

## TC Document

### I. Basic Information for TC

▪ Country/Region:	BARBADOS
▪ TC Name:	Improving: Institutional Frameworks for Integrated Coastal Zone Management, National Risk Information Planning Systems and Sustainable Climate-Resilient Coastal Infrastructure
▪ TC Number:	BA-T1068
▪ Team Leader/Members:	Chakalall, Yuri (CSD/RND) Team Leader; Hori, Tsuneki (CSD/RND) Alternate Team Leader; Alleng, Gerard P. (CSD/CCS); Almeida Oleas, Natalia (LEG/SGO); Banerjee, Onil (CSD/RND); Cluverius, Letizia (CSD/RND); Franklin, Rochelle (CCB/CBA); Giles Alvarez, Laura (CCB/CBA); Padilla, Maria Camila (VPC/FMP); Rajack, Robin Michael (CSD/HUD); Restrepo, Lisa Sofia (CSD/RND); Rodriguez Pineda, Mario Vinicio (VPC/FMP)
▪ Taxonomy:	Client Support
▪ Operation Supported by the TC:	.
▪ Date of TC Abstract authorization:	20 May 2020
▪ Beneficiary:	Coastal Zone Management Unit (CZMU) within Ministry of Maritime Affairs & Blue Economy (MMABE); Department of Emergency Management (DEM); Ministry of Finance & Economic Affairs
▪ Executing Agency and contact name:	Coastal Conservation Project Unit
▪ Donors providing funding:	Japan Special Fund(JSF)
▪ IDB Funding Requested:	US\$500,000.00
▪ Local counterpart funding, if any:	US\$60,000.00 (In-Kind)
▪ Disbursement period (which includes Execution period):	24 months
▪ Required start date:	October 2020
▪ Types of consultants:	Individuals and firms
▪ Prepared by Unit:	CSD/RND-Env, Rural Dev & Disaster Risk
▪ Unit of Disbursement Responsibility:	CCB/CBA-Country Office Barbados
▪ TC included in Country Strategy (y/n):	No
▪ TC included in CPD (y/n):	Yes
▪ Alignment to the Update to the Institutional Strategy 2010-2020:	Institutional capacity and rule of law; Environmental sustainability

### II. Objectives and justification of the TC

- 2.1 The objective of this TC is to provide support to the Government of Barbados (GoBA) for the completion of technical studies to develop the design of an Advanced, Integrated Coastal Zone Management (ICZM) Institutional, Coastal Risk Assessment, and Sustainable Climate Resilient Coastal Infrastructure Program. This Program would contribute to effective management and sustainable development of Barbados' Blue Economy<sup>1</sup> growth ambition. The Program will enable resilient

<sup>1</sup> Blue Economy is a concept that promotes the "sustainable use of ocean resources for economic growth, improved livelihoods, and jobs while preserving the health of ocean ecosystem." For island states like Barbados, its oceanic territorial space to the limits of their exclusive economic zone, is significantly

transformative national level impact that is aligned with national priorities and the IDB Country Strategy 2019-2023.

- 2.2 The coastal zone of Barbados is the country's main economic asset. In 2018, contribution of travel and tourism to GDP for Barbados was 34.9 %.<sup>2</sup> More than half the population reside within 2km of the coast and more than 95% of the tourism related physical plant is located at or near the coast. Modeling suggests that coastal storm surge induced from a 100-year cyclone predicts that 6,000 residences along the south and west coasts and 70% of west coast hotels would be affected.<sup>3</sup> Average annual probable losses from multiple hazards and storm surge, specifically have been estimated at US\$103.58M for US\$45.2 million respectively.<sup>4</sup> In part as a result of a lingering recession, Barbados has been facing severe macroeconomic challenges and in 2018, signed a US\$290 million four-year International Monetary Fund (IMF) Extended Fund Facility (EFF) program and has been in the process of undergoing a comprehensive reform. The COVID-19 pandemic poses a significant threat to the continued achievement of the structural performance benchmarks under the EFF, particularly if there is an extended downturn in the tourism sector which is a main driver for growth and source of foreign exchange for the country.
- 2.3 The country continues to be faced with traditional challenges related to its limited economic diversification, fiscal fragility and susceptibility to the impacts of climate change including sea level rise, increased temperatures and the prospect of more intense hurricanes and beach erosion. As such, public policy and institutional reform efforts are not only centered on the fiscal, but on public sector efficiency, a strong social safety net and crisis-resilient health system, and as well as interventions that can and will better incentivize, stimulate and more optimally regulate resilient sustainable economic growth, now and in the future. Continued deliberate attention to resilience and disaster risk related policies to safeguard lives, investments and the economy should be required. In 2018, the Government created a Ministry of Maritime Affairs and the Blue Economy (MMABE) on the premise that despite its small land space Barbados' maritime space is over 400 times bigger, covering 183,436km<sup>2</sup> representing an underdeveloped and underexplored opportunity that should be sustainably utilized to advance the economic interest of the country. The importance of risk-based coastal planning, long-term shoreline planning and beach enhancement, including the promotion of hazard-resilient coastal infrastructure in this context was underscored and reinforced in the International Monetary Fund's Extended Fund Facility (IMF-EFF) October 2018 report. Such measures will also support the country's post COVID-19 reopening business strategy and reinforce its destination competitiveness in the mid to longer term.
- 2.4 The proposed TC will help the MMABE to identify and specify the scope, dimension, and scale of modernized/updated institutional public policy, institutional (including requisite technical skills and competencies), legislative, budgetary reforms and

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(400 times) larger than its terrestrial landmass. With UN Economic Commission for Latin America and the Caribbean (UNECLAC) estimates suggesting that oceans contribute between US\$1.5 to 3 trillion each year to global economic activities, this space represents a significant underdeveloped, and/or untapped resources for the country's economic development. The country has signaled its intent to develop a Blue Economy by creating a Ministry of Maritime Affairs and the Blue Economy in May 2018.

<sup>2</sup> World Data Atlas: <https://knoema.com/atlas/Barbados/topics/Tourism/Travel-and-Tourism-Total-Contribution-to-GDP/Contribution-of-travel-and-tourism-to-GDP-percent-of-GDP>

<sup>3</sup> Government of Barbados, Strategic Action Plan Disaster Risk Management and Climate Change Adaptation (2018).

<sup>4</sup> Global Assessment Report on Disaster Risk Reduction (2015).

adjustments that are required to meet contemporary emergent ICZM challenges and those of the future as well as to improve and strengthen the transition to Blue Economy, in a post COVID-19 reopening and recovery context. The Government has already approved budgetary resources in its financial estimates for the continuation of the Project Execution Team (PET) staff resource complement beyond the life of the concluding Coastal Risk Assessment and Management Program Loan (BA-L1014)<sup>5</sup> operation, from February 2020 through to February 2022, signaling its strong commitment to the continuance of the ICZM agenda.

- 2.5 This TC is consistent with the need for greater investment in resilient infrastructure and programs conducive to a climate resilient approach as identified in the IDB Country Strategy 2019-2023 (GN-2953-1) and The TC is aligned with the Bank's Disaster Risk Management Policy (GN-2354-5) in Directive A2, "Identification and Reduction of Project Risk". This TC is also aligned with the Japan Special Fund (JSF) operational guidance Section: 2(a) policy and strategy formulation/implementation activities.<sup>6</sup> Additionally, the TC is consistent with IDB Group's Operational Response Framework to the COVID-19 Pandemic in the context of support strategic supply chains and productive development/investments.
- 2.6 This TC is aligned with the Second Update to the Institutional Strategy (2020-2023) (AB3190-2) and the Corporate Results Framework (2020-2023) (GN-2727-12) in the cross-cutting theme: Climate Change and Environmental Sustainability. Furthermore, the TC is aligned with "Sustainable Infrastructure for Competitiveness and Inclusive Growth Strategy" (GN-2710-5), specifically with the priority area of action "Support the construction and maintenance of socially and environmentally sustainable infrastructure, thus enhancing quality of life". This TC is also consistent with the "IDB Integrated Strategy for Climate Change Adaptation and Mitigation, and Sustainable Renewable Energy" (GN2609-1) and with the "Climate Change Sector Framework Document" (GN-2835-8). One hundred percent of the TC's resources are invested in Climate Change activities, according to the joint methodology of the Multilateral Development Banks for climate finance estimation. These resources contribute to the IDB Group's goal of increasing financing for climate change projects to 30% of all the IDB Groups' operational (includes loans and TCs) approvals by the end of 2020.

### III. Description of activities/components and budget

- 3.1 **Component I. Institutional Capacity Development for Advanced and Improved Integrated Coastal Zone Management** This component will include four subcomponents:
- 3.2 **Subcomponent I.a. Plan & Specification of Institutional Reform for Advanced ICZM.** The focus of this component is the identification, characterization and specification of the scope, constituent activities, type and level of effort related to requisite institutional re-engineering, reform, modernization, capacity development, legal drafting, and legislative amendments required for optimized future ICZM and in the context of the vision for a transition to Blue Economy development. The individual

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<sup>5</sup> The program disbursed the majority of its resources by February 2020 and is in the process of final evaluation through the Project Completion Reporting (PCR) exercise.

<sup>6</sup> Although JSF prioritizes C and D countries, A and B countries are also eligible for funding.

consultant will develop a detailed design institutional reform/legal action and implementation plan with schedule for advanced capacity development.

**3.3 Subcomponent I.b. Pilot Governance and Public-Private Economic Enterprise Models for Marine Management Areas and Beach Management.**

3.4 In a prevailing environment of continued macro-economic constraint, there is significant pressure on the Government's capacity to identify, design, develop and finance public investments and policies that stimulate employment and livelihood creation and generate economic growth leveraging its beach, and coastal marine space inclusive of its protected/marine management areas. Notwithstanding this, there has also been a trend of increasing (but un-resolved) unsolicited development application proposals from the private sector to seek approval for individual enterprises or public-private partnership arrangements that involve these public assets. This subcomponent will develop the design of a governance framework for pilot implementation/adaptive testing and performance monitoring of "model" investment partnerships and/or co-governance enterprise arrangements, in respect of beach and marine area management proposed to Cabinet. Specific COVID-19 public biosafety guidelines for beach and coastal marine resource users and resource managers will also be developed.

**3.5 Subcomponent I.c. National Reef Rehabilitation and Restoration Program.**

Activities under this component will include a formal review of the findings and recommendations of the feasibility assessment for the upscaling of the coral aquaculture facility to support a national coral reef restoration/rehabilitation program. Preferred business-economic-enterprise model options for the selective plant-out, monitoring, and incentivization of a sustainable coral reef restoration value chain will be identified and comparatively appraised for decision-making re: feasibility of implementation. Configuration and treatment of governance and oversight for coastal habitat and coral reef restoration (inclusive of human resourcing) in the context of a modernized/updated reform process for advanced ICZM will also be specified to inform the institutional reform/legal action plan identified at Subcomponent I.a. above.

**3.6 Subcomponent I.d. Ecosystem Services/Natural Capital Valuation.** Activities under this subcomponent will be focused on the implementation of valuation research outputs that will serve to support a value-based paradigm for justifying Government expenditure, budget allocations to, and the value proposition of the work and role of the CZMU in ICZM to public and private sectors. Cost-benefit analysis (construction cost vs avoidance of losses) of coastal infrastructure options will be assessed as part of this effort. Configuration and treatment of ecosystem services/natural capital valuation in the context of a modernized/updated reform process for advanced ICZM (inclusive of human resources) will also be specified to inform the institutional reform/legal action plan identified at Subcomponent I.a. above.

**3.7 Component II. Improved and Strengthened Utilization of Coastal & National Risk Assessment.**

**3.8 Subcomponent II.a. Enhanced National Coastal Risk Information Planning Platform (NCRIPP).** The individual consultant will develop a new investment and maintenance plan for the NCRIPP including resilience building, financial protection and risk transfer, selective continuous updating of underlying cadastral, asset and demographic datasets. The component will also support activities to: (i) refine

NCRIPP hazard models with higher resolution/enhanced analysis; and (ii) practically integrate NCRIPP within the emergency management and financial protection and risk transfer processes within the Government.

**3.9 Subcomponent II.b. Community Based Disaster Risk Management (CBDRM).**

3.10 While the state plays and will continue to play the major role in developing and implementing plans, policies and mitigation measures that reduce hazard impacts, individual communities are essential partners and critical components of the planning, mitigation, preparedness and response phases of the disaster risk management cycle. This subcomponent would seek to conduct an assessment for multi-hazard community-based disaster risk management (CBDRM) and develop related CBDRM plans in two vulnerable communities. These communities will be identified on the basis of criteria including but not limited to poverty levels, and natural hazard exposure (via the NCRIPP). Final community selection will be determined on dialogue between relevant Government agencies such Department of Emergency Management, District Emergency Organizations and local community groups/CBOs and key partners of the National Emergency Management System (NEMS).

3.11 **Component III. Sustainable Climate Resilient Coastal Infrastructure.** The focus of this component is to undertake final reviews, adjustments and any additional technical assessments including cost updates to successfully finalize bid preparation and independent construction supervision packages for the construction of these projects. This work will be complimented by a specific study to quantify the extent of offshore sand reserves and a review of cost efficient, quality and quantity capable sources of armor stone; given that these infrastructure projects are dependent on the supply of these materials for construction.

3.12 The estimated total amount of this TC is US\$560,000, with US\$500,000 to be drawn from the Bank's contribution and local counterpart contribution of US\$60,000, in kind.

**Indicative Budget**

Component	Description	IDB (US\$)	GOBA Counterpart (In Kind)	Total Funding
<b>Component I. Institutional Capacity Development for Advanced and Improved Integrated Coastal Zone Management</b>	<b>Subcomponent I.a. Plan &amp; Specification of Institutional Reform for Advanced ICZM</b> - Studies/Strategic implementation Plan - ICZM Reform Terms of References - Scopes of Work & Cost Estimates - Meetings and Workshops	37,700		
	<b>Subcomponent I.b. Pilot Governance and Economic Enterprise Models for Public-Private/Co-Management Partnerships for Marine Management Areas and Beach Management</b> - Surveys/Studies/Business models/Vision-Strategy/Governance Decision framework/Reform Terms of References/Scopes of Work & Cost Estimates/Meeting & Workshops	48,300	20,000	244,600
	<b>Subcomponent I.c. National Reef Rehabilitation &amp; Restoration Program</b>			

Component	Description	IDB (US\$)	GOBA Counterpart (In Kind)	Total Funding
	<ul style="list-style-type: none"> <li>-Draft national plan and work-program for coral reef restocking/Policy reform Terms of References/Scopes of Work &amp; Cost Estimates/Meetings &amp; Workshops</li> <li>- Review of environmental suitability for implementation of National Reef Rehabilitation and Restoration Program</li> </ul>	25,700		
	<ul style="list-style-type: none"> <li>- Studies/national action plan for ecosystem services and natural capital valuation: Policy/valuation methodologies/Reform Terms of References/Scopes of Work &amp; Cost Estimates/Meetings &amp; Workshops</li> </ul>	29,900		
	<b>Subcomponent I.d. Ecosystem Services/Natural Capital Valuation</b> <ul style="list-style-type: none"> <li>- Pilot project economic valuation of coastal infrastructure projects including business disruption assessment</li> </ul>	42,000		
		41,000		
<b>Component II. Improving Coastal &amp; National Risk Assessment</b>	<b>Subcomponent II.a. Enhanced National Coastal Risk Planning Platform (NCRIPP)</b> <ul style="list-style-type: none"> <li>- Workplan for upgrading and operational integration of the NCRIPP within the risk management framework of the Government of Barbados</li> <li>- Studies/high resolution flood modeling</li> <li>- Critical evaluation of risk determination frameworks in NCRIPP</li> <li>- Enhancement of NCRIPP software to update hazard and risk models and incorporate environmental assets</li> </ul>	18,400		
		22,100		
		14,700		
		59,600	20,000	168,700
	<b>Subcomponent II.b. Community based Disaster Risk Management</b> <ul style="list-style-type: none"> <li>- Studies/technical assessments</li> <li>- Consultations/Meetings &amp; Workshops</li> <li>- Preparation of 2 behaviorally informed community-based DRM plans for two vulnerable communities.</li> </ul>	33,900		
<b>Component III. Sustainable Climate Resilient Coastal Infrastructure</b>	<ul style="list-style-type: none"> <li>- Quantification of offshore sand reserves and procurement recommendations for sourcing sand and stone materials for infrastructure construction</li> <li>- Decision methodology for infrastructure evaluation and preparation of maintenance/operational plan</li> <li>- Environmental and social impact assessment</li> <li>- Independent quantity surveyor assessments of Bills of quantities using civil engineering standard method of measurement (CSEMM4)</li> <li>- Development of bid-ready tender documents for 5 large coastal infrastructure projects</li> </ul>	60,100		
		16,500		
		19,400	20,000	146,700
		14,200		
		16,500		
<b>Total (US\$)</b>		<b>500,000</b>	<b>60,000</b>	<b>560,000</b>

#### **IV. Executing agency and execution structure**

- 4.1 The TC will be executed by the MMABE, Government of Barbados. The Project Execution Team (PET) and a Project Manager identified from the Coastal Zone Management Unit, within MMABE will be responsible for the administration of the procurement of the consulting services. The PET will maintain an appropriate system of internal accounting, administrative controls and accounting staff acceptable to the Bank so as to provide the necessary documentation to permit verification of expenditures for the Project and facilitate the timely preparation of financial statements, budgets, and reports. A financial audit report will be undertaken at project closure. The PET will submit semi-annual (6 month) progress reports including a description of progress made, results achieved, status of implementation of planned activities and any adjustments for the remaining implementation period. It is expected that the CZMU capacity will be further developed through participation and review of the consultancy activities of TC. Procurement will be carried out in accordance with the Policies for the Selection and Contracting of Consultants financed by the IDB (GN2350-15).

#### **V. Major issues**

- 5.1 Inter-institutional coordination, GOBA ownership and commitment to the specification and implementation of public policy modernization and institutional reform actions for advanced ICZM and transition to Blue Economy is a critical aspect for this TC to achieve the objective of its activities. At the same time, this factor may present a potential risk of generating a delay in its execution. This risk will be mitigated with the design of this TC with the experienced Project Execution Team of Coastal Zone Management Unit serving as the executing agency to lead and facilitate coordination. The establishment of a formal intra-governmental inter-institutional coordination mechanism (for the duration of the TC) under the authority of the Ministries of: Finance and Economic Affairs, and MMABE would also provide additional support to mitigate this risk.
- 5.2 The United States (US) dollar exchange rate to be used for project reporting, including disbursement request should be the Telegraphic Transfer Selling Rate to Commercial Banks and will be the exchange rate in force on the date on which the disbursement currency is converted into the local currency of Barbados.

#### **VI. Exceptions to Bank policy**

- 6.1 None.

#### **VII. Environmental and Social Strategy**

- 7.1 It is not anticipated that the activities to be financed under this TC will have negative direct or indirect social or environmental effects. The project team considers that, according to the Bank's Safeguards Screening Toolkit, this operation should be given a "C" classification.

#### **Required Annexes:**

- [Request from the client](#)
- [Results Matrix](#)

- [Terms of Reference](#)
- [Procurement Plan](#)





GOVERNMENT OF BARBADOS  
MINISTRY OF FINANCE, ECONOMIC AFFAIRS AND INVESTMENT  
(ECONOMIC AFFAIRS DIVISION)



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OUR REF: 7096/56/3 Vol VI

DATE: August 7, 2020

Mr. Juan Carlos De La Hoz Viñas  
Representative  
Inter-American Development Bank  
"Hythe", Welches  
Maxwell Main Road  
CHRIST CHURCH

Dear Sir,

**Technical Cooperation**  
**BA-T1068: Improving Institutional Frameworks for**  
**Integrated Coastal Zone Management, National Risk Information Planning Systems**  
**and Sustainable Climate-Resilient Coastal Infrastructure**

Reference is made to the captioned subject.

The Government of Barbados is requesting from the Inter-American Development Bank, Technical Cooperation (TC) in the amount of US\$500,000.00 for the project titled: BA-T1068: Improving Institutional Frameworks for Integrated Coastal Zone Management, National Risk Information Planning Systems and Sustainable Climate-Resilient Coastal Infrastructure.

The purpose of the TC is to provide support to the Ministry of Maritime Affairs and the Blue Economy (MMABE) for the strengthening of climate resilience and the systematic management of disaster recovery through the identification of risk, reduction of vulnerability and ex-ante risk mitigation in furtherance of Barbados' goals for Integrated Coastal Zone Management and the development and growth of the Blue Economy. A copy of the full TC abstract is appended.

To this end, the Government of Barbados is proposing that the TC be executed by the Coastal Zone Management Unit of the MMABE.

You are invited to note that this request was supported by the Cabinet of Barbados at its meeting held on July 9, 2020, following the consideration of Note (20) 643/MMABE 28.

Your kind consideration in the matter is greatly appreciated.

