

COMMONWEALTH OF DOMINICA

**DISASTER VULNERABILITY REDUCTION PROJECT
(DVRP)**

**ENVIRONMENTAL ASSESSMENT (EA)
&
ENVIRONMENTAL MANAGEMENT FRAMEWORK (EMF)**



March 2014

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ACRONYMS

DOWASCO	Dominica Water and Sewerage Company
DVRP	Disaster Vulnerability Reduction Project
EA	Environmental Assessment
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
GSPS	Growth and Social Protection Strategy
IDA	International Development Association
IMF	International Monetary Fund
IPM	Integrated Pest Management
MoE	Ministry of Environment, Natural Resources, Physical Planning and Fisheries
OP/BP	Operational Policy/Bank Policy
PCU	Project Coordinating Unit
PMH	Princess Margaret Hospital
TOR	Terms of Reference
WHO	World Health Organisation

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1.0 INTRODUCTION AND PROJECT DESCRIPTION

1.1 Introduction and Background

The Commonwealth of Dominica in partnership with the World Bank has embarked on a project to reduce the impacts of climate change disasters in Dominica and build resilience to adapt to such impacts. Dominica's Disaster Vulnerability Reduction Project (DVRP) provides an overview of the country circumstances, the development context and identifies climate change vulnerabilities in key sectors, for specifically vulnerable groups, for the private sector, important eco-systems and natural resources. It also provides an overview of linkages to existing development plans and programs, most importantly Dominica's Growth and Social Protection Strategy (GSPS) and Dominica's National Climate Change Adaptation Policy, as well as Dominica's Low Carbon Climate Resilient Development Strategy.

Dominica is exposed to a high level of risk to meteorological (high wind/excess rainfall/hurricanes and drought) and geophysical (seismic/volcanic/tsunami) hazards, which have significant negative impacts to its economic stability. These hazards often result in significant and recurrent damages to national infrastructure including housing, transportation networks, schools, hospitals as well as communications networks, water and electrical services. As is the case with most island states, a single hazard event can impact the entire population and economy of Dominica due to its' small population and limited geographical area.

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. More recently, in December 2013, heavy rainfall caused extensive landslides, rockfalls and flooding with restoration and rehabilitation works estimated at US\$18,022,000. With climate change threatening to heighten the impacts of hydro-meteorological hazards, the result in the decades to come may be an increase in the burden of weather-related disasters that can threaten the sustainability of Dominica's development processes.

1.2 Project Description

The objective of the DVRP is to measurably reduce vulnerability to natural hazards and climate change impacts in Dominica. This would be achieved through investment in climate resilient infrastructure, as well as improved hazard data collection and monitoring systems to better inform future investment decisions.

The DVRP under preparation consists of four components:

1. Prevention and Adaptation Investments
2. Capacity Building and Data Development
3. Hazard Risk Management and Evaluation
4. Natural Disaster Response Investments

1.2.1 Component 1: Prevention and Adaptation Investments

This component would be designed to reduce physical vulnerability and pilot adaptive measures to build resilience to current and future hydro-meteorological shocks. US\$28 million has been

designated to this component. Activities under would include a suite of civil works to improve infrastructure resilience to disaster events and climate change adaptation measures.

1.2.2 Component 2: Capacity Building and Data Development, Hazard Risk Management and Evaluation

This component includes support for capacity building for analysis and assessment of risks from natural hazards and climate change including the integration of this analysis in the development decision making process. Component 2 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. US\$7 million has been designated to this component.

1.2.3 Component 3: Natural Disaster Response Investments

This provisional component (US\$1 million) would finance emergency recovery and reconstruction activities under an agreed action plan of activities in order to support rapid response in the event of an emergency.

1.2.4 Component 4: Project Management and Implementation Support

Activities under this component (US\$2 million) would support strengthening and developing the institutional capacity for Project management primarily within the Ministries of Environment and Finance.

1.3 Description of Sub-projects under the Components

1.3.1 Component 1: Prevention and Adaptation Investments

Activities under this component would include a suite of civil works to improve infrastructure resilience to disaster events and climate change adaptation measures. Sub-projects to be financed under this component, through the provision of works, technical advisory services, operating costs, and acquisition of goods, include:

- Construction of water storage and distribution infrastructure
- Slope stabilization interventions
- Climate resilient rehabilitation of primary and secondary roads and bridges along the East Coast and in the South
- Improved climate resilient drainage systems, including maintenance of storm water drainage systems

1.3.2 Component 2: Capacity Building and Data Development, Hazard Risk Management and Evaluation

Core data systems to be developed under this component include:

- Creation of a high resolution digital topographic and bathymetric model for Dominica
- Creation of a high resolution soils survey map including chemical and physical characteristics for each soil unit
- Design and deployment of a robust hydromet network to provide high resolution hydrologic data for use in a wide range of activities to support, for example, engineering design,

national land use and coastal zone planning, disaster management, roads construction practices and design, agricultural development and others

- Community level risk mapping and training on climate adaptation measures

1.3.3 Component 3: Natural Disaster Response Investments

This provisional component under this Project would allow for rapid reallocation of International Development Association (IDA) funds during an emergency, under streamlined procurement and disbursement procedures. The emergency mechanism component would be triggered, following an adverse natural event, by an official Government of the Commonwealth of Dominica declaration of a national emergency. Under this component, expenditures on critical imports (imported or locally manufactured) required by the public/private sectors, and reconstruction/rehabilitation (civil works, goods, and services) of damaged infrastructure may be financed as per (OP/BP 10.00).

1.3.4 Component 4: Project Management and Implementation Support

Activities under this component would support strengthening and developing the institutional capacity for Project management, including:

- a) Financing the establishment of a new Project Coordination Unit (PCU) within the Ministry of Environment, including staffing, training, and operating costs;
- b) Preparation for 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) Training of staff in project management and implementation support;
- h) Monitoring and evaluation of project progress and results; and
- i) Related activities to support efficient project management and implementation, through the provision of technical advisory services, training, operating costs, and acquisition of goods.

2.0 LEGAL AND REGULATORY FRAMEWORK

2.1 General Context

In Dominica, responsibility for environment and resource management falls under the mandate of various Government Agencies and Statutory Organisations, governed by about 105 pieces of legislation. Reviews of this legislation have all concluded that comprehensive environmental and natural resource management legislation is an urgent priority in order to prevent irreversible environmental damage to the natural resources upon which Dominica relies for sustained economic and social development. This is now in draft form.

However, in the absence of comprehensive legislation, environmental management continues through the legislation that presently exists. Additionally, Dominica is party to several international conventions/protocols and there are several environmental policies and plans (refer to Table 1) which have been developed and/or approved by the Cabinet of Ministers that serve to guide environmental management in Dominica through the development of strategies and plans that aim at mainstreaming climate change into national development. Table 2 shows the Ministries/ Agencies involved in various aspects of environmental management and execution of development works.

The main pieces of legislation of relevance to the DVRP are highlighted in section 2.3 below.

Table 1 - Key National Documents related to Climate Change and the Environment

YEAR	POLICY DOCUMENT
2012	Growth and Social Protection Strategy
2010	Montreal Protocol (Substances that Deplete the Ozone Layer) Regulations, 2010
2010	National Strategy for Health
2010	Sector Strategy, Natural Resources and Energy Sector Plan
2010	Tourism 2010 Policy
2010	Draft Environmental & Planning Regulations for Renewable Energy
2010	Draft Geothermal Development Bill
2010	National Energy Policy (Draft)
2010	National Integration Water Resources Management Policy (Draft)
2009	Dominica Forestry Policy
2009	Disaster Management Plan
2009	National Emergency Management Policy
2009	National Shelter Policy
2007	National Policy for the Agriculture - Environment (Agri - Eco) System, 2007 - 2025, Submitted for Cabinet's approval
2006	Growth and Social Protection Strategy
2006	St. George's Declaration
2005	National Biosafety Framework
2005	Draft National Implementation Plan on Persistent Organic Pollutants
2004	National Environment Policy/National Environment Management Strategy
2002	Dominica's Policy on Planning for Adaptation to Climate Change
2002	National Biodiversity Strategy and Action Plan
2002	Physical Planning Act
1998	Plan to reduce the vulnerability of school buildings to Natural Disasters

Table 2 - Agencies with responsibility for Project Approval and/or Implementation* and Environmental Management

DEPARTMENT/MINISTRY/ORGANISATION	MANDATE/RESPONSIBILITY
Physical Planning Department - Ministry of Environment, Natural Resources, Physical Planning & Fisheries	Coordinates development planning and land use, approval of projects, EIAs reviews and requests
Environmental Coordinating Unit - Ministry of Environment, Natural Resources, Physical Planning & Fisheries	Focal Point - Implementation/ Coordination and development of environmental policy
Fisheries Division - Ministry of Environment, Natural Resources, Physical Planning & Fisheries	Sustainable management and development of the fisheries resource by creating an enabling environment for enhanced food security and poverty reduction
Forestry, Parks and Wildlife Division - Ministry of Agriculture and Forestry	Mandate for protection of the forest resources
Division of Agriculture - Ministry of Agriculture and Forestry	Agriculture and climate change, food security and poverty reduction
Dominica Meteorological Services - Ministry of Public Works, Energy and Ports	Collects climatological data for analysis, educational support to schools and community groups
Office of Disaster Management - Ministry of National Security, Immigration and Labour	Coordinates the overall Disaster Management programme based upon the principles of prevention, mitigation, preparedness, response and recovery
Dominica Solid Waste Management Cooperation (Statutory Body)	Responsible for solid waste management
Environmental Health Department - Ministry of Health	Protect the health of the public through monitoring of the environment and instituting intervention measures to prevent negative impacts on health
*Dominica Water and Sewage Corporation - Ministry of Lands, Housing, Settlements and Water Resource Management	Providing quality water and sewerage services through the use of appropriate technology, sound management and environmentally sustainable practices
*Public Works Corporation (Statutory Body) - Ministry of Public Works, Energy and Ports	Implement programmes to improve the infrastructure in roads, utilities, ports and energy
DOWASCO (Statutory Body) - Ministry of Public Works, Energy and Ports	Monitoring and coordinating activities in the water sector

2.2 World Bank Safeguards and Policies

During the preparation of the project, the World Bank identified five Bank Safeguards to be applied during project execution. Safeguards are applied to assure that project funds are engaged in a manner consistent with Bank institutional policies with respect to social and environmental protection and management. The application of relevant Bank safeguards is required during the preparation and execution of Bank sponsored activities. The Bank Safeguards that have been applied to this project are described below.

2.2.1 OP/BP 4.01 - Environmental Assessment

This project has been classified as Category B and, as such, an environmental assessment (EA) is required. Projects are classified Category B if:

“Its potential adverse environmental impacts on human populations or environmentally important areas -including wetlands, forests, grasslands, and other natural habitats--are less adverse than those of Category A projects. These impacts

are site-specific; few if any of them are irreversible; and in most cases mitigation measures can be designed more readily than for Category A projects. The scope of EA for a Category B project may vary from project to project, but it is narrower than that of Category A EA. Like Category A EA, it examines the project's potential negative and positive environmental impacts and recommends any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance.”

The EA (Environmental Assessment) for the Dominica DVRP consists of a preliminary assessment of the potential impacts of the various components, activities and elements of the DVRP, and is included within this EA/EMF document.

It should be noted that Social Safeguards policies were also triggered for this project: OP/BP4.12 (Involuntary Resettlement) and OP4.10 (Indigenous Peoples). Those aspects are addressed in separate documents prepared specifically for that purpose.

2.2.2 OP/BP 4.04 - Natural Habitats

This safeguard seeks to support the protection and rehabilitation of natural habitats associated with sponsored projects. This safeguard applies when activities are identified that may significantly affect the quality of natural habitats, which are defined as land or water areas where the biological communities are formed largely by native plant and animal species where human activity has not essentially or heavily modified the area's primary ecological functions. Particular attention is applied to critical habitats where impacts may result in ecological modifications that affect core survival requirements for resident species particularly where Endangered Species are involved. It is the Banks' Policy that any effects to critical natural habitat would be excluded from the Project.

This safeguard is triggered based on the possibility that some construction or agricultural research activities may relate to issues affecting natural habitats. In addition, Dominica is fortunate to have forest covering across about 60 percent of the island, for which reason any major civil works that involve clearing lands (for example laying of pipeline or construction of new roads) may also affect natural habitats, as well as works along sensitive coastline or riverside areas.

2.2.3 OP/BP 4.09 - Pest Management

Activities involving the use of pesticides or pest control measures are subject to the application of this safeguard. As a matter of policy, the safeguard promotes the use of appropriate biological or environmental pest control measures such as Integrated Pest Management and seeks to minimize the potential health risks associated with pest management activities. Additionally, the safeguard prohibits the use of internationally banned pesticides and promotes the safe application and applicator training when pesticides are employed. This safeguard is triggered owing to the possibility that agricultural activities may involve the use of pesticides, as well as possible pesticide use for emergency vector control and building treatments.

2.2.4 OP/BP 4.11 - Physical Cultural Resources

This safeguard is designed to avoid/ mitigate adverse impacts on cultural resources from development projects that the World Bank finances. Cultural resources are defined as objects, sites, structures, natural features or landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. They are important as sources of valuable historical and scientific information, as assets for economic and social development, and as

integral parts of a people's cultural identity and practices. The loss of such resources is irreversible, but fortunately, it is often avoidable.

Under this project, no known cultural sites would be impacted; however, this safeguard provides a mechanism for ensuring that in the event of 'chance findings', such resources are protected. For the Dominica DVRP, it also provides that community input be included in the design or removal of any historic buildings or sites of religious or cultural importance. This safeguard was triggered as a precaution since excavation or earthmoving may uncover such resources, and since historical buildings of importance to local communities may be rehabilitated.

2.2.5 OP/BP 4.36 - Forests

The forest safeguard is designed to guide Bank sponsored projects when activities may potentially affect forest resources. The safeguard seeks to enhance the use of forest management practices that promote resource conservation, renewable resource uses and inclusion of considerations for ecological services offered by forest resources. Any effect on primary forest, that is forests which are in good state of conservation and have not been logged/ harvested previously, would be excluded from the Project.

As agricultural research projects may be proposed relating to forestry and forest management, proposals will be reviewed for compliance with this safeguard.

2.3 Review of Relevant Legislation

In regards to the types of projects proposed under the DVRP and the associated environmental safeguards, the relevant legislations are as follows.

Physical Planning Act (2002) provides inter alia for the orderly and progressive development of land and for the grant of permissions to develop land and for other powers of control over the use of land. This Act details the application and approval process which is executed through the Physical Planning Division of the Physical Planning and Development Authority. The Act states that 'No person shall carry out any development of land except under and in accordance with the terms of a development permission granted in that behalf prior to the commencement of such development.'

It makes provision for the Authority to consult with local authorities where such consultation is desirable in the interests of good planning. Further, 'Unless the Authority otherwise determines, environmental impact assessment shall be required in respect of any application for development permission to which the Second Schedule (Refer to Appendix 2) applies.'

Forestry Act (1959), Forest and Wildlife Act (1976), National Parks and Protected Areas Act - provides for the protection of Dominica's biodiversity, National Parks and protected areas system. The act authorizes the Minister to designate Government lands as protected areas for the preservation of natural features and for the conservation of historic sites and landmarks.

Water and Sewerage Act (1989) - the water management authority is vested in DOWASO which includes among its functions water conservation and the preservation and protection of catchment areas. Responsibility for catchment areas is shared with the Forestry and Wildlife Division.

Water and Sewerage (Catchment Area) Regulations (1995) - These rules were made under section 5 of the Act. The rules prohibit certain acts in water catchment areas including washing equipment used for applying pesticides and containers which contain or have contained pesticides in any river

or stream in the area. Of note is the requirement that there must be no direct discharge of household or industrial waste, sewerage or sludge into any stream or river.

Fisheries Act (1987), Marine Pollution Management Bill (1999) - Relating to Coastal Areas Management - the Fisheries Act specifically prohibit a person from disposing of or dumping litter, soil, debris or pollutant in the marine environment or causing a pollutant to enter the marine reserve. It specifically protects the Marine Environment from Land Base Pollution.

2.4 National Environmental Management

The Physical Planning Department has the primary responsibility to issue environmental permits for development or construction. Activities or projects that require an EIA (Environmental Impact Assessment) are listed in Annex 2. In practice an EIA is created only in private sector developments, and the relevant Line Ministries are consulted to provide input into the evaluation of the EIA.

While Dominica does not currently have comprehensive environmental management legislation in place, some level of environmental management occurs nonetheless. Although it would be preferable that this is covered by existing legislation, adherence to environmental guidelines during project implementation would ensure that environmental management is factored into all activities and by all individuals. In fact, this stipulation should be built into all contractual arrangements.

Overall, environmental management in Dominica is hampered by inadequate institutional capacity, overlap/lack of clarity of responsibilities for relevant initiatives, insufficient technical and financial resources and inadequate/outdated /legislation for enforcement.

To ensure that environmental guidelines are adhered to, the proposed projects should be examined by the agency responsible for approval of development projects in Dominica, the Planning Department, as well as the Project Steering Committee of the PCU, prior to implementation to identify proposed environmental issues and put in place mitigation measures. Other responsible agencies should also be consulted as necessary.

Figure 1 shows the proposed organisational structure of the DVRP. Within this structure, the Ministry of Environment would be the technical lead for coordination amongst agencies in the project through the PCU. The PCU would be responsible for overseeing the day-to-day execution of activities and project development, including environmental management through the Project Coordinator and Environmental Specialist (Safeguards Expert). The various line Ministries/Agencies would also assist with project environmental management as needed.

Figure 1 - Organisational Structure of the PCU for the DVRP



3.0 DESCRIPTION OF EXISTING ENVIRONMENT

3.1 Dominica General Context

Dominica is located at 15 degrees North and 61 degrees west, occupying a central position in the eastern Caribbean archipelago. The country is bordered by the French territories of Guadeloupe and Martinique to the north and south respectively. The island is approximately 750.6 square kilometers and is the largest in the Windward and Leeward groups of the Eastern Caribbean.

The islands volcanic natural history remains evident in continuing seismic activity and in scenic attractions such as the Valley of Desolation and the Boiling Lake, which together with dense forests populated with an abundance of natural lakes and waterfalls, provide the basis for a growing eco-tourism industry. Dominica has a forest area of 45 000 hectares, more than half of the island's 75 000 hectare over all land area.

Dominica has rich volcanic soil and is well served by over 365 streams and rivers. The high mountains and deep ravines are covered in rich tropical forests. Since 1975, an extensive system of national protected areas constitutes a significant carbon sink and provides protection for approximately 20% of the national territory. Protected areas include one marine park, two large forest reserves (Central and Northern), and the Morne Trois Pitons National Park, a UNESCO World Heritage Site.

Figures 2 and 3: Location Map and Geographical Features of Dominica



3.2 Geology

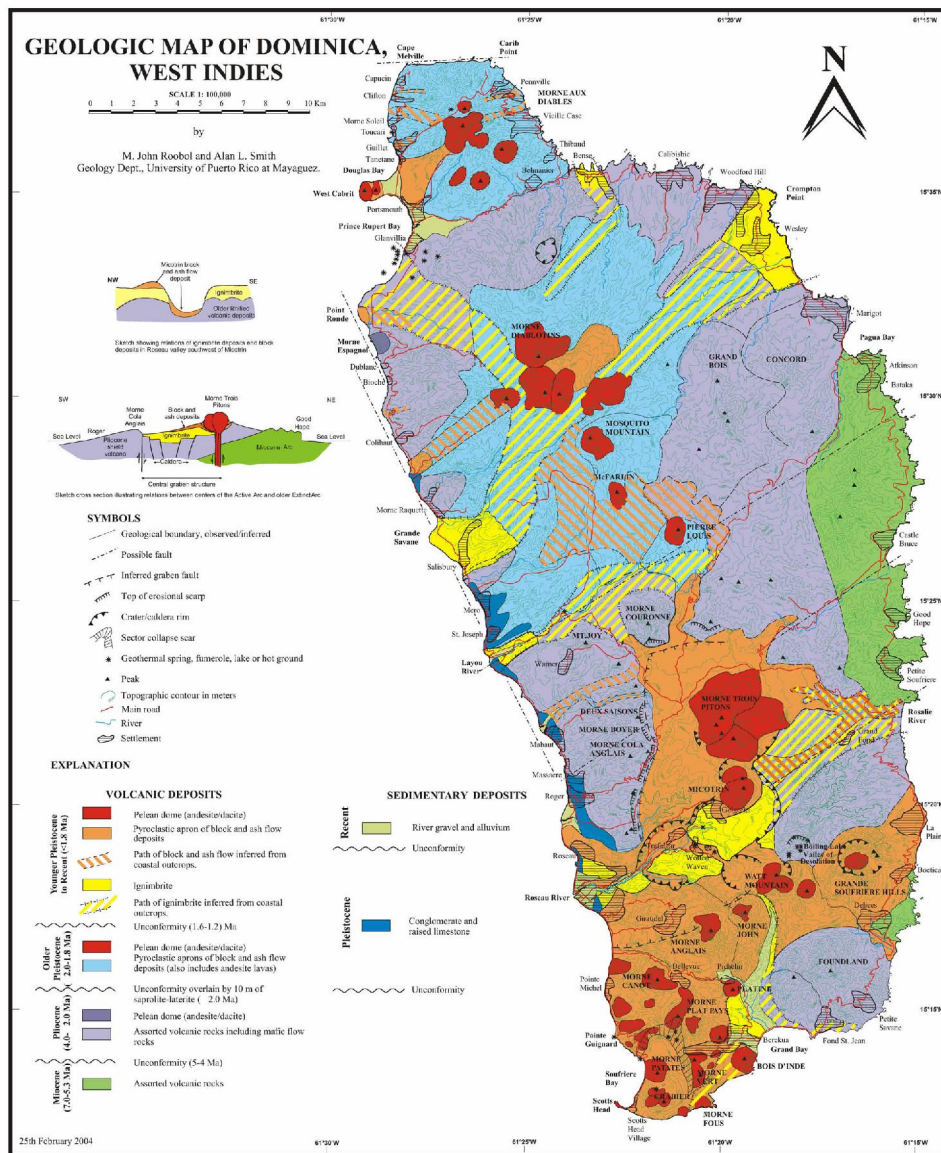
Dominica is part of the wider Antillean Arc of islands that are geologically quite young. While the active tectonic processes may not appear evident every day, the region is still active as evidenced by earthquakes such as the swarm which occurred from 1998 to 2000. There are fault zones cross the island, and to the east lies a deep ocean trench where active plate tectonics drive the geologic processes that have shaped the island.

There are nine active volcanoes on Dominica, giving the island its characteristic rugged topography. The rocks of Dominica are almost entirely of volcanic origin, other than recent alluvium along river valleys and reworked beach deposits along some coastlines. The youngest volcanic centres are of

late Pleistocene age (less than 1 million years old) and have formed the south part of the island (Morne Trois Pitons, Wotten Waven/ Micotrin, Morne Watt, Grand Soufrière Hills, Morne Anglais and the Plat Pays volcanic complex). The most recent eruption was from the Plat Pays area about 450 years ago; and, all six volcanic centers are considered active today. Older Pleistocene volcanoes (up to 2 million years) formed the north part of Dominica, including Morne Diablotins and Morne aux Diables.

A third set of volcanic rocks (Pliocene age, 3 to 4 million years old) underlies most of the island, while the oldest rocks are between 5 and 7 million years old (Miocene age) and outcrop in a crescent-shaped zone across a swath of the East Coast. These oldest rocks consist of reworked and weathered debris derived from the oldest volcanic materials, and pose unique characteristics and challenges for the stability of slopes and hillsides because of their high clay content and easily erodible nature.

Figure 4 - Geologic Map of Dominica



Present Affiliations: M.J.R. Saudi Geological Survey, P.O. Box 54141, Jeddah 21514, Saudi Arabia; A.L.S. Dept. of Geological Sciences, California State University, 5500 University Parkway, San Bernardino, California 92407, USA. Fieldwork supported by NSF grants EAR 7717054, EAR 9527273, OCE90-0119994 and NASS/NMCC 94-0088. Note: To print this map at the correct scale of 1:100,000, the 10 kilometer bar scale has to be 10 cm long.

3.3 Topography

Dominica is volcanic in origin and is characterized by very rugged and steep terrain with approximately ninety miles of coastline. The northern half of the island is dominated by the country's highest summit, Morne Diablotin, which is the highest and largest volcano in Dominica, and the second highest mountain in the Eastern Caribbean, measuring 22 km x 18 km at its base and towering to a height of 1447 meters. A chain of mountains extends from the island's center to the south and the topography is characterized by a number of ridges and steep river valleys with gently sloping lands being restricted to narrow coastal strips, particularly in the center and northeast of the island as illustrated in Figure 5.

Figure 5 - Topography of Dominica



3.4 Climate

Dominica's climate is characterized as tropical maritime with dominant influences being the Atlantic Ocean, the Caribbean Sea, and the northeasterly trade winds. As a result of its mountainous terrain the island possesses a number of micro-climates. Rainfall is distributed between a dry season from December to May and a rainy season from June to November. The western Caribbean coast is in the rain shadow of the various mountain ranges and average rainfall along that coast is significantly less than in interior locations. Limitations in measuring equipment have restricted the ability to maintain meteorological records of interior areas. High rainfall makes the island susceptible to landslides particularly in mountainous areas. Dominica's rugged topography results in considerable amount of orographic rainfall.

The island's climate is characterized by consistently warm year-round temperatures with a daytime average of 26 - 27 degrees Celsius in coastal areas decreasing to 19 - 21 Celsius degrees in mountainous areas, while night-time temperatures vary from 18 - 22 Celsius on the coast and 10 - 12 Celsius at higher elevations.

Rainfall patterns display considerable variability both on annual and locational basis. Nevertheless, Dominica's mountainous terrain makes it the wettest island in the eastern Caribbean with annual rainfall totals exceeding 10,000mm (400 inches) in some of the higher elevations. The island experiences a dry season between the months of February to June, with November being statistically the wettest month. Relative humidity remains high throughout the year consistently averaging above 85% in mountainous interior areas. Generally rainfall is less on the island's western Leeward coast which, based on the prevailing winds, is within a rain-shadow of the mountainous interior.

Figure 6 - Annual Rainfall (in inches)

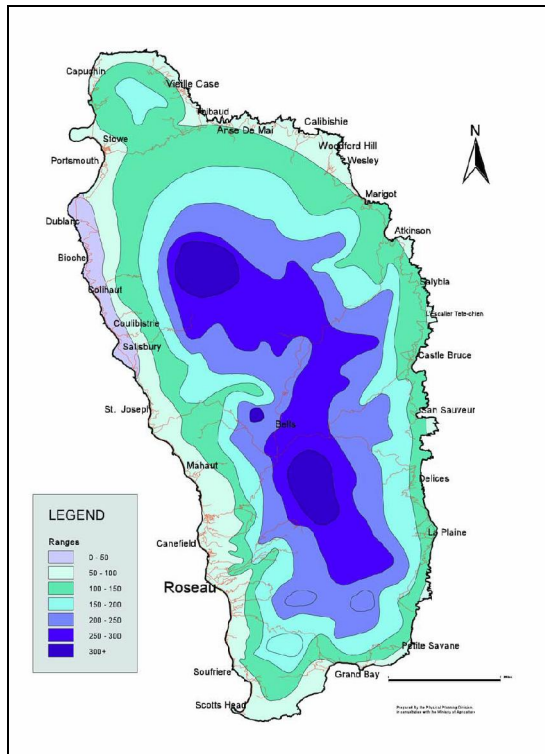
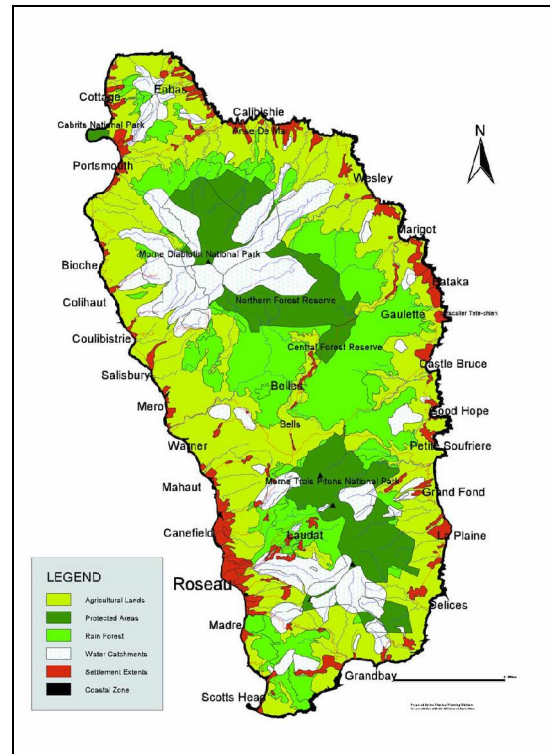


Figure 7 - Land Use



3.5 Human Settlements

Dominica was originally populated by Amerindian peoples, known as Kalinago or Caribs, and is the only island in the Caribbean still to possess distinct communities of these indigenous people of the Caribbean. Population estimates for 2001 indicate that Dominica had a population of approximately 71,000 persons (a decline from 74,750 in 1994), including two thousand Kalinagos, the remaining survivors of the first inhabitants of the island. 27.0% of the Dominican households live below the poverty line (based on the latest available figures), Topographic conditions have forced human settlements onto narrow coastal areas particularly in the south and west with approximately 44,000 persons (62%) living along the coast. The largest community is Roseau (the capital city) and its environs with 14,847 persons representing almost 21% of the total population.

