



Government of Saint Vincent and the Grenadines

Disaster Vulnerability Reduction Project (DVRP) Environmental Assessment Report December 2010

Central Planning Division, Ministry of Finance and Economic Planning
1st Floor, Administrative Centre, Bay Street, Kingstown, St. Vincent
Tel.: 784-457-1746 • Fax: 784-456-2430 • E-mail: cenplan@vineysurf.com

TABLE OF CONTENTS

LIST OF ACRONYMS	1
EXECUTIVE SUMMARY	2
1. INTRODUCTION.....	4
1.1. Project Background.....	4
1.2. Description of the Proposed Project.....	5
1.3. Project Location	8
2. ENVIRONMENTAL ASSESSEMENT	11
2.1. Scope of Work.....	11
2.2. Methodology	11
2.2.1. Review Existing Information.....	11
2.2.2. Field Visits:.....	13
2.2.3. Limitations of the Study.....	14
3. LEGISLATIVE FRAMEWORK	15
4. DESCRIPTION OF THE EXISTING ENVIRONMENT	18
4.1. Physical attributes	18
4.2. Climate	19
4.3. Biological	21
4.4. Socio-economic context.....	23
4.5. Agriculture	23
4.6. Tourism	24
4.7. Industrial Sector	25
4.8. Poverty issues.....	25
5. ANALYSIS OF PROJECT IMPACTS.....	27
6. MITIGATION ANALYSIS.....	30
7. ENVIRONMENTAL MANAGEMENT PLAN (EMP)	33
7.1. Site Security.....	33
7.2. Discovery of antiquities.....	33
7.3. Asbestos.....	34
7.4. Worker Sanitation.....	35
7.5. Noise Control.....	35
7.6. Use and management of hazardous materials.....	35

7.7.	Use of preservatives and paint substances.....	36
7.8.	Site stabilization and erosion control.....	36
7.9.	Traffic Management	37
7.10.	Management of standing water.....	37
7.11.	Management of trash and debris.....	37
7.12.	Schools.....	38
7.13.	Agency Responsibility.....	38
RECORD OF CONSULTATIONS.....		40
ANNEXES		41
	Terms of Reference.....	42
	Screening Tool/Scoping Checklist.....	45
LIST OF PREPARERS.....		53

LIST OF ACRONYMS

DVRP	Disaster Vulnerability Reduction Project
EA	Environmental Assessment
EMP	Environmental Management Plan
ERDMP	Emergency Recovery and Disaster Management Project
GDP	Gross Domestic Product
GoSVG	Government of St. Vincent and the Grenadines
HDI	Human Development Index
MoHILPP	Ministry of Housing, Informal Human Settlements, Physical Planning and Land and Surveys
NEMO	National Emergency Management Organisation
PPCR	Pilot Project for Climate Resilience
PRSP	Poverty Reduction Strategy Paper
PSIPMU	Public Sector Investment Programme Management Unit
SNC	Second National Communication
SVG	St. Vincent and the Grenadines
USAIDCOTS	United States Agency for International Development Caribbean Open Trade

EXECUTIVE SUMMARY

This Environmental Assessment (EA) study was undertaken as part of the preparation requirements of the proposed St. Vincent and the Grenadines Disaster Vulnerability Reduction Project. The Assessment was conducted in compliance with World Bank requirements as presented in OP 4.01, *Environmental Assessments* and includes relevant considerations as presented in the World Bank Safeguards for Natural Habitats, OP/BP 4.04, *Natural Habitats* and OP/BP 4.11 *Physical Cultural Resources*, for Category B projects.

The EA reflects an analysis of the general impacts and mitigations to be applied during project execution since at this stage precise locations have not been identified and engineering designs do not exist. As a result, the assessment is forward looking with emphasis on impacts reasonably expected based on the nature of the activities and the development of an Environmental Management Plan (EMP) to be applied during project execution.

Proposals of the Projects

There are a number of small civil works activities proposed for funding under the project including coastal and river defense works, refurbishment of existing building and slope stabilization works along vulnerable areas. Many of these are along the coastal zones but scattered throughout the country. In most cases precise locations have not been identified for specific works and engineering designs do not exist.

Major Findings and Recommendations

From assessment of the works proposed it is anticipated that most of the likely environmental issues will relate to construction site management and construction operations. Furthermore, the environmental impacts for the type of works proposed

under the project are expected to be moderate in nature and can be managed through the application of appropriate engineering and management measures. Actions for the management of these issues include noise control, debris management, site security, worker sanitation, site stabilization and erosion control and are outlined in the Environmental Management Plan. It is recommended that the project incorporate these actions into construction contracts to strengthen compliance.

1. INTRODUCTION

1.1. Project Background

St. Vincent and the Grenadines (SVG) is among the most disaster-prone countries in the world, regularly suffering disasters related to natural events. These hazards have caused significant and recurrent damages to national infrastructure including housing, road networks, schools, hospitals and other facilities such as phone lines, water and electricity. The resulting impacts significantly affect human welfare, national economic activities, property, and natural resources. In addition, while local and sub-regional data are presently not available to evaluate the specific effects of climate change for SVG, global and regional data indicate that rising sea levels and changes in storm patterns are changing the country's risk profile. Indeed, effects of climate change are already evident in many parts of the country with storm activity continuing to impact on exposed coastlines and development. The situation is only expected to worsen as SVG is highly vulnerable to the impacts of global warming and climate associated impacts.

Meanwhile, over the last decade, SVG has undertaken some risk reduction activities with the development of disaster preparedness and response investments. During this period, most of the activities in disaster risk reduction focused on the development of national disaster plans, setting up the disaster management agency, National Emergency Management Organisation (NEMO), and promoting public education and awareness. Despite these efforts, SVG continues to face high levels of risk to its economic stability and national welfare. Post-disaster rehabilitation of damaged infrastructure is a major contributor to the national economic risk profile. Studies have documented that aging public infrastructure presents very high levels of vulnerability, particularly in critical sectors such as health, education, water, and roads. Further, the annual tropical storm/hurricane season, combined with the cumulative effects of climate change, will continue to threaten island economies. Without intervention, these factors will likely increase the need to continue to divert limited financial resources away from economic

growth activities into repairs and reconstruction as a result of disaster and climate change events. While work continues in preparedness and response, the logical next step is reduction of vulnerability to infrastructure.

1.2. Description of the Proposed Project

Project Objectives

The proposed project seeks to measurably decrease the vulnerability of people and national economies in the Eastern Caribbean to climate change and natural hazards. The development objectives of the project would be to:

- (i) Integrate disaster vulnerability reduction and climate resilience into national development strategies and management of public infrastructure. To a great degree, this requires an improved scientific basis for decision making, as it relates to physical planning, infrastructure investments, and land use regulations.;
- (ii) Improve SVG's access to, and benefit from, regional collaboration and support structures for hazard monitoring and risk assessments, and
- (iii) Reduce the risk of loss of human life due to natural hazard induced structural failure of critical public infrastructure.

Project Components

The proposed project will have four (4) components:

Component 1 - Capacity Building for Hazard and Risk Evaluation and Applications for Improved Decision Making

The project will support improving national capacity to evaluate and integrate natural hazard and climate change risk reduction into the national development policy and decision making process. Improvements in risk analysis capacity will support future

programmes for retrofitting existing infrastructure, disaster risk mitigation, and disaster preparedness planning. This improved capacity will allow St. Vincent and the Grenadines to prioritize investments and improve risk management across a portfolio among various sectors using different tools such as cost-benefit analysis, hazard and vulnerability modeling.

Activities will include:

- Identification and creation of required baseline data for hazard assessment and risk modeling;
- Development of institutional systems for the collection, sharing and management of geospatial data among national agencies and with regional institutions;
- Training and education in applications integrating geospatial data systems, hazard and risk assessment to support decision making within various sectors and mainstream the use of these tools as a standard practice in development planning;
- Training in the use of risk modeling software for relevant sectors and institutions where applicable;
- Support development of operational agencies with purchase of equipment, hardware and software required to implement risk analysis and monitoring activities; and
- Training of contractors and strengthening of institutional structures for improved use of building codes.

