

**Ministry of Finance and Economic Planning, Central Planning Division  
Saint Vincent & the Grenadines**



**Consultancy Services for  
Design of the New Alignment for Paget Farm Road in Bequia**

**Environmental and Social Impact Assessment Report  
Draft Ver.4 (5<sup>th</sup> December 2016)/Updated 11<sup>th</sup> January 2017**



**Submitted by FDL Consult Inc.**



## **ESIA Conducted April – October 2016**

### **Notice**

This Draft Environmental Impact Assessment Report Ver. 4 (dated 5<sup>th</sup> December 2016) and updated 11<sup>th</sup> January 2017, incorporates the Clients comments dated 21<sup>st</sup> December 2016.

## List of Abbreviations

CDB	Caribbean Development Bank
cf	refer to
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EMF	Environmental Management Framework
EMP	Environmental Management Plan
ESIA	Environmental and Social Impact Assessment
GoSVG	Government of St. Vincent and the Grenadines
GRM	Grievance Redress Mechanism
LBS	Land Base Source (of marine Pollution)
MOH	Ministry of Health (Ministry of Health Wellness and the Environment)
NBSAP	National Biodiversity Strategy and Action Plan
OECS	Organisation of Eastern Caribbean States
OP	Operational Policy
PAP	Project Affected Persons
PHD	Public Health Department
PPU	Physical Planning Unit
RDVRP	Regional Disaster Vulnerability Project
SGD	St. Georges Declaration (of Principles of Environmental Sustainability)
SVG	St. Vincent and the Grenadines
UNCBD	United Nations Convention on Biological Diversity
UNCCD	United Nations Convention to Combat Desertification
WB	World Bank

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## **1.0 Executive Summary**

For the purposes of this document, Environmental and Social Impact Assessment (ESIA) is defined as a report of the predictions of the consequences of the proposed action [the alignment of the Paget Farm Road including all civil works] on the physical and social environment considering technology options and policy guidelines.

In terms of policy guidelines, the 2009 Draft Environmental Management Policy (EMP) is the best available guidance document for EIA undertaken in SVG therefore the layout of this document follow that recommended in the EMP. Additionally, the guidance of the Physical Planning Department in the Ministry of Housing, Informal Human Settlement, Physical Planning, Lands and Surveys is imperative since this body must ultimately approve the scope of the ESIA and its mitigation measures. In the preparation of this ESIA, the said Ministry was consulted and guidelines in the draft policy observed.

A screening checklist (Appendices 1 and 2) taken from the Environmental Management Framework (EMF) for the Regional Disaster Vulnerability Reduction Project (RDVRP) was used; additionally, the legal and regulatory framework, the project impact assessment and mitigation measures were done according to the EMF. The RDVRP WB funded project is the umbrella project under which this activity falls, consequently, the individual elements (environmental, social, technology and policy) are treated as defined in the EMP.

The Social Assessment (SA) was conducted in compliance with World Bank requirements as presented in OP 4.12, World Bank Safeguards Involuntary Resettlement and OP/ BP 4.10 on Indigenous peoples, for Category B projects.

This ESIA Report describes the proposed activities to be undertaken in the construction of a new alignment for the Paget Farm Road, Bequia. It identifies potential environmental challenges, proposed mitigation measures and provides a management plan inclusive of a monitoring and reporting framework.

The negative impacts associated with this development are expected to be medium (3 on a scale of 1-5) and are associated mainly with resettlement of affected persons, excavation works resulting in loss of biodiversity, temporary disruption to vehicular traffic and dust. The greatest negative impact will be experienced by the homes located less than ten meters (10 m) from the selected alignment – proposed new road.

Positive impacts include improvement to the Paget Farm road, reduced risk of road subsidence, short term jobs for several persons and improved security for the travelling public.

The proposed project would result in negative environmental and social impacts, but these could be readily mitigated and managed. There is no significant negative impact or policy concern that would prevent the implementation of any component of this project, moreover, if the mitigation

measures are followed and correctly implemented the project could be successfully implemented with positive benefits.

## **1.1 Project Components**

The new alignment takes this portion of the road on a winding path through a dry forest before re-joining the existing road. The construction of this segment of the road will involve the following:

1. General site clearance (removal of trees and shrubbery) to facilitate setting out of the new road alignment by the survey team;
2. Earthworks, comprising excavation of existing grade materials and filling with either select excavated material or imported granular fill to achieve the proposed road finish elevations;
3. Construction of a new concrete road pavement (inclusive of structural reinforcement);
4. Construction of new reinforced concrete drains and retaining structures; and
5. Re-vegetation of the slopes of the new roadway embankment for erosion control.

## **1.2 Project Conformity with World Bank Safeguard Policies**

While this project was not specifically identified in the EMF, its features are sufficiently similar to other sub-projects to allow for the application of the elements enumerated in the EMF. In accordance with OP4.01 an environmental screening was undertaken to determine the appropriate extent and type of environmental assessment required (Appendices 1 and 2). The category of project potential environmental impact was classified as Category B given the amount of civil works involved and the potential for adverse environmental impacts on human population, dry forest or grass land. The impacts are site specific and not major; however, some elements are considered naturally irreversible.

The B classification of the project coupled with the fact that it evokes the EIA trigger according to Schedule II of the Draft Environmental Management Policy demands that a limited EIA be undertaken.



## 1.3 Project Impact Matrix

**Table 1: Project Impact Matrix**

<b>Proposed Activity: Alignment and Construction of Paget Farm Road</b>	<b>Nature of Impact</b>	<b>Impact</b>	<b>Level of Impact</b>
Land use change from forest to road	Environmental	Negative	Moderate
Land disturbance	Environmental	Negative	High
Discomfort to residents (relocation, loss of privacy)	Social	Negative	Moderate
Discomfort to residents (noise, dust)	Health	Negative	Moderate
Road construction (excavation, soil removal)	Environmental	Negative	Low
Road construction ( construction of retaining wall and paving of road)	Environmental and social	Positive	High
Loss of biodiversity	Environmental	Negative	Low
Traffic disruption	Social	Negative	Low
Disposal of spoil	Environmental	Negative	Low
Workers' health and safety	Social	Negative	Moderate

## 2.0 Legal and Regulatory Framework

This project involves rerouting a portion of the road with the associated excavation, construction of retaining walls, relocation of affected persons, loss of biodiversity and expected increase in vehicular traffic. These activities would impact the portion of the island through which the road passes, as a result, there are consequences for terrestrial habitats. Legislation governing the disruption of terrestrial areas is therefore presented.

### 2.1 The Terrestrial Environment

The geography and geology of Bequia speaks of limited rainfall, limited fresh ground water, shallow porous topsoil covered by stung vegetation growth in most places where vegetation exists. These factors are largely responsible for the small terrestrial biodiversity pools of flora and fauna and the minimal amount of agricultural practice on the island.

### 2.2 National Legislation

St. Vincent & the Grenadines has enacted several pieces of environmental management legislation with the objective of protection, conservation, enhancement and restoration of the natural resources of the Country (Table 2).

