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Report No: PAD659

INTERNATIONAL DEVELOPMENT ASSOCIATION

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED CREDIT

IN THE AMOUNT OF SDR 11 MILLION (US\$ 17 MILLION EQUIVALENT)
WITH PROPOSED CO-FINANCING FROM THE
STRATEGIC CLIMATE FUND GRANT IN THE AMOUNT OF US\$ 12 MILLION
AND
STRATEGIC CLIMATE FUND LOAN IN THE AMOUNT OF US\$ 9 MILLION

TO THE
COMMONWEALTH OF DOMINICA

FOR A

DISASTER VULNERABILITY REDUCTION PROJECT
IN SUPPORT OF THE THIRD PHASE OF THE EASTERN CARIBBEAN
REGIONAL DISASTER VULNERABILITY REDUCTION PROGRAM

APRIL 2, 2014

*Caribbean Country Management Unit
Sustainable Development Division
Latin America and the Caribbean Region*

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CURRENCY EQUIVALENTS

(Exchange Rate Effective December 6, 2013)

Currency Unit = XCD
XCD\$0.37 = US\$1
US\$1.54 = SDR 1

FISCAL YEAR

January 1 – December 31

ABBREVIATIONS AND ACRONYMS

APL	Adaptable Program Loan
BP	Bank Policy
CAPRA	Central American Probabilistic Risk Assessment
CAS	Country Assistance Strategy
CCRIF	Caribbean Catastrophe Risk Insurance Facility
CDB	Caribbean Development Bank
CIF	Climate Investment Funds
CPACC	Caribbean Planning for Adaptation to Climate Change
DOWASCO	Dominica Water and Sewerage Company
DRM	Disaster Risk Management
DVRP	Disaster Vulnerability Reduction Project
EA	Environmental Assessment
EIA	Environmental Impact Assessment
ECU	Environmental Coordinating Unit
EMP	Environment Management Plan
EMF	Environment Management Framework
ESSAF	Environmental and Social Screening and Assessment Framework
EU	European Union
GDP	Gross Domestic Product
GEF	Global Environment Facility
GFDRR	Global Facility for Disaster Reduction and Recovery
GIS	Geographic Information System
GNI	Gross National Income
GoCD	Government of the Commonwealth of Dominica
HDI	Human Development Index
IBRD	International Bank for Reconstruction and Development
IC	Individual Consultant
ICB	International Competitive Bidding
IDA	International Development Association

IDB	Inter-American Development Bank
IFR	Interim Financial Report
IMF	International Monetary Fund
IPF	Investment Project Financing
LCS	Least Cost Selection
LiDAR	Light Detection and Ranging
MACC	Mainstreaming Adaptation to Climate Change
MoPWEF	Ministry of Public Works, Energy and Ports
MoE	Ministry of Environment, Natural Resources
MoF	Ministry of Finance
NCB	National Competitive Bidding
NDP	National Disaster Plan
NEPO	National Emergency Planning Organization
ODM	Office of Disaster Management
OECS	Organization of Eastern Caribbean States
OM	Operations Manual
OP	Operation Policy
ORAF	Operational Risk Assessment Framework
PCU	Project Coordination Unit
PDO	Project Development Objective
PPA	Project Preparation Advance
PPCR	Pilot Program for Climate Resilience
PRGF	Poverty Reduction and Growth Facility
RAP	Resettlement Action Plan
RPF	Resettlement Policy Framework
RPS	Regional Partnership Strategy
SCF	Strategic Climate Fund
SPACC	Special Program on Adaption to Climate Change
SPCR	Strategic Program for Climate Resilience
TOR	Terms of Reference
UNDP	United Nations Development Program
UNFCCC	United Nations Framework Convention on Climate Change
XCD	Eastern Caribbean Dollar

Regional Vice President:	Hasan A. Tuluy
Country Director:	Sophie Sirtaine
Sector Director:	Ede Jorge Ijjasz-Vasquez
Sector Manager:	Anna Wellenstein
Task Team Leader:	Zoe Elena Trohanis

DOMINICA
Disaster Vulnerability Reduction Project (P129992)

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PAD DATA SHEET*Dominica**Disaster Vulnerability Reduction Project (P129992)***PROJECT APPRAISAL DOCUMENT***LATIN AMERICA AND CARIBBEAN**LCSDU*

Report No.: PAD659

Basic Information			
Project ID P129992	EA Category B - Partial Assessment	Team Leader Zoe Elena Trohanis	
Lending Instrument Investment Project Financing	Fragile and/or Capacity Constraints []		
	Financial Intermediaries []		
	Series of Projects [X]		
Project Implementation Start Date 01-Aug-2014	Project Implementation End Date 01-Sep-2019		
Expected Effectiveness Date 30-Jul-2014	Expected Closing Date 01-Jul-2020		
Joint IFC No			
Sector Manager Anna Wellenstein	Sector Director Ede Jorge Ijjasz-Vasquez	Country Director Sophie Sirtaine	Regional Vice President Hasan A. Tuluy
Borrower: Ministry of Finance			
Responsible Agency: Ministry of Environment			
Contact: Telephone No.: 767-266-3238	Harold Guiste	Title: Email: psagriculture@dominica.gov.dm	Permanent Secretary
Project Financing Data(in USD Million)			
[] Loan	[X] Grant	[] Guarantee	
[X] Credit	[] IDA Grant	[] Other	
Total Project Cost:	39.50	Total Bank Financing:	17.00
Financing Gap:	0.00		
Financing Source		Amount	
BORROWER/RECIPIENT		1.50	

International Development Association (IDA)	17.00
Strategic Climate Fund Credit	9.00
Strategic Climate Fund Grant	12.00
Total	39.50

Expected Disbursements (in USD Million)

Fiscal Year	2015	2016	2017	2018	2019	2020	2021	0000	0000
Annual	0.30	3.00	7.00	14.50	13.00	0.20	0.00	0.00	0.00
Cumulative	0.30	3.30	10.30	24.80	37.80	38.00	38.00	0.00	0.00

Proposed Development Objective(s)

The objective of the Project is to reduce vulnerability to natural hazards and climate change impacts in Dominica through: (i) investment in resilient infrastructure, and (ii) improved hazard data collection and monitoring systems.

Components

Component Name	Cost (USD Millions)
Prevention and Adaptation Investments	29.12
Capacity Building and Data Development, Hazard Risk Management and Evaluation	7.37
Natural Disaster Response Investments	1.00
Project Management and Implementation Support	2.00

Institutional Data

Sector Board

Urban Development

Sectors / Climate Change

Sector (Maximum 5 and total % must equal 100)

Major Sector	Sector	%	Adaptation Co-benefits %	Mitigation Co-benefits %
Water, sanitation and flood protection	Flood protection	40	100	
Public Administration, Law, and Justice	Central government administration	10	100	
Water, sanitation and flood protection	Water supply	15	100	
Transportation	General transportation sector	35	100	
Total		100		

I certify that there is no Adaptation and Mitigation Climate Change Co-benefits information

applicable to this project.			
Themes			
Theme (Maximum 5 and total % must equal 100)			
Major theme	Theme	%	
Social protection and risk management	Natural disaster management	50	
Environment and natural resources management	Climate change	50	
Total		100	
Compliance			
Policy			
Does the project depart from the CAS in content or in other significant respects?		Yes []	No [X]
Does the project require any waivers of Bank policies?		Yes []	No [X]
Have these been approved by Bank management?		Yes []	No [X]
Is approval for any policy waiver sought from the Board?		Yes []	No [X]
Does the project meet the Regional criteria for readiness for implementation?		Yes [X]	No []
Safeguard Policies Triggered by the Project		Yes	No
Environmental Assessment OP/BP 4.01		X	
Natural Habitats OP/BP 4.04		X	
Forests OP/BP 4.36		X	
Pest Management OP 4.09		X	
Physical Cultural Resources OP/BP 4.11		X	
Indigenous Peoples OP/BP 4.10		X	
Involuntary Resettlement OP/BP 4.12		X	
Safety of Dams OP/BP 4.37			X
Projects on International Waterways OP/BP 7.50			X
Projects in Disputed Areas OP/BP 7.60			X
Legal Covenants			
Name	Recurrent	Due Date	Frequency
Establishment of a Project Steering Committee		30-Jun-2014	
Description of Covenant			
The Recipient shall ensure that the Project Steering Committee is maintained at all times during the implementation of the Project, with a composition, mandate, and in form and substance satisfactory to			

the Association.

Name	Recurrent	Due Date	Frequency
Establishment of the Project Coordination Unit		30-Jun-2014	

Description of Covenant

The Recipient shall operate and maintain, at all times during the implementation of the Project, the Project Coordination Unit within the Recipient's Ministry of Environment, with functions, staffing and resources satisfactory to the Association.

Conditions

Name	Type
Project Operations Manual	Effectiveness

Description of Condition

GoCD to adopt a Project Operations Manual

Name	Type
Legal Agreements	Effectiveness

Description of Condition

GoCD to execute the three Legal Agreements: Financing Agreement, Grant Agreement, Loan Agreement

Name	Type
Component 3: Natural Disaster Response Investments	Disbursement

Description of Condition

GoCD to adopt a Component specific Operations Manual and defined Action Plan of Activities

Team Composition

Bank Staff

Name	Title	Specialization	Unit
Subhash C. Seth	Consultant	Transport Engineer	AFTFW
Gerald E. Meier	Consultant	Spatial Data Specialist	LCSDU
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M. Mozammel Hoque	Sr Financial Management Specialist	Financial Management	LCSFM
Vivian Nwachukwu-Ironi	Paralegal	Paralegal	LEGCF
Victor Manuel Ordonez Conde	Senior Finance Officer	Finance Officer	CTRLN
Manju Ghumman	Program Assistant	Program Assistant	LEGLE
Zoe Elena Trohanis	Sr Urban Spec.	Team Lead	LCSDU
Plamen Stoyanov Kirov	Senior Procurement	Procurement	LCSPT

	Specialist		
Edith Ruguru Mwenda	Senior Counsel	Senior Counsel	LEGAM
M. Yaa Pokua Afriyie Oppong	Senior Social Development Specialist	Social Development	LCSSO
Tiguist Fisseha	Disaster Risk Management Specialist	Disaster Risk Management	LCSDU
Raquel Almeida Campos	Temporary	Temporary	LCSDU
Michael J. Darr	Consultant	Environmental Safeguards	LCSEN
Nicholas James Callender	E T Consultant	Operations Analyst	LCSDU
Michael Fedak	Consultant	GIS Specialist	LCSDU

Non Bank Staff

Name	Title	Office Phone	City

Locations

Country	First Administrative Division	Location	Planned	Actual	Comments
Dominica	Saint Peter	Saint Peter	X		
Dominica	Saint Mark	Saint Mark	X		
Dominica	Saint John	Saint John	X		
Dominica	Saint George	Saint George	X		
Dominica	Saint David	Saint David	X		
Dominica	Saint Andrew	Saint Andrew	X		

I. STRATEGIC CONTEXT

A. Country Context

1. *Development Context.* Dominica is a small island state with an area of 750 square km, 148 km of coastline, and an estimated population of 71,680. An upper-middle income small island state, Dominica had a GNI per capita of US\$ 6,828 in 2011.¹ Despite relatively strong social indicators – UNDP’s 2011 Human Development index ranked Dominica as 81st out of 187 countries – nationwide, the poverty rate was estimated at 28.8 percent (2008/09), and approximately 13.9 percent of the population is unemployed (2009).² While poverty is found in both urban and rural areas, three quarters of Dominica’s poor households live in rural areas – where half of all households live in poverty.

2. Dominica’s economy reflects many of the classic features of a small island economy. High dependence on agriculture and agricultural exports, primarily bananas, as a proportion of GDP and source of foreign reserves make the country economically vulnerable to international commodity price fluctuations. Coupled with high levels of under-employment and unemployment as well as heavy dependence on foreign capital and aid for investment into productive sectors and for infrastructure development further exacerbate the country’s macroeconomic vulnerability. Attempts to diversify have been slow, however recent trends indicate that the island is making progress in its move towards developing “ecotourism” and the tourism sector, more generally. Through this effort, Dominica has become more acutely aware of the need to protect the environment and of the growing threat climate change presents to its valuable natural resources and biodiversity.

3. Dominica has unsustainable debt levels, which have largely resulted from inadequate fiscal management and the nation’s economic exposure to external shocks. Both the International Monetary Fund (IMF) and the World Bank have implemented programs in an effort to promote economic stabilization. In 2006, through the Poverty Reduction and Growth Facility (PRGF), key policy measures and structural reforms aimed at poverty reduction and pro-poor growth were identified and prioritized, while fiscal targets were modified to allow for more pro-poor spending in response to a crisis. Through the 2004 Dominica Economic Recovery Support Operation³, the World Bank supported Dominica’s efforts to regain fiscal sustainability and to restart growth (while protecting social gains) through a medium-term reform program and a single-tranche structural adjustment credit, whereby (a) public expenditure management was improved, (b) financial and debt management was reformed and (c) the public sector investment program was restructured.

4. A key development challenge facing Dominica is its vulnerability to geographic and climactic factors. As the island is located within the Atlantic hurricane belt, higher-intensity weather events can have very serious impacts on the productive sectors of the economy (i.e. tourism and agriculture), with particularly severe effects on vulnerable communities and households. In this context of high vulnerability, natural hazards often become disasters with large associated costs imposed on the country’s fragile economy exacerbating poverty. The

¹ Figures from the World Economic Outlook, as of February 2, 2013.

² Source: 2009 Country Poverty Assessment (CPA) for Dominica, Caribbean Development Bank.

³ P078841

economy's susceptibility to a variety of natural hazards is underscored by its rank as 12th on the list of 111 countries on the composite vulnerability index of the Commonwealth Secretariat and the World Bank.

5. ***Climate Vulnerability Context.*** With regards to physical vulnerability, steep topographic conditions and rugged interior have led to human settlements and physical development being highly concentrated along narrow coastal areas (particularly in the south and west). Approximately 44,000 persons (62% of the total population) live along the coast, with 21% of the total population (14,850)⁴ living in the coastal capital city, Roseau. A significant proportion of Dominica's population as well as assets are therefore highly vulnerable to hurricanes as well as high-intensity rainfall, wind and storm surge events. Disasters in Dominica have had deleterious impacts on livelihoods, destroyed infrastructure and disrupted the provision of essential services and have absorbed a growing share of the national budget to cover recovery and reconstruction efforts. In 2011, for example, record level flooding and landslides associated with heavy rain caused in excess of US\$100 million in damage. In April 2013, heavy rains caused landslides, flooding and a 40-foot deep split in a section of the East Coast main road resulting in two deaths, and more recently in December 2013 heavy rains caused widespread damage to infrastructure and housing with damage estimates in the range of US\$20 million. Given its vulnerability to climate variability and natural hazards, Dominica has undertaken a number of initiatives to respond to the threats posed by climate change as well as to mitigate the potential impacts of natural disasters in order to protect development gains.

B. Sectoral and Institutional Context

6. ***Climate Change Adaptation and Mitigation.*** Dominica ratified the UN Framework Convention on Climate Change (UNFCCC) in 1993, and given its commitment to reducing the impacts of climate change, it was among the 3 countries in the region (along with Saint Lucia and Saint Vincent and the Grenadines) to adopt a comprehensive adaptation framework, which allowed the island to be chosen to pilot adaptation investments under the GEF Caribbean Planning for Adaptation to Climate Change (CPACC) Project (1998 – 2001). The CPACC Project supported Dominica in developing a National Climate Change Adaptation Policy, adopted by the Cabinet in 2002. In 2003, a follow on GEF-funded Mainstreaming Adaptation to Climate Change (MACC) regional Project supported the development of an enabling environment for climate change adaptation in Dominica. The third phase Project, the Special Program on Adaptation to Climate Change (SPACC), approved in 2007, supported efforts by Dominica to implement specific pilot adaptation measures addressing primarily the impacts of climate change on the island's natural resources base, focused on biodiversity and land degradation along coastal and near coastal areas. Having established a strong track record on climate change adaptation, Dominica is now one of six countries selected in the Caribbean to participate in the Pilot Program for Climate Resilience (PPCR), one of the targeted programs of the Climate Investment Funds (CIF).

7. Within the context of the PPCR, Dominica has recently developed the Low Carbon Climate Resilient Development Strategy, which includes the country-driven Strategic Program

⁴ Source: National Statistical Office - Results from the 2011 National Census.

for Climate Resilience (SPCR)⁵ and provides an overview of the country's climate change circumstances and its development context; it also identifies climate change vulnerabilities in key sectors, including agriculture, ecosystems, and natural resource systems, and to some extent, the infrastructure sector. Dominica developed its SPCR based on a comprehensive and consultative planning process. The SPCR, a five year strategy to build the country's resilience to climate change impacts, was endorsed by the PPCR sub-committee in November 2012. The SPCR positions Dominica on a climate resilient development path, consistent with national poverty reduction and sustainable development goals. The SPCR also provides an overview of linkages to existing development plans and programs, most importantly Dominica's Growth and Social Protection Strategy and Dominica's National Climate Change Adaptation Policy.

8. Based on stakeholder consultations, assessments and studies that informed the development of the SPCR, the following priority areas for support were identified: (a) Promotion of food security through climate resilient agriculture/fisheries development; (b) Comprehensive Risk Management Framework and Sustainable Climate change financing; and, (c) Enhancing infrastructure resilience and promotion of sustainable human settlements. These three priority action areas are reflected in the development of this DVRP Project and set a strong foundation for the achievement of PPCR goals and objectives as well strongly positioning Dominica to respond to the upcoming challenges faced by climate variability.

9. *Disaster Risk Management.* Integral to its work on climate adaptation, the country is enhancing its disaster preparedness and emergency response. Disaster risk management (DRM) efforts in Dominica are implemented under the authority of the Emergency Powers Act of 1951 (amended in 1973 and 1990). A National Disaster Plan (NDP) was initially developed in 1988 and subsequently revised, most recently in 2006.⁶ The NDP includes policy documents to guide prevention, mitigation and response. Together with the National Climate Change Adaptation Policy and the National Hurricane Disaster Management Plan and Disaster Preparedness Plan for the Agriculture Sector, these documents guide disaster mitigation, management and response by assigning specific responsibilities and procedures under a policy framework for disaster risk management and reduction.