Activities under this component will be supported by regional technical agencies and complemented by additional grant resources that can be executed through national and regional agency partnerships.

Component 2 - Prevention and Mitigation Investments:

This component includes a broad set of civil works activities, such as drainage improvements, rehabilitation, reconstruction and retrofitting of bridges and roads, retrofitting of critical public buildings (including schools and emergency shelters), investments in satellite emergency centres, coastal and river defense mechanisms, etc. Civil works will be executed to include construction and rehabilitation of existing infrastructure in order to reduce their vulnerability to natural hazards and climate change. Works will focus on priority public infrastructure including transportation, education and public utility sectors and will include activities to rehabilitate or construct emergency shelters, re-enforce river defenses that protect key infrastructure and realignment, and rehabilitation of bridges. Included under works is the potential for the design, development and preparation of priority works construction projects such as a new hospital complex to assist the Government in engaging construction financing available from other donors in the region. Other infrastructure works include construction of satellite community warehouses and stockpiling of gabion baskets in order to ensure a reliable stock in case of river and coastal defense malfunction.

The project will fund supporting studies required for the development of works packages such as hydrologic/hydraulic investigations, geotechnical investigations and associated pre-engineering and engineering activities required to support engineering design and safeguard compliance. During the execution of the works, specific activities will include the integration of building code requirements in the works development process and will introduce hazard/risk analysis and climate change impact analysis to assist in the design and construction of resilient infrastructure.

As a result of the extensive damage caused by Hurricane Tomas, SVG has begun to implement a hurricane recovery program to rehabilitate vulnerable infrastructure, originally identified under the Disaster Vulnerability Reduction Project (DVRP), which was damaged as a result of the event. The programme is focused on communities located

in areas where high hazard exists and in many cases have already been exposed to significant damages from events such as Hurricane Ivan, Dean, tropical storm Omar, and most recently, Hurricane Tomas (2010). Typically, these areas are exposed to recurrent storm surge, severe cliff erosion, landslide exposure and other hazards that pose a recurrent and imminent risk to life and property. Hurricane Tomas exacerbated existing problems and caused significant damage to physical infrastructure previously included under proposed activities of the DVRP and Pilot Project for Climate Resilience (PPCR) investment plan, including schools and shelters slated to be retrofitted, as well as vulnerable roads, coastal defenses and riverbanks. The Hurricane Tomas Emergency Recovery Project will also include institutional strengthening investments aimed at improving the Government's capacity to identify and assess risks/vulnerabilities to adverse natural events.

Component 3 – Emergency Response Contingent Credit

Following, or immediately before the occurrence of an adverse natural event, and subject to the Government's declaration of a national emergency in accordance with the National Emergency and Disaster Management Act of 2006, this component will all the Government to request the World Bank to re-categorize financing to or add contingent financing to cover early recovery and rehabilitation costs.

Component 4 - Project Management and Implementation Support

Activities under this component relate to the institutional support and capacity development for project management and execution. Activities include training, staffing and development activities associated with project execution such as consulting services.

1.3. Project Location

As described, the project has a number of activities scattered throughout St. Vincent and the Grenadines (Bequia). Most of the sites are located in communities in the following areas:

- a) Coastal protection and river defense works. This includes: (i) coastal protection investments in Sandy Bay, Georgetown, and Kingstown around the South river; and (ii) river defense works along Buccament, Colonaire, Warrowarrow and Cumberland.
- b) Relocation of the Milton Cato Memorial Hospital. PAHO's Safe Hospital study has highlighted the dire structural (vulnerable to category 1 Hurricane, flooding issues) and operational conditions of the main General Hospital, and therefore the need to build a new Hospital with higher construction standards at a new location. This sub-component will include the feasibility studies and the design for the new Hospital.
- c) Rehabilitation and reconstruction of critical roads and bridges. This includes rehabilitation of two bridges on Fenton road (Green Hill and Dauphine), and Paget Farm road.
- d) Drainage improvement works in Arnos Vale.
- e) Retrofitting and reconstruction of critical public buildings. Health centres and police stations in areas such as Troumaca, Overland, Stubbs and Marriaqua will be upgraded and strengthened to ensure that they can assist communities during disasters.
- f) Retrofitting of emergency shelters. This includes complete retrofitting community centers and schools, with installation of Emergency equipment, sanitary facilities and improved drainage. The scope of works needed for the additional shelter

- facilities (Dorsetshire Hill and Kingstown government schools, and Campden Park and Georgetown community centers) will be defined in the course of the project.
- g) Construction of Satellite warehouses. Nine satellite warehouses will be established throughout the State to store emergency equipment and supplies within reach of communities.
 - h) Slope stabilization and drainage. This includes implementation of landslide prevention and drainage works around Dark View, Chester Cottage, Maroon Hill, Paget Farm, Fancy, Mount Grennan, Spring, Baleine and between Mt. Pleasant and Peruvian Vale of the Windward Highway.
 - i) Installation of Specialized Disaster equipments: Nine solar powered emergency communication radios (VHF/HF) will be procured and installed across the islands. Training on radio operations and maintenance will be provided to community members.

2. ENVIRONMENTAL ASSESSEMENT

2.1. Scope of Work

This Environmental Assessment (EA) study was undertaken as part of the preparation requirements of the proposed St. Vincent and the Grenadines Disaster Vulnerability Reduction Project. The Assessment was conducted in compliance with World Bank requirements as presented in OP 4.01, *Environmental Assessments* and includes relevant considerations as presented in the World Bank Safeguards for Natural Habitats, OP/BP 4.04, *Natural Habitats* and OP/BP 4.11, *Physical Cultural Resources*, for Category B projects.

Generally, the EA is a project level assessment and reflects an analysis of the general impacts and mitigations to be applied during project execution since at this stage engineering designs do not exist and precise locations have not been identified for specific works. As a result, the assessment is forward looking with emphasis on impacts reasonably expected based on the nature of the activities and the development of an Environmental Management Plan (EMP) to be applied during project execution.

2.2. Methodology

The EA for this Project was conducted during the period 18th October, 2010 to 5th November, 2010. The findings presented are based on professional judgment, stakeholder and expert consultations; review of existing reports, studies, maps; and internet research.

2.2.1. Review Existing Information

Prior to visiting the project sites, the team undertook a review of studies and literature relevant to the project. As part of this review of literature, the following were examined:

Kingstown Arnos Vale Drainage Improvement Study

This study was conducted by DLN Consultants under the St. Vincent and the Grenadines Emergency Recovery and Disaster Management Project (ERDMP) in 2006. The overall objective was to assess the existing drainage conditions in the Kingstown/Arnos Vale watershed areas and to develop a programme of remedial works to ensure that the resulting storm drainage system will provide long term protection from flooding. The study identified critical works required for flood protection and provided conceptual designs and preliminary cost estimates for the works. Some of the areas assessed under this study have been identified to be addressed under the current project. These include the Warrawarrow and the South Rivers.

Vulnerability and Adaptation Assessment Report

This study was conducted as part of the Second National Communication (SNC) project report. Generally, the report examined the physical vulnerabilities in the agriculture, coastal zones, and water sectors for comparison purposes while adding health, the main social sector and tourism which is emerging as the key economic sector. The study also assessed how vulnerabilities in these sectors are being and will continue to be affected by the vagaries of global climate change and variability. Additionally, the study examined historic trends, consequences and response mechanisms in a climate change context, for the selected sectors. Based on the assessment, the study made recommendations with respect to public awareness, strengthening of the soil and water conservation strategies and technologies and strengthening the enforcement of the building codes and regulations.

*St. Vincent Emergency Recovery and Disaster Management Project (ERDMP) -
Environmental Impact Assessment*

This study was undertaken by Ivor Jackson and associates as part of the requirements for

the funding of the ERDMP. The study focused on the proposed civil work activities, namely construction of the Layou seawall and Colonaire, Langley Park and Buccament river defense. While the other proposed works were undertaken under that project, the Buccament river defense was not. This activity is now proposed for funding under the DVRP. The study revealed that the major issue at Buccament was severe erosion and undermining of the bridge abutments. Along the right upstream bank there has also been erosion to the point where the existing main road is also threatened indicating that there is a need for river protection. It concluded that gabion basket system as proposed is an appropriate alternative for the existing situation. Among the positive impacts of installing the gabion walls include reduction in the variability of channel depths, which will produce a more uniform, incised single channel pattern; reduction in both erosion and siltation and long-term protection for bridge foundation and roadways.