Yours faithfully,

**Alyson G. Forte**  
Permanent Secretary  
Economic Affairs and Investment

c.c.: Permanent Secretary, Ministry of Maritime Affairs and the Blue Economy  
Director, Coastal Zone Management Unit


















## Results Matrix

### Outcomes

Outcome: 1 Institutional capacity development for advanced integrated coastal zone management improved									
Indicators	Flags*	Unit of Measure	Baseline	Baseline Year	Means of verification	2021	2022	EOP	
1.1 Advanced ICM institutional development plan		Plan (#)	0.00	2020	Institutional development plan	P	0.00	1.00	1.00
						P(a)			0.00
						A			
Outcome: 2 Utilization of coastal and national risk assessment strengthened and improved									
Indicators	Flags*	Unit of Measure	Baseline	Baseline Year	Means of verification	2021	2022	EOP	
2.1 National coastal risk information implementation and community based DRM plans		Plan (#)	0.00	2020	Completed NCRIPP and CDRM Plans	P	1.00	2.00	3.00
						P(a)			0.00
						A			
Outcome: 3 Sustainable climate resilient infrastructure construction bid packages finalized									
Indicators	Flags*	Unit of Measure	Baseline	Baseline Year	Means of verification	2021	2022	EOP	
3.1 Bid tender packages completed		Tender packages (#)	0.00	2020	Bid packages	P	2.00	3.00	5.00
						P(a)			0.00
						A			

CRF Indicator

### Outputs: Annual Physical and Financial Progress

1 Institutional Capacity Development for Advanced and Improved Integrated Coastal Zone Management						Physical Progress				Financial Progress				Theme	Fund	Flags
Outputs	Output Description	Unit of Measure	Baseline	Baseline Year	Means of verification	2021	2022	EOP		2021	2022	EOP				
1.1 Institutional development plan designed	Plan & Specification of Institutional Reform for Advanced ICM	Plans (#)	0	2020	Plan	P	0	1	1	P	0	37700	37700	Institutional Development	JSF	
						P(a)			0	P(a)			0			
						A				A						
1.2 Governance models designed/implemented	Pilot Governance and Public-Private Economic Enterprise Models for Marine Management Areas and Beach Management	Models (#)	0	2020	Model framework	P	1	0	1	P	24150	24150	48300	Disaster Prevention	JSF	
						P(a)			0	P(a)			0			
						A				A						
1.3 Strategies designed	National plan and workprogram for coral reef restocking/restoration	Strategies (#)	0	2020	Strategy	P	1	0	1	P	0	25700	25700	Disaster Prevention	JSF	
						P(a)			0	P(a)			0			
						A				A						
1.4 Diagnostics and assessments completed	Environmental suitability for implementation of national reef rehabilitation and restoration	Diagnostics (#)	0	2020	Diagnostic assessment	P	1	0	1	P	29900	0	29900	Disaster Prevention	JSF	
						P(a)			0	P(a)			0			
						A				A						
1.5 Action plans designed	National action plan for ecosystem services/natural capital valuation	Action Plans (#)	0	2020	Plan	P	1	0	1	P	0	42000	42000	Disaster Prevention	JSF	
						P(a)			0	P(a)			0			
						A				A						
1.6 Methodologies designed/strengthened	Economic valuation of coastal infrastructure inclusive of business disruption	Methodologies (#)	0	2020	Methodology	P	1	0	1	P	41000	0	41000	Disaster Prevention	JSF	
						P(a)			0	P(a)			0			
						A				A						
2 Improved and Strengthened Utilization of Coastal & National Risk Assessment						Physical Progress				Financial Progress				Theme	Fund	Flags
Outputs	Output Description	Unit of Measure	Baseline	Baseline Year	Means of verification	2021	2022	EOP		2021	2022	EOP				
2.1 Implementation and Management Plan developed	Workplan for upgrading and operational integration of national coastal risk information planning platform within GoBA	Plans (#)	0	2020	Plan	P	0	1	1	P	0	18400	18400	Disaster Prevention	JSF	
						P(a)			0	P(a)			0			
						A				A						
2.2 Technical models built	High resolution flood modeling for enhancement of national coastal risk information planning platform (NCRIPP)	Models (#)	0	2020	model	P	0	1	1	P	0	22100	22100	Sustainable Infrastructure	JSF	
						P(a)			0	P(a)			0			
						A				A						
2.3 Methodologies designed/strengthened	Critical evaluation of risk determination frameworks in the national coastal risk information planning platform	Methodologies (#)	0	2020	Methodology	P	1	0	1	P	14700	0	14700	Disaster Prevention	JSF	
						P(a)			0	P(a)			0			
						A				A						
2.4 Technical models designed	Enhancement of NCRIPP software to update hazard and risk models and incorporate environmental assets	Models (#)	0	2020	Technical model	P	0	1	1	P	29800	29800	59600	Biodiversity and Ecosystem Conservation	JSF	
						P(a)			0	P(a)			0			
						A				A						
2.5 Action plans designed	Behaviorally informed community based disaster risk management plans for vulnerable communities	Action Plans (#)	0	2020	Action Plan	P	1	1	2	P	16950	16950	33900	Disaster Prevention	JSF	
						P(a)			0	P(a)			0			
						A				A						
3 Sustainable Climate Resilient Coastal Infrastructure						Physical Progress				Financial Progress				Theme	Fund	Flags
Outputs	Output Description	Unit of Measure	Baseline	Baseline Year	Means of verification	2021	2022	EOP		2021	2022	EOP				
3.1 Feasibility study completed	Quantification of offshore sand reserves and procurement recommendations for sourcing sand and stone for coastal	Studies (#)	0	2020	Study	P	0	1	1	P	30050	30050	60100	Disaster Prevention	JSF	
						P(a)			0	P(a)			0			
						A				A						
3.2 Environmental impact assessment completed	Environmental and social impact assessment	Assessments (#)	0	2020	Assessment	P	1	0	1	P	19400	0	19400	Biodiversity and Ecosystem Conservation	JSF	
						P(a)			0	P(a)			0			
						A				A						
3.3 Surveys conducted	Independent quantity survey of bill of quantities of boardwalk design in civil engineering standard method of measurement format	Surveys (#)	0	2020	Survey	P	1	0	1	P	14200	0	14200	Disaster Prevention	JSF	
						P(a)			0	P(a)			0			
						A				A						
3.4 Bid tender packages completed	Tender packages (#)		0	2020	Bid package	P	2	3	5	P	0	16500	16500	Sustainable Infrastructure	JSF	
						P(a)			0	P(a)			0			
						A				A						
3.5 Methodologies designed/strengthened	Decision methodology to evaluation final engineering designs and preparation of infrastructure maintenance and operational plan	Methodologies (#)		2020	Methodology	P	1	0	1	P	16500	0	16500	Disaster Prevention	JSF	
						P(a)			0	P(a)			0			
						A				A						

### Other Cost

### Total Cost

CRF Indicator

Standard Output Indicator

	2021	2022	Total Cost
P	\$236,650.00	\$263,350.00	\$500,000.00
P(a)			
A			

## **BARBADOS**

### **COASTAL ZONE MANAGEMENT UNIT, MINISTRY OF MARITIME AFFAIRS AND THE BLUE ECONOMY**

**Improving Institutional Frameworks for Integrated Coastal Zone Management, National Risk Information Planning Systems and Sustainable Climate-Resilient Coastal Infrastructure (BA-T1068) Implementation plan for a procurement ready institutional capacity development program for Advanced Integrated Coastal Zone Management.**

#### **TERMS OF REFERENCE**

##### **1. Background**

1. The coastal zone of Barbados is the country's main economic asset. In 2018, contribution of travel and tourism to GDP for Barbados was 34.9 %<sup>1</sup>. More than half the population reside within 2km of the coast and more than 95% of the tourism related physical plant is located at or near the coast. Modeling suggests that coastal storm surge induced from a 100-year cyclone predicts that 6,000 residences along the south and west coasts and 70% of west coast hotels would be affected<sup>2</sup>. Average annual probable losses from multiple hazards and storm surge, specifically have been estimated at US\$103.58M for US\$45.2 million respectively<sup>3</sup>. In part as a result of a lingering recession, Barbados has been facing severe macroeconomic challenges and in 2018, Barbados signed a US\$290 million four-year International Monetary Fund (IMF) Extended Fund Facility (EFF) program and has been in the process of undergoing a comprehensive reform. The COVID-19 pandemic poses a significant threat to the continued achievement of the structural performance benchmarks under the EFF, particularly if there is an extended downturn in the tourism sector which is a main driver for growth and source of foreign exchange for the country.
2. The country continues to be faced with traditional challenges related to its limited economic diversification, fiscal fragility and susceptibility to the impacts of climate change including sea level rise, increased temperatures and the prospect of more intense hurricanes. As such, public policy and institutional reform efforts are not only centered on the fiscal, but on public sector efficiency, a strong social safety net and crisis-resilient health system, and as well as interventions that can and will better incentivize, stimulate and more optimally regulate resilient sustainable economic growth, now and in the future. Continued deliberate attention to resilience and disaster risk related policies to safeguard lives, investments and the economy is required. In 2018, the Government created a Ministry of Maritime Affairs and the Blue Economy (MMABE) on the premise that despite its small land space Barbados' maritime space is over 400 times bigger, covering 183,436km<sup>2</sup> representing an underdeveloped and underexplored opportunity that should be sustainably utilized to advance the economic interest of the country. The importance of risk-based coastal planning, long-term shoreline planning and beach enhancement, including the promotion of hazard-resilient coastal

infrastructure in this context was underscored and reinforced in the International Monetary Fund's Extended Fund Facility (IMF-EFF) October 2018 report. Such measures will also support the country's post COVID19 reopening business strategy and reinforce its destination competitiveness in the mid to longer term.

3. The proposed TC will help the MMABE to identify and specify the scope, dimension, and scale of modernized/updated institutional public policy, institutional (including requisite technical skills and competencies), legislative, budgetary reforms and adjustments that are required to meet contemporary emergent ICZM challenges and those of the future as well as to improve and strengthen the transition to Blue Economy, in a post COVID19 reopening and recovery context. The Government has already approved budgetary resources in its financial estimates for the continuation of the Project Execution Team (PET) staff resource complement beyond the life of the concluding Coastal Risk Assessment and Management Program Loan (BA-L1014) operation, from February 2020 through to February 2022, signaling its strong commitment to the continuance of the ICZM agenda.
4. This TC will support the Government to develop a program design that will build resilience, systematically manage disaster risk through risk identification, vulnerability reduction, and ex-ante risk mitigation in national ICZM and in the context of the country's ambition and trajectory for Blue Economy development and growth. The TC is aligned with the Bank's Disaster Risk Management Policy (GN-2354-5) in Directive A2, "Identification and Reduction of Project Risk". The TC is also aligned with one of the objectives of SUS: Strengthen capacities to manage disaster risk and respond to emergencies stemming from disasters (GN-2819-1). Additionally, the TC is consistent with IDB Group's Operational Response Framework to the COVID19 Pandemic in the context of support strategic supply chains and productive development/investments.
5. Notably, all prefeasibility or feasibility studies of specific investment projects including environmental and social studies should be consistent with the Environmental and Social Policy Framework (GN-2965-21).

## 2. **Objective**

1. The specific objective of this consultancy is to prepare a detailed implementation plan for a procurement ready institutional capacity development program for Advanced Integrated Coastal Zone Management.

## 3. **Scope of Services and Required Tasks**

Under the direction of the Project Manager, the consultant will:

- i. Prepare and submit an Inception Report outlining the proposed methodology, work plan and schedule for completing the tasks described below **within one month of the commencement of this assignment.**
- ii. Review the outputs of the other components under this TC, namely:
  - a. Subcomponent 1b: Pilot Governance and Public-Private Economic Enterprise Models for Marine Management Areas and Beach Management.
  - b. Subcomponent 1c: Ecosystem Based Adaptation
  - c. Subcomponent 1d: Ecosystem Services/Natural Capital Valuation
  - d. Subcomponent 2a: Enhanced National Coastal Risk Information Planning Platform
  - e. Component 3: Sustainable Climate Resilient Coastal Infrastructure.
- iii. Prepare a Draft Implementation Plan with detailed designs for institutional reform/ legal requirements and schedule for advanced capacity development, **within 3 months of the commencement of this consultancy.** The Plan shall contain include but not limited to the following:
  - a. Procurement packages- terms of reference, cost estimates for all activities, recommendations for the type of procurements;
  - b. A detailed project schedule management plan inclusive of activity durations, predecessor relationships and the critical path;
  - c. Risk Management Plan;
  - d. Stakeholder participation;
  - e. Monitoring and evaluation;
  - f. Recommendations for personnel requirements to execute the Plan.
- iv. The consultant shall present the Draft Implementation Plan at a consultation session with personnel from the Ministry of Maritime Affairs and the Blue Economy, Public Investment Unit and other stakeholders recommended by the Coastal Zone Management Unit and the Project Execution Team. The consultation session shall be undertaken **within four months of the commencement of this assignment.**
- v. The consultant shall collate the comments from the consultation session and submit a report of the consultation to the CZMU and PET, **within five months of the commencement of this assignment.**
- vi. Submit the Final Implementation Plan which incorporates the comments from the consultation session **within seven months of the commencement of this assignment.**

#### **4. Characteristics of the Assignment and Required**

**4.1.Type of Consultancy:** Individual Consultant

**4.2.Starting Date and Duration:** Approximately six months.

4.3.**Place of Work:** Barbados and the consultant's place of residence.

4.4.**Qualifications and Experience:**

- i) A masters degree from a recognized university in the fields of natural resource management.....
- ii) A minimum of ten years' experience in the design of development projects/programmes in the Caribbean; and
- iii) Excellent command of the English Language.

**5. Client's Input**

5.1.The CRMP will provide the consultant with all relevant documentation required to facilitate the execution of the consultancy.

**6. Payment Schedule**

6.1 Payment will be made on the submission and approval of the deliverables as described below:

- Inception Report – 10%
- Draft Implementation Plan- 45%
- Consultation Session- 5%
- Consultation Report- 10%
- Final Implementation Plan – 30%

**8.Coordination**

8.1.The consultant will report directly to the Project Manager who will supervise the consultancy. Staff from the Project Execution Team (PET) will provide technical, administrative and coordination support to the consultancy. The consultant will maintain regular contact with the PET and provide the PET with informal updates on the progress of the work and to discuss any issues that may need to be resolved or opportunities which may arise, in order to facilitate the successful implementation of the activit

## **BARBADOS**

### **COASTAL ZONE MANAGEMENT UNIT, MINISTRY OF MARITIME AFFAIRS AND THE BLUE ECONOMY**

**Improving Institutional Frameworks for Integrated Coastal Zone Management, National Risk Information Planning Systems and Sustainable Climate-Resilient Coastal Infrastructure (BA-T1068) Implementation plan for a procurement ready institutional capacity development program for Advanced Integrated Coastal Zone Management.**

#### **TERMS OF REFERENCE**

##### **1. Background**

1. The coastal zone of Barbados is the country's main economic asset. In 2018, contribution of travel and tourism to GDP for Barbados was 34.9 %<sup>1</sup>. More than half the population reside within 2km of the coast and more than 95% of the tourism related physical plant is located at or near the coast. Modeling suggests that coastal storm surge induced from a 100-year cyclone predicts that 6,000 residences along the south and west coasts and 70% of west coast hotels would be affected<sup>2</sup>. Average annual probable losses from multiple hazards and storm surge, specifically have been estimated at US\$103.58M for US\$45.2 million respectively<sup>3</sup>. In part as a result of a lingering recession, Barbados has been facing severe macroeconomic challenges and in 2018, Barbados signed a US\$290 million four-year International Monetary Fund (IMF) Extended Fund Facility (EFF) program and has been in the process of undergoing a comprehensive reform. The COVID-19 pandemic poses a significant threat to the continued achievement of the structural performance benchmarks under the EFF, particularly if there is an extended downturn in the tourism sector which is a main driver for growth and source of foreign exchange for the country.
2. The country continues to be faced with traditional challenges related to its limited economic diversification, fiscal fragility and susceptibility to the impacts of climate change including sea level rise, increased temperatures and the prospect of more intense hurricanes. As such, public policy and institutional reform efforts are not only centered on the fiscal, but on public sector efficiency, a strong social safety net and crisis-resilient health system, and as well as interventions that can and will better incentivize, stimulate and more optimally regulate resilient sustainable economic growth, now and in the future. Continued deliberate attention to resilience and disaster risk related policies to safeguard lives, investments and the economy is required. In 2018, the Government created a Ministry of Maritime Affairs and the Blue Economy (MMABE) on the premise that despite its small land space Barbados' maritime space is over 400 times bigger, covering 183,436km<sup>2</sup> representing an underdeveloped and underexplored opportunity that should be sustainably utilized to advance the economic interest of the country. The importance of risk-based coastal planning, long-term shoreline planning and beach enhancement, including the promotion of hazard-resilient coastal

infrastructure in this context was underscored and reinforced in the International Monetary Fund's Extended Fund Facility (IMF-EFF) October 2018 report. Such measures will also support the country's post COVID19 reopening business strategy and reinforce its destination competitiveness in the mid to longer term.

3. The proposed TC will help the MMABE to identify and specify the scope, dimension, and scale of modernized/updated institutional public policy, institutional (including requisite technical skills and competencies), legislative, budgetary reforms and adjustments that are required to meet contemporary emergent ICZM challenges and those of the future as well as to improve and strengthen the transition to Blue Economy, in a post COVID19 reopening and recovery context. The Government has already approved budgetary resources in its financial estimates for the continuation of the Project Execution Team (PET) staff resource complement beyond the life of the concluding Coastal Risk Assessment and Management Program Loan (BA-L1014) operation, from February 2020 through to February 2022, signaling its strong commitment to the continuance of the ICZM agenda.
4. This TC will support the Government to develop a program design that will build resilience, systematically manage disaster risk through risk identification, vulnerability reduction, and ex-ante risk mitigation in national ICZM and in the context of the country's ambition and trajectory for Blue Economy development and growth. The TC is aligned with the Bank's Disaster Risk Management Policy (GN-2354-5) in Directive A2, "Identification and Reduction of Project Risk". The TC is also aligned with one of the objectives of SUS: Strengthen capacities to manage disaster risk and respond to emergencies stemming from disasters (GN-2819-1). Additionally, the TC is consistent with IDB Group's Operational Response Framework to the COVID19 Pandemic in the context of support strategic supply chains and productive development/investments.
5. Notably, all prefeasibility or feasibility studies of specific investment projects including environmental and social studies should be consistent with the Environmental and Social Policy Framework (GN-2965-21).

## 2. **Objective**

1. The specific objective of this consultancy is to prepare a detailed implementation plan for a procurement ready institutional capacity development program for Advanced Integrated Coastal Zone Management.

## 3. **Scope of Services and Required Tasks**

Under the direction of the Project Manager, the consultant will:



- i. Prepare and submit an Inception Report outlining the proposed methodology, work plan and schedule for completing the tasks described below **within one month of the commencement of this assignment.**
- ii. Review the outputs of the other components under this TC, namely:
  - a. Subcomponent 1b: Pilot Governance and Public-Private Economic Enterprise Models for Marine Management Areas and Beach Management.
  - b. Subcomponent 1c: Ecosystem Based Adaptation
  - c. Subcomponent 1d: Ecosystem Services/Natural Capital Valuation
  - d. Subcomponent 2a: Enhanced National Coastal Risk Information Planning Platform
  - e. Component 3: Sustainable Climate Resilient Coastal Infrastructure.
- iii. Prepare a Draft Implementation Plan with detailed designs for institutional reform/ legal requirements and schedule for advanced capacity development, **within 3 months of the commencement of this consultancy.** The Plan shall contain include but not limited to the following:
  - a. Procurement packages- terms of reference, cost estimates for all activities, recommendations for the type of procurements;
  - b. A detailed project schedule management plan inclusive of activity durations, predecessor relationships and the critical path;
  - c. Risk Management Plan;
  - d. Stakeholder participation;
  - e. Monitoring and evaluation;
  - f. Recommendations for personnel requirements to execute the Plan.
- iv. The consultant shall present the Draft Implementation Plan at a consultation session with personnel from the Ministry of Maritime Affairs and the Blue Economy, Public Investment Unit and other stakeholders recommended by the Coastal Zone Management Unit and the Project Execution Team. The consultation session shall be undertaken **within four months of the commencement of this assignment.**
- v. The consultant shall collate the comments from the consultation session and submit a report of the consultation to the CZMU and PET, **within five months of the commencement of this assignment.**
- vi. Submit the Final Implementation Plan which incorporates the comments from the consultation session **within seven months of the commencement of this assignment.**

#### **4. Characteristics of the Assignment and Required**

**4.1.Type of Consultancy:** Individual Consultant

**4.2.Starting Date and Duration:** Approximately six months.

4.3.**Place of Work:** Barbados and the consultant's place of residence.

4.4.**Qualifications and Experience:**

- i) A masters degree from a recognized university in the fields of natural resource management.....
- ii) A minimum of ten years' experience in the design of development projects/programmes in the Caribbean; and
- iii) Excellent command of the English Language.

