

**COASTAL INFRASTRUCTURE PROGRAM****(BA-0019)****EXECUTIVE SUMMARY**

<b>Borrower:</b>	Government of Barbados (GOB)	
<b>Guarantor:</b>	Government of Barbados	
<b>Executing Agency:</b>	Ministry of Physical Development and Environment (MPE)	
<b>Amount and Source:</b>	IDB: (OC)	US\$17.0 million
	Local:	US\$ 7.2 million
	Total:	US\$24.2 million
<b>Financial Terms and Conditions:</b>	Amortization Period:	20 years
	Grace Period:	4 years
	Disbursement Period:	4.5 years
	Interest Rate:	Variable
	Supervision and Inspection:	1%
	Credit Fee:	0.75%
	Currency:	U.S. dollars from the Single Currency Facility
<b>Objectives:</b>	The objective of the program is to support the sustainable development and improvements for shoreline preservation and management in Barbados in order to ensure a healthy environment and continued economic development for its inhabitants	
<b>Description:</b>	<p>The program comprises a range of coastal management works and activities related to four specific objectives: (1) shoreline stabilization and erosion control; (2) restoration of coastal habitats; (3) improve the amount of public coastal access; and (4) institutional strengthening for coastal management. The investment activities are all engineering works consisting of physical structures adapted to coastal and near-shore oceanographic conditions.</p> <p>The program will include the following components:</p> <ol style="list-style-type: none"> <li>1. <u>Shorelines stabilization works</u>: Includes coastal infrastructure to create and/or enhance the amenity value of beaches for local and tourist use in the following locations:</li> </ol>	

(i) Rockley to Drill Hole; (ii) Woman's Bay; (iii) Crane beach; (iv) Hometown Beach, and (v) Welches Beach.

2. Coastal ecosystem recovery works: Activities include the restoration and protection of affected ecosystems at (i) Hometown Beach (lagoon aeration system) and (ii) Walkers Savannah (dune restoration).
3. Coastal access improvement works: Activities aimed to encourage safe and increased access to the waterfront. The works will include the Bay Street Old Hospital Jetty and Tent Bay boat access.
4. Institutional development: Activities to upgrade capabilities and support the process of innovating coastal management through the Coastal Zone Management Unit (CZMU) equipment, the Ministry of Physical Development and Environment (MPE): (i) staff training; (ii) strategic plan preparation; and (iii) public education strategy development.

**Relationship of  
Project in Bank's  
Country and Sector  
Strategy:**

The Program directly responds to the country's principal area of strategic focus enhancing environmental infrastructure and natural resources management. The improved coastal infrastructure will provide alternatives for leisure and recreational use of beaches by locals and visitors. Tourism has provided the backbone for Barbados' economic progress, it remains one of the largest growth industries in the world and continued benefit to Barbados is dependent on the provision to visitors of an attractive natural and built environment. The CP includes as principal areas of strategic focus to support GOB's efforts to establish adequate environmental infrastructure and a comprehensive framework that is fully cognizant of the environmental implications of economic development policies.

**Environmental/  
Social Review:**

The Committee on Environment and Social Impact – Technical Review Group (CESI/TRG) review the environmental aspects of the project in the TRG 33-01 meeting on August 31, 2001. Environmental impact studies were prepared during the feasibility studies. Additional direct stakeholder consultation was carried out as part of the updated environmental assessment from June to August of 2001.

<b>Benefits:</b>	The proposed program will result in significant environmental and economic benefits resulting from shoreline stabilization of important beach tracts, the recovery of impacted ecosystems, the improved access to beaches and the upgrade institutional capabilities to coastal zone management. The economic benefits are derived from increased land value, higher stay over of tourist and avoiding increase costs of transport from road disruptions.
<b>Risks:</b>	There are minor risks associated from a potential conflict of interest from the CZMU, a mainly regulatory and advisory agency, overseeing the construction of coastal infrastructure. The potential conflict is mitigated by the fact that the construction of works will be contracted and a project management firm will supervise the contractors. Once construction is finalized, the Ministry of Public Works and Transport (MPT) will assume responsibility for operation and maintenance.
<b>Special Contractual Clauses:</b>	<p>As conditions precedent to first disbursement the Bank will require:</p> <ul style="list-style-type: none"><li>(i) The proper staffing of the Project Administration Unit (PAU) with a Project Coordinator, an experienced engineer and a financial/accounting officer (see paragraph 3.4).</li><li>(ii) The awarding of the contract of the consulting firm in charge of preparing the final designs, tender documents and supervision of the civil works construction (project management consultant) (see paragraph 3.5).</li></ul> <p>Other conditions:</p> <ul style="list-style-type: none"><li>(i) <u>Approval of final engineering designs:</u> Prior to the call for bids for the construction of the infrastructure coastal works, the Executing Agency will submit for the Bank's non-objection, the final engineering designs and budget. Any change in the designs will undergo appropriate revisions to the social and environmental assessment (see paragraph 3.5)</li><li>(ii) <u>Recognition of local counterpart contribution:</u> The Bank may recognize as part of the local counterpart contribution the equivalent of US\$750,000 as part of the expenditures in the contracting of the project management consulting firm as established in paragraph 3.18 and incurred up to 18 months prior to approval of the loan.</li></ul>

**Poverty-Targeting  
and Social Equity  
Classification:**

This operation does not qualify as a social equity enhancing project, as described in the indicative targets mandated by the Bank's Eighth Replenishment (document AB-1704). Furthermore, this operation does not qualify as a Poverty Targeted Investment (PTI).

**Exceptions to Bank  
Policy:**

None.

**Procurement:**

Bank procedures will be followed in the procurement of works, goods, and consulting services. International competitive bidding will be followed for purchases of more than US\$250,000 for procurement of goods and related services, and US\$1,500,000 for construction works. Bids below these ceilings will take place in accordance with Government of Barbados procedures. Consultant services will be hired in accordance with Bank procedures

## **I. FRAME OF REFERENCE**

### **A. Macroeconomic situation**

- 1.1 Barbados registered 3.7 percent real Gross Domestic Product (GDP) growth in 2000, making it the eighth consecutive year of economic expansion. The leading contributors to this growth performance included tourism and sugar production, which enjoyed growth rates of 7.9 percent and 9.7 percent, respectively. Tourism's high growth rate was achieved in spite of significant challenges, which likely dampened tourist demand for Barbados, such as the Summer Olympics in Australia. Also, major refurbishment of tourist resorts took important accommodation capacity out of operation in 2000. However, this also reflects investor confidence in the industry, as evidenced by construction of new accommodations and refurbishment of existing capacity.
- 1.2 The sustained period of good economic performance resulted in the creation of jobs and reduction of unemployment, which in 2000 reached a record low of 9.3 percent. The inflation rate during 2000 was 2.6 percent, a one percentage point increase relative to 1999. Barbados recorded a fiscal deficit of 2.4 percent of GDP. With respect to the balance of payments, Barbados recorded a current account deficit of B\$122.9 million in 2000, 2.3 percent of GDP. The monetary authorities continued to keep a tight rein on monetary policy in 2000, with net domestic credit declining by 5.6 percent and net international reserves rising by 49.7 percent.
- 1.3 The economic outlook shows good short-term prospects for continued growth of three to four percent per year over the next few years as the investments in increased capacity and on going refurbishment begin to realize increased output. The diversified nature of the existing tourism market in terms of the origin of visitors is an important factor in giving resilience to the economy. However, Barbados faces some significant challenges to maintain competitiveness in international markets. Continued and enhanced competitiveness will require investments in human resource development and other areas that will raise productivity.

### **B. The coastal environment of the country**

- 1.4 The island of Barbados is a peak on the "Barbados Ridge" an extensive underwater mountain range between Tobago and Martinique. The ridge descends gradually into the Atlantic, reaching depths of more than 2,500 m, just 15 km off the East Coast of the island. The shallow shelf, which surrounds Barbados, is generally less than 2 km wide. The 92 Km. long Barbados coastline has an interesting diversity of land and seascapes and is a unique asset. The north, east and south-east coast known as the "Atlantic Coast" faces the trade winds and it is continually exposed to high wave energy, the area is characterized by limestone cliffs with pocket beaches. Reef development is minimal offshore but there are

extensive areas of limestone pavement dominated by sea fans. The Atlantic coast contains most of the least developed section of coastline. The west and south coast known as the "Caribbean Coast", whilst backed by limestone cliffs, presents a very different aspect. Sandy beaches, fringing reefs and relatively calm waters have created optimal conditions for tourism development. The reef tract has served as a natural barrier against wave erosion.

- 1.5 Some global and regional changes, and their effect on the coastal environment of Barbados are related to fluctuations in temperature, oceanographic current circulation, meteorological variations and natural hazards from hurricanes and tropical storms. Situations such as global warming and its influence on sea level rise rates and changing regional weather patterns will affect management decisions. Prediction on sea level rise in Barbados suggest an average of 0.4 mm/year. The type of change that is more visible is characterized by cliff failures and landslides and some other slower changes occurring in sand dunes and beaches. Reefs are the primary sources of sediment to nourish beaches, the health of these sensitive ecosystems is key to the quality and safety of the coastline.