10. Regionally, Dominica is a signatory to the Caribbean Disaster Management Response Agency⁷ Agreement, which provides disaster management related institutional strengthening, capacity building and technical assistance support to member states. In addition, Dominica is part of a multi-country risk pooling facility, the Caribbean Catastrophe Risk Insurance Facility (CCRIF), which was established in 2007 and is owned, operated, and registered in the Caribbean for Caribbean governments.

11. With support from the World Bank, Dominica implemented the Emergency Recovery and Disaster Management Program (ERDMP) in the early 2000s. The ERDMP's⁸ objectives were to: (a) strengthen key economic and social infrastructure and facilities with the aim of minimizing damage caused by future natural disasters and reducing the disruption of economic activity in the event of disaster emergencies (pre-disaster works); (b) to reconstruct and

⁵ See the CIF website for more details on the SPCR: <http://www.climateinvestmentfunds.org>

⁶ See GFDRR, *Disaster Risk management in Latin America and the Caribbean Region: GFDRR Country Notes*.

⁷ As of September 2009, the agency was renamed the Caribbean Disaster Emergency Management Agency.

⁸ Project # P069633 – closed in 2002.

rehabilitate key social and economic infrastructure following disasters; and (c) to strengthen the country's institutional capacities to prepare for and respond to disaster emergencies in an efficient and effective manner.

12. Dominica still faces challenges in strategically and comprehensively managing natural hazard risk, particularly in the context of a changing climatic environment that threatens to increase disaster risk, further expose existing vulnerabilities, and complicating the search for efficient long-term solutions. Similar to other Eastern Caribbean countries, an overall structure for analyzing and integrating disaster risk information in the development process is lacking. Development decisions in Dominica commonly do not account for disaster risk and expected climate change impacts due to a lack of available information on hazards, vulnerability, exposure, and expected climate change impacts. Secondly, information sharing among agencies is weak, largely due to limited capacity and lack of an overall mechanism to share information with low transaction costs. Finally, disaster risk management (DRM) responsibilities are dispersed among various government agencies, with limited collaboration between entities.

13. To overcome these challenges, there is an urgent need to improve the overall information base upon which national policymakers can better plan physical development and design more effective climate change adaptation measures. This would also facilitate the move from primarily response and recovery after natural disasters to a more proactive approach of making systematic and strategic DRM decisions. Moreover, a mechanism for data sharing is required to make information available to all agencies involved in carrying out disaster risk reduction and climate change adaptation measures.

14. The Project will factor poverty and socio-economic vulnerability of the general population into the selection of sub-projects and support investments to improve the access of poor and vulnerable population to road networks. Civil works within the Project are largely focused on the East and Southern-most parts of the island within the Parishes of St Patrick and St David; these parishes, which include the indigenous Carib/Kalinago territory, have poverty rates of 42.7 and 40.4percent respectively, which are significantly higher than the national poverty rate of 28.8 percent.

15. **World Bank Value Added.** The World Bank has significant expertise in supporting the design and implementation of climate resilience programs in other OECS countries and globally; lessons learned will inform the Project with benefit to both the population and the Government of the Commonwealth of Dominica. The evaluation carried out by the Bank following Hurricane Tomas in Saint Lucia in November 2010 indicated that risk reduction investments financed by the Bank over the past decade held up well and served their purposes when faced with a 1-in-500-year rainfall event. Similar conclusions were reached in the evaluation of school infrastructure in Grenada following Hurricane Ivan in 2004. This and other evidence suggests that retrofitting, rehabilitation, and improved data for decision-making to build the resilience of disaster risk mitigation investments pay off when faced with an adverse natural event.

C. Higher Level Objectives to which the Project Contributes

16. ***Relationship to Regional Partnership Strategy.*** The World Bank Group's Regional Partnership Strategy (RPS) for the Organization of Eastern Caribbean States (OECS), 2010-2014

(Report # 53762), discussed by the Executive Directors on June 8, 2010 focuses on two strategic objectives. These are: 1) building resilience, and 2) enhancing competitiveness and stimulating growth over the medium term. The RPS notes that among the key challenges facing the sub region is reducing vulnerability to adverse natural events. Historical data indicates that the sub regional probability of a hurricane in any given year is approximately 18 percent, and it is widely acknowledged that natural events like hurricanes can cause major economic damage, resulting in significant public expenditures. In addition, the project is fully aligned with pillar 1 - Enhanced Resilience – in the proposed RPS for FY15-17 to be presented to the Board on May 22, 2014.

17. ***Reducing Vulnerability to Climate Change.*** This program would contribute to vulnerability and risk reduction within Dominica through a combination of civil works, capacity building, and institutional development activities at the national and local levels. These activities are designed to improve national resilience to natural hazards and longer-term impacts resulting from climate change and are fully in line with the goal of the country's SPCR. Given the urgent needs in the infrastructure sector, the project will support sound design and construction measures to enhance resilience of the selected road and drainage sub-projects, which would occur in parallel to the development of Component 2. Improved planning to minimize climate risks will benefit from digital surveys using LiDAR technology for the entire country to identify, among others, the potential landslide areas in advance to prioritize drainage and road improvements as well as other opportunities for resiliency in other sectors, such as agriculture, water supply, and land use planning.

18. ***Promoting Shared Prosperity and Ending Extreme Poverty.*** The Project directly supports the World Bank's objectives of reducing poverty and boosting shared prosperity. The 2008/09 Dominica Country Poverty Assessment identifies the main causes of local poverty being as a result of external factors including food prices, reduction in exports, and recurrent natural disasters. Climate change and natural disasters have the greatest impact on the poorest populations who generally live in higher-risk areas; in the case of Dominica, even frequent, low-intensity events such as a heavy rainfall can have crippling and cumulative effects on livelihoods and communities. Impediments to development gains as a result of climate hazards particularly impacting the poorest communities can be minimized by reducing the exposure to hazard events and by decreasing the vulnerability of the poor to impacts of climate change. This project promotes vulnerability reduction by supporting local capacity to cope with climate change and disaster impacts.

II. PROJECT DEVELOPMENT OBJECTIVE

A. Project Development Objective

19. The objective of the Project is to reduce vulnerability to natural hazards and climate change impacts in Dominica through: (i) investment in resilient infrastructure, and (ii) improved hazard data collection and monitoring systems.

B. Project Beneficiaries

20. The Project would benefit the entire population of Dominica (71,680 people), including women and other vulnerable groups, due to the reduced risk of key infrastructure failure and the increased capacity of the Government to quickly rehabilitate damaged public infrastructure

following an adverse natural event. The Project would have specific benefits for people living in the geographical locations of Project interventions or using public infrastructure that would have a reduced risk of failure as a consequence of the Project activities. In addition, the Island's Indigenous Population would be well served by the Project as some of the planned infrastructure, namely the road resilience investments, will likely be implemented in the Kalinago Territories.

21. A successful creation of a robust spatial data management platform, early warning systems and data collection/management infrastructure will allow the country to improve decision-making applications in the context of disaster reduction and climate adaptation. There is national benefit in improved understanding of risk and devising risk reduction solutions allowing for improved Government and agency-wide physical planning. Monitoring and evaluation mechanisms as well as quantitative and qualitative indicators to measure Project progress and impact are presented in Annex 1: Results Framework and Monitoring and Annex 3: Implementation Arrangements.

C. Program Development Objectives Level Results Indicators

22. The achievement of the PDO would be measured using the following key indicators: (a) Number of direct Project beneficiaries (male/female/indigenous); (b) Number of days of interrupted traffic due to landslips, flooding and other climate-related events in project areas; (c) Number of households with disrupted water service in project area due to water shortage or hazard events; and (d) Climate risk analysis reflected in drainage and transport infrastructure design

III. PROJECT DESCRIPTION

A. Project Components

23. The proposed Project would consist of the following four components: (1) Prevention and Adaptation Investments; (2) Capacity Building and Data Development, Hazard Risk Management and Evaluation; (3) Natural Disaster Response Investments; and (4) Project Management and Implementation Support.

24. **Component 1: Prevention and Adaptation Investments (US\$29.125 million – IDA (US\$16 million), SCF credit (US\$9 million); SCF Grant (US\$3 million); Counterpart Financing (US\$1.125 million)).** This component would be designed to reduce physical vulnerability and pilot adaptive measures to build resilience to current and future hydro-meteorological shocks. Activities under this component include carrying out of selected infrastructure investments, including: (a) construction of water storage and distribution infrastructure; (b) slope stabilization; (c) rehabilitation of transportation infrastructure including, *inter alia*, selected primary and secondary roads and bridges; and (d) improvement of drainage in selected areas, all through the provision of works, technical advisory services, operating costs and acquisition of goods. Integrated hazard/climate analysis will inform engineering designs with respect to future service demands and infrastructure design life and will be built into the pre-engineering phase of each subproject.

25. **Component 2: Capacity Building and Data Development, Hazard Risk Management and Evaluation (US\$7 million SCF Grant; Counterpart Financing (US\$375,000))**. This component will support the creation of relevant core data and data collection systems as well as the integration analytical tools to permit improved decision making and engineering design for risk reduction and climate change adaptation. Activities under this component support building the capacity for analysis and assessment of risks from natural hazards and climate change, including integration of such analysis into policy and decision making process for the development of investments, and developing data collection systems, including: (a) creation of high resolution digital topographic and bathymetric model for the Recipient; (b) creation of a high resolution soils survey map; (c) design and deployment of robust hydromet network; and (d) development of district and community level climate adaptation plans, all through the provision of technical advisory services and training, and acquisition of goods.

26. **Component 3: Natural Disaster Response Investments (US\$1 million IDA – no SCF/PPCR funds)**. This component would support carrying out of Emergency Recovery and Reconstruction Subprojects under an agreed action plan of activities (Agreed Action Plan of Activities) designed as a mechanism to implement the Recipient's response to an Emergency. This provisional component would allow rapid reallocation of the IDA credit, under streamlined procurement and disbursement procedures, to cover emergency response and recovery costs following an adverse natural event that causes a major disaster in Dominica. The contingent emergency component would be triggered, by an official Government of the Commonwealth of Dominica declaration of an emergency, in accordance with the country's laws and policies, following an adverse natural event. Dominica may ask the Bank to re-categorize and reallocate financing from other project components to partially cover emergency response and recovery costs. This component could also be used to channel additional funds, should they become available, in response to the emergency. A specific Operations Manual (OM) would apply to this component, detailing financial management, procurement, safeguards, and any other necessary implementation arrangements.

27. **Component 4: Project Management and Implementation Support (US\$2 million SCF Grant)**. Activities under this component would support strengthening the institutional capacity for Project management, including: (a) strengthening the capacity and staffing of the PCU; (b) preparation of investment designs and tender documents; (c) preparation of Project reports; (d) processing of contracts and tender evaluation; (e) coordination of participating line ministries; (f) supervision of the quality of works; (g) provision of training of staff of the PCU in Project management and implementation support; (h) monitoring and evaluation of the Project progress and results; and (i) carrying out related activities on Project management and implementation, all through the provision of technical advisory services, training and operating costs, and acquisition of goods. The project will also support knowledge sharing and lessons learning activities at the program level and coordination with the PPCR Caribbean Regional Program in terms of knowledge management and M&R. There is a process underway at the country level supported by the CIF to align the project indicators with the PPCR core indicators and streamline M&R framework across the OECS.

B. Project Financing

Lending Instrument

28. The proposed lending instrument for the sub regional Program is Investment Project Financing (IPF) implemented in the OECS as a series of projects⁹. Currently, there are four confirmed participating countries: Grenada, Saint Lucia, Saint Vincent and the Grenadines and Dominica¹⁰. Country Projects in Grenada and Saint Vincent and the Grenadines form the IPF 1. Saint Lucia constitutes the second phase (IPF 2) of the Program (due to be approved by the Board this FY 2014) with Dominica participating through this Project as IPF 3.

29. **Rationale for IPF:** The choice of the IPF derives from a combination of the national and regional nature of disaster risk management and climate change adaptation in the Eastern Caribbean. There is a strongly shared sentiment of the need to collectively make progress on confronting climate change adaptation challenges in the region. However, the countries are at different stages of readiness to devise and implement adaptation strategies. The IPF provides a sufficiently linked but flexible instrument to allow the Eastern Caribbean countries to move forward together but each at a pace of their own.

Project Cost and Financing

30. Project financing includes a proposed Credit in the amount of US\$17 million equivalent, in International Development Association financing, with proposed co-financing from the Climate Investment Funds (CIF) Strategic Climate Fund (SCF) Grant in the amount of a of US\$12 million and a Strategic Climate Fund (SCF) Credit of US\$9 million as well as in-kind counterpart contribution in the amount of \$1.5 million.

Project Components	Project cost (US\$ Million)	SCF Financing: 53.2% IDA Financing: 43% Counterpart Financing: 3.8%	% Financing
1. Prevention and Adaptation Investments	29.125	SCF Grant/SCF Credit/IDA/Counterpart	73.7%
2. Capacity Building and Data Development, Hazard Risk Management and Evaluation	7.375	SCF Grant/Counterpart	18.6%
3. Natural Disaster Response Investments	1	IDA	2.5%
4. Project Management and Implementation Support	2	SCF Grant	5.1%
Total Costs	39.5	SCF Grant and Credit/IDA	100%
Total Financing Required	39.5		

⁹ The IPF lending instrument is referred to as an Adaptable Program Loan (APL) in documentation for the Grenada and Saint Vincent and the Grenadines RDVRPs. The term APL has been retired and subsequent Projects in the series fall under the new IPF guidelines.

¹⁰ The DVRP in Grenada and Saint Vincent and the Grenadines (P117871) is currently two years into implementation. The DVRP in Saint Lucia (P127226) is under preparation.

C. Lessons Learned and Reflected in the Project Design

31. **Cost estimates for civil works should be studied during preparation.** Experience from the Dominica Emergency Recovery and Disaster Management Project (2004, P069633) indicates that cost of works designed for Dominica are higher than that of neighboring countries due to topographic conditions. As demonstrated from the Saint Lucia Hurricane Tomas Emergency Response Project (HTERP), conducting the due diligence of cost estimating civil works during project preparation could present significant benefits in the long-term, especially in order to minimize chances of budget shortfalls as the project is implemented. Based on these two projects, as well as lessons from the PPCR/DVRP projects in Grenada and Saint Vincent and the Grenadines, factors for increased costs should be studied in detail and should be taken into account in works preparation to allow Dominica to receive the full benefits from its borrowing.

32. **The importance of having a strong project coordination unit (PCU) is paramount in multi-sector projects to ensure effective implementation.** As disaster vulnerability reduction involves multiple sectors, there is always incentive to design a comprehensive, multi-sectoral program. Outcomes from the first series DVRP projects in Grenada and Saint Vincent and the Grenadines show that a diverse set of activities oftentimes bear significant implications on project management and speed of implementation. In such cases, experience has shown the benefit of dedicating substantial time in the project preparation phase towards: (i) drawing consensus amongst implementing agencies regarding project activities and coordination; (ii) building the needed local capacity in procurement, financial management and M&E; and (iii) providing the PCU with requested training, advisory services and technical assistance in preparation for its leadership of Project implementation.

33. **Effective disaster risk management entails systematic behavioral change.** The recently completed Implementation Completion and Results Report (ICR) for the Second Disaster Management Project (DMP II–P086469) in Saint Lucia highlights the importance of establishing a culture of prevention, while noting disaster risk reduction is a process which requires behavior change spawning from education, awareness raising and empirical learning from implementing actual works. Part of the required behavioral change entails accounting for disaster risk when designing projects. However, Dominica needs increased capacity to interpret hazard and risk information as well as integrate such information into territorial and project planning and decision making.¹¹ Component 2 therefore includes hazard and risk data collection activities as well as corresponding technical assistance to increase local capacity on the interpretation and use of such information in planning and decision making processes.

34. **Access to liquidity following a natural disaster expedites post disaster response.** Past disaster emergencies in the Caribbean show that affected governments often struggle to raise financing to cover emergency response and rehabilitation immediately following a disaster event. The Caribbean Catastrophe Risk Insurance Facility is an insurance pool that covers part of this financing need in accordance with the signed policy of each of its member countries. The Project therefore includes an emergency contingency component (Component 3) to enable GoCD to

¹¹ Experience drawn from the Caribbean Catastrophe Risk Insurance Facility (P108058) and the Central American Probabilistic Risk Assessment (P101639) demonstrate that accessing relevant, accurate and sufficient amounts of data represents significant limiting factors when aiming to successfully integrate risk assessment into project design and decision-making.

finance its emergency response and recovery needs based upon a positive list of goods and activities.

IV. IMPLEMENTATION

A. Institutional and Implementation Arrangements

35. The Project will be implemented by the Ministry of Environment (supported by a Project Coordination Unit (PCU)) with oversight from the Ministry of Finance. The PCU is yet to be established, but to expedite Project preparation efforts and to facilitate the hiring of key PCU staff, the GoCD requested a US\$2 million Project Preparation Advance (PPA) from its IDA allocation. The PPA became effective in December 2013 and is expected to be utilized to hire PCU staff and procure key goods and studies to advance preparation.

36. The Ministry of Environment would be the technical lead for coordination amongst agencies in the Project, responsible for overseeing the PCU and day-to-day execution of activities and Project development. The Ministry of Finance would be directly involved in the management of the Project, with the Ministry of Environment reporting on fiduciary matters and overall project progress to the Ministry of Finance. The Ministry of Finance would be responsible for coordinating financial management, contract management and monitoring of the Project, in coordination with the relevant PCU staff. The Ministry of Environment is also the PPCR Focal Point for Dominica, and is responsible for reporting to the Sub-Committee on implementation of the PPCR and the monitoring and evaluation framework for the PPCR.

