Proposed Construction of a New Polyclinic at Bois Jolie, Dennery, St. Lucia

Environmental Impact Assessment and Feasibility Study

Volume 1 of 2

by

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ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
CEHI	Caribbean Environmental Health Institute
CITES	Convention on Trade in Endangered Species of Wild Flora and Fauna
CSME	CARICOM Single Market and Economy
CUBiC	Caribbean Uniform Building Code
CWIQ	St. Lucia Core Welfare Indicators Questionnaire
CZM	Coastal Zone Management
CZMAC	Coastal Zone Management Advisory Committee
CZMU	Coastal Zone Management Unit
DCA	Development Control Authority
DH	Dennery Hospital
DOF	Department of Fisheries
DPC	Dennery Polyclinic
EC$	Eastern Caribbean dollars
EHD	Environmental Health Department
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMG	Emerging Markets Group
EMS	Emergency Medical Service
EMT	Emergency Medical Technician
EOC	Emergency Operations Centre
GIS	Geographic Information Systems
GDP	Gross Domestic Product
GOSL	Government of Saint Lucia
HIA	Hewanorra International airport
HIV	Human immunodeficiency virus
IFC	World Bank International Finance Corporation
IWRM	Integrated Water Resources Management
LBS	Land Based Sources of Pollution
LIME	Landline, Internet, Mobile, Entertainment (formerly Cable and wireless Ltd)
LUCELEC	St. Lucia Electricity Services Ltd
MCH	Maternal and Child Health
MOA	Ministry of Agriculture
MOEA	Ministry of Economic Affairs
MOPD	Ministry of Physical Development, Environment and Housing
MOH	Ministry of Health, Human services and Family Affairs
MCWTPU	Ministry of Communications, Works Transport and Public Utilities
mph	miles per hour
NCA	National Conservation Authority
NDC	National Development Corporation
NEAP	National Environmental Action Plan

NEC	National Environmental Commission
NEMAC	National Emergency Management Advisory Committee
NEMO	National Emergency Management Organisation
NEOC	National Emergency Operations Centre
NEP	National environment Policy
NEMS	National Emergency Medical Services
or	National Environmental Management Strategy
NGO	Non-governmental Organisation
NIC	National Insurance Corporation
OAS	Organisation of American States
OECS	Organisation of Eastern Caribbean States
PAHO	Pan American Health Organisation
PMU	Project Management Unit
PPP	Public Private Partnership
ROW	Right of Way
RFP	Request for Proposals
SALCC	Sir Arthur Lewis Community College
SDED	Sustainable Development and Environment Division
SJH	Saint Jude Hospital
SLASPA	St. Lucia Air and Seaports Authority
SLNS	Saint Lucia National Standard
SLNT	Saint Lucia National Trust
SWMA	St. Lucia Solid Waste Management Authority
SOE	State of the Environment
TOR	Terms of Reference
UHC	Universal Health Care
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
VH	Victoria Hospital
WASCO	Water and Sewerage Company
WRMA	Water Resources Management Agency
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1.0 EXECUTIVE SUMMARY

1.1 General Aspects

This Environmental/Social Impact Assessment (EIA) has been prepared for the new Dennery Polyclinic (DPC) to be constructed at Bois Jolie, Dennery, as well as the proposed upgrading works at the old Dennery Hospital structure within Dennery Village. The EIA was conducted during the Bois Jolie facility conceptual design stage. Financing for the project is available from the World Bank. At the time of writing this report, draft conceptual plans had been presented by the Consultant to the MOH, and were under review by the Ministry. Tenders had been received by the PCU for the Dennery Village building upgrading.

The EIA is based on a review of existing environmental conditions derived from published sources, supplemented by detailed reconnaissance of the site, and discussions with MOH management, the engineer responsible for production of conceptual designs, and PCU staff responsible for managing this and other World Bank financed projects, concerning the likely nature and scope of works. A review of the relevant policy, institutional and legislative framework relating to various aspects of environmental management was carried out, consultations took place with various stakeholders relevant to project social and environmental impact assessment and environmental management, and a user survey was carried out in November 2011 at the Richfond and La Resource health centres and in Dennery Village.

1.2 The project

The Dennery Hospital operated from a site within Dennery Village for many years. The space available for operations at that site had been reduced to one building for a number of years as the other building was deemed unsuitable for patient services, due to poor condition of the structure. Hurricane Tomas in October 2010 damaged the roof of the occupied structure, forcing a relocation to the Richfond Health Centre, where hospital services are offered to the present day. Richfond Health Centre Services were transferred to and combined with La Ressource Health Centre services to facilitate this. Both Richfond and La Ressource Health Centres are within the quarter of Dennery.

Under this World Bank-funded project, the hurricane-damaged building at Dennery village is to be rehabilitated, so that services may return there temporarily. The World Bank is funding building renovation and hospital equipment procurement for that purpose. Government of Saint Lucia is committed to demolish the other building at that site, before services are returned there. The renovated structure will accommodate most of the services that were offered at that site before the passage of Hurricane Tomas.

The World Bank will also finance construction and equipping of a new polyclinic at Bois Jolie, also in the quarter of Dennery.

The TOR for this EIA (see Appendix 1) proposed that an EIA be conducted for the proposed works at the original and proposed sites at Dennery Village and Bois Jolie respectively.

1.3 Impacts and mitigation measures

Key potentially beneficial impacts associated with project implementation are almost all related to the post-construction (operational). The main potentially beneficial impacts are:

- Removal of derelict structure from original hospital site, improving public health, safety and site aesthetics.
- Reduced risk of loss of access to polyclinic by users and service providers during flood conditions.
- Reduced transportation costs and increased ease of access for a large segment of the catchment population.
- Improved health services available to the catchment population as a result of increased space available for operations within modern and improved facilities, and allocation of requisite resources for improved services.
- Reduced need for the catchment population to travel to Castries or Vieux Fort to access emergency and other health services.
- Organisationally, new protocols applied within an improved/new structure prompting improvements in quality of service.
- An incremental improvement in technology and introduction of new or expanded services.
- Improved water supplies, with increased storage provision for normal and emergency requirements.
- Improved medical and other equipment performance and longevity.
- Improved infectious disease control.
- Improved patient comfort and safety.
- Improved staff facilities.
- Compliance with national/ international standards in health care.
- Improved occupational health and safety within the polyclinic.
- Improved rodent control.

- Improved waste water treatment.
- Increase in employment opportunities.
- Improved hospital security.
- Improved biomedical and solid waste management within the polyclinic.
- Opportunity for development of complementary ancillary services on vacant properties in the vicinity of the proposed Bois Jolie site, increasing employment and private sector investment in the area.
- More efficient communication between, and access to information by, the various health service providers, regardless of physical location, resulting in more effective patient care.
- Improved access to and use of real time data and information.
- Increased amenity value in the vicinity as a result of health facilities available within a mixed use area.

Benefit enhancement measures are premised on the incorporation of appropriate features into the project designs, a political and financial commitment to health sector reform and UHC, and adoption of a high standard of routine and periodic maintenance and operations by the facility managers, so that benefits are sustained in the long term.

The principal potentially adverse impacts associated with the project mostly relate to the construction phase:

- Health and safety hazards to the workforce, arising from participation in an inherently dangerous occupation.
- Exposure of workforce and occupants of nearby structures to asbestos during removal of roof sheets from derelict structure on the original hospital site within Dennery Village.
- Land and water pollution, public health hazards and landscape amenity value degradation arising from inadequate disposal of liquid wastes, spillages of contaminating materials, and inadequate disposal of solid wastes arising at the worksites.
- Enhancement of erosