	Storm 4	I	25			102
16/10/1897	Storm 5	TS	44			62
8/10/1898	Storm 9	TS	21			58
10/28/1899	Storm 8	TS		21	4	73
7/6/1901	Storm 2	TS		5	12	69
9/14/1901	Storm 7	I		16	9	75
12/8/1903	Storm 2	III	12	42	53	121
10/14/1904	Storm 3	TS		19	2	58
17/7/1909	Storm 4	TS	43			62
7/8/1909	Storm 5	TS	15			37
16/9/1909	Storm 8	I	33	24	33	65
9/10/1909	Storm 6	II		60	52	100
9/9/1910	Storm 3	I	34	26	34	81
11/21/1912	Storm 6	TS	28			41
8/14/1915	Storm 2	III	55	9	16	117
9/2/1915	Storm 4	I	8			86
8/16/1916	Storm 4	I	22	36	45	111
9/27/1917	Storm 3	III		31	22	115
8/4/1918	Storm 1	TS	55			63
10/18/1927	Storm 7	TS	40			41

10/31/1927	Storm 6	TS	12	24	21	46
9/3/1928	Storm 3	TS	48			47
9/13/1931	Storm 8	TS	64			46
11/8/1932	Storm 10	IV	59	4	20	132
7/2/1933	Storm 18	I	55	36	53	83
7/17/1933	Storm 15	TS	71			83
8/17/1933	Storm 6	TS	10			46
9/21/1933	Storm 3	I	33	28	35	52
10/3/1933	Storm 2	I	38			85
9/27/1935	Storm 4	III		22	14	121
8/12/1938	Storm 2	I	55			92
10/31/1939	Storm 5	I	8	34	36	90
8/21/1944	Storm 11	I	7	44	58	92
10/15/1944	Storm 4	I	32			86
10/12/1945	Storm 11	I	75	7	22	76
9/20/1947	Storm 6	TS		3	15	40
9/19/1948	Storm 7	I	7			89
10/16/1950	King	I			68	92
8/18/1951	CHARLIE	II	58			104
10/14/1951	ITEM	I	20			81
10/3/1953	Storm 10	TS			66	40
8/23/1955	Storm 5	TS	4			40
9/5/1955	HILDA	II	16	5	7	92
5/23/1970	ALMA	TS	16	7	21	40
9/20/1973	GILDA	TS	56	15	3	48
9/20/1975	ELOISE	TS	36	15	13	40
8/6/1980	ALLEN	IV		23	11	142
5/7/1981	ARLENE	TS	38	20	11	46
11/5/1981	KATRINA	TS	21	36	46	83
9/13/1988	GILBERT	IV	24			150
9/19/2002	ISIDORE	I	52	18	9	69
9/30/2002	LILI	TS		9	4	73
8/12/2004	CHARLEY	I	32	44	58	92
9/12/2004	IVAN	IV	22			155
8/17/2008	FAY	TS			73	52
8/30/2008	GUSTAV	I	52	22	33	94
11/7/2008	PALOMA	IV	33	13	9	135

Cat IV
Cat III

Distances in statute miles
Max winds at CPA in miles per hour
CPA (Closest Point of Approach) has to be below 75 statute miles to be a direct hit