**Table 2: Environmental Legislation Relevant to this Project**

Agency	Legislation	Scope
Ministry of Agriculture, Rural Transformation Forestry and Fisheries	<ul style="list-style-type: none"> <li>• <i>Forest Resource Conservation Act</i> (No.47, 1992)</li> </ul>	To provide for the conservation, management and proper use of the forest and watersheds, declaration of forest reserves, cooperative forest and conservation areas.
Ministry of Agriculture, Rural Transformation Forestry and Fisheries  [Forestry]	<ul style="list-style-type: none"> <li>• <i>Natural Forest Resource Act</i> (1947)</li> <li>• Wildlife Protection Act (No.16, 1987) &amp; later amendments (1988, 1991)</li> <li>• Wildlife Conservation Act (1991)</li> <li>• UNCCD</li> <li>• Cartagena Convention – LBS Protocol</li> </ul>	<p>Providing for the protection of wildlife and any connected issues.</p> <p>The conservation and sustainable management of the Nation's forest, wildlife and national park resources Convention to Combat Desertification</p> <p>Convent against land based sources of marine pollution</p>
Ministry of Tourism and	<ul style="list-style-type: none"> <li>• <i>National Parks Act</i> (No.33, 2002)</li> </ul>	To preserve, manage, protect and develop the natural and cultural heritage of SVG, including

Agency	Legislation	Scope
Culture	<ul style="list-style-type: none"> <li><i>National Parks (Amendment) Act</i> (No.13, 2010)</li> </ul>	the historical and cultural heritage of the Island
Ministry of Housing, Informal Human Settlement, Physical Planning, Lands and Surveys [PPU]	<ul style="list-style-type: none"> <li><i>Town and Country Planning Act</i> (No.45, 1992)</li> </ul>	<i>The Town and Country Planning Act</i> (No.45, 1992) guides planning in St. Vincent & the Grenadines. Under this act, the PPU has the legal authority for environmental management in general, including the evaluation of the need for and level of EIA requirements.
The Ministry of Economic Planning, Sustainable Development, Industry, Information and Labour.	United Nations Conventions: <ul style="list-style-type: none"> <li>UNCBD</li> <li>UNFCCC</li> <li>St. Georges Declaration of Principles for Sustainable Development (SGD) in the Organization of the Eastern Caribbean States (OECS) of 2001</li> </ul>	Convention for the protection of biological diversity.  Convention to reduce greenhouse gas emissions.  This sub-regional agreement is designed to support sustainable development and covers a wide range of environmental issues including ... the Multilateral Environmental Agreements (MEAs)

Of those regulations previously mentioned, the following pieces of legislation are of particular significance to the project, and as such a synopsis of the relevance of each is presented below.

***Environment Management Act (2009 Draft)*** – defines the limits of pollution allowed and the process for receiving a pollution permit should the quantities to be produced during the process surpass the established national limits. The Act makes the Department of Environment responsible for the continuous and long-term assessment of the status of natural resources and of pollution, environmental degradation and other adverse impacts on the environment; the coordination, monitoring and ensuring the protection and sustainable use of natural resources for the benefit of the present and future generations; the prevention and control of pollution where there is no existing legal provision for such control by co-ordinating all activities relating to the discharge of wastes into the environment . Although the Act does not mention the Sustainable Development Unit, this Unit should be informed and be included in the monitoring and review process.

***Noise Act No. 18 of 1988*** makes new provisions in respect of the control of noise and vibration with a view to their abatement. Section 5 of the Act applies to work on construction; the erection, construction, alteration, repair or maintenance of buildings, structures or roads. Where it appears to the Board that works to which this section applies are being carried out on any premises, it may serve a notice imposing requirements as to the way the work is being carried out and may publish notice of the requirements in such a way as appears to it to be appropriate.

***Public Health Act (No.9, 1977)***- states when the Chief Environmental Health Officer is of the opinion that a source of contaminant or pollutant is adding to, emitting or discharging into the environment any contaminant or pollutant that constitutes of the amount concentration or level of which constitutes an immediate danger to life or the health of any person or to property, he may issue an order directed to the person responsible for the source of the contaminant or pollutant to abate the public nuisance. This project must therefore ensure that it conducts its business in conformity with the laws of SVG and never constituting a public nuisance; it would be necessary to contain all discharge from the project.

The ***Town and Country Planning Act (No.45, 1992)***- is designed to guide planning in St. Vincent & the Grenadines. Under the Act, Article 29, an EIA for environmentally sensitive projects or activities is required. The Physical Planning Unit (PPU) has the legal authority for environmental management in general under this Act, including the evaluation of, the need for and level of EIA required.

Within this piece of legislation lies the authority of the Planning Department to “*make provision for the orderly development of land, the assessment of the environmental impacts of development, the grant of permission to develop land and for other powers to regulate the use of land, and for related matters.*” The Physical Planning Board has a cadre of experts drawn from the public and private sector and has the authority to coop other relevant experts as needed b.

This EIA along with technical drawings and application forms will constitute the request for planning approval to undertake this project.

The ***Waste Management Act (No 31 of 2000)***- provides for the management of solid waste in conformity with best environmental practices.

The ***National Parks Act (No 13 of 2010)***- makes provision for national parks and the establishment of an authority for national park, to make further provision for the preservation, protection, management and development of the natural physical and ecological resources and the historical and cultural heritage of St. Vincent and the Grenadines and for connected matters. The waters around Bequia border the Tobago Cays Marine Park and are part of the fisheries conservation area of SVG and buffers, therefore, if as a result of this project, sedimentation levels rise to visibility, Fisheries and National Park must be notified. These agencies should also be involved in the monitoring of the project.

The ***Motor and Road Traffic Act and Regulations*** are included in the Laws of St. Vincent and the Grenadines and are designed to regulate and control the flow of traffic. This is done by way of sign posts, markings, reflectors and bumps on the street's surface. The traffic branch of the Royal St. Vincent and the Grenadines Police Force is charged with enforcing these regulations.

Special authority can be issued to wardens to regulate the flow of traffic in order to facilitate the execution of road works.

## **2.3 Regional and International Agreements**

**St. Georges Declaration (SGD) of Principles for Sustainable Development in the OECS:** St. Vincent and the Grenadines is a signatory to the St. Georges Declaration of Principles on Environmental Sustainability in the OECS. Principle one of the SGD requires that participating countries integrate Social, Economic and Environmental Considerations into National Development Policies, Plans and Programmes. Principle four calls for the participation of civil society in decision making (see 4.4.1) while Principle thirteen calls for protection and conservation of biodiversity.

**The United Nations Convention on Biological Diversity (UNCBD):** This convention seeks to protect the diversity of life and their supporting habitats. St. Vincent and the Grenadines has ratified this convention and is therefore obligated to protect its biological resources including marine life forms. Currently, SVG is preparing its fifth report and its Biodiversity Strategy and Action Plan (NBSAP) for submission to the secretariat of the convention. The country has set a number of targets it intends to achieve by 2020; among which is the conservation of 20% of its near shore and marine environment.

**The Cartagena Protocol on Land Based Source (LBS) of Marine Pollution:** St. Vincent and the Grenadines has not ratified this Protocol but has participated in regional efforts mounted under this Protocol. Given the significance of the marine environment to SVG, elements of the protocol should be considered.

### **World Bank Operational Policy:**

- (i) Operational Policy 4.04 on Natural Habitats seeks to ensure that World Bank-supported infrastructure and other development projects take into account the conservation of biodiversity, as well as the numerous environmental services and products which natural habitats provide to human society. The policy strictly limits the circumstances under which any Bank-supported project can damage natural habitats (land and water areas where most of the native plant and animal species are still present).
- (ii) Operational Policy 4.12, World Bank Safeguards for Involuntary Resettlement and OP/BP 4.10 on Indigenous peoples, for Category B projects.