St. Vincent Coastal Vulnerability Assessment

The assessment of the island of St. Vincent was undertaken under the United States Agency for International Development – Barbados Caribbean Open Trade (USAID-COTS) programme. The purpose of the study was to assess the vulnerability of selected areas of the south and east coasts of St Vincent to storm surge and coastal erosion, so as to inform development and disaster mitigation planning. Public infrastructure, social and economic facilities, and environmental assets deemed highly vulnerable to storm surge and coastal erosion were identified and mapped. The study area extended from Questelles on the south east coast in the greater Kingstown area to Sandy Bay on the northeast coast.

2.2.2. Field Visits:

Several field visits to project sites were undertaken in during the months of October and November 2010. During these visits, interviews were held with residents in the areas,

photographs were taken, and visual inspections and activity screening¹ were conducted and recorded.

2.2.3. Limitations of the Study

As indicated, some Project information and planning and background data were not prepared or decided during the conduct of this study. Furthermore, at some of the proposed sites, studies to inform the final designs will be conducted as project activities as such, it would be impossible to design an environmental mitigation strategy for these activities. Notwithstanding, recommendations have been made for the policies which will inform how different impacts can be mitigated. Further, the EA identifies which activities will require further assessment once designs are finalized.

¹ World Bank screening tool prescribed under OP 4.01 was utilized for this purpose. A sample is provided in Annex 2

3. LEGISLATIVE FRAMEWORK

St. Vincent and the Grenadines has several Environmental legislation which address the protection of the physical and human environment. The following are relevant in the context of this project:

- The Town and Country Planning Act No. 45 of 1992;
- The Central Water & Sewerage Act of 1992;
- The Waste Management Act, No. 31 of 2000;
- The Litter act, No. 15 of 1991;
- The Environmental Health Services Act, No. 14 of 1991; and
- The Noise Control Act, 1988.

The Town and Country Planning Act No. 45 of 1992

Under section 3 of the Town and Country Planning Act, the Physical Planning and Development Board was established. The Act makes provisions for the orderly and progressive development of land and the proper planning of town and country areas. Section 29 (2) of the Act specifies that the Board may by notice require an EIA to be submitted to it in such form and contain such information as may be prescribed by the notice, in instances where it is of the opinion that the activities are likely to cause or is causing pollution or is otherwise likely to have adverse effects on the environment. While this is so, EIA regulations or other procedures to implement the various provisions of the Act, however do not exist. Land management and development is therefore an ad-hoc process and largely sector-driven. The Town and Country Planning Act also establishes standards for setbacks from beaches, highways, riverbanks and other sensitive areas however the major weakness as it relates to this project, is that of enforcement.

The Central Water & Sewerage Act of 1991

This Act makes provision for conservation, control, apportionment and use of water resources. Under the Act, the Minister with responsibility for the Environment has

authority to set aside protected areas for the protection of water resource. National standards for the discharge of treated effluents into surface water have not been established, but the current approach of the Central Water and Sewerage Authority is to apply World Health Organization or European Union standards.

Waste Management Act No. 31 of 2000

The Waste Management Act No. 31 of 2000 provides for the management of solid waste in conformity with best environmental practices. It defines the roles and responsibilities of the National Solid Waste Authority and generally provides the framework for waste management planning and waste management operations in St. Vincent and the Grenadines. The Act is supported by the Solid Waste Management Regulations of 2006, which, among other things, establish the national standards for the handling of solid wastes such as derelict vehicles, scrap tires, used oil and special waste and specify the requirements for obtaining licenses and permits in connection with waste management operations.

The Litter No. 15 of 1991

This act makes provisions for the control of emissions and effluent discharge into water bodies, but there are no accompanying regulations in place to support this Act. In addition, there are no programmes for water quality monitoring for natural surface waters thus analyses are only be done if a problem is suspected.

The Environmental Health Services Act, No 14, 1991

The act makes provision for conservation and maintenance of the environment in the interest of Health generally and in particular in relation to places frequented by the public. This act determines that the Ministry of Health and Environment has this responsibility. In this respect, the Environmental Health Unit is responsible for regulating, monitoring and controlling any present and likely environmental pollution and

to investigate, prevent and remediate environmental pollution, including the management and disposal of solid, liquid and gaseous waste.

Noise Control Act, 1988.

Section 5 of the Act describes a code of practice for noise control at construction sites, which is enforced by the police. The Physical Planning Board may serve a notice specifying the type of plant to be used for construction and setting limits for noise levels and working hours. Where works of the listed type specified in the Act are intended, the developer must submit an application to the Board and specify the exact nature of works, construction methods to be applied and noise control measures proposed.

4. DESCRIPTION OF THE EXISTING ENVIRONMENT

4.1. Physical attributes

Saint Vincent and the Grenadines (SVG) is a multi-island State within the archipelago of islands in the Caribbean Sea called the Antilles. The country consists of thirty-four islands, islets and cays and is situated 13° north latitude, and 61° west longitude. It is approximately 150 kilometres west of Barbados, 40 kilometres southwest of St. Lucia, 110 kilometres north-northeast of Grenada, and 270 kilometres north of Trinidad and Tobago. The main island, St. Vincent, lies to the extreme north, is roughly elliptical in shape, 30 kilometres long and 16 kilometres wide, with an estimated land area of 340 sq. km. The Grenadines cover a land area of approximately 50 sq. km. and stretch a distance of 72 km. to the southwest of the mainland, St. Vincent. The seven inhabited Grenadine islands are Bequia and Mustique in the Northern Grenadines; and Union, Canouan, Mayreau, Palm Island, and Petit St. Vincent in the Southern Grenadines. In addition there are a number of uninhabited islets and rocks, including the Tobago Cays, which are of environmental, historic and economic significance.

The main topographical feature of St. Vincent is the rugged, thickly forested central mountain range that runs in a north–south direction. The highest point on the island, the La Soufriere Volcano, rises to 1,234 metres. Other peaks range in height from 800 to 1,100 metres. Highly dissected ridges and valleys, which extend to the coast, characterize the topography on the leeward side. The spurs are steep and the valleys deep and narrow. The windward side is dominated by more gently undulating foothills, shallow valleys and extensive coastal plains. There are many drainage systems of small streams and rivers. As such, the mainland is divided into thirteen watershed areas. The Grenadines are low-lying, with the highest point at 330 metres, Mt. Taboi on Union Island. The second highest point, Mt. Royal, on the island of Canouan, is 290 metres high.

La Soufriere, a large active volcano, is located on the north end of Saint Vincent and has erupted five times in recorded history: 1718, 1812, 1902, 1974, and 1979. On several of these occasions, the toll in terms of human lives², property and disruption of agricultural activity has been significant. In fact, the eruption of 1979 when a characteristic cloud of super heated gases (Nuée Ardente), flowed down the mountain slopes resulted an estimated US \$100m in damages. Settlements within the areas of extreme risk with respect to volcanic eruptions are located to the north of the Rabacca and Wallilabou Rivers, and include Sandy Bay, Point, Owia, and Fancy.

There are no major faults or folds anywhere in the country. St. Vincent and the Grenadines occasionally experience earthquakes associated with activity of the La Soufriere volcano and suffer minor effects from seismic events in the Caribbean Basin.

4.2. Climate

The country has a humid tropical climate. The temperatures range from approximately 18° C to 33° C, with an annual average of around 26°C. Temperatures tend to be cooler on the higher elevations of the mainland's interior due to the orographic influences of the central mountain range. There are two distinct seasons: a dry season from January to May, and a wet season from June to December, with the wettest period between June and September. On the mainland, the annual rainfall varies from 2,000 mm on the extreme south coast to 6,000 mm in the mountainous interior. Rainfall intensity decreases from north to south and from the windward side of the island to the leeward coast. The evapotranspiration rate averages 1,250 mm a year along the coast and decreases progressively with altitude. Precipitation is significantly lower in the Grenadines. The average annual rainfall on Bequia, Union and Canouan is about 1250 mm per year. The wettest months are June to November when the monthly average is 150 mm, while the

² There is no record of lives being lost in the eruptions of 1974 and 1979 however 1,680 persons were killed in the event of 1902.

driest period is from February to April during which the average monthly rainfall is around than 250 mm. No rivers and streams are found in the Grenadines.

Although St. Vincent and the Grenadines is located south of the main Hurricane Zone, the country has suffered the impact of several severe storms in the past. In 2004 the passage of Hurricane Ivan caused extensive damage from flooding, high winds, storm waves, and landslides, particularly on the coastline, destroying settlements and major infrastructural development and most recently the passage of hurricane Tomas (2010). Extended drought can also bring on ravages particularly in the agricultural sector.

Scientists predict that global warming and associated climate change may cause an increase in the intensity and frequency of storms and hurricanes. Poor land management and deforestation in light of climate change impacts can therefore be a formula for disaster. Effects of climate change are typically insidious and manifest in variations from historical conditions. Local and sub-regional data are presently not available to evaluate the specific effects of climate change for SVG, but global and regional data indicate that rising sea levels and changes in storm patterns are changing the country's risk profile. Furthermore, current trends in climate modeling suggest that while SVG will face the same suite of hazards it currently experiences, the intensity, frequency and duration appears to be changing. For example, current estimates suggest that storms are trending toward fewer in number but greater in rainfall intensity. This has the effect of increasing drought vulnerability and increased exposure to landslip, flooding and related phenomena.

SVG is a volcanic island characterized by deeply dissected terrain and a coastal zone largely composed of steep cliffs reaching to the sea. There are limited areas where coastal access is possible mostly located on the western or leeward side of Saint Vincent and the neighbouring islands.

SVG is exposed to a range of natural hazards. Most important are hazards stemming from weather related phenomena such as winds, rainfall, hurricane and drought. The islands experience an annual hurricane season from June to November, followed by a rainy season from November to January. The dry season extends typically from February to May.

4.3. Biological

The natural vegetation of SVG exists in several stages of development and/or disturbance caused by human and natural (volcanic) interventions. It is therefore defined by a climax vegetation formation based on environmental gradients. The concentric variations of rainfall with elevation give rise to concentric variations in vegetation. The slopes of the La Soufriere volcano have been subject to the frequent disturbance of vegetation by volcanic eruptions, however it shows both the success of re-vegetation along with the variation of vegetation with elevation. This concentric variation in vegetation is modified by factors of topography and geology in the Grenadines, which have lower relief, and a more semi-arid climate than the mainland. The soils of the Grenadines are shallow with a uniform vegetation distribution of scrub and cacti vegetation. The physical and environmental conditions of rainfall, soils, elevation, terrain, and exposure to the trade winds, on these small islands, result in a remarkable diversity of eco-systems and forest types.

The following is a summary of the vegetation types that exist on the island

- ***Elfin Woodland:*** Found on exposed summits above 500 metres on both sides of the central mountains. They consist of pure stands of dwarfed trees about three metres in height covered with epiphytes. This vegetation type is commonly associated with the Palm Brake vegetation type.

- ***Rain Forest:*** Confined to areas in the upper Colonaire, Cumberland and Buccament Valleys between 300 and 488 metres.
- ***Palm Brake:*** This refers to a sub-climax type typically at elevations over 500 metres arising after disturbances such as landslides or tree-falls (opening up the forest canopy). The land is covered initially by mosses, then by small tree ferns and heliconias followed by the characteristic Mountain Cabbage Palms.
- ***Secondary Rain Forest:*** This type describes the resultant forests arising from disturbances from volcanic eruptions, hurricanes and human activity. The largest areas lie around the Soufriere Mountains. The vegetation ranges from almost bare soil on the upper slopes of the Soufriere volcano to significant stands of new forest at lower elevations.
- ***Deciduous Seasonal Forests/Cactus Scrub:*** On the dry southern and south-western coasts of St. Vincent and the Grenadines where the soils are extremely thin, deciduous to semi-deciduous and xerophytic species predominate.
- ***Littoral Woodland:*** This type of vegetation is characterized by manchineel, button mangrove, sea grape and similar species. They exist as small narrow strips along the eastern coastline on St. Vincent and on a number of the islets and cays of the Grenadines. This type of vegetation is fast disappearing as development takes place along the coast.
- ***Swamp:*** Only small areas of swamp occur in St. Vincent and the Grenadines. These exist in the southern section of the main land on the coast and on a few of the Grenadine islets. The typical species found in these areas are Red Mangrove, Black Mangrove, White Mangrove and Button Mangrove.

In total, there are more than 1,150 species of flowering plants, 163 species of ferns, 4 species of amphibians, 16 species of reptiles, 111 species of birds, and 15 species of mammals have been identified on SVG. In terms of marine biodiversity, over 500 species have been identified. Among these are at least 450 species of fin-fish, 12 species of whales and dolphins, 4 species of turtles, 9 of gastropods, 11 seaweeds and 30 different coral species. Nonetheless, it must be noted that local biodiversity listings are far from complete and are in many respects outdated. Consequently, current data only partially represents the wealth of natural assets, which are at risk of being lost or severely depleted due to a multitude of threats.

4.4. Socio-economic context

The 2001 population and housing census indicated that SVG has a population of 106,253 persons. Approximately 90% of the population is of African descent, while the other 10% is a combination of East Indian, European and indigenous people. St. Vincent and the Grenadines is internationally classified as a lower-middle-income country. The economic development is structured around the agriculture, tourism and international business services sectors. The Gross Domestic Product (GDP) per capita (2008) is US\$ 5,515; the literacy rate is 96% and the life expectancy at birth is 74 years. In 2009, the overall Human Development Index (HDI) Value is 0.772 and the country is ranked 91st in terms of HDI.

4.5. Agriculture

The agricultural sector, in particular the banana industry, has contributed immensely to the economic development of St. Vincent and the Grenadines over the past three decades. It provides income, employment and improved welfare for the Vincentian society. The sector's relative contribution to GDP has declined from an average of 18% in 1988 to 8% in 2008. This decline is directly linked to a fall-off in banana production as a result of the loss of preferential marketing arrangements to the United Kingdom and ever-changing

market conditions in Europe, including more stringent quality standards, greater competition and lower prices. Additional factors include new sanitary and phyto-sanitary (SPS) requirements for export of bananas to Europe (under the EUREP-GAP standard), the escalating cost of inputs and low labour productivity relative to labour cost.

St. Vincent and the Grenadines was among the world's main exporters of arrowroot flour, however the crop is now of minor importance, dwarfed by banana and other agricultural production. Other crop commodities of significance in SVG include dasheen, eddoes, sweet potatoes and yams. Major tree crops include mango, coconut, avocado and citrus. The livestock industry is relatively small. According to the 2000 Agriculture Census, production (in terms of number of heads) was dominated by sheep, goats and poultry.

4.6. Tourism

The tourism sector has continued to play an increasingly greater role in recent times as the agricultural sector declined. In 2004 the number of stop over tourists reached 86,700 with tourism receipts totaling US\$95.6 million. Due to the contraction of the agricultural sector, the tourism sector is now making a greater contribution to national development with direct investment and ancillary development in support service sectors. This trend is anticipated to increase as national development policy seeks to place the hospitality sector within the main engines of economic growth.

Tourism in SVG has been focused primarily on the “sea and sand” experience especially with respect to the extensive array of water-based activities available on the Grenadine islands. The Government of St. Vincent and the Grenadines (GOSVG) has sought to diversify its tourism product with a focus on upscale and niche markets. This has attracted investors such as the Mustique Company Ltd., Raffles Resorts, Donald Trump and Disney, with major investments including convention centres, yacht facilities and professional golf courses. Incentives are currently being offered to hotel developers interested in properties in excess of 100 rooms.