The rich culture and history of Dominica has created physical cultural resources, which are features or objects of interest and value to nation's people because of their archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. These may include Amerindian sites, relicts of forts or plantations, shipwrecks, or historic buildings which may have great local or international value, thus meriting attention and preservation.

3.6 Infrastructure

Problems associated with inadequate solid and liquid waste management present threats to coastal resource health, while increasing urbanization is resulting in traffic congestion and associated public transportation concerns. Energy issues are also of concern to human settlement



Major landslide on Imperial Highway

planners since relatively long distances, rugged terrain and high costs of fuel make local transportation costs high. Vulnerability to disaster risks, both natural and man-made, are also increasing with urbanization. Underlying many of these problems are significant challenges deriving from the lack of available financing for human settlements.

Vulnerability of human settlements in Dominica to existing weather and climate change can be viewed in terms of risks from coastal processes, inland flooding, and landslides. A consistent feature of human settlements in Dominica is the vulnerability of roads and buildings to storm surge, flooding and landslides. Inadequate planning controls are apparent in the continuing construction of buildings, critical infrastructure and other facilities in active wave inundation, flood- and landslide-prone areas.

3.7 Socioeconomic

The Dominica economy reflects many of the traditional features of a small open economy. This includes a high level of dependence on external trade as a proportion of gross domestic product (GDP), dependence on single sector export products (in this case agriculture) and tourism revenue, high levels of underemployment and unemployment, and dependence on foreign capital (both public and private sector) for investment into productive sectors and for infrastructural development.

The island has always been in a vulnerable position economically, socially, culturally, and environmentally. Economic developments, in particular, are significantly affected by both natural and man-made external factors as is increasingly evidenced by the negative impact on the local economy of changes associated with such international phenomenon as globalization and trade liberalization. The dependence of the economy on the constricting banana industry exposes its high economic vulnerability. Attempts to diversify are slow, however, recent trends indicate that the island is moving towards tourism/ecotourism, as it markets its unique environment and culture. In doing so Dominica has become more acutely aware of the need to protect the environment and of the growing threat to its vulnerable natural resources presented by climate change.

Dominica, by its very nature is vulnerable, given its susceptibility to natural disasters and its ecological and economic fragility. Vulnerability to climate change in Dominica, like many developing countries, is aggravated by external pressures affecting its resilience and adaptive capacity such as terms of trade, impacts of globalisation (both positive and negative), financial crises, international conflicts, rising external debt, and internal local conditions such as rapid population growth, rising incidence of poverty, political instability, unemployment, reduced social cohesion, and a widening gap between poor and rich, together with the interactions between them. It is widely acknowledged that climate change can exacerbate natural disasters with enormous human and economic costs.

3.8 Geohazards

Dominica is vulnerable to a number of natural hazards such as hurricanes, earthquakes, volcanic activity, drought, tsunamis, flooding, and landslides. The effects of these phenomena can be exacerbated by the activities of population such as deforestation, indiscriminate garbage disposal, poor building practices, and unplanned settlements in environmentally sensitive areas.

The island lies within the Atlantic hurricane belt. Since the late 1970s the island has been affected by a number of hurricanes and tropical storms. In 1979 Hurricane David caused extensive destruction particularly in the southern parts of the island. In 1995, Hurricane Luis also caused wide-spread damage and in August 2007 Hurricane Dean struck the island causing widespread damage to

agricultural outputs as well as to road infrastructure estimated at almost 20 percent of GDP (source IMF).

Coastal zones are also vulnerable to storm surge during hurricanes, causing flooding and erosion from wave energy. Depending on the precise configuration of the local sea floor relative to an approaching wave or storm surge, the level of the sea could rise 3 to 5 meters (Caribbean Disaster Mitigation Project, 2000). The eastern side of Dominica is exposed to long-fetch waves across thousands of miles of open Atlantic Ocean, and consequently may be particularly vulnerable to the effects of wave erosion, but all coastal zones of Dominica are subject to coastal flooding and increased damage from wave energy during storms.

Tsunamis pose a hazard in the Eastern Caribbean and can be caused by earthquakes, by avalanches off the side of La Soufriere or other volcanoes (Le Friant and others, 2009), and by eruptions of volcanoes particularly those lying on the seafloor such as Kick-em Jenny near Grenada, which could result in a 2-meter tsunami arriving in Dominica within minutes of eruption (Gibbs, 2001).

The University of West Indies (UWI, 2011) has produced updated maps showing seismic hazard (earth shaking) that can be used for planning purposes in the Eastern Caribbean. These seismic hazards result from tectonic activity (the subduction of the Atlantic Plate beneath the Caribbean Plate). In St. Vincent the peak ground acceleration (expressed as a percentage (%) of g, the acceleration of gravity), is up to 15%g every 100 years, 25%g every 500 years, and 40%g every 1,000 years. The shaking is that typically expected from faults which cut across the island, and not from the explosive forces of erupting volcanoes.

The volcanoes of Dominica are active and pose a continuous hazard of eruption. By comparing the time of most recent eruption, the style of volcanic activity, and the potentially affected population, a composite volcanic hazard map of Dominica shows that the most vulnerable regions are to the south and southwest, with highly vulnerable areas near Roseau and Portsmouth. UWI's volcanic hazard atlas (2005) considers such an eruption likely within the next 100 years. In addition to eruptions which spew molten lava or ash, Dominica has an abundance of water-related eruptive features, in which water may contact hot buried lava and explode. The Valley of Desolation is one such example, and while these types of phreatic eruptions are more frequent, they affect smaller areas.

3.9 Biological Resources

Dominica is host to an astonishing biodiversity, including more than 1,200 species of plants, and the most diverse assemblage of wildlife in the eastern Caribbean, including 175 species of avifauna. The Biodiversity Strategy and Action Plan (2006) provide an excellent reference document and bibliography of these resources, as well as outlining national direction for the way forward. About 60% of the island is forested, with a variety of vegetation types represented because of the island's large elevation change, rainshadow effects and rugged topography.

About one-third (about 20%) of Dominica is contained within protected areas such as designated Forest Reserves and National Parks, which are also recognized as Important Bird Areas (IBAs). Ocean and coastal resources include two protected marine areas on the north and south ends of the island.

Figure 8 - Volcanic hazard map

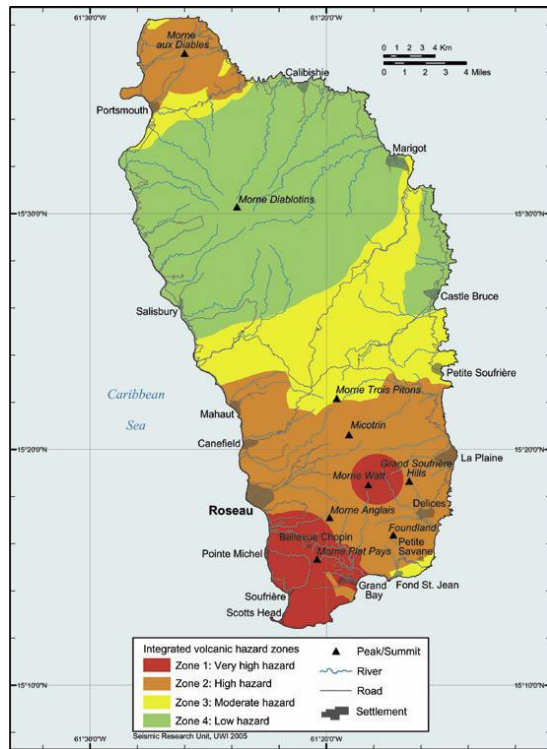


Figure 9 - Vegetation types in Dominica

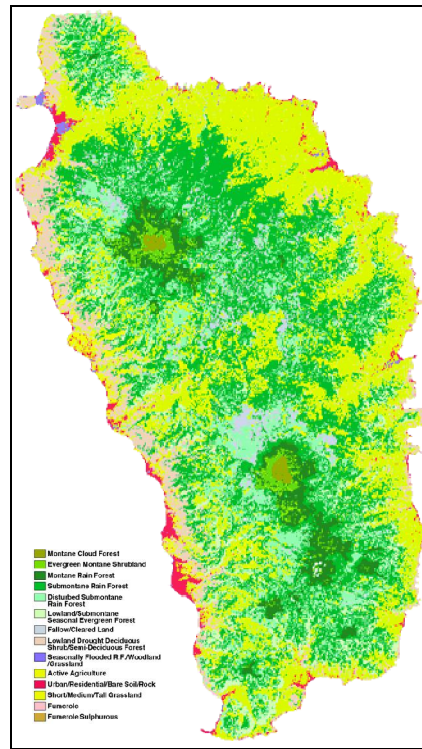


Figure 10 - Protected areas in Dominica

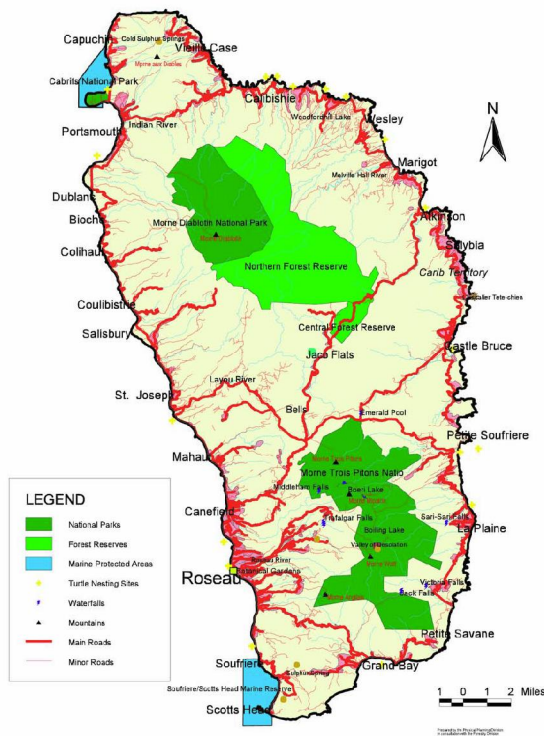
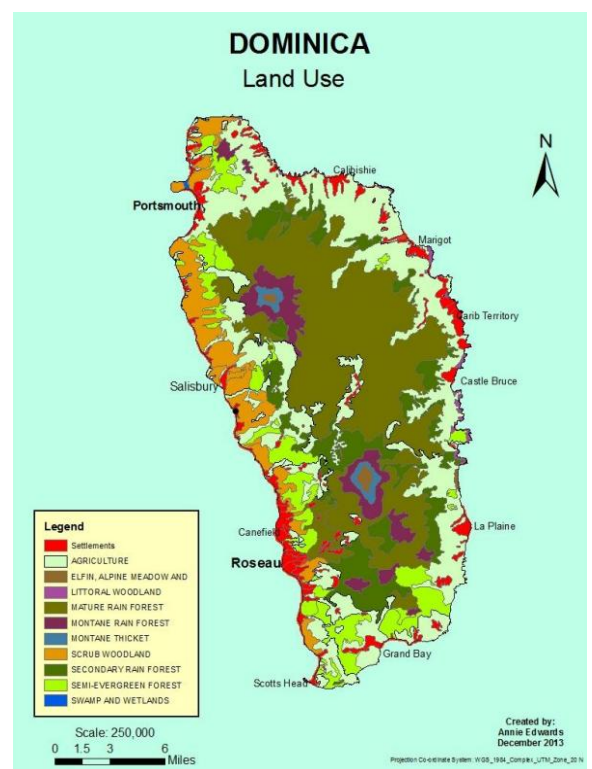


Figure 11 - Land Use Map of Dominica



4.0 PROJECTED IMPACTS

4.1 Analysis of the Project

The impacts highlighted in this section relate to the civil works proposed on the respective sites under consideration. The proposed civil works activities with any potential impacts are generally small to mid-sized, except for activities to be undertaken during the Dubique slope stabilization. None of the projects are being implemented in known historic or cultural sites. However, forested areas occur across the island, and sensitive marine and coastal environments are always downstream of any activity on land. Accordingly, care must be taken during construction and implementation activities, and pertinent environmental management measures must be implemented.

The social, cultural, historical, and socio economic impacts of these projects are being detailed in a separate social impact assessment document being prepared for this DVRP.

There are both positive and negative impacts associated with the project and its components. It must be noted that the projected impacts and their significance is based on currently available information. As the project components become more defined, site visits could be made and the expected impacts would become more succinct and site specific. However, if proper environmental management plans are not in place or conversely not adhered to, then the anticipated negative impacts would become more significant. Hence, the importance of proper environmental planning, project design and implementation, in particular monitoring during implementation.