37. For the preparation and implementation of Project activities, the Project Coordination Unit would rely on technical support provided by the line agencies involved. Line agencies will be responsible for the preparation of technical specifications, bills of quantities and terms of reference relating to Project activities. The PCU will prepare appropriate bidding documentation and carry out the procurement process under the supervision of the Ministry of Finance. Line agencies, such as the Ministries, including the Ministry of Public Works, Dominica Water and Sewerage Authority (DOWASCO), and the Office of Disaster Management among others, will also provide technical supervision for Project implementation within their respective areas of expertise. More complex civil works would rely on the services of an independently contracted engineer to carry out supervision of works. The PCU would also manage environment and social safeguards aspects of the Project, as well as the Project reporting, monitoring and evaluation.

38. To ensure communication and ownership among participating ministries, the Ministry of Environment will convene a Project Steering Committee, comprising Director level staff or above of the relevant Project line ministries. Greater detail on the Project implementation arrangements is provided in Annex 3. The Project's Implementation Support Plan can be found in Annex 5.

B. Results Monitoring and Evaluation

39. The results framework, presented in Annex 1, has been developed in coordination with GoCD. Indicators have also been reviewed vis-à-vis the PPCR core indicators to ensure

alignment and facilitate reporting of results at program level. The PCU would be responsible for monitoring of and reporting on performance indicators defined for the Project, which would be reported to the Bank semi-annually in the context of the Bank’s supervision missions. The PCU would rely on information from participating line ministries to inform results from Project activities. The PCU would also be responsible, under the guidance of the Ministry of Environment, for reporting on the PPCR program level monitoring and evaluation indicators for Dominica, which are linked to the proposed Project level indicators. The expected costs for implementation of these activities would be drawn from Component 4 of the Project.

C. Sustainability

40. The GoCD recognizes that the sustainability of infrastructure investments and of their physical development planning in general is dependent on improving the understanding of adaptation options to strengthen resiliency to disaster and climate risks. The disaster vulnerability reduction works and capacity-building initiatives at technical and policy levels implemented under the Project would require the ownership of the participating national authorities and the participation and support of local communities as well as the continued support of regional technical agencies. The assumptions for the studies of road infrastructure, drainage systems and bridge design will include reasonable provisions for specifications and design aiming at limiting the maintenance requirements through adequate assumptions justified by pre-engineering studies. All investments proposed will also be included in the corresponding ministry’s operations and maintenance programs to ensure funding is allocated for maintenance of new or upgraded assets.

V. KEY RISKS AND MITIGATION MEASURES

41. As referenced in Annex 4: Operation Risk Assessment Framework (ORAF), key risks to achieving the Project Development Objective were identified along with mitigation measures to minimize the potential impact of these risks for the Project. The ORAF will also be used to monitor and reassess risks and review mitigation measures during Project implementation.

A. Risk Ratings Summary Table

Risk Category	Rating
Stakeholder Risk	Moderate
Implementing Agency Risk	High
- Capacity	High
- Governance	High
Project Risk	Substantial
- Design	High
- Social and Environmental	Moderate
- Program and Donor	Moderate
- Delivery Monitoring and Sustainability	High
Overall Risk	Substantial

B. Overall Risk Rating Explanation

42. Overall implementation risk is rated Substantial in light of the large Project size, its complexity and multi-sectoral design, as well as the need to establish a new PCU to manage Project activities in accordance with Bank policies and procedures, which at the outset will require a great deal of capacity building and support to mitigate weaknesses in implementation capacity, especially with regard to procurement and safeguards.

VI. APPRAISAL SUMMARY

A. Economic Analysis

43. The economic analysis shows that the Project is economically viable with economic net benefits of US\$9 million and economic returns of 18 percent. The subproject for road rehabilitation shows returns over 16 percent and benefits about 40 percent higher than their associated costs. The water subproject shows benefits close to US\$5 million and return of 21 percent. The sensitivity analysis shows that all subprojects have ample room for changes in critical variables. When costs increase as much as 39 percent or benefits reduce as much as 40 percent, these components will still show positive returns. The results of the risk analysis confirm those from the sensitivity analysis. Both types of subprojects show reassuring results with probabilities higher than 88 percent of obtaining net positive benefits. The other project components, namely institutional strengthening and investments in hazard risk assessment capacity, would support the avoidance of further indirect losses by encouraging citizens to improve preparedness and enhancing government response capacity following major events.

B. Technical Considerations

44. Proposed works and institutional strengthening activities have been evaluated for each subproject to ensure consistency with the short- and long-term objectives of the Project. Specific works to be financed under the Project are based on priorities identified by the Government, emanating from the list of investments identified in the SPCR document. Site visits were made to each of the proposed work sites and detailed reviews were conducted to verify, along with the respective agencies, the appropriateness of the design principles and the selected technologies of execution. The costs estimates and survey of quantities have been updated in the course of the Project preparation. The scope of work for each of the different interventions under Component 1 has been adequately defined as well as the conditions for effective supervision ensuring the quality of execution, the compliance with the contract documents, and the objectives of the Project. In all cases, clear relationships between civil works and Project objectives have been identified, and supporting engineering and safeguard activities have been budgeted and included in the works program.

C. Financial Management

45. A financial management capacity assessment for the Project has been conducted by the Bank, and actions to strengthen financial management capacity have been agreed with the government. The FM assessment concludes that with the implementation of the agreed action

plan, the financial management arrangements will satisfy the Bank's minimum requirements under OP/BP 10.02. The overall Project financial management risk is assessed as "significant" as the Project will have decentralized implementation arrangements involving six different ministries and many subprojects, and the GoCD has limited experience implementing Bank financed projects. To mitigate these risks, the action plan includes the appointment of a Project Financial Management Specialist whose initial responsibility will be to integrate the project financial management system with the SmartStream. An Audit Expert will be also appointed to support the Director of Audit to conduct audit of the Project financial statements. More details are provided in Annex 3.

D. Procurement

46. Dominica's public sector, public expenditures management and public procurement have been subject to several Economic Sector Work reports, including: the OECS Country Procurement Assessment Report (CPAR) and Commonwealth of Dominica CPAR (June 2003) as well as the OECS Policy Note on Project Fiduciary Management (June 2007). The most recent report on Dominica Public Expenditure and Financial Accountability (PEFA) was prepared by ECORYS, in the Netherlands, on behalf of the EU Delegation in Barbados, in June 2010. The CPAR (June 2003) provided a detailed Action Plan for improvement of the public procurement system. However, due to the limited resources, staff, capacity and other priorities related to the debt reduction strategy, most of the actions of this plan have not been completed and the procurement environment risk is thus assessed as high.

47. The Ministry of Finance and the Ministry of Environment do not have recent experience in carrying out Bank procurement and capacity is low. Based on the above information and given the complexity of the project, the overall risk for the project procurement is assessed as high. In order to mitigate the procurement risk, a Procurement Specialist will be hired under the PCU prior to Project effectiveness; intensive training would be provided to the Procurement Specialist as well as relevant Government/PCU staff during the first two years of project implementation, coupled with frequent supervision missions.

E. Environment (including Safeguards)

48. The Project has been classified as Category B in accordance with the Bank policy on Environmental Assessments (OP/BP 4.01). The safeguards triggered by the Project and the respective instruments are outlined below.

49. **Environmental Assessment (OP 4.01).** The GoCD has prepared a Project-level Environmental Assessment (EA) together with an Environmental Management Framework (EMF), which has been consulted with the public and disclosed in-country and on the Bank's website prior to appraisal. The EA and EMF describe two types of Projects: those with relatively complex environmental conditions or those with moderate to significant potential impacts (if unmitigated), requiring a stand-alone Environmental Impact Assessment (EIA) (e.g., sea-wall defense and cliff stabilization), and those comprising relatively simple civil works where the impacts are limited to the construction phase (e.g., hydromet installation or water tank construction). The EMF has in place procedures to screen for impacts on natural habitats, forests

and pest management and physical cultural resources and to develop proposed mitigation measures as required.

50. **Environmental Assessment (OP 4.01).** The GoCD has prepared a Project-level Environmental Assessment (EA) together with an Environmental Management Framework (EMF), which has been disclosed in-country and on the Bank's website prior to appraisal. The EA and EMF describe two types of Projects: those with relatively complex environmental conditions or those with moderate to significant potential impacts (if unmitigated), requiring a stand-alone Environmental Impact Assessment (EIA) (e.g., sea-wall defense and cliff stabilization at Dubique), and those comprising relatively simple civil works where the impacts are limited to the construction phase (e.g., precipitation station installation or water tank construction). The EMF has in place procedures to screen for impacts on natural habitats, forests and pest management and physical cultural resources and proposed mitigation measures.

54. The **Natural Habitats policy (OP 4.04)** is triggered as a precaution due to potential Project activities which may occur in highland forest areas, river valleys, coastlines and / or marine areas. The EA and EMF account for natural habitats when screening both known works and any future activities currently undefined. Potential application of this policy is identified in the EA, while screening of future subprojects is described in the EMF to determine if additional assessment and specialized mitigation measures would be required for these Projects, once detailed designs are known during implementation.

55. The **Forests Policy (OP/BP 4.36)** is being triggered as a precaution because limited forest resource harvesting may be done. The term forest harvesting only refers to incidental clearing of a very limited number of trees as may be required for the agroforestry pilot plots which would also include planting of trees for slope stabilization, erosion prevention, or planting of climate resilient crops. All proposed project activities will be screened using the EMF; any negative effects on primary forest would be excluded.

56. The **Physical Cultural Resources Policy (OP/BP 4.11)** has been triggered as a precaution. The EMF and EMP include a "chance-find" procedure, particularly during activities such as major excavations, road realignments or similar works where such assets could be affected by clearing, blading, excavation or trenching. Stakeholder contribution to conceptual design of any historically or culturally significant rehabilitation works will also be solicited.

57. The **Pest Management Policy (OP/BP 4.09)** has been triggered as a precaution. Works for greenhouses, crop management, and others could involve the use of pesticides and herbicides. The EMF will screen for any significant pesticide use and will require that a Pest Management Plan be developed if indicated by the Policy. Standard measures have been developed and will be used for incidental use of pesticides (e.g. termite treatments for buildings, or safe use of pesticides for vector control), and are built into a generic standardized EMP within the EMF.

58. The EMF also includes a section with clear safeguards guidelines for emergency investments and works including types of activities, responsibilities for screening and environmental management, and for preparation of any safeguards studies prior to works as pertinent under OP 10.00 and consistent with the Project category, as may be considered under Component 3. Consideration would be given to internal/external safeguards specialist review of

activities proposed under Component 3 and applying the screening measures in the EMF. Key individuals and agencies were consulted during preparation of the draft EA-EMF, which was then disclosed to the public on the government's website and delivered to community groups, agencies and ministries for comment. The final draft of the EA-EMF was revised to include record of these consultations.

F. Social (including Safeguards)

59. The social impacts emanating from the Project are likely to be positive and the Project beneficiaries would be the entire Dominican population, including the Island's Indigenous Population. A Social Assessment for the Project will be conducted once the Social Specialist is mobilized to further clarify the nature and extent of potential impacts and benefits including any gendered impacts. Broad consultation has been carried out for the Project among key stakeholders, including the Carib community, private sector, non-governmental organizations, and other groups, which have been involved in Project design. These stakeholders will be engaged during implementation and monitoring of Project results via outreach and a communications strategy to be developed for the Project.

60. **Involuntary Resettlement (OP/BP 4.12).** The Involuntary Resettlement Policy is being triggered as a precaution as it is possible that works planned under the project, including rehabilitation of roads, slope stabilization measures and drainage infrastructure etc. might encroach upon private lands therefore necessitating compensation. All works requiring private land acquisition will be subject to prior review. Any voluntary concession of land by the indigenous community will be monitored and legal documentation obtained prior to any transactions. In addition, populations would only be resettled in the event of an emergency, as per component 3. The client prepared a Resettlement Policy Framework (RPF), which has been consulted and disclosed in country and at the Bank's website prior to appraisal. In the event that land acquisition becomes necessary sub-project resettlement plans will be prepared and affected parties compensated prior to sub-project financing.

61. **Indigenous Peoples (OP 4.10).** The project would have benefits for the entire Dominican population including the Islands' Indigenous Carib/Kalinago population who predominantly reside in the Carib Territory. As mandated in the Carib Reserve Act of 1978, the land in the Territory is the property of the Carib Council and no individual can own land and/or be titled land is his or her name. An Indigenous Peoples Plan (IPP) has been developed with the guidance of the Ministry of Carib Affairs and the Carib Council and in full consultation with the community. The IPP lays out a series of measures to ensure that project benefits are fully enjoyed by the community. Appropriate grievance-handling procedures and arrangements for monitoring the IPP are in place and will be managed by the PCU.

62. **Staffing.** To ensure adequate capacity to ensure compliance with Bank safeguards policies during Project implementation, social and environmental safeguards specialists will be hired under the PPA prior to Project implementation to support the PCU to oversee the implementation of the policies triggered by the Project. More details on safeguards policies are provided in Annex 3.

Annex 1: Results Framework and Monitoring

Country: Dominica

Project Name: Third Phase Disaster Vuln.Reduction APL for Dominica (P129992)

Results Framework

Project Development Objectives

PDO Statement

The objective of the Project is to reduce vulnerability to natural hazards and climate change impacts in Dominica through: (i) investment in resilient infrastructure, and (ii) improved hazard data collection and monitoring systems.

These results are at | Project Level

Project Development Objective Indicators

Indicator Name	Core	Unit of Measure	Baseline	Cumulative Target Values					Frequency	Data Source/ Methodology	Responsibility for Data Collection
				YR1	YR2	YR3	YR4	End Target			
Direct project beneficiaries	<input checked="" type="checkbox"/>	Number	0.00	0.00	1000.00	6000.00	15000.00	71860.00	Semi-Annual	Semi-annual Project Progress Reports	PCU; National Statistics Bureau
Female beneficiaries	<input checked="" type="checkbox"/>	Percentage Sub-Type Supplemental	0.00	0.00	49.00	49.00	49.00	49.00	Semi-annual	National Statistics Bureau	PCU
Indigenous Beneficiaries	<input type="checkbox"/>	Number Sub-Type Supplemental	0.00	0.00	0.00	2145.00	2145.00	2145.00	Semi-Annual	Semi Annual Progress Reports	PCU; Ministry of Carib Affairs

Number of days of interrupted traffic due to landslips, flooding and other climate-related events in project areas	<input type="checkbox"/>	Number	30.00	30.00	30.00	18.00	12.00	7.00	TBD	Semi-annual Project Progress Reports; MoPW Supervision Reports	PCU; MoPW
Number of households with uninterrupted water service in project area due to water shortage or hazard events	<input type="checkbox"/>	Number	0.00	0.00	200.00	1200.00	2000.00	3000.00	Semi-Annual	Semi-annual Project Progress Reports	PCU; Dominica Water and Sewerage Authority; Ministry of Lands, Housing, Settlements & Water Resource Management
Climate risk analysis reflected in drainage and transport infrastructure design	<input type="checkbox"/>	Yes/No	No	No	No	Yes	Yes	Yes	Semi-Annual	Semi-annual Project Progress Reports	PCU; Ministry of Public Works

Intermediate Results Indicators

Indicator Name	Core	Unit of Measure	Baseline	Cumulative Target Values					Frequency	Data Source/ Methodology	Responsibility for Data Collection
				YR1	YR2	YR3	YR4	End Target			
Roads rehabilitated, Non-rural	<input checked="" type="checkbox"/>	Kilometers	0.00	0.00	0.00	12.00	30.00	42.00	Semi-Annual	Semi-annual Project Progress	PCU; Ministry of Public Works, Energy and Ports;

										Reports; MoPW Supervision Reports	Dominica Water and Sewerage Authority; Ministry of Lands, Housing, Settlements & Water Resource Management
Increased water storage capacity in project areas	<input type="checkbox"/>	Liters	0.00	0.00	0.00	568261.0 0	1136523. 00	1818437. 00	Semi- Annual	Semi- annual Project Progress Reports; MoPW and DOWASC O Supervision Reports	PCU; Dominica Water and Sewerage Authority; Ministry of Lands, Housing, Settlements & Water Resource Management
Storm drains constructed under the project	<input type="checkbox"/>	Meter(m)	0.00	0.00	0.00	980.00	2520.00	3500.00	Semi- Annual	Semi- annual Project Progress Reports	PCU; Physical Planning Department; ICT
Number of Government ministries/agenc ies connected to a spatial data sharing platform	<input type="checkbox"/>	Number	0.00	3.00	6.00	8.00	8.00	10.00	Semi- Annual	Semi- annual Project Progress Reports	PCU; Physical Planning Department; ICT
Number of Government officials trained in spatial data management	<input type="checkbox"/>	Number	0.00	10.00	30.00	50.00	60.00	60.00	Semi- Annual	Semi- annual Project Progress Reports;	PCU; Physical Planning Department

and data analysis under the Project										Inventory report of instrumentation/software installed	
LiDAR mapping of the entire country completed	<input type="checkbox"/>	Yes/No	No	No	No	Yes	Yes	Yes	Semi-Annual	Semi-annual Project Progress Reports	PCU; Ministry of Agriculture and Forestry; Ministry of Public Works
District climate adaptation plans prepared	<input type="checkbox"/>	Number	0.00	0.00	0.00	2.00	4.00	6.00	Semi-Annual	Semi-annual Project Progress Reports	PCU; Physical Planning Department;
Operations Manual for this component prepared to facilitate disbursement in the event of an emergency	<input type="checkbox"/>	Yes/No	No	No	Yes	Yes	Yes	Yes	Semi-Annual	Semi-annual Project Progress Reports	PCU; Ministry of Finance; ODM

Annex 2: Detailed Project Description

Dominica Disaster Vulnerability Reduction Project

1. The objective of the Project is to reduce vulnerability to natural hazards and climate change impacts in Dominica through: (i) investment in resilient infrastructure, and (ii) improved hazard data collection and monitoring systems.