**5. Client's Input**

5.1.The CRMP will provide the consultant with all relevant documentation required to facilitate the execution of the consultancy.

**6. Payment Schedule**

6.1 Payment will be made on the submission and approval of the deliverables as described below:

- Inception Report – 10%
- Draft Implementation Plan- 45%
- Consultation Session- 5%
- Consultation Report- 10%
- Final Implementation Plan – 30%

**8.Coordination**

8.1.The consultant will report directly to the Project Manager who will supervise the consultancy. Staff from the Project Execution Team (PET) will provide technical, administrative and coordination support to the consultancy. The consultant will maintain regular contact with the PET and provide the PET with informal updates on the progress of the work and to discuss any issues that may need to be resolved or opportunities which may arise, in order to facilitate the successful implementation of the activit

# **Improving Institutional Frameworks for Integrated Coastal Zone Management, National Risk Information Planning Systems and Sustainable Climate-Resilient Coastal Infrastructure (BA-T1068)**

## **The Development of a Draft National Plan and Work Programme for Coral Reef Restocking**

### **TERMS OF REFERENCE**

#### **1. Background**

1. The coastal zone of Barbados is the country's main economic asset. In 2018, contribution of travel and tourism to GDP for Barbados was 34.9 %<sup>1</sup>. More than half the population reside within 2km of the coast and more than 95% of the tourism related physical plant is located at or near the coast. In addition, much critical infrastructure including water, electricity, natural gas and telecommunication installations, transportation nodes (road, air and sea), commercial, health, education and government facilities can also be found in, or near the coast. Access to the coastal zone is also critical for other traditional uses such as fishing and maritime transport. It is for these reasons that integrated coastal area management must be regarded as a critical activity to support national sustainable development goals.
2. Due to its location and geology, Barbados is moderately exposed to, inter alia, hurricanes and tropical storms and resulting directly from these: storm surges and storm-force winds. Also, the country is highly susceptible to coastal beach erosion and cliff instability, either from specific storm events or from ongoing geomorphologic processes. In addition, low lying regions of the island, including those in the densely populated coastal zone, are often prone to rainfall-induced flooding. As such, the country's primary locations of economic activity and associated public infrastructure are associated with a high level of exposure to natural hazards. Indeed, modelling suggests that coastal storm surge induced from a 100-year cyclone would affect 6,000 residences along the south and west coasts and 70% of west coast hotels would be negatively impacted<sup>2</sup>. Furthermore, average annual probable losses from multiple hazards and storm surge specifically have been estimated at US\$103.58M and US\$45.2 million respectively<sup>3</sup>.
3. The country continues to be faced with traditional challenges related to its limited economic diversification, fiscal fragility and susceptibility to the impacts of climate change including sea level rise, increased temperatures and the prospect of more intense hurricanes. As such, public policy and institutional reform efforts are not only centered on the fiscal, but on public sector efficiency, a strong social safety net and crisis-resilient health system, and as well as interventions that can and will better incentivize, stimulate and more optimally regulate resilient sustainable economic growth, now and in the future. Continued deliberate attention to resilience and disaster risk related policies to safeguard lives, investments and the economy is required and has been identified as a national priority. In 2018, the Government created a Ministry of Maritime Affairs and the Blue Economy (MMABE) on the premise that despite its small land space Barbados' maritime space is over 400 times larger, covering 183,436km<sup>2</sup> representing an underdeveloped and underexplored opportunity that should be sustainably utilized to advance the economic interest of the country.

4. The current activity is a component of a technical cooperation (TC) project facilitated by the Inter-American Development Bank (IDB) in order to support the Government of Barbados in the development of a program design that will build resilience, systematically manage disaster risk through risk identification, vulnerability reduction, and ex-ante risk mitigation in national ICZM, and in the context of the country's ambition and trajectory for Blue Economy development and growth in a post COVID19 reopening and recovery context.
5. The current TC project titled: Improving Institutional Frameworks for Integrated Coastal Zone Management, National Risk Information Planning Systems and Sustainable Climate-Resilient Coastal Infrastructure (BA-T1068) complements and utilizes outputs from the recently concluded Coastal Risk Assessment and Management Program (CRMP) Loan (BA-L1014) operation as well as several cooperation projects in Barbados supported by the Japan International Cooperation Agency (JICA), including The Caribbean Disaster Management Project Phase I, executed with the Caribbean Disaster Emergency Response Agency (CDERA, the current Caribbean Disaster Emergency Management Agency: CDEMA).
6. Notably, all prefeasibility or feasibility studies of specific investment projects including environmental and social studies should be consistent with the Environmental and Social Policy Framework (GN-2965-21).
7. Under the CRMP, the Ecosystem-Based Pilot Project (EBA) activity provided the Government with key information related to the resources required (financial, materials, capacity) for the establishment and operation of a coral husbandry facility to support the growth and outplanting of a relatively small number of coral colonies. A second activity conducted under the CRMP further expanded this knowledge-base by determining the requirements and site-related considerations for upgrading the EBA facility components and operations to support a national coral reef restoration/ rehabilitation programme.
8. These terms of reference (TORs) refer to the consultant services of a required for activities consultant to develop a draft national plan and work programme for coral reef restocking as a mechanism to reintroduce various coral species to degraded reefs and build on the ecosystem-based adaptation activities conducted under the CRMP.

## 2. **Objective and Framework**

- a. The Specific objective of this consultancy is to design a work programme of activities to operationalize a national coral reef restocking programme in Barbados, inclusive of enterprise models for sustainability and draft governance models for effective oversight.
- b. The development and design of the programme of activities for coral reef restocking will occur in a highly participatory manner, with extensive stakeholder consultation to develop a plan that can be implemented based on local opportunities and constraints, produce measureable outcomes, and meet the expectations and targets of environment managers.

### 3. Main Activities

The consultant will:

- a. Prepare a work plan describing the methodology and schedule of tasks for the development of the programme of activities for coral reef restocking
- b. Conduct a formal review and present an analysis on the findings of both the Ecosystem-Based Adaptation Pilot Project and the Feasibility Assessment for the Expansion of the EBA activities with regard to the necessary considerations for a facility to support coral restocking initiatives;
- c. Review the sustainable finance model options described in the Feasibility Assessment for the Expansion of the EBA and engage with relevant stakeholders to obtain feedback on one or more preferred business models which would incentivize participation in a sustainable coral reef restoration value chain, including an analysis on their feasibility of implementation;
- d. Conduct research and consult with relevant stakeholders to determine several potential governance models to facilitate the transparent and efficacious implementation, monitoring and administration of a national coral reef restocking programme, including an assessment of each model's feasibility of implementation;
- e. Evaluate and describe the institutional, policy, human and financial resources that would be required to effectively manage the national programme, including implementation and sustainability costs;
- f. Specify a set of actions that would generate the outputs required to produce the outcome of an implemented, effectively governed, economically sustainable national program for coral reef restocking based on the results of (c.) and (d.);
- g. For each action specified in (f.), provide a specific terms of reference including costs and timeframe for execution.

### 4. Reports/Deliverables

- a. Work Plan as described in 3a within **two weeks** of the start of the contract;
- b. Baseline Knowledge and Stakeholder Consultation Report based on activities 3b to 3d within **two months** of the start of the contract;
- c. Draft Work Programme for a National Coral Reef Restocking Programme based on activities 3e and 3f within **four months** of the start of the contract;
- d. Implementation Action Portfolio based on activity 3g within **five months** of the start of the contract.

### 5. Payment Schedule

- 15% upon delivery and approval of the Work Plan (4a);
- 20% upon delivery and approval of the final Baseline Knowledge and Stakeholder Consultation Report (4b);

- 30% upon delivery and approval of the Draft Work Programme for a National Coral Reef Restocking Programme (4c);
- 35% upon delivery and approval of the Implementation Action Portfolio (4d).

## 6. **Characteristics of the Consultancy**

1. Consultancy category and modality: Individual Consultant.
2. Contract duration: 70 discontinuous days within 6 months.
3. Travel: Travel to Barbados for the purpose of stakeholder interaction can be included in the Consultant's proposal but is not a requirement of the activity.
4. Place of work: Barbados and/or the Consultant's country of residence.
5. Responsible Person: Project Manager, Ricardo Arthur (CZMU).

## 7. **Required Qualifications**

- A Master's degree in Marine Biology, or Environmental Science or equivalent, with a minimum of 5 years of professional experience in the management of marine resources including public environmental policy development. Work experience in SIDS is preferred. Professional experience in the establishment or operation of reef restoration initiatives an asset.
- Languages: English
- Skills: Excellent analytical, writing and communication skills and effective ability to interact with diverse groups of stakeholders.

# **Improving Institutional Frameworks for Integrated Coastal Zone Management, National Risk Information Planning Systems and Sustainable Climate-Resilient Coastal Infrastructure (BA-T1068)**

## **The Development of a Marine Environmental Suitability for Coral Reef Restocking Report**

### **TERMS OF REFERENCE**

#### **1. Background**

1. The coastal zone of Barbados is the country's main economic asset. In 2018, contribution of travel and tourism to GDP for Barbados was 34.9 %<sup>1</sup>. More than half the population reside within 2km of the coast and more than 95% of the tourism related physical plant is located at or near the coast. In addition, much critical infrastructure including water, electricity, natural gas and telecommunication installations, transportation nodes (road, air and sea), commercial, health, education and government facilities can also be found in, or near the coast. Access to the coastal zone is also critical for other traditional uses such as fishing and maritime transport. It is for these reasons that integrated coastal area management must be regarded as a critical activity to support national sustainable development goals.
2. Due to its location and geology, Barbados is moderately exposed to, inter alia, hurricanes and tropical storms and resulting directly from these: storm surges and storm-force winds. Also, the country is highly susceptible to coastal beach erosion and cliff instability, either from specific storm events or from ongoing geomorphologic processes. In addition, low lying regions of the island, including those in the densely populated coastal zone, are often prone to rainfall-induced flooding. As such, the country's primary locations of economic activity and associated public infrastructure are associated with a high level of exposure to natural hazards. Indeed, modelling suggests that coastal storm surge induced from a 100-year cyclone would affect 6,000 residences along the south and west coasts and 70% of west coast hotels would be negatively impacted<sup>2</sup>. Furthermore, average annual probable losses from multiple hazards and storm surge specifically have been estimated at US\$103.58M and US\$45.2 million respectively<sup>3</sup>.
3. The country continues to be faced with traditional challenges related to its limited economic diversification, fiscal fragility and susceptibility to the impacts of climate change including sea level rise, increased temperatures and the prospect of more intense hurricanes. As such, public policy and institutional reform efforts are not only centered on the fiscal, but on public sector efficiency, a strong social safety net and crisis-resilient health system, and as well as interventions that can and will better incentivize, stimulate and more optimally regulate resilient sustainable economic growth, now and in the future. Continued deliberate attention to resilience and disaster risk related policies to safeguard lives, investments and the economy is required and has been identified as a national priority. In 2018, the Government created a Ministry of Maritime Affairs and the Blue Economy (MMABE) on the premise that despite its small land space Barbados' maritime space is over 400 times larger, covering 183,436km<sup>2</sup> representing an underdeveloped and underexplored opportunity that should be sustainably utilized to advance the economic interest of the country.

4. The current activity is a component of a technical cooperation (TC) project facilitated by the Inter-American Development Bank (IDB) in order to support the Government of Barbados in the development of a program design that will build resilience, systematically manage disaster risk through risk identification, vulnerability reduction, and ex-ante risk mitigation in national ICZM, and in the context of the country's ambition and trajectory for Blue Economy development and growth in a post COVID19 reopening and recovery context.
5. The current TC project titled: Improving Institutional Frameworks for Integrated Coastal Zone Management, National Risk Information Planning Systems and Sustainable Climate-Resilient Coastal Infrastructure (BA-T1068) complements and utilizes outputs from the recently concluded Coastal Risk Assessment and Management Program (CRMP) Loan (BA-L1014) operation as well as several cooperation projects in Barbados supported by the Japan International Cooperation Agency (JICA), including The Caribbean Disaster Management Project Phase I, executed with the Caribbean Disaster Emergency Response Agency (CDERA, the current Caribbean Disaster Emergency Management Agency: CDEMA).
6. Notably, all prefeasibility or feasibility studies of specific investment projects including environmental and social studies should be consistent with the Environmental and Social Policy Framework (GN-2965-21).
7. Under the CRMP, the Ecosystem-Based Pilot Project (EBA) activity provided the Government with key information related to the resources required (financial, materials, capacity) for the establishment and operation of a coral husbandry facility to support the growth and outplanting of a relatively small number of coral colonies. A second activity conducted under the CRMP further expanded this knowledge-base by determining the requirements and site-related considerations for upgrading the EBA facility components and operations to support a national coral reef restoration/ rehabilitation programme.
8. These terms of reference (TORs) refer to the services of a consultant to develop a Marine Environment Suitability for Coral Reef Restocking Report, building on the information gained during the CRMP as well as contemporary information sources.

## 2. **Objective and Framework**

- a. The Specific objective of this consultancy is to compile and review data and information related to the marine environment of Barbados (water quality, pollutant inputs, coral reef health, coral propagation patterns, donor and recipient site considerations, etc.) in relation to the operation of a national coral reef restoration and rehabilitation program. The resulting report will also make recommendations for additional studies to fill identified data/information gaps.
- b. The review/assessment will occur in a highly participatory manner, with extensive stakeholder consultation to take advantage of local knowledge, gain insights into potential challenges and ensure that the review will meet the expectations of marine environment managers.



### 3. Main Activities

The consultant will:

- a. Prepare an Inception Report describing the methodology and schedule of tasks for the marine environmental suitability review.
- b. Collate and conduct a formal review, and present analysis, on the findings of recent (post 2010) marine water quality and coral ecosystem health technical reports, scientific studies, academic papers and grey literature for Barbados;
- c. Prepare a Marine Water Quality and Ecosystem Health Literature Review report detailing (b.) above, and inclusive of the implications for a national coral reef restoration and rehabilitation program and an assessment of any identified data gaps;
- d. Present the results of the literature review analysis to the CZMU for discussion;
- e. Conduct stakeholder interviews with environmental managers in the public service as well as marine researchers in academia;
- f. Based on (b.) to (e.) prepare a Marine Environmental Suitability for Coral Reef Restocking report which describes the current degree of suitability of different sections of the coast of Barbados for use as donor and/or recipient sites, the local conditions in each of these sections which could impact the success of coral reef restocking efforts, any recommended additional studies to fill any gaps in knowledge, and recommendations related to required water quality improvements to promote the successful implementation of a national restocking program;

### 4. Reports/Deliverables

- a. Inception Report as described in 3a within **two weeks** of the start of the contract;
- b. Marine Water Quality and Ecosystem Health Literature Review (3c.) within **three months** of the start of the contract;
- c. Draft Marine Environmental Suitability for Coral Reef Restocking report (3f.) within **five months** of the start of the contract;

### 5. Payment Schedule

- 15% upon delivery and approval of the Inception Report (4a);
- 30% upon delivery and approval of the final Marine Water Quality and Ecosystem Health Literature Review (4b);
- 55% upon delivery and approval of the final Marine Environmental Suitability for Coral Reef Restocking report (4c).

### 6. Characteristics of the Consultancy

1. Consultancy category and modality: Individual Consultant.
2. Contract duration: 60 discontinuous days within 6 months.

3. Travel: Travel to Barbados for the purpose of stakeholder interaction can be included in the Consultant's proposal but is not a requirement of the activity.
4. Place of work: Barbados and/or the Consultant's country of residence.
5. Responsible Person: Project Manager, Ricardo Arthur (CZMU).

**7. Required Qualifications**

- A Master's degree in Marine Biology, or Environmental Science or equivalent, with a minimum of 5 years of professional experience in the management of tropical marine resources including public environmental policy development. Work experience in SIDS is preferred. Professional experience in management of marine water quality an asset.
- Languages: English
- Skills: Excellent analytical, writing and communication skills and effective ability to interact with diverse groups of stakeholders.

## **Barbados**

### **Coastal Zone Management Unit, Ministry of Maritime Affairs and The Blue Economy**

#### **Improving Institutional Frameworks for Integrated Coastal Zone Management, National Risk Information Planning Systems and Sustainable Climate-Resilient Coastal Infrastructure (BA-T1068)**

#### **The Development of a Draft National Action Plan for Ecosystem Services/Natural Capital Valuation**

## **TERMS OF REFERENCE**

### **1. Background**

1. The current TC project titled: Improving Institutional Frameworks for Integrated Coastal Zone Management, National Risk Information Planning Systems and Sustainable Climate-Resilient Coastal Infrastructure (BA-T1068) complements and utilizes outputs from the recently concluded Coastal Risk Assessment and Management Program (CRMP) Loan (BA-L1014) operation as well as several cooperation projects in Barbados supported by the Japan International Cooperation Agency (JICA), including The Caribbean Disaster Management Project Phase I, executed with the Caribbean Disaster Emergency Response Agency (CDERA, the current Caribbean Disaster Emergency Management Agency: CDEMA).
1. This terms of reference (TOR) refer to the consultant services required for activities related to Component 1d- Ecosystem Services/Natural Capital Valuation. Activities under this subcomponent are focused on the implementation of valuation research outputs that will serve to support a value-based paradigm for justifying Government expenditure, budget allocations to, and the value proposition of the work and role of the CZMU in ICZM to public and private sectors.
2. This consultancy will build on the outputs from The CRMP, "Institutional Stability for Integrated Coastal Risk Management for the Coastal Zone Management Unit: Proposal for Cost Recovery Mechanisms for Coastal Infrastructure". The Cost Recovery consultancy provided (i) a feasible set of alternatives for cost recovery associated with coastal infrastructure and the protection of natural assets in the coastal zone using fees that charge individuals or businesses directly, and/or levies (taxes) on groups of individuals or businesses, and (ii) presented conceptual models of value for CZMU projects and activities which can serve as a framework for a value-based paradigm for future government expenditure re: coastal investments and their maintenance..
3. Notably, all prefeasibility or feasibility studies of specific investment projects including environmental and social studies should be consistent with the Environmental and Social Policy Framework (GN-2965-21).

### **2. Objective and Framework**

- a. The Specific objective of this consultancy is to development an action plan to identify and specify operational measures required to advance GOBA operational decision-

making on the cost recovery option measures for the provision of coastal infrastructure services.

- b. The plan will identify and recommend simple, best practice, cost-effective coastal/marine ecosystem services valuation approaches and the identification and specification of how best such valuations can be sustainably incorporated into national public accounting.

### 3. Main Activities

- a. The consultant will prepare and submit an Inception Report which includes but not limited to: executive summary, objectives of the assignment, consultation, approach/methodology with stakeholder matrix, and work plan/schedule.
- b. Conduct a formal review of the outputs from Cost Recovery Mechanisms for Coastal Infrastructure consultancy. Refine/ update the eight valuation models with an assessment of data needs and sources ensuring conformance with the United Nations System of Sustainable Environmental Economic Accounting system.
- c. Conduct stakeholder consultations to: (i) review current government accounting processes (ii) present the United Nations System of Sustainable Environmental Economic Accounting (UN SEEA) system, describing concepts and methods, data needs, resource requirements and the analysis and policy use of the accounting results; (iii) Agreement on a collaborative work programme, including mechanisms of coordination and implementation.
- d. Based on the review (b) and consultations (c); prepare a baseline report which (i) presents outcomes from stakeholder meetings, assessing the feasibility of the applicability of the UN SEEA framework to Barbados.; (ii) provides an assessment of previous work including present data gaps (iii) A review of current government accounting related to the environment and ecosystem services.
- e. Based on the results of (b) to (d); specify a set of actions (action plan) that would generate the outputs required to produce the outcome of operationalization of ecosystem services valuation and cost recovery options within Barbados' national accounting practices. This should include (i) institutional, policy, human and financial resources that would be required for implementation and (ii) methods for monitoring and evaluating implementation.
- f. Presentation of action plan at stakeholder workshop to identified key strategic partners for feedback on proposed set of actions from (e)
- g. Development of terms of reference (s) for the execution of the proposed actions including costs and timeframe for execution.

### 4. Reports/Deliverables

- a. Inception report as described in 3a within **two weeks** of the start of the contract;
- b. Baseline Assessment Report based on activities 3b to 3d within **two months** of the start of the contract;

- c. Action Plan and stakeholder workshop based on activities 3e and 3f within **four months** of the start of the contract;

- d. Terms of Reference based on activity 3g within **five months** of the start of the contract.

Each report must be submitted as: (i) one hard copy (ii) one electronic file in MS format and (iii) an electronic file in PDF.