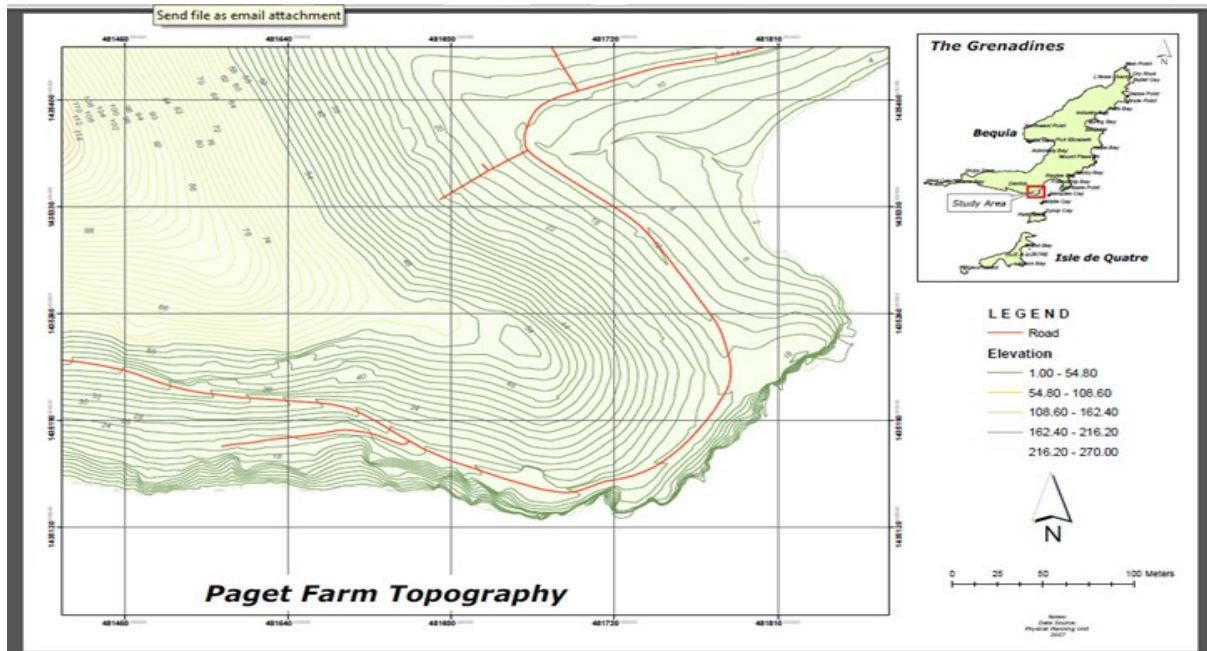
## 3.0 The Environment

### 3.1 Physical Environment

**Geology:** Subduction of the North American tectonic plate under the Caribbean plate gave rise to the volcanic arc of the Lesser Antilles East of the Caribbean plate. The portion of the volcanic arc between Grenada and St. Vincent gave rise to the Grenadines. Bequia (the second largest of the Grenadine islands) is comprised of a sequence of Pliocene basalt and andesite lavas and dykes which are inter-layered with, and intruded into, debris flows, fluvial sandstones, monolithological ash flows, avalanche and crumble breccias. Some of the epiclastic rocks contain coarse-grained plutonic blocks comprised of mixtures of olivine, plagioclase, clinopyroxene, orthopyroxene, amphibole, magnetite and ilmenite crystals<sup>1</sup>.

Paget Farm lies to the south east of the island; the area under consideration is the 20m coast that contains the main road going south from Port Elizabeth, the administrative centre of the island. The seaward edge of road drops sharply into the sea while the landward portion rises more gently to a semi plateau (Figure 1). From the plateau, the road alignment falls sharply before re-joining the main road further north.

**Figure 1: Area Topography**



<sup>1</sup>Terence E. Smith, Earth Sciences, University of Windsor, Ontario Canada.



**Hydrology:** Bequia has a tropical climate with a distinct seasonal rainfall pattern. The annual rainfall is around 1500mm per annum. There is no perennial river and springs are almost non-existent. Public (and private) water supply from open wells, even though limited, are traditionally the most available and affordable water supply systems occurring on the islands. The geology of the island allows for only limited volume of available fresh groundwater in those shallow wells (which predominantly yield brackish water and have limited abstraction capacities), and on the other hand from the potential increase of groundwater salinization (progress of inland saline intrusion from sea water) due to the effects of the groundwater abstraction from alluvial and coastal.

Further north along the road is a desalination plant that now meets most of the island's dry season needs.

### 3.2 Biotic Environment:

The area exists within the edge zone of Bequia's dry forest that borders housing and other infrastructural development. The vegetation consists primarily of native and naturalized plant species. In general, the vegetation is represented by an evidently thick upper canopy - approximately 15 to 20 feet tall, and is distinguished by the dominance of the old, gnarled White Cedar *Tabebuia pallid* (Figure 2). Scattered individuals of Mapou *Pisonia fragrans*, Black Torch *Erithalis fruticosa* and Fiddlewood *Citharexylum spinosum* are also present. The understorey is noticeably absent, and so generally is ground cover vegetation, except for few clusters of Agave *Agave caribaeicola* that exist where sunlight is able to penetrate to the forest floor, and/or where canopy vegetation has been interrupted or removed. Here, soil cover is much improved, and patched of shrubs such as Lantana *Lantana camara*, White Wattle *Croton micans* and Wedelia *Wedelia trilobata*, and juvenile plants of Glory Cedar *Gliricidia sepium* and Fiddlewood *Citharexylum spinosum* predominates.

Figure 2: Dense Forest Canopy



The absence of these two latter storeys appears to be directly related to the closure of the canopy by *T. pallida* which allows very little sunlight to the forest floor. Overall, leaf litter, consisting mainly of dried *T. pallida*, constitutes the protective soil cover, leading to soils that are loose and unstable.

Twenty nine (29) plant species were identified at the project site (Appendix 3), the majority of which are native to or naturalized on Bequia. *T. pallida*, is among the most represented. It is evident that the *T. pallida* here are over half a century old and have played an important role in conserving the soil through the reduction of water and wind velocities on these slopes.

The area also provides a habitat for a number of wildlife including arthropods, insects (butterfly) and reptiles (particularly tortoises, and lizards).

### 3.3 Social Environment

The housing stock along the Paget Farm road is predominantly modern concrete structures nestled on the slopes overlooking the sea. The residents make full use of the narrow strip of land seaward of the road as the vantage point for viewing the Easter Regatta as the vessels sail along the coastal waters of Paget Farm.

The community being affected is a closed knit community consisting of two extended families. There are four (4) households from among these, that are likely to be relocated because the proposed alignment puts their houses in the path of the road. The households consist of thirteen (13) members of the Ollivierre family; refer to Table 3 for their social data and views.

**Table 3: Social Data on Affected Persons**

Names of household members	Age group	Sex	Occupation	How do you feel about the road coming near you?	How do you feel about moving?
Household 1 1. Johnny 2. Cassandra 3. Aliyah 4. Johnson	Over 60 31-40 10-15 < 10	Male Female Female Male	Civil service Seamstress Student Students	Not good. Totally against it	Pay me whatever I need for it
Household 2 1. Mary 2. Franklyn 3. Erica	Over 60 Over 60 Over 60	Female Male Female	Housewife Fisher Banker	Not comfortable	Don't feel good; not moving
Household 3 1. Anna 2. David	41-50 51-60	Female Male	Unemployed Fisher	Not comfortable	Not thinking about moving
Household 4 1. Ivor 2. Sylvalene	Over 60 Over 60	Male Female	Retired Retired	Don't mind really	Not comfortable moving; don't like the proposed new



Names of household members	Age group	Sex	Occupation	How do you feel about the road coming near you?	How do you feel about moving?
3. Stan	31-40	Male	Sailor		location
4. Jamie	31-40	Male	Fisher		

This Paget Farm road is the main land connection to the Bequia Airport, the Fisheries Centre and the island's main Desalination plant; consequently, it is one of the most used portions of road in Bequia.

The proposed realignment of the road provides greater protection and security for the travelling public, however, the portion of the road that is being replaced still serves a number of households that were strategically built along its path. Provision will need to be made for the same level of safety to the residents of these homes.

### 3.4 Site Information- Design and Construction

Site investigation revealed that the geological profile is that of volcanic base bed rock with calciferous deposits on the top (Figure 3).