2. **Component 1 -- Prevention and Adaptation Investments (US\$29.125 million – IDA (US\$16 million), SCF credit (US\$9 million); SCF Grant (US\$3 million); Counterpart Financing (US\$1.125 million)).** This component would be designed to reduce physical vulnerability and pilot adaptive measures to build resilience to current and future hydro-meteorological shocks. Activities under this component include carrying out of selected infrastructure investments, including: (a) construction of water storage and distribution infrastructure; (b) slope stabilization; (c) rehabilitation of transportation infrastructure including, *inter alia*, selected primary and secondary roads and bridges; and (d) improvement of drainage in selected areas, all through the provision of works, technical advisory services, operating costs and acquisition of goods.

3. Sub-Component 1.1. Road Works (\$18,750,000 – IDA (\$10,312,500), SCF (\$7,725,000), Counterpart Financing (\$712,500)). The rehabilitation Project covers sections of the main road in the eastern part of island, which have been found particularly vulnerable under heavy rainfall conditions. The overall purpose is to significantly improve the drainage conditions and stabilize the embankments. Four continuous sections of roads have been identified: (i) Pont Casse to Bois Diable (4.5 km); (ii) Bois Diable to Castle Bruce (9.5 km); (iii) Castle Bruce to Petite Soufrière (8.8 km); and (iv) Castle Bruce to Hatton Garden (20.5 km), for a total of 43.3 km. MPWEP has conducted extensive surveys of the areas, leading to an updated and detailed description of the scope of work as well as reliable cost estimates. The scope of work for each segment is further detailed by the nature of the required civil works. Each site of intervention is geographically located and the estimates relate to quantified works, such as: (a) the rehabilitation/reconstruction of drainage and hydraulic structures, which are mainly culverts and lateral drains per MPWEP standards; (b) the stabilization of selected lateral slopes and embankments as a preventive action in the objective of vulnerability reduction to natural hazards, through the re-profiling of steep slopes identified as subject to collapse under any pressure from water or lateral effort; (c) the rehabilitation/reconstruction of some bridges structures, corroded stringers, abutments, and handrails; (d) the rehabilitation of damaged road sections, road realignment, pavement rehabilitation, and restoration of camber for lateral drainage when appropriate, signage and traffic improvement measures.

4. Definite design still needs to be completed in order to take into consideration the results of more hydrological, geotechnical and topographical data, which will also be provided as pre-engineering services under this sub-component.

5. Sub-Component 1.2. South Coast Cliff Stabilization (\$5,100,000 – IDA (\$2,805,000); SCF (\$2,101,200), Counterpart Financing (\$193,800)). The identified subproject relates to a section of steep cliffs in the area of the village of Dubique at the south sea side of the island. The cliffs are along the coastal road over a length of 720 meters. The section identified as the most

critical and considered under this sub-component covers a length of 420 m. The proposed stabilization procedure is the re-profiling of the cliffs in successive platforms. The scope of the work includes 145,000 m³ of excavation with an allowance for excavation in rock materials, a reconstruction of a longitudinal drain at the base of the cliff, some transversal culverts towards the sea, and some rehabilitation work of the coastal road (3,150 m²). The approach for the stabilization is based on the assumption of an acceptable access from the top of the cliff. The methodology for the execution of the sub-component will be verified after a thorough value engineering study based on the topographical and geotechnical conditions. Stabilization design will also include the intermediary phases of load conditions during construction, as well as the environmental, public safety and traffic dispositions during the works.

6. Sub-Component 1.3. Storm Drains (\$2,775,000 – IDA (\$1,526,250); SCF(\$1,143,300); Counterpart Financing (\$105,450)). Considering the most critical needs for improving drainage conditions of the transportation infrastructures, this sub-component specifically covers the construction of additional storm drains to be constructed or rehabilitated throughout the island. The specific locations of the storm drains will be determined on the basis of a wider pre-engineering study based on extensive hydrological and geotechnical data resulting from a pre-engineering study included in the Project.

7. Sub-Component 1.4. West Coast Water Storage (US\$2,500,000 – IDA (\$1,375,000); SCF(\$1,030,000); Counterpart Financing (\$95,000)). The West Coast water storage Project relates to the installation of a new primary water supply network to the cities located along the 31 km stretch between Salisbury and Capuchin on the North-West side of the island. Current conditions are that the water system on this area is divided into nine different individual zones, each with their own individual water system. Existing systems are inefficient as they use a lower water level source subject to seasonal drops. A Project currently under implementation, covers the construction of two intakes installations, just west of Coulibistrie to the South, and at Picard, N-E of Portsmouth to the north. Each intake sub-project includes the intake structure itself at the river, a sedimentation tank, filters and chlorination equipment. The main lines from the intakes reaches down to the existing main distribution line along the highway at sea level. This subproject includes the construction of eight storage tanks and their supply lines. The tanks' capacities range from 15,000 Gal (1) to 80,000 Gal (2), with five of them at 45,000 Gal. The tanks are designed as cast-in-place reinforced concrete per DOWASCO standards, following well-known and adequate technologies.

8. Inherent in this component is the need to design improved resilience within the subproject portfolio by integrating hazard/climate analysis supported under component 2. These analyses will provide the criteria needed to inform the engineering designs with respect to future service demands and infrastructure design life. This requirement will be built into the pre-engineering phase for each subproject and assist in building an engineering culture that routinely incorporates climate/hazard analysis as a key component in the engineering design process. As higher resolution data become available through Component 2 activities, the project will support their integration within the engineering process through training and technical assistance.

9. **Component 2 -- Capacity Building and Data Development, Hazard Risk Management and Evaluation (US\$ 7.375 million - US\$7 million SCF Grant; US\$375,000 Counterpart**

Financing). The Project would support building the capacity for analysis and assessment of risks from natural hazards and climate change including the integration of this analysis in the development decision making process. This component will support the creation of relevant core data and data collection systems as well as the integration analytical tools to permit improved decision making and engineering design for risk reduction and climate change adaptation. Activities under this component support building the capacity for analysis and assessment of risks from natural hazards and climate change, including integration of such analysis into policy and decision making process for the development of investments, and developing data collection systems, including: (a) creation of high resolution digital topographic and bathymetric model for the Recipient; (b) creation of a high resolution soils survey map; (c) design and deployment of robust hydromet network; and (d) development of district and community level climate adaptation plans, all through the provision of technical advisory services and training, and acquisition of goods.

10. This component would also seek to develop national capacity by supporting an institutional strengthening program designed to provide training, and build institutional capacity for risk analysis, data collection and data management. The Project would finance a series of capacity-building and technical assistance activities to support the improved integration of science based disaster risk management and climate change adaptation analysis tools and methodologies in the development decision-making process. Specific activities will support the development of, inter alia: (a) a spatial data collection, management and distribution system; (b) improved seismic monitoring capacity; (c) watershed management support; (d) increased connectivity and data sharing amongst agencies and; (e) training, knowledge exchange and capacity building related to modeling, data analysis and spatial data management and distribution.

11. ***Component 3 – Natural Disaster Response Investments (US\$1 million IDA).*** This component would support carrying out of Emergency Recovery and Reconstruction Subprojects under an agreed action plan of activities (Agreed Action Plan of Activities) designed as a mechanism to implement the Recipient's response to an Emergency. Due to the high risk of a catastrophic event in Dominica, a provisional component would be added under this Project to allow for rapid reallocation of the loan during an emergency, under streamlined procurement and disbursement procedures. The PPCR resources will not be used for the activities under this component. This emergency component may be triggered in the event of a natural disaster, either national or localized in scope, in accordance with Dominican laws and policies. This component would be triggered upon declaration of a natural disaster, in accordance with Dominican laws and policies and in accordance with Chapter 15:03 of the Emergency Powers (Disaster) Act of 1987, along with a request to the Bank to activate the component in compliance with the defined action plan and the component-specific Operations Manual. Following this declaration, the Government could officially request reconstruction/rehabilitation financing under this component through a letter to the Country Director. In addition, the Government would be required to submit a recovery action plan indicating reconstruction/rehabilitation needs. The recovery action plan would outline the requested re-categorized financing or additional financing to cover early recovery and rehabilitation costs.

12. The contingent emergency component would be implemented following the rapid response procedures governed by OP/BP 10.00. Once triggered, OP/BP 10.00 facilitates rapid utilization of loan proceeds by minimizing the number of processing steps and modifying fiduciary and safeguard requirements so as to support rapid implementation. Disbursements are expected to be in the form of two types of expenditures, namely critical imports and rehabilitation or reconstruction activities - including civil works and related goods and services. Disbursements would be made against a positive list of eligible critical imports or the procurement of goods, works, and consultant services needed for the recipient's economic recovery. In addition to reallocation of funds from other components in this Project, the contingent component may also serve as a conduit for additional financing from IDA in the event of an emergency.

13. Below is a list of critical imports eligible under the component:

- Construction materials
- Water, land, and air transport equipment, including spare parts
- Agricultural equipment and inputs (excluding pesticides)
- School supplies and equipment
- Medical supplies and equipment
- Petroleum and fuel products
- Construction equipment and industrial machinery
- Communications equipment
- Seeds and fertilizer
- Food and water containers and any other items which may be acceptable to the Bank and agreed to by the Borrower and the Bank

14. ***Component 4 - Project Management and Implementation Support (US\$2 million SCF Grant)***. Activities under this component would support strengthening the institutional capacity for Project management, including: (a) strengthening the capacity and staffing of the PCU; (b) preparation of investment designs and tender documents; (c) preparation of Project reports; (d) processing of contracts and tender evaluation; (e) coordination of participating line ministries; (f) supervision of the quality of works; (g) provision of training of staff of the PCU in Project management and implementation support; (h) monitoring and evaluation of the Project progress and results; and (i) carrying out related activities on Project management and implementation, all through the provision of technical advisory services, training and operating costs, and acquisition of goods.

Annex 3: Implementation Arrangements

Dominica Disaster Vulnerability Reduction Project

Project Institutional and Implementation Arrangements

1. The Project will be implemented by the Ministry of Environment with support from a Project Coordination Unit (PCU) and oversight from the Ministry of Finance (see Figure 1). The Ministry of Environment would be the technical lead for coordination amongst agencies in the Project, responsible for overseeing the PCU and day-to-day execution of activities and Project development. The Ministry of Finance would be directly involved in the management of the Project, with the Ministry of Environment reporting to the Ministry of Finance. The Ministry of Finance will provide oversight of financial management and contract management of the Project in coordination with PCU staff, under the Ministry of Environment, throughout project implementation.
2. Procurement activities including bidding and contract management and supervision would be managed through the PCU. The PCU would also manage environment and social safeguards aspects of the Project, as well as the Project reporting, monitoring and evaluation. As needed, line Ministries would provide technical support, particularly with respect to works Projects. Line Ministries would also provide technical documentation to support procurement activities and, as needed, the PCU would engage the services of qualified consultants to assist with procurement, design and supervision. Participating Ministries would provide technical staff to assist in contract supervision.
3. In terms of PPCR reporting, the Ministry of the Environment, through the PCU, would be responsible for supporting the M&E for the PPCR and would prepare consolidated reports as required by the CIF. In addition, the Communications specialist in the PCU would track and document lessons learned emanating from the Project for the benefit of other PPCR countries.
4. MPWEP and DOWASCO will provide supervision support for component 1 activities in order to ensure the compliance of the works execution with the contract documents. Supervision services for all works under Component 1 will be outsourced to independent resident engineers exercising a control of the quality and compliance of execution on site, ensuring the day-to-day coordination with contracting firms, verifying progress statements, and reporting to the PCU. Recurrent technical auditing services will be contracted to a qualified individual consultant in order to provide periodical review of Project documents, procurement process, design and studies, quality of execution, compliance to works specifications and supplies, performances in the services of supervision and construction management.
5. To ensure communication and ownership among participating ministries, the Ministry of Environment will convene a Project Steering Committee, comprising Director-level staff of the relevant Project line ministries. The Permanent Secretary of the Ministry of Environment, who would chair the Project Steering Committee, would be responsible for coordinating with and informing the relevant Permanent Secretaries on Project progress as well as ensuring adequate support from their staff on Project activities. The Terms of Reference (TORs) for the Committee, including the membership and meeting frequency, will be included in the Operations Manual

(OM), to be adopted prior to effectiveness of the Project’s Financing Agreement. The Project’s Implementation Support Plan can be found in Annex 5.

6. **PCU Capacity Analysis and Staffing Recommendations.** The Project Coordination Unit will have limited experience with World Bank financed projects and will steadily grow in size in accordance with workload and to ensure quality in Project implementation. The PCU would consist of key fiduciary staff, including a Procurement Specialist and a Financial Management Specialist, as well as a Social Specialist, an Environmental Specialist, a Communications/M&E Specialist, a Project Engineer to provide engineering support during civil works and input to bidding documents, the Project Coordinator and support staff. Figures 1 and 2 indicate the preliminary staffing and reporting structure of the PCU:

Figure 1: PCU Staffing/Internal Reporting Structure

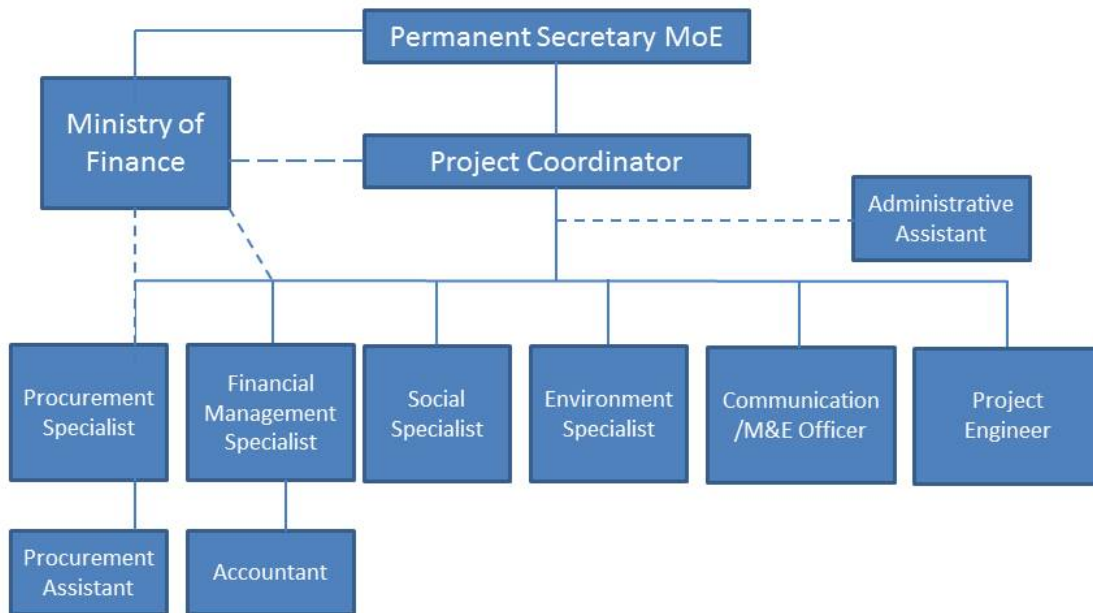
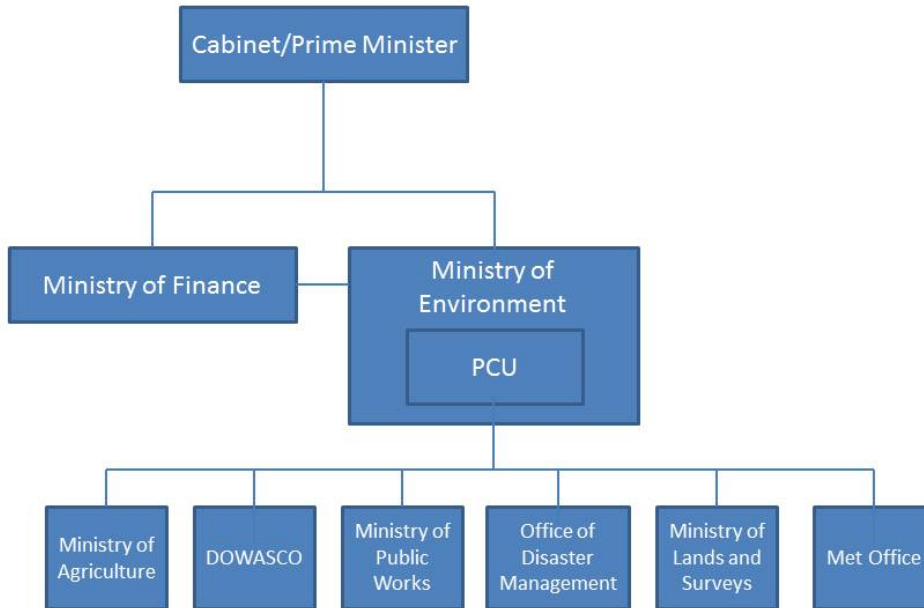


Figure 2: PCU External Reporting and Coordination Arrangements



7. ***Technical Capacity.*** Due to the large number of civil works under the DVRP that would be expected to internalize best available practice in design and execution, it would be necessary for the PCU to add the appropriate technical capacity. The PCU will contract a Project Engineer to provide critical path inspections and engineering reviews of designs and related contract documentation. The Project Engineer would report to the PCU Coordinator and liaise closely with the engineers from the Ministry of Works.

8. ***Readiness.*** Disbursements for the first two years of the project are expected to be low, focusing initially on capacity building within the Ministry of Environment to manage the Project, along with relevant line agencies and the Project Coordination Unit to execute the Project. Low initial disbursement trends will also be attributed to the sequence and nature of activities for civil works (which comprise the majority of allocated funds) sub-projects under Component 1 that must be executed and procured prior to the commencement of construction activities. These activities include pre-engineering studies, technical studies and consultancy services related to the design of proposed civil works.

Financial Management, Disbursement and Procurement

Financial Management

9. **Summary.** Dominica has a good public financial management (PFM) system. The Government is implementing a PFM reform program with the support of CARTAC and the IMF. The Government is using an Integrated Financial Management Information System (SmartStream), which is working well. The SmartStream is used to prepare Government public accounts and also donor financed Project financial statements. The Project will use the SmartStream to capture all Project financial data, prepare quarterly financial reports as well as annual Project financial statements. The Office of the Accountant General will provide an additional terminal in the proposed PCU, design an additional chart of accounts and provide adequate access to enter all Project financial management data into the SmartStream. The Government is using both economic and functional classifications, which are GFS compliant. To support the Project, a Financial Management Specialist will be appointed to strengthen financial management capacity within the Government and the PCU. An Audit Expert will be also appointed to support the Director of Audit in conducting the required auditing of the Project financial statements.