The issue of airlift is a major constraint, as currently the island is only accessible via turbo-prop aircraft from neighbouring islands flying to the E.T Joshua Airport. The GOSVG is currently undertaking a multi-million dollar airport and condo-villa development project. The new Argyle International Airport will be the island's first international airport and will feature a 50,000 square-foot terminal. It will effectively open up the island to non-stop international flights. In addition to these investments, the Canouan airport and that Grenadine island has recently been expanded to accommodate jet aircrafts.

The rise in eco-tourism in SVG is noteworthy in the context of land conservation. Sustainable management of land-based resources is of critical importance not only guaranteeing quality of eco-touristic excursion experience but also quality of marine ecosystems that have dive site potential in that sector. The Ministry of Tourism developed a Community-Based Tourism Programme. The programme commenced as a collaborative effort between the Ministry and the North Leeward Tourism Association and will ensure that communities play a more integral role in the tourism sector. This is seen as necessary if the industry is to thrive.³

4.7. Industrial Sector

The industrial sector in SVG employs around 8% of the workforce and in 2008 contributed about 29.2% to GDP. Industrial activity is focused primarily on agricultural processing of foodstuffs such as flour, rice, animal feeds, beans and other dried grain.

4.8. Poverty issues

In 2001 the unemployment rate was 21% while the poverty rate was at 37.5%. The work undertaken by the present Government in the fight against poverty is documented in a

³ www.gov.vc. The Official Website of Saint Vincent and the Grenadines

publication entitled: “Four Years of Progress: Poverty reduction in St. Vincent and the Grenadines April 2001 to April 2005”. The Government has developed a Poverty Reduction Strategy Paper (PRSP) which is intended to develop policies and programmes aimed at addressing key elements of poverty reduction in the short, medium and long term. The PRSP components include, *inter-alia*, policies to stimulate growth, trade, investment, increase or generate employment opportunities and greater investment in human capital, thus increasing the livelihood of all people in SVG.

A phenomenon that has been rooted in the circumstance of poverty is the illegal cultivation of marijuana on the steep mountainous slopes in the interior of the island (an emerging major cause of deforestation and land degradation in SVG). The activity is supporting the livelihoods of a segment of the population that may not have access to alternative desirable means of income on account of their situation of poverty. It is estimated that there are over 2,000 marijuana farmers currently making a living from planting this illegal crop, which is substantially more lucrative than the growing of other crops. The average land area that growers tend to cultivate is 0.4 hectares.

Squatter settlement growth is another one of the manifestations of poverty in SVG and is of consequence in the context of land degradation. Squatter settlements in St. Vincent are typically situated on marginal, less favourable lands for economic development that also tend to be more prone to environmental degradation (such as land slippage) under intensive utilization. Compounding the situation is the fact that these settlements are often devoid of basic sanitation services such as running water and proper sewage disposal facilities, which predisposes the residents to water borne diseases such as diarrhea which affect especially children. Given the nature of tenure and lack of resources, residents have little or no vested interest in managing the lands and lack the capacity to make any investments that may address sustainable land management. Some major squatter settlements are at Rose Bank, (northwest rural) Byrea (east coast) and Troumaca “German Gutter” (northwest).

5. ANALYSIS OF PROJECT IMPACTS

The project is designed to address a number of issues and yield results at several locations throughout St. Vincent and the Grenadines. At the time of assessment, many of the project designs were not finalized thus the potential magnitude or significance of impacts, depends on technical design, decisions regarding technical equipment and management arrangements, which have not yet been taken. Notwithstanding, the emphasis in this section is on the impacts reasonably expected based on the nature of the activities.

Generally, the works contemplated under this project will relate to the rehabilitative work to existing failed critical infrastructure such as bridges, roads, protection of vulnerable areas of roadway and refurbishment of vital public buildings. The impacts for these types of works are expected to be moderate in nature and can be managed through the application of appropriate engineering, construction site management and construction operations management measures.

Specifically:

- There will be no use of hazardous materials apart from fuel and paint products
- No pesticide applications will be required
- No pollution impacts have been identified apart from those associated with site debris management.

In addition, there are some works proposed which have elements of new constructions particularly those involving expanded river defense works and drainage improvements, coastal protective structures and road realignments which will likely present the possibility for significant environmental impacts and may require separate Environment Impact Assessments.

Project Activities

The following activities are anticipated to have the most significant impact⁴:

a) *Coastal protection and river defense works.*

This includes: (i) coastal protection investments in Sandy Bay, Georgetown, and Kingstown around the South river; and (ii) river defense works along Buccament, Colonaire, Warrowarrow and Cumberland. Among the positive physical impacts, there will be a reduction in the variability of channel depths, which will produce a more uniform, incised single channel pattern; reduction in both erosion and siltation and long-term protection for roadways. On the other hand, the activity may result in changes in river flow, discharge and sedimentation characteristics with possible coastal effects.

b) *Rehabilitation and reconstruction of critical roads and bridges.*

This includes rehabilitation of two bridges on Fenton road (Green Hill and Dauphine), and Paget Farm road. Possible environmental impacts will include dust and noise from construction in the cases of Fenton Road and Bridges since works will be concentrated on rehabilitating existing infrastructure. There is also the potential for marine and coastal zone impacts relative to water quality and sedimentation.

c) *Drainage improvement works in Arnos Vale.*

This activity may result in changes in river flow and discharge and sedimentation characteristics with possible coastal effects. There may also be the possibility of temporary disruption of traffic on a major transport route.

d) *Retrofitting and reconstruction of critical public buildings.*

Under this activity several health centres and police stations will be upgraded and strengthened to ensure that they can assist communities during disasters. These works are limited to replacement, rehabilitation and improved disaster resistance of

⁴ Impact refers to physical environmental impact

production capabilities in already existing areas thus foreseeable negative environmental impact are limited debris, trash and noise generation.

e) *Retrofitting of emergency shelters.*

This includes complete retrofitting emergency shelters with installation of emergency equipment, sanitary facilities and improved drainage. These works are limited to replacement, rehabilitation and improved disaster resistance of production capabilities in already existing areas thus foreseeable negative environmental impact are limited to debris, trash and noise generation.

f) *Slope stabilization and drainage.*

This includes implementation of landslide prevention and drainage works around Dark View, Chester Cottage, Maroon Hill, Paget Farm, Fancy, Mount Grennan, Spring, Baleine and between Mt. Pleasant and Peruvian Vale of the Windward Highway. There is the possibility for impacts related to water quality and sediment migration. There may also be a possibility of temporary disruption of traffic.

6. MITIGATION ANALYSIS

This project has been classified as category B in accordance with OP/BP 4.01 Environmental Assessments. Works proposed under the project are largely rehabilitation and retrofitting of selected infrastructure and impacts are generally associated with the actual construction phase of the works activities. However, select works involve new constructions particularly those involving expanded river defense works and drainage improvements, coastal protective structures and road realignments will likely present the possibility for significant environmental impacts.

As a category B project, the Government of SVG has prepared an Environmental Assessment examining project activities and providing an environmental framework to guide project execution. Two groups of projects have been identified. These are those which will require an Environmental Assessment to be completed during project execution and those comprising uncomplicated rehabilitation works where the impacts are limited to the construction phase (e.g. repair and retrofitting). To address these activities, procedures have been included in the operations manual detailing requirements for a stand-alone Environmental Assessment and the screening of uncomplicated activities for the inclusion of environmental compliance contracting clauses to mitigate construction related impacts.

Projects requiring an EA have been identified and contracting requirements have been incorporated into the procurement plan. EAs will be completed during the preparation of works activities and will establish environmental requirements for the design and construction phase of the activity draft TORs are included in the operations manual. All such projects are subject to prior review. Specific works identified requiring an EA are presented in the following table.