**Figure 3: Rock Cliff at Edge of Road Showing Base Structure of Site**



The weathered portion of the calcium deposit combined with the organic deposits give rise to a very thin top soil that supports select vegetation (Figure 4).

**Figure 4: Organic Deposits on Forest Floor**



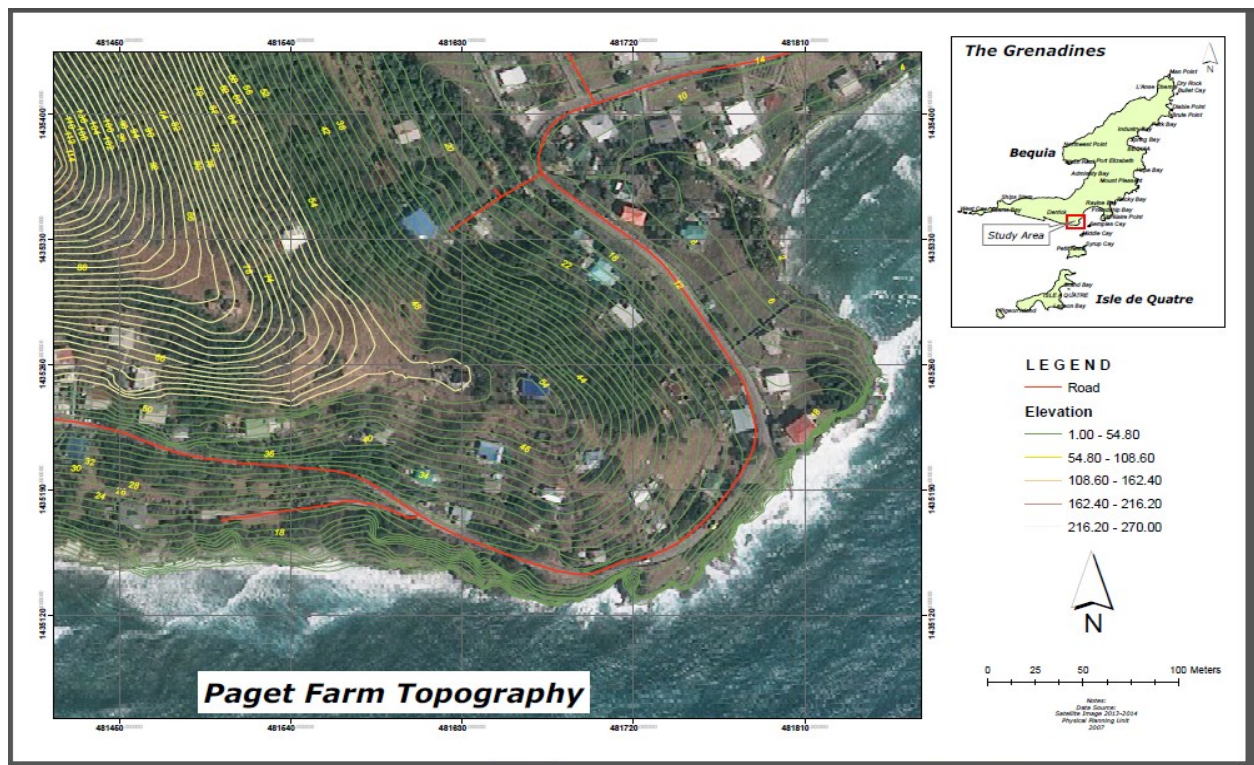
In obtaining the new alignment, excavation would be necessary to level and widen the selected path since the two dimensional analyses in the SLOPE/W software application revealed that slope stability, in the form of a Factor of Safety greater than unity (i.e.  $>1.0$ ) was not found to exist anywhere between the crest of the existing slope and the Paget Farm Road (FDL 2016).

## 4.0 Project Impact and Mitigation Measures

## 4.1 Area of Impact

This project is designed primarily to strengthen, by realigning approximately 140m of the Paget Farm road (cf. Figure 5). Activities associated with this project may include excavation works, trucking, relocation of homes, drainage construction and paving of road. Most of these activities would take place in Paget Farm; however, trucking and resettlement will impact a much wider area creating a range of social and environmental impacts primarily during the construction phase of the project.

### Figure 5: Map Showing Project Area with Contour Overlay



## 4.2 Physical Impacts

The major physical impacts of this project are those associated with excavation, slope stabilization, clearing of vegetation cover, and demolition of some housing structures. In addition to the physical alteration of the landscape these activities will produce dust and noise above ambient levels having both physical and social impacts.



In general, despite the fact that *T. pallida* has provided some level of soil protection through closure of the forest canopy (which reduced direct impact of rain and wind), the absence of an understorey and significant ground cover means that the soil is generally loose and unstable, and highly vulnerable to erosion once the extant vegetation is removed.

#### **4.2.1 Mitigation**

Where excavation is to be undertaken public notification must appear in selected media at least fourteen days before the start of work. Provision must be made for the safe passage of pedestrians and motor vehicles where the excavation abuts or interface with the existing road. Since the existing road is the only motorable road way in the area, full time traffic personnel should be employed to manage the flow of traffic when and where construction merges with or threatens passage on the existing road. Given the topography of the area, it would be necessary to install retaining structures and screens before excavation. All excavated material must be contained and kept covered or wet until disposal. Vehicle moving this excavated material must cover its cargo and carry an amount commensurate with its pan size.

Vegetation cover is an essential element of dust control, erosion control and slope stabilization and therefore should only be removed if unavoidable. Under such condition the Forestry Department should be notified and their assistance sought in replanting new trees at the earliest possible time. There should be minimal cutting prior to construction, particularly of some of the larger trees especially White Cedar where possible. This would provide needed cover for the regeneration that will occur with the increased exposure to light. Additionally, priority must be given to selection and maintenance of seed trees for propagation purposes.

Following road construction, contour planting with Vetiver grass or similar vegetative material along road verges must be undertaken. Depending on the amount of clearing and the steepness of the eventual slopes, several rows of contours may be required. These along with the remaining and regenerating vegetation should reduce erosion potential.

Where the alignment passes less than twenty (20) feet from dwelling house(s), a barrier or fence should be constructed between the house and the evolving road prior to the start of construction work. This fence should remain in place for the duration of the road construction.

In controlling noise, no equipment or vehicle should stand idle with their engines running and all vehicles and motorized equipment should be fitted with silencers. Heavy equipment will operate only during regular working hours.

### **4.3 Impacts on Biodiversity**

Impacts associated with the loss of biodiversity (flora or fauna) and their associated habitats are issues addressed in SVG's Fifth National Report to the United Nations Convention on Biological Diversity. As a signatory to the convention on Biological Diversity, SVG is obligated to do all within its powers to prevent or reduce habitat degradation and biodiversity loss.

The alignment proposed for this section of the road passes through dry forest with plants older than fifty (50) years. These trees form a natural windbreak and are home to a variety of insects, bird and reptiles; they also serve to retain the very thin top soil. Loss of these trees will not only reduce the island's biodiversity pool but will also negatively impact air quality, ambient temperatures and the aesthetics of the area.

#### **4.3.1 Mitigation**

Fast growing tree species will be planted early in the project cycle so as to be well established by the end of the project. Additionally, it is recommended that the project timeline is so arranged that the trees are cut at the end of the traditional hurricane season. The Forestry Department and the Sustainable Development Unit in the Ministry of Economic Planning Sustainable Development, Industry Information and Labour should oversee the removal of vegetation and also provide guidance in the replanting process. These activities will be documented for UNCBD reporting purposes.

One week before the cutting of the trees, organisms should be flushed out and given time to clear the area. Despite best effort, the air quality will be negatively impacted; the cooling effects of the trees and the oxygen they produce will be lost. However, this will be minimal and short term since the air is not static and the new trees are expected to be well established within two years (one year of which is project time and overlapped by the existing trees). In addition to the fast growing species, white cedar should be planted as replacement for the existing ones.