10. **Staffing.** The PCU will require a Financial Management (FM) Specialist to work closely with the Office of the Accountant General to: (i) manage fiduciary risks for the Project, and (ii) to build sustainable capacity in the office of the Accountant General and the implementing ministries/agencies. The FM Specialist will be appointed within three months from the Project date of effectiveness. In the interim, staff from the Ministry of Finance and office of the Accountant General will provide FM support until Specialist is contracted.

11. **Budgeting.** The PCU will prepare the Project budget, which will be integrated into the national budget. The PCU and the MoF will monitor the implementation of the budget. The budget year for Dominica is from June 1 to June 30; the Project accounting year would follow the Government's accounting fiscal year. Project annual budgeting would be based on the cost tables, and will be updated according during Project implementation. The annual budgets would be prepared by the PCU in collaboration with the relevant implementing ministries/agencies, and submitted to the Ministry of Finance for final approval. The approved annual budget would be included in the budget estimates, entered into the accounting system, and used for periodic comparison with actual results as part of the interim reporting. The approved budget would be shared with the World Bank and would be used to monitor implementation progress.

12. **Accounting.** The Project will use the SmartStream for Project accounting as discussed above. Project transactions would be recorded as incurred, and all primary supporting documentation would be maintained to facilitate post reviews and external annual audits. Such documents should be maintained for a minimum period of five years. The detailed accounting policies and procedures would be set forth in the Project Operations Manual (OM).

13. **Financial reporting.** The PCU would be responsible for producing and submitting the interim financial reports (IFRs) to the Bank on a quarterly basis. These reports would provide the required monitoring information and would be used for disbursement purposes. The IFRs would

include a short narrative outlining the major project achievements for the quarter, the project sources and uses of funds, bank reconciliation statements and necessary procurement tables. These reports would be submitted to the Bank no later than 45 days after the end of each reporting period. The annual financial statements would include the project's sources and uses of funds, a detailed analysis of project expenditures, a schedule of withdrawal applications presented during the year, a reconciliation of the designated account, the notes to the financial information, and the management representation letter. These reports would be prepared by the PCU and made available to both the internal and external auditors.

14. ***Internal control and Internal Audit.*** The Ministry of Finance is responsible for the financial control of all government receipts and expenditures. All government expenditures are pre-audited before payments are made. The MoF has an Internal Audit Committee chaired by the Financial Secretary, which meets every week. The Committee invites the internal auditors of the Government once a month to review all control issues and advise the internal auditors where additional controls would be required. All payments are made based on the certification by the Permanent Secretary of the implementing ministry and checks are jointly signed by the Ministry of Finance and the implementing Ministry. The same practice will be followed for the project. However, the PCU will provide additional control and review the documentation of all expenditures before any payments are made. The OM would reflect the structure of the PCU, administrative arrangements, internal control procedures (including procedures for authorization of expenditures) maintenance of records, safeguarding of assets (including cash), segregation of duties to avoid conflict of interest, regular reconciliation of bank account statements, bank accounts signing mandate (to include at least two signatories), regular reporting to ensure close monitoring of project activities, and the flow of funds to support project activities. Assets acquired by the project would be in the custody of the respective participating ministries/implementing agencies, which would also keep copies of the supporting documentation. The PCU would maintain all supporting records of the project. Annual physical inspection would be undertaken by the implementing agencies and PCU staff, with the participation of the internal auditors. All expenditures of the Project would be audited by the internal auditors, and their reports would be shared with the Bank. In addition, Technical Audits would also be conducted for all construction related works of the Project to ensure that all works are completed as per specifications and acceptable standards.

15. ***Disbursement and flow of funds.*** The project fund would be channeled through a designated account denominated in US dollars, which would be opened by the PCU in a commercial bank. Advances to the designated account would be made based on the forecast of the project's eligible expenditures for a period of at least six months, based on interim financial reports. Supporting documentation for expenditures made from the designated account would also be based on the IFRs. As eligible expenditures are incurred, the PCU would withdraw the amount to be financed by the Bank from the designated account (US\$ or XCD\$) in accordance with the financing agreement. The PCU would operate a local currency account, to finance project expenditures in local currency. These accounts would operate in accordance with the procedures and guidelines set forth in the Bank's Disbursement Guidelines. The Reimbursement method of disbursement would also be available. The supporting documentation for this method would also be interim financial reports, and the pre-finance expenditures would be clearly identified in the reports if combined with supporting advances made to the designated account in

the same interim financial reports. The minimum application size for reimbursement would be US\$200,000.

16. **External Audit.** The external audit of the Project will be conducted by the Director of Audit. However, the Director of Audit would require an additional qualified Audit Expert for a period of four months every year during the implementation period of the Project, to provide audit support. While conducting the audit, the Audit Expert will provide on the job training to the staff of the Director of Audit to build in-house capacity. The annual project financial statements would be audited in accordance with auditing standards issued by the International Organization of Supreme Audit Institutions and/or International Standards on Auditing issued by the International Federation of Accountants. The PCU would prepare the auditors' terms of reference, which would be reviewed by the Bank before the engagement of the auditor. The annual audit reports would include an opinion on the project financial statements, including designated account reconciliation, review of the internal controls, review of the project's compliance with the terms of the financing agreement(s), and a management letter. The project's annual audit report would need to be submitted to the Bank for review no later than six months following the end of the fiscal year. In accordance with the Bank's disclosure of information, the audited financial statement would be made publicly available.

Procurement

17. A new Public Procurement and Contract Association Act, passed in Parliament in December 2012, is still not fully in place. For the act to be enforced, the Minister of Finance is required to issue an Order published in the Gazette. The enactment of the new public procurement act would be an important step in the establishment of a sound public procurement system working in accordance with the principles of efficiency, fairness and transparency. The implementation of the new public procurement act would require some additional staff, capacity building, resources and time. There is an electronic system for collecting and disseminating information on procurement processes. This includes dissemination of law and regulations, invitations to bid, requests for proposals, and information on contract awards. Procurement under the Project would be carried out in accordance with the World Bank "Guidelines: Procurement of Goods, Works, and Non-Consulting Services under IBRD Loans and IDA Credits and Grants by World Bank Borrowers, dated January 2011", and "Guidelines: Selection and Employment of Consultants under IBRD Loans and IDA Credits and Grants by World Bank Borrowers, dated January 2011" and the provisions stipulated in the Financing Agreement (FA). The various procurement actions under different expenditure categories are described in general below. For each contract to be financed under the FA, the various procurement or consultant selection methods, the estimated costs, prior/post review requirements, and timeframe have been agreed between the Borrower and the Bank in the Procurement Plan (PP). The PP will be updated at least annually or as required to reflect the actual project implementation needs and improvements in institutional capacity. A General Procurement Notice (GPN) in UNDB and Specific Procurement Notices (SPN) will be published for all ICB procurement and Consulting contracts as per Guidelines as the corresponding bidding documents and RFPs become ready and available. A full-time Procurement Specialist would be mobilized as part of the PCU staff to manage all contracting processes.

Procurement Arrangements:

18. **Works:** Works procured under the project would consist of (a) Construction of water storage and distribution infrastructure; (b) Slope stabilization interventions; (c) Climate resilient rehabilitation of primary and secondary roads and bridges along the East coast and in the South; and (d) Improved climate resilient drainage systems. Procurement of works will be carried out using International Competitive Bidding (ICB), National Competitive Bidding (NCB), Shopping and other methods indicated in the FA. Procurement will be carried out using the World Bank's Standard Bidding Documents and other sample documents and templates, as agreed upon with the Bank. The procurement method thresholds and prior review thresholds for Works are indicated in the table below. Domestic preferences in accordance with clause 2.55 and Appendix 2 of the guidelines will not apply.

19. **Procurement of Goods and Non-consulting Services:** Procurement of goods and services other than consulting services would include: water metering equipment, water quality testing equipment, hydrological and meteorological equipment, laboratory equipment, vehicles, IT and office equipment, etc., and other goods and services. Procurement of goods will be carried out using International Competitive Bidding (ICB), National Competitive Bidding (NCB), Shopping and other methods indicated in the FA. The procurement will be carried out using World Bank's Standard Bidding Documents and other sample documents and templates, all agreed upon with the Bank. The procurement methods thresholds and prior review thresholds for Works are indicated in the table below. Domestic preferences in accordance with clause 2.55 and Appendix 2 of the guidelines will not apply.

20. **Selection of Consultants:** Consultants' services contracts procured under this project will include: detailed designs and supervision, technical assistance, feasibility and environmental studies, spatial data management and maps, public education and awareness campaigns and strengthening PCU capacity, as well as capacity within other ministries and institutions, etc. The following selection methods will be used: Quality and Cost Based Selection (QCBS), Least Cost Selection (LCS), Selection Based on Consultants' Qualifications (CQ), Individual Consultants, and other selection methods indicated in the FA. The selections will be done using the Bank's Standard Request for Proposal (RFP) and other sample documents and templates, all agreed upon with the Bank. Short lists of consultants for services estimated to cost less than US\$100,000 equivalent per contract may be composed entirely of national consultants in accordance with the provisions of paragraph 2.7 of the Consultant Guidelines.

21. **Procurement arrangements under Component 3:** In the case of urgent assistance needed as a result of a natural disaster, the simplified procurement procedures outlined in the Bank guidance note: "Situations of Urgent Need of Assistance or Capacity Constraints, Simplified Procurement Procedures", may be used. The procurement arrangements and procedures under Component 3 will be elaborated in further detail in the Operations Manual.

22. **Operating Costs (OC):** "Operating Costs" means incremental operating costs incurred by the PCU on account of Project implementation, management and monitoring, including dissemination of Project related information and publications, office rent and utilities, office and

equipment insurance, maintenance and repair, vehicle insurance, local travel, communication, translation and interpretation, bank charges, and other miscellaneous costs directly associated with the Project. All operating costs are based on periodic budgets and procured using the implementing agency's administrative procedures acceptable to the Bank. Operating costs do not include salaries of government officials and civil servants.

23. **Training Costs:** The Project will finance training (workshops, etc.), as needed. The training will be carried out according to training plans, which the PCU will revise semi-annually and as needed and submit to the Bank for no objection prior to implementation. The expenses will be covered under the training category and disbursed based on the Statement of Expenses (SOE).

24. **Procurement methods thresholds and prior review thresholds:** The following procurement methods thresholds and prior review thresholds will be used:

Expenditure Category	Contract Value (Thresholds) US\$ thousands	Procurement Method	Contracts Subject to Prior Review
1. Works			
	>1,500	ICB	All
	150 – 1,500	NCB	1 st contract and all > US\$750,000
	<150	Shopping	First contract
	Regardless of value	Direct Contracting	All
2. Goods			
	>150	ICB	All
	50-150	NCB	1 st two contracts
	<50	Shopping	First contract
	Regardless of value	Direct Contracting	All
3. Consulting Services			
3.1 Firms	>100	QCBS, QBS, FBS, LCS	All
	<100	QCBS, QBS, FBS, LCS, and CQS	1 st two contracts and all TORs by TTL
	Regardless of value	Single Source	All
3.2 Individuals	Regardless of value	IC	All TORs by TTL, and all > US\$50,000

Procurement Plan

25. The Borrower has prepared a detailed Procurement Plan (PP), which provides information on procurement packages, methods, Bank review and times for procurement and implementation. This plan has been agreed upon between the Borrower and the Bank project team at negotiations, and will be available at the implementing agency's project database and on the Bank's external website. The PP will be updated in agreement with the Bank project team annually or as required to reflect the actual project implementation needs.

Goods, Works, and Non Consulting Services

(a) List of contract packages to be procured following ICB and direct contracting:

No.	Contract (Description)	Estimated Cost (USD)	Procurement Method	Review by Bank (Prior/Post)	Expected Bid-Opening Date
1	East Coast Road Works	15.000.000	ICB	Prior	May, 2016
2	South Coast Road Works	3.500.0000	ICB	Prior	May, 2016
3	Water Storage Supply Distribution Pipes	500.000	ICB	Prior	September, 2014
4	Storm Drain Reconstruction	2.000.000	ICB	Prior	February, 2015
5	Computer Equipment, Specialized Hardware	300.000	ICB	Prior	June, 2014
6	Engineering and Mapping Software	240.000	DC	Prior	N/A
7	Specialized Geodata Hardware	150.000	DC	Prior	N/A
8	Engineering Test Equipment	130.000	ICB	Prior	August, 2014

Consulting Services

(a) List of consulting assignments with short-list of international firms.

No.	Description of Assignment	Estimated Cost (USD)	Selection	Review by Bank (Prior/Post)	Expected Submission
1	Works Pre engineering and design Services	1.040.000	QCBS	Prior	June, 2015
2	LiDAR bathymetry and topography	1.750.000	QCBS	Prior	June, 2015
3	Soil Mapping	950.000	QCBS	Prior	June, 2015

Frequency of Procurement Supervision

26. In addition to the prior review, procurement supervision and post reviews will be carried out by the Bank team. It is expected that a supervision mission in the field will be conducted every six months. At a minimum, one post review report, which will include physical inspection with the Bank technical expert of sample contracts including those subject to prior review, will be prepared each year.

Environmental and Social (including safeguards)

27. This Project has been classified as Category B in accordance with World Bank policy on Environmental Assessments (OP/BP 4.01). Physical works proposed under the Project would include the rehabilitation and improvement of roads; design and deployment of hydro meteorological monitoring stations; installation of diversions, water lines, and storage tanks; agroforestry, and soil stabilization; storm drains, bridges, and associated works. Some proposed subprojects could involve activities in environmentally sensitive areas such as river valleys, forest areas, and coastlines. Accordingly, the appropriate safeguards instruments have been prepared, as explained below.

28. **Environmental Assessment (OP 4.01).** The GoCD has prepared a joint Project-level Environmental Assessment (EA) and Environmental Management Framework (EMF), which has been disclosed in-country and in InfoShop prior to appraisal. The EA- EMF describes two types of Projects: those with relatively complex environmental conditions or those with moderate to significant potential impacts (if unmitigated), requiring a stand-alone Environmental Impact Assessment (EIA), and those comprising relatively simple civil works where the impacts are limited to the construction phase (e.g., building repair and retrofitting).

29. The EA is a program-wide evaluation of the potential impacts anticipated from all the types of subprojects being considered under the program. For more complex Projects or those in sensitive areas, the EMF establishes under which specific circumstances other safeguards policies for Natural Habitats or Physical Cultural Resources may be triggered, such as subprojects in environmentally sensitive or complex areas, or those with potentially significant impacts if improperly managed.

30. An Environmental Management Framework (EMF) has also been prepared to set out the principles, rules, guidelines and procedures for the future assessment of environmental and social impacts for subprojects as they become more clearly defined and ready to implement. The EMF specifically responds to the types of Projects/subprojects under Components 1 and 2 as well as includes standard procedures for mitigating environmental impacts of construction, monitoring and reporting. For relatively simple subprojects and activities, a screening procedure and draft contract clauses for generic standardized environmental mitigation measures were developed to serve as a generic standardized Environmental Management Plan (EMP) suitable for inclusion into the Project's Operations Manual (OM) to be applied as needed to works construction contracts.

31. This simplified environmental management strategy should suffice in the majority of cases, since most works are relatively simple civil works involving minor impacts during

construction that can be mitigated with best management practices and standard operating procedures (e.g. small road, slope, or storm drain works, bridge rehabilitation). The EMF identifies those subprojects or works that may affect environmentally sensitive or complex areas, or which could entail significant negative impacts, and require additional assessment in the form of subproject-specific Environmental Impact Assessments (EIAs) to develop the appropriate and necessary site-specific mitigation and management measures. Finally, the EMF includes a section with clear safeguards guidelines for emergency investments and works including for the preparation of any safeguards studies prior to works as pertinent under OP 10.00 (as may be considered under Component 3).

32. Subprojects requiring stand-alone EIAs would have the assessment studies completed once designs are sufficiently defined to allow a meaningful evaluation performed and specific mitigation measures developed. The EIAs would be conducted prior to the initiation of the works activities and would establish environmental requirements for the design and construction phases of the activity. To address the need for EIAs during implementation, a screening procedure is included in the EMF and in the Operations Manual (OM) detailing requirements for a stand-alone EIA and providing TORs for an EIA study. For relatively simple subprojects and activities, a screening procedure and draft contract clauses for generic standardized environmental mitigation measures would be included in the EMP and OM to be applied as needed to works construction contracts. Potential impacts from these types of fairly uncomplicated activities would be managed by the inclusion of environmental compliance contacting clauses to mitigate construction-related impacts.

33. The **Natural Habitats policy (OP 4.04)** is triggered as a precaution due to potential Project activities which may occur in highland forest areas, river valleys, coastlines and / or marine areas. The EA and EMF account for natural habitats when screening both known works and any future activities currently undefined. Potential application of this policy is identified in the EA, while screening of future subprojects is described in the EMF to determine if additional assessment and specialized mitigation measures would be required for these Projects, once detailed designs are known during implementation. Scoping for well-preserved vegetation, intact forest areas, rare or endangered species habitat, and other complex or sensitive ecosystems should be conducted for projects of any considerable size or with potential impacts extending off-site to any considerable extent (e.g., downstream areas, riverbeds, etc.).

34. The **Forests Policy (OP/BP 4.36)** is being triggered as a precaution because limited forest resource harvesting may be done. The term forest harvesting only refers to incidental clearing of a very limited number of trees as may be required for the agroforestry pilot plots which would also include planting of trees for slope stabilization, erosion prevention, or planting of climate resilient crops. All proposed project activities will be screened using the EMF and any negative effects on primary forest would be excluded.

35. The **Physical Cultural Resources Policy (OP/BP 4.11)** has been triggered as a precaution. The EMF and EMP include a "chance-find" procedure, particularly during activities such as major excavations, road realignments or similar works where such assets could be affected by clearing, blading, excavation or trenching. Archaeological relics may also be encountered and a robust chance-find procedure developed, for which interaction with the Carib

Community may be relevant, even for lands outside the designated Carib Territory. There is no formal body to screen antiquities, except for Historic Buildings in Roseau; rather, the local practice is to consult the island's historian, if any items of interest are uncovered.