The capacity building or institutional strengthening activities (Components 2 and 4) could be considered environmentally benign with no adverse impacts. However, the civil works in Component 1 (Prevention and Adaptation Investments) could have negative impacts, especially if not diligently managed. Emergency measures (Component 3) would likely involve only the purchase of goods or materials; however, it is possible that some civil works could be necessary on an urgent basis.

4.1.1 Road Works

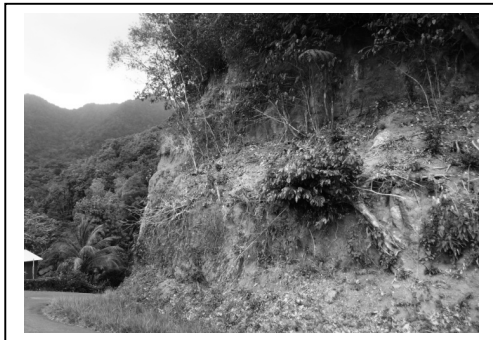
The **East Coast Road Vulnerability Reduction Project** under Component 1 is expected to have some of the greatest anticipated environmental impacts. The areas proposed under this sub project include the Carib Territory (Link 4) and are as follows:

- Link 1: Pond Casse - Bois Diable (4.5 km)
- Link 2: Boise Diable - Castle Bruce (9.5 km)
- Link 3: Castle Bruce - Petit Soufriere (8.8 km)
- Link 4: Castle Bruce - Hatton Garden (20.5 km)

A site visit was conducted and the condition of the road was assessed through visual observation showing the poor drainage conditions as one of the main area of concern. While the number of culverts seems functioning with an adequate spacing, lateral ditches are obstructed at places with vegetation. It was reported that the road, which was built more than 45 years ago, has never been under any program of periodic maintenance. The top layer of pavement does not present any camber for lateral drainage thus causing occasional potholes. However, based on visual observation the road structure appears to remain in good condition. It appears therefore that any concern related to the need for improved drainage conditions could only be addressed through the implementation of a periodical maintenance program. Link 4 crosses through the Carib Territory.

The proposed project encompasses a wide range of interventions of infrastructure works such as slope stabilization, retaining walls, road realignment, pavement rehabilitation and improved drainage structures - storms drains and water storage facilities and will include associated drainage works to improve the protection of critical infrastructures structures from flood impacts. Bridge replacement and rehabilitation are also possible components of the civil works, as well as river defense structure such as retaining walls, gabions, and the like.

More related to the objective of vulnerability reduction to natural hazards, it was observed that multiple sites show the need for preventive actions of slope stabilization on the high side of the road. Slopes that are more like actual cliffs are subject to collapse under any slight pressure from water or lateral effort. Rockfalls and fallen trees are then causing road obstruction then requiring costly emergency measures.



Other lateral escarpment in potentially unstable shape



Example of lateral slope stabilization as applied on the rehabilitated road through the Central Forest Reserve

There is also a major road project considered in the south part of the island. The **Dubique Slope Stabilization** presents very complex geotechnical conditions because of the height of the slope to be stabilized, the loose soils and rocks comprising the hillside, and the narrow space in which to work. Access will be challenging through nearby communities, who rely on water from the Geneva River which must therefore be protected from siltation or sedimentation effects. Space is limited in which to work, with the only flat lands near the mouth of the Geneva River. This project presents complex, sensitive, and challenging conditions, and could have a significant environmental impact if poorly managed, therefore an Environmental Impact Assessment (EIA) is recommended.

Dubique is a small coastal village situated on the southeast coast of Dominica. The village is approximately 17km (11 miles) from Roseau and about 1.6km (1 mile) from Grandbay. The road along the frontage is generally about 5m wide, with a verge/drainage on the landward side before the steeply ascending cliff. The cliffs vary in height up to approximately 45m (150ft) and are formed from weakly cemented boulders and cobbles. The seaward side is protected by a small seawall (constructed in the early 1990's). However, the low elevation (less than 2m in places) of the road/wall structure makes it very vulnerable to wave attack from the Atlantic Ocean.

In addition to wave attack from storm conditions, the road is frequently subject to the high incidence of falling rocks and slides from the high cliffs. The risk of personal injury and damage to both pedestrians and motorists may be deemed to be quite high over the 1km (0.6 mile) stretch of road. The recent occurrence of a number of landslides along the area demarcated for phase 1 works has highlighted the need for urgent measures to mitigate the risk of damage to infrastructure and loss of life. The concept of a possible route from Geneva to Stowe has been investigated but with the challenges of rugged terrain, high volumes of excavation and the construction of numerous

bridges/crossing structures, this option was not considered. Recent topographic surveys of the area have shown rather high cliffs, with typical heights ranging from 15m (45ft) to well over 100m (330ft).

A range of possible measures to reduce the risk to injury and to improve the durability of the coastal road exist. Key suggested options are:

- Excavation to stabilise the existing cliffs
- Construction of an alternative route from Geneva to intercept the coastal route, past the high cliffs to the east
- Improving the existing sea defences to minimise overtopping events and erosion to the existing road

The best alternative should be selected based on an engineering feasibility study, which should include an EIA.

4.1.2 Water Works

In collaboration with DOWASCO, the West Coast Project is a water supply system that consists of construction of water reservoirs and related pipes works. It includes the installation of a new primary water supply network to the villages located along the 31 km stretch between Salisbury and Capuchin (northwest side of Dominica). Current conditions are that the water system on this area is divided into 9 different individual zones, each with their own individual water system. Those existing systems are inefficient as they use a lower water level source subject to seasonal drops. The project is ongoing and is based on two main intakes at higher levels (just west of Coulibistrie to the South, and at Picard, northeast of Portsmouth). The whole project is divided into three lots. Lots 1 and 2 pertaining to the intakes and associated water treatments, and main lines supply and installation towards the distribution system are currently under completion for a provisional acceptance expected by March 2014.

It is important to note that an EIA was conducted for the West Coast Water Project in September 2009, and serves as a valuable reference, as well as reassurance that the project as a whole has been adequately assessed. The only components of the project that will be financed by DVRP concerns Lot 3, which is the construction of eight storage tanks (one being already under construction) and their supply lines (typically of 200-meter length). Two tanks would have a capacity of 80K gallons, and six others with various capacities between 30K and 60K gallons. Technically, the project is very feasible under a well-controlled management structure and with well-known procedures and technologies. The type of construction with this particular technology is accessible to a large number of local contractors.

4.1.3 Monitoring Stations

Monitoring stations for rainfall, stream flow, and seismic activity are being considered by DOWASCO, MET and ODM. These may use existing sites, or may require small new sites to be acquired and prepared by blading, grading or clearing. Access to sites should be carefully screened to ensure that footprints are minimal and that new access roads are not constructed unless absolutely necessary. Standard mitigation measures will be developed for these works, which may include in-stream works for the stream flow measuring stations.

4.1.4 Agroforestry

Forestry and Agriculture have planned a broad range of interventions, which may include greenhouses, animal rearing facilities, limited forest resource harvesting, conversion of clear-cut cropland to tree crops on riverbeds and slopes, and planting of windrow trees for slope stabilization. Intercropping and "mixed farming" is practiced on steep slopes common in Dominica, in which various types of crops are planted to best accommodate variations in slope, soil, and elevation. Extensive public education and participation programs (e.g. 4-H Club and Agricultural Extension Service) are planned to support these activities. Detailed project proposals are to be developed during implementation, leaving the potential scope fairly extensive at project appraisal.

Within this Project, 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. Effects on critical natural habitat and primary forests would also be excluded.

4.2 Impacts

As noted earlier, there are both positive and negative impacts associated with this DVRP.

4.2.1 Positive Impacts

The positive impacts are expected to be significant. These include:

- The provision of better water supply to communities, which would provide potable water to more households in the area. Also, the storage tanks would provide sufficient water supply to communities when water intakes are shut down during extreme climate events.
- Potential economic growth and development that is likely to occur as a result of the improvement in the road network and increased income and employment opportunities from project implementation and improvement in services. Local communities would also benefit from immediate employment and income generating opportunities created during project implementation.
- Improvement in the quality and standard of living through easier access to necessary information and resources.
- Development of a safer transport route which would open the community to more development and ease concerns of risk to life and limb.
- Improvement in development planning and decision making from the data sets expected (hydrometeorological data analysis and archiving system, soil mapping, bathymetric surveys), would help with designing and placement of appropriate sea defence, weather prediction, useful in agriculture, etc.

4.2.2 Negative Impacts

The data collection, archiving and analysis is expected to have little or no environmental impacts. However, the larger infrastructure components will have some significant impacts. The Dubique

component especially is one where there is the possible need for an EIA. Alternatively, an EA-environmental assessment could be done which is not as detailed as an EIA but still provides alternatives or mitigation measures for prospective environmental impacts. If they impacts are great, it leads to the development of an EIS - environmental impact statement which essentially is a documents detailing the mitigation measures to endure that the goals and policy of environmental management are met on the project.

The following impacts are anticipated at various stages of implementation of the DVRP's projects:

- **Soil erosion and land slippage** - Some erosion during construction is unavoidable and will occur temporarily as a result of runoff in areas of excavation or other areas of earth disturbances. Unplanned or indiscriminate land clearing, excavation and poor drainage can result in soil erosion and landslides within steep sloping areas which may eventually result in siltation and pollution of rivers and coastal areas. Since, this material may eventually find their way into the nearby streams and rivers causing increases in the suspended sediment concentration. This can be exacerbated by construction during the rainy season or improper construction methods, which leave soils exposed unnecessarily. Landslides at riverbanks could also occur during construction which could also lead to obstruction and siltation of rivers.
- **Soil contamination** - Fuel is expected to be stored on site and there is an increased risk of spills of hazardous material which may occur, or if oily products from engines are spilled on site or due to improper disposal of used oils and lubricants. During construction, and with heavy traffic, there are likely to be increased risks of accidental spills of oils and fuels. One component of this Project includes the use of pesticides and herbicides. Therefore, there is the risk of soil contamination from these chemicals.
- **Water pollution** - surface water (rivers) or/and groundwater and coastal/marine waters may be contaminated by improper utilisation of storage of construction materials that are toxic or hazardous, such as chemicals or petroleum products. Also, materials used during construction could be accidentally or intentionally dumped in the water. This can cause temporary or permanent loss of habitats or aquatic flora and fauna. Soil erosion could also lead to water pollution. One component of this Project includes the use of pesticides and herbicides. Therefore, there is the increased risk of water contamination from these chemicals.
- **Loss of Biodiversity** - Indiscriminate land clearing and excavation, improper disposal of waste materials (oil, grease etc.) could destroy flora and fauna and pollute the area, and quite possibly destroy some of the natural resources. Changes in forest management could have indirect effects, but could be substantial if carried out over broad areas and long time periods.
- **Loss of Physical Cultural Resources** - the unplanned or unintentional destruction of historic buildings, religious or culturally significant sites, could result in the loss of valuable physical cultural resources. Excavation could destroy artifacts of prehistoric age, and cause the loss of irrecoverable archaeological information, unless properly avoided.
- **Ponding** - Project activities may lead to creation of stagnant water in excavation pits or other areas. The resultant stagnant water bodies create suitable conditions for the breeding of mosquitoes and other disease vectors. Presently, in Dominica there is concern over the

breeding of the *Aedes aegypti* mosquito since there has been an increase in the incidence of Dengue Fever and Chikungunya.

- **Noise Pollution** - Ambient noise levels in the project area have not been measured. The use of the vibration and/ or noise producing equipment that is generated from the construction site can be a potential nuisance to the local community and farmers. It may also create unacceptable disturbance to marine species.
- **Air Pollution** - The major effects on air quality during construction would be an increase in suspended particles (dust) from excavation as well as movement of heavy machinery and trucks over unpaved roads, also the dust caused when all traffic is directed to unpaved detours. This increased dust could be unfavourable to resident's health and a nuisance for their property; it could also form layers on vegetation and reduce visibility for pedestrians and motorists. Any proposed site clearing and excavation activities and use of malfunctioning equipment and machinery can emit excessive levels of dust and carbon monoxide into the air which can be harmful to people.
- **Waste Generation** - The civil works projects are expected to generate the most waste materials. This would include both construction waste and sanitary waste from workers on site. Construction waste would include material packaging as well as earth and rocks. It would be imperative to ensure that these are correctly disposed of.
- **Traffic Congestion and Inaccessibility** - There is likely to be increased traffic and/or congestion due to some road works, excavation and construction activities. Some areas may be difficult to access.
- **Health and Safety** - Potential hazards to the health and safety of workers and other persons in the area in the event of accidents or injury due to improper use, storage and disposal of hazardous materials and waste etc, can occur. There is also the possibility of injury to workers caused by falls, falling equipment or material or from machinery and vehicles.

4.3 Summary of Impacts

The potential negative impacts described above would be the result of the civil works described under the road works, the water works, the monitoring stations, and the agroforestry projects. In large part the negative effects are minor and reversible, occurring mainly during construction, and can be avoided or minimized by the application of standard environmental management methods as described in the "Mitigation Measures" (Section 5) of this report. Some of the projects could have potentially significant or major negative effects, and thus require more detailed analysis and planning in the form of EIAs which would be done specifically for those projects, as described in the "Screening Procedures" (Section 6) later in this report.

5.0 MITIGATION MEASURES

This section highlights the appropriate measures to be taken in order to minimize or eliminate negative impacts and enhance positive impacts. However, the application of good operation and management practices is of utmost importance. Public consultation is also necessary to inform the affected Communities of the potential problems and mitigation measures. Their concerns and suggestions should also be given due consideration and if possible, employment should be provided for the local residents. This could enhance cooperation and support for the project by the affected Community. In general, impacts generated due to construction and civil works could be avoided or mitigated by the development and adherence to a Construction Management Plan.