## **C. Coastal zone management**

### **1. Opportunities and challenges**

- 1.6 The coastline of Barbados is central to the lives of all Barbadians, providing amenities that go well beyond those traditionally valued by the market. The beaches of Barbados are a focus for leisure and recreational use by locals and visitors alike. In the case of Barbadians this amounts to more than one million person days at beach locations every year. Tourism has provided the backbone for Barbados' economic progress in the last 30 years. It remains one of the largest growth industries in the world and continued benefit to Barbados is dependent on the provision to visitors of an attractive natural and built environment.
- 1.7 There are few parts of Barbados where the hand of human intervention has failed to leave a mark on the natural environment. Development has resulted in coastlines dominated by tourism and residential infrastructure. Impacts of development on the coastal environment include loss of natural habitat, encroachment on active beach areas, reduced water quality at some sites, and the degradation of coral reefs, which serve as natural buffers against shoreline erosion. The combined effects of these changes have contributed to accelerate beach erosion and instability. Shorefront construction has also reduced public coastal access in some locations<sup>1</sup>. Natural regional changes in the Caribbean also affect the coastal environment of Barbados. In this regard, it is important to recognize the importance of maintaining natural processes, yet being able to adapt to changes that may adversely affect the Region. A fragmented institutional and

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<sup>1</sup> Currently, the Town and County Planning Office (TCPO) has the power to negotiate access or easements with landowners during development or reconstruction, and Government may in the last resort compulsorily purchase land in the public interest. A 1995 GAZETTED Order also establishes setback provisions.

legislative structure historically restricted the GOB's capacity to respond to these problems. The value of beaches and the pressure of use on them makes it essential to manage the resource in a way that caters for the demand without damaging the resource on which it depends.

- 1.8 To address the growing threats to the coastline of Barbados, in 1983 the GOB embarked on a program to prepare Barbados for coastal zone management in an effort to safeguard the character and special features of the coastline while recognizing the opportunities and uses these features create. The GOB's efforts have resulted in the development and implementation of a comprehensive approach to manage the environment, resources and use of its coastline through Integrated Coastal Management (ICM)<sup>2</sup>.

## **2. Institutional framework**

- 1.9 Effective October 1<sup>st</sup> 2001, the recently established Ministry of Physical Development and Environment (MPE)<sup>3</sup> has primary responsibility for environmental and natural resources management in Barbados. The objective of the MPE is to promote and facilitate the sustainable use of Barbados' resources by encouraging the involvement of all citizens and the integration of environmental considerations into all aspects of natural development and to develop all local energy resources in a sustainable manner, seeking to achieve their most efficient and effective use.
- 1.10 The lead organization for coastal zone management in Barbados is the CZMU within the MPE. Responsibilities of the CZMU include reviewing planning applications for developments in the coastal zone, conducting monitoring and research, enforcing the Coastal Zone Management Act and any subsidiary regulations, and acting as the advisor and lead focal point for coastal zone management for the GOB.
- 1.11 The Town and Country Planning Office (TCPO) has the lead responsibility under the Town and Country Planning Act for reviewing and providing approval for all development projects in Barbados (including both government and non-government projects). The CZMU participates in all TCPO planning decisions that pertain to development projects in the coastal zone. For example, the CZMU assists in the preparation of Environmental Impact Assessment (EIA) terms of reference and in providing technical and scientific review of planning applications. The MPE's Environmental Engineering Division (EED), which has responsibility for implementing the Marine Pollution Control Act, is responsible for water quality monitoring and control. However, because of the implications

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<sup>2</sup> ICM involves the comprehensive assessment, setting of objectives, planning and management of coastal systems and resources. ICM takes into account traditional, cultural and historical perspectives, cumulative impacts, and conflicting interests and uses. It is a continuous and evolutionary process for achieving sustainable development through participation of the public and private sectors with the support and interest of local communities.

<sup>3</sup> The MPE replaces the Ministry of Environment, Energy and Natural Resources, taking on all the environmental functions and responsibilities.

for coastal ecology, this monitoring is undertaken in collaboration with the CZMU.

- 1.12 Responsibility for operation and maintenance activities in the coastal zone falls primarily on the National Conservation Commission (NCC) (which is also within the MPE) and the MPT. The NCC has responsibility for day-to-day operation of beach areas. This includes beach clean-up, lifeguard services, vendor registration, and the operation and maintenance of certain public amenities (e.g., vending kiosks, lifeguard stations, changing rooms). The MPT has responsibility for the maintenance of marine and coastal structures. The CZMU inspects coastal structures on a regular basis and reports maintenance needs to the Ministry of Public Works. In turn, the MPT does not undertake maintenance of any coastal structures without first obtaining technical input from the CZMU.

### **3. Legal framework**

- 1.13 To enable the legal framework for ICM, the GOB prepared two pieces of legislation: the Coastal Zone Management Act and the Marine Pollution Control Act<sup>4</sup>. The Town and Country Planning Act, which establishes the framework for national planning and development support these two acts.
- 1.14 The Marine Pollution Control Act establishes the framework for pollution control. This Act is broad authorizing legislation for environmental protection and applies to most sources of marine-based and land-based pollution. The Act authorizes the development of subsidiary standards and regulations for land and airborne sources of pollution, seabed activities, and dumping activities.
- 1.15 The Coastal Zone Management Act of 1998 establishes the legal framework for coastal zone management in Barbados. The Coastal Zone Management Act requires the development of a Coastal Zone Management Plan (CZMP). The CZMP presents general and specific guidance for: (i) Global and regional coastal change; (ii) Conservation management; (iii) Maintenance and construction of coastal structures; (iv) Beach management recreation and safety; (v) Fisheries; (vi) Coastal habitat restoration; (vii) Community tourism; (viii) Resource exploration and extraction; (ix) Water quality; (x) Zoning; (xi) Set Back, access and views to the sea; and (xii) Environmental impact assessment
- 1.16 The Draft CZMP consists of 3 key documents: the Policy Framework; the Integrated Management Plan for the South and West Coast; and the Integrated Management Plan for the Atlantic Coast. The strategic objective of the CZMP as set forth in the Policy Framework is the sustainable use of the coastal zone by implanting policies, which maintain, and where possible, enhance environmental quality while enabling economic development. To achieve this objective four main policies were established: (i) applying standards and procedures; (ii) seeking compatibility between socio-economic and environmental interest; (iii)

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<sup>4</sup> Both Bills were passed by Parliament in December 1998.



conservation heritage, culture and ecology; and (iv) working and living with dynamic coast.

#### **4. Current developments**

- 1.17 The implementation of the CZMP has been advancing according to the process prescribed in the Coastal Zone Management Act. The Draft Plan must still undergo a statutorily mandated process of public consultation and parliamentary approval. It is expected that this process will begin by the end of 2001. Although the Draft Plan has not been legally adopted pursuant to the Act, on the basis of Cabinet approval, the GOB has been adhering to its recommendations. The CZMU has been putting into practice the recommendation of the plan, particularly with respect to: (i) the evaluation of all coastal-related development proposals which require building permits; (ii) EIAs for all coastal developments; (iii) enforcement of building set-backs and zoning of ecologically sensitive areas, both along the coast and in the marine zone; and (iv) enforcement of design requirements related to coastal engineering practice.
- 1.18 The GOB is enhancing the staffing of the MPE and engaging an international consulting firm to develop regulations under the Coastal Zone Management Act and the Marine Pollution Control Act. The regulations and standards would include: under the Coastal Zone Management Act (Coastal Planning Regulations, Coastal Engineering Regulations, Coral Protection Regulations, Beach Dumping Regulations); and under the Marine Pollution Control Act (Control of Marine Sources of Pollution Regulations, Control of Land-Based Sources of Pollution Regulations, Sampling Regulations, Ambient Water Quality Standards). Moreover, the revised National Physical Development Plan (NPDP) has endorsed and adopted in various sections of the document, many of the recommendations contained in the Coastal Zone Management Plan. These include the provisions for marine ecological reserves, building set-backs from the high water mark and along coastal cliffs, and the protection of Benthic communities. Indeed, the policies set out in both Plans are so fully complementary that together they provide a very sound basis for all physical development on the island. It is also to be noted that in cases of hearings, arbitration and appearances before the Courts of Law, the CZMU functions as expert witness for the Chief Town Planner, on coastal, marine and oceanographic matters.

#### **D. Bank experience and lessons learned**

- 1.19 Throughout the GOB efforts to implement coastal zone management in the country, the Bank has been a key partner in the process. Between 1983-84, a Diagnostic and Pre-Feasibility Study of the island's coasts was conducted by the GOB with financial support of the Inter-American Development Bank (IDB). The project was executed by the Coastal Conservation Project Unit (CCPU), which was established specifically for this purpose. Two further projects were subsequently supported through pre-investment loans: the Coastal Conservation Pre-Investment Program (Loan 571/OC-BA for US\$4.7 million) and the technical

cooperation Coastal Conservation Program Phase I (Loan 856/OC-BA for US\$3.6 million).

- 1.20 The Bank's support has resulted in the establishment of one of the most comprehensive and long-running coastal and marine monitoring programs in the Caribbean. This monitoring provides the technical basis, among other things, for the design of effective shoreline structures where negative environmental impacts can be minimized. It is also important to note the continuous use of a participatory approach to involve shorefront property owners and other stakeholders in developing the shoreline stabilization strategy.
- 1.21 The Coastal Conservation Pre-Investment Program, 1991-95, focused on the west and south coasts and designed various engineering and non-engineering measures for beach creation, stabilization, and enhancement. Demonstration projects for beach improvement and protection were constructed at a cost of US\$3 million, of which the Bank contributed with US\$1.75 million. The program also undertook environmental impact assessments of existing and proposed works, and prepared two Draft Bills for submission to Parliament –the draft Coastal Zone Management (CZM) Bill and the Marine Pollution Control Bill. Another important output of the Program was the preparation of the Coastal Zone Management Plan for the West and South Coasts. Additionally, engineering designs and a feasibility assessment for selected investments along the west and south coasts were developed.
- 1.22 Following the successful Coastal Conservation Pre-Investment Program, the GOB sought further assistance from the IDB in financing the first phase of a comprehensive, island-wide coastal zone management program, the Coastal Conservation Program Phase I. Completed in 1999, this Technical Cooperation (TC) focused on diagnostic studies for the Atlantic Coast, to complement those previously conducted on the west and south coasts. This TC also prepared a detailed Coastal Zone Management Plan for the entire island, provided support to institutional strengthening efforts, and identified cost recovery mechanisms necessary for financing coastal management projects in Barbados. An important output of Phase I is the design and feasibility assessment of a package of capital works, submitted for the GOB consideration, which would form the basis of an investment phase program. The feasibility studies defined selection criteria through which the projects have been subsequently ranked for selection.
- 1.23 The Bank's support has led to institutional strengthening, through the establishment in 1995 of the CZMU, the preparation of the CZM Bill and Plan, and increased local technical capacity. The Pre-Investment loans have allowed the identification and thorough analysis of investment works for the proposed Investment Phase. Demonstration projects initiated with funds from Loan 571/OC-BA continue to prove the technical soundness of the measures recommended and adopted, through beach accretion and improved protection, and serve as training grounds to foster ICM.

- 1.24 The CZMU is the national focal point for coastal management in Barbados. Its professional and technical staff includes planners, engineers, marine biologists and surveyors. The CZMU is responsible for undertaking, in conjunction with others, the primary functions for ICM and for liaison with others concerning secondary ICM functions. It therefore works with other agencies of government that provide environmental management or development control functions to implement the ICM Plan. Given that the necessary legislation (CZM Act and the Marine Pollution Control Act) has been passed by Parliament, and that the ICM Plan is in place, the CZMU has made the final transition from a technically based service provider/project manager to a strategic and regulatory organization with a clear mandate and legislation.
- 1.25 The Project Completion Report (PCR) of the Coastal Conservation Program Phase I, states as one of the main lessons learned, the importance of qualified technical and professional staff as well as the low professional turnover in the CZMU as a key factor for the Program's success. An additional factor for the Program's achievement was the inclusion of international quality control specialists to review and provide additional technical opinion on the work carried out by consultants and the demonstration projects.
- 1.26 An evaluation of performance and impact of all terrestrial and marine coastal structures, including demonstration projects, within the project area was conducted. This analysis served as input to develop design criteria in relation to desired standards of service and to develop guidelines for construction within the coastal planning area as required for the Integrated Coastal Management Plan (ICMP). These were used in turn to determine a schedule of priorities for improvements and thus provide the basis for investment possibilities to be considered in future projects.

**E. IDB strategy and rationale for involvement**

- 1.27 The Barbados CP of 1998-2001 states that the Bank's principal areas of strategic focus are: (i) to strengthen human resource development; (ii) to enhance environmental infrastructure and natural resource management; (iii) to strengthen environment for private sector development; and (iv) to strengthen economic management capacity and administration of justice. The CP includes as principal areas of strategic focus to support GOB's efforts to establish adequate environmental infrastructure and a comprehensive framework that is fully cognizant of the environmental implications of economic development policies.
- 1.28 The Bank's Strategy for Coastal and Marine Resources Management adopts Integrated Coastal Management as the framework for responding to both global and national issues posed by the relationships between human society and coastal and marine environments. The Strategy acknowledges the Barbados' Coastal Conservation Program as one of the initiatives that has had a significant influence on public policy in the coastal environment. The GOB's Program directly responds to the Strategy's challenge posed to the Caribbean island states of the

immediate need for integrated approaches to natural resources management, with coastal management providing that integrating perspective.

- 1.29 The importance of environmental management is largely acknowledged by the GOB in various sectoral policies, among which is the National Tourism Policy (NTP). The NTP explicitly articulates tourism policy as environmentally based, integral to which is the continuous improvement of the health and beauty of the natural, built, and socio-cultural environment of Barbados. To this end, the GOB considers coastal conservation and management as priority areas for public investment.
- 1.30 Tourism has become the main export sector and the major source of foreign currency earnings as well as a key source of employment in Barbados. As a result and in order to ensure sustainable development it is necessary to foster greater efficiency in production of quality export goods and services. To this end, and given the dependence on narrow natural resource assets, it is paramount to strengthen the environmental regulatory framework and to foster infrastructure that enhances the characteristics of the natural environment.
- 1.31 The Bank is supporting sewerage system projects in the South Coast (Loans 709/OC-BA and 710/OC-BA). This project aims to improve near-shore marine water-quality and hence will have favorable impact on coral reefs' health and other marine ecosystems, which in turn will help to stabilize the shoreline and temper the effect of natural ocean activity. The GOB is developing a similar project for the West Coast.

**F. Coastal infrastructure investment priorities**

- 1.32 Implementation of the ICMP will be a long-term and continuous process. Some elements require immediate action and will be straight-forward to incorporate into the day-to-day operations of the responsible agencies. In other cases they can be built onto existing arrangements. There will also be a need for some new procedures and practices, as well as additional investments to be covered by both the GOB and the private sector. A proactive approach will require commitment to continuous improvement in the areas of environmental, economic and social development. As previously described a number of Government units and agencies are responsible for overseeing, legislating advising, supporting and implementing ICM in Barbados. The funding for most of these functions is allocated in annual basis by Central Government, but funds from complementary sources will be needed specially to cover the cost of repairing existing and the construction of new coastal structures.
- 1.33 Structures are constructed along the coastline for a variety of purposes. There is strong pressure for development of the land and near-shore areas along the coast creating the need to protect this development from damage by waves and storm surge. Coastal structures are an important physical component in most coastal protection schemes. Structures may be designed to control directly wave and

storm surge action or to stabilize a beach which, in turn provides protection to the coast and creates recreational value. There is limited supply of sand available in most coastal areas and the sand is usually moving along the shore, as well as on and offshore. Often, structures are required to control where this sand remains and to protect the beach from losses caused by waves and storm surge. Some other uses of coastal structures allow coastal accesses for a variety of purposes.

- 1.34 Man made structures on the Barbados coastline include harbour breakwaters and berthing facilities, jetties and piers, seawalls and revetments, and intervention measures such as beach nourishment schemes associated with the stabilization of beaches and other physical features. Degraded coastal structures may in themselves be a safety hazard or may increase more general exposure to hazard.
- 1.35 The CZMP identifies the needs and priorities of coastal infrastructure and proposes a package of selected works. The infrastructure projects to be included in the program were selected through a two tier hierarchical approach. The first and overriding criterion, demanded consistency with GOB integrated coastal management policy. The second criteria depended somewhat on the nature of the project presented. In the case of engineering works, there was a requirement to achieve the Bank's normal economic criterion for evaluation.
- 1.36 The selected coastal engineering works ranked as the top most desirable investments. These investment cover approximately 70% of the total activities identified in the feasibility studies. These selected works follow three complementary types of interventions:

#### **1. Shoreline stabilization**

- 1.37 The works aim to create and/or enhance the amenity value of beaches for local and tourist use, providing the catalyst for private sector investment in the rehabilitation of properties and infrastructure along the intervened section of waterfront.

#### **2. Coastal ecosystem recovery**

- 1.38 A combination of man-made and natural events has led to the degradation, damage and loss of valuable coastal and marine habitats and pressure is likely to continue. These activities are centered on the restoration and protection of important impacted ecosystems, including dune rehabilitation and water quality improvements<sup>5</sup>.

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<sup>5</sup> Coastal conservation projects related to parks and protected areas are proposed to be implemented by the MPE with the support of the Caribbean Development Bank (US\$11 million), including the Carlisle Bay Park, Folkstone Marine Park and Marine Reserve and Harrison Cave.

### **3. Coastal access**

- 1.39 Activities aim to encourage increased access to the waterfront through the establishment, where there is local interest and community support, of coastal foot-paths and new accesses.

## **II. PROGRAM OBJECTIVE AND DESCRIPTION**

### **A. Objective**

- 2.1 The principal objective of the proposed program is to ensure a healthy environment and continued economic development of Barbados through improved management and conservation of the coastal zone.

### **B. Description**

- 2.2 The program comprises a range of coastal management works and activities related to four specific objectives: (1) shoreline stabilization and erosion control; (2) restoration of coastal habitats; (3) improvement of public coastal access and; (4) institutional strengthening for coastal management<sup>6</sup>. The investment activities are all engineering works consisting of physical structures adapted to coastal and near-shore oceanographic conditions

- 2.3 The program will have the following components:

#### **1. Shoreline stabilization (US\$14.3 million)**

##### **a) Rockley to the Drill Hall – Waterfront Improvement (US\$7.9 million)**

- 2.4 This section of the southwest coast from just west of Rockley Beach to Drill Hall has little or no beach over its entire length. In order to develop a stable beach for recreation purposes along this coastal segment, this project proposes the following investment phase efforts: (i) construct eight groynes; (ii) place approximately 70,000 cubic meters of beach recharge at two beach segments where the incident wave angle is such that the proposed groynes would hold beach recharge; (iii) construct shoreline revetments; (iv) limited clearance of nearshore beach rubble to enhance bathing activities; and (v) construct steps to the beach for improved access.