## 5. **Payment Schedule**

- a. 15% upon delivery and approval of the Inception report (4a);
- b. 40% upon delivery and approval of the Final Baseline Assessment Report (4b);
- c. 40% upon delivery and approval of the Action Plan and stakeholder workshop (4c);
- d. 5% upon delivery and approval of the Terms of Reference (4d)

## 6. **CHARACTERISTICS OF THE CONSULTANCY**

- a. Consultancy category and modality: Individual Consultant.
- b. Contract duration: 40 discontinuous days within 6 months.
- c. Travel: Travel to Barbados for the purpose of stakeholder interaction can be included in the Consultant's proposal but is not a requirement of the activity.
- d. Place of work: Barbados and/or the Consultant's country of residence
- e. Responsible Person: Project Manager, Ricardo Arthur (CZMU)

## 7. **Required Qualifications**

- a. Qualifications and Skills: A Minimum Master's Degree in Resource Economics, Economics, Natural Resource Management or similar fields
- b. Experience: At least 10 years' experience in the the area of ecosystem accounting, environmental and ecological economics. Knowledge of International Public Sector Accounting Standards. Work Experience in United Nations System of Sustainable Environmental Economic Accounting (UN SEEA) system. Professional experience in the coastal ecosystem accounting is an asset. Work experience in SIDS is preferred
- c. Languages: English
- d. Skills: Excellent analytical, writing and communication skills and effective ability to interact with diverse groups of stakeholders.

## **8. Coordination**

The consultant will report directly to the Project Manager of the CRMP who will supervise the consultancy. Staff from the Project Execution Team (PET) will provide technical, administrative and coordination support to the consultancy. The consultants should be in regular contact with such representatives during the preparation of the work to provide the PET with informal updates on the progress of the work, and to discuss any issues that may need to be resolved to facilitate successful implementation.

## **Barbados**

### **Coastal Zone Management Unit, Ministry of Maritime Affairs and The Blue Economy**

#### **Improving Institutional Frameworks for Integrated Coastal Zone Management, National Risk Information Planning Systems and Sustainable Climate-Resilient Coastal Infrastructure (BA-T1068)**

#### **Pilot Project- Economic Valuation of Coastal Infrastructure Projects including business disruption assessment**

### **TERMS OF REFERENCE**

#### **1. Background**

1. The coastal zone of Barbados is the country's main economic asset. In 2018, contribution of travel and tourism to GDP for Barbados was 34.9 %<sup>1</sup>. More than half the population reside within 2km of the coast and more than 95% of the tourism related physical plant is located at or near the coast. In addition, much critical infrastructure including water, electricity, natural gas and telecommunication installations, transportation nodes (road, air and sea), commercial, health, education and government facilities can also be found in, or near the coast. Access to the coastal zone is also critical for other traditional uses such as fishing and maritime transport. It is for these reasons that integrated coastal area management must be regarded as a critical activity to support national sustainable development goals.
2. Due to its location and geology, Barbados is moderately exposed to, inter alia, hurricanes and tropical storms and resulting directly from these: storm surges and storm-force winds. Also, the country is highly susceptible to coastal beach erosion and cliff instability, either from specific storm events or from ongoing geomorphologic processes. In addition, low lying regions of the island, including those in the densely populated coastal zone, are often prone to rainfall-induced flooding. As such, the country's primary locations of economic activity and associated public infrastructure are associated with a high level of exposure to natural hazards. Indeed, modelling suggests that coastal storm surge induced from a 100-year cyclone would affect 6,000 residences along the south and west coasts and 70% of west coast hotels would be negatively impacted<sup>2</sup>. Furthermore, average annual probable losses from multiple hazards and storm surge specifically have been estimated at US\$103.58M and US\$45.2 million respectively<sup>3</sup>.
3. The country continues to be faced with traditional challenges related to its limited economic diversification, fiscal fragility and susceptibility to the impacts of climate change including sea level rise, increased temperatures and the prospect of more intense hurricanes. As such, public policy and institutional reform efforts are not only centered on the fiscal, but on public sector efficiency, a strong social safety net and crisis-resilient health system, and as well as interventions that can and will better incentivize, stimulate and more optimally regulate resilient sustainable economic growth, now and in the future. Continued deliberate attention to resilience and disaster risk related policies to safeguard lives, investments and the economy is required and has been identified as a national priority. In 2018, the Government created a Ministry of

Maritime Affairs and the Blue Economy (MMABE) on the premise that despite its small land space Barbados' maritime space is over 400 times larger, covering 183,436km<sup>2</sup> representing an underdeveloped and underexplored opportunity that should be sustainably utilized to advance the economic interest of the country.

4. The current activity is a component of a technical cooperation (TC) project facilitated by the Inter-American Development Bank (IDB) in order to support the Government of Barbados in the development of a program design that will build resilience, systematically manage disaster risk through risk identification, vulnerability reduction, and ex-ante risk mitigation in national ICZM, and in the context of the country's ambition and trajectory for Blue Economy development and growth in a post COVID19 reopening and recovery context.
5. The current TC project titled: Improving Institutional Frameworks for Integrated Coastal Zone Management, National Risk Information Planning Systems and Sustainable Climate-Resilient Coastal Infrastructure (BA-T1068) complements and utilizes outputs from the recently concluded Coastal Risk Assessment and Management Program (CRMP) Loan (BA-L1014) operation as well as several cooperation projects in Barbados supported by the Japan International Cooperation Agency (JICA), including The Caribbean Disaster Management Project Phase I, executed with the Caribbean Disaster Emergency Response Agency (CDERA, the current Caribbean Disaster Emergency Management Agency: CDEMA).
6. Notably, all prefeasibility or feasibility studies of specific investment projects including environmental and social studies should be consistent with the Environmental and Social Policy Framework (GN-2965-21).
7. This terms of reference (TOR) refer to the services of a consultant for activities related to subcomponent 1e- Pilot Project- Economic Valuation of Coastal Infrastructure Projects including business disruption assessment. Activities under this subcomponent will be focused on conducting an economic valuation for Coastal Infrastructure projects to serve as a framework for a value-based paradigm for future government spending. This subcomponent also requires an assessment of the potential disruption to businesses due to construction of five proposed coastal infrastructure projects.
8. This consultancy will build on the outputs from The CRMP, "Institutional Stability for Integrated Coastal Risk Management for the Coastal Zone Management Unit: Proposal for Cost Recovery Mechanisms for Coastal Infrastructure". The Cost Recovery consultancy provided which conducted an initial economic valuation of previously constructed coastal programmes.

## 2. **Objective and Framework**

- a. The Specific objective of this consultancy is to undertake an economic valuation of the coastal infrastructure works designed under the CRMP inclusive of the likely business disruption assessment resulting from their construction.



### 3. Main Activities

#### 1. Inception Report

- a. The consultant will conduct an inception meeting with the client.
- b. Following feedback from 3.1a, prepare and submit an Inception Report which includes but not limited to: executive summary, objectives of the assignment, consultation, approach/methodology with stakeholder matrix, and work plan/schedule

#### 2. Business Disruption

- c. Conduct a baseline assessment of the state of the businesses around the five coastal infrastructure project sites. This would require the consultant to conduct stakeholder meetings with the businesses.
- d. Through the consideration of a range of construction business disruptions scenarios, quantify the potential economic impact of the construction at the various project sites.
- e. Based on 3.2c and 3.2d, develop a business disruption plan. This plan should include an assessment of potential business disruption costs and suggest mitigation measures to limit disruption costs

#### 3. Economic Valuation

- f. Review the following documents (i) previously conducted economic valuation on the coastal infrastructure projects from the CRMP Proposal for Cost Recovery Mechanisms for Coastal Infrastructure (ii) The outputs from the consultancy for the development of a Draft National Action Plan for Ecosystem Services/Natural Capital Valuation
- g. Update the estimated economic valuation of coastal infrastructure project. This should include estimating the remaining values which includes (i) risk reduction services in terms of avoided costs and improved property (ii) value to businesses from risk reduction and enhanced commercial traffic. (iii) environmental costs of the projects in terms of lost or impaired ecosystem services also seems warranted.

### 4. Reports/Deliverables

- a. Inception report as described in 3a within **two weeks** of the start of the contract;
- b. Business Disruption Report based on activities 3.2 within **two months** of the start of the contract;
- c. Economic valuation based on activities 3.3 within **four months** of the start of the contract;

Each report must be submitted as: (i) one hard copy (ii) one electronic file in MS format and (iii) an electronic file in PDF.

## **5. Payment Schedule**

- a. 15% upon delivery and approval of the Inception report (4a);
- b. 50% upon delivery and approval of the Business Disruption Report (4b);
- c. 35% upon delivery and approval of the Economic Valuation (4c);

## **6. CHARACTERISTICS OF THE CONSULTANCY**

- a. Consultancy category and modality: Individual Consultant.
- b. Contract duration: 65 discontinuous days within 4 months.
- c. Travel: Travel to Barbados for the purpose of stakeholder interaction can be included in the Consultant's proposal but is not a requirement of the activity.
- d. Place of work: Barbados and/or the Consultant's country of residence
- e. Responsible Person: Project Manager, Ricardo Arthur (CZMU)

## **7. Required Qualifications**

- a. Qualifications and Skills: A Minimum Master's Degree in Resource Economics, Economics, Natural Resource Management or similar fields
- b. Experience: At least 10 years' experience in the valuation of environmental or coastal resources; Work experience in SIDS is preferred with work in the Caribbean an asset. Must have experience conducting stakeholder consultations.
- c. Languages: English
- d. Skills: Excellent analytical, writing and communication skills and effective ability to interact with diverse groups of stakeholders.

## **8. Coordination**

The consultant will report directly to the Project Manager of the CRMP who will supervise the consultancy. Staff from the Project Execution Team (PET) will provide technical, administrative and coordination support to the consultancy. The consultants should be in regular contact with such representatives during the preparation of the work to provide the PET with informal updates on the progress of the work, and to discuss any issues that may need to be resolved to facilitate successful implementation.

## **Barbados**

### **Coastal Zone Management Unit, Ministry of Maritime Affairs and The Blue Economy**

#### **Improving Institutional Frameworks for Integrated Coastal Zone Management, National Risk Information Planning Systems and Sustainable Climate-Resilient Coastal Infrastructure (BA-T1068)**

#### **Pilot Project- Economic Valuation of Coastal Infrastructure Projects including business disruption assessment**

### **TERMS OF REFERENCE**

#### **1. Background**

1. The coastal zone of Barbados is the country's main economic asset. In 2018, contribution of travel and tourism to GDP for Barbados was 34.9 %<sup>1</sup>. More than half the population reside within 2km of the coast and more than 95% of the tourism related physical plant is located at or near the coast. In addition, much critical infrastructure including water, electricity, natural gas and telecommunication installations, transportation nodes (road, air and sea), commercial, health, education and government facilities can also be found in, or near the coast. Access to the coastal zone is also critical for other traditional uses such as fishing and maritime transport. It is for these reasons that integrated coastal area management must be regarded as a critical activity to support national sustainable development goals.
2. Due to its location and geology, Barbados is moderately exposed to, inter alia, hurricanes and tropical storms and resulting directly from these: storm surges and storm-force winds. Also, the country is highly susceptible to coastal beach erosion and cliff instability, either from specific storm events or from ongoing geomorphologic processes. In addition, low lying regions of the island, including those in the densely populated coastal zone, are often prone to rainfall-induced flooding. As such, the country's primary locations of economic activity and associated public infrastructure are associated with a high level of exposure to natural hazards. Indeed, modelling suggests that coastal storm surge induced from a 100-year cyclone would affect 6,000 residences along the south and west coasts and 70% of west coast hotels would be negatively impacted<sup>2</sup>. Furthermore, average annual probable losses from multiple hazards and storm surge specifically have been estimated at US\$103.58M and US\$45.2 million respectively<sup>3</sup>.
3. The country continues to be faced with traditional challenges related to its limited economic diversification, fiscal fragility and susceptibility to the impacts of climate change including sea level rise, increased temperatures and the prospect of more intense hurricanes. As such, public policy and institutional reform efforts are not only centered on the fiscal, but on public sector efficiency, a strong social safety net and crisis-resilient health system, and as well as interventions that can and will better incentivize, stimulate and more optimally regulate resilient sustainable economic growth, now and in the future. Continued deliberate attention to resilience and disaster risk related policies to safeguard lives, investments and the economy is required and has been identified as a national priority. In 2018, the Government created a Ministry of

Maritime Affairs and the Blue Economy (MMABE) on the premise that despite its small land space Barbados' maritime space is over 400 times larger, covering 183,436km<sup>2</sup> representing an underdeveloped and underexplored opportunity that should be sustainably utilized to advance the economic interest of the country.

4. The current activity is a component of a technical cooperation (TC) project facilitated by the Inter-American Development Bank (IDB) in order to support the Government of Barbados in the development of a program design that will build resilience, systematically manage disaster risk through risk identification, vulnerability reduction, and ex-ante risk mitigation in national ICZM, and in the context of the country's ambition and trajectory for Blue Economy development and growth in a post COVID19 reopening and recovery context.
5. The current TC project titled: Improving Institutional Frameworks for Integrated Coastal Zone Management, National Risk Information Planning Systems and Sustainable Climate-Resilient Coastal Infrastructure (BA-T1068) complements and utilizes outputs from the recently concluded Coastal Risk Assessment and Management Program (CRMP) Loan (BA-L1014) operation as well as several cooperation projects in Barbados supported by the Japan International Cooperation Agency (JICA), including The Caribbean Disaster Management Project Phase I, executed with the Caribbean Disaster Emergency Response Agency (CDERA, the current Caribbean Disaster Emergency Management Agency: CDEMA).
6. Notably, all prefeasibility or feasibility studies of specific investment projects including environmental and social studies should be consistent with the Environmental and Social Policy Framework (GN-2965-21).
7. This terms of reference (TOR) refer to the services of a consultant for activities related to subcomponent 1e- Pilot Project- Economic Valuation of Coastal Infrastructure Projects including business disruption assessment. Activities under this subcomponent will be focused on conducting an economic valuation for Coastal Infrastructure projects to serve as a framework for a value-based paradigm for future government spending. This subcomponent also requires an assessment of the potential disruption to businesses due to construction of five proposed coastal infrastructure projects.
8. This consultancy will build on the outputs from The CRMP, "Institutional Stability for Integrated Coastal Risk Management for the Coastal Zone Management Unit: Proposal for Cost Recovery Mechanisms for Coastal Infrastructure". The Cost Recovery consultancy provided which conducted an initial economic valuation of previously constructed coastal programmes.

## 2. **Objective and Framework**

- a. The Specific objective of this consultancy is to undertake an economic valuation of the coastal infrastructure works designed under the CRMP inclusive of the likely business disruption assessment resulting from their construction.

### 3. Main Activities

#### 1. Inception Report

- a. The consultant will conduct an inception meeting with the client.
- b. Following feedback from 3.1a, prepare and submit an Inception Report which includes but not limited to: executive summary, objectives of the assignment, consultation, approach/methodology with stakeholder matrix, and work plan/schedule

#### 2. Business Disruption

- c. Conduct a baseline assessment of the state of the businesses around the five coastal infrastructure project sites. This would require the consultant to conduct stakeholder meetings with the businesses.
- d. Through the consideration of a range of construction business disruptions scenarios, quantify the potential economic impact of the construction at the various project sites.
- e. Based on 3.2c and 3.2d, develop a business disruption plan. This plan should include an assessment of potential business disruption costs and suggest mitigation measures to limit disruption costs

#### 3. Economic Valuation

- f. Review the following documents (i) previously conducted economic valuation on the coastal infrastructure projects from the CRMP Proposal for Cost Recovery Mechanisms for Coastal Infrastructure (ii) The outputs from the consultancy for the development of a Draft National Action Plan for Ecosystem Services/Natural Capital Valuation
- g. Update the estimated economic valuation of coastal infrastructure project. This should include estimating the remaining values which includes (i) risk reduction services in terms of avoided costs and improved property (ii) value to businesses from risk reduction and enhanced commercial traffic. (iii) environmental costs of the projects in terms of lost or impaired ecosystem services also seems warranted.

### 4. Reports/Deliverables

- a. Inception report as described in 3a within **two weeks** of the start of the contract;
- b. Business Disruption Report based on activities 3.2 within **two months** of the start of the contract;
- c. Economic valuation based on activities 3.3 within **four months** of the start of the contract;

Each report must be submitted as: (i) one hard copy (ii) one electronic file in MS format and (iii) an electronic file in PDF.

## **5. Payment Schedule**

- a. 15% upon delivery and approval of the Inception report (4a);
- b. 50% upon delivery and approval of the Business Disruption Report (4b);
- c. 35% upon delivery and approval of the Economic Valuation (4c);

## **6. CHARACTERISTICS OF THE CONSULTANCY**

- a. Consultancy category and modality: Individual Consultant.
- b. Contract duration: 65 discontinuous days within 4 months.
- c. Travel: Travel to Barbados for the purpose of stakeholder interaction can be included in the Consultant's proposal but is not a requirement of the activity.
- d. Place of work: Barbados and/or the Consultant's country of residence
- e. Responsible Person: Project Manager, Ricardo Arthur (CZMU)

## **7. Required Qualifications**

- a. Qualifications and Skills: A Minimum Master's Degree in Resource Economics, Economics, Natural Resource Management or similar fields
- b. Experience: At least 10 years' experience in the valuation of environmental or coastal resources; Work experience in SIDS is preferred with work in the Caribbean an asset. Must have experience conducting stakeholder consultations.
- c. Languages: English
- d. Skills: Excellent analytical, writing and communication skills and effective ability to interact with diverse groups of stakeholders.

## **8. Coordination**

The consultant will report directly to the Project Manager of the CRMP who will supervise the consultancy. Staff from the Project Execution Team (PET) will provide technical, administrative and coordination support to the consultancy. The consultants should be in regular contact with such representatives during the preparation of the work to provide the PET with informal updates on the progress of the work, and to discuss any issues that may need to be resolved to facilitate successful implementation.

## **BARBADOS**

### **Improving Institutional Frameworks for Integrated Coastal Zone Management, National Risk Information Planning Systems and Sustainable Climate-Resilient Coastal Infrastructure (BA-T1068)**

#### **Development of a Work Plan for the Upgrading and Operational Integration of the NCRIPP within the Risk Management Framework of the Government of Barbados**

#### **TERMS OF REFERENCE**

##### **1. Background**

1. The coastal zone of Barbados is the country's main economic asset. In 2018, contribution of travel and tourism to GDP for Barbados was 34.9 %<sup>1</sup>. More than half the population reside within 2km of the coast and more than 95% of the tourism related physical plant is located at or near the coast. In addition, much critical infrastructure including water, electricity, natural gas and telecommunication installations, transportation nodes (road, air and sea), commercial, health, education and government facilities can also be found in, or near the coast. Access to the coastal zone is also critical for other traditional uses such as fishing and maritime transport. It is for these reasons that integrated coastal area management must be regarded as a critical activity to support national sustainable development goals.
2. Due to its location and geology, Barbados is moderately exposed to, inter alia, hurricanes and tropical storms and resulting directly from these: storm surges and storm-force winds. Also, the country is highly susceptible to coastal beach erosion and cliff instability, either from specific storm events or from ongoing geomorphologic processes. In addition, low lying regions of the island, including those in the densely populated coastal zone, are often prone to rainfall-induced flooding. As such, the country's primary locations of economic activity and associated public infrastructure are associated with a high level of exposure to natural hazards. Indeed, modelling suggests that coastal storm surge induced from a 100-year cyclone would affect 6,000 residences along the south and west coasts and 70% of west coast hotels would be negatively impacted<sup>2</sup>. Furthermore, average annual probable losses from multiple hazards and storm surge specifically have been estimated at US\$103.58M and US\$45.2 million respectively<sup>3</sup>.
3. The country continues to be faced with traditional challenges related to its limited economic diversification, fiscal fragility and susceptibility to the impacts of climate change including sea level rise, increased temperatures and the prospect of more intense hurricanes. As such, public policy and institutional reform efforts are not only centered on the fiscal, but on public sector efficiency, a strong social safety net and crisis-resilient health system, and as well as interventions that can and will better incentivize, stimulate and more optimally regulate resilient sustainable economic growth, now and in the future. Continued deliberate attention to resilience and disaster risk related policies to safeguard lives, investments and the economy is required and has been identified as a national priority. In 2018, the Government created a Ministry of Maritime Affairs and the Blue Economy (MMABE) on the premise that despite its small land space Barbados' maritime space is over 400 times larger, covering

183,436km<sup>2</sup> representing an underdeveloped and underexplored opportunity that should be sustainably utilized to advance the economic interest of the country.