5.1 Construction Management Plan

Construction activities will occur over a period of time and as such, activities need to be designed so as to minimize the impacts to natural environment. While temporary in nature, construction impacts can be disruptive particularly with respect to noise, management of construction debris, traffic management and interruption of basic services such as drinking water, sanitary, and communication and also impacts on rivers and coastal shorelines. To manage these impacts, the PCU shall include in the construction contract the requirement to develop a construction management plan for all activities involving civil works. This plan shall at a minimum include:

- Construction Schedule
- Service interruption Schedule
- Logistics plan (for deliveries, storage and waste management)
- Communication Plan (to advise and alert commuters, pedestrians and other users and service providers to construction activities)
- Noise management
- Traffic Management
- Dust and other form of pollutants
- Required coordination activities (including regular meetings with communities and other service providers that may be impacted whether directly or indirectly)

This plan shall be submitted by the contractor(s) for approval by line Ministries and the PCU of the Ministry of Environment, Natural Resources, Physical Planning and Fisheries prior to the commencement of construction activities. To the extent possible, the contractor(s) shall schedule major disruptive activities to occur at times when commuting activities are at a minimum (e.g. between 6 am and 6 pm, or weekends and holidays).

5.2 Construction Contract Clauses

Guidelines for the plan appear below in Tables 3 and 4, which will be modified to create standard contracting clauses for civil works.

Table 3 - Standard Mitigation Measures for All Construction Sites

<p>Permits and Approvals. The contractor shall be responsible for ensuring that he or she has all relevant legal approvals and permits required to commence works.</p>
<p>Site Security. The contractor shall be responsible for maintaining security over the construction site including the protection of stored materials and equipment. In the event of severe weather, the contractor shall secure the construction site and associated equipment in such a manner as to protect the site and adjacent areas from consequential damages. This includes the management of onsite, construction materials, construction and sanitary wastes, additional strengthening of erosion control and soil stabilization systems, and other conditions resulting from contractor activities which may increase the potential for damages.</p>
<p>Noise Control. The contractor(s) shall control noise emissions generated as a result of contracting activities to the extent possible. In the case of site locations where noise disturbance will be a concern, the contractor(s) shall ensure that the equipment is in good working order with manufacturer supplied noise suppression (mufflers etc.) systems functioning and in good repair. Where noise management is a concern, the contractor(s) shall make reasonable efforts to schedule activities during normal working hours (between 8 am and 5 pm). Where noise is likely to pose a risk to the surrounding community, the contractor(s) shall inform the site manager and shall develop a public notification and noise management plan for approval by the line Ministry and PCU of the Ministry of Environment, Natural Resources, Physical Planning and Fisheries. Elements of the hazardous materials management shall include: contractor must provide temporary storage on site of all hazardous or toxic substances in safe containers labeled with details of composition, properties and handling information; the containers of hazardous substances shall be placed in a leak-proof container to prevent spillage and leaching; the wastes shall be transported by specially licensed carriers and disposed in a licensed facility; paints with toxic ingredients or solvents or lead-based paints will not be used; banned chemicals will not be used on any project.</p>
<p>Dust Control. The following conditions apply to work sites for the control of air quality including dust control at construction sites: (a) construction materials such as sand, cement, or other fines should be kept properly covered, (b) cement should be kept stored within a shed or container, (c) the sand and fines can be moistened with sprays of water, and (d), unpaved, dusty construction roads should be compacted and then wet periodically. During interior demolition, debris-chutes shall be used above the first floor; and, demolition debris shall be kept in controlled area and sprayed with water mist to reduce debris dust. During pneumatic drilling/wall destruction dust shall be suppressed by ongoing water spraying and/or installing dust screen enclosures at site. At all sites, the surrounding environment (sidewalks, roads) shall be kept free of debris to minimize dust; there will be no open burning of construction / waste material at the site; there will be no excessive idling of construction vehicles at sites; and, the bins of all haulage vehicles transporting aggregate or building materials must be covered on all public roads.</p>
<p>Use and management of hazardous materials, fuels, solvents and petroleum products. Any use of hazardous materials excluding pesticides, oils, fuels and petroleum products shall conform to the proper use recommendations of the product. Waste hazardous materials and their containers shall be disposed of in a manner approved by the relevant agency. A site management plan will be developed by the contractor if the operation involves the use of these materials to include estimated quantities to be consumed in the process, storage plans, spill control plans, and waste disposal practices to be followed. This plan is subject to the approval of the line Ministry and PCU of the Ministry of Environment, Natural Resources, Physical Planning and Fisheries.</p>
<p>Use of preservatives and paint substances. All paints and preservatives shall be used only with the approval of the contracting officer. Information shall be provided to the contracting officer that describes the essential components of the materials to be used so that an informed determination can be made as to the potential for environmental effects and suitability can be made. Storage, use, and disposal of excess paints and preservatives shall be managed in conformance with the manufacturers' recommendations and as approved by the contracting officer. The contractor shall provide the contracting officer with a list of materials and estimated quantities to be used, storage, spill control and waste disposal plans to be observed during the execution of the contract. This plan is subject to the approval of the line Ministry and PCU of the Ministry of Environment, Natural Resources, Physical Planning and Fisheries.</p>

Site stabilization and erosion control. The Contractor shall implement measures at the site of operations to manage soil erosion through minimization of excavated area, preservation of existing ground cover to the extent possible, and provision of approved ground cover. For all construction sites, standard measures such as silt fences, baffles, filters, or sedimentation basins will be used to prevent sediment from moving off site and causing excessive turbidity in nearby drains, streams, rivers, wetlands, and coastal waters. Standard erosion control measures will include (a) proper site drainage and prevention of drains being clogged by construction material or sediment to prevent overflow and flooding, (b) all construction materials, including chemicals, must be properly stored, (c) construction vehicles and machinery will be washed only in designated areas where runoff will not pollute natural surface water bodies. Where excavations are made, contractor shall implement appropriate stabilizing techniques to prevent cave-in or landslide. Where slopes are cut, (a) keep angle of slopes within limits of soil type, (b) balance cut and fill to limit steepness of slopes, (c) all slopes and excavated areas must be monitored for movement, and (d) the use of retaining structures and planting with deep rooted grasses (bio-engineering) to retain soil during and after works will be done. An erosion management plan will be required where the potential exists for significant sediment quantities to accumulate in wetlands, lakes, rivers and nearshore marine systems. This plan shall include a description of the potential threat, mitigation measures to be applied, and consideration for the effects of severe weather and an emergency response plan. If works are long coastal marine areas or near major streams and river, water quality monitoring must be done before construction, and at regular intervals to determine turbidity levels and other quality parameters. Erosion control plans shall be approved by the line Ministry and PCU of the Ministry of Environment, Natural Resources, Physical Planning and Fisheries.

Traffic Management. In cases where construction activities result in the disruption of area transportation services, including temporary loss of roadway, blockage due to deliveries and site related activities, the contractor(s) shall provide the line Ministry and PCU of the Ministry of Environment, Natural Resources, Physical Planning and Fisheries with a traffic management plan including a description of the anticipated service disruptions, community information plan, and traffic control strategy to be implemented so as to minimize the impact to the surrounding community. This plan shall consider time of day for planned disruptions, and shall include consideration for access to essential services such as medical, disaster evacuation, and other critical services. The plan shall be approved by the line Ministry and the PCU of the Ministry of Environment, Natural Resources, Physical Planning and Fisheries. Elements of the traffic management plan to be developed and implemented by contractor shall include: alternative routes to be identified in the instance of extended road works or road blockages; the public to be notified of all disturbance to their normal routes; signposting, warning signs, barriers and traffic diversions must be clearly visible and the public warned of all potential hazards; provision must be made for the safe passages and crossings for all pedestrians where construction traffic interferes with their normal route; there must be active traffic management by trained and visible staff at the site or along roadways as required to ensure safe and convenient passage for the vehicular and pedestrian public; Adjustment of working hours to local traffic patterns, e.g. avoiding major transport activities during rush hours or times of livestock movement.

Management of standing water. Under no circumstances shall the contractor(s) permit the collection of standing water as a consequence of contractor(s) activities without the approval of the line Ministry and PCU of the Ministry of Environment, Natural Resources, Physical Planning and Fisheries. This will require proper landscaping, filling or drainage of the work site in order to reduce disease incidence, but not in such a way as to affect surrounding areas, water bodies, streams, wetland or coastline.

Management of trash and debris. The contractor(s) shall provide the contracting officer with a trash and debris management plan that conforms to the solid waste management policies and regulations of Dominica. Under no circumstances shall the contractor(s) allow construction wastes to accumulate so as to cause a nuisance or health risk due to the propagation of pests and disease vectors. The site waste management plan shall include a description of how wastes will be stored, collected and disposed of in accordance with current law. Additionally the contractor(s) shall provide for the regular removal and disposal of all site wastes and provide the contracting officer with a schedule for such removal.

<p>Management of Liquid Wastes. Under no circumstances shall the contractor allow construction related liquid wastes to accumulate on or off the site, or to flow over or from the site in an uncontrolled manner or to cause a nuisance or health risk due to its content. The site waste management plan shall include a description of how these wastes will be stored, collected and disposed of in accordance with current law. Additionally the contractor shall provide for the regular removal and disposal of all site wastes and provide the contracting officer with a schedule for such removal. Liquid and chemical wastes will be stored in appropriate containers separated from the general refuse; all waste will be collected and disposed of properly in approved landfills by licensed collectors; the records of waste disposal will be maintained as proof for proper management as designed; and, construction related liquid wastes must not be allowed to accumulate on or off the site, or to flow over or from the site in an uncontrolled manner or to cause a nuisance or health risk due to its contents.</p>
<p>Occupational Health and Safety. An Accident and Emergency Response Plan should be prepared and approved before commencement of work. This should be done in consultation with the Accident and Emergency Department of the Princess Margaret Hospital (PMH) and also Primary Health Care in the relevant District, as well as the Fire and Ambulance Service. The contractor shall ensure that all workers operate within a safe environment. The contractor shall ensure that there are basic medical facilities on site and that there are staff trained in basic first aid. Workers must be provided with the necessary protective gear as per their specific tasks such as hard hats, overalls, gloves, goggles, boots, etc. The contractor shall provide the contracting officer with an occupational health and safety plan for approval by the local health authority prior to the commencement of site activities. All relevant Labour and Occupational Health and Safety regulations must be adhered to ensure worker safety. Appropriate posting of information within the site must be done to inform workers of key rules and regulations to follow.</p>
<p>Worker Sanitation. Sanitation facilities shall be provided to site workers. All sanitary wastes generated as a result of project activities shall be managed in a manner approved by the contracting officer and the local authority responsible for public health. The contractor(s) shall provide a site sanitation plan for approval and implementation prior to the commencement of site activities.</p>
<p>Community Relations. Above all there must be community consultation before and during project implementation. This will allow for the development of open communication or rapport between the community and the contractor. It will allow for concerns to be addressed upfront and the affected community would have greater tolerance to the inconveniences experience. They are also the ones on the ground and their concerns and recommendations should have merit.</p>
<p>Closure plan. A final cleanup plan must also be defined to ensure site is cleared and cleaned after project is completed.</p>

In addition to the standard measures in Table 3 above, there are also special mitigation measures that relate to World Banks safeguards policies, or to high risk, sensitive conditions, or complex situations that involve special care. These special measures are detailed in Table 4 below.

Table 4 - Specialized Mitigation Measures for Selected Environmental Aspects

<p>Discovery of Antiquities. If, during the execution of the activities contained in this contract, any material is discovered onsite which may be considered of historical or cultural interest, such as evidence of prior settlements, native or historical activities, evidence of any existence on a site which may be of cultural significance, all work shall stop and the supervising contracting officer shall be notified immediately. The area in which the material was discovered shall be secured, cordoned off, marked, and the evidence preserved for examination by the local archaeological or cultural authority. No item believed to be an artifact must be removed or disturbed by any of the workers. Work may resume, without penalty of prejudice to the contractor upon permission from the contracting officer with any restrictions offered to protect the site.</p>

Use and Management of Pesticides. Any use of pesticides shall be approved by the contracting officer and shall conform to the manufacturers' recommendations for use and application. Any person using pesticides shall demonstrate that they have read and understood these requirements and are capable of complying with the usage recommendations to the satisfaction of the contracting officer. All pesticides to be used shall conform to the list of acceptable pesticides that are not banned by the relevant local authority. If termite treatment or vector control treatment is to be utilized, ensure appropriate chemical management measures are implemented to prevent contamination of surrounding areas, and use only licensed and registered pest control professionals with training and knowledge of proper application methods and techniques. Finally, for projects or activities that may involve significant amounts of pesticides, herbicides, or agricultural chemicals, a Pest Management Plan will be prepared, in accordance with the guidelines in Annex 3 of this EMF.

Asbestos. In the event that during the course of work activities the contractor discovers asbestos as part of the existing site which requires stabilizing and/or removing it, the contractor shall contact the relevant local authorities and the contracting officer immediately. If work has already commenced, all work in the area must stop immediately. An asbestos management plan must be prepared by the contractor and approved by the relevant local health and waste management authorities and the contracting officer describing how this material will be stored, collected and disposed of in accordance with current law, and identifying the approved experienced professional who will undertake this work. The plan must include (a) description of the type and extent of asbestos, (b) site safety measures, (c) stabilization techniques to be employed, (d) storage and transport plan, (e) approved disposal procedure, and (f) worker awareness and training. In preparing the plan, the contractor should liaise with the relevant local health and waste management agencies to ensure that the adequacy of the measurements being proposed. Site management shall consist of enclosing relevant sections of the site with appropriate material by the contractor. Where possible the asbestos and its location must be appropriately contained and sealed to minimize exposure, and any asbestos shall be marked clearly as a hazardous material. Stabilizing friable asbestos will be done prior to removal (if removal is necessary) and it will be treated with a wetting agent to minimize asbestos dust. Asbestos will be handled and disposed by skilled and experienced professionals using appropriate PPE (personal protective equipment) such as respirators and tyvec suites which will be provisioned to workers to protect them and prevent contamination with asbestos fibers. Respiratory protection together with measures to prevent the contamination of clothing and inadvertent transport of asbestos fiber off-site shall be provided to all exposed workers. If asbestos material is to be stored temporarily, the wastes should be securely enclosed inside closed containments and marked appropriately. Security measures must be implemented against unauthorized removal of asbestos from the site. No removed asbestos will be reused.

Medical waste. In the event that the contractor discovers medical wastes, the contractor shall provide the contracting officer with a medical waste management plan as part of a site waste management plan that conforms to the waste management policies and regulations of the relevant health and waste management authorities. The plan shall include a description of how these wastes will be stored, collected and disposed of in accordance with current law. The contractor must ensure that all persons handling medical wastes are provided with proper protective clothing. All medical wastes must be secured in specially labeled and sealed containers, and disposed of according to relevant local legislation at specified disposal sites. Medical wastes must be kept separate from the other waste streams on site. The waste management plan provided by the contractor must ensure that all persons handling medical wastes are provided with proper protective clothing. All medical wastes must be treated as hazardous. All medical wastes must be secured in specially labeled and sealed containers separate from other wastes streams. All medical wastes must be disposed of according to relevant local legislation at specified disposal sites.

Water pipelines. The Contractor shall utilize the following measures to mitigate potential environmental, health and safety impacts during the construction and installation of the water pipeline:

- **Trenching.** Soil stockpiling will be done in designated areas alongside the trench using piles no higher than 2 meters, convex in shape, and located so as to minimize disturbance and hazard to passersby or traffic. The contractor shall ensure that stockpiles do not cause damming of water or runoff, or that such stockpiles are themselves not washed away.

- Dewatering. Removal of water from trenches shall be done in such a manner to prevent the discharge of mud or sediment into any water body, or the creation of standing water bodies on lands outside the work area.
- Dust Control. During dry periods when dust is a nuisance it shall be mitigated by spraying of water onto work surfaces along the pipeline work area. Dust shall not be allowed to travel outside of the work zone.
- Traffic Control. For all works alongside roadways, appropriate safety signage and barriers shall be used to ensure the safety of any foot traffic or vehicular traffic. If the trench is exposed to foot or vehicle traffic appropriate restrictive barriers, taping, and warning signage shall be used. Traffic shall be controlled and stopped as necessary on public thoroughfares in accordance with good safety practice and national requirements. Trenches or equipment exposed to public access must be clearly demarcated and restricted to public access. Mud and sand brought onto paved public access roads shall be washed and cleared daily.
- Safety Plan. The Contactor will prepare a Health and Safety Plan which shall include emergency response and first aid procedures, awareness training suitable to the tasks being conducted, vehicle and equipment safety provisions, and personal protective equipment information. The contractor will provide hard hats, work boots, protective eyewear and gloves to workers and will ensure that they are used by workers on the job.
- Vegetation and Topsoil Clearing. If any vegetation or brush is cleared, or topsoil removed, it shall be done in such a way as to avoid disturbance or effects outside the established work area. Herbicides or burning may not be used to dispose of any cleared vegetation, rather such vegetation must be chipped, shredded, and dispersed in approved areas or hauled to an approved landfill. Should fauna be encountered work will cease until such fauna have been safely relocated. If any agricultural land is crossed, topsoil shall be stored separately and replaced by spreading on the land surface upon completion of work.
- Access Roads. No new access roads will be opened, only existing roadways will be used for all the entry and exit of materials and equipment to and from the work zone.
- Work Areas. Contractor will delineate approved work areas for all activities including excavation, stockpiling, access, equipment placement during excavation, and materials storage. Such work areas are subject to approval by the contract manager and/or supervising engineer, and Contractor may use only those lands for which approval and access has been provided by the contracting officer and/or supervising engineer. Any rental, use or acquisition of lands from private parties is not permitted without previous notification to and express written approval by the PCU through application of relevant World Bank Policy.
- Vehicle and Equipment Fueling and Maintenance. All gasoline and diesel filling, oil changing, and maintenance of vehicles and equipment will be done outside of the project area at established facilities. If fuel trucks are used they will have adequate safety equipment and fire extinguishers, be free of leaks and be fitted with appropriate dispensers, and have spill kits and absorbent materials ready to retrieve any leaked or spilled fuels. No fuel, new oil or waste oil will be stored on the work site, and vehicles will not be washed on the work site or in adjacent areas.

Explosives. Use of explosives shall be at the approval of the relevant local authority and shall be supervised and undertaken by a qualified explosives technician. Blasting will be limited to between the hours of 9:00am and 4:00 pm unless specifically approved by the local authority and the contracting officer. Any use of explosives shall be permitted only after an explosives management and blasting plan has been approved by the relevant local authority and the contracting officer. This plan shall include

- A. Description of the explosive agent, charge description, intended use.
- B. Site safety plan including:
 1. Storage of initiators, booster charges and principal blasting agents
 2. Handling precautions to be observed
 3. Transport to and from site
 4. Security of stored materials
 5. Disposal of excess or damaged explosive materials.

C. Analysis of risk to surrounding area and mitigation measures to be employed including:

1. Over-pressure event
2. Noise
3. Flying debris
4. Seismic transmission
5. Accidental detonation

D. Name and qualifications for all persons responsible for handling explosive agents.

Works in Forest Areas. For any work in a designated Forest Reserve, or in a forest area, the following will apply:

- There must be no unnecessary clearing of natural vegetation.
- Any negative effects on primary forest are prohibited.
- Avoid the use of herbicides or other chemicals.
- Any works to be undertaken in a protected forest area must be done under the supervision of a representative of the Forestry Department.
- The contractor must ensure that any work undertaken in the forest reserve must be done by manual means.
- There must be minimal impact to flora and fauna in the forest area.
- All recognized natural habitats, wetlands and protected areas in the immediate vicinity of the activity must not be damaged or exploited.
- The contractor must ensure that all staff will be strictly prohibited from hunting, foraging, logging or other damaging activities.
- A survey and an inventory shall be made of large trees in the vicinity of the construction activity, large trees shall be marked and cordoned off with fencing, their root system protected, and any damage to the trees avoided.
- There will be no unlicensed borrow pits, quarries or waste dumps in protected areas.
- Upon completion, all wastes must be immediately removed out of the forested area.

5.3 Additional Considerations

Finally, if approval from the relevant permitting Agency has been sought and granted for any particular project or activity, then the contract language should include any additional permit conditions and/or recommendations of Physical Planning as well as those of any other statutory agency who was part of the permitting. If an EIA has been conducted for a particular sub-project due to its environmentally sensitive or complex nature (see section 6 and Table 5), then the specific recommendations for mitigative measures in that EIA should also be included in the contract language, in addition to the standard minimum mitigation measures in Table 3 above and any applicable special mitigation measures in Table 4 above.

6.0 ENVIRONMENTAL SCREENING PROCEDURES

6.1 Introduction

This section of the report provides an important element of the environmental management process, namely the screening procedure for future work activities and subprojects. At present the proposed works are known at a general level of detail and their potential impacts are also known only in a general sense, so it is impossible to generate any detailed mitigation or management plan.

The preliminary project descriptions, impact evaluations, and generalized mitigative measures given previously in this report therefore provide a good starting point, but as is often the case details and particulars may change over time. In the future as detailed actions emerge and specific activities are ready to begin physical works, the scope, scale, and design of particular activities become fully known. At that time it will be necessary to ascertain their potential environmental impacts through a screening process, identify potential environmental impacts, and provide the appropriate mitigation measures.

As part of this process it will be critical to identify those works which could have more significant impacts, or which could affect sensitive areas or involve complex conditions, and which would merit additional evaluation, assessment, and careful planning to best manage impacts during project execution. Accordingly, this part of the report contains the screening procedures, which are the guidelines, procedures and protocols that will be used for environmental management of future subprojects or activities once they are defined in sufficient detail to allow the development of detailed planning efforts. In addition, any works in primary forest or in critical natural habitat will be identified and excluded from consideration as part of the Project.

6.2 National Permitting

The Physical Planning Department is the main authority with legislated responsibility for granting planning permits or approvals as highlighted earlier in this report. In doing so, this authority consults with other statutory agencies, depending on the type of project being applied for. According to Schedule II of the Physical Planning Act, there is a list of projects to determine if a proposal requires an EIA (Refer to Annex 2). For all World Bank projects, the requirements of the Physical Planning Act must be followed, as well as all laws and regulations and guidelines pertaining to environmental protection in Dominica.

The evaluation, screening and scoping of activities and projects by the Physical Planning Department may conclude that certain projects or activities require that an EIA be conducted. In such cases, then any mitigation requirements or conditions from that EIA should be included in the relevant contracting language to ensure that they are carried out. Any relevant permits or approvals that are necessary in accordance with law in Dominica must also be obtained.

6.3 World Bank Environmental Safeguards

As part of the general assessment process under the World Bank's policy on Environmental Assessment (OP/BP 4.01), the Bank, as the main project sponsor with its own internal procedures, would determine whether all of the collective suite of potential sub-projects that together create a program such as the DVRP might have a significant environmental impact or not, as was the case with this project. This would be part of the initial screening, and resulted in a classification of "Category B" meaning that while there will be some negative impacts, they can be identified and managed through fairly standard means, as described within this EMF.

Four other Bank safeguards on environmental matters have been identified as applicable to the project (Refer to Section 2.2) and include:

- Natural Habitats (OP/BP 4.04)
- Pest Management (OP/BP 4.09)
- Physical Cultural Resources (OP/BP 4.11)
- Forests (OP/BP 4.36)

These policies would not apply to most of the projects being considered under the DVRP program, since they involve relatively simple civil works with only limited impacts. However, each project or activity must be screened and scoped carefully during the planning process, in order to identify any cases where specific activities or projects could affect natural habitats, physical cultural resources, the management of forests, or involve the significant use of pesticides. In these cases, the policies would apply, and care must be exercised to ensure that the provisions of the policies are followed.

These will generally be the projects for which the possible environmental effects could be significant, where issues surrounding the proper management are more complex than previously assumed, or that involve sensitive areas or natural habitats require special attention to avoid doing harm. In those cases, additional study is merited in the form of a separate EIA appropriate to the scale of the potential effects, which would have as its end product a specific tailor-made set of mitigation measures to best manage the project in question.

6.4 Screening Criteria and Checklists

The screening criteria for the DVRP projects addresses the environmental aspects and allows for flagging of the pertinent World Bank policy response if or as necessary. To begin it is necessary to determine whether a proposed project falls into one of two groups: those which involve more complex environmental conditions and/or potentially significant environmental effects (if unmitigated) and which therefore require more cautious planning efforts; or, those comprising relatively simple or uncomplicated works where the impacts are minimal (e.g., effects during construction of minor works) and which can be addressed through standardized or generic mitigation measures.

The first step of the screening procedure will be the preparation of a screening form designed to capture the necessary information about the proposed activity and its potential environmental impacts. The screening form will be completed by the PCU in coordination with the associated Line Ministry. The screening form should indicate whether a sub-project or activity is environmentally complex or may have potentially significant impacts if unmitigated. These would include the following:

- Potential impact to natural habitats: whether or not a specific activity or subproject would potentially affect land or water areas where the biological communities are formed largely by native plant and animal species where human activity has not essentially or heavily modified the area's primary ecological functions, and so trigger OP/BP 4.10.
- Potential impact to physical cultural resources: whether or not a specific subproject or activity would potentially affect objects, sites, structures, natural features or landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance, and so trigger OP/BP 4.11.

- Potential for forest effects: whether project has or may have impacts on the health and quality of forests, projects that affect the rights and welfare of people and their level of dependence upon or interaction with forests, and projects that aim to bring about changes in the management, protection, or utilization of natural forests, and so trigger OP4.36.
- Pesticide Use: whether or not the project would involve procurement of pesticides or pesticide application equipment (either directly through the project, or indirectly through on-lending, co-financing, or government counterpart funding), and whether the project may (i) lead to substantially increased pesticide use and subsequent increase in health and environmental risk, (ii) maintain or expand present pest management practices that are unsustainable, not based on an IPM approach, and /or pose significant health or environmental risks.
- Potential for Hazardous Waste: whether or not special or hazardous wastes would need to be handled, for example waste solvents, asbestos, medical waste, infectious or biohazard materials, or radioactive materials.
- Existence of extremely challenging geotechnical conditions: Would activities pose a high risk of causing landslides, slips, slumps, rockfalls, debris-flows, or excessive erosion? Is work space limited and is there a risk to workers and area residents? Are large amounts of earthwork envisaged?

To assist the PCU and proposing agencies in determining if a project is likely to have significant environmental impacts or presents complex conditions for which an environmental assessment is required, the following checklist is proposed in Table 5 below. Additional checklists and forms may be developed and used by the PCU and Line Ministries to assist with the screening process.

Table 5 - Identification of Complex/Sensitive Sub-Projects or Activities

Characteristic of Sub-project or Activity:	Yes/No	Comments
1. Does the project involve construction of new roads, or major rehabilitation of existing roads?		
2. Does the project involve dam construction, reconstruction, rehabilitation, or strengthening?		
3. Does the project involve hazardous materials management and disposal (e.g. asbestos, medical or infectious waste, solvents) or gasoline) excepting small amounts normal for construction?		
4. Will the project significantly modify any coastal zone features, reef or marine features?		
5. Could the project activities significantly affect any natural or protected areas or Forest Reserves located within 1 km of the Project?		
6. Could the project impact or affect primary rainforest or critical natural habitats or the habitat of endangered species of plants or animals?		
7. Could the project adversely affect critical resources such as primary rainforests, critical natural habitats or drinking water diversions?		
8. Could the project adversely affect natural waterways (streams, rivers, or wetlands) by sedimentation, pollution, flooding, draining, or filling)?		
9. Would the works adversely affect cultural property, including archeological and historical sites?		
10. Would the works require leveling and clearing of lands with natural habitat (those water or land areas where most of the original plant and animal species are still present), especially any habitat critical to ecological or preservation purposes?		

11. Does the project involve the use of introduced, non-native species?		
12. Does the project involve the use of pesticides, herbicides, or other agents to destroy pests?		
13. Does the project pose a high risk of causing landslides, slips, slumps, rockfalls, debris-flows, or excessive erosion?		
14. Will the project result in the violation of Dominican law, international treaty, or Bank policy?		

In cases where it is suspected that a specific project or activity could meet these criteria, the screening procedure would result in a positive determination and such subproject would require closer examination to determine if a separate stand-alone EIA should be done specifically for that project. For projects requiring a stand-alone EIA, the EIA will be completed prior to initiation of the works and will establish environmental requirements for the design and construction phase of the activity in the form an EMP specific to that sub-project. Draft Terms of Reference (TORs) to assist the PCU in contracting and undertaking the EIA are included in Annex 9. World Bank staff may assist in preparing the TORs and reviewing the EIAs.