##### **b) Woman's Bay (Silver Sands) – Headland Protection (US\$1.2 million)**

- 2.5 There is a headland between the beaches at Little Bay and Woman's Bay that helps to stabilize the two adjacent beaches. The headland, which consists of erodible material, is stabilized by a rock revetment. The revetment is in very bad shape. While still largely holding the headland in place, sections of the revetment have been removed by wave attack to allow large segments of the headland material behind the revetment to be eroded away. Serious headland deterioration is underway. The project involves the construction of a revetment to replace the existing structure, which has approximately two more years of functional life.

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<sup>6</sup> Annex II presents the Logical Framework for the program.

**c) Crane Beach, St. Philip – Restoration and Enhancement (US\$2.0 million)**

- 2.6 The project proposed for this site is in some ways similar to the one at Woman's Bay/Little Bay in that a deteriorating revetment protects a small headland that, in turn, stabilizes Crane Beach which is situated to the north and south of the headland. The condition at Crane Beach headland is complicated by the fact that access to Crane Beach North and South via the headland, which is at the terminus of the access road, is difficult to impossible.
- 2.7 The works proposed are: (i) replacement of the existing deteriorating revetment that stabilizes the headland; (ii) construction of a shore-parallel spur south from the headland to hold and expand the beach adjacent to the headland for easier pedestrian access to the south beach via new steps from the headland down to the beach; (iii) resurfacing of the headland and construction of a walkway at the top of the revetment to allow access to the north beach; and (iv) reconstruction of the access road to the headland.

**d) Holetown Beach Improvement (US\$0.7 million)**

- 2.8 For a half kilometer of shore south of the lagoon the beach is very narrow or non-existent, to some extent because existing shoreline structures were constructed too close to the waters edge. To enhance the beach, the project comprises the construction of four rubble mound groynes, dredging of sand from an offshore source and placement on the existing foreshore between groynes.

**e) Welches Beach Improvement (US\$2.5 million)**

- 2.9 Highway 7 is right at the shoreline in Welches and there is a concern that during the surge and higher wave action that occur during a storm, the road will be undermined. Access to the beach for recreation is difficult and beach rock outcrops occur. The proposed scope of works for this site includes: (i) construction of a retaining wall with a walkway along the seaward edge and access steps to the beach; (ii) construction of a revetment along the seaward edge of the roadway and fronting the retaining wall; construction of three new groynes and refurbishing of the one existing groyne; and (iii) placement of approximately 12,000 cubic meters of sand recharge.

**2. Coastal ecosystem recovery (US\$0.7 million)**

**a) Holetown Beach – Lagoon Aeration System (US\$0.2 million)**

- 2.10 The Holetown Lagoon is a natural impoundment lined with mangroves. During most of the year flow into the lagoon is relatively low and the entrance is blocked by a bar at the beach. Water quality in the lagoon deteriorates, with low dissolved oxygen levels, high concentrations of phosphate, suspended and volatile particulate matter and high coliform counts. Strong odors periodically emanate from the lagoon (due to the release of anoxic gases from the nutrient-rich



sediments), causing considerable discomfort to residents and passers by from time to time. Water quality and odor can be improved significantly by a system in which air is pumped into the water along the entire lagoon (an air compressor on land feeding a manifold in the lagoon through which the air enters the lagoon). A long-term solution would only be achieved when a proper sewer network and sewerage treatment system is in operation. When storm water flows pass through the lagoon the bar is washed away and the air bubbling system may be damaged. Consequently, a system of boulders needs to be placed beneath the bar to control outflows during storms and the aeration system needs to be reconstructed to withstand flood flows.

**b) Walkers Savannah – Dune Restoration (US\$0.5 million)**

- 2.11 Walkers Savannah is an ecologically important area in the proposed Barbados National Park System (BNPS). Part of this area contains a coastal dune system which has been significantly denuded by sand mining activities (some in approved areas, some not in approved areas). Damage to the dune system has also been caused by vehicle traffic through the dunes. Since 1999, the government has stopped mining of the frontal dune system and the mined dunes have been partially rebuilt and vegetated. Vehicular damage to the dune system appears still to be occurring.
- 2.12 The dune system was naturally formed by sand transported by the tropical easterly winds. Restoration is proposed to be accomplished by two mechanisms: (i) by allowing natural processes to rebuild the dunes (this assumes sufficient sand availability for wind transport and a possibly long time for the restoration to occur); and (ii) by expediting and controlling natural dune formation by the planting of native dune vegetation and/or the installation of sand fencing. Improved control and monitoring will be established by the GOB to enforce the protection of the area.

**3. Coastal access improvement (US\$1.7 million)**

**a) Bay Street – Demolition and Replacement of Old Hospital Jetty (US\$0.8 million)**

- 2.13 The existing wood deck and rail jetty with concrete support piles is badly deteriorated and needs to be removed because it is a safety hazard and it detracts aesthetically from an important beach recreation area. Owing to the fact that no other jetties are available in Carlisle Bay for public use, it is desirable to replace this structure.
- 2.14 The specific works include: (i) demolition and removal of the existing jetty, concrete block wall at the landward end, and unused pipeline under the jetty; (ii) erection of a handrail along the car park (and along any walkway to the replacement jetty); and (iii) construction of the replacement jetty.

**b) Tent Bay – Boat Access and Slipway (US\$0.9 million)**

- 2.15 The project involves constructing an access system that includes: (i) a concrete slab slipway built over the upper slipway with timber strips to serve as bearings as the boats are pulled upward; (ii) a flat concrete slab to serve as a temporary boat storage area at the base of the upper slipway and having an elevation of 1.25 m above mean sea level; (iii) two concrete slab lower slipways extending into the sea from the temporary storage area; and (iv) boat storage areas. The two lower slipways will be oriented in different directions for use by vessels that approach from different directions as incident wave directions change and; upper road widening and a kerb so a tractor can maneuver and winch the boats up the lower and upper slipways.

**4. Institutional development (US\$0.3 million)**

- 2.16 This component aims to upgrade capabilities and support the process of innovation in coastal conservation. Generally, the institutional framework for coastal zone management in Barbados is already quite strong. Taking into consideration on-going institution strengthening initiatives within the MPE, the following institution strengthening outputs will be achieved as part of this project to further reinforce Barbados' system for integrated coastal zone management:

**a) CZMU equipment and technical support**

- 2.17 The capacity of the CZMU will be enhanced through the acquisition of new Geographic Information Systems (GIS)-capable computers with software and peripherals. This will enhance the CZMU's existing capacity for GIS and will support future integrated planning efforts. In addition CZMU supervision will be supported by a quality control mechanisms to review and provide technical opinion on the work carried out by the contractors.

**b) MPE staff training**

- 2.18 MPE staff will receive short-course training in GIS and remote sensing. Some of this training may be provided through standardized courses abroad. However, this training will be implemented in Barbados to provide maximum exposure for individuals in the CZMU, EED, and other relevant agencies and to provide opportunities to incorporate relevant on-the-job experiences into the training program.

**c) MPE strategic plan development**

- 2.19 The MPE will receive technical assistance to develop a strategic plan for the Ministry. This strategic plan will be critical to integrate the various functions of the Ministry and to ensure that the Ministry's various units (all of which have come from other ministries) are working concert toward a common purpose. The technical assistance will include reviewing the Ministry's mission and revising it as appropriate, establishing priority objectives, developing an operational plan to

achieve those objectives, and developing appropriate technical and administrative control systems.

**d) MPE public education strategy development**

- 2.20 The MPE will receive technical assistance and training in the development of a long-term public education and awareness strategy that includes non-traditional education and social marketing. This strategy will also address opportunities to increase the availability of information to the public.

**C. Cost and financing**

- 2.21 The total cost of the proposed project is US\$24.2 million, of which the Bank will finance US\$17 million (70%) with resources from the Single Currency Facility of Ordinary Capital (OC) with repayment over 20 years at a variable rate of interest, a 0.75% credit commission, and a 1% inspection and supervision charge. Disbursements will be 4.5 years from the date of approval. The GOB will contribute US\$7.2 million (30%). The following table shows expenditures items by investment categories and sources of financing.

**Table 2.1**  
**Cost and Financing**  
**(in US\$ thousands)**

CATEGORY	IDB	LOCAL	TOTAL	%
<b>I. Administration &amp; Supervision</b>	0	2,333	2,333	9.0
1.1 Project Administration Unit		633	633	
1.2 Engineering Design & Supervision		1,500	1,500	
1.3 Auditing		200	200	
<b>II. Direct Costs</b>	14,000	2,900	16,900	70.0
2.1 Civil Works	13,900	2,700	16,600	
2.2 Institution Strengthening	100	200	300	
<b>III. Unallocated Costs</b>	1,000	1,837	2,800	12
3.1 Contingencies	1,000	1,000	2,000	
3.2 Escalation		837	837	
<b>Subtotal</b>	<b>15,000</b>	<b>7,070</b>	<b>22,370</b>	
<b>IV. Financial Costs</b>	2,000	130	2,130	9
4.1 Interest	1,830		1,830	
4.2 Credit Commission		130	130	
4.3 Credit Inspection and Supervision	170		170	
<b>Total</b>	<b>17,000</b>	<b>7,200</b>	<b>24,200</b>	<b>100</b>
Percentage	70	30	100	

**1. Administration and supervision (US\$2.3 million)**

- 2.22 This category (9% of the total cost) will finance expenditures needed for the PAU, including personnel, equipment, supplies, and technical services. This category will also finance expenditures needed for the Project Management Consultant firm that will have responsibility for preparing final designs for the physical investments, assisting government in the procurement of contractors to carry out the physical investments, and managing and supervising the contractors. An external-auditing firm will also be contracted.