4. The current activity is a component of a technical cooperation (TC) project facilitated by the Inter-American Development Bank (IDB) in order to support the Government of Barbados in the development of a program design that will build resilience, systematically manage disaster risk through risk identification, vulnerability reduction, and ex-ante risk mitigation in national ICZM, and in the context of the country's ambition and trajectory for Blue Economy development and growth in a post COVID19 reopening and recovery context.
5. The current TC project titled: Improving Institutional Frameworks for Integrated Coastal Zone Management, National Risk Information Planning Systems and Sustainable Climate-Resilient Coastal Infrastructure (BA-T1068) complements and utilizes outputs from the recently concluded Coastal Risk Assessment and Management Program (CRMP) Loan (BA-L1014) operation as well as several cooperation projects in Barbados supported by the Japan International Cooperation Agency (JICA), including The Caribbean Disaster Management Project Phase I, executed with the Caribbean Disaster Emergency Response Agency (CDERA, the current Caribbean Disaster Emergency Management Agency: CDEMA).
6. Notably, all prefeasibility or feasibility studies of specific investment projects including environmental and social studies should be consistent with the Environmental and Social Policy Framework (GN-2965-21).
7. One of the major outputs of the CRMP was the National Coastal Risk Information and Planning Platform (NCRIPP), a multi-user, web-based software system for assessing risks to assets/infrastructure island-wide from various natural hazard scenarios including storm winds, rainfall-induced flooding and coastal cliff instability. The NCRIPP utilizes hazard exposure model outputs based on the probabilistic assessment of hazards for various return periods combined with vulnerability and asset value information to quantify risk in terms of the cost of repair or replacement for different event severities.
8. These terms of reference (TORs) refer to the services of a consultant to develop a work plan for the upgrading of the NCRIPP and for its integration within Government of Barbados financial and emergency management processes.

## **2. Objectives and Framework**

- a. The Specific objectives of this consultancy are:
  - i. The development of a work plan identifying the necessary activities and technical requirements to permit the updating of the NCRIPP's underlying cadastral and asset characteristic data sets on a real-time or near real-time basis to support time-relevant decision making utilizing the risk calculation functionality of the NCRIPP.
  - ii. The identification of the necessary actions to facilitate the sustainable integration of the NCRIPP within Government of Barbados processes related to the mitigation, financial management, risk transfer and emergency planning aspects of the disaster management cycle.



- b. The consultant will work in a collaborative manner with the developers of the NCRIPP and Government of Barbados stakeholders to clearly identify the technical, capacity and financial resources necessary to meet the requirements of the objectives.

### **3. Main Activities**

The consultant will:

- a. Prepare an Inception Report describing the methodology and schedule of tasks for the development of the work plan for the upgrading of the NCRIPP as well as identification of necessary NCRIPP integration actions
- b. Review the technical details, datasets and risk-related outputs of the NCRIPP risk assessment system;
- c. Obtain detailed feedback from the developers of the NCRIPP (Applied Research Associates) on the technical requirements to permit the system to ingest continuously updated cadastral, asset and demographic data including approximate costs for the software development required to modify the system;
- d. Obtain detailed feedback from the developers of the NCRIPP (ARA) on the technical requirements to permit new asset classes (coastal and marine ecosystems) to be incorporated within the NCRIPP, including approximate costs for the software development required to modify the system;
- e. Consult with stakeholders in the land management framework of the Government of Barbados (Lands and Surveys Department, Town and Country Development Planning, Barbados Revenue Authority) to obtain feedback on the status of complimentary activities with regard to digital land information management systems and planned future operational practices for the updating of information in these systems;
- f. Consult with stakeholders in the demographic information management framework of the Government of Barbados (Barbados Statistical Service, Ministry of Social Care) to obtain feedback on the mechanisms by which demographic information is collected and updated and modalities for the sharing of this information or its derivatives for the purpose of visualization within the NCRIPP;
- g. Consult with relevant persons within the Ministry of Finance in relation to national budgeting for disaster risk reduction initiatives and risk transfer initiatives in order to determine the types and format of hazard, exposure and/or risk information that would inform their decision-making processes. Also determine the Ministry's preferred method for capacity development/training for use of the NCRIPP;
- h. Consult with relevant persons within the Department of Emergency Management in relation to emergency management planning to determine the types and format of hazard, exposure and/or risk information that would inform their planning procedures. Also determine the Department's preferred method for capacity development/training for use of the NCRIPP;
- i. Prepare an NCRIPP Upgrade and Integration Report detailing the technical, capacity and financial requirements for the upgrading of the NCRIPP as described in c. to f. as well as the actions required to integrate the NCRIPP within national financial

management and emergency management planning processes as described in g. and h.

- j. Based on the information in i. prepare an Activity Portfolio which includes detailed individual terms of reference for the required activities including costs and timeframes for execution.

#### 4. **Reports/Deliverables**

- a. Inception Report as described in 3a within **two weeks** of the start of the contract;
- b. Draft NCRIPP Upgrade and Integration Report (3i) within **four months** of the start of the contract;
- c. Activity Portfolio (3j) within **five months** of the start of the contract.

#### 5. **Payment Schedule**

- 15% upon delivery and approval of the Inception Report (4a);
- 50% upon delivery and approval of the Draft NCRIPP Upgrade and Integration Report (4b);
- 35% upon delivery and approval of the Activity Portfolio (4c).

#### 6. **Characteristics of the Consultancy**

1. Consultancy category and modality: Individual Consultant.
2. Contract duration: 50 discontinuous days within 5 months.
3. Travel: Travel to Barbados for the purpose of stakeholder interaction can be included in the Consultant's proposal but is not a requirement of the activity.
4. Place of work: Barbados and/or consultant's country of residence
5. Responsible Person: Project Manager, Ricardo Arthur (CZMU)

#### 7. **Required Qualifications**

- A minimum Bachelor's degree in human resource management or organizational development or related fields with experience in public sector training and/or capacity development, with at least 5 years in a professional capacity. Experience in hazard risk management systems or operational hazard risk management an asset.
- Languages: English
- Skills: Excellent analytical, writing and communication skills.

### **8Coordination**

The consultant will report directly to the Project Manager of the CRMP who will supervise the consultancy. Staff from the Project Execution Team (PET) will provide technical, administrative and coordination support to the consultancy. The consultants should be in regular contact with

such representatives during the preparation of the work to provide the PET with informal updates on the progress of the work, and to discuss any issues that may need to be resolved to facilitate successful implementation.

## **BARBADOS**

### **Improving Institutional Frameworks for Integrated Coastal Zone Management, National Risk Information Planning Systems and Sustainable Climate-Resilient Coastal Infrastructure (BA-T1068)**

#### **High Resolution Flood Modelling for the Enhancement of the National Coastal Risk Information and Planning Platform**

### **TERMS OF REFERENCE**

#### **1. Background**

1. The coastal zone of Barbados is the country's main economic asset. In 2018, contribution of travel and tourism to GDP for Barbados was 34.9 %<sup>1</sup>. More than half the population reside within 2km of the coast and more than 95% of the tourism related physical plant is located at or near the coast. In addition, much critical infrastructure including water, electricity, natural gas and telecommunication installations, transportation nodes (road, air and sea), commercial, health, education and government facilities can also be found in, or near the coast. Access to the coastal zone is also critical for other traditional uses such as fishing and maritime transport. It is for these reasons that integrated coastal area management must be regarded as a critical activity to support national sustainable development goals.
2. Due to its location and geology, Barbados is moderately exposed to, inter alia, hurricanes and tropical storms and resulting directly from these: storm surges and storm-force winds. Also, the country is highly susceptible to coastal beach erosion and cliff instability, either from specific storm events or from ongoing geomorphologic processes. In addition, low lying regions of the island, including those in the densely populated coastal zone, are often prone to rainfall-induced flooding. As such, the country's primary locations of economic activity and associated public infrastructure are associated with a high level of exposure to natural hazards. Indeed, modelling suggests that coastal storm surge induced from a 100-year cyclone would affect 6,000 residences along the south and west coasts and 70% of west coast hotels would be negatively impacted<sup>2</sup>. Furthermore, average annual probable losses from multiple hazards and storm surge specifically have been estimated at US\$103.58M and US\$45.2 million respectively<sup>3</sup>.
3. The country continues to be faced with traditional challenges related to its limited economic diversification, fiscal fragility and susceptibility to the impacts of climate change including sea level rise, increased temperatures and the prospect of more intense hurricanes. As such, public policy and institutional reform efforts are not only centered on the fiscal, but on public sector efficiency, a strong social safety net and crisis-resilient health system, and as well as interventions that can and will better incentivize, stimulate and more optimally regulate resilient sustainable economic growth, now and in the future. Continued deliberate attention to resilience and disaster risk related policies to safeguard lives, investments and the economy is required and has been identified as a national priority. In 2018, the Government created a Ministry of Maritime Affairs and the Blue Economy (MMABE) on the premise that despite its small land space Barbados' maritime space is over 400 times larger, covering

183,436km<sup>2</sup> representing an underdeveloped and underexplored opportunity that should be sustainably utilized to advance the economic interest of the country.

4. The current activity is a component of a technical cooperation (TC) project facilitated by the Inter-American Development Bank (IDB) in order to support the Government of Barbados in the development of a program design that will build resilience, systematically manage disaster risk through risk identification, vulnerability reduction, and ex-ante risk mitigation in national ICZM, and in the context of the country's ambition and trajectory for Blue Economy development and growth in a post COVID19 reopening and recovery context.
5. The current TC project titled: Improving Institutional Frameworks for Integrated Coastal Zone Management, National Risk Information Planning Systems and Sustainable Climate-Resilient Coastal Infrastructure (BA-T1068) complements and utilizes outputs from the recently concluded Coastal Risk Assessment and Management Program (CRMP) Loan (BA-L1014) operation as well as several cooperation projects in Barbados supported by the Japan International Cooperation Agency (JICA), including The Caribbean Disaster Management Project Phase I, executed with the Caribbean Disaster Emergency Response Agency (CDERA, the current Caribbean Disaster Emergency Management Agency: CDEMA).
6. Notably, all prefeasibility or feasibility studies of specific investment projects including environmental and social studies should be consistent with the Environmental and Social Policy Framework (GN-2965-21).
7. One of the major outputs of the CRMP was the National Coastal Risk Information and Planning Platform (NCRIPP), a multi-user, web-based software system for assessing risks to assets/infrastructure island-wide from various natural hazard scenarios including storm winds, rainfall-induced flooding and coastal cliff instability. The NCRIPP utilizes hazard exposure model outputs based on the probabilistic assessment of hazards for various return periods combined with vulnerability and asset value information to quantify risk in terms of the cost of repair or replacement for different event severities.
8. These terms of reference (TORs) refer to the consultant services required to model the rainfall-induced flooding hazard at the watershed scale at a higher resolution than was utilized during the development of the NCRIPP.

## 2. **Objective and Framework**

- a. The Specific objective of this consultancy is to conduct rainfall-induced flood modelling at the watershed/sub-watershed scale for the entire island of Barbados at a 5m or finer grid resolution within the terrestrial portions of model domains for the 10, 25, 50 and 100yr return periods based on the probabilistically determined rainfall event scenarios evaluated under the NCRIPP, including climate change considerations. The end result of the modelling exercise will be high-resolution (5m or finer grid size) spatial data layers indicating the spatial extent and depth of flood waters relative to the topographic data for the specified return period events.

- b. The consultant will perform the modelling with topographical data from the high resolution LiDAR survey conducted under the CRMP in 2015, as well as other datasets (land use, soil type) utilized for the original flood modelling.

### 3. Main Activities

The consultant will:

- a. Review the technical details and datasets used to perform the CRMP rainfall-induced flood modelling study and prepare a Work Plan describing the methodology and schedule of tasks required to perform the new modelling and produce the required area coverage/water level spatial datasets at the desired resolution
- b. Prepare watershed maps defining the individual model domains to be used for the hydrologic/flood modelling and present the maps to the CZMU for discussion and agreement;
- c. Perform the hydrologic/flood modelling for the agreed watersheds utilizing the probabilistic rainfall scenarios developed under the CRMP study at the required resolution and prepare a report detailing the technical considerations, assumptions, issues and limitations of the flood modelling. The report must include a comparative analysis of the results from the CRMP flood hazard study;
- d. Present the results of the flood modelling to the CZMU and strategic partners and provide recommendations for future activities to improve hydrologic/flood modelling and model validation in Barbados;
- e. Provide the high-resolution flood model output spatial data layers to the CZMU along with ISO standard 19139/19115 metadata for each layer.

### 4. Reports/Deliverables

- a. Work Plan as described in 3a within **three weeks** of the start of the contract;
- b. Presentation of watershed maps **two months** of the start of the contract;
- c. Flood modelling report within **four months** of the start of the contract;
- d. Presentation of the flood modelling results and datasets within **five months** of the start of the contract.

### 5. Payment Schedule

- 15% upon delivery and approval of the Work Plan (4a);
- 50% upon delivery and approval of the final Flood Modelling Report (4c);
- 35% upon delivery Flood Modelling presentation and submission and approval of the flood model output spatial data layers (4d and 4e);

### 6. Characteristics of the Consultancy

1. Consultancy category and modality: Individual Consultant.
2. Contract duration: 60 discontinuous days within 6 months.

3. Travel: Travel to Barbados is not required for the purposes of this study.
4. Place of work: Consultant's country of residence
5. Responsible Person: Project Manager, Ricardo Arthur (CZMU)

7. **Required Qualifications**

- A post-graduate degree in hydrological modelling or fluid mechanics or related fields with extensive experience and/or a specialty in flood modelling with at least 5 years in a professional capacity. The modelling of stream flows/flooding in karst topographies an asset.
- Languages: English
- Skills: Excellent analytical, writing and communication skills.

## **BARBADOS**

### **Improving Institutional Frameworks for Integrated Coastal Zone Management, National Risk Information Planning Systems and Sustainable Climate-Resilient Coastal Infrastructure (BA-T1068)**

#### **Critical Evaluation of the Risk Determination Frameworks in NCRIPP and CAPRA**

#### **TERMS OF REFERENCE**

##### **1. Background**

1. The coastal zone of Barbados is the country's main economic asset. In 2018, contribution of travel and tourism to GDP for Barbados was 34.9 %<sup>1</sup>. More than half the population reside within 2km of the coast and more than 95% of the tourism related physical plant is located at or near the coast. In addition, much critical infrastructure including water, electricity, natural gas and telecommunication installations, transportation nodes (road, air and sea), commercial, health, education and government facilities can also be found in, or near the coast. Access to the coastal zone is also critical for other traditional uses such as fishing and maritime transport. It is for these reasons that integrated coastal area management must be regarded as a critical activity to support national sustainable development goals.
2. Due to its location and geology, Barbados is moderately exposed to, inter alia, hurricanes and tropical storms and resulting directly from these: storm surges and storm-force winds. Also, the country is highly susceptible to coastal beach erosion and cliff instability, either from specific storm events or from ongoing geomorphologic processes. In addition, low lying regions of the island, including those in the densely populated coastal zone, are often prone to rainfall-induced flooding. As such, the country's primary locations of economic activity and associated public infrastructure are associated with a high level of exposure to natural hazards. Indeed, modelling suggests that coastal storm surge induced from a 100-year cyclone would affect 6,000 residences along the south and west coasts and 70% of west coast hotels would be negatively impacted<sup>2</sup>. Furthermore, average annual probable losses from multiple hazards and storm surge specifically have been estimated at US\$103.58M and US\$45.2 million respectively<sup>3</sup>.
3. The country continues to be faced with traditional challenges related to its limited economic diversification, fiscal fragility and susceptibility to the impacts of climate change including sea level rise, increased temperatures and the prospect of more intense hurricanes. As such, public policy and institutional reform efforts are not only centered on the fiscal, but on public sector efficiency, a strong social safety net and crisis-resilient health system, and as well as interventions that can and will better incentivize, stimulate and more optimally regulate resilient sustainable economic growth, now and in the future. Continued deliberate attention to resilience and disaster risk related policies to safeguard lives, investments and the economy is required and has been identified as a national priority. In 2018, the Government created a Ministry of Maritime Affairs and the Blue Economy (MMABE) on the premise that despite its small land space Barbados' maritime space is over 400 times larger, covering



183,436km<sup>2</sup> representing an underdeveloped and underexplored opportunity that should be sustainably utilized to advance the economic interest of the country.

4. The current activity is a component of a technical cooperation (TC) project facilitated by the Inter-American Development Bank (IDB) in order to support the Government of Barbados in the development of a program design that will build resilience, systematically manage disaster risk through risk identification, vulnerability reduction, and ex-ante risk mitigation in national ICZM, and in the context of the country's ambition and trajectory for Blue Economy development and growth in a post COVID19 reopening and recovery context.
5. The current TC project titled: Improving Institutional Frameworks for Integrated Coastal Zone Management, National Risk Information Planning Systems and Sustainable Climate-Resilient Coastal Infrastructure (BA-T1068) complements and utilizes outputs from the recently concluded Coastal Risk Assessment and Management Program (CRMP) Loan (BA-L1014) operation as well as several cooperation projects in Barbados supported by the Japan International Cooperation Agency (JICA), including The Caribbean Disaster Management Project Phase I, executed with the Caribbean Disaster Emergency Response Agency (CDERA, the current Caribbean Disaster Emergency Management Agency: CDEMA).
6. Notably, all prefeasibility or feasibility studies of specific investment projects including environmental and social studies should be consistent with the Environmental and Social Policy Framework (GN-2965-21).
7. One of the major outputs of the CRMP was the National Coastal Risk Information and Planning Platform (NCRIPP), a multi-user, web-based software system for assessing risks to assets/infrastructure island-wide from various natural hazard scenarios including storm winds, rainfall-induced flooding and coastal cliff instability. The NCRIPP utilizes hazard exposure model outputs based on the probabilistic assessment of hazards for various return periods combined with vulnerability and asset value information to quantify risk in terms of the cost of repair or replacement for different event severities.
8. These terms of reference (TORs) refer to the services of a consultant to perform a critical evaluation and comparison of the risk determination models used in the NCRIPP versus those used in the CAPRA system.

## **2. Objective and Framework**

- a. The Specific objective of this consultancy is to conduct an comparative evaluation of both the NCRIPP and the CAPRA (probabilistic) risk assessment systems to compare and contrast the risk determination frameworks (including model assumptions) of both platforms.
- b. The consultant will also make recommendations on how the NCRIPP could be modified to produce additional/enhanced probabilistic risk information of practical benefit to development planning and national risk mitigation initiatives.

### 3. Main Activities

The consultant will:

- a. Develop a work plan for the assessment detailing the schedule and required tasks to complete the critical evaluation and comparison of the platforms
- b. Review the technical details, datasets and risk-related outputs of the NCRIPP risk assessment system;
- c. Conduct interviews with the developers on the NCRIPP platform (Applied Research Associates) as required to obtain additional insights into the risk determination processes;
- d. Review the risk determination procedures for the CAPRA platform;
- e. Prepare a Platform Comparison Report for the NCRIPP and CAPRA describing the differences and similarities between the risk calculation functionality of the systems and detailing the assumptions and any specific considerations inherent in both systems and the authoritative sources of this information. The report should also make recommendations for how the NCRIPP could be modified to perform additional risk metric calculations or assessment types to increase its utility for development planning and other phases of the risk management cycle;

### 4. Reports/Deliverables

- a. Work Plan as described in 3a within **two weeks** of the start of the contract;
- b. Draft Platform Comparison Report within **three months** of the start of the contract;
- c. Final Platform Comparison Report within **four months** of the start of the contract.

### 5. Payment Schedule

- 15% upon delivery and approval of the Work Plan (4a);
- 40% upon delivery and approval of the Draft Platform Comparison Report (4b);
- 45% upon delivery and approval of the Final Platform Comparison Report (4c).

### 6. Characteristics of the Consultancy

1. Consultancy category and modality: Individual Consultant.
2. Contract duration: 40 discontinuous days within 5 months.
3. Travel: Travel to Barbados is not required for the purposes of this study.
4. Place of work: Consultant's country of residence
5. Responsible Person: Project Manager, Ricardo Arthur (CZMU)

### 7. Required Qualifications

- A post-graduate degree in civil engineering or structural engineering or hazard risk assessment or related fields with extensive experience and/or a specialty in the

numerical determination of risk based on asset vulnerability and hazard severity, with at least 5 years in a professional capacity. Extensive experience in the determination of risk via assessment platforms such as CAPRA an asset.

- Languages: English
- Skills: Excellent analytical, writing and communication skills.