Based on the discussion and analysis of the DVRP sub-projects presented in Section 4 of this report, most are fairly simple and do not involve significant impacts. There are only a few which meet the criteria presented in Table 5 above and therefore merit additional analysis. Once the details of the activities encompassed in those sub-projects are known with greater precision, the screening tools should be applied and an informed decision made with respect to the need for additional assessment and planning.

Potential project activities may occur in highland forest areas, on coastlines, in sensitive riparian areas along streams or rivers, or in other areas where the policy could be triggered owing to the richness of Dominica's natural habitat. Table 5 of the EMF considers natural habitats in screening procedures, to identify areas that may trigger this policy and require additional assessment to develop site-specific mitigation and management measures. Effects on critical natural habitat, such as primary forests, would be excluded from project financing. The Forests policy is being triggered as a precaution because limited forest resource harvesting may be done.

As noted in Section 4.1.4, 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 from consideration for financing.

If none of the criteria in Table 5 apply to a particular sub-project or activity, then it is considered to have only a limited and minor environmental impact. Based on the discussion and analysis in Section 4 of this report, most of the sub-projects with minor civil works will involve only limited or minor impact, and can be easily mitigated by using standardized generic environmental controls that represent best practice for construction of civil works. For the relatively uncomplicated environmental actions required of these activities, standardized generic construction contract clauses are sufficient, and can be applied as needed to works construction contracts. The draft language for inclusion in contracts can be found in Tables 3 and 4 of this EMF.

6.5 Emergency Procedures

Component 3 of the RDVP is intended to provide financing for emergency sub-projects. Because most of the elements financed under Component 3 are likely to be related to emergency provision

of critical goods, it is expected that those subprojects will fall into Category C and therefore would require no environmental screening or assessment work. However, some Component 3 activities could include demolition, removal, repair or reconstruction of damaged public infrastructure, clearing of debris, or other activities which could have potential negative impacts if not mitigated, and would therefore fall into Category B. It is even possible that there may be exceptional cases where a proposed sub-project would involve work in highly ecologically sensitive areas, potentially affect physical cultural resources, or require acquisition of substantial areas of land either temporarily or permanently for reconstruction work or relocation of a vulnerable population.

In order to ensure that Component 3 emergency subproject activities are consistent with the World Bank Safeguard Policies as outlined in this Environmental Assessment / Environmental Management Framework document, the activities identified for financing under Component 3 will be subject to an expedited review by safeguards specialists to determine if they are eligible under the safeguard policies and compliance procedures used by the PCU for all activities financed under the DVRP. This will allow the possibility to exclude certain activities if the environmental or social impacts are too great, or to include appropriate mitigation measures for a proposed activity if feasible. Having the existing safeguards screening process in place will also allow a certain degree of flexibility and efficiency in processing potential subprojects or activities.

7.0 PLANNING AND EXECUTION

Within any type of project there is expected to be some level of environmental and social impacts, whether positive or negative. Therefore, the intent should be to minimise or avoid any negative impacts as far as practical. This can be done through proper environmental management. However, in order to be effective, environmental management must be fully integrated with the overall project management effort at all levels. This section of the EMF discusses the roles and responsibilities of the various parties during the project execution, in the context of planning for successful implementation of the project as regards environmental performance, and can be considered the Environmental Management Plan (EMP) for the project.

7.1 Project Management

The Project Management structure of Dominica's Disaster Vulnerability Reduction Project (DVRP), includes a Project Coordinator, who would be responsible for the day-to-day management of the Project. There is also expected to be the appointment of a Project Committee comprising relevant line Ministries to oversee certain aspects of the Project. While it is expected that members would include those that have direct responsibility for the various components of the DVRP, it should also include members who have institutional and regulatory responsibility for environmental management, such as the Planning Division. The mandate of the Committee should include the responsibility to ensure a successful implementation of the mitigation measures and also to identify and address unidentified impacts of the Project.

It is evident that there is an informal working relationship between responsible agencies in Dominica. As such, every effort should be made to continue/establish acceptable working relationships between the relevant agencies/Ministries in order to achieve the desired environmental management goals for this Project.

It would be prudent, given the nature of this Project in the Dominican context, for the PCU to consider engaging an Environmental Specialist who would have the overall responsibility for ensuring the implementation of the mitigation measures and the coordination of environmental management activities (monitoring, enforcement, audits and inspection) of the Project.

Consistent with the assignment of project management responsibilities, environmental and social management responsibilities are distributed among the Project Coordination Unit (PCU) and the Ministry of Environment, Natural Resources, Physical Planning and Fisheries. The PCU will have overall technical responsibility for the management of project activities and in this capacity will be the lead agency for coordinating the application of environmental and social requirements under the project.

The Project Coordination Unit (PCU) of the Ministry of Environment, Natural Resources, Physical Planning and Fisheries is the Project implementing agency. Project implementation arrangements have been designed to take advantage of existing capacities and comparative advantages within Dominica. The Ministry of Finance will provide fiduciary services, whereas the PCU will contract specialists (financial management and procurement) and will be responsible for overall contracts management. The PCU would have primary responsibility for Project coordination and for the technical implementation of the Project. This would ensure that the PCU remains responsible for all technical aspects, at the same time as existing (and scarce) fiduciary management capacity within the Ministry of Finance is tapped and strengthened.

7.2 Supervision and Review

Activities executed under the Project relate to primarily to building climate resilience within vulnerable sectors that are most critical to the country transformation into a more robust economy. While contracts for construction will be managed by the PCU of the Ministry of Environment, Natural Resources, Physical Planning and Fisheries, the Government has a vested interest in the management of safeguard related activities both from the perspective of Project management and as an affected party. The PCU within the Ministry of Environment, Natural Resources, Physical Planning and Fisheries will have the ultimate responsibility for the enforcement of required safeguards under the Project. To this end, the enforcement of contract related requirements will fall to the PCU within the Ministry of Environment, Natural Resources, Physical Planning and Fisheries who will engage the services of an environmental specialist to provide compliance oversight.

The PCU will be responsible for the application of safeguard requirements for the evaluation, award and execution of grant related activities using screening procedures contained in this plan. At an agreed interval, the PCU will forward a report of grant activities to the Ministry of Environment, Natural Resources, Physical Planning and Fisheries including safeguard screening reports for their periodic review.

With respect to construction activities, the Line Ministries will provide coordination and supervision services to ensure works activities conform to agreed procedures and policies. While not exercising direct contract supervision in the contractual sense, the line Ministries shall report, on an agreed schedule, to the PCU within the Ministry of Environment, Natural Resources, Physical Planning and Fisheries noting contractor activities.

While the line Ministries will be an active participant in project implementation, ultimately, enforcement responsibility will fall to the PCU of the Ministry of Environment, Natural Resources, Physical Planning and Fisheries with respect to contracting obligations.

7.3 Communication and Grievance Resolution

Notwithstanding contractual and other legal grievance resolution mechanisms under national and international law, the PCU of the Ministry of Environment, Natural Resources, Physical Planning and Fisheries shall be ultimately responsible for the management of any conflicts arising Project contract activities.

Construction management, as a contractual issue, will reside with the PCU of the Ministry of Environment, Natural Resources, Physical Planning and Fisheries; however, the line Ministries shall assume an active role in coordinating contractor activities. Responsibilities will be assigned as mutually agreed between the PCU and Line Ministries; however, the PCU shall have the sole authority to engage the contractor in disputes and modifications to contracts. For this reason, the PCU shall work closely with the line ministries in the preparation of construction contracts to assure that construction impacts are minimized, and are acceptable with respect to World Bank operations.

The Line Ministries and the PCU shall prepare a communication plan detailing specific responsibilities and communication requirements. This plan shall be submitted to the Bank for its No Objection.

7.4 Public Consultation and Dissemination of Information

Above all there must be community consultation before and during project implementation. This will allow for the development of open communication or rapport between the community and developer. It will allow for concerns to be addressed upfront and the affected community would have greater tolerance to the inconveniences experience. They are also the ones on the ground and their concerns and recommendations should have merit. Public Consultation is critical for this type of project - especially to gain community support and 'buy in'.

It should include Provisions for the PCU to organize public consultation forums with the affected communities, interested organizations and individuals as often as is necessary. A Public Consultation Plan should be prepared by the PCU, which among other things, identifies the target groups, schedule, information to be disseminated (safeguard instruments etc.) how and where it would be disseminated.

In accordance with World Bank's procedures, both the Project details and the draft EA/EMF safeguard instrument were publicly disclosed prior to project appraisal. Consultation on the draft EA/EMF was done with key Agencies prior to finalizing the first draft. The first draft document was then disseminated via email to several key individuals, Community Groups, Agencies and Ministries. It was also placed on the website of the Government of Dominica and the World Bank, where the public and other interested persons were invited to review and submit comments or concerns by a given date. Details of this public disclosure and consultations are summarized in Technical Annex 1.

7.5 Incorporation of Environmental Contract Clauses

While construction activities are inherently disruptive, actions can be taken to minimize impacts to the physical and natural environment. Based on the potential impacts identified, the PCU of the Ministry of Environment Natural Resources, Physical Planning and Fisheries shall include in the construction contract specific clauses to guide contractor activities during the construction period. Tables 3 and 4 contain the draft language for environmental performance contract clauses, which shall be adjusted as needed to conform to Dominica national legal requirements, the World Bank Safeguards Policies, and any additional environmental performance clauses arising from EIAs conducted for the activity or project. The PCU will ensure that results of all these analyses and conditions are included or, are interpreted as an integral part of the Contract before signing.

8.0 TECHNICAL ANNEXES

8.1 ANNEX 1 - RECORDS OF CONSULTATIONS

In the preparation of the first draft of this EA/EMF, a consultation was held on 29th January 2014 with key individuals and Agencies (refer to Table 6, as well as Figure 12). The Local Consultant, World Bank Consultant and local counterpart from the Ministry of Environment were present to discuss the proposed projects within the DVRP, ask questions of relevant Agencies, and answer queries or concerns posed and receive feedback on what should be included in the draft document. This feedback fed into the first draft document which was then disclosed for public consultation on the Government of Dominica web portal (<http://dominica.gov.dm/notices/288-draft-environmental-assessment-and-environmental-management-framework>) (See Figure 13) on 27th February 2014 and persons were invited to submit comments no later than 14th March 2014.

The document was also disclosed on the website of the World Bank. Additionally, the draft document was emailed to several key individuals, Community Groups, Agencies and Ministries (Please see Table 7 and Figure 14 - copy of email message).

No further comments were received from any of the Agencies or individuals that the document was emailed to. Neither was any comments received from the public based on the website disclosure. However, several comments were received through the World Bank and these were incorporated into this final document, the main one being the concern for damage to the forested areas and natural habitats. The World Bank Safeguards of Natural Habitats (OP/BP 4.04) and Forests (OP/BP 4.36) are triggered by this Project; therefore, appropriate provisions have already been put in place to identify and address these issues if they should arise.

Figure 12 - Sign in Sheet for Consultation

NAME	Institutions	Contact
MIKE DARR	World Bank	mjdarr@domia.com
M. Ysa Oppong	Social Dpt World Bank	yoppong@worldbank.org
Andrea Marie	Private	andreamarie2@gmail.com
Kimisha Thomas	E.C.U	ecu@dominica.gov.dm
DON CORRIETTE	ODM	Corriette.d@dominica.gov.dm edm@dominica.gov.dm (767) 448 7777 (767) 275 3625
Michael Fedak	World Bank	mikefedak@gmail.com
MARSHALL ALEXANDER	DOMINICA NAT SERVICES	Marshall.Alexander@dnat.com TEL 225 6997
MAGNUS WILLIAMS	DOWASCO	m.williams@dowasco.dm 275-1155
Emile Lancelot	Min. Public Works	emile.lancelot@typhos.com 275 0550
Bradley Guye	Forestry Div.	guyeb@dominica.gov.dm
Essence Joseph	Ministry of the Environment	ps@environment@dominica.gov.dm

Table 6 - List of Persons at the Consultation

NAME	AGENCY
Mike Darr	Environmental Specialist, World Bank
Collin Guiste	ECU, Ministry of Environment
Andrea Marie	Local Consultant
Kimisha Thomas	ECU
Don Corriette	Officer of Disaster Management
Michael Fedak	World Bank
Marshall Alexander	Dominica Meteorological Services
M. Yaa Oppong	Social Specialist, World Bank
Marcus Williams	DOWASCO
Annie Edwards	Physical Planning
Emile Lancelot	Ministry of Public Works
Bradley Guye	Forestry Division
Dr. E. Douglas	Ministry of Environment

Figure 13 - Image of Government of Dominica Web Portal where the Document was disclosed