### **4.4 Social Impacts**

Social impacts associated with this project are summarized in Table 4 and are related to changes in environmental quality resulting from the use of heavy equipment in proximity to homes, the loss of private space and the increase in vehicular traffic.

**Table 4: Social Impact**

Source of Impact	Description of Impact	Type of Impact	Level of Impact
Noise from heavy equipment	Ear irritant	Negative	Moderate
Dust from soil excavation and vehicle movement	Air pollution	Negative	Moderate
Encroachment – domestic space changed to road	Loss of privacy	Negative	Moderate
Vehicular traffic	Road safety issue	Negative	Low
New road	Improved road safety	Positive	High
Construction jobs	Improved Livelihood	Positive	Moderate

Two public consultations with residents in the project area revealed that persons welcome the road improvement/stabilization noting that the road is the main connector with other communities on the island. Concerns raised by these persons included:

- (i) The loss of privacy for the homes in close proximity to the new segment of the road;
- (ii) Increased noise level and vibrations associated with the traffic and construction work;
- (iii) Compensation for any land used or encroached upon; and
- (iv) What will happen to the unrepaired portion of road as the alignment moves inland?
- (v) Will the public still have access to the area as a view point for the regatta?

#### 4.4.1 Mitigation

- (i) To date, two public consultations have taken place including a cross section of stakeholders. Two more public consultations will be convened for the purpose of apprising the community of the proposed work and to elicit from them any concerns or information that will inform the work program. Further consultations will be convened as the project progresses to inform residents of the project's status, progress and safety requirements. The public consultation will be an on-going activity taking place throughout the project cycle, and will focus mainly on project inception, project progress and work schedule, compensation issues and implementation of after- project community support activities. Discussions will be held with affected property owners to arrive at appropriate compensation; such compensation will take place before completion of the project. Public consultation and participation will afford the affected persons an opportunity to contribute to the project. Public consultation and participation will take place through local town hall meetings, radio and television programmes,

request for written proposals/comments, completion of questionnaires/application forms, public readings and explanations of the project ideas and requirements.

The RDVRP grievance Redress Mechanism makes provision for “The affected persons to file his/her grievance in writing, or complete a grievance form and submit to the Project Steering Committee (PSC).” The grievance note should be signed and dated by the aggrieved person. It is further recommended that a Social Specialist be assigned to the project to interface between the PAP and the project personnel.

The Social Specialist/Liaison Officer should be based in Bequia and have direct contact with project authorities, both government and contactors. Appointing a liaison officer does not preclude government officials (Police, Public Health authorities, Ministry of Housing, Informal Human Settlement, Lands and Physical Planning) from interaction with the community in their normal course of work.

- (ii) Traffic wardens will be employed to regulate the flow of traffic in the area. Heavy equipment associated with the project will move between 8:00am and 4:00pm. If it becomes necessary to conduct work outside of these hours, the public will be notified ahead of time. Trucks moving construction waste, spoils, or building material will be covered and their load kept within their license quota.
- (iii) Any waste generated by the project will be disposed of in accordance with the regulations of the SVG Solid Waste Management Unit.
- (iv) Warning signs will be placed at appropriate points and project site will be closed to the general public.

Pursuant to the RDVRP’s Resettlement Policy Framework:

- (v) Resettlement and land acquisition will be minimized as much as possible. Where land acquisition is unavoidable, the project will be designed to minimize adverse impact on the most vulnerable. Persons impacted will be compensated, relocated and or rehabilitated as appropriate to improve their standard of living, income earning capacity and production capacity, or at least to restore them to pre-Project levels.
- (vi) All resettlement cases residing in, or having rights over resources within the Project area as of the date of the assessment are entitled to compensation for their losses and/or income rehabilitation. Lack of legal rights or title to the asset(s) taken for the project

will not bar the resettlement cases from receiving compensation, rehabilitation and relocation measures to achieve the project objectives.

- (vii) The Public Sector Investment PMU will provide the general direction for the planning of the relocation/compensation process, ensure coordination between various stakeholders and monitor the implementation. At the launching of the project, stakeholders will be consulted to establish planning principles and work arrangements aimed at identifying and mitigating adverse social impacts induced by subprojects operations.

## **4.5 Waste Disposal**

Human activity in any area will result in the generation of waste: human body waste, domestic waste (food wrapping, items of clothing etc.), construction waste and spoils from excavation.

### **4.5.1 Mitigation**

The contractor will be required to install portable toilet facilities to be emptied in a place and manner stipulated by the Public Health Department. These toilet facilities must be fitted with proper lids and should be emptied daily.

There must be designated sites for the temporary storage of construction waste and bins for the storage of domestic waste. These bins must have proper lids and be emptied at a minimum of twice per week. Disposal sites must be designated by the Waste Management Authority.

## **4.6 Occupational Health and Safety**

All workers are required to be fitted with and wear at all times on the project site appropriate working and protective gears including hard hats, hard tip boots, eye wear and dusk mask. Workers on slopes or heights over ten feet should stand on proper surfaces/scaffold with appropriate harness. The nearest hospital or clinic should be notified of the work in progress and any hazard to which workers may be exposed so that they can be ready to deal with any emergency from the project.

St. Vincent and the Grenadines is a member of and abides by the standards set by the International Labour Organization regarding health and safety standards and the rights of workers. In this regard, SVG have an obligation arising from the very fact of membership in the Organization to respect, to promote and to realize, in good faith and in accordance with the Constitution, the principles concerning the fundamental rights and freedom of association and the effective recognition of the right to collective bargaining.

The following matrix is a summary of the impacts and mitigation measures associated with this project (cf. Table 5).



**Table 5: Potential Project Impacts and Mitigation Measures**

Potential Project Impacts and Mitigation Measures			
Project Phase	Project Activity	Impact	Mitigation Measure
<b>Mobilization</b>	Increased traffic in the project area	Moving heavy equipment into the area across the current fractured road will cause delays in traffic.	Heavy equipment and big trucks will not operate during peak hours and traffic wardens will be assigned to direct the flow of traffic.
	Delivery on site of building material and heavy equipment	Traffic obstruction and encroachment unto private property.	Recognizing that there is limited space around this construction site, storage sites will be identified within proximity and on state land.
	Construction of site office and sanitary facilities	Construction work results in noise and dust; the physical appearance and location of these facilities can negatively impact the aesthetics of the community.	All structures to be built will conform to standards set by the Physical Planning Department. Sanitary facilities will conform to the regulations in the Public health Act.
<b>Pre-Construction</b>	Clearing and preparation of work site	The road alignment passes very close to two houses; such proximity does not confirm to the physical planning standard and may therefore require resettlement of the families. Land acquisition will be required.	<p>WORLD BANK Grievance Redress Mechanisms, January 2014, should be followed in dealing with affected persons. During the life cycle of the project, all grievances pertaining to the Regional Disaster Vulnerability Reduction Project (RDVRP) would be received by the Social Specialist. The Social Specialist identifies the Grievance, then in collaboration with the Project Steering Committee (PSC), guided by the Attorney General, evaluates and resolves the claims.</p> <p>Only trees that are in the immediate work path will be removed at this time. Affected people will be consulted to arrive at alternatives and or compensation.</p>
<b>Construction</b>	Excavation and grading of selected road alignment	This activity will produce dust, noise and dust pollution. The unused excavated material will become	Excavation equipment will not stand idle with their engines running. No equipment involved in the work process should emit sounds exceeding 85 dBA