Source: Cayman Islands National Weather Service, 2010

Appendix 4 Licensed Tourism Properties, 2009/10

Name	Category	Island	Total Number of Units	Total Number of Bedrooms	Total Number of Beds
Grand Cayman					
Cayman Club, The	Apartment	Grand Cayman	2	8	8
Coral Sands Resort	Apartment	Grand Cayman	12	24	48
Northern Lights [4,6]	Apartment	Grand Cayman	2	4	6
Sealodge # 23	Apartment	Grand Cayman	1	2	2
Anchorage Condominiums, The	Apartment	Grand Cayman	14	32	52
Aqua Bay Club	Apartment	Grand Cayman	20	39	72
Aqua Bay Club #10	Apartment	Grand Cayman	20	39	72
Avalon Condominiums, The	Apartment	Grand Cayman	16	48	67
Avalon Condominiums, The 12	Apartment	Grand Cayman	16	48	67
Azure Breeze # 2	Apartment	Grand Cayman	1	3	4
Azure Breeze # 5	Apartment	Grand Cayman	1	3	4
Azure Breeze # 6	Apartment	Grand Cayman	1	3	2
Beachcomber	Apartment	Grand Cayman	22	62	80
Beachcomber 5, 29	Apartment	Grand Cayman	22	62	80
Blue 92	Apartment	Grand Cayman	1	1	1
Bonnie's Arch # 101	Apartment	Grand Cayman	1	3	6
Britannia Villas (PP)	Apartment	Grand Cayman	5	15	21
Caribbean Paradise (9)	Apartment	Grand Cayman	1	3	5
Casa Caribe	Apartment	Grand Cayman	17	50	75
Cayman Club, The # 2,15,19,22	Apartment	Grand Cayman	3	11	13
Cayman Reef Resort #3	Apartment	Grand Cayman	1	1	1
Cayman Reef Resort [Cayman Villas]	Apartment	Grand Cayman	3	5	9
Christopher Columbus	Apartment	Grand Cayman	30	78	120
Coconut Bay [102,117]	Apartment	Grand Cayman	2	6	8
Coconut Bay [123]	Apartment	Grand Cayman	1	3	3
Coconut Bay Getaway [114]	Apartment	Grand Cayman	1	2	4
Cocoplum	Apartment	Grand Cayman	5	10	15
Colonial Club, The	Apartment	Grand Cayman	3	8	9
Compass Point	Apartment	Grand Cayman	17	25	29
Coral Bay Village-Bldg 1 / Apt #1	Apartment	Grand Cayman	1	2	3
Coral Stone Club [Strata]	Apartment	Grand Cayman	32	96	124
Crescent Point Resort (Strata)	Apartment	Grand Cayman	7	21	28
Cresent Point # 12,15	Apartment	Grand Cayman	2	6	8
Discovery Point Club	Apartment	Grand Cayman	35	70	140

Discovery Point Club #15, #37	Apartment	Grand Cayman	2	4	8
Gardens of the Kai [1-4, 8,9,10, 11,]	Apartment	Grand Cayman	9	20	31
George Town Villas # 202	Apartment	Grand Cayman	1	2	4
George Town Villas # 203	Apartment	Grand Cayman	1	2	3
George Town Villas #109 & 315	Apartment	Grand Cayman	2	4	6
George Town Villas #117	Apartment	Grand Cayman	1	2	3
George Town Villas #218	Apartment	Grand Cayman	1	2	5
George Town Villas (107,115)	Apartment	Grand cayman	2	4	8
George Town Villas (113,318)	Apartment	Grand Cayman	2	4	8
George Town Villas (316)	Apartment	Grand Cayman	1	2	4
Geroge Town Villas #303	Apartment	Grand Cayman	1	2	3
Grand View Condos	Apartment	Grand Cayman	17	35	64
Grand View Condos 231,632 [PP]	Apartment	Grand Cayman	2	5	9
Grandview 1212	Apartment	Grand Cayman	1	2	4
Harbour Heights	Apartment	Grand Cayman	28	58	84
Heritage Club, The	Apartment	Grand Cayman	10	20	48
Heritage Club, The 2,10,15	Apartment	Grand Cayman	14	28	68
Island House # 17 (Kai Kotch)	Apartment	Grand Cayman	1	2	3
Island House # 19	Apartment	Grand Cayman	1	2	3
Island House [12, 21]	Apartment	Grand Cayman	3	6	6
Island House 14	Apartment	Grand Cayman	1	2	3
Islands Club	Apartment	Grand Cayman	16	37	54
Kaibo Yacht Club (Phase I) A1, C11, C12, D15,	Apartment	Grand Cayman	4	8	13
Kaibo Yacht Club A1, A2, A3, A9, B14 (Phase II)	Apartment	Grand Cayman	5	10	18
Kaibo Yacht Club A10 (Phase II)	Apartment	Grand Cayman	1	2	4
Kaibo Yacht Club A4 Phase 2	Apartment	Grand Cayman	1	2	2
Kaibo Yacht Club B17 (Phase II)	Apartment	Grand Cayman	1	2	2
Kaibo Yacht Club B18, B20, C26, C29 (Phase II)	Apartment	Grand Cayman	4	8	15
Kaibo Yacht Club B8 (Phase I)	Apartment	Grand Cayman	1	2	3
Kaibo Yacht Club C 22 (Phase 2)	Apartment	Grand Cayman	1	2	2
Kaibo Yacht Club C 23 (Phase 2)	Apartment	Grand Cayman	1	2	3