**2. Direct costs (US\$16.9 million)**

- 2.23 This category (70% of total cost) will finance the civil work to complete the physical investments. This category will also finance equipment, technical services, and training to strengthen the institutional capacity of the MPE.

**3. Unallocated costs (US\$2.8 million)**

- 2.24 This category (12% of total costs) will finance physical contingencies and price escalation.

**4. Financial costs (US\$2.1 million)**

- 2.25 This category (9% of total cost) includes interest payable during the period of execution, the credit commission, and the credit inspection and supervision fees.

### **III. EXECUTION, INSTITUTIONAL AND ENVIRONMENTAL ASPECTS OF THE PROJECT**

#### **A. Organization for project execution**

##### **1. Executing agency**

- 3.1 The borrower of the loan will be the Government of Barbados. The MPE will be the Executing Agency for this project. The MPE has primary responsibility for environmental and natural resources management in Barbados. The MPE is a new ministry, having been established in September of 2001, replacing the functions of the Ministry of Environment, Energy and Natural Resources. Although the Ministry itself is new, the Ministry's units are all well established, having been drawn from the Ministry of Health and the Ministry of Finance and Economic Affairs.
- 3.2 The MPE consists of an Administrative Unit, the Environmental Unit, the Energy Division, the Coastal Zone Management Unit (CZMU), the Environmental Special Projects Unit and the Environmental Engineering Division. In addition to these units, the Ministry has responsibility for five state companies and statutory bodies, among them the National Conservation Commission (NCC).

##### **2. Project Administration Unit**

- 3.3 The MPE will implement the project through the CZMU. To administer the implementation of this project, the CZMU will establish a Project Administration Unit (PAU) within the CZMU. The CZMU will house the PAU and will provide it with all of the necessary logistical and administrative support. Although the CZMU will procure some additional equipment to support the PAU, the CZMU generally has sufficient office space, equipment, vehicles, and support personnel to house and support the PAU. The Director of the CZMU will have the main responsibility to coordinate the execution of the project and the country-wide implementation of the CZMP.
- 3.4 The PAU will be headed by a Project Manager and will include an engineer and an accountant. The PAU's personnel will be recruited locally on a competitive basis. The PAU will have day-to-day responsibility for project execution, including the procurement of all goods and services, the supervision of all consultants and contractors, and the preparation of all required reports. The PAU will also have the following responsibilities: (i) preparing and submitting to the Bank disbursement requests and the corresponding justification of expenses; (ii) maintaining adequate financial, accounting and internal control systems for the management of the program's resources; (iii) maintaining an adequate disbursements support documentation filing system, which must always be available for review by the Bank and the program's external auditors; and (iv) preparing and submitting to the Bank the annual financial statements regarding program's expenses, and the semi-annual Revolving Fund Status Reports. The

establishment of the PAU and the hiring of the PAU staff shall be completed prior to first disbursement of the loan.

### **3. Project execution mechanisms**

- 3.5 Following a normal practice of project execution in Barbados, the CZMU through the PAU will engage a Project Management Consultant as the primary vehicle for project execution. The Project Management Consultant will be an internationally recruited engineering and design firm that will have responsibility for preparing final designs for the physical investments, assisting government in the procurement of Civil Works Contractors to carry out the physical investments, and managing and supervising the civil works contractors. The CZMU began the process to hire the Project Management Consultant during project preparation in accordance with IDB procurement procedures<sup>7</sup>. The PAU shall hire the Project Management Consultant prior to first disbursement of the loan. The final engineering designs and budgets prepared by the Project Management Consultant shall be subject to IDB no-objection. Any change in designs will undergo appropriate revisions to the social and environmental impact assessment.
- 3.6 Once the final designs are prepared, the PAU will hire one or more Civil Works Contractors to implement the physical investments. These contractors will be contracted directly by the GOB; however, they will be supervised by and report to the Project Management Consultant.
- 3.7 To ensure quality control, the PAU will also contract with a firm or consortium to carry out periodic independent monitoring of the Project Management Consultant and the Civil Works Contractors. This Quality Control Consultant will provide additional checks and balances and ensure that the PAU has independent technical assistance to assess the performance of the Project Management Consultant and the Civil Works Contractors.
- 3.8 Various consultants and trainers will be hired by the PAU to implement the institution strengthening component of the project. The PAU will have direct responsibility for hiring and supervising these consultants.
- 3.9 The CZMU will prepare and submit yearly reports to the Bank to inform on progress achieved in the statutorily mandated process of public consultation and parliamentary approval of the Coastal Zone Management Draft Plan. This process is already underway and is expected to culminate by 2003. The report will summarize the GOB advances implementing the Plan and should also inform on CZMU's activities that relate to the Plan's recommendations, including: (i) evaluation and issuance of building permits for coastal-related development proposals; (ii) EIAs conducted for coastal developments; (iii) enforcement of

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<sup>7</sup> Expressions of Interest were received on August 17, 2001. The selection of the firm is expected by the end of October 2001.

building set-backs and zoning of ecological sensitive areas; and (iv) enforcement of design requirements related to coastal engineering practices.

#### **4. Financial management**

- 3.10 The GOB Fiscal Year runs April 1 to March 31. Budgets are divided into recurrent and capital accounts. Most financial management activities within the MPE are decentralized to the various units. The MPE Administrative Unit's principal responsibilities pertain to coordination and compilation of information. Units do not receive or make any payments directly. Warrants issued by the Ministry of Finance authorize the units to access funds through the Government Treasurer. Units record all expenditures in a vote book, and send payment requests to the Treasurer, which issues the payment directly to the payee. Each unit prepares monthly statements of expenditures that describe actual expenditures vs. the warrant. The MPE has no internal audit function. The Auditor General has statutory responsibility for auditing all government accounts. The MPE's financial records are not computerized and all accounting is done by hand.
- 3.11 The CZMU Accountant will be responsible for the financial management of the project, including accounting and requesting IDB disbursements. To facilitate this responsibility, the PAU will establish a computerized accounting system for the project. The GOB is in the process of computerizing the accounting systems of all ministries. The PAU will ensure that all computer hardware acquired for the accounting system project is compatible with the GOB's computerization initiative. CZMU Accountant and Clerical Officer will receive training in the use of computers, including the use of the accounting software. The accounting system will permit the preparation by source of funds of monthly and year-end statements of project investments and cashflows. The CZMU is in the process of establishing the computerized accounting system and training accounting personnel.
- 3.12 Consistent with GOB procedures, a specific and separate Bank account in the Program's name will be established in the Central Bank for the constitution of the revolving fund and for the management of the Bank's financing. The revolving fund will amount to 5% of the value of the loan. When the PAU incurs an expense to be funded by the loan, it will request payment by the Treasurer. The Treasurer will make the payment and debit the revolving fund for the amount of the payment. The PAU will request to the Bank the replenishment of the revolving fund, providing the corresponding justification of project expenditures. They will also be required to prepare and submit to the Bank a semi-annual report showing the use of the loan's funds as of June 30<sup>th</sup> and December 31<sup>st</sup>, within 60 days of the end of each six-month period.



## **5. External audit**

- 3.13 The project's annual financial statements will be presented to the Bank during the period of execution duly audited by a firm of Certified Public Accountants or Chartered Accountants acceptable to the Bank. Such presentations will take place within 120 days after the closing of each fiscal year.

### **B. Implementation schedule**

- 3.14 Implementation includes contracting of the Project Management Consultant Firm (US\$1.5 million), expected to initiate activities during the last quarter of 2001, and the execution of four contracts for construction of physical works for the following facilities: (i) Woman's Bay headland protection, Crane Beach restoration, Holetown Beach improvement, Welches Beach improvement, and the Bay Street demolition and replacement of the Old Hospital Jetty (US\$7.2 million); (ii) Rockley to Drill Hall waterfront improvement (US\$7.9 million); (iii) Tent Bay boat access (US\$0.9 million); and (iv) Walkers Savannah dune restoration (US\$0.5 million). The construction of the first package of shoreline stabilization works is planned to begin in the third quarter of 2002. The Rockley waterfront improvement is scheduled to commence the second quarter of 2003, as well as the Tent Bay boat access and the Walkers Savannah dune restoration. The construction of all physical works for the project is scheduled to be completed by the fourth quarter of 2005.
- 3.15 In addition to the physical works, other activities to be financed include: (i) installation of the Holetown lagoon aeration system; (ii) acquisition of CZMU equipment; and (iii) MPE staff training, and development of strategic plan and public education strategy. Annex III presents a tentative bidding schedule and an estimate of accounts involved.

### **C. Procurement**

- 3.16 Bank procedures will be followed in the procurement of works, goods, and consulting services. International competitive bidding will be followed for purchases of more than US\$250,000 for procurement of goods and related services, and US\$1,500,000 for construction works. Bids below these ceilings will take place in accordance with GOB procedures. Consultant services will be hired in accordance with Bank procedures.