36. The **Pest Management Policy (OP/BP 4.09)** has been triggered as a precaution. Works for greenhouses, crop management, and others could involve the use of pesticides and herbicides. Simple management procedures could be developed, since the quantities stored and used would likely be small. Standard measures may be applied for incidental use of pesticides (e.g. termite treatments for buildings, or safe use of pesticides for vector control), which can be built into a generic standardized EMP.

37. The EMF also includes a section with clear safeguards guidelines for emergency investments and works including types of activities, responsibilities for screening and environmental management, and for preparation of any safeguards studies prior to works as pertinent under OP 10.00 and consistent with the Project category, as may be considered under Component 3. Normally such Projects would involve provision of goods and would be considered Category (C), but some activities could include demolition or removal of debris, or emergency repair of critical infrastructure, which would be classified as Category B Projects and would require mitigation measures to be implemented. Consideration would be given to internal/external safeguards specialist review of activities proposed under Component 3 and applying the screening measures in the EMF.

38. The Project Operations Manual will specify that all contracts include the standardized, generic mitigation measures that are annexed in the EA/EMF, to provide a minimum performance standard for environmental mitigation measures. Reporting requirements would also be defined in the OM for environmental and social safeguards matters.

39. **Social.** The social impacts emanating from the Project are likely to be positive and the Project beneficiaries would be the entire Dominican population, including the Island's Indigenous Population. A Project-level Social Assessment will be undertaken early into Project implementation by the Social Specialist within the PCU; the Social Assessment will further clarify the nature and extent of potential impacts and benefits including any gendered impacts. Broad consultation has been carried out for the Project among key stakeholders, including the Carib community, private sector, non-governmental organizations, and other groups, which have been involved in Project design. These stakeholders will be engaged during implementation and monitoring of Project results via outreach and a communications strategy to be developed for the Project.

40. **Involuntary Resettlement.** The Involuntary Resettlement Policy (OP/BP 4.12) is triggered by this Project as works planned, including the rehabilitation of primary and secondary roads and bridges and the construction of storm drains, could potentially lead to the involuntary taking of land. A social assessment and land acquisition screening exercise currently being conducted will identify the potential location and scale of any acquisition. A Resettlement Policy Framework (RPF) has been developed to clarify resettlement principles and estimate the magnitude of any potential impacts. The RPF has been consulted and disclosed in country and via the World Bank's website prior to appraisal and negotiations.

41. **Indigenous Peoples.** The Island of Dominica is home to an indigenous Carib/Kalinago population who meet the characteristics of Indigenous Peoples as defined by the World Bank's Policy on Indigenous Peoples (OP/BP 4.10). Population estimates vary but are believed to be in the order of 3,000 plus individuals. The majority of the indigenous population resides in the "Carib Territory", a territory governed by the 1978 Carib Act. Some proposed subprojects may be implemented in the Carib Territory. Initial consultations conducted by the Bank team during Project preparation with members of the Carib Council and Ministry of Carib Affairs show appreciation for the policy (OP/BP 4.12) and an interest in having Project works implemented in the Territory. An Indigenous Peoples Plan has been prepared, consulted, and disclosed prior to Project appraisal. Any voluntary concession of land by the indigenous population necessitated by the Project will be monitored and legal documentation obtained prior to any transactions. Appropriate grievance-handling procedures and arrangements for monitoring the IPP are in place and will be managed by the PCU.

42. **Staffing.** As the Project focal point, the Ministry of Environment would be responsible for communicating Project decisions made to participating line ministries and foster coordination between technical agencies and central Government. The Ministry of Environment will also be responsible for the hiring of key PCU staff for social and environmental safeguards implementation. The Bank will provide capacity building support to the PCU and the Ministry of Environment to manage and implement applicable Bank safeguards policies.

43. The project will require a full-time Social Specialist to oversee and coordinate the implementation of the Indigenous Peoples Policy (OP/BP 4.10) and the Involuntary Resettlement Policy (OP/BP 4.10). Specifically, the Social Specialist will manage the implementation of the Indigenous Peoples Plan and its associated consultations and liaise closely with the Ministry of Carib Affairs and the Carib Council. In addition, the triggering of OP/BP 4.12 (Involuntary Resettlement) will require the development of resettlement plans and their associated surveys and consultations etc.

44. A full-time Environmental Specialist will also be hired as part of the PCU staffing arrangement. Given the importance of natural habitat in Dominica, the staff position should be afforded priority. Staff from Ministry of Public Works and DOWASCO may also review and inspect works in the field to verify that project contract requirements are being fulfilled.

Monitoring & Evaluation

45. The results framework, presented in Annex 1, has been developed in coordination with GoCD, and the monitoring of the indicators will be carried out by the PCU. Indicators have also been reviewed vis-à-vis the PPCR Core Indicators to ensure coordination of efforts. As indicated previously, the PCU would also be responsible for monitoring progress and capturing lessons learned with respect to the implementation of the PPCR program in Dominica.

46. Overall responsibility for monitoring and evaluation of the Project will lie with the PCU, which will provide timely information about the Project's implementation progress, including qualitative information on the execution of selected activities, procurement and contractual

decisions, accounting and financial recording, and other operational and administrative matters. The Project Coordination Unit would rely on information from participating line Ministries to inform results from Project activities.

47. The Project will also support capacity building and development of a monitoring and evaluation system, as GoCD does not have a consolidated monitoring and evaluation system in place. The Project's OM will provide specific details regarding monitoring and evaluation responsibilities, including data collection requirements, timing and use of information. The expected costs for implementation of these activities would be drawn from Component 4 of the Project.

Annex 4

Operational Risk Assessment Framework (ORAF)

Dominica: Third Phase Disaster Vuln.Reduction IPF for Dominica (P129992)

Project Stakeholder Risks						
Stakeholder Risk	Rating	Moderate				
<p>Risk Description:</p> <p>The Project is financing key elements of the GoCD’s Strategic Program for Climate Resilience (SPCR), the development of which was highly consultative and covered all sectors in government as well as the private sector. Given the Project’s high profile and its ambitious aim to include multiple sectors in the Project’s design, various line ministries and private sector entities may potentially be dissatisfied with Project activities and / or express concern that certain activities were not included in the Project</p>	Risk Management:					
	Elements to be financed under the Project have been selected in consultation with key stakeholders (down to the community level in some cases), so as to ensure local ownership and support of selected works.					
	Resp:	Status:	Stage:	Recurrent:	Due Date:	Frequency:
	Client	Completed	Both	<input checked="" type="checkbox"/>		
	Risk Management:					
	All proposed sub-components and investments have been selected from the SPCR and have been vetted by the GoCD and approved by Cabinet.					
	Resp:	Status:	Stage:	Recurrent:	Due Date:	Frequency:
Client	Completed	Implementation	<input checked="" type="checkbox"/>			
Risk Management:						
Prior technical reviews of proposed activities would be undertaken to ensure that Project components would not have adverse impact on local residents. During preparation and implementation of sub-Projects, the Project Coordination Unit would disseminate relevant information to stakeholders and beneficiaries to increase awareness of the proposed Project and activities.						
Resp:	Status:	Stage:	Recurrent:	Due Date:	Frequency:	
Both	Not Yet Due	Implementation	<input checked="" type="checkbox"/>			

Implementing Agency (IA) Risks (including Fiduciary Risks)							
Capacity	Rating	High					
<p>Risk Description:</p> <p>The Project would be the largest Bank-financed operation for the GoCD, and is multi-sectorial and complex by nature involving a wide variety of ministries and agencies. These stakeholders may not be accustomed to working cohesively under one implementing agency. This may create confusion and slow Project implementation.</p> <p>Furthermore, the Project would require the strengthening of a new PCU with extensive training for its staff to ensure adequate Project management capacity. Current capacity is inadequate to handle the large number of contracts and maintains insufficient technical capacity to adequately review and approve designs, coordinate across government agencies as well as enforce quality control.</p> <p>The PCU will be housed within the Ministry of Environment with oversight from the Ministry of Finance. MoF and MoE do not have recent experience in carrying out Bank procurement. Both the PCU and Ministry of Environment will initially have limited capacity for executing World Bank Projects which may delay Project implementation.</p>	Risk Management:						
	<p>The proposed Project would be designed with components/activities clearly defined by beneficiary ministry/agency to clarify responsibilities and reduce confusion. A Project Coordination Unit (PCU) which would be led by a Coordinator and would integrate technical and fiduciary personnel (procurement specialist, a financial management specialist, civil engineer, an environment specialist, an M&E/communications specialist and a social specialist) would be established. Key fiduciary staff (procurement specialist and FM specialist) would be contracted during Project preparation. A Project preparation advance would provide funds for the salaries of the PCU staff and the initial hiring of the key fiduciary staff. The Project would work with the PCU in developing appropriate implementation and oversight arrangements to minimize duplication; and the Project Steering committee would promote coherence and facilitate dialogue among relevant stakeholders. A Project Operations Manual would be developed and disseminated amongst Project agencies to ensure this arrangement is solidified.</p> <p>During implementation, all the necessary trainings will be provided to the PCU staff and relevant specialists working in the executing agencies.</p>						
	Resp:	Status:	Stage:	Recurrent:	Due Date:	Frequency:	
	Client	In Progress	Both	<input checked="" type="checkbox"/>			
	Risk Management:						
	<p>The Ministry of Finance and the Ministry of Environment will provide additional oversight, resources and support to augment capacity until the PCU becomes fully operational. During implementation, the Bank will work closely with the PCU and the Ministries of Environment and Finance to strengthen the unit's Project management capacity, particularly with respect to procurement, fiduciary, and safeguards requirements.</p>						
	Resp:	Status:	Stage:	Recurrent:	Due Date:	Frequency:	
Both	In Progress	Both	<input checked="" type="checkbox"/>				

Governance	Rating	High				
<p>Risk Description:</p> <p>The Government, and specifically the Ministry of Environment and other Project affiliated agencies, have demonstrated strong ownership and commitment to the Project's objective and activities. However, with possibility of changes in political leadership, there may be a shift in national priorities. Plus, overall trend after elections is high turnover of technical and management staff of government institutions and Projects, which could disrupt Project implementation.</p> <p>Certain policy-level issues and decisions under the Project (for instance, staffing appointments, financial decisions, public consultation documents etc.) must be submitted to Cabinet for concurrence and approval. Items or issues deemed significant are brought before Cabinet for their decision, or for their information. The process of obtaining Cabinet approval can sometimes take up to a few weeks, which could disrupt Project implementation.</p>	Risk Management:					
	<p>Given the broad consensus around DRM and climate adaptation issues, no major Project changes are expected. The Financing Agreement would include a covenant to minimize unjustified firing of PCU staff and the Operations Manual would include objective performance evaluation procedures. Furthermore, the Bank team would ensure adequate supervision and maintain an ongoing climate adaptation and disaster risk reduction policy dialogue during the electoral cycle.</p>					
	Resp:	Status:	Stage:	Recurrent:	Due Date:	Frequency:
	Bank	Not Yet Due	Implementation	<input checked="" type="checkbox"/>		Monthly
	Risk Management:					
	<p>Close correspondence and communication with the Ministry of Finance and the Ministry of Environment around this issue ensures that Cabinet is aware of key timeframes in order to minimize delays. Additionally, the Bank team has factored in additional time required for Cabinet approvals into the project planning process, which could be replicated during implementation.</p>					
Resp:	Status:	Stage:	Recurrent:	Due Date:	Frequency:	
Both	In Progress	Both	<input checked="" type="checkbox"/>			
Risk Management:						
<p>Project investment decisions would be based on a participatory process that involves local authorities and communities, including prioritization of mitigation measures. Moreover, Project evaluation includes periodic, independent technical audits for the infrastructure supported under Component 1 as well as annual financial audits of the use of Project funds. The Ministry of Environment will ensure open, transparent communications about the Project as part of its website.</p>						
Resp:	Status:	Stage:	Recurrent:	Due Date:	Frequency:	
Client	Not Yet Due	Implementation	<input checked="" type="checkbox"/>			

Project Risks							
Design	Rating	High					
<p>Risk Description:</p> <p>Physical environmental data is insufficient for design of climate resistant infrastructure Projects.</p> <p>Storm events during Project execution may damage works and modify construction requirements.</p> <p>Storm events during Project implementation could change GoCD priorities, thereby requiring redistribution of Project funding from vulnerability reduction and climate change adaptation activities emergency recovery.</p> <p>Scope of rehabilitation of works may grow with the discovery of hidden damages during construction.</p>	Risk Management:						
	The Project would build national capacity for strengthening the understanding of climate change adaptation needs through multidisciplinary physical environmental data collection and management throughout the lifetime of the Project. The proposed civil works under the Project would retrofit existing infrastructure vulnerable to current climate risks.						
	Resp:	Status:	Stage:	Recurrent:	Due Date:	Frequency:	
	Client	Not Yet Due	Implementation	<input checked="" type="checkbox"/>			
	Risk Management:						
	The proposed Project would schedule/prioritize works so that critical stages are completed prior to recurrent storm season. Risk management contingencies would also be included in works planning and execution contracts.						
	Resp:	Status:	Stage:	Recurrent:	Due Date:	Frequency:	
	Client	Not Yet Due	Implementation	<input checked="" type="checkbox"/>			
Risk Management:							
The Contingency component of the Project, in line with BP/OP 10.0, would allow the government to access Bank funding for emergency recovery and reconstruction purposes							
Resp:	Status:	Stage:	Recurrent:	Due Date:	Frequency:		
Client	Not Yet Due	Implementation	<input checked="" type="checkbox"/>				
Risk Management:							
The Project team would provide for detailed inspections at the pre-engineering stage to minimize hidden damage impacts. Risk management contingencies would also be included in works planning and execution contracts.							
Resp:	Status:	Stage:	Recurrent:	Due Date:	Frequency:		
Client	Not Yet Due	Implementation	<input checked="" type="checkbox"/>				

Social and Environmental	Rating	Moderate				
<p>Risk Description:</p> <p>The Ministry of Environment and the PCU will not be familiar with Bank social and environmental safeguards requirements.</p>	<p>Risk Management:</p> <p>The PCU would be organized within the Ministry of Environment, which will help to sharpen the focus on environmental and social safeguards. The PCU will hire social and environmental safeguards specialists, and the Bank would provide safeguard training at the beginning and during Project implementation and periodic supervision throughout implementation. All required safeguard instruments (Environmental Assessment, Social Assessment, Environmental Management Framework (EMF)/Indigenous Peoples Plan (IPP), and Resettlement Policy Framework (RPF)) have been prepared, consulted and disclosed. A list of standardized mitigation measures has been included in the Environmental Management Plan (EMP) to strengthen the mitigation of negative social and environmental impacts. The Project would also emphasize compliance with national environmental policies in addition to Bank safeguards.</p>					
	Resp:	Status:	Stage:	Recurrent:	Due Date:	Frequency:
	Both	In Progress	Implementation	<input checked="" type="checkbox"/>		Monthly
	<p>Risk Management:</p> <p>While large scale private land acquisition is not anticipated, all works requiring the triggering of OP 4.12 would be subject to prior review.</p>					
	Resp:	Status:	Stage:	Recurrent:	Due Date:	Frequency:
	Both	In Progress		<input checked="" type="checkbox"/>		Monthly
	<p>Risk Management:</p> <p>The Project team would benefit from the Bank's extensive experience with resettlement of populations from high risk areas. The Bank team will include a social specialist during Project implementation to assist in advising the GoCD on the application of OP 4.12</p>					
	Resp:	Status:	Stage:	Recurrent:	Due Date:	Frequency:
	Both	In Progress		<input checked="" type="checkbox"/>		Monthly
	<p>Risk Management:</p>					

	<p>The Indigenous Peoples Plan (IPP) has been developed on the basis of the social assessment carried out during Project preparation in consultation with the Indigenous Peoples to ensure that the Indigenous communities affected by the proposed Project receive culturally appropriate social and economic benefits; and when potential adverse effects are identified, those adverse effects are avoided, minimized, mitigated, or compensated for.</p>					
	Resp: Both	Status: In Progress	Stage:	Recurrent: <input checked="" type="checkbox"/>	Due Date:	Frequency: Monthly
Program and Donor	Rating Moderate					
<p>Risk Description:</p> <p>While the success of the Project would not be generally dependent on other agencies' supported Projects or initiatives, it is important, however, to coordinate Project implementation with key partners such as the CDB, IDB, UNDP and others. Additionally, the Project will be developed and its results monitored in close conjunction with the CIF/PPCR Sub-Committee.</p>	<p>Risk Management:</p> <p>The Project is being prepared in close consultation with relevant development partners, and a stock-taking exercise of Projects and initiatives being carried out as part of SPCR implementation was done to inform Project design. Further coordination would be promoted through the donors' climate change coordination committee to ensure harmonized safeguards and fiduciary procedures as well as engineering standards. In addition, the Ministry of Environment, via the PCU, will be responsible for reporting and monitoring and evaluation requirements of the PPCR /CIF.</p>					
	Resp: Both	Status: In Progress	Stage:	Recurrent: <input checked="" type="checkbox"/>	Due Date:	Frequency: Quarterly
Delivery Monitoring and Sustainability	Rating High					
<p>Risk Description:</p> <p>In general, DRM Projects have suffered from weak M&E due to lack of baseline risk information and to some extent reflecting the difficulty in measuring impacts based on probabilistic assumptions.</p>	<p>Risk Management:</p> <p>Project design is paying special attention to the results framework and M&E.</p>					
<p>Sustainability of Project results may be hindered by lack of clear responsibilities or resources for maintenance of mitigation works, and in the case of capacity building, due to turn over of staff, particularly after elections.</p>	Resp: Client	Status: Not Yet Due	Stage:	Recurrent: <input type="checkbox"/>	Due Date:	Frequency:
	<p>Risk Management:</p> <p>Having local authorities and communities fully engaged in identifying, prioritizing, and supervising mitigation works ensures construction quality, beneficiaries' satisfaction and strong sense of ownership of investments. In addition, all investments would be included in the recurrent O&M budgets of the line agencies responsible for maintaining the</p>					

	investments after the Project ends.					
	Resp: Client	Status: Not Yet Due	Stage: Implementation	Recurrent: <input checked="" type="checkbox"/>	Due Date:	Frequency: Monthly
Other (Optional)	Rating					
Risk Description:	Risk Management:					
	Resp:	Status:	Stage:	Recurrent: <input type="checkbox"/>	Due Date:	Frequency:
Other (Optional)	Rating					
Risk Description:	Risk Management:					
	Resp:	Status:	Stage:	Recurrent: <input type="checkbox"/>	Due Date:	Frequency:
Overall Risk						
Overall Implementation Risk:	Rating	Substantial				
Risk Description: Dominica currently has no ongoing Bank-financed Projects and there is an increased risk of low capacity due to the lack of experience with Bank Project preparation and implementation as well as due to the number of ministries involved in implementation. Despite some experience in managing previous Bank-financed Projects, the proposed Project is the largest Bank operation to be financed in Dominica, which could potentially be challenging to a newly established PCU. However, project design, which is not technically complex, has been tested in other OECS countries that are successfully implementing DVRP projects so the implementation risk is rated as substantial.						