## **8Coordination**

The consultant will report directly to the Project Manager of the CRMP who will supervise thconsultancy. Staff from the Project Execution Team (PET) will provide technical, administrative and coordination support to the consultancy. The consultants should be in regular contact with such representatives during the preparation of the work to provide the PET with informal updates on the progress of the work, and to discuss any issues that may need to be resolved to facilitate successful implementation

## **BARBADOS**

### **Improving Institutional Frameworks for Integrated Coastal Zone Management, National Risk Information Planning Systems and Sustainable Climate-Resilient Coastal Infrastructure (BA-T1068)**

#### **NCRIPP Software Engineering Development for Advanced Functionality**

#### **TERMS OF REFERENCE**

##### **1. Background**

1. The coastal zone of Barbados is the country's main economic asset. In 2018, contribution of travel and tourism to GDP for Barbados was 34.9 %<sup>1</sup>. More than half the population reside within 2km of the coast and more than 95% of the tourism related physical plant is located at or near the coast. In addition, much critical infrastructure including water, electricity, natural gas and telecommunication installations, transportation nodes (road, air and sea), commercial, health, education and government facilities can also be found in, or near the coast. Access to the coastal zone is also critical for other traditional uses such as fishing and maritime transport. It is for these reasons that integrated coastal area management must be regarded as a critical activity to support national sustainable development goals.
2. Due to its location and geology, Barbados is moderately exposed to, inter alia, hurricanes and tropical storms and resulting directly from these: storm surges and storm-force winds. Also, the country is highly susceptible to coastal beach erosion and cliff instability, either from specific storm events or from ongoing geomorphologic processes. In addition, low lying regions of the island, including those in the densely populated coastal zone, are often prone to rainfall-induced flooding. As such, the country's primary locations of economic activity and associated public infrastructure are associated with a high level of exposure to natural hazards. Indeed, modelling suggests that coastal storm surge induced from a 100-year cyclone would affect 6,000 residences along the south and west coasts and 70% of west coast hotels would be negatively impacted<sup>2</sup>. Furthermore, average annual probable losses from multiple hazards and storm surge specifically have been estimated at US\$103.58M and US\$45.2 million respectively<sup>3</sup>.
3. The country continues to be faced with traditional challenges related to its limited economic diversification, fiscal fragility and susceptibility to the impacts of climate change including sea level rise, increased temperatures and the prospect of more intense hurricanes. As such, public policy and institutional reform efforts are not only centered on the fiscal, but on public sector efficiency, a strong social safety net and crisis-resilient health system, and as well as interventions that can and will better incentivize, stimulate and more optimally regulate resilient sustainable economic growth, now and in the future. Continued deliberate attention to resilience and disaster risk related policies to safeguard lives, investments and the economy is required and has been identified as a national priority. In 2018, the Government created a Ministry of Maritime Affairs and the Blue Economy (MMABE) on the premise that despite its small land space Barbados' maritime space is over 400 times larger, covering

183,436km<sup>2</sup> representing an underdeveloped and underexplored opportunity that should be sustainably utilized to advance the economic interest of the country.

4. The current activity is a component of a technical cooperation (TC) project facilitated by the Inter-American Development Bank (IDB) in order to support the Government of Barbados in the development of a program design that will build resilience, systematically manage disaster risk through risk identification, vulnerability reduction, and ex-ante risk mitigation in national ICZM, and in the context of the country's ambition and trajectory for Blue Economy development and growth in a post COVID19 reopening and recovery context.
5. The current TC project titled: Improving Institutional Frameworks for Integrated Coastal Zone Management, National Risk Information Planning Systems and Sustainable Climate-Resilient Coastal Infrastructure (BA-T1068) complements and utilizes outputs from the recently concluded Coastal Risk Assessment and Management Program (CRMP) Loan (BA-L1014) operation as well as several cooperation projects in Barbados supported by the Japan International Cooperation Agency (JICA), including The Caribbean Disaster Management Project Phase I, executed with the Caribbean Disaster Emergency Response Agency (CDERA, the current Caribbean Disaster Emergency Management Agency: CDEMA).
6. Notably, all prefeasibility or feasibility studies of specific investment projects including environmental and social studies should be consistent with the Environmental and Social Policy Framework (GN-2965-21).
7. One of the major outputs of the CRMP was the National Coastal Risk Information and Planning Platform (NCRIPP), a multi-user, web-based software system for assessing risks to assets/infrastructure island-wide from various natural hazard scenarios including storm winds, rainfall-induced flooding and coastal cliff instability. The NCRIPP utilizes hazard exposure model outputs based on the probabilistic assessment of hazards for various return periods combined with vulnerability and asset value information to quantify risk in terms of the cost of repair or replacement for different event severities.
8. These terms of reference (TORs) refer to the services of a consultant to modify the software components of the NCRIPP to incorporate new datasets and enhanced functionality.

## **2. Objective and Framework**

- a. The Specific objective of this consultancy is to incorporate updated rainfall flood model and beach erosion model datasets within the NCRIPP as well as to update/add the risk calculation and results presentation functions for these hazards.
- b. The consultant will also be responsible for detailing the requirements for the updating of the underlying cadastral and demographic datasets for the NCRIPP on a continuous basis and preparing the platform for this eventuality.

### 3. Main Activities

The consultant will:

- a. Develop an inception report for the activity identifying the required activities to achieve the requirements of the TOR and the timelines for each activity;
- b. Review the datasets and risk calculation methodologies for both the high resolution rainfall flooding and beach erosion modelling studies completed under other contracts/activities;
- c. Undertake the software programming and database modifications necessary to update the NCRIPP to incorporate both the new datasets in terms of assets, hazard extent and severity, risk calculation parameters and processes, risk reporting and mitigation modelling;
- d. Prepare a Platform Modification Summary Report which describes the changes to the capabilities of the NCRIPP system, how to retrieve risk information related to both the revised rainfall flooding and beach erosion hazard models, how to perform mitigation modelling for both hazard types, and how to compare the pre/post mitigation modelling results;
- e. Undertake any necessary software programming and database modifications necessary to update the NCRIPP in preparation for continuously updated cadastral (land parcels, building polygons) and demographic (occupation, population density, etc.) datasets;
- f. Prepare an NCRIPP Cadastral Data Workflow Report that describes the necessary steps, considerations, requirements and technical details to allow for the integration of updated cadastral and demographic datasets on a continuous basis in a manner which maintains system integrity, preserves version information and identifies the date on which the system was updated for each dataset.

### 4. Reports/Deliverables

- a. Inception Report as described in 3a within **two weeks** of the start of the contract;
- b. Platform Modification Summary Report (3d) within **three months** of the start of the contract;
- c. NCRIPP Cadastral Data Workflow Report (3f) within **four months** of the start of the contract.

### 5. Payment Schedule

- 15% upon delivery and approval of the Inception Report (4a);
- 50% upon delivery and approval of the Platform Modification Summary Report (4b);
- 35% upon delivery and approval of the NCRIPP Cadastral Data Workflow Report (4c).

### 6. Characteristics of the Consultancy

1. Consultancy category and modality: Individual Consultant.

2. Contract duration: 30 discontinuous days within 5 months.
3. Travel: Travel to Barbados is not required for the purposes of this study.
4. Place of work: Consultant's country of residence
5. Responsible Person: Project Manager, Ricardo Arthur (CZMU)

**7. Required Qualifications**

- Extensive experience and/or a specialty in the software development for web-based land use/development planning platforms and/or hazard risk determination platforms, with at least 5 years in a professional capacity.
- Languages: English
- Skills: Excellent analytical, writing and communication skills.

**8Coordination**

The consultant will report directly to the Project Manager of the CRMP who will supervise the consultancy. Staff from the Project Execution Team (PET) will provide technical, administrative and coordination support to the consultancy. The consultants should be in regular contact with such representatives during the preparation of the work to provide the PET with informal updates on the progress of the work, and to discuss any issues that may need to be resolved to facilitate successful implementation

## **BARBADOS**

### **TERMS OF REFERENCE**

#### **Community Based Disaster Risk Management**

##### **1. Background**

1. The coastal zone of Barbados is the country's main economic asset. In 2018, the contribution of travel and tourism to GDP for Barbados was 34.9 %<sup>1</sup>. More than half the population reside within 2km of the coast and more than 95% of the tourism related physical plant is located at or near the coast. Modeling suggests that coastal storm surge induced from a 100-year cyclone predicts that 6,000 residences along the south and west coasts and 70% of west coast hotels would be affected<sup>2</sup>. Average annual probable losses from multiple hazards and storm surge, specifically have been estimated at US\$103.58M for US\$45.2 million respectively<sup>3</sup>. In part as a result of a lingering recession, Barbados has been facing severe macroeconomic challenges and in 2018, Barbados signed a US\$290 million four-year International Monetary Fund (IMF) Extended Fund Facility (EFF) program and has been in the process of undergoing a comprehensive reform. The COVID-19 pandemic poses a significant threat to the continued achievement of the structural performance benchmarks under the EFF, particularly if there is an extended downturn in the tourism sector which is a main driver for growth and source of foreign exchange for the country.
2. The country continues to be faced with traditional challenges related to its limited economic diversification, fiscal fragility and susceptibility to the impacts of climate change including sea level rise, increased temperatures, drought and the prospect of more intense hurricanes. As such, public policy and institutional reform efforts are not only centered on the fiscal, but on public sector efficiency, a strong social safety net and crisis-resilient health system, as well as interventions that can and will better incentivize, stimulate and more optimally regulate resilient sustainable economic growth, now and in the future. Continued deliberate attention to resilience and disaster risk related policies to safeguard lives, investments and the economy is required. In 2018, the Government created a Ministry of Maritime Affairs and the Blue Economy (MMABE) on the premise that despite its small land space Barbados' maritime space is over 400 times bigger, covering 183,436km<sup>2</sup> representing an underdeveloped and underexplored opportunity that should be sustainably utilized to advance the economic interest of the country. The importance of risk-based coastal planning, long-term shoreline planning and beach enhancement, including the promotion of hazard-resilient coastal infrastructure in this context was underscored and reinforced in the International Monetary Fund's Extended Fund Facility (IMF-EFF) October 2018 report. Such measures will also support the country's post COVID19 reopening business strategy and reinforce its destination competitiveness in the mid to longer term.
3. The proposed Technical Cooperation (TC) will help the MMABE to identify and specify the scope, dimension, and scale of modernized/updated institutional public policy,



institutional (including requisite technical skills and competencies), legislative and budgetary reforms and adjustments that are required to meet contemporary emergent ICZM challenges and those of the future as well as to improve and strengthen the transition to Blue Economy, in a post COVID19 reopening and recovery context. The Government has already approved budgetary resources in its financial estimates for the continuation of the Project Execution Team (PET) staff resource complement beyond the life of the concluding Coastal Risk Assessment and Management Program Loan (BA-L1014) operation, from February 2020 through to February 2022, signaling its strong commitment to the continuance of the ICZM agenda.

4. This TC will support the Government to develop a program design that will build resilience, systematically manage disaster risk through risk identification, vulnerability reduction, and ex-ante risk mitigation in national ICZM and in the context of the country's ambition and trajectory for Blue Economy development and growth. The TC is aligned with the Bank's Disaster Risk Management Policy (GN-2354-5) in Directive A2, "Identification and Reduction of Project Risk". The TC is also aligned with one of the objectives of SUS: Strengthen capacities to manage disaster risk and respond to emergencies stemming from disasters (GN-2819-1). Additionally, the TC is consistent with IDB Group's Operational Response Framework to the COVID19 Pandemic in the context of support to strategic supply chains and productive development/investments.
5. Notably, all prefeasibility or feasibility studies of specific investment projects including environmental and social studies should be consistent with the Environmental and Social Policy Framework (GN-2965-21).

## 2. Objective

The specific objective of this consultancy is the preparation of behaviorally informed Community-Based Disaster Risk Management Plans for two communities identified as especially vulnerable using the National Coastal Risk Information and Planning Platform.

## 3. Scope of Services and Required Tasks

Under the direction of the Project Manager, the consultant will:

- i. Prepare and submit an Inception Report outlining the proposed methodology, work plan and schedule for completing the tasks described below **within one month of the commencement of this assignment.**
- ii. Through discussion with the Department of Emergency Management, other members of the National Emergency Management System (NEMS), and the two communities previously identified as being vulnerable to hazards, the consultant shall seek to characterize the two communities using a highly consultative approach. The analysis shall include but not limited to:
  - a. Review the existing hazard, risk and vulnerability maps of the communities;

- b. Conduct a demographic analysis related to age structure, type of housing, at-risk community members and vulnerable groups, etc.
- c. the strengths and weaknesses of the implementation of the community-based DRM including but not limited to the governance structure in place to support CBDRM programmes, present knowledge about DRM and CCA and behavioural adaptations measures implemented at the community and household level .
- iii. Collate this information into a Technical Paper and present the findings at stakeholder workshop in each community. **The Technical Paper and the workshop shall be submitted and completed within 3 months of the commencement of this assignment.**
- iv. Based on the information from the technical paper and the community stakeholder workshops, prepare a Draft Community-Based Disaster Management Plan which includes but is not limited to the following information:
  - a. Capacity development training initiatives for each community;
  - b. Pre- and post –assessment training tools;
  - c. Initiatives for reducing the impact to hazards based on the priority setting by the stakeholders;
  - d. Action plans and guidelines for the development of disaster risk management activities with clear pathways to access funding for the initiatives;
- v) Present the Draft Plan at a stakeholder workshop to be organized by the DEM. **The Draft Plan and the stakeholder workshop shall be submitted and conducted within five months of the commencement of this assignment; and**
- vi) Using information from the stakeholder workshop and the Draft Plan, submit the Final Community-Based DRM Plan. **The Final Plan shall be submitted within seven months of the commencement of this assignment.**

#### **4. Characteristics of the Assignment and Required Qualifications**

4.1.**Type of Consultancy:** Individual Consultant

4.2.**Starting Date and Duration:** Approximately nine months.

4.3.**Place of Work:** Barbados and the consultant's place of residence.

4.4.**Qualifications and Experience:**

i) A Master's degree from a recognized university in the fields of natural resource management, disaster management or any other related field.

ii) Demonstrated experience in:

- CBDRM

- Disaster Risk Management and vulnerability assessment & mapping, GIS applications
- Good training and workshop facilitations skills

iii) Excellent command of the English Language.

## **5. Client's Input**

5.1. The CRMP will provide the consultant with all relevant documentation required to facilitate the execution of the consultancy. The consultant will be required to interact with other agencies and departments to identify other possible sources of documentation relevant for the consultancy.

## **6. Payment Schedule**

6.1 Payment will be made on the submission and approval of the deliverables as described below:

- Inception Report – 10%
- Technical Paper and Workshop-20%
- Draft Plan and Workshop- 40%
- Final Plan-30%

## **8. Coordination**

8.1. The consultant will report directly to the Project Manager who will supervise the consultancy. Staff from the Project Execution Team (PET) will provide technical, administrative and coordination support to the consultancy. The consultant will maintain regular contact with the PET and provide the PET with monthly updates on the progress of the work and to discuss any issues that may need to be resolved or opportunities which may arise, in order to facilitate the successful implementation of the activity.

## **Barbados**

### **Coastal Zone Management Unit, Ministry of Maritime Affairs and The Blue Economy**

#### **Improving Institutional Frameworks for Integrated Coastal Zone Management, National Risk Information Planning Systems and Sustainable Climate-Resilient Coastal Infrastructure (BA-T1068)**

#### **Sustainable Climate Resilient Coastal Infrastructure- Quantification of Stone and Sand Materials & recommendations for procurement**

### **TERMS OF REFERENCE**

#### **I. Background**

1. The coastal zone of Barbados is the country's main economic asset. In 2018, contribution of travel and tourism to GDP for Barbados was 34.9 % . More than half the population reside within 2km of the coast and more than 95% of the tourism related physical plant is located at or near the coast. In addition, much critical infrastructure including water, electricity, natural gas and telecommunication installations, transportation nodes (road, air and sea), commercial, health, education and government facilities can also be found in, or near the coast. Access to the coastal zone is also critical for other traditional uses such as fishing and maritime transport. It is for these reasons that integrated coastal area management must be regarded as a critical activity to support national sustainable development goals.
2. Due to its location and geology, Barbados is moderately exposed to, inter alia, hurricanes and tropical storms and resulting directly from these: storm surges and storm-force winds. Also, the country is highly susceptible to coastal beach erosion and cliff instability, either from specific storm events or from ongoing geomorphologic processes. In addition, low lying regions of the island, including those in the densely populated coastal zone, are often prone to rainfall-induced flooding. As such, the country's primary locations of economic activity and associated public infrastructure are associated with a high level of exposure to natural hazards. Indeed, modelling suggests that coastal storm surge induced from a 100-year cyclone would affect 6,000 residences along the south and west coasts and 70% of west coast hotels would be negatively impacted. Furthermore, average annual probable losses from multiple hazards and storm surge specifically have been estimated at US\$103.58M and US\$45.2 million respectively.
3. The country continues to be faced with traditional challenges related to its limited economic diversification, fiscal fragility and susceptibility to the impacts of climate change including sea level rise, increased temperatures and the prospect of more intense hurricanes. As such, public policy and institutional reform efforts are not only centered on the fiscal, but on public sector efficiency, a strong social safety net and crisis-resilient health system, and as well as interventions that can and will better incentivize, stimulate and more optimally regulate resilient sustainable economic growth, now and in the future. Continued deliberate attention to resilience and disaster risk related policies to safeguard lives, investments and the economy is required and has been identified as a national priority. In 2018, the Government created a Ministry of

Maritime Affairs and the Blue Economy (MMABE) on the premise that despite its small land space Barbados' maritime space is over 400 times larger, covering 183,436km<sup>2</sup> representing an underdeveloped and underexplored opportunity that should be sustainably utilized to advance the economic interest of the country.

4. The current activity is a component of a technical cooperation (TC) project facilitated by the Inter-American Development Bank (IDB) in order to support the Government of Barbados in the development of a program design that will build resilience, systematically manage disaster risk through risk identification, vulnerability reduction, and ex-ante risk mitigation in national ICZM, and in the context of the country's ambition and trajectory for Blue Economy development and growth in a post COVID19 reopening and recovery context.
5. The current TC project titled: Improving Institutional Frameworks for Integrated Coastal Zone Management, National Risk Information Planning Systems and Sustainable Climate-Resilient Coastal Infrastructure (BA-T1068) complements and utilizes outputs from the recently concluded Coastal Risk Assessment and Management Program (CRMP) Loan (BA-L1014) operation as well as several cooperation projects in Barbados supported by the Japan International Cooperation Agency (JICA), including The Caribbean Disaster Management Project Phase I, executed with the Caribbean Disaster Emergency Response Agency (CDERA, the current Caribbean Disaster Emergency Management Agency: CDEMA).
6. Notably, all prefeasibility or feasibility studies of specific investment projects including environmental and social studies should be consistent with the Environmental and Social Policy Framework (GN-2965-21).
7. Under the Coastal Risk Assessment and Management Program (BA-L1014;) final engineering designs for waterfront and drainage improvements, highway protection, shoreline stabilization and enhancement along stretches of shoreline at five locations along the coast of Barbados were developed. The five large-scale coastal infrastructure projects which are 'shovel-ready' for construction including completed designs, quantity and cost estimates.
8. Based on the designs, beach nourishment is a major component of these coastal infrastructure projects. It would be necessary for the Government of Barbados to source 59,150m<sup>3</sup> of beach fill. Currently,; the estimated costs are approximately 12.5 million BDS equating to 15% of the project cost. Between design and construction of these projects it is expected that the estimated cost will change based on the proposed source of sand.
8. The natural alongshore sediment regime/budget of the south coast of Barbados allows for a more reliable supply whilst the sediment regime/budget for the west coast, is less reliable and as a consequence placement of beach fill is absolutely necessary for beach creation along the west coast.
9. The fundamentals of sediment transport along the shoreline of Barbados are generally well understood. Sediment budgets and transport studies were conducted

by Delcan (1995) for the south and west coasts in 1995 and by Halcrow for the east coast in 1999. In 1998 and 2007 In addition Sediment Trend Analyses were conducted for the entire island in two separate studies. the purpose of these recent investigations has been to aid in the design of specific coastal engineering structures, and not as updates to the sediment budgets. Under the CRMP, the sediment budget work was updated annualized sediment budgets based on the sediment production and transport characteristics and also an analysis and modelling of shoreline changes using at least two (2) future climate change and increased sea level scenarios.

10. There are a number of possible sources of beach fill. Quarried sand has been currently, utilised on a majority of coastal projects however, this has been considered as not being feasible due to concerns with the impact of compaction on sea turtle nesting. To address this concern, an assessment of alternative sand sources from either offshore deposits or other countries is required to determine sustained availability and the ability of the sourced sand to perform similar to the sand naturally found at the current project sites.
11. Armour stones are the major elements of the coastal engineering projects to provide shoreline protection. For these projects, the majority of armour stones would be imported as the locally sourced stone is made from limestone which is more porous and not as durable as the imported granite stone. Also, requiring procurement for the projects would be local and imported armour stones. These projects require 50,438 tonnes of imported stone with an estimated cost of 14.75 million BDS and 25,303 tonnes of local stone with an estimated cost of 3.3 million BDS.
12. This terms of reference (TOR) refer to the services of a consultant for activities related to Component 3- Sustainable Climate Resilient Coastal Infrastructure- Procurement of Sand and Armour Stone.

## **2. Purpose and Objective**

- a. The Specific objective of this consultancy is to develop a procurement plan for the sourcing of sand and armour stone sources that would be suitable for use in beach rehabilitation projects developed under the BA-L1014 program. This would require an assessment of local, regional and international sand and armour stone sources.

## **3. Main Activities**

The consultant will:

- a. Prepare and submit an Inception Report which includes but not limited to: executive summary, objectives of the assignment, approach/methodology and workplan/schedule.
- b. Review and assess existing studies and reports which include (i) sediment transport and budgets studies; (ii) existing database on sediment sample characteristics
- c. Following the review and in guidance with the Coastal Zone Management Unit, the consultant will propose the three most feasible sites within Barbados' waters for the offshore sand supply for the proposed coastal infrastructure projects.