Kaibo Yacht Club D14 Phase 1	Apartment	Grand Cayman	1	2	3
Kaibo Yacht Club E18 - Phase 1 (Kaibo - Kai)	Apartment	Grand Cayman	1	2	2
Kaibo Yacht Club-A7, B16 (Phase II)	Apartment	Grand Cayman	2	4	5
Lacovia Condominiums	Apartment	Grand Cayman	33	71	104
London House	Apartment	Grand Cayman	20	37	52
Mahogany Point #4	Apartment	Grand Cayman	1	3	3
Mahogany Point (3)	Apartment	Grand Cayman	1	3	5
Meridian, The	Apartment	Grand Cayman	22	64	82
Nautilus Apartments	Apartment	Grand Cayman	3	6	9
North Point # 202	Apartment	Grand Cayman	1	2	3
North Point Condos [100-104, 200,201,203]	Apartment	Grand Cayman	10	20	20
North Pointe Condos #204 'Oceans Edge'	Apartment	Grand Cayman	1	2	4
Northern Lights (3)	Apartment	Grand Cayman	1	2	3
On the Bay # 104,311	Apartment	Grand Cayman	2	5	7
On the Bay # 205	Apartment	Grand Cayman	1	3	3
Palacade # 2	Apartment	Grand Cayman	1	4	7
Plantana Condos	Apartment	Grand Cayman	36	66	117
Plantation Village Beach Resort	Apartment	Grand Cayman	56	112	168
Pools # 10, 12	Apartment	Grand Cayman	2	3	6
Pools [2]	Apartment	Grand Cayman	1	2	3
Pools of the Kai #1	Apartment	Grand Cayman	1	1	2
Pools of the Kai [5,6,7,9,11]	Apartment	Grand Cayman	5	8	11
Reef Resort, The (+ Castaways Cove)	Apartment	Grand Cayman	152	166	332
Regal Beach # 523	Apartment	Grand Cayman	1	2	3
Regal Beach Club [Strata]	Apartment	Grand Cayman	21	44	67
Regal Beach Resort [111, 431, 513,523,631]	Apartment	Grand Cayman	4	9	17
Rum Cove # 2 & Rum Haven # 1	Apartment	Grand Cayman	3	3	4
Seacliff - Orange	Apartment	Grand Cayman	1	3	4
Sealodge #16 & #18	Apartment	Grand Cayman	1	2	3
Sealodge #17 (Kozy Kai)	Apartment	Grand Cayman	1	1	1
Seven Mile Beach Resort & Club	Apartment	Grand Cayman	35	70	105
Silver Sands Condominiums	Apartment	Grand Cayman	15	33	51
Sundowner [3,11]	Apartment	Grand Cayman	2	5	7
Tamarind Bay Condominiums	Apartment	Grand Cayman	8	18	35
The Renaissance	Apartment	Grand Cayman	6	19	25