### **D. Execution period and investment schedule**

- 3.17 The execution period of the project will be four years. The following table presents a summary of the projected disbursement schedule, indicating the sources of financing.

**Table 3.1**  
**Investment Schedule**  
**Direct Costs (US\$ thousands)**

YEAR	IDB	LOCAL	TOTAL	%
1	3,400	1,500	4,900	20
2	6,900	2,600	9,600	40
3	5,200	2,200	7,400	30
4	1,500	0.900	2,400	10
<b>TOTAL</b>	<b>17,000</b>	<b>7,200</b>	<b>24,200</b>	<b>100</b>

**E. Retroactive financing**

- 3.18 With the supervision of the Bank's Country Office, the CZMU has proceeded with the procurement of the Project Management Consultant in accordance with Bank procedures. It is proposed that the Bank may recognize as part of the local counterpart contribution up to US\$750,000 for the engagement of the Project Management Consultant (see Annex III – Tentative Procurement Plan).

**F. Maintenance**

- 3.19 Maintenance costs of the investments are estimated at US\$215,000 per year. As investments are completed, the PAU will formally hand over responsibility for operation and maintenance to the Ministry of Public Works and Transport (MPT). Upon completion of the investment, the GOB will notify the IDB of the date when the MPT will assume responsibility for the operation and maintenance of the investment, subject to regulation by the CZMU, TCPO, and other relevant authorities. The CZMU will maintain responsibility for monitoring the status of the investments and for making recommendations for periodic maintenance to the MPT. In the first quarter of each year, beginning with the fiscal year after which the coastal works are constructed and for five consecutive years, the borrower will submit a report to the Bank, in a format to be agreed upon, demonstrating that the infrastructure are being maintained in accordance with the requirements and recommendation of the CZMU inspection reports.

**G. Land acquisition**

- 3.20 All the physical works are located in public property. Access to the shoreline, the beaches and the immediate marine surroundings are crown property. It will not be necessary to acquire any land. Keeping with the Bank's policy, before issuing calls for bids of works, the borrower will have to demonstrate that it holds legal title to the lands on which the works are to be constructed.

## **H. Supervision of the project**

- 3.21 The Bank's Country Office in Barbados (COF/CBA) will be responsible for supervising the project. The Bank will establish inspection procedures so as to ensure satisfactory completion of the project components and to verify compliance with agreed measures for environmental monitoring as part of the annual reports. The Logical Framework of the project shows the main indicators to be used during the supervision of the execution (see Annex II). A Mid-term evaluation mission, with the participation of the project team and COF/COB, will take place to verify the achievements of the program and the expected implementation of the Coastal Zone Management Plan. Prior to the mission a mid-term evaluation the quality control consultant firm will prepare report, and the CZMU will report on the activities described in paragraph 3.9.
- 3.22 **Ex-post Evaluation:** There will not be a formal Ex-post Evaluation of the Program. However, the Executing Agency has indicated its willingness to conduct a Final Evaluation of the Program with its own resources, as it is normal practice of the agency. The Bank will participate in the final evaluation, a joint report of the project development impact will be produced as a result of the evaluation analysis.

## **I. Environmental aspects**

- 3.23 The works proposed in this project aim to maintain or enhance beach features along the Barbadian coastline. Thus, it is expected that the proposed works will have positive effects on the beach environment. The supporting activities of environmental education and community awareness programs, and institutional strengthening will also contribute to enhance the positive environmental impacts of the project.
- 3.24 The primary and overriding criterion for selecting works to be included in Phase II required consistency with GOB's ICM policy<sup>8</sup>. In this regard, the Standards and Procedures Policy states: "Apply standards and procedures to avoid degradation of the environment and to reduce the risk of long term or irreversible effects upon it". Due to the nature of this project, potential environmental impacts were identified during the feasibility studies. Updated environmental assessments for each proposed work and for the project as a whole were prepared. The conceptual designs of the proposed works have benefited from oceanographic monitoring information, and modeling carried out by the CZMU with the support of renowned coastal research centers.

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<sup>8</sup> ICM policy in Barbados is guided by Barbadians' vision for the future of the coast of Barbados: "A coast to be proud of, which is valued, appreciated and safeguarded as a place to live, work and relax; a place where development and use of resources will be sustainable, and where the natural environment is protected and enhanced to keep its essential and unique place in the Barbadian heritage".

- 3.25 The construction of some of the proposed works might entail the temporary disturbance of the local marine ecosystem. During construction, marine ecology specialists from the CZMU should be actively involved in supervising construction. Appropriate monitoring programs will be set up at specific sites along the coastline in order to ensure that water quality standards are maintained within acceptable limits. The general health of potentially affected reefs will also need to be closely monitored, both during and after construction. Where sand nourishment and construction of groynes is required, the use of turbidity barriers is recommended to minimize sediment plume formation and thus protect sensitive marine communities. Where possible disturbance to local fauna due to construction exists, all necessary precautions will be adopted to minimize potential trauma. An experienced quality control firm/agency will be hired to provide additional technical support to the supervision and monitoring of project implementation. The system of public information developed by the CZMU will be expanded and main stakeholders will be encouraged to participate during project execution.
- 3.26 During the feasibility studies extensive public and stakeholder participation was carried for the formulation of the Coastal Management Plan and for each coastal infrastructure project<sup>9</sup>. Additional direct consultation was carried out as part of the updated environmental assessment.
- 3.27 During the updated environmental assessment direct interviews with residents of the proposed projects were conducted. In all cases, the result was general support for the intention to create/enhance beaches along selected portions of the coast and strong support for the provision of safe pedestrian access to the beaches. Some of the concerns indicated by residents were related to the aesthetic impact of the proposed structures and to the effect of sand retention and erosion of the beach segments adjacent to the proposed works. The updated assessment confirms the consistency of the project components with the Integrated Coastal Management Plan and it is viewed as a necessary follow up to the environmental planning and tourism development activities implemented by the GOB and the private sector. Recommendations from the study will be taking into consideration during the final engineering construction designs and will also be incorporated to the comments and observations for the preparation of the final Integrated Coastal Zone Management Plan.
- 3.28 The environmental monitoring system is already in place. The CZMU is operating the "Shoreline and Near Shore data System" (SANDS). This is a dynamic data base use for storage, analysis and retrieval of critical marine and oceanographic data. Some of the databases include: (i) beach profiles (100 sites); (ii) inventory of coastal structures; (iii) coral reef monitoring (22 sites); and (iv) water quality data for both terrestrial and coastal sites.

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<sup>9</sup> The draft Coastal Zone management Plan was made available to the general public during June and July 1998 and countrywide public meetings were held.

**J. Poverty-Targeting and Social Equity**

- 3.29 This operation does not qualify as a social equity enhancing project, as described in the indicative targets mandated by the Bank's Eighth Replenishment (document AB-1704). Furthermore, this operation does not qualify as a Poverty Targeted Investment (PTI).

#### **IV. VIABILITY AND RISKS**

##### **A. Technical and environmental justification**

- 4.1 The CZMP identified priority actions, some of which have started to be implemented systematically as part of the GOB routine activities and others which were designed and packaged to be easily accommodated in the annual programs and budgets of the GOB. In contrast, the civil works proposed required substantial capital outlay, which is usually financed by the government through international donor's collaboration.
- 4.2 The proposed works have undergone rigorous technical evaluation and are deemed to be the best options from a financial, socio-economic and environmental perspective. Projects were identified and selected first as part of a pre-feasibility study and later on prioritize as part of a feasibility study supported by the IDB. The feasibility assessment included mathematical model investigations for Rockley to Drill Hole, Crane Beach and Welches Beach. The study undertook detailed modeling of waves, estimation of potential along-shore drift rates and beach profile response. Bathymetric data and beach profile monitoring supported the study.
- 4.3 Conceptual engineering design followed normal engineering practice the proposed layout of the works has benefited from the mathematical modeling study and wave driven sediment transport. The schemes have been designed to tie in with the existing coastal structures, therefore minimizing both environmental aspects and capital costs. Additional information from demonstration projects have helped to improve the engineering design.
- 4.4 The type of coastal engineering works proposed are common in Barbados. Groynes, revetments, jetty's and detached break waters have been in use for many years. There is a cumulative experience of dealing with coastal structures to provide access to the shorelines and to protect beaches from dynamic processes. A manual on the maintenance of coastal structures is available and in use, this ensures the maximum useful life for a coastal structure. In summary there is institutional and technical capacity in the country to carry out the proposed projects and properly inspect and maintain the structures.
- 4.5 Final engineering designs and tender documents will be prepared by an international consulting firm. Terms of reference have been agreed with the Bank. The project team will review the engineering designs prior to the call for bids. Environmental impact studies will be carried out, if warranted as a result of changes in the design.
- 4.6 An environmental impact analysis was performed for each investment project. Specific recommendations to protect the marine and coastal environment were taken into consideration in the design and some other considerations have been incorporated into the draft contract documents for final designs. An

environmental management plan will be part of the construction of each infrastructure work. With proper engineering design and good construction procedures only small disturbance of the environment are expected.

**B. Economic analysis**

4.7 Formal cost-benefit analysis has been conducted for the following shoreline stabilization project components: Rockley Beach to Drill Hall, Woman's Bay, Crane Beach, and Welches Beach. Together, this works comprise close to 80% of the budgeted amount for all infrastructure components.