Potential Project Impacts and Mitigation Measures			
Project Phase	Project Activity	Impact	Mitigation Measure
		waste.	measured with a standard Sound Level Meter. All excavated material will be put on prepared area away from the sea. Any unused material will be transported in covered vehicle to the predetermined and approved disposal site. Wetting of the roadway and any stock pile of fine aggregate or soil to control dust
	Mixing concrete and cleaning concrete mixers	Cement sludge can contaminate soil.	Cement sludge will not be dumped, it will be contained and allow to settle and solidify. The solid material will then be used as fill while the liquid is released into a seepage pit.
	Maintenance and fueling of equipment	Oil and gas spills, disposal of used oils	No servicing of vehicle or changing of oil must be done on site. If fuel is stored and dispensed on site, the area should be specially prepared with traps and drainage system. Disposal of any contaminant, oils or any toxic substance will follow the protocol approved by the PHD.
	Concrete works for retaining walls and drains	Social Impact: Opening of cement bags release cement dust; cement mixers produce noise and smoke. Empty bags may litter the surrounding.	Workers must be provided with safety gears (eye glasses and dust mask). Cement bags will be opened as close to the mixers as possible and empty bags stored in closed area until disposed of at the sanitary landfill. Retaining structures should be put in place prior to excavation given the gradient.
	Drain improvement; clearing culverts	During the drainage works, debris blocking the drains and culverts will be removed; this is waste material.	All waste will be collected in one area and covered until disposal.

Potential Project Impacts and Mitigation Measures			
Project Phase	Project Activity	Impact	Mitigation Measure
<b>Construction</b>		Social Impact: Pedestrians wondering onto construction site;  Parking of Vehicle and storing of building material.	The project will employ persons to direct the traffic during construction. Large brightly painted signs will be erected at project borders. During the night strobe lights will be turned on. The work area would be cordoned off or enclosed to the extent possible. Vehicles associated with the project will not park on road way neither will construction material be stored on the road.
	Acquiring material	Social/economic impact: no support to or involvement of local merchants	All materials that are available at reasonable prices should be purchased locally.
	Public awareness, grievance, employment	Social impact: Public unaware of progress or safety issues; aggrieved persons with no avenue for redress and project bring no economic benefit to the community	After the final demarcation of the project site a sign post would be erected to notify the public about the pre project development. Notification should be given on radio via the public service information, about the project's development. The contractor should appoint a public relations person to organize community meetings and to respond to any complaints from anyone regarding the project impacts. Where possible, employment opportunities should go to persons in the local community.
<b>Post Construction</b>	Dismantling scaffolding or other security structures, office buildings or other temporary structures	Health and safety	Workers will use safety gears; trucks will travel at 15mph through communities; appropriate size trucks would be used.
	Site restoration and protection	Waste management, vegetation loss	Transport waste to landfill site, replanting of selected vegetation; stabilization of any excavated area.

## 5.0 Alternatives for Paget Farm Road Alignment

Four options were examined for the development of the Paget Farm road alignment. A multi-criteria approach was explored to determine the hierarchy of the design options and was guided by the three pillars of sustainable development identified by the World Bank; economic viability, social impact and environmental impact. The analysis revealed that whereas Option 3 does not provide a long term solution to the slope instability along the Paget Farm road in comparison to Options 1 and 2, it meets the overall project objective of maintaining a safe vehicular access to Paget Farm and its environs. A risk assessment of Option 3 at various stages from design through to post construction was conducted. Overall, the risks identified with the project were such that the implementation of timely mitigation measures was found to reduce the likelihood, impact and/or severity of these risks to acceptable levels. Option 4, “Do Nothing”, means that the project’s objective of maintaining access to Paget Farm would not be met. The following is a summary of all four cases.

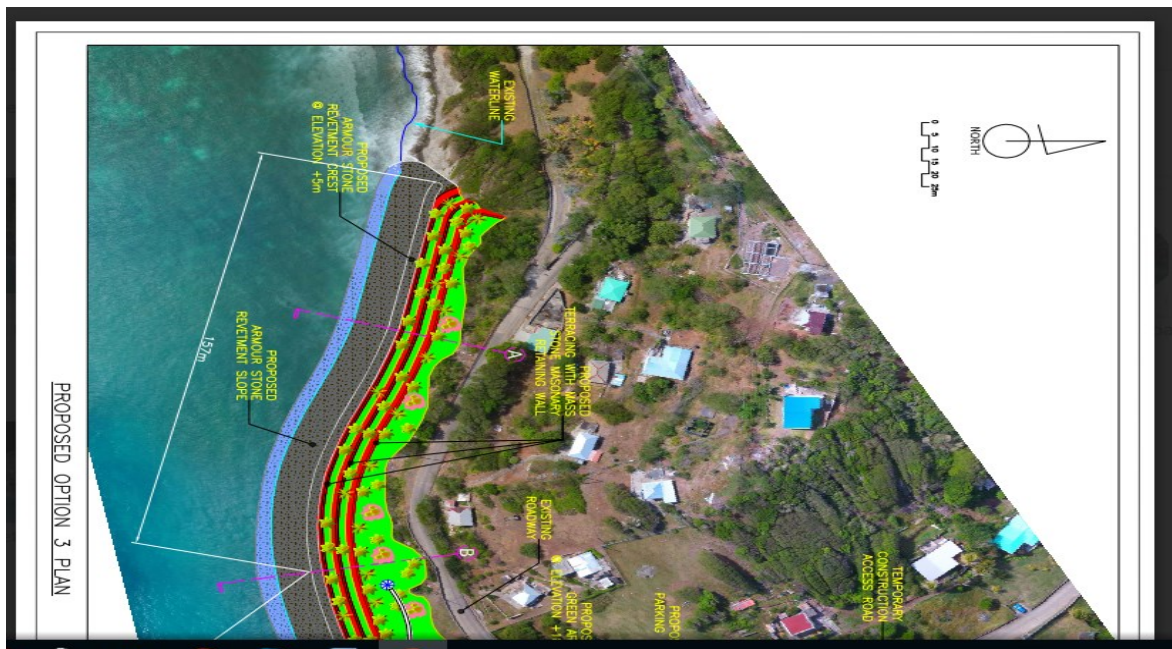
### 5.1 Option 1. Inland Relocation of Road

Option one involves a combination of landward movement of the portion of the Paget Farm road where seaward end has been eroded with the construction of coastal revetment and slope stabilization structures. This option provides a holistic solution to the erosion problem experienced at the site, as it addresses the slope instability while also precluding continued land wasting (refer to Figure 6 and Figure 7 respectively). This option therefore offers permanent relief from an escalating problem, as climate change is predicted to exacerbate storm surges and coastal erosion.