Table: Project Activities identified requiring Environmental Assessment under Bank Safeguard OP/BP 4.01

St. Vincent and the Grenadines Disaster Vulnerability Reduction Project
Environmental Assessment

Works Element	Pertinent Activities	Issues Initially Identified	Potential Impact Themes
<i>River defence: Construction of gabion/reinforced concrete for the Warrawarrow</i>	River defences to be expanded beyond existing works.	Potential encroachment on private land, changes in river flow, discharge characteristics and sedimentation characteristics with possible coastal effects	Biological, Physical, Socio-economic
<i>River defence: Colonaire River</i>	River defences to be expanded beyond existing works.	Potential encroachment on private land, changes in river flow and discharge characteristics with possible coastal effects	Biological, Physical, Socio-economic
<i>River defence: Buccament river</i>	River defences to be expanded beyond existing works.	Potential encroachment on private land, changes in river flow and discharge characteristics with possible coastal effects	Biological, Physical, Socio-economic
<i>River defence: Kingstown - South River</i>	River defences to be expanded beyond existing works.	Potential encroachment on private land, changes in river flow and discharge characteristics with possible coastal effects	Biological, Physical, Socio-economic
<i>Relocation of the Milton Cato Memorial Hospital</i>	Final design and site engineering investigations for major new construction, site to be determined	Complete design for the New construction and relocation central hospital facility. While construction of the facility is not included under the project, a complete engineering design requires the integration of environmental impact mitigations.	Biological, Physical, Socio-economic
<i>Drainage Improvement: drainage improvements work: Arnos Vale</i>	Expansion of existing drainage control works with addition of detention basin. Culvert replacement on principal access road to Kingstown from the south.	Changes in river flow, discharge characteristics and sedimentation characteristics with possible coastal effects, temporary traffic disruption on major transportation route	Biological, Physical, Socio-economic
<i>River defence: Cumberland River</i>	River defences to be expanded beyond existing works.	Potential encroachment on private land, changes in river flow and discharge characteristics with possible coastal effects	Biological, Physical, Socio-economic
<i>Coastal defence: Georgetown</i>	Construction of sea defenses in the vicinity of Georgetown including breakwater structures	Potential marine and coastal zone impacts relating to water quality, sedimentation - sediment migration, fisheries and marine habitat implications and erosion	Biological, Physical, Socio-economic
<i>Coastal defence: Sandy Bay</i>	Construction of sea defenses in the vicinity of Sandy Bay including breakwater structures	Potential marine and coastal zone impacts relating to water quality, sedimentation - sediment migration, fisheries and marine habitat implications and erosion	Biological, Physical, Socio-economic

Works Element	Pertinent Activities	Issues Initially Identified	Potential Impact Themes
<i>Rehabilitation of Road to Paget Farm</i>	New construction and realignment of Paget Farm Road, Bequia	Requires re-alignment through occupied lands. Project tied to works in coastal defenses under Slope Stabilization: Paget Farm	Biological, Physical, Socio-economic
<i>Slope Stabilization: Dark View (road realignment)</i>	ea/social geo tech, design and super 14%	Requires re-alignment through occupied lands. Project tied to works in coastal defenses under Slope Stabilization: Paget Farm	Biological, Physical, Socio-economic
<i>Slope Stabilization: Paget Farm</i>	Stabilization of cliffs along Paget Farm Road and construction of breakwater structures	Component tied to Paget Farm Road Rehabilitation. Potential marine and coastal zone impacts relating to water quality, sedimentation - sediment migration, fisheries and marine habitat implications and erosion	Biological, Physical, Socio-economic

For uncomplicated activities, a screening procedure and draft construction contract clauses are included in the operations manual to be applied as needed to works construction contracts.

As identified in the EA, construction activities are generally located in urban centres and along vulnerable roadway areas with respect to landslip and rock fall. Projects potentially affecting sensitive habitats, coastal zone, or involving any additional application of environmentally related safeguard policy have been identified needing EA preparation.

Supervision for environmental compliance will be managed through the Public Sector Investment Programme Management Unit (PSIPMU)⁵ in close collaboration with the Ministry of Housing, Informal Human Settlements, Physical Planning and Land and Surveys (MoHILPP) under Bank Supervision. In addition to Bank requirements, the PSIPMU will also be responsible for ensuring the proper application of any National environmental requirements.

⁵ The PSIPMU is a unit within the Central Planning Division of the Ministry of Finance and Economic Planning which will act as the Project Coordination/Implementation Unit for the Project

7. ENVIRONMENTAL MANAGEMENT PLAN (EMP)

As indicated, the project activities are at different levels of preparation. In some cases there are no final engineering designs for the works proposed. In other cases, studies which will inform the designs to be implemented will be undertaken as part of project implementation. As such, the full impact of these activities can not be ascertained at this point. Accordingly, the EMP provides guidance on actions which must be taken during the implementation and operational phase of the project to ensure that activities are undertaken in an environmentally sustainable fashion so as to minimize the impact of the initiative on the surrounding environment, both human and natural. In order to strengthen compliance with the EMP, the actions and recommendations described below can also form clauses in contracts that govern construction and project implementation.

7.1. 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 wastes, construction and sanitary, additional strengthening of erosion control and soil stabilization systems and other conditions resulting from contractor activities that may increase the potential for damages.

7.2. 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 marked and the evidence preserved for examination.

Work may resume, without penalty of prejudice to the contractor upon permission from the PSIPMU with any restrictions offered to protect the site.

7.3. Asbestos

While asbestos materials have not been identified in structures targeted for repair or reconstruction under this project, the following asbestos management procedures shall be implemented should they be discovered during the construction process.

The contractor shall contact the Solid Waste Management Unit to develop an asbestos management plan. Site management shall consist of stabilizing friable asbestos and the provision of worker protection to 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 exposed workers.

The asbestos management plan shall be developed by the contractor in consultation with the Solid Waste Management Unit to include as a minimum:

- Description of the issue and extent of contamination
- Site safety measures
- Stabilization techniques to be employed
- Storage and transport plan
- Approved disposal procedure
- Worker awareness and training

This plan shall be approved by the Solid Waste Management Unit and the Public Sector Investment Programme Management Unit.

7.4. 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 Public Sector Investment Programme Management Unit. The contractor shall provide a site sanitation plan for approval and implementation prior to the commencement of site activities.

7.5. Noise Control

The contractor 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 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 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 shall inform the site manager and shall develop a public notification and noise management plan for approval by the Public Sector Investment Programme Management Unit.

7.6. Use and management of hazardous materials, fuels, solvents and petroleum products

Any use 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 contracting officer.

7.7. 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 PSIPMU. The contractor shall provide the PSIPMU 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 contracting officer.

7.8. 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, provision of approved ground cover.

Where excavations are made, contractor shall implement appropriate stabilizing techniques to prevent cave-in or landslide. Erosion control measures shall be approved by the PSIPMU.

An erosion management plan will be required where the potential exists for significant sediment quantities to accumulate in wetlands, lakes, rivers and near-shore 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.

7.9. 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 shall provide the Project Implementation Unit 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 Project Implementation Unit

7.10. Management of standing water

Under no circumstances shall the contractor permit the collection of standing water as a consequence of contractor activities without the approval of the contracting officer and consultation with the Environmental Management Department of the Ministry of Health and the Environment.

7.11. Management of trash and debris

The contractor shall provide the PSIPMU with a trash and debris management plan that conforms to the solid waste management policies and regulations of St. Vincent and the Grenadines. Under no circumstances shall the contractor 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 shall provide for the regular removal and disposal of all site wastes and provide the contracting officer with a schedule for such removal.

7.12. Schools

The project includes rehabilitative works to schools. In some cases, construction may occur while classes are being held. If this is the case, the school will use undamaged areas for classroom activities. The contractor shall seek to minimize as much as possible, the impacts to ongoing classes. Contractors shall also work with the Ministry of Education's designate to manage the storage and flow of materials so as to minimize disruption to school activities. In cases where this is not an option, the project implementation unit will coordinate with the Ministry of Education to propose a system which will ensure that the smallest level of disruption to school activities e.g. shift system in collaboration with neighbouring schools.