Annex 5: Implementation Support Plan

Dominica Disaster Vulnerability Reduction Project

1. The strategy for the Implementation Support Plan (ISP) draws on the risk profile of the Project (ORAF, Annex 4) and aims to enhance the client's delivery quality of the proposed interventions. As such, the ISP focuses on risk mitigation measures defined in the ORAF and standard Bank implementation support, including technical, institutional, safeguards (environment, social) and fiduciary aspects. The Disaster Vulnerability Reduction Project is the largest Bank intervention to be undertaken in Dominica and is the first Project to be done with this client in many years. The Project involves infrastructure investments across different sectors resulting in the triggering of various environment and social safeguards. Appropriate implementation would require hands-on implementation support in both technical and fiduciary aspects of Project implementation.

2. The Task Team Leader (TTL) of the Project would be based at World Bank headquarters, along with technical specialists. Initially (at least until mid-term review), the task team would undertake 4 supervision missions per year. The frequency of missions thereafter would be determined based on the implementation progress of the Project. Regular supervision by the Bank would focus on the following areas:

- (a) **Strategic** – Implementation support missions would meet with the PCU and the partner institutions to: (i) review Project activities, (ii) re-confirm strategic alignment of Project activities to the PDO; and (iii) ensure the necessary coordination among respective stakeholders.
- (b) **Technical** – The implementation support team for the Project would consist of technical specialists who would review and supervise the execution of the Project components with partner institutions, ensure the activities keep in-line with the PDO, and make adjustments to the design and procurement plan when necessary. Ongoing support for M&E would continue to strengthen the PCU and the Bank's ability to both monitor Project progress and assess the impact of interventions.
- (c) **Safeguards** –Bank environmental and social specialists would support the PCU and executing agencies, as needed, in the preparation and consultation process associated with the safeguard instruments needed for the Project, in accordance with the relevant Frameworks prepared for the Project: Environmental Impact Assessment and Environmental Management Framework (EIA/EMF) and Resettlement Policy Framework (RPF), Indigenous Peoples Plan (IPP), and Resettlement Action Plans (RAP), when needed. This support would continue throughout Project implementation, in particular to ensure the application and effectiveness of those instruments. These specialists would: (i) develop the PCU's knowledge and understanding of Bank safeguard instruments and further familiarize PCU staff with their application; (ii) ensure the PCU has the capacity to undertake environmental and social analyses and develop mitigation approaches; and (iii) ensure regular and close supervision of progress and implementation of the plans.

(d) Procurement and Fiduciary – The Bank’s financial management and procurement specialists would provide timely, targeted training to the PCU and possibly other executing institutions prior to Project effectiveness and through periodic supervision missions during project implementation. These specialists would: (i) develop the PCU’s knowledge and understanding of Bank rules and procedures and further familiarize PCU staff with their application; (ii) provide training to the PCU staff on Bank Procurement Guidelines; (iii) ensure the PCU has the capacity to manage the flow of funds and accounting procedures, in line with FM guidelines; and (iv) support the PCU in building its overall FM and procurement capacity to improve and facilitate project management. The supervision strategy for this Project is based on its FM risk rating, which would be evaluated on regular basis by the FMS in consultation with relevant task team leader. Procurement supervision would also be carried out semi-annually. The support would focus primarily on contract management and on improving proficiency and efficiency in implementation according to Bank guidelines.

(e) Client-relations – The TTL task team would: (i) coordinate Bank supervision to ensure consistent Project implementation, as specified in the legal documents (i.e. Financing Agreement, OM); and (ii) review Project progress in achieving the PDO and address implementation roadblocks as they may arise with the client.

Implementation Support Plan

3. Project Oversight and Technical Back-stopping: Regular follow-up and support for the proposed Project would be provided by the TTL assisted by operational support staff. Technical specialists in transport and civil engineering, risk assessment, GIS and the water sector would also support the project in implementing specific activities. The project would be supervised on a routine basis by procurement, financial management and safeguards specialists.

4. Fiduciary inputs: Training would be provided by the Bank’s procurement and FM specialists before commencement of project activities, and as needed throughout project implementation. Additional training would also occur through regional (hub) level events. The supervision strategy for this project is based on its FM risk rating, which would be evaluated on regular basis by the FMS in consultation with the task team leader.

5. Safeguards: Inputs from the environmental and social specialists would be provided on a regular basis as part of Project supervision.

Table 1: Skills Mix Required

<i>Skills needed</i>	<i># Staff Weeks per FY</i>	<i># Trips per year</i>	<i>Comments</i>
Task Team Leader	7	3	HQ-based
Operations Analyst	10	3	HQ-based
Civil/Transport Engineer	5	3	HQ-based
Procurement Specialist	3	2	HQ-based
Financial Management Specialist	3	2	HQ-based
Environmental Specialist	2	2	HQ-based
Social Specialist	2	2	HQ-based

GIS/Data Management Specialist	2	2	HQ-based
TOTAL	39	20	

* Skills needed in the team (to be carried through the same or other arrangements in case there is a change of TTLs throughout Project implementation)

Time	Focus	Skills Needed	Resource Estimate	Partner Role
First 12 months	<ul style="list-style-type: none"> Contracting of Tech. Assistance for all components Procurement of LiDAR Development of tender docs Training in FM, Safeguards and Procurement Team leadership implementation supervision coordination 	<ul style="list-style-type: none"> Procurement Financial Management Technical Guidance/support Technical support/engineer TTL 	4 sw 4sw 5 sw 5sw 6 sw	N/A
12-60 months	<ul style="list-style-type: none"> Technical design & implementation Procurement/ contracting Financial management M&E 	<ul style="list-style-type: none"> Technical Guidance/support Procurement Financial management M&E Specialist 	18 sw 4 sw 6 sw 2 sw	N/A

Table 2: Partners

Name	Institution/Country	Role
Client	MoE	Project counterpart, overall responsible for Project implementation, in compliance with agreements spelled out in Financing Agreement, and coordinating among counterpart agencies
Project Coordination	PCU	Responsible for Project execution
Key Government Project Partner institutions	MoE/MoF	Strategic and technical role, responsible for coordinating line Ministries regarding climate change adaptation activities responsible for communicating and disseminating information on climate change in Dominica.
Project Partner institutions/agencies (Governmental)	DOWASCO, MPW, Physical Planning, Lands and Surveys, MoF, MoE, ODM, Met office	Each Ministry and agency would provide technical support to the PCU, and would be responsible for the implementation of specific technical activities, elaboration of terms of reference, guidelines, and supporting documentation relative to their sectors. The PCU would retain fiduciary responsibilities for all project activities.

Annex 6. Economic Analysis

DOMINICA DISASTER VULNERABILITY REDUCTION PROJECT AND PILOT PROGRAM FOR CLIMATE RESILIENCE

SUMMARY

1. The project will have a positive impact on socio-economic development in Dominica.

The economic analysis shows that the Project is economically viable with economic net benefits of US\$9 million and economic returns of 18 percent. The subproject for Road rehabilitation show returns over 16 percent and benefits about 40 percent higher than their associated costs. The water component shows benefits close to US\$5 million and return of 21 percent. The sensitivity analysis show that all components but fisheries have ample room for changes in critical variables. When costs increase as much as 39 percent or benefits reduce as much as 40 percent, these components will still show positive returns. The results of the risk analysis confirm those from the sensitivity analysis. All subprojects analyzed show reassuring results with probabilities higher than 88 percent of obtaining net positive benefits.

2. Rationale for public sector provision/financing. Given the vulnerability to climatic variability and natural hazards, Dominica has undertaken a number of initiatives to respond to the threats posed by climate change as well as to mitigate the potential impacts of natural disasters. Public financing is crucial to strengthen key economic and social infrastructure and facilities, to reconstruct and rehabilitate key social and economic infrastructure following disasters; and to strengthen the country's institutional capacities to prepare for and respond to emergencies in an efficient and effective manner.

3. World Bank Value Added. The expertise of the World Bank in climate resilience programs has proved worthwhile and the population and the Government of the Commonwealth of Dominica will benefit from it. The evaluation carried out by the Bank following Hurricane Tomas in Saint Lucia in November 2010 indicated that risk reduction investments financed by the Bank over the past decade held up well and served their purposes when faced with a 1-in-500-year rainfall event. Similar conclusions were reached in the evaluation of school infrastructure in Grenada following Hurricane Ivan in 2004. This and other evidence suggests that retrofitting, rehabilitation, and improved data for decision-making to build the resilience of disaster risk mitigation investments pay off when faced with an adverse natural event.

ECONOMIC ANALYSIS OF THE PROJECT

4. Objective. The objective of this evaluation is to estimate the net economic benefits to be attained when the activities for reducing disaster vulnerability are implemented. Net benefits result from comparing benefits to associated costs. Some of the benefits are estimated, while others, yet of immeasurable value, are not estimated as they are intangible; examples of these benefits are: reduction on sentimental property loss, disruption of daily activities, environmental improvement, reduction of potential evacuation or displacement, better physical protection against disaster impacts, and the correlated improved well-being of the local population. This

evaluation includes only some measurable benefits, related mainly to damage to infrastructure and immediate costs to the population. The results therefore represent a fraction of actual benefits to be attained. The analysis is complemented with sensitivity and risk assessments, which help to identify the variables with highest risk for the Project.

Component 1

5. *Methodology.* The evaluation was carried out for two sub-components of the Project under Component 1 -Prevention and adaptation investments – the water storage sub-component and the resilient roads sub-component. Cost Benefit technique was carried out for selected works.

6. *Cost Benefit Analysis* compares the economic costs and benefits of a sample of selected subprojects under Component 1 - Prevention and Adaptation Investments. The sample consisted of works for: (a) retrofitting and rehabilitating water infrastructure; and (b) climate resilient rehabilitation of roads, which represent the type of works to be financed. The investment cost of the sample plus a portion of the Project management cost is USD 22.3, which corresponds to 62% of total Project costs. .

<i>Table 1. Sample of Activities in Component 1 for Economic Evaluation</i>	<i>Thousand USD</i>
Retrofitting and Rehabilitation of Water Infrastructure	5,823
Climate Resilient Rehabilitation of Roads	16,443
Project Management and implementation (proportional cost)	1,172
Total Sample	23,438

7. Each subproject was evaluated converting financial costs into economic costs eliminating taxes and subsidies, and estimating benefits as the avoided costs. The results were tested against real world uncertainties through sensitivity and risk analyses.

8. *Scenarios.* “With” and “without” Project scenarios were built to identify the incremental costs and incremental benefits associated with each subproject. The “with” Project scenario assumes that the proposed investment is carried out and greater hazard protection is in place. In the “without” Project scenario the current vulnerability of infrastructure and local population remains. The net benefit of each subproject was estimated as the difference between incremental benefit and incremental costs of the two scenarios.

9. *Economic Benefits* were estimated using avoided costs approach. These benefits correspond to expected reductions in coping costs incurred by Project beneficiaries (government and population). The avoided cost was measured as the difference between the expected damage cost of both scenarios: with and without Project. A curve with total damage costs was built for each scenario versus the probability of occurrence. The area¹² under the curve corresponds to the *expected damage cost* for each scenario. The difference between the expected damage cost *with*

¹² The area under the curve is approximated as the sum of trapezoids whose areas are equal to the average of the bases times the height. The average of the bases is the average of the damage cost, and the height is the difference between the probabilities.

Project scenario, and the expected damage cost *without* Project scenario corresponds to the *expected avoided damage costs*, or *expected benefits* of the Project.

10. To measure damage costs, three categories of damages were measured: (a) immediate costs to restore access to infrastructure (minor repair, debris removal, etc.); (b) repair cost of public infrastructure and private property (capital assets and stock comprised); and (c) coping costs for users of the infrastructure, and also the travel time approach was used to measure the additional cost of traveling when disruption of the traffic occurs and alternate routes have to be used, due to climate change events. The expected cost of additional time spent and expected additional fuel cost was estimated. All other intangible benefits, albeit important, were not included.

11. The subprojects were appraised measuring their flow of costs and benefits for the Project lifetime, which is estimated at 25 years. Costs and benefits were expressed in constant prices as of December 2012¹³. The discount rate corresponding to the opportunity cost of capital for the Caribbean Islands was estimated as 12%.

12. **Current Situation and Expected Benefits at selected subprojects.** The activities selected for the Project were based on: (i) high risk of structural failure and affectation by periodic storms and hurricanes with recurrence periods of as low as two years; and (ii) high impact on the economic activities and the livelihoods of the communities. A brief description of each of the subprojects on the selected sample as well as the expected benefits is presented below:

13. **Retrofit and Rehabilitate water infrastructure.** DOWASCO is implementing works to improve the water system along the west coast. The Project is connecting nine independent systems into one network. The intakes, pipelines, and treatment plant have already been completed. However, for the system to work properly each area must contain storage of adequate capacity. This will allow for the tank water level to fluctuate based on changing customer demand and tank inflow, yet always contain sufficient water to allow for uninterrupted service, even at peak demand. The storage tanks functions as a buffer and also as a means to regulate and maintain service pressure. If the Project is not implemented, some of the communities will experience frequent low water pressure and not enough water supply, particularly during peak demand periods and especially for customers living at high elevation.

14. Two benefits were estimated for this sub-component: (a) improvement of the service provided guaranteeing continuity of water supply and a safety factor for the service; (b) reduction of physical losses due to adequate flow and pressure. The first benefit was estimated as reduction on current coping costs of irregularities on the service. The second benefit was estimated as reduction on DOWASCO's variable costs, when physical losses decrease.

15. ***Coping costs for current customers.*** The estimation was made for two situations: (a) cost of storing water inside the houses; (b) cost of service interruptions.

- a. The general practice in area that experiences low water pressure or outage is to rely on water stored in private tanks or small 45-gallon drum. It is estimated that

¹³ Exchange rate - ECD 2.68: 1 USD

about 10% of houses have tanks and the remainder have access to 45-gallon drums. Current average coping costs are estimated as EC 170 per household per year¹⁴.

- b. Benefits of eliminating service interruption due to storage were estimated just for the population who lives at high elevation (about 10%) and only during the peak hours. When water shortage occurs, communities have one of the following options: (a) restrict consumption, (b) drive to other communities to collect water, (c) have water distributed by DOWASCO in its water trucks; (d) get water from DOWASCO sold by private companies in pickups, or (e) buy bottled water. The costs of some of these alternatives were estimated as follows: (i) cost of water distributed by water trucks¹⁵; (ii) water transported by private pickup is estimated to cost four to five times the previous cost, that is EC\$ 135 per cubic meter; and (iii) bottled water, which costs about EC\$ 2 per 250 ml bottle, which corresponds to EC\$ 8 per liter. DOWASCO estimates that about 80% of the water supply is distributed through private vendors, 20% through DOWASCO's trucks, and about 2% of the population buys bottled water. For this evaluation the weighted average costs was used.

16. *Benefits of physical losses reduction.* When the west coast Project was designed the physical losses¹⁶ were estimated at 37 percent and are expected to reduce to 20 percent. There is no information about the contribution that adequate flow and pressure will play in this reduction, yet personnel of DOWASCO opine that the role is important due to the characteristics of the system. The water system connects 9 villages with varying distances and different elevation. The flow rate to each tank will vary based on the state (filling/closed inlet) of the other tanks on the network. The supply network was designed to avoid the use of multiple, expensive flow control/pressure sustaining valves. The storage tanks will function as buffers and also to regulate and maintain service pressure. A third of the reduction of losses was applied to this component. Projection of volume of water with and without this component was carried out and DOWASCO's variable cost of producing a cubic meter was applied to find the flow of costs under both situations. The difference corresponds to savings DOWASCO will have when the component is implemented.

17. Total benefits equal the aggregate savings that both customers and DOWASCO will have once the component is on place. Net benefit corresponds to total benefits minus total costs.

18. Costs included in this evaluation consisted of storage costs plus operation and maintenance cost of one percent of the investment.

19. Road Vulnerability Reduction Component. The Ministry of Public Works has proposed a

¹⁴ The cost of a roof water tank is about USD 650 with a 5years lifetime and the cost of a 45 gallon-drum is about USD 100 with 2years lifespan. The first cost was applied to 10% of the 3,100 customers in the zone and the second cost was applied to the 90% remainder.

¹⁵ DOWASCO operates two water trucks rented at a cost of EC\$ 150 for 2 hours; the truck carries up to 2,000 imp gallons, which corresponds to 9 cubic meters and so to EC\$ 33 per cubic meter. Transportation cost plus DOWASCO's average tariff of EC\$ 2.9 per cubic meter, results in a total cost of EC\$36 per cubic meter.