4.8 In some respects the costs and benefits of the proposed coastal conservation projects are straightforward to analyze in economic terms. They do not produce import substitutes, or use goods in production that might otherwise have been exported. There are no indirectly traded items used in production. The production materials are a few bulky, low value non-traded goods produced competitively in local markets. There are however, methodological issues in valuing intangibles like amenity and safety, the project's main benefits, for which no clear markets have developed. Subjective valuation techniques, based on behavioral or revealed relationships, offer the only practical way to measure these categories of environment-related benefits, and they are increasingly accepted for decision making.

**1. Costs**

**a) Financial cost of structures**

4.9 The shoreline conservation structures are composed of large volumes of relatively few items of low value material, mainly rock, sand and cement. While processing and skilled labor costs are small components of total costs, transport and unskilled labor costs are relatively large.

**b) Economic costs of structures**

4.10 Financial costs are valued at the prices that the project entity is expected to pay for them. However, these prices do not necessarily reflect economic costs to society. A major aim of economic analysis is to assess the project's contribution to the society's welfare. This evaluation requires that there be adjustments for price distortions by using "shadow" prices that reflect more closely the opportunity costs and benefits of the project, instead of market prices. For these analyses adjustments have been made to the observed prices of tradable goods and labor.

**2. Benefits**

4.11 The basis for assessing the incremental benefits of the shoreline stabilization project components is the "with" and "without" project comparison. Following

this examination, the quantifiable benefits accrued to the coastal protection projects are as follows:

- a. Benefits to land owners through increase in land rents as a result of improved amenities, particularly beaches either protected or created by infrastructure works (estimated through hedonic pricing methods).
- b. Benefits to Barbadians by securing improved amenities at sites suitable for family and group outings (estimated through random utility models).
- c. Benefits from higher valuations by stay-over tourists of beaches, leading to increased likelihood of return visits (estimated through ordered logit models).
- d. Benefits of avoiding increased costs of transport resulting from road disruptions (estimated based on adjusted market prices of avoided expenditures).

4.12 Each scheme has a different benefit mix:

- a. Rockley Beach to Drill Hall project benefits derive from improved land values from the creation of new beaches, gains to Barbadian beach users, and gain of revenue from tourist visits.
- b. Woman's Bay benefits are derived from averted losses of land values, tourist revenues, and Barbadian beach users.
- c. Crane Beach benefits are mainly from tourist revenue, with additional benefits from Barbadian outings and land values.
- d. Welches Beach project benefits are from maintaining road links and improved land values.

4.13 To avoid the likelihood of double counting benefits, improved land values accrued to hotel and commercial properties have been excluded from the benefit mix. Likewise, benefits to own-parish Barbadian beach users have been netted out.

4.14 The benefits estimated for each scheme are not exhaustive. Many values are not in the benefit mix of the schemes analyzed, in particular existence values, contribution of coastal environment to cultural identity, and safety considerations. The Welches beach scheme is also expected to have additional benefits not captured in the analysis, in particular benefits to Barbadian beach users and generation of additional tourist revenues.

### **3. Summary of financial and economic analysis**

4.15 Table 4.1 gives a summary of the main economic indicators for each project:



**Table 4.1**  
**Financial and Economic Indicators**

PROPOSED SCHEME	NPV @ 12% IN BDS (000)	INTERNAL RATE OF RETURN
	ECONOMIC PRICES	ECONOMIC PRICES
Rockley Beach to Drill Hall	20,258	27%
Crane Beach	305	13%
Woman's Bay	474	14%
Welches	1,945	48%

- 4.16 All the schemes analyzed are economically viable at the discount rate of 12%. At financial prices, the internal rate of return of the schemes are 26% for Rockley to Drill Hall, 11% for Crane Beach, 13% for Woman's Bay, and 42% for Welches.

**a) Sensitivity analysis**

- 4.17 Sensitivity analysis was carried out for each scheme by increasing costs, decreasing benefits, or delaying benefits.
- 4.18 Based on the sensitivity analysis, Rockley Beach to Drill Hall is a very attractive scheme. Even under a scenario of 50% cost increase or 50% decrease in benefits, the Economic Internal Rates of Return (IRR) are 18% and 14%, respectively. Even a seven-year delay still yields a 13% Economic IRR.
- 4.19 Crane Beach is sensitive to cost over-runs above 7% as well as a decrease in benefits over 6%. This scheme is also sensitive to a one-year delay.
- 4.20 Woman's Bay is insensitive to a cost increase of up to 18%, or a decrease in benefits of less than 15%, or up to a one-year delay.
- 4.21 Welches Beach is insensitive to a cost increase of up to 38%, a benefit decrease of over 27%, and a delay in benefits of two years.

**C. Institutional and financial viability**

**1. Institutional viability**

- 4.22 The lead institution for coastal zone management in Barbados is the CZMU within the MPE. The CZMU evolved from the Coastal Conservation Project Unit, established in 1983, to a very experienced and technically capable agency. The CZMU has been able to coordinate effectively with the various ministries, the private sector, the NGO and the coastal communities the preparation of the country's Coastal Zone Management Plan. Barbados has gained recognition as a Caribbean region leader in the development and implementation of Integrated Coastal Management. Once the CZMP is fully implemented, the CZMU's

transition from a technically based service provider/project manager to a strategic and regulatory organization with a clear mandate and legislation will be complete.

- 4.23 The CZMU is an agency that shows an adequate institutional structure and sound internal procedures for project implementation. The CZMU has proven to be a judicious and effective manager of resources from the GOB and international donors, mainly the IDB. Given the CZMU's effective execution of previous Bank (Loans 571/OC-BA and 856/OC-BA), the experienced gained in implementing demonstration projects of similar character as those considered under this proposal, and the high quality of its technical and professional staff (cited as one of the key factors behind the success of the Coastal Conservation Program Phase I in the Project completion Report), the CZMU is uniquely qualified to implement the proposed works.

## 2. Fiscal impact

- 4.24 The following table presents a summary of the historical and projected costs and their financing expressed in 2000 constant US dollars:

**Table 4.2**  
**MPE Baseline Budget Projections**  
(in US\$ thousands)

	HISTORICAL		PROJECTIONS					
	Actual	Estimate						
	FY 00-01	FY 01-02	FY 02-03	FY 03-04	FY 04-05	FY 05-06	TOTAL	Average
<b>CURRENT COSTS</b>	<b>15,242.9</b>	<b>15,615.1</b>	<b>15,404.0</b>	<b>15,404.0</b>	<b>15,404.0</b>	<b>15,404.0</b>	<b>61,616.0</b>	<b>15,404.0</b>
CZMU	654.0	754.8	704.0	704.0	704.0	704.0	2,816.0	704.0
Other	14,588.9	14,860.3	14,700.0	14,700.0	14,700.0	14,700.0	58,800.0	14,700.0
<b>CAPITAL COSTS</b>	<b>3,478.3</b>	<b>5,349.4</b>	<b>6,850.0</b>	<b>13,750.0</b>	<b>12,350.0</b>	<b>6,350.0</b>	<b>39,300.0</b>	<b>9,825.0</b>
CZMU - CIP	0.0	0.0	4,900.0	9,800.0	7,400.0	2,400.0	24,500.0	6,125.0
CZMU - Other	811.4	1,697.1	950.0	950.0	950.0	950.0	3,800.0	950.0
Subtotal CZMU Capital	811.4	1,697.1	5,850.0	10,750.0	8,350.0	3,350.0	28,300.0	7,075.0
MPE <sup>1</sup> - Other Project	2,666.9	3,652.3	1,000.0	3,000.0	4,000.0	3,000.0	11,000.0	2,750.0
<b>TOTAL COSTS</b>	<b>18,721.2</b>	<b>20,964.5</b>	<b>22,254.0</b>	<b>29,154.0</b>	<b>27,754.0</b>	<b>21,754.0</b>	<b>100,916.0</b>	<b>25,229.0</b>
<b>FINANCING</b>	<b>18,721.2</b>	<b>20,964.5</b>	<b>22,254.0</b>	<b>29,154.0</b>	<b>27,754.0</b>	<b>21,754.0</b>	<b>100,916.0</b>	<b>25,229.0</b>
Local	18,353.0	20,964.5	18,054.0	19,854.0	19,354.0	17,854.0	75,116.0	18,779.0
IDB	0.0	0.0	3,400.0	6,900.0	5,200.0	1,500.0	17,000.0	4,250.0
Other external	368.2	0.0	800.0	2,400.0	3,200.0	2,400.0	8,800.0	2,200.0

1/ The change of Ministries did not affect budgetary allocations.

- 4.25 Because MPE has been in existence as such only from September of 2001, the historical data corresponds to reports from the no-longer existent Ministry of Environment, Energy and Natural Resources, which cover the last two fiscal years. For the projections, current costs remain at the estimated level for FY 01-02 in accordance with the ministry's plans to control these costs so as to keep them constant in real terms. Capital costs projections rely on the ministry plans which include the Bank's project under consideration, a CDB park projects and an

allowance of US\$950 thousand per year to cover rehabilitation works routinely carried out by the CZMU.