**Figure 6: Road Re-alignment – Option 1**



**Figure 7: Coastal Revetment– Option 1**

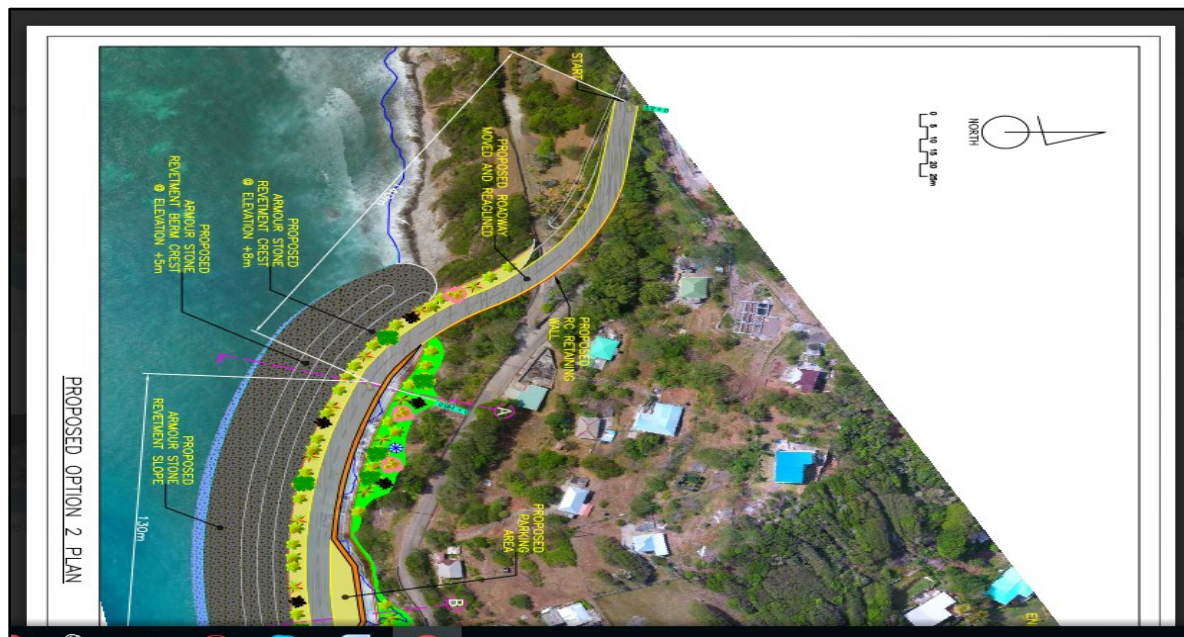




## 5.2 Option 2. Seaward Relocation of Road

Option two seeks to construct a totally new road section seaward of the existing road (Figure 8). This is a highly technical task that will significantly impact the marine environment. This option will slow down the rate of erosion in this portion of the coast and reduce the loss of land. It brings vehicular traffic closer to the water's edge increasing the chances of vehicles plunging into the sea if there is an accident in this area.

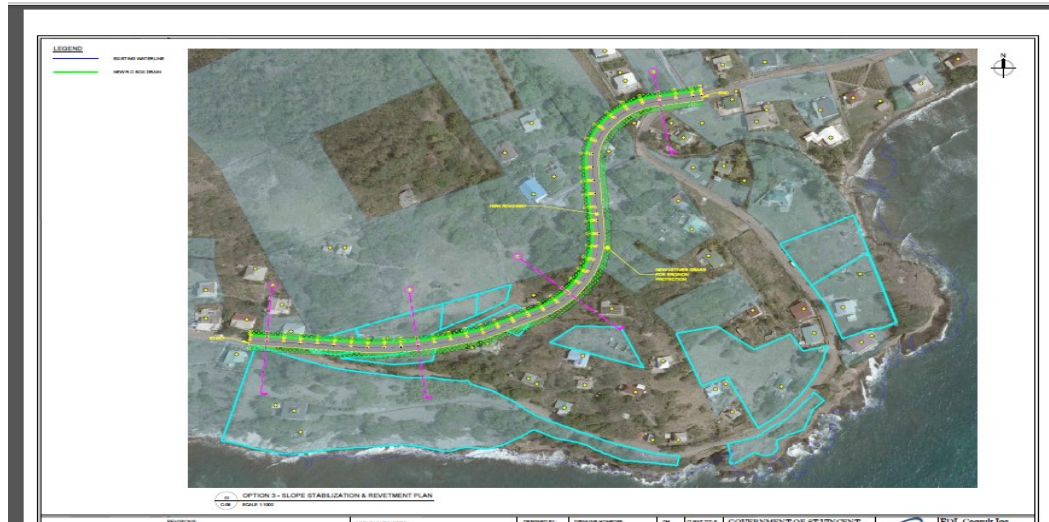
Figure 8: Alignment of Option 2



## 5.3 Option 3: The Magenta or Massa Hill Option; Inland Movement of the Road

This option holds the potential for longer life without consideration for coastal erosion or impact on the marine environment; however, it has a much larger environmental foot print (Figure 9). It requires acquisition of a more land to create a gentler descent. The social, environmental and economic cost for this would be very high. There is also the potential for protracted negotiations since one land owners is not thrilled with the road in her backyard.

Figure 9: Alignment for Option 3



#### 5.4 Option 4: Do Nothing

The “do nothing” option was also explored; however, the coastal and geotechnical analyses point to further slope failure being imminent rather than a possibility. Therefore, doing nothing was summarily dismissed, as some means of engineering intervention is required to ensure that the project’s objective of maintaining access to Paget Farm is met.

## Appendix 1: Environmental Screening Checklist: Part 1

<b>PART 1-PROJECT AND SPONSOR INFORMATION</b>
<b>Name of Action/Project:</b> Design of New Alignment for Paget Farm Road
<b>Project Location: Paget Farm Bequia</b>
<b>Name of Applicant or Sponsor:</b> FDL Consult Inc.
<b>E-Mail:</b> <a href="mailto:fdl@fdlconsultinc.com">fdl@fdlconsultinc.com</a>
<b>Address:</b> Goodlands Castries Saint Lucia
<b>Brief Description of Proposed Action/Project:</b> <p>Coastal erosion has significantly damaged the support structures of the Paget Farm road in Bequia. The government has therefore sought assistance under the RDVRP project for the repair/realignment or construction of alternative roadway to replace the existing one.</p> <p>Four options were examined in the search for a solution to the problem; a multi-criteria analysis was used to determine the most appropriate option. Option three was deemed the most appropriate and hence this assessment was focused on option three. Option three was the subject of detailed survey and engineering design and is presented here as the new alignment for this portion of the Paget Farm Road.</p> <p>The development process includes vegetation clearing, excavation, road paving, drain paving and construction of retaining structures.</p>

<b>SITE INFORMATION</b>		
Total acreage of the site of the proposed action?	<b>&gt;1</b>	<b>Acre</b>
Total acreage to be physically disturbed?	<b>&gt;1</b>	<b>Acre</b>
Total acreage (project site and any contiguous properties) owned or controlled by the applicant or project sponsor?	<b>Undetermined</b>	<b>Acre</b>
<b>LAND USE AND PLANS</b>		
Check all land uses that occur on, adjoining and near the proposed action.		
Urban		
Rural	✓	
Industrial		



Residential	✓		
Commercial			
Forest	✓		
Agriculture			
Parkland			
Other Specify: River basin			
	<b>Yes</b>	<b>No</b>	<b>N/A</b>
Is the proposed action consistent with adjacent uses?		✓	
Is the proposed action consistent with the predominant character of the existing built or natural landscape?	✓		
Is the proposed action/project compatible with the National Development Plan and other development plans?	✓		
Is the site of the proposed action located in or adjoin an environmentally sensitive or valuable area?			
If Yes, specify: Yes, The road will pass through a dry forested area.			
<b>TRAFFIC MANAGEMENT</b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>
Will the proposed action result in a substantial increase in traffic above present levels?	✓		
Are public transportation service(s) available at or near the site of the proposed action?	✓		
<b>UTILITIES</b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>
Will the proposed action connect to an existing public water supply?		✓	
Will improvements be necessary to allow for connection?		✓	
Will the proposed action/project be able to connect to an existing roadway?	✓		
Will improvements be necessary?		✓	
Will project require the re-location of existing roadways, drainage and other utilities?	✓		
Will the proposed action/project require connection to the electrical grid after construction?		✓	
Will the proposed action connect to an existing wastewater or storm water utility?	✓		
What method is proposed to handle sanitary wastewater? <i>No sanitary waste water will be generated</i>			
Please			specify
<b>WATER</b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>
Will the proposed action/project require connection to water mains?		✓	
Will the project include any water conservation devices/techniques?		✓	
Will the project include any rainwater capturing devices?		✓	
<b>AESTHETICS AND CULTURAL RESOURCES</b>			
Is the project site known to contain any scenic vistas or recreation area that is important to the community?		✓	