The Terraces at Camana Bay	Apartment	Grand Cayman	2	4	4		
Treasure Island #217	Apartment	Grand Cayman	1	2	3		
Treasure Island Condos [104]	Apartment	Grand Cayman	1	3	4		
Turtle Nest Condos	Apartment	Grand Cayman	9	18	26		
Villas of the Galleon [32, 33]	Apartment	Grand Cayman	2	4	5		
Villas of the Galleon [Strata]	Apartment	Grand Cayman	55	99	168		
Villas Papppagallo [7,]	Apartment	Grand Cayman	1	1	3		
Villas Papppagallo [Strata]	Apartment	Grand Cayman	9	18	19		
White Sands # 16	Apartment	Grand Cayman	1	2	3		
White Sands [3,9,11]	Apartment	Grand Cayman	3	3	6		
Dicovery Point # 36	Apartment	Grand Cayman	3	3	6		
Lacovia # 8 & 40	Apartment	Grand Cayman	3	3	6		
Cotton Tree	Apartment	Grand Cayman	5	9	11	**GCM Apt Total**	**2042**
Moon Glow	Guest House	Grand Cayman	1	2	2		
Barefoot Kai	Guest House	Grand Cayman	1	3	5		
Beachplum	Guest House	Grand Cayman	1	4	4		
Blue Lagoon	Guest House	Grand Cayman	1	4	5		
Calypso Blue	Guest House	Grand Cayman	1	4	6		
Castaway Cove Guest House	Guest House	Grand Cayman	1	4	5		
Cayman Castle	Guest House	Grand Cayman	1	6	8		
Cayman Chillin	Guest House	Grand Cayman	1	3	4		
Cayman Dream	Guest House	Grand Cayman	1	2	4		
Cayman Sands	Guest House	Grand Cayman	1	6	10		
Caymanease	Guest House	Grand Cayman	1	3	5		
Coco Kai	Guest House	Grand Cayman	1	5	6		
Coconut Beach	Guest House	Grand Cayman	1	4	6		
Conquered Fame	Guest House	Grand Cayman	1	4	6		
Cool Change	Guest House	Grand Cayman	1	2	3		
Coral Kai	Guest House	Grand Cayman	1	5	5		
Coral Reef	Guest House	Grand Cayman	1	5	9		
Desert Rose Cottage	Guest House	Grand Cayman	1	2	3		
Ecstasea	Guest House	Grand Cayman	1	5	7		
Fantasea	Guest House	Grand Cayman	1	2	3		
Far Tortuga	Guest House	Grand Cayman	1	5	7		
Fishbones	Guest House	Grand Cayman	1	3	3		
Great Escape	Guest House	Grand Cayman	1	4	7		
Gypsy	Guest House	Grand Cayman	1	4	6		
Halcyon Days	Guest house	Grand Cayman	1	2	4		
Harbour View	Guest House	Grand Cayman	12	12	18		
Hilltime	Guest House	Grand Cayman	1	4	4		
Innesfree	Guest House	Grand Cayman	1	3	4		
Jeff's Private Guesthomes	Guest House	Grand Cayman	2	4	5		

Jewel of The Kai	Guest House	Grand Cayman	1	3	3		
Kai Boose	Guest House	Grand Cayman	1	2	3		
Kai 'Conut	Guest House	Grand Cayman	1	5	6		
Kai Ku Apartment/ Guest House	Guest House	Grand Cayman	1	7	11		
Kai Rumba	Guest House	Grand Cayman	1	3	3		
Kai Vista	Guest House	Grand Cayman	1	4	4		
Kailypso	Guest House	Grand Cayman	1	3	**5**		
Kai-Yak Cove	Guest House	Grand Cayman	1	2	3		
Kirk Kove	Guest House	Grand Cayman	1	2	4		
Mahogany Cove (Cayman Villas)	Guest House	Grand Cayman	1	4	9		
No Snow	Guest House	Grand Cayman	1	6	6		
Och Kai	Guest House	Grand Cayman	1	4	9		
Parrot -ise	Guest House	Grand Cayman	1	4	4		
Pease Bay House	Guest House	Grand Cayman	1	5	7		
Pelican Point	Guest House	Grand Cayman	1	4	6		
Pieces of Eight	Guest House	Grand Cayman	1	6	7		
Reef Romance	Guest House	Grand Cayman	1	5	5		
Sand Castle	Guest House	Grand Cayman	1	5	5		
Scuba Shack	Guest House	Grand Cayman	1	3	5		
Sea Cove	Guest House	Grand Cayman	1	2	3		
Seven Treasures	Guest House	Grand Cayman	1	5	7		
Shangri La Bed and Breakfast	Guest House	Grand Cayman	1	8	10		
Spanish Bay Getaway	Guest House	Grand Cayman	1	4	5		
Tara Sand	Guest House	Grand Cayman	1	4	5		
Thatch Hill	Guest House	Grand Cayman	1	2	5		
The Retreat at Lookout Farms	Guest House	Grand Cayman	1	8	9		
Treasure Cove	Guest House	Grand Cayman	1	4	4		
Turtle Nest Inn	Guest House	Grand Cayman	8	8	15		
Two Rainbows	Guest House	Grand Cayman	1	5	7		
Villa Bellagio	Guest House	Grand Cayman	1	5	9		
Villa Emmanuel	Guest House	Grand Cayman	1	5	7		
We'll Sea	Guest House	Grand Cayman	1	2	2		
Windsong	Guest House	Grand Cayman	1	4	6		
Windward Cove	Guest House	Grand Cayman	1	4	5		
Heritage House	Guesthouse	Grand Cayman	1	4	4		
Sea Spray Cottage	Guesthouse	Grand Cayman	1	1	1	**GCM GH Total**	**268**
Caribbean Club	Hotel	Grand Cayman	25	76	130		
Grand Cayman Marriott Beach Resort	Hotel	Grand Cayman	295	295	377		
Ramada Grand Caymanian Resort	Hotel	Grand Cayman	89	95	142		
Cobalt Coast Resort	Hotel	Grand Cayman	21	21	47		
Comfort Suites and Resort	Hotel	Grand Cayman	112	126	266		

Grand Cayman Beach Suites	Hotel	Grand Cayman	53	62	116		
Morritts Grand Resort	Hotel	Grand Cayman	40	64	128		
Morritt's Tortuga Club & Resort	Hotel	Grand Cayman	146	191	331		
Ritz-Carlton, Grand Cayman	Hotel	Grand Cayman	365	365	732		
Sunshine Suites	Hotel	Grand Cayman	126	126	201		
Westin Casuarina Resort	Hotel	Grand Cayman	343	345	440	**GCM Hotel Total**	**1766**
Cayman Brac						**GCM Total**	**4076**
Carib Sands Beach Resort	Apartment	Cayman Brac	15	27	29		
Carib Sands [124]	Apartment	Cayman Brac	1	1	2		
Cayman Breakers	Apartment	Cayman Brac	9	18	18		
Ocean Wave Apartments	Apartment	Cayman Brac	1	2	2		
Southern Palms	Apartment	Cayman Brac	2	2	2	**CYB Hotel Total**	**50**
Brac Paradise Cottage	Guest House	Cayman Brac	1	3	4		
Captain's Cove	Guest House	Cayman Brac	1	2	2		
Featherstone	Guest House	Cayman Brac	1	1	2		
Garden Estate, The	Guest House	Cayman Brac	1	4	5		
Island Time	Guest House	Cayman Brac	1	3	5		
Johanson Cottage	Guest House	Cayman Brac	1	3	4		
Lankford House	Guest House	Cayman Brac	1	2	3		
Paradise Found	Guest House	Cayman Brac	1	2	3		
Parrot's Cove	Guest House	Cayman Brac	1	1	2		
Sea Feather	Guest House	Cayman Brac	1	2	3		
Secluded Sunsets	Guest House	Cayman Brac	1	1	2		
Sonscape	Guest House	Cayman Brac	1	1	1		
Southern Reach	Guest House	Cayman Brac	1	2	4		
Three Palms	Guest House	Cayman Brac	1	4	6		
Villa Marbella	Guest House	Cayman Brac	1	5	12		
Walton's Mango Manor	Guest House	Cayman Brac	6	7	11		
Cayman Cottage	Guesthouse	Cayman Brac	1	1	2		
Paso de los Caracoles	Guesthouse	Cayman Brac	1	4	5	**CYB Hotel Total**	**48**
Alexander Hotel,The	Hotel	Cayman Brac	31	33	41		
Brac Reef Beach Resort	Hotel	Cayman Brac	41	41	72		
La Esperanza	Hotel	Cayman Brac	5	11	12	**CYB Hotel Total**	**85**
Little Cayman						**CYB Total**	**183**
Club, The	Apartment	Little Cayman	5	15	23		
Conch Club Condominiums	Apartment	Little Cayman	12	26	46		
Sir Turtle Beach Villas	Apartment	Little Cayman	1	4	9	**LYC Apt. Total**	**45**
Blossom Village Cottage (Little Cayman)	Guest House	Little Cayman	1	3	5		
Casa Cassiopeia	Guest House	Little Cayman	1	5	9		
Head O'Bay	Guest House	Little Cayman	1	2	2		
Mam's Palace	Guest House	Little Cayman	1	2	2		
My Way Resort Cottages	Guesthouse	Little Cayman	1	1	2		
Little Cayman Cottage	Guest House	Little Cayman	1	2	4	**LYC GH Total**	**15**

Little Cayman Beach Resort	Hotel	Little Cayman	40	40	80		
Paradise Villas	Hotel	Little Cayman	12	12	14		
Pirates Point Resort	Hotel	Little Cayman	11	11	30		
Southern Cross Club	Hotel	Little Cayman	12	13	13	**LYC Hotel Total**	**76**
						LYC Total	**136**