7.13. Agency Responsibility

Several government agencies have responsibility for decision making on development and resource use. As it relates to EIAs the following are the key agencies:

Agency	Responsibility
Physical Planning and Development Board	Planning permission and development control
Pesticide Control Board	Control of importation, distribution and use of pesticides
Central Water and Sewerage Authority	Conservation, control distribution and use of water resources
Public Health Department	Maintenance of the environment generally and in particular place frequented by the public

REFERENCES

Environmental Solutions Ltd. 2007. *St. Vincent Coastal Vulnerability Assessment*

Ivor Jackson and Associates. 2001. *Environmental Impact Assessment – Emergency Recovery and Disaster Management Project*

Kocks Consult GmbH. 2008. *Argyle International Airport Project Environmental Impact Assessment.*

Pinto, F and Caballero, P. *Project Proposal for Capacity Building and Mainstreaming of sustainable land Management in St. Vincent and Grenadines*

University of the West Indies - Seismic Research Unit. 2004. *Report on Mass Movement at Baleine.*

University of the West Indies – Seismic Research Unit. 2005 and 2007. *Landslide Hazard Assessment Reports*

RECORD OF CONSULTATIONS

Organisation	Representative	Position
Ministry of Transport and Works	Brent Bailey	Chief Engineer
Fisheries Division – Ministry of Agriculture, Forestry and Fisheries	Lucine Edwards	Fisheries Officer
NEMO	Michelle Forbes	Director (Ag)
Meteorological Office	Anthonio Joyette	Meteorological Officer
Physical Planning Unit	Anthony Bowman Dornet Hull Laurette Pinder	Town Planner GIS Officer Planning Technician
Ministry of Housing	Kenrick Glynn Hudson Nedd	Permanent Secretary Chief Technical Officer
Lands and Surveys Department	Osborne Browne	Chief GIS Officer
Environmental Management Department	Edmund Jackson Nyasha Hamilton Yasa Belmar	Director Environmental Educator Environmental Analyst
Solid Waste Management Unit	Winsbert Quow	Manager
Ministry of Education	LuAnn Gilchrist	Chief Education Officer
Economic Planning Unit – Central Planning Division	Beresford George Trelson Mapp	Senior Economist Economist
National Parks Authority	Andrew Wilson	Director

ANNEXES

ANNEXE 1 – Terms of Reference

ANNEXE 2 – Scoping Checklist

TERMS OF REFERENCE ENVIRONMENTAL ASSESSMENT

SAINT VINCENT AND THE GRENADINES DISASTER VULNERABILITY REDUCTION PROJECT

1. Introduction

The government of Saint Vincent and the Grenadines (GoSVG) is in the process of preparing a World Bank funded project designed to contribute to the reduction of vulnerability to natural disaster in the region. The project will include various activities related to institutional strengthening and training as well as the execution of various works to retrofit or protect national assets.

According to the Bank's Environmental Assessment Policy [OP4.01] the project is classified as Category B meaning that environmental impacts for the type of work anticipated under the project are expected to be moderate in nature and can be managed through the application of appropriate engineering and management measures.

To ensure that the proposed Disaster Vulnerability Reduction Project (DVRP) takes environmental concerns into account, the GoSVG will engage a Consultant to a project level Environmental Assessment (EA), during the project preparation stage, based on the activities planned for execution under the proposed Disaster Vulnerability Reduction Project (DVRP). The EIA team will be engaged by the Public Sector Investment Project Management Unit (PSIPMU) to design, conduct and write up the results of the EA with input – where necessary - from the affiliated ministries/agencies particularly, Education, Works, Housing (including Lands and Community Development) and NEMO.

The purpose of these Terms of Reference (TORs) is to identify the nature, scope and extent of the EA.

2. Background

Saint Vincent and the Grenadines (SVG) comprises a collection of eastern Caribbean islands, the largest of which is St. Vincent. They are volcanic in origin and are characterized by a deeply dissected topography with a range of habitat components including marine, tropical and dry forest, urban and agricultural elements.

The environmentally significant project activities will likely focus on small to mid-sized civil works to be executed on St. Vincent, and possibly the Grenadines. Works activities include retrofitting of structures to improve disaster resilience, road works and bridge construction/rehabilitation including the possibility of road realignment, sea defenses, and building construction.

Cultural and historical aspects include archaeological considerations as St Vincent was the location of a significant population of the Carib indigenous group. While no works have been identified in known historical sites, there remains the possibility for chance discovery of artifacts in the project area.

Marine habitats are varied and include sand beaches, near-shore reef systems, marine grasses and other features typical of the geographic setting. Terrestrial habitats are varied and St. Vincent does have endemic species including the St. Vincent parrot (*Amazona guildingii*) which is listed as endangered in CITES appendix I. Given the current suite of proposed works, there are no implications for the intervention into natural habitats or critical habitats however this should be verified under the Environmental Assessment.

3. Objectives of the EA

This Environmental Assessment is to be conducted at the project preparation phase in the Bank project development cycle and is required for project approval under the Bank's Safeguard System. The EA is a project level assessment and reflects an analysis of the general impacts and mitigations to be applied during project execution. At this stage, in most cases, engineering designs do not exist and precise locations have generally not been identified for specific works. As a result, the assessment will be forward looking with emphasis on impacts reasonably expected based on the nature of the activities and the development of an Environmental Management Plan (EMP) to be applied during project execution. The plan will include activities required based on the specific works to be undertaken and may include the requirement for separate environmental assessments to be conducted for specific works activities depending on the magnitude of expected impacts. To this end, the EMP will include a screening procedure to identify activities requiring additional analysis.

The EA will be conducted in compliance with World Bank requirements as presented in OP 4.01, Environmental Assessment and shall include considerations as presented in Bank Safeguards OP/BP 4.04, Natural Habitats and OP/BP 4.11, Physical Cultural Resources.

4. Scope

This assessment shall include the examination of all activities proposed under the DVRP with particular emphasis on the civil works activities.

5. Specific EA Requirements

As a project level assessment, the Consultant shall review with the line agencies activities to be included in the project and assess the potential environmental impacts that may arise. During the assessment the consultant will assess the environmental management capacity of the various agencies and include a review of applicable St. Vincent and the

Grenadines national regulations to identify specific environmental compliance activities in addition to those included under OP 4.01 and related safeguards.

At a minimum, the EA will include the following:

1. Executive Summary of not more than 2 pages
2. Description of the Project
3. Legal framework including environmental, land use, water management and other related laws and regulations
4. Description of the Existing Environment
 - Biological
 - Physical
 - Socioeconomic
5. Analysis of project Impacts
 - Biological
 - Physical
 - Socioeconomic
6. Mitigation Analysis
7. Mitigation plan
8. Environmental Management Plan
9. Record of consultations
10. Technical Annexes
11. List of Preparers

In addition to the assessment, the Consultant shall provide an environmental screening procedure for works activities designed to identify works activities requiring additional assessment during the project execution. These procedures will be incorporated in the Project Operations Manual.

The consultant shall provide a draft TOR for Environmental assessments to be included in the project operations manual as well as environmental management requirements for small works not requiring a separate EA.

6. Schedule

Level of effort = 10 days

Keeping with the project approval timeline, the Environmental Assessment will be completed by October 30, 2010

7. Qualifications of Consultant

The consultant shall have a minimum of a bachelor's degree in natural sciences or related discipline and a minimum of 5 years experience in the development of Environmental assessments and analysis. Consultant shall have demonstrated experience in the analysis of impacts related to civil works.

SCREENING TOOL/SCOPING CHECKLIST

o.	Questions to be considered in Scoping	Yes/No?	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why?
1. Will construction, operation or decommissioning of the Project involve actions which will cause physical changes in the locality (topography, land use, changes in waterbodies, etc)?				
1.1	Permanent or temporary change in land use, land cover or topography including increases in intensity of land use?			
1.2	Clearance of existing land vegetation and buildings?			
1.3	Creation of new land uses?			
1.4	Pre-construction investigations - e.g. boreholes, soil testing?			
1.5	Construction works?			
1.6	Demolition works?			
1.7	Temporary sites used for construction works or housing of construction workers?			
1.8	Above ground buildings, structures or earthworks including linear structures, cut and fill or excavations?			
1.9	Underground works including mining or tunneling?			
1.10	Reclamation works?			
1.11	Dredging?			
1.12	Coastal structures - e.g. seawalls, piers?			
1.13	Offshore structures?			
1.14	Production and manufacturing processes?			
1.15	Facilities for storage of goods or materials?			