- 4.26 On an annual average basis, MPE total projected costs amount to US\$25.2 million in comparison to the FY 01-02 estimate of US\$ approximately US\$21 million. This increase is due to an investment plan that increases capital costs from US\$5.3 million in FY 01-02 to an average of US\$9.8 million for the projected period. Since works execution and its supervision is contracted out, the internal capacity needed to handle this increase is related to contracting management activities. This contracting management capacity is being strengthened in the PAU as a part of project design. Notwithstanding the increase in investment costs, on the financing side, projected local annual average financing requirements decrease to US\$18.8 million from an estimated US\$21 million in FY 01-02 as a result of the level of the Bank's and CDB expected financing of capital costs. In summary, contracting management capacity strengthening, CMZU's execution experience with prior Bank's financed projects, and a lower projected local fund requirements, point to an institutionally and financially viable project.
- 4.27 Total operation and maintenance costs of the proposed investments are estimated to be approximately US\$215,000. This is only 1.3 percent of projected MPE recurrent expenditures during the last year of the project. Furthermore, as discussed in the next section, it is reasonable to assume that increased property tax revenue resulting from the investments will be sufficient to offset the operation and maintenance costs.

### **3. Cost recovery**

- 4.28 The project investments are by their nature largely public goods. By enhancing public amenities and coastal security, property owners, hotel operators, tourist operators, tourists, and the public at large will all benefit from the investments. It will be very difficult to isolate the discrete benefits of the investments to specific groups. Furthermore, in Barbados, the coastal zone is public property. There are no private beaches and all beaches are open to the public. In this context, it will be difficult to implement a cost recovery system based on user fees.
- 4.29 In light of the public good nature of the investments (and the public nature of Barbados' coastal areas) any cost recovery will probably have to be based on taxation. The investments will be treated as public goods that convey a broad set of improved public amenities and enhanced safety to residents and visitors. The area where taxation is likely to recover costs soonest is the land tax. Many coastal property owners should experience substantial windfall increases in the value of their properties as a result of the proposed investments (improved beach amenities, reduced threats of erosion, etc.).
- 4.30 The Ministry of Finance and Economic Affairs, Land Tax Department is responsible for implementing the land tax. Taxes are paid annually and reassessments are done every three years. Assessments are based on estimates of

market value (the Land Tax Department tracks property sale prices) and field assessments. The last adjustment was in 1999, with the next two adjustments scheduled for 2002 and 2005. The records of the Land Tax Department are computerized.

- 4.31 Because of the timing of the project, it is unlikely that the project will produce any significant increases in land tax revenues in the 2002 adjustment. Some increases could be expected, however, as pending project investments could encourage some speculative increases in the value of abutting properties. To ensure that the GOB realizes the potential cost recovery for the investments through land taxes, the Bank will finance a consultant to support the Land Tax Department to improve its valuations and adjustments methodologies.

#### **4. Sustainability**

- 4.32 This project is necessary for the continued sustainable development of the Barbados economy, which is heavily dependent on the protection and enhancement of the country's natural coastal environment. This project will be sustainable for several reasons. First, the project is taking place within the context of a strong institutional framework for integrated coastal zone management. The project will finance selected institution strengthening measures to enhance the already robust system. Second, most of the investments do not require ongoing operation, but only periodic maintenance. Provisions have been made in the project for the assignment of responsibility for maintenance activities. The achievement of cost recovery through taxation will provide resources to maintenance activities.

#### **D. Issues and risks**

- 4.33 Potential conflict of interest: The CZMU has a regulatory and advisory role, with other government and non-government entities bearing responsibility for the construction, operation, and maintenance of coastal structures. However, the CZMU will have responsibility for overseeing the implementation of the project investments. Any potential conflict of interest in this regard is mitigated by the fact that: (i) Previous experience with the construction of demonstration projects have proven to be satisfactorily executed; (ii) the works will be contracted by the CZMU and supervised by a project management firm; and (iii) once construction of the works is finalized, responsibility for their operation and maintenance will be delegated to the Ministry of Public Works and Transport with the CZMU resuming its regulatory and oversight role.

**COASTAL INFRASTRUCTURE PROGRAM  
(BA-0019)  
Logical Framework**

OBJECTIVES	BENCHMARKS	MEANS OF VERIFICATION	ASSUMPTIONS
Ensure a healthy environment and sustained economic development through effective management of the coastal zone.	1.1 Full public adoption and implementation of the CZMP by the end of 2003. 1.2 Full Compliance with land-use policy by 2004.	1.1 Public consultation meetings. 1.2 Statutory status of the CZMP. 1.3 Reports from Town and County Planning	1.1 GoB continues to support coastal policy.
Support priority investments for coastal zone stabilization, coastal ecosystem management, coastal access improvement and coastal development.	1.1 No further decline in coastal and marine environmental quality in areas of direct project influence. 1.2 Increased land value of accumulated US\$5.5 million accrued by 2006 of properties in areas of direct project influence (750 m. radius). 1.3 Increased revenue from tourist stayover visits of US\$7.5 million by 2006 (750 m. radius).	1.1 Quarterly CZMU reports of monitoring program. 1.2 Updated Land value assessment (Land Tax department), and tax collection reports. 1.3 Tourism statistics from the Ministry of Tourism.	1.1 Tourism number are influenced by environmental situation and values 1.2 No significant external change in long-term tourism development in Barbados
Reduce the loss of coastal infrastructure to coastal erosion and beachfront facilities.	1.1 Loss of sand recharge volume is less than 3% per year at Rockley Beach, Holetown Beach and Welches Beach. 1.2 No rate of beach erosion is detected at Woman's Bay and Crane Beach.	1.1 CZMU monitoring reports.	1.1 Seasonal storms are within parameters.
Improve the quality of two important coastal ecosystems.	2.1 Water quality at Holetown Lagoon improves (dissolved oxygen level is maintained above 4 ppm). 2.2 10% yearly increase of sand volume and vegetation cover in Walkers Savannah dunes.	2.1 CZMU monitoring reports	2.1 Regulations are enforced

OBJECTIVES	BENCHMARKS	MEANS OF VERIFICATION	ASSUMPTIONS
TS (cont...)			
ement of safe access to the ne for leisure and economic es	3.1 Public safety is improved to access the waterfront (Hospital Jetty). 3.2 Number of safe- landings of fisherman-boats increase (Tent Bay)	3.1 CZMU monitoring reports	
hening of the MPE.	4.1 90% compliance with set-back requirements. 4.2 Routine near-shore water quality monitoring is performed. 4.3 Yearly reef monitoring is carried out 4.4 Routine Quarterly inspection are performed on coastal structures	4.1 CZMU monitoring report. 4.2 Town and County reports.	4.1 Local budget allocation is
TIES			
ne stabilization works			
ockley to Drill Hall improvement.	1a. US\$7.9 million		
oman's bay headland protection	1b. US\$1.2 million		
rane beach restoration	1c. US\$2.0 million		
oletown beach improvement.	1d. US\$0.7 million		
elches beach improvement	1e. US\$2.5 million		
l ecosystem recovery			
oletown Beach	2a. US\$0.7 million		
Walkers Savannah	2b. US\$0.5 million		
l access improvement			
ay Street Jetty	3a. US\$0.8 million		
ent Bay Boat Access	3b. US\$0.9 million		
ional strengthening			
CZMU equipment	4a. US\$20.000		
PE staff training	4b. US\$80.000		
PE Strategic plan	4c. US\$60.000		
PE public education strategy.	4d. US\$70.000		

**COASTAL INFRASTRUCTURE PROGRAM  
(BA-0019)  
BIDDING SCHEDULE - TENTATIVE PROCUREMENT PLAN**

PRINCIPAL PROCUREMENT	FINANCING BANK %		METHOD	PREQUALIFICATIONS	AMOUNT (US\$ THOUSANDS)	PUBLICATION (HALF C)
	IDB	LOCAL				
MU equipment	0	100		NO	20	
lting						
l designs and supervision	0	100	ICB	YES	1,500	0
iting Firm	0	100	ICB	YES	200	0
hical quality control	100	0	ICB	YES	100	0
E strategic plan	0	100	LB	YES	60	0
E public education strategy	0	100	LB	YES	70	0
s and Improvements						
Package 1 man's Bay, Crane Beach, Holetown Beach, Welches Beach, Old pital Jetty.	80	20	ICP	YES	7,200	0
Package 2 kley – Drill Hall Beach	80	20	ICP	YES	7,900	0
t Bay and Walkers Savannah (2 lots)	70	30	LCP	NO	1,400	0

International calls for proposals  
International competitive bidding  
Local bidding  
Local call for proposals

bidding regulations:

For US\$10,000, contracts may be awarded without tenders.

US\$10,000 and less than US\$50,000, contracts may be awarded without tenders, but written quotations shall be obtained.

US\$50,000, tenders must be invited in the local press.

**PROPOSED RESOLUTION**

**BARBADOS. LOAN \_\_\_\_/OC-BA TO THE  
GOVERNMENT OF BARBADOS  
(Coastal Infrastructure Program)**

The Board of Executive Directors

**RESOLVES:**

That the President of the Bank, or such representative as he shall designate, is authorized, in the name and on behalf of the Bank, to enter into such contract or contracts as may be necessary with the Government of Barbados, as Borrower, for the purpose of granting it a financing to cooperate in the execution of the Coastal Infrastructure Program. Such financing will be for an amount of up to seventeen million dollars of the United States of America (US\$17,000,000) from the Single Currency Facility of the Ordinary Capital resources of the Bank, and will be subject to the "Special Contractual Conditions" and the "Financial Terms and Conditions" of the Executive Summary of the Loan Proposal.