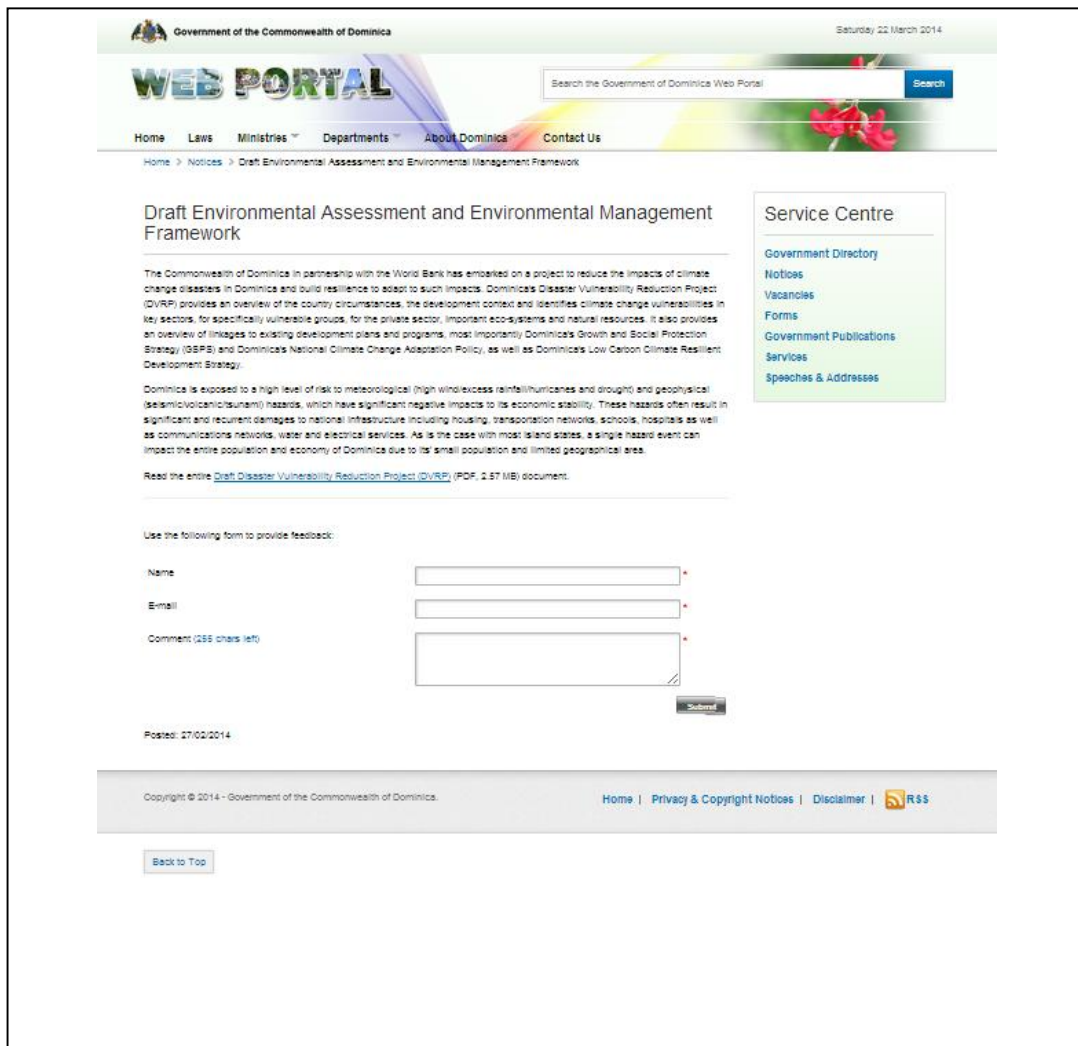
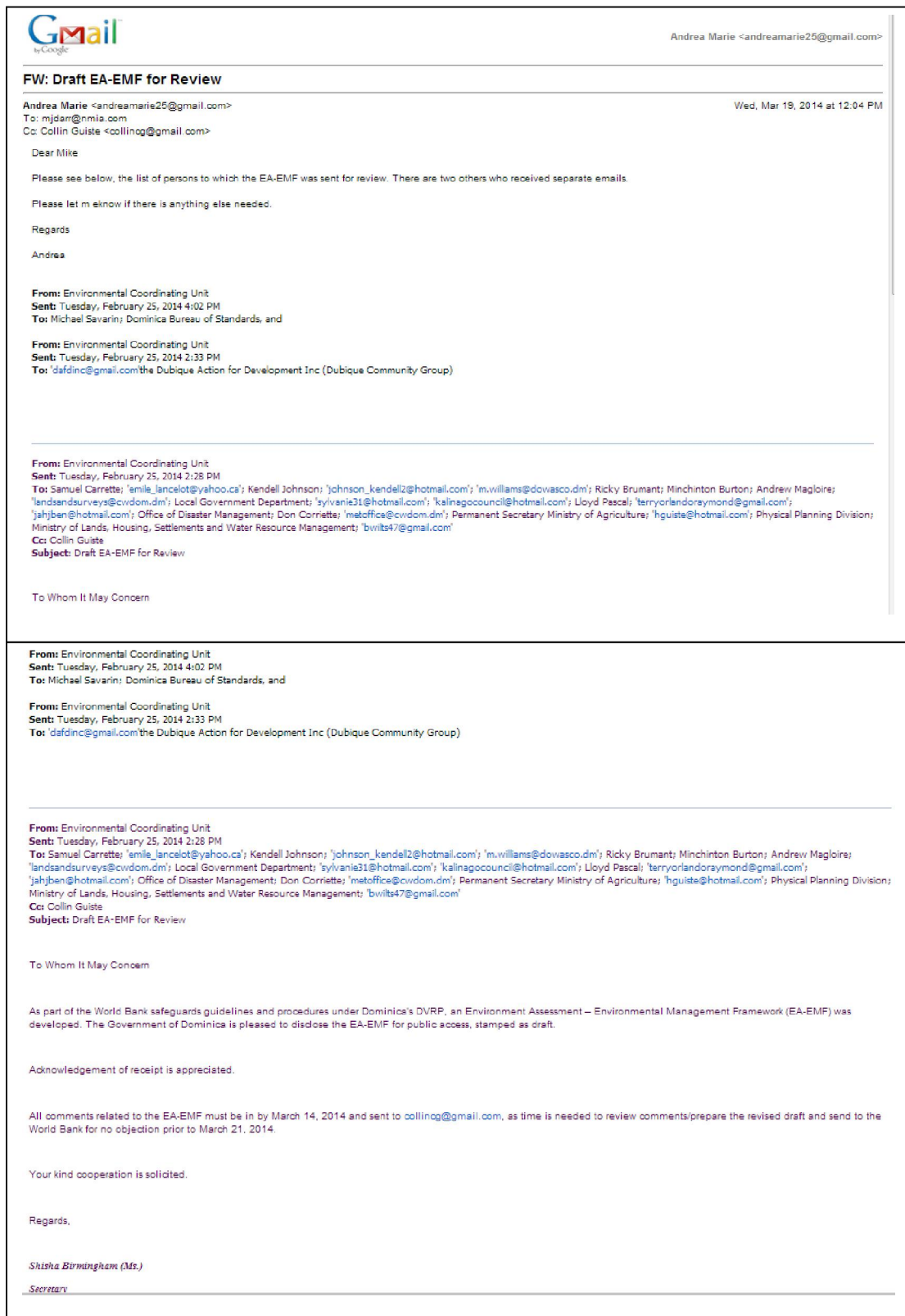


Table 7 - List of Persons who received the document via email for Consultation

NAME	AGENCY/MINISTRY/GROUP
Mr. Samuel Carrette	Chief Development Planner, Ministry of Finance
Mr. Lloyd Pascal	Director, Environmental Coordinating Unit, Ministry of Environment
Mr. Ricky Brumant	Director, Division of Agriculture
Mr. Harold Guiste	Permanent Secretary, Minister of Environment, Natural Resources, Physical Planning and Fisheries, and Ministry of Agriculture and Forestry
Mr. Michington Burton	Director, Forestry Division
Mr. Terry Raymond	Head, Dominica Youth Environmental Organization
Ms. Sylvanie Burton	Carib Development Officer, Ministry of Carib Affairs
Ms. Annie Edwards	Physical Planner, Physical Planning Division
Mr. Michael Savarin	Director, Dominica Bureau of Standards
M. Williams	DOWASCO
	Local Government Department
	Lands and Surveys Department
Kendell Johnson	Kendell Johnson - Chief Technical Officer, Ministry of Public Works, Energy and Ports
	Kalinago Council
Mr. Jaisaiah Benoit	Head, National Youth Council
Mr. Emile Lancelot	Engineer, Ministry of Public Works, Energy and Ports
	Dubique Action for Development Inc (Dubique Community Group)
Mr. Don Corriette	Director, Office of Disaster Management
	Dominica Meteorological Services
Mr. Andrew Magloire	Head, Fisheries Division
	Ministry of Lands, Housing, Settlements and Water Resource Management

Figure 14 - Image of Email Message sent inviting comments on the draft EA/EMF



8.2 ANNEX 2 - SCHEDULE II OF THE PHYSICAL PLANNING ACT

Matters for which Environmental Impact Assessment shall be required:

1. Hotels of More Than Twelve Rooms;
2. Sub-Divisions Of More Than Six Plots;
3. Residential Development Of More Than Six Units;
4. Any Industrial Plant Which In The Opinion Of The Authority Is Likely To Cause Significant Adverse Environmental Impact;
5. Quarrying And Other Mining Activities; (Section 18(3) And 23). 2002 Physical Planning Act 5 218
6. Marinas;
7. Land Reclamation, Dredging And Filling Of Ponds;
8. Airports, Ports And Harbours;
9. Dams And Reservoirs;
10. Hydro-Electric Projects And Power Plants;
11. Desalination Plants;
12. Water Purification Plants;
13. Sanitary Land Fill Operations, Solid Waste Disposal Sites And Other Similar Sites;
14. Gas Pipeline Installations;
15. Any Development Projects Generating Or Potentially Generating Emissions, Aqueous Effluent, Solid Waste, Noise/Vibration Or Radioactive Discharges;
16. Any Development Involving The Storage And Use Of Hazardous Materials;
17. Coastal Zone Developments;
18. Development In Wet Lands, Marine Parks, National Parks, Conservation Areas, Environmental Protection Areas Or
19. Other Sensitive Environmental Areas

8.3 ANNEX 3 - PEST MANAGEMENT INFORMATION

Operational Policy 4.09 on Pest Management seeks to ensure that projects avoid using harmful pesticides. A preferred solution is to use Integrated Pest Management (IPM) techniques and encourage their use in the whole of the sectors concerned. The Bank requires that any pesticides it finances be manufactured, packaged, labelled, handled, stored, disposed of, and applied according to standards acceptable to the Bank. The Bank does not finance formulated products that fall in WHO classes IA and IB, or formulations of products in Class II, if (a) the country lacks restrictions on their distribution and use; or (b) they are likely to be used by, or be accessible to, lay personnel, farmers, or others without training, equipment, and facilities to handle, store, and apply these products properly.

For the majority of projects considered in the DVRP, pesticides will not be used, or only small amounts may be used for such activities as building extermination or termite foundation treatments. For these routine activities, the following procedures apply:

- Any use of pesticides shall be approved by the contracting officer and shall conform to the manufacturers' recommendations for use and application.
- Any person using pesticides shall demonstrate that they have read and understood these requirements and are capable of complying with the usage recommendations to the satisfaction of the contracting officer.
- All pesticides to be used shall conform to the list of acceptable pesticides that are not banned by the relevant local authority.
- If termite treatment or vector control treatment is to be utilized, ensure appropriate chemical management measures are implemented to prevent contamination of surrounding areas, and use only licensed and registered pest control professionals with training and knowledge of proper application methods and techniques.

However, for projects or activities that may involve more significant amounts of pesticides, herbicides, or agricultural chemicals, a Pest Management Plan will be prepared. The determination of whether or not a Pest Management Plan should be prepared is whether or not the project would involve procurement of pesticides or pesticide application equipment (either directly through the project, or indirectly through on-lending, co-financing, or government counterpart funding), and whether the project may (i) lead to substantially increased pesticide use and subsequent increase in health and environmental risk, (ii) maintain or expand present pest management practices that are unsustainable, not based on an IPM approach, and /or pose significant health or environmental risks.

A pest management plan is a comprehensive plan, developed when there are significant pest management issues such as:

1. New land-use development or changed cultivation practices in an area;
2. Significant expansion into new areas;
3. Diversification into new crops in agriculture, particularly if these tend to receive high usage of pesticide, like cotton, vegetables, rice, etc.;
4. Intensification of existing low-technology systems;
5. Proposed procurement of relatively hazardous pest control products or methods;
6. Specific environmental or health concerns (e.g., proximity of protected areas or important aquatic resources; worker safety).

A pest management plan is also developed when proposed financing of pest control products represents a large component of the project. The plan is designed to minimize potential adverse

impacts on human health and the environment and to advance ecologically based IPM. The plan is based on on-site evaluations of local conditions conducted by appropriate technical specialists with experience in participatory IPM. The first phase of the plan was an initial reconnaissance to identify the main pest problems and their contexts, which for the DVRP include the possible use of pesticides and herbicides for agroforestry projects. It is not known how significant these issues may be, therefore this Annex to the EA/EMF provides guidance the second phase, which is development of specific operational plans to address the pest problems identified, as well as specific procedures for screening pest control products.

The procurement of any pesticide in a Bank-financed project is contingent on an assessment of the nature and degree of associated risks, taking into account the proposed use and the intended users. With respect to the classification of pesticides and their specific formulations, the Bank refers to the World Health Organization's Recommended Classification of Pesticides by Hazard and Guidelines to Classification (Geneva: WHO 1994-95). The following criteria apply to the selection and use of pesticides in Bank-financed projects:

- a) They must have negligible adverse human health effects.
- b) They must be shown to be effective against the target species.
- c) They must have minimal effect on nontarget species and the natural environment. The methods, timing, and frequency of pesticide application are aimed to minimize damage to natural enemies. Pesticides used in public health programs must be demonstrated to be safe for inhabitants and domestic animals in the treated areas, as well as for personnel applying them.
- d) Their use must take into account the need to prevent the development of resistance in pests.

The Bank requires that any pesticides it finances be manufactured, packaged, labeled, handled, stored, disposed of, and applied according to standards acceptable to the Bank. The Bank does not finance formulated products that fall in WHO classes IA and IB, or formulations of products in Class II, if (a) the country lacks restrictions on their distribution and use; or (b) they are likely to be used by, or be accessible to, lay personnel, farmers, or others without training, equipment, and facilities to handle, store, and apply these products properly.

As an exception, the Pest Management Plan may be limited to pest control product screening when all of the following conditions are met:

1. Expected quantities of pest control products are not significant from a health or environment standpoint (for a description of the term 'significant' see section on EA).
2. No significant environmental or health concerns related to pest control need to be addressed.
3. The project will not introduce pesticide use or other non-indigenous biological control into an area, or significantly increase the level of pesticide use.
4. Products to be financed fall in Class III or table 5 of the WHO Classification of Pesticides by Hazard. Table 5 refers to pesticides unlikely to present acute hazard in normal use.

It is considered most likely that projects within the DVRP will only use minimal amounts of pesticides, and typically for routine uses, such that the standard mitigation measures described previously are necessary. However, if a project proposed for financing is identified during the screening procedures as meeting the criteria to trigger the Pest Management Policy as described in this Annex, then such project would require an EIA with specific mitigation and management

measures for the pesticide use envisaged. The EIA would include a Pesticide Management Plan as described in this Annex, and would be forwarded to the Bank for no-objection.

LIST OF PREPARERS

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