¹⁶ volume of water lost to volume of water produced

section of road of 43.3 km for rehabilitation under the Project that comprises four major links: (i) Pond Casse to Bois Diable (4.5 km); (ii) Bois Diable to Castle Bruce (9.5 km); (iii) Castle Bruce to Petite Soufriere (8.8 km); and (iv) Castle Bruce to Hatton Garden through the Carib Territory (20.5 km). These sections are located at Center and North Eastern part of the island, which historically are among the areas with the highest volumes of rainfall in the island and so more vulnerable to landslides and flooding, These sections are very important for economic activity of the island, as they link Melville Hall airport and the Carib Territory with Roseau, the Capital. This component consists of a wide range of interventions, such as: embankments immediately adjacent to the existing roads; hydraulic structures, bridges, and needed infrastructure improvement. It is expected that the rehabilitated infrastructure will have the sufficient robustness/resilience to help such structure function under extreme environmental forces.

20. To get an idea of the importance of the road, traffic information was taken at Pond Casse and Hatton Garden from a study prepared by Louis Berger S.A in 2008¹⁷. As part of the design of the upgrade of the Roseau-Melville Hall Road, the firm counted the number of vehicles crossing in different sections of the road during a week of September 2006. For this evaluation the number of vehicles passing by Hatton Garden and Pond Casse were used, but in order to avoid double counting, an average was calculated. Then this information was updated to 2012 using the GDP growth during the period (4.6%). Results are presented in table 2.

Table 2. Average Number of Vehicles Crossing per day

	<i>Pond Casse</i>	<i>Hatton Garden</i>	<i>Average</i>
Cars	1,621	1,197	1,409
SUV	2,376	1,692	2,034
Pick up	2,960	2,147	2,554
Minibus	2,097	1,557	1,827
Bus	243	166	205
Trucks 2 Axis	473	268	371
Trucks 3 or more Axis	137	68	103
<i>Total</i>	<i>9,907</i>	<i>7,096</i>	<i>8,501</i>

21. The road has had a history of slope failure, road edge failure as well as other problems associated with its vulnerability to adverse climatic conditions. Poor soils coupled with inadequate drainage compounded by more intense rainfall events have given rise to flooding, landslides, and damage to the road structure. Some of these events have led to the temporary isolation of communities along this route.

22. The benefits of this component were estimated using the avoided cost approach. The following costs were included for two scenarios: with and without implementation of the works: (a) damage cost based on previous events for different magnitude and storm recurrence period. Historical information was used according to assessments made by the Ministry of Public Works; and (b) travel costs, including time and fuel, according to distance driven with and without Project. The expected damage cost was estimated as the damage cost multiplied by its probability of occurrence. A curve with total damage costs was built for both scenarios: with and

¹⁷ Government of the Commonwealth of Dominica, Ministry of Public Works, Energy and Ports. *Roseau-Melville Hall Road Upgrading Project. Detailed Design, Tender Documents & Supervision of Construction Works. Final Report. Volume 2. Technical Information.* March 2008.

without Project. The area under the curve corresponds to the *expected damage cost* for each scenario. The difference between the expected damage cost *with* Project scenario, and the expected damage cost *without* Project scenario corresponds to the *expected avoided damage costs*, or *expected benefits* of the Project.

23. *Damage Cost.* The cost of damage varies according to severity of event. For rains with a recurrence period of 2 years, damage to the road segments proposed for the Project consisted of cleaning costs and minor repairs to infrastructure; while for more severe events, damage includes not only debris removal, but also repairs to restoring immediate access to the infrastructure, and additional rehabilitation works. Costs of past events assessed by the Ministry of Public Works were used for this evaluation.

24. For immediate damage assessments made by the Ministry of Public Works during the events of 2011 and 2013 where intense rain occurred in September, November 2011¹⁸, and April 2013¹⁹ were used. In these events, major slope instability and flooding occurred affecting the North, East, and South Eastern parts of the island. The rainfall resulted in damage to critical and essential transportation assets (roads, crossings, and drainage systems), other related infrastructural assets and private properties.

25. In September and November 2011, a series of landslides occurred in Project areas, cutting off vehicular access and communication amongst a number of rural communities. The worst hit section was Hatton Garden to Castle Bruce where there were two massive landslides, which completely blocked the roadway; and 5 other moderate size landslides, which also restricted the free movement of people and motor vehicle. The severity of the large landslides required heavy-duty excavators and backhoes to clear the slides and reinstall the drainage and traffic capacity of the damaged sections. The duration of cleanup activities for this particular section was 6 days. The Castle Bruce to Petite Soufriere was also hit hard, and cleanup activities lasted 10 days.

26. According to the Ministry of Public Works, the immediate cost of repairing the damages caused by 2011 rains was EC\$1.3 million. This cost consisted of cleaning up the debris (EC\$ 199 thousand) and emergency repairs needed to make the road operational and to avoid additional damages, as the water saturated could have generated more slopes failure (EC\$ 1.1 million). Then in April 2013 strong rains caused additional damages, which cost EC\$ 3.6 million to clean up and to do emergency works. For this evaluation the average of both costs was used as the damage cost of events with a recurrence period of two years.

27. The assessment also showed that the repairs done after the storms were not enough to avoid further damages with upcoming events. The infrastructure in many spots of the road is in high level of deterioration and it is urgent to make additional works to avoid greater damages. The Ministry assessed the works needed for urgent rehabilitation in the sections of the road included in this component, and valued them at EC\$ 10.7 million. This cost plus cleaning up

¹⁸ Government of the Commonwealth of Dominica, Ministry of Public Works, Energy and Ports. *Draft Report on the Impact of Heavy Rains on 17-18 September 2011 and 27-28 November 2011.* May 2012

¹⁹ Government of the Commonwealth of Dominica, Ministry of Public Works, Energy and Ports. *Proposed Rehabilitation of Roads and Drainage Structures in the Eastern Part of Dominica.* May 2013

cost was used as the damages cost associate with event of recurrence period higher than two years.

28. Taking the previous information, the following costs were used for different recurrence periods

Recurrence period	Damage cost (000 EC\$)	
	w/o Project	with Project
2	2,477	-
10	10,899	-
25	13,079	10,899
50	17,002	13,079

29. *Travel Costs.* In case of traffic disruption, vehicles would either have to take alternatives routes, or wait until the road is in use again. When alternative routes are taken, some of them are secondary roads that are not prepared to handle heavy traffic. Traffic detours increase the distance from 43 km to 100 km at lower speed, due to heavier traffic and road type. It is estimated that 65 minutes are needed when road is working properly, to almost four hours when the detour is taken. Travel costs include fuel cost and time spent crossing the road under both scenarios: with and without Project.

30. For estimating fuel cost, an average efficiency was used for each type of vehicle as well as the current price per gallon (EC 15.30). For the cost of time, we used an average hourly wage (EC 8 per hour). The hourly wage was obtained from interviews of daily income in the Carib Territory. Table 3 shows the result for daily fuel and time costs. It was assumed than the road would be closed for 10 days during events with a recurrence period of two years, as it happened in the events of 2011. The same number of days was kept constant for higher recurrence periods, assuming that even though the damage will higher not necessary the number of days of road closure as more equipment will be used.

Table 3. Travel cost per day

	Fuel Costs 000 EC		Time Costs 000 EC	
	w/o Project	with Project	w/o Project	with Project
Cars	92.4	16.7	45.1	12.3
SUV	155.6	28.2	65.1	17.7
Pick up	209.3	37.9	81.7	22.2
Minibus	149.7	27.1	58.5	15.9
Bus	20.4	3.7	6.6	1.8
Trucks 2 Axis	37.0	6.7	11.9	3.2
Trucks 3 or more Axis	9.8	1.8	3.3	0.9
<i>Total</i>	674	122	272	74

31. The expected travel cost corresponded to annual cost times the probability of occurrence. The difference between the expected travel cost for both situations is the net savings to be obtained when traveling through this road.

32. The benefits from reduction of damage costs and reduction on travel costs were compared with the costs of required works on both scenarios. The difference corresponds to the

net benefit for this component. For the without Project scenario the investment and operation and maintenance costs were taken from studies carried out by the Ministry of Public Works which present a maintenance cost of EC\$9 thousand per km per year, and required investment of EC\$175 thousand per km per year, every ten years²⁰. Associated operation costs were included.

Results

33. *Results* show that the Project is economically viable with benefits of USD 9 million and economic returns of 18 percent. The subproject for Road rehabilitation shows returns of 16 percent and benefits 40 percent higher than associated costs. The water component shows benefits close to USD 5 million and return of 21 percent. Total benefits surpassed 20 percent the costs of the selected sample.

Table 4. Economic Results

<i>Economic Results</i>	<i>Present value of flows (Thousand USD)</i>				
	<i>COSTS</i>	<i>BENEFIT</i>	<i>NET BENEFIT</i>	<i>B/C</i>	<i>IRR</i>
1. Retrofitting and rehabilitation water infrastructure	6,092	10,960	4,868	1.8	21.6%
2. Climate resilient rehabilitation of roads	11,764	16,319	4,555	1.4	16.4%
<i>Total Sample</i>	<i>17,857</i>	<i>27,279</i>	<i>9,423</i>	<i>1.2</i>	<i>18.1%</i>

Sensitivity Analysis

34. The sensitivity analysis allows one to compare the base case scenario with additional scenarios to identify the extreme and most likely Project outcomes. The variables identified as the ones with the greatest effect on Project's outcome are: (i) cost overrun; (ii) Project delays; and (iii) reduction in economic benefits.

35. The sensitivity analysis was used to identify the value of the variables that cause the Project to exactly break even. Results show that both sub-components have ample room for changes in critical variables. When costs increase as much as 39 percent for roads and 77 percent for water or benefit reduce as much as 28 percent for roads or 44 percent for water, these components will still show positive returns.

Table 3. Results of the Sensitivity Analysis

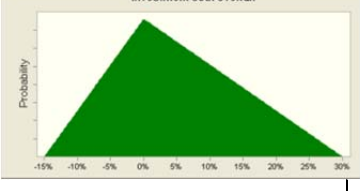
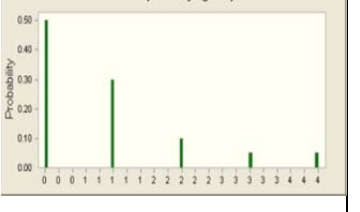
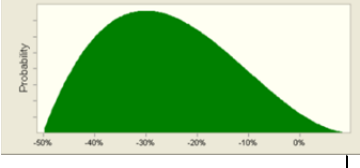
	BREAK-EVEN OF THE PROJECT'S ECONOMIC OUTCOME		
	Costs overrun	Delay (years)	Reduction on benefits
	%	#	%
Retrofitting and rehabilitation water infrastructure	77%	4	44%
Climate resilient rehabilitation of roads	39%	4	28%

²⁰ Ministry of Public Works. *Toward better Roads. Annex 4. Road Economic Model*

Risk Analysis

36. To enhance the accuracy of the economic analysis, a risk analysis was carried out using the Crystal Ball. This software works with Monte Carlo simulation sampling probability distribution for each of the variables selected and produced thousands of possible outcomes. The results allow one to obtain the probability of obtaining positive results with the Project. The assumed probability distributions and their respective specifications for each variable are presented in table 5.

Table 5. Probability Distribution selected for each variable

<p><i>Cost Overrun</i></p>		<p>Triangular distribution with parameters:</p> <p>Minimum -15%</p> <p>Likeliest 0%</p> <p>Maximum 30%</p>												
<p><i>Project Delay</i></p>		<p>Custom distribution with parameters:</p> <table border="1"> <thead> <tr> <th>Value</th> <th>Probability</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0.50</td> </tr> <tr> <td>1</td> <td>0.30</td> </tr> <tr> <td>2</td> <td>0.10</td> </tr> <tr> <td>3</td> <td>0.05</td> </tr> <tr> <td>4</td> <td>0.05</td> </tr> </tbody> </table>	Value	Probability	0	0.50	1	0.30	2	0.10	3	0.05	4	0.05
Value	Probability													
0	0.50													
1	0.30													
2	0.10													
3	0.05													
4	0.05													
<p><i>Reduction on benefits</i></p>		<p>Beta distribution with parameters:</p> <p>Minimum -50%</p> <p>Maximum 10%</p> <p>Alpha 2</p> <p>Beta 3</p>												

37. The results of the risk analysis confirm those from the sensitivity analysis. All components show very reassuring results and have probabilities higher than 88 percent of obtaining net benefits.

Table 5. Economic Risk Assessment

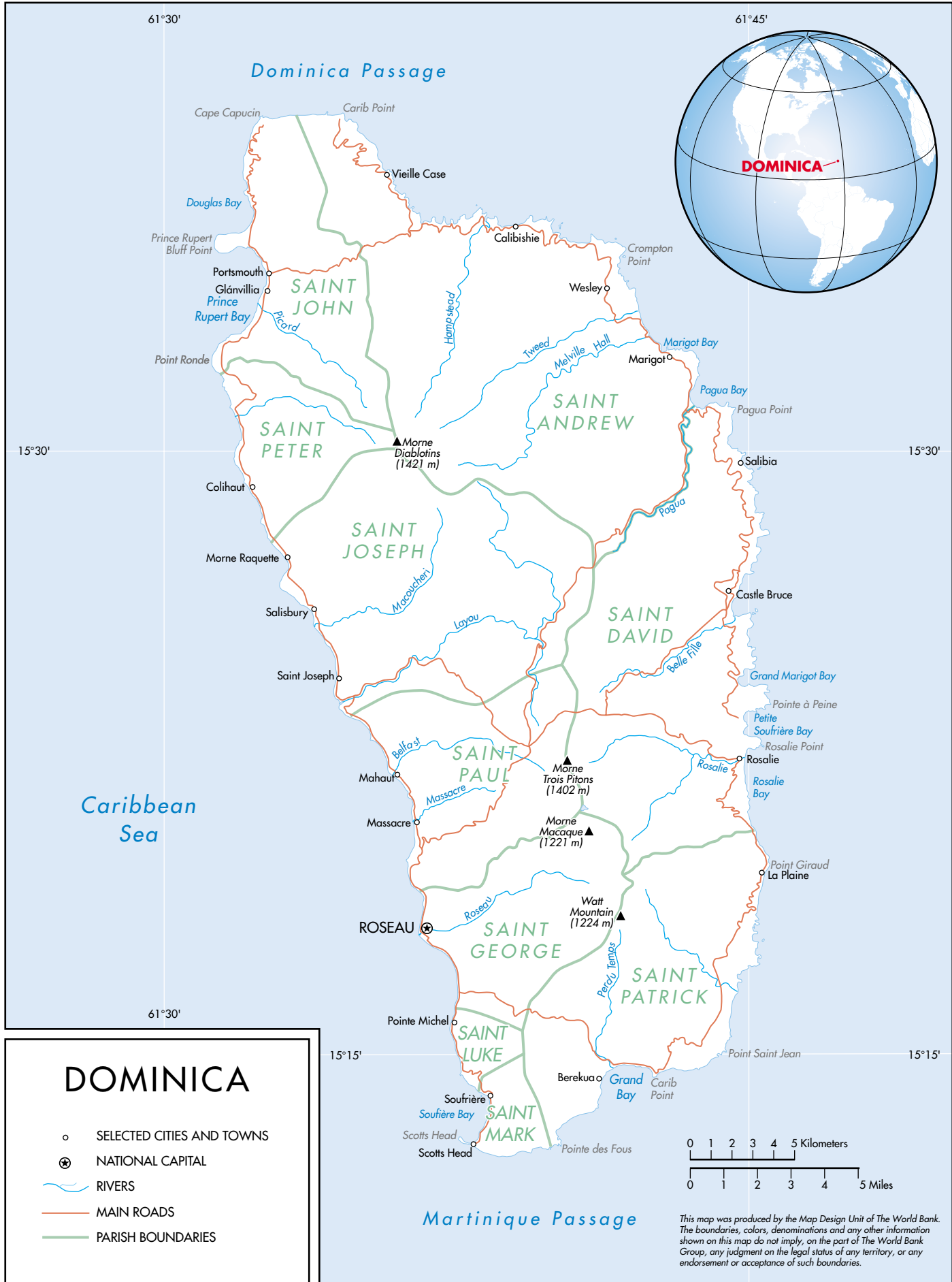
	<i>Economic Analysis</i>	
	<i>Probability of Positive NPV</i>	<i>Expected Mean NPV (000US\$)</i>
Retrofitting and rehabilitation water infrastructure	90%	2,182
Climate resilient rehabilitation of roads	100%	11,734

Component 2

38. The economic rationale for disaster management and mitigation is based on the premise that improved recuperative capacity of the economy will lower any adverse longer-term impacts on the country's economic growth trajectory. The costs of disasters can be broken down into two parts: firstly the opportunity cost of not being able to safeguard the population and their property, and secondly the opportunity cost of lost economic activity, especially if damages to physical infrastructure cause prolonged disruptions in economic activity.

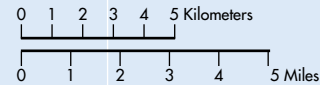
39. The steep topography and development in areas vulnerable to landslides as well as flooding due to excess rainfall pose a significant risk to Dominica. Losses from landslides and flooding occur on an annual basis. Measuring benefits to losses averted from such events cannot be accurately completed, but they are assumed to be significant. Given the nature of this component, it is difficult to quantify the potential project benefits and estimate the economic rate of return to project investments. First, the component has no revenue generating activities that can be used to quantify the benefits. Second, the component strengthens the capacity to analyze and assess hazard risk, which in itself is difficult to quantify. Thirdly, Dominica has significant data limitations on hazard and disaster losses, therefore estimating averted losses is challenging.

40. Investments within Component 2 of the project aim to strengthen Government capacity to monitor and understand hazard and climate risks and use that information as a basis for more informed decision-making in terms of disaster management and climate resiliency. The Project would limit the fiscal shock caused by an adverse natural event. The transport and water sector would be strengthened to avoid direct losses and the indirect economic losses due to lost access to markets and essential services. Institutional strengthening and investments in hazard risk assessment capacity would be made to avoid further indirect losses by encouraging citizens to improve preparedness and enhance Government response prior to and following major events.



DOMINICA

- SELECTED CITIES AND TOWNS
- ⊕ NATIONAL CAPITAL
- ~ RIVERS
- MAIN ROADS
- PARISH BOUNDARIES



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