- d. At the proposed sites recommended at (3c) the consultant will conduct the quantitative assessments of Barbados' offshore sand reserves to ground truth the spatial extent and sand depths.
- e. Using the information from (3d), compare feasible local , regional and international sand sources. Discussion should (i) include an analysis of the compatibility of the fill material with respect to the native sand at the receiving beaches to be nourished. (ii) indicate the suitability of the materials to meet the requirements outlined in the technical specifications of the coastal infrastructure projects developed under BA-L1014; (iii) cost associated with the source which would include but not limited to cost of dredging, transporting, storage and placing a specified volume of sediment;
- f. Conduct an evaluation of regional and international sources for the supply of the imported stone requirements for the coastal infrastructure projects. This evaluation should include but not limited to (i) material quality to meet the requirements of the technical specification (ii) material availability and production rates (iii) cost (iv) transportation methods (v) scheduling considerations.
- g. Present the assessment from (3e) and (3f) on the various local, regional, and international sediment and armour sources for the proposed Coastal Infrastructure Projects. The assessment should include (i) a discussion of the costs and benefits, risks and sustainability issues relevant to each option;
- h. Recommendations should be made to the Government of Barbados on the most suitable source for the proposed works based on the assessment from (3g). This should include a procurement plan for the sourcing of both the sand and armour stone.
- i. Provide a review of the benefits vs the risk of the Client- supplied armour stone and sand. Based on this review and utilizing the assessment at (e) recommendation if the procurement of sand should be the responsibility of the Client or Contractor
- j. Provide monthly progress reports including (i) activities completed and overview of evaluations conducted (ii) upcoming activities and (iii) project concerns

#### 4. **Reports/Deliverables**

- a. Inception report as described in 3a within **two weeks** of the start of the contract
- b. Progress Reports as described in 3i reviewing the activities every month submitted within **one(1), two (2), three (3)** of the start of the contract
- c. Final report providing recommendations and Procurement plan as described at 3h submitted within **four months** of the start of the contract

Each report must be submitted as: (i) one hard copy (ii) one electronic file in MS format and (iii) an electronic file in PDF.

## **5. Payment Schedule**

Payments will be made as follows:

- a. 20% upon delivery and approval of the Inception report
- b. 10% upon delivery and approval of 1<sup>st</sup> progress report
- c. 10% upon delivery and approval of 2<sup>nd</sup> progress report
- d. 10% upon delivery and approval of 3<sup>rd</sup> progress report
- e. 50% upon delivery and approval of the Final report

## **6. Characteristics Of The Consultancy**

- a. Consultancy category and modality: Individual Consultant.
- b. Contract duration: 45 discontinuous days within 4 months.
- c. Travel: Travel to Barbados necessary for the purpose of offshore sand assessment.
- d. Place of work: Barbados and/or the Consultant's country of residence
- e. Responsible Person: Project Manager, Ricardo Arthur (CZMU)

## **7. Required Qualifications**

- a. Qualifications and Skills: A Master's degree in Coastal Engineering or a similar field
- b. Experience: At least five years of relevant professional experience in the procurement of sand, armor stone, and/or other natural materials used in the construction of coastal engineering.

## **8. Coordination**

The consultant will report directly to the Project Manager of the CRMP who will supervise the consultancy. Staff from the Project Execution Team (PET) will provide technical, administrative and coordination support to the consultancy. The consultants should be in regular contact with such representatives during the preparation of the work to provide the PET with informal updates on the progress of the work, and to discuss any issues that may need to be resolved to facilitate successful implementation.



## **Barbados**

### **Coastal Zone Management Unit, Ministry of Maritime Affairs and The Blue Economy**

#### **Improving Institutional Frameworks for Integrated Coastal Zone Management, National Risk Information Planning Systems and Sustainable Climate-Resilient Coastal Infrastructure (BA-T1068)**

#### **Decision Methodology to Evaluate Final Engineering Documents & Preparation of Maintenance and Operational Plan for Five Sustainable Climate Resilient Coastal Infrastructure Projects**

### **TERMS OF REFERENCE**

#### **1. Background**

1. The current TC project titled: Improving Institutional Frameworks for Integrated Coastal Zone Management, National Risk Information Planning Systems and Sustainable Climate-Resilient Coastal Infrastructure (BA-T1068) complements and utilizes outputs from the recently concluded Coastal Risk Assessment and Management Program (CRMP) Loan (BA-L1014) operation as well as several cooperation projects in Barbados supported by the Japan International Cooperation Agency (JICA), including The Caribbean Disaster Management Project Phase I, executed with the Caribbean Disaster Emergency Response Agency (CDERA, the current Caribbean Disaster Emergency Management Agency: CDEMA).
2. Notably, all prefeasibility or feasibility studies of specific investment projects including environmental and social studies should be consistent with the Environmental and Social Policy Framework (GN-2965-21).
3. This terms of reference (TOR) refer to the activities related to Component 3- Sustainable Climate Resilient Coastal Infrastructure. The focus of this component is to undertake final reviews, adjustments and any additional technical assessments including cost updates to successfully finalize bid preparation and independent construction supervision packages for the construction of these projects.
4. Under the CRMP, coastal Infrastructure designs which included quantity and cost estimates were completed for five large-scale coastal infrastructure projects which are 'shovel-ready' for construction. The project sites assessed were (i) The St. Lawrence Gap to Rockley Beach (SLGRB) (ii) Mullins to St. Peter's Bay, St. Peter; (iii) Sand Street, St. Peter; (iv) Clinketts, St. Lucy; and (iv) Oistins Bay, Christ Church.
4. The projects all have a focus on shoreline protection and enhancement with climate change informed designs. The goals of these projects were as follows;
  - a. Sustainable development that considers future climate change;
  - b. Protect human life and health through a managed approach to surge, stormwater, and other hazards;
  - c. Enhance the prosperity of community and country through economic and environmental improvements;

- d. Reduce damage to property and promote economic resilience; and
- e. Spend public funds responsibly and effectively.

## **2. Purpose and Objective**

- a. The Specific objective of this consultancy is to develop a review methodology, undertake final reviews, adjust and add necessary technical assessments including cost updates of the Engineering Designs for the five proposed Sustainable Climate Resilient Coastal Infrastructure.
- b. The technical assessments conducted would include a stakeholder and operational plans.
- c. The evaluation of the designs would utilise the outputs of the Coastal Risk Assessment and Management Program (CRMP) and also the Procurement of Material consultancy conducted under this TC. The documents updated under this consultancy would be utilised under the bid document preparation consultation.

## **3. Main Activities**

The consultant will:

- a. Prepare and submit an Inception Report which includes but not limited to: executive summary, objectives of the assignment, approach/methodology and workplan/schedule.
- b. Review the Final Engineering Reports developed for the five coastal engineering projects. These reports include: the final designs; the EIA and Second Consultation inputs; Construction Drawings; Contract Documents, including Technical Specifications and Discrete Bills of Quantities; Engineer's estimate of construction costs and schedules; Recommended construction methodology; Environmental management plan; Environmental impact statements. For each project construction logistics, stockpile, staging area and site access issues will have to be examined.
- c. Develop a review and recommendations report following the review of the documents at 3b and the outputs from the relevant contracts in under the TC.
- d. Implement the recommendations to update the documents for the technical specification, construction methodology.
- e. Review of previous criteria utilised for site selection by the CZMU and multi-criteria assessment utilised during the CRMP. Provide and assessment of short comings of these criterion.
- f. Develop a rigorous, standardized methodological process for decision support re appraisal and design of coastal risk management physical engineering (structural) and non-structural (planning/behavioral) interventions. This methodology should be easily repeatable by the CZMU in the assessment of future coastal works. The methodology

should (i) consider sustainability of the projects by assessing project maintenance and climate change adaptability; (ii) leverage information from the National Coastal Risk and Planning Platform (NCRIPP) in the cost-benefit analysis (construction cost vs avoidance of losses).

- g. Rank the proposed coastal projects based on the methodology developed at (h)
- h. Prepare an operational plan for the maintenance and rehabilitation of previously constructed and proposed coastal infrastructure projects. This activity would require the consultant to review the Delcan study on coastal maintenance and annual maintenance reports developed by the CZMU for the previously constructed projects.

#### 4. **Reports/Deliverables**

- a. Inception report as described in a within **one week** of the start of the contract
- b. Revision and Recommendation Report based on activities (3b) to (3i) within **one months** of the start of the contract
- c. Operation plan based on activities (3b) to (3k) within **two months** of the start of the contract

Each report must be submitted as: (i) one hard copy (ii) one electronic file in MS format and (iii) an electronic file in PDF.

#### 5. **Payment Schedule**

- a. 10% upon delivery and approval of the Inception report (4a);
- b. 65% upon delivery and approval of the Revision and Recommendation Report (4b);
- c. 25% upon delivery and approval of the Operation plan (4c)

#### 6. **Characteristics of The Consultancy**

- d. Consultancy category and modality: Individual Consultant.
- e. Contract duration: 40 discontinuous days within 6 months.
- f. Travel: Travel to Barbados for the purpose of stakeholder interaction is a requirement of the activity.
- g. Place of work: Barbados and/or the Consultant's country of residence
- h. Responsible Person: Project Manager, Ricardo Arthur (CZMU)

#### 7. **Required Qualifications**

- a. Qualifications and Skills: A Master's degree in Coastal Engineering or a similar field;

- b. Experience: At least 7 years' of professional experience in the area of coastal engineering and coastal protection structures including hydraulic engineering, construction, planning and design. At least 5 years' substantial, relevant and practical experience working on coastal management in Small Island Developing States (SIDS) or tropical environments, and/or other developing countries. Project management of engineering projects and asset. Working experience in Barbados is an asset. Demonstrated ability to conduct stakeholder consultations;
- c. Languages: English
- d. Skills: Excellent analytical, writing and communication skills and effective ability to interact with diverse groups of stakeholders.

## **8. Coordination**

The consultant will report directly to the Project Manager of the CRMP who will supervise the consultancy. Staff from the Project Execution Team (PET) will provide technical, administrative and coordination support to the consultancy. The consultants should be in regular contact with such representatives during the preparation of the work to provide the PET with informal updates on the progress of the work, and to discuss any issues that may need to be resolved to facilitate successful implementation.

## **Barbados**

### **Coastal Zone Management Unit, Ministry of Maritime Affairs and The Blue Economy**

#### **Improving Institutional Frameworks for Integrated Coastal Zone Management, National Risk Information Planning Systems and Sustainable Climate-Resilient Coastal Infrastructure (BA-T1068)**

#### **Developing Environmental and Social Impact Assessment for Sustainable Climate Resilient Coastal Infrastructure**

### **TERMS OF REFERENCE**

#### **I. Background**

1. The coastal zone of Barbados is the country's main economic asset. In 2018, contribution of travel and tourism to GDP for Barbados was 34.9 % . More than half the population reside within 2km of the coast and more than 95% of the tourism related physical plant is located at or near the coast. In addition, much critical infrastructure including water, electricity, natural gas and telecommunication installations, transportation nodes (road, air and sea), commercial, health, education and government facilities can also be found in, or near the coast. Access to the coastal zone is also critical for other traditional uses such as fishing and maritime transport. It is for these reasons that integrated coastal area management must be regarded as a critical activity to support national sustainable development goals.
2. Due to its location and geology, Barbados is moderately exposed to, inter alia, hurricanes and tropical storms and resulting directly from these: storm surges and storm-force winds. Also, the country is highly susceptible to coastal beach erosion and cliff instability, either from specific storm events or from ongoing geomorphologic processes. In addition, low lying regions of the island, including those in the densely populated coastal zone, are often prone to rainfall-induced flooding. As such, the country's primary locations of economic activity and associated public infrastructure are associated with a high level of exposure to natural hazards. Indeed, modelling suggests that coastal storm surge induced from a 100-year cyclone would affect 6,000 residences along the south and west coasts and 70% of west coast hotels would be negatively impacted. Furthermore, average annual probable losses from multiple hazards and storm surge specifically have been estimated at US\$103.58M and US\$45.2 million respectively.
3. The country continues to be faced with traditional challenges related to its limited economic diversification, fiscal fragility and susceptibility to the impacts of climate change including sea level rise, increased temperatures and the prospect of more intense hurricanes. As such, public policy and institutional reform efforts are not only centered on the fiscal, but on public sector efficiency, a strong social safety net and crisis-resilient health system, and as well as interventions that can and will better incentivize, stimulate and more optimally regulate resilient sustainable economic growth, now and in the future. Continued deliberate attention to resilience and disaster risk related policies to safeguard lives, investments and the economy is required and has been identified as a national priority. In 2018, the Government created a Ministry of

Maritime Affairs and the Blue Economy (MMABE) on the premise that despite its small land space Barbados' maritime space is over 400 times larger, covering 183,436km<sup>2</sup> representing an underdeveloped and underexplored opportunity that should be sustainably utilized to advance the economic interest of the country.

4. The current activity is a component of a technical cooperation (TC) project facilitated by the Inter-American Development Bank (IDB) in order to support the Government of Barbados in the development of a program design that will build resilience, systematically manage disaster risk through risk identification, vulnerability reduction, and ex-ante risk mitigation in national ICZM, and in the context of the country's ambition and trajectory for Blue Economy development and growth in a post COVID19 reopening and recovery context.
5. The current TC project titled: Improving Institutional Frameworks for Integrated Coastal Zone Management, National Risk Information Planning Systems and Sustainable Climate-Resilient Coastal Infrastructure (BA-T1068) complements and utilizes outputs from the recently concluded Coastal Risk Assessment and Management Program (CRMP) Loan (BA-L1014) operation as well as several cooperation projects in Barbados supported by the Japan International Cooperation Agency (JICA), including The Caribbean Disaster Management Project Phase I, executed with the Caribbean Disaster Emergency Response Agency (CDERA, the current Caribbean Disaster Emergency Management Agency: CDEMA).
6. Notably, all prefeasibility or feasibility studies of specific investment projects including environmental and social studies should be consistent with the Environmental and Social Policy Framework (GN-2965-21).
7. Under the CRMP, coastal Infrastructure designs which included projects environmental and social baseline studies were completed for five large-scale coastal infrastructure projects. The project sites assessed were (i) The St. Lawrence Gap to Rockley Beach (SLGRB) (ii) Mullins to St. Peter's Bay, St. Peter; (iii) Sand Street, St. Peter; (iv) Clinketts, St. Lucy; and (iv) Oistins Bay, Christ Church.
8. This terms of reference (TOR) refer to the activities related to Component 3- Sustainable Climate Resilient Coastal Infrastructure. The St. Lawrence Gap to Rockley Board walk project site was finished in 201x, based on the timeframe between design and construction the CZMU would require the information to be updated. The focus of this consultancy is to update the social and environmental assessments for this project sites
8. Also, for any large scale infrastructure project it is important to have meaningful stakeholder engagement with both the stakeholders directly influenced by the project but also with the wider public. The consultant would therefore be required to provide the CZMU with a stakeholder engagement plan to ensure information about the project is effectively distributed and stakeholder feedback is received and actioned within a manageable timeframe.
9. Within Component 1, a Pilot Project on the Economic Valuation for coastal infrastructure projects will be completed. One of the outputs would be a business disruption plan to proactively assess mechanisms the government of Barbados can utilise to compensate business which may adversely be affected by the sustainable infrastructure

projects. The consultant of this consultancy, 'Developing Environmental and Social Impact Assessment for Sustainable Climate Resilient Coastal Infrastructure' would be required to provide input to this business disruption plan.

## 1. Purpose and Objective

- a. The Specific objective of this consultancy is to (i) Facilitate environmental impact assessments for the St. Lawrence Gap to Rockley Board Walk (ii) Development of a Stakeholder engagement plan for the five Sustainable Climate Resilient Coastal Infrastructure during the period of construction.
- b. The evaluation of the designs would utilise the outputs of the Coastal Risk Assessment and Management Program (CRMP) and also the assessments conducted under this TC.

## 2. Main Activities

The consultant will:

- a. Prepare and submit an Inception Report which includes but not limited to: executive summary, objectives of the assignment, approach/methodology and workplan/schedule.
- b. Review and assess the final engineering reports developed under the Coastal Risk Assessment and Management Program (CRMP) for Sustainable Climate Resilient Coastal Infrastructure
- c. Conduct stakeholder consultations for residents, businesses and general public for the St. Lawrence to Rockley Board Walk. Consultations should include but not limited to public meetings and surveys of utilization of the project sites
- d. Based on the activities at 2b and 2c, develop an environmental and social impact assessment report which includes details of engagement and consultation activities such as:
  - Stakeholder mapping and identification of key stakeholders
  - Dates, types and methods of engagement and consultation, and outcomes to date
  - Key findings from engagement and consultation, including a summary of issues and concerns raised by various stakeholder groups and how these will be addressed or have been incorporated into the project design and mitigation measures.
  - Direct and cumulative impact assessment
- e. Development of a Stakeholder engagement plan including grievance redress mechanisms for the five Coastal Engineering Projects during the period of construction. This plan should include the tools and resources required for its execution.

## 3. Reports/Deliverables

- a. Inception report as described in 2a within **two weeks** of the start of the contract;

- b. Completion of stakeholder consultations based on activities 2b within **two months** of the start of the contract
- c. Environmental and Social Impact Assessment based on activities 2c within **three months** of the start of the contract
- d. Stakeholder Engagement Plan based on activities 2d within **four months** of the start of the contract;

Each report must be submitted as: (i) one hard copy (ii) one electronic file in MS format and (iii) an electronic file in PDF.

#### **4. Payment Schedule**

- a. 10% upon delivery and approval of the Inception report (3a);
- b. 15% upon completion of stakeholder consultations (3b)
- c. 55% upon delivery and approval of the Environmental and Social Impact Assessment (3c)
- d. 20% upon delivery and approval of the Stakeholder Engagement Plan (3d)

#### **5. Characteristics Of The Consultancy**

- a. Consultancy category and modality: Individual Consultant.
- b. Contract duration: 30 discontinuous days within 4 months.
- c. Travel: Travel to Barbados necessary for the purpose of stakeholder engagement
- d. Place of work: Barbados and/or the Consultant's country of residence
- e. Responsible Person: Project Manager, Ricardo Arthur (CZMU)

#### **6. Required Qualifications**

- a. Qualifications and Skills: Master's Degree or equivalent qualification in Environmental Science, Environmental Studies or related fields.
- b. Experience: At least 5 years working experience in Environmental Conservation, environment assessment or related fields. Experience in facilitating stakeholder consultation and environmental and social impact assessments. Work experience in Barbados is preferred.
- c. Languages: English
- d. Skills: Excellent analytical, writing and communication skills.

#### **7. Coordination**

The consultant will report directly to the Project Manager of the CRMP who will supervise the consultancy. Staff from the Project Execution Team (PET) will provide technical, administrative



and coordination support to the consultancy. The consultants should be in regular contact with such representatives during the preparation of the work to provide the PET with informal updates on the progress of the work, and to discuss any issues that may need to be resolved to facilitate successful implementation.

## **Barbados**

### **Coastal Zone Management Unit, Ministry of Maritime Affairs and The Blue Economy**

#### **Improving Institutional Frameworks for Integrated Coastal Zone Management, National Risk Information Planning Systems and Sustainable Climate-Resilient Coastal Infrastructure (BA-T1068)**

#### **Sustainable Climate Resilient Coastal Infrastructure -Independent Quantity Surveyor assessment of Bill Of Quantities (BOQ) including updating of St. Lawrence Gap to Rockley Boardwalk BOQ in Civil Engineering Standard Method of Measurement (CSEMM4)**

## **TERMS OF REFERENCE**

### **1. Background**

1. The coastal zone of Barbados is the country's main economic asset. In 2018, contribution of travel and tourism to GDP for Barbados was 34.9 %<sup>1</sup>. More than half the population reside within 2km of the coast and more than 95% of the tourism related physical plant is located at or near the coast. In addition, much critical infrastructure including water, electricity, natural gas and telecommunication installations, transportation nodes (road, air and sea), commercial, health, education and government facilities can also be found in, or near the coast. Access to the coastal zone is also critical for other traditional uses such as fishing and maritime transport. It is for these reasons that integrated coastal area management must be regarded as a critical activity to support national sustainable development goals.
2. Due to its location and geology, Barbados is moderately exposed to, inter alia, hurricanes and tropical storms and resulting directly from these: storm surges and storm-force winds. Also, the country is highly susceptible to coastal beach erosion and cliff instability, either from specific storm events or from ongoing geomorphologic processes. In addition, low lying regions of the island, including those in the densely populated coastal zone, are often prone to rainfall-induced flooding. As such, the country's primary locations of economic activity and associated public infrastructure are associated with a high level of exposure to natural hazards. Indeed, modelling suggests that coastal storm surge induced from a 100-year cyclone would affect 6,000 residences along the south and west coasts and 70% of west coast hotels would be negatively impacted<sup>2</sup>. Furthermore, average annual probable losses from multiple hazards and storm surge specifically have been estimated at US\$103.58M and US\$45.2 million respectively<sup>3</sup>.
3. The country continues to be faced with traditional challenges related to its limited economic diversification, fiscal fragility and susceptibility to the impacts of climate change including sea level rise, increased temperatures and the prospect of more intense hurricanes. As such, public policy and institutional reform efforts are not only centered on the fiscal, but on public sector efficiency, a strong social safety net and crisis-resilient health system, and as well as interventions that can and will better incentivize, stimulate and more optimally regulate resilient sustainable economic growth,

now and in the future. Continued deliberate attention to resilience and disaster risk related policies to safeguard lives, investments and the economy is required and has been identified as a national priority. In 2018, the Government created a Ministry of Maritime Affairs and the Blue Economy (MMABE) on the premise that despite its small land space Barbados' maritime space is over 400 times larger, covering 183,436km<sup>2</sup> representing an underdeveloped and underexplored opportunity that should be sustainably utilized to advance the economic interest of the country.