St. Vincent and the Grenadines Disaster Vulnerability Reduction Project
Environmental Assessment

o.	Questions to be considered in Scoping	Yes/No?	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why?
1.16	Facilities for treatment or disposal of solid wastes or liquid effluents?			
1.17	Facilities for long term housing of operational workers?			
1.18	New road, rail or sea traffic during construction or operation?			
1.19	New road, rail, air, waterborne or other transport infrastructure including new or altered routes and stations, ports, airports, etc.?			
1.20	Closure or diversion of existing transport routes or infrastructure leading to changes in traffic movements?			
1.21	New or diverted transmission lines or pipelines?			
1.22	Impoundment, damming, culverting, realignment or other changes to the hydrology of watercourses or aquifers?			
1.23	Stream crossings?			
1.24	Abstraction or transfers of water from ground or surface waters?			
1.25	Changes in waterbodies or the land surface affecting drainage or run-off?			
1.26	Transport of personnel or materials for construction, operation or decommissioning?			
1.27	Long term dismantling or decommissioning or restoration works?			

St. Vincent and the Grenadines Disaster Vulnerability Reduction Project
Environmental Assessment

o.	Questions to be considered in Scoping	Yes/No?	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why?
1.28	Ongoing activity during decommissioning which could have an impact on the environment?			
1.29	Influx of people to an area either temporarily or permanently?			
1.30	Introduction of alien species?			
1.31	Loss of native species or genetic diversity?			
1.32	Any other actions?			
2. Will construction or operation of the Project use natural resources such as land, water, materials or energy, especially any resources which are non-renewable or in short supply?				
2.1	Land especially undeveloped or agricultural land?			
2.2	Water?			
2.3	Minerals?			
2.4	Aggregates?			
2.5	Forests and timber?			
2.6	Energy including electricity and fuels?			
2.7	Any other resources?			
3. Will the Project involve use, storage, transport, handling or production of substances or materials which could be harmful to human health or the environment or raise concerns about actual or perceived risks to human health?				
3.1	Will the project involve use of substances or materials which are hazardous or toxic to human health or the environment (flora, fauna, water supplies)?			

St. Vincent and the Grenadines Disaster Vulnerability Reduction Project
Environmental Assessment

o.	Questions to be considered in Scoping	Yes/No?	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why?
3.2	Will the project result in changes in occurrence of disease or affect disease vectors - e.g. insect or water borne diseases?			
3.3	Will the project affect the welfare of people - e.g. by changing living conditions?			
3.4	Are there especially vulnerable groups of people who could be affected by the project - e.g. hospital patients, the elderly?			
3.5	Any other causes?			
4. Will the Project produce solid wastes during construction or operation or decommissioning?				
4.1	Spoil, overburden or mine wastes?			
4.2	Municipal waste (household and/or commercial wastes)?			
4.3	Hazardous or toxic wastes (including radioactive wastes)?			
4.4	Other industrial process wastes?			
4.5	Surplus product?			
4.6	Sewage sludge or other sludges from effluent treatment?			
4.7	Construction or demolition wastes?			
4.8	Redundant machinery or equipment?			
4.9	Contaminated soils or other material?			
4.10	Agricultural wastes?			

St. Vincent and the Grenadines Disaster Vulnerability Reduction Project
Environmental Assessment

o.	Questions to be considered in Scoping	Yes/No?	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why?
4.11	Any other solid wastes?			
5. Will the Project release pollutants or any hazardous, toxic or noxious substances to air?				
5.1	Emissions from combustion of fossil fuels from stationary or mobile sources?			
5.2	Emissions from production processes?			
5.3	Emissions from materials handling including storage or transport?			
5.4	Emissions from construction activities including plant and equipment?			
5.5	Dust or odours from handling of materials including construction materials, sewage and waste?			
5.6	Emissions from incineration of waste?			
5.7	Emissions from burning of wastes in open air - e.g. slash material, construction debris?			
5.8	Emissions from any other sources?			
6. Will the Project cause noise and vibration or release of light, heat energy or electromagnetic radiation?				
6.1	From operation of equipment - e.g. engines, ventilation plant, crushers?			
6.2	From industrial or similar processes?			
6.3	From construction or demolition?			
6.4	From blasting or piling?			
6.5	From construction or operational traffic?			
6.6	From lighting or cooling systems?			

St. Vincent and the Grenadines Disaster Vulnerability Reduction Project
Environmental Assessment

o.	Questions to be considered in Scoping	Yes/No?	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why?
6.7	From sources of electromagnetic radiation (consider effects on nearby sensitive equipment as well as people)?			
6.8	From any other sources?			
7. Will the Project lead to risks of contamination of land or water from releases of pollutants onto the ground or into sewers, surface waters, groundwater, coastal waters or the sea?				
7.1	From handling, storage, use or spillage of hazardous or toxic materials?			
7.2	From discharge of sewage or other effluents (whether treated or untreated) to water or the land?			
7.3	By deposition of pollutants emitted to air, onto the land or into water?			
7.4	From any other sources?			
7.5	Is there a risk of long term build-up of pollutants in the environment from these sources?			
8. Will there be any risk of accidents during construction or operation of the Project which could affect human health or the environment?				
8.1	From explosions, spillages, fires, etc. from storage, handling, use or production of hazardous or toxic substances?			
8.2	From events beyond the limits of normal environmental protection - e.g. failure of pollution control systems?			
8.3	From any other causes?			

St. Vincent and the Grenadines Disaster Vulnerability Reduction Project
Environmental Assessment

o.	Questions to be considered in Scoping	Yes/No?	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why?
8.4	Could the project be affected by natural disasters causing environmental damage - e.g. floods, earthquakes, landslip, etc?			
9. Will the Project result in social changes, for example, in demography, traditional lifestyles, employment?				
9.1	Changes in population size, age, structure, social groups, etc.?			
9.2	By resettlement of people or demolition of homes or communities or community facilities - e.g. schools, hospitals, social facilities?			
9.3	Through in-migration of new residents or creation of new communities?			
9.4	By placing increased demands on local facilities or services - e.g. housing, education, health?			
9.5	By creating jobs during construction or operation or causing the loss of jobs with effects on unemployment and the economy?			
9.6	Any other causes?			
10. Are there any other factors which should be considered such as consequential development which could lead to environmental effects or the potential for cumulative impacts with other existing or planned activities in the locality?				
10.1	Will the project lead to pressure for consequential development which could have significant impact on the environment - e.g. more housing, new roads, new supporting industries or utilities, etc?			

St. Vincent and the Grenadines Disaster Vulnerability Reduction Project
Environmental Assessment

o.	Questions to be considered in Scoping	Yes/No?	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why?
10.2	Will the project lead to development of supporting facilities, ancillary development or development stimulated by the project which could have impact on the environment - e.g. supporting infrastructure (roads, power supply, waste or waste water treatment, etc.), housing development, extractive industries, supply industries, other?			
10.3	Will the project lead to after-use of the site which could have an impact on the environment?			
10.4	Will the project set a precedent for later developments?			
10.5	Will the project have cumulative effects due to proximity to other existing or planned projects with similar effects?			

LIST OF PREPARERS

This EA report was prepared by:

Nayasha Hamilton – Environmental Educator, Ministry of Health and the Environment
Ronette Jordon – Project Officer, Central Planning Division
Yasa Belmar - Environmental Analyst – Ministry of Health and the Environment

With Contributions from:

Brent Bailey – Chief Engineer, Ministry of Transport and Works
DeAnna Ralph – Social Policy Coordinator
Dornet Hull – GIS Officer, Physical Planning Unit
Laurette Pinder – Planning Technician, Physical Planning Unit
Lucine Edwards - Fisheries Officer, Fisheries Division
Maurice John – Procurement Specialist – Central Planning Division
Rohan Keizer – Project Officer, Central Planning Division
Trelson Mapp – Economist – Central Planning Division