Is the proposed action located in an archaeological sensitive area?		✓	
<b>ENVIRONMENTALLY SENSITIVE AREAS</b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>
Does any portion of the site of the proposed action, or lands adjoining contain wetlands or other water bodies?		✓	
Would the proposed action physically alter, or encroach into, any existing wetland or water body?		✓	
If Yes, identify the wetland or water body and extent of alterations?			Acres
<b>VEGETATION</b>			
Identify the typical habitat types that occur on, or are likely to be found on the project site. Check all that apply:			
Shoreline/Beach			
Dry Forest	✓		
Farmland			
Pasture			
Wetland			
Urban			
Rural	✓		
<b>SENSITIVE OR THREATENED SPECIES</b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>
Does the site of the proposed action or surrounding sites contain any species of animal or plant that are known to be threatened or endangered?		✓	
<b>STORMWATER/DRAINAGE</b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>
Will the proposed action create storm water discharge, either from point or non-point sources	✓		
Will the storm water discharges flow to adjacent properties?		✓	
Will the storm water discharges flow to offsite drainage?	✓		
Will storm water flow to onsite conveyance or drainage features/devices?	✓		
Does the proposed action include construction or other activities that result in the impoundment of water or other liquids (e.g. retention pond, waste lagoon, dam)?		✓	
<b>Please describe:</b>			
<b>NATURAL HAZARDS</b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>
Is the project site located in an area that is prone to flooding?		✓	
Is the project site located in an area that is prone to landslides?	✓		
Is the project located in an area that can be inundated by storm surge?		✓	
In what volcanic hazard zone is the project located?	<b>Zone 2, high risk</b>		
Is the project site located in a coastal area that can be impacted by coastal erosion due to sea level rise and/or strong wave action?		✓	

**The need for land acquisition will trigger World Bank Policy, Involuntary resettlement (BP/O.P 4.12).** It will be necessary to demarcate the geographical boundaries of the project sites for effective application of social assessment. The Chief Surveyor, Social Specialist along with the Ministry of Housing would make recommendations for suitable relocation where necessary.

**I AFFIRM THAT THE INFORMATION PROVIDED ABOVE IS TRUE AND ACCURATE TO THE BEST OF MY KNOWLEDGE**

Applicant/sponsor name: \_\_\_\_\_

Date: \_\_\_\_\_

## Appendix 2: Project Environmental Screening Checklist Form - Part 2

**Part 2 – Preliminary Screening of Environmental Impact.** The Lead/Approving Agency is responsible for the completion of **Part 2**. Answer all of the following questions using the information contained in Part 1 and other materials submitted by the project sponsor or otherwise available to the reviewer. When answering the questions, the reviewer should be guided by the concept “*Have my responses been reasonable considering the scale and context of the proposed action?*”

LAND USE AND PLANS	No to minimal impact	Moderate impact	Widespread impact
Will the proposed action create a material conflict with an adopted land use plan or surrounding uses?		✓	
Will the proposed action result in a change in the use or intensity of use of land?			✓
Will the proposed action impair the character or quality of the existing community?		✓	
Will the project conflict with any existing or planned adjacent uses?	✓		
<b>TRAFFIC MANAGEMENT</b>			
Will the proposed action result in an adverse change in the existing level of traffic or affect existing infrastructure?		✓	
<b>UTILITIES</b>			
Will major works be required to allow the project to connect to utilities?	✓		
<b>STORMWATER MANAGEMENT</b>			
Will the proposed action result in an increase in the potential for erosion, flooding or drainage problems?	✓		
Will storm water quality and quantity control devices/techniques be incorporated into project?		✓ +	
<b>SUSTAINABILITY</b>			
Will the project incorporate any green/sustainable building practices/techniques?	N/A		
Will the project incorporate reasonably available energy conservation or renewable energy opportunities?	N/A		

<b>LAND USE AND PLANS</b>	<b>No to minimal impact</b>	<b>Moderate impact</b>	<b>Widespread impact</b>
Will the project incorporate energy conservation practices?	N/A		
Will the proposed action have an impact on existing water supplies?	✓		
Will the project incorporate reasonably available water conservation fixtures/devices?	N/A		
Will the project incorporate water conservation practices?	N/A		
<b>NATURAL RESOURCES</b>			
Will the proposed action have an impact on environmentally sensitive areas (steep slopes, rivers, flood plains, unique habitats, etc.)?		✓	
Will the proposed action result in an adverse change to natural resources (e.g., forests, wetlands, water bodies, groundwater, air quality, flora and fauna)?			✓
Will the project result in a decrease in farmland?	✓		
Will the project affect any endangered or threatened plant or animal species (on project or adjacent site)?	✓		
<b>AESTHETIC, CULTURAL AND HISTORICAL RESOURCES</b>			
Will the proposed action impair the character or quality of important historic, archaeological, architectural or aesthetic resources?	✓		
Will the project result in the disturbance/removal of significant historical/cultural resources?	✓		
<b>PEST MANAGEMENT</b>			
Will the project result in the increased use of chemicals used for the control/treatment of pests?	✓		
Will the project employ the use of Integrated Pest Control?	N/A		

## Appendix 3: Project Site Vegetation

	<b>FAMILY</b>	<b>Scientific Name</b>	<b>Vernacular Name</b>
1.	ASCLEPIADACEAE	<i>Tylophora indica</i>	Vomit Bush
2.	ASPARAGACEAE	<i>Agave caribaeicola</i>	Agave; Century Plant
3.	ANACARDIACEAE	<i>Comocladia dodonea</i>	Christmas Bush
4.	APOCYNACEAE	<i>Cryptostegia grandiflora</i>	India Rubber Vine
5.	APOCYNACEAE	<i>Plumeria sp.</i>	Frangipani
6.	ASTERACEAE	<i>Wedelia trilobata</i>	Wedelia
7.	BIGNONIACEAE	<i>Tabebuia pallid</i>	White Cedar
8.	BORAGINACEAE	<i>Cordia curassavica</i>	Black Sage
9.	CACTACEAE	<i>Pilosocereus royenii</i>	Pipe Organ Cactus
10.	CACTACEAE	<i>Opuntia dillenii</i>	Prickly Pear
11.	CAPPARACEAE	<i>Capparis cynophallophora</i>	Jamaican Caper
12.	CYPERACEAE	<i>Abildgaardia ovate</i>	Flatspike Sedge
13.	EUPHORBIACEAE	<i>Ricinis communis</i>	Castor Oil Plant
14.	EUPHORBIACEAE	<i>Croton flavens</i>	Rock Sage
15.	EUPHORBIACEAE	<i>Croton micans</i>	White Wattle
16.	FABACEAE	<i>Pithecellobium unguis-cati</i>	Bread and Cheese
17.	FABACEAE	<i>Leucaena leucocephala</i>	Leucaena
18.	FABACEAE	<i>Indigofera suffruticosa</i>	West Indian Indigo
19.	FABACEAE	<i>Gliricidia sepium</i>	Glory Cedar
20.	FABACEAE	<i>Cassia (Senna) bicapsularis</i>	Christmas Tree; Ratta Sugar
21.	NYCTAGINACEAE	<i>Pisonia fragrans</i>	Mapou
22.	POACEAE	<i>Dactyloctenium aegyptium</i>	Crow Foot Grass
23.	POACEAE	<i>Digitaria sp.</i>	Tropical Crabgrass
24.	POLYGONACEAE	<i>Antigonon leptopus</i>	Coral Vine; Mexican Creeper
25.	POLYGONACEAE	<i>Coccoloba uvifera</i>	Sea Grape
26.	RUBIACEAE	<i>Randia aculeata</i>	Cockspout
27.	RUBIACEAE	<i>Erithalis fruticosa</i>	Black Torch
28.	VERBENACEAE	<i>Citharexylum spinosum</i>	Fiddlewood
29.	VERBENACEAE	<i>Lantana camara</i>	Lantana