4. The current activity is a component of a technical cooperation (TC) project facilitated by the Inter-American Development Bank (IDB) in order to support the Government of Barbados in the development of a program design that will build resilience, systematically manage disaster risk through risk identification, vulnerability reduction, and ex-ante risk mitigation in national ICZM, and in the context of the country's ambition and trajectory for Blue Economy development and growth in a post COVID19 reopening and recovery context.
5. The current TC project titled: Improving Institutional Frameworks for Integrated Coastal Zone Management, National Risk Information Planning Systems and Sustainable Climate-Resilient Coastal Infrastructure (BA-T1068) complements and utilizes outputs from the recently concluded Coastal Risk Assessment and Management Program (CRMP) Loan (BA-L1014) operation as well as several cooperation projects in Barbados supported by the Japan International Cooperation Agency (JICA), including The Caribbean Disaster Management Project Phase I, executed with the Caribbean Disaster Emergency Response Agency (CDERA, the current Caribbean Disaster Emergency Management Agency: CDEMA.
6. Notably, all prefeasibility or feasibility studies of specific investment projects including environmental and social studies should be consistent with the Environmental and Social Policy Framework (GN-2965-21).
7. This terms of reference (TOR) refer to the activities related to Component 3- Sustainable Climate Resilient Coastal Infrastructure. The focus of this component is to undertake final reviews, adjustments and any additional technical assessments including cost updates to successfully finalize bid preparation and independent construction supervision packages for the construction of these projects.
8. Under the CRMP, coastal Infrastructure designs which included quantity and cost estimates were completed for five large-scale coastal infrastructure projects which are 'shovel-ready' for construction. The project sites assessed were (i) The St. Lawrence Gap to Rockley Beach (SLGRB) (ii) Mullins to St. Peter's Bay, St. Peter; (iii) Sand Street, St. Peter; (iv) Clinketts, St. Lucy; and (iv) Oistins Bay, Christ Church.
8. The projects all have a focus on shoreline protection and enhancement with climate change informed designs. The goals of these projects were as followed;
  - a. Sustainable development that considers future climate change;
  - b. Protect human life and health through a managed approach to surge, storm water, and other hazards;

- c. Enhance the prosperity of community and country through economic and environmental improvements;
  - d. Reduce damage to property and promote economic resilience; and
  - e. Spend public funds responsibly and effectively.
9. Due to the timeframe which has elapsed between the design and the expected time of construction, the current cost estimates for the five Sustainable Climate Resilient Coastal Infrastructure require updating. This is the third consultancy within component 3 to review and update the engineering designs for tendering.

## 2. Purpose and Objective

- a. The Specific objective of this consultancy is to assess and update the Bill of Quantities (BOQ) prepared for the five proposed Sustainable Climate Resilient Coastal Infrastructure
- b. This requires revision of the BOQ for St. Lawrence Gap to Rockley Beach (SLGRB) in CSEMM4 format and a review and update of cost for the four other infrastructure projects

## 3. Main Activities

The consultant will:

- a. Develop a work plan for this consultancy providing a detailed approach/methodology and work plan/schedule.
- b. Review the following documents (i) the initial budget estimate prepared for the detailed engineering design the five sustainable engineering project (ii) Reports from the Component 1.3 - Pilot Project- Economic Valuation of Coastal Infrastructure Projects and (iii) Component 3 - Procurement of sand and stone material.
- c. On review of the documents at (b) update The First Bill of Quantities for St. Lawrence Gap to Rockley Beach project site based on chainage along the shoreline of the site. The Bill of Quantities will follow these subdivisions and list the line items separately for each section between designated chainage. The information should be presented in the CSEMM4 format.
- d. Assess the prepared Bill of Quantities for the four project sites (i) Mullins to St. Peter's Bay, St. Peter; (ii) Sand Street, St. Peter; (iii) Clinketts, St. Lucy; and (iv) Oistins Bay, Christ Church. Update these BOQs utilizing the information from (b).
- e. Review and update where necessary the requirements of measurement and payment outlined in the technical specifications
- f. The updates at (c) to (e) should ensure the documents are ready for tendering and the cost are accurately updated for the solicitation of funding to complete the construction successfully for the tendering of the work

#### 4. Reports/Deliverables

- a. Inception report as described in a within **one week** of the start of the contract
- b. Updated First Bill of Quantities for St. Lawrence Gap to Rockley Beach project site based on activities (3c) to (3f) within **one months** of the start of the contract
- c. Second and Third Bill of Quantities, one for each of the project sites (i) Mullins to St. Peter's Bay, St. Peter; (ii) Oistins Bay, Christ Church based on activities (3d) to (3f) within **two months** of the start of the contract
- d. Fourth and Fifth Bill of Quantities, one for each of the project sites (i) Sand Street, St. Peter; and (iii) Clinketts, St. Lucy based on activities (3d) to (3f) within **two months** of the start of the contract

Each report must be submitted as: (i) one hard copy (ii) one electronic file in MS format and (iii) an electronic file in PDF.

#### 5. Payment Schedule

- a. 10% upon delivery and approval of the Work plan (4a);
- b. 40% upon delivery and approval of the First Bill of Quantities (4b);
- c. 30% upon delivery and approval of the Second and Third Bill of Quantities (4c);
- d. 20% upon delivery and approval of the Fourth and Fifth Bill of Quantities (4d);

#### □ 6. CHARACTERISTICS OF THE CONSULTANCY

- a. Consultancy category and modality: Individual Consultant.
- b. Contract duration: 30 discontinuous days within 2 months.
- c. Travel: Travel to Barbados for the purpose of stakeholder interaction can be included in the Consultant's proposal but is not a requirement of the activity.
- d. Place of work: Barbados and/or the Consultant's country of residence
- e. Responsible Person: Project Manager, Ricardo Arthur (CZMU)

#### 6. 7 Required Qualifications

- f. Qualifications and Skills: A Bachelor's Degree in Quantity Surveying/Cost Engineering.

Experience: A Quantity Surveyor with at least 5 years' experience in QS\CE, production of bills of quantities on pre-contract civil engineering projects utilising internationally recognised standard method of measurement. Experience using CESMM for measurement of bills of quantities for sea- defense and or nearshore works or civil engineering works of a comparable scale. Practical experience working on coastal management

in Small Island Developing States (SIDS) or tropical environments, and/or other developing countries. Project management of engineering projects and asset. Working experience in Barbados is an asset. Demonstrated ability to conduct stakeholder consultations;

- a. Languages: English
- b. Skills: Excellent analytical, writing and communication skills and effective ability to interact with diverse groups of stakeholders.

## 7. **8. Coordination**

The consultant will report directly to the Project Manager of the CRMP who will supervise the consultancy. Staff from the Project Execution Team (PET) will provide technical, administrative and coordination support to the consultancy. The consultants should be in regular contact with such representatives during the preparation of the work to provide the PET with informal updates on the progress of the work, and to discuss any issues that may need to be resolved to facilitate successful implementation.

## **Barbados**

### **Coastal Zone Management Unit, Ministry of Maritime Affairs and The Blue Economy**

#### **Improving Institutional Frameworks for Integrated Coastal Zone Management, National Risk Information Planning Systems and Sustainable Climate-Resilient Coastal Infrastructure (BA-T1068)**

#### **Sustainable Climate Resilient Coastal Infrastructure -Independent Quantity Surveyor assessment of Bill Of Quantities (BOQ) including updating of St. Lawrence Gap to Rockley Boardwalk BOQ in Civil Engineering Standard Method of Measurement (CSEMM4)**

## **TERMS OF REFERENCE**

### **1. Background**

1. The coastal zone of Barbados is the country's main economic asset. In 2018, contribution of travel and tourism to GDP for Barbados was 34.9 %<sup>1</sup>. More than half the population reside within 2km of the coast and more than 95% of the tourism related physical plant is located at or near the coast. In addition, much critical infrastructure including water, electricity, natural gas and telecommunication installations, transportation nodes (road, air and sea), commercial, health, education and government facilities can also be found in, or near the coast. Access to the coastal zone is also critical for other traditional uses such as fishing and maritime transport. It is for these reasons that integrated coastal area management must be regarded as a critical activity to support national sustainable development goals.
2. Due to its location and geology, Barbados is moderately exposed to, inter alia, hurricanes and tropical storms and resulting directly from these: storm surges and storm-force winds. Also, the country is highly susceptible to coastal beach erosion and cliff instability, either from specific storm events or from ongoing geomorphologic processes. In addition, low lying regions of the island, including those in the densely populated coastal zone, are often prone to rainfall-induced flooding. As such, the country's primary locations of economic activity and associated public infrastructure are associated with a high level of exposure to natural hazards. Indeed, modelling suggests that coastal storm surge induced from a 100-year cyclone would affect 6,000 residences along the south and west coasts and 70% of west coast hotels would be negatively impacted<sup>2</sup>. Furthermore, average annual probable losses from multiple hazards and storm surge specifically have been estimated at US\$103.58M and US\$45.2 million respectively<sup>3</sup>.
3. The country continues to be faced with traditional challenges related to its limited economic diversification, fiscal fragility and susceptibility to the impacts of climate change including sea level rise, increased temperatures and the prospect of more intense hurricanes. As such, public policy and institutional reform efforts are not only centered on the fiscal, but on public sector efficiency, a strong social safety net and crisis-resilient health system, and as well as interventions that can and will better incentivize, stimulate and more optimally regulate resilient sustainable economic growth,

now and in the future. Continued deliberate attention to resilience and disaster risk related policies to safeguard lives, investments and the economy is required and has been identified as a national priority. In 2018, the Government created a Ministry of Maritime Affairs and the Blue Economy (MMABE) on the premise that despite its small land space Barbados' maritime space is over 400 times larger, covering 183,436km<sup>2</sup> representing an underdeveloped and underexplored opportunity that should be sustainably utilized to advance the economic interest of the country.

4. The current activity is a component of a technical cooperation (TC) project facilitated by the Inter-American Development Bank (IDB) in order to support the Government of Barbados in the development of a program design that will build resilience, systematically manage disaster risk through risk identification, vulnerability reduction, and ex-ante risk mitigation in national ICZM, and in the context of the country's ambition and trajectory for Blue Economy development and growth in a post COVID19 reopening and recovery context.
5. The current TC project titled: Improving Institutional Frameworks for Integrated Coastal Zone Management, National Risk Information Planning Systems and Sustainable Climate-Resilient Coastal Infrastructure (BA-T1068) complements and utilizes outputs from the recently concluded Coastal Risk Assessment and Management Program (CRMP) Loan (BA-L1014) operation as well as several cooperation projects in Barbados supported by the Japan International Cooperation Agency (JICA), including The Caribbean Disaster Management Project Phase I, executed with the Caribbean Disaster Emergency Response Agency (CDERA, the current Caribbean Disaster Emergency Management Agency: CDEMA.
6. Notably, all prefeasibility or feasibility studies of specific investment projects including environmental and social studies should be consistent with the Environmental and Social Policy Framework (GN-2965-21).
7. This terms of reference (TOR) refer to the activities related to Component 3- Sustainable Climate Resilient Coastal Infrastructure. The focus of this component is to undertake final reviews, adjustments and any additional technical assessments including cost updates to successfully finalize bid preparation and independent construction supervision packages for the construction of these projects.
8. Under the CRMP, coastal Infrastructure designs which included quantity and cost estimates were completed for five large-scale coastal infrastructure projects which are 'shovel-ready' for construction. The project sites assessed were (i) The St. Lawrence Gap to Rockley Beach (SLGRB) (ii) Mullins to St. Peter's Bay, St. Peter; (iii) Sand Street, St. Peter; (iv) Clinketts, St. Lucy; and (iv) Oistins Bay, Christ Church.
8. The projects all have a focus on shoreline protection and enhancement with climate change informed designs. The goals of these projects were as followed;
  - a. Sustainable development that considers future climate change;
  - b. Protect human life and health through a managed approach to surge, storm water, and other hazards;



- c. Enhance the prosperity of community and country through economic and environmental improvements;
  - d. Reduce damage to property and promote economic resilience; and
  - e. Spend public funds responsibly and effectively.
9. Due to the timeframe which has elapsed between the design and the expected time of construction, the current cost estimates for the five Sustainable Climate Resilient Coastal Infrastructure require updating. This is the third consultancy within component 3 to review and update the engineering designs for tendering.

## 2. Purpose and Objective

- a. The Specific objective of this consultancy is to assess and update the Bill of Quantities (BOQ) prepared for the five proposed Sustainable Climate Resilient Coastal Infrastructure
- b. This requires revision of the BOQ for St. Lawrence Gap to Rockley Beach (SLGRB) in CSEMM4 format and a review and update of cost for the four other infrastructure projects

## 3. Main Activities

The consultant will:

- a. Develop a work plan for this consultancy providing a detailed approach/methodology and work plan/schedule.
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Each report must be submitted as: (i) one hard copy (ii) one electronic file in MS format and (iii) an electronic file in PDF.

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- d. 20% upon delivery and approval of the Fourth and Fifth Bill of Quantities (4d);

#### ☐ **6. CHARACTERISTICS OF THE CONSULTANCY**

- a. Consultancy category and modality: Individual Consultant.
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- e. Responsible Person: Project Manager, Ricardo Arthur (CZMU)

#### 6. **7 Required Qualifications**

- f. Qualifications and Skills: A Bachelor's Degree in Quantity Surveying/Cost Engineering.

Experience: A Quantity Surveyor with at least 5 years' experience in QS\CE, production of bills of quantities on pre-contract civil engineering projects utilising internationally recognised standard method of measurement. Experience using CESMM for measurement of bills of quantities for sea- defense and or nearshore works or civil engineering works of a comparable scale. Practical experience working on coastal management

in Small Island Developing States (SIDS) or tropical environments, and/or other developing countries. Project management of engineering projects and asset. Working experience in Barbados is an asset. Demonstrated ability to conduct stakeholder consultations;

- a. Languages: English
- b. Skills: Excellent analytical, writing and communication skills and effective ability to interact with diverse groups of stakeholders.

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The consultant will report directly to the Project Manager of the CRMP who will supervise the consultancy. Staff from the Project Execution Team (PET) will provide technical, administrative and coordination support to the consultancy. The consultants should be in regular contact with such representatives during the preparation of the work to provide the PET with informal updates on the progress of the work, and to discuss any issues that may need to be resolved to facilitate successful implementation.

PROCUREMENT PLAN FOR NON-REIMBURSABLE TECHNICAL COOPERATIONS										
Country: Barbados					Executing agency: Coastal Zone Management Unit, Government of Barbados				Public or private sector: Public Sector	
Project number: BA-T1068					Title of Project: Improving Institutional Frameworks for Integrated Coastal Zone Management, National Risk Information Planning Systems and Sustainable Climate-Resilient Coastal Infrastructure					
Period covered by the plan: 24 months										
Threshold for ex-post review of procurements:					Goods and services (in US\$):		Consulting services(in US\$):		\$ 500,000.00	
Item Nº	Ref. AWP	Description (1)	Estimated contract cost (US\$)	Procurement Method (2)	Review of procurement (3)	Source of financing and percentage		Estimated date of the procurement notice or start of the contract	Technical review by the PTL (4)	Comments
						IDB/JSF %	Local/other %			
1		Component 1: Institutional Capacity Development for Advanced and Improved Integrated Coastal Zone Management Improved								
		Subcomponent 1a: Plan & Specification of Institutional Reform for Advanced ICZM	\$ 37,700.00	IICQ	N/A		100%	0%	21-May-21	Individual consultant
		ICZM institutional reform design and strategic implementation plan								
		Subcomponent 1b: Pilot Governance and Public-Private Economic Enterprise Models for Marine Management Areas and Beach Management								
		Design of governance framework for pilot implementation of "model" investment partnerships and/or co-governance enterprise arrangements	\$ 48,300.00	IICQ	N/A		100%	0%	30-Apr-21	Individual consultant
		Subcomponent 1c: National Reef Rehabilitation and Restoration Program								
		Development of a Draft National Plan and Work Programme for Coral Reef Restocking	\$ 25,700.00	IICQ	N/A		100%	0%	30-Apr-21	Individual consultant
		Review of environmental suitability for implementation of National Reef Rehabilitation and Restoration Program	\$ 29,900.00	IICQ	N/A		100%	0%	30-Apr-21	Individual consultant
		Subcomponent 1d: Ecosystem Services/Natural Capital Valuation								
		The Development of a Draft National Action Plan for Ecosystem Services/Natural Capital Valuation	\$ 42,000.00	IICQ	N/A		100%	0%	30-Apr-21	Individual consultant
		Pilot Project- Economic Valuation of Coastal Infrastructure Projects including buisness disruption assessment	\$ 41,000.00	IICQ	N/A		100%	0%	30-Apr-21	Individual consultant
2		Component 2: Improving and Strengthening the Utilization of Coastal & National Risk Assessment								
		Subcomponent 2a: Enhancing the National Coastal Risk Information Planning Platform								
		Development of a Work Plan for the Upgrading and Operational Integration of the NCRIPP within the	\$ 18,400.00	IICQ	N/A		100%	0%	30-Apr-21	Individual consultant
		High Resolution Flood Modelling for the Enhancement of the National Coastal Risk Information and	\$ 22,100.00	IICQ	N/A		100%	0%	30-Apr-21	Individual consultant
		Critical Evaluation of the Risk Determination Frameworks in NCRIPP and CAPRA	\$ 14,700.00	IICQ	N/A		100%	0%	30-Apr-21	Individual consultant
		Enhancement of the NCRIPP Software to update Hazard and Risk Models, and incorporate	\$ 59,600.00	IICQ	N/A		100%	0%	30-Apr-21	Individual consultant
		Subcomponent 2b: Community Based Disaster Risk Management (CBDRM)	\$ 33,900.00	IICQ	N/A		100%	0%	30-Apr-21	Individual consultant
		Preparation of Behaviorally-Informed Community-Based Disaster Risk Management Plans for two Vulnerable Communities								
3		Component 3 Sustainable Climate Resilient Coastal Infrastructure								
		Quantification of offshore sand reserves and procurment recommendation of Sand and Stone material	\$ 60,100.00	IICQ	N/A		100%	0%	30-Apr-21	Individual consultant
		Decision methology to evaluate Final Engineering Documents of Five Coastal Infastructure Projects and the preparation of Maintenance and Operational Plan	\$ 16,500.00	IICQ	N/A		100%	0%	23-Dec-21	Individual consultant
		Environmental and Social Impact Assessment	\$ 19,400.00	IICQ	N/A		100%	0%	20-May-21	Individual consultant
		Lawrence Gap to Rockley Boardwalk BOQ in Civil Engineering Standard Method of Measurement	\$ 14,200.00	IICQ	N/A		100%	0%	30-Apr-21	Individual consultant
		Development of Tender Documents- Bid ready packages for five large coastal infrastructure projects	\$ 16,500.00	IICQ	N/A		100%	0%	28-Sep-22	Individual consultant
4		Project Execution Unit								
		Operating expenses								
Total			\$ 500,000.00	Prepared by: Yuri Chakalall			Date: October 2020			
(1) Grouping together of similar procurement is recommended, such as computer hardware, publications, travel, etc. If there are a number of similar individual contracts to be executed at different times, they can be grouped together under a single heading, with an explanation in the comments column indicating the average individual amount and the period during which the contract would be executed. For example: an export promotion project that includes travel to participate in fairs would have an item called "airfare for fairs", an estimated total value od US\$5,000, and an explanation in the Comments column: "This is for approximately four different airfares to participate in fairs in the region in years X and X1".										
(2) Goods and works: CB: Competitive bidding; PC: Price comparison; DC: Direct contracting.										
(2) Consulting firms: CQS: Selection Based on the Consultants' Qualifications; QCBS: Quality and cost-based selection; LCS: Least Cost Selection; FBS: Selection nder a Fixed Budget; SSS: Single Source Selection; QBS: Quality Based selection.										
(2) Individual consultants: IICQ: International Individual Consultant Selection Based on Qualifications; SSS: Single Source Selection.										
(2) Country system: include selection Method										
(3) Ex-ante/ex-post review: In general, depending on the institutional capacity and level of risk associated with the procurement, ex-post review is the standard modality. Ex-ante review can be specified for critical or complex process.										
(4) Technical review: The PTL will use this column to define those procurement he/she considers "critical" or "complex" that require ex ante review of the terms of reference, technical specifications, reports, outputs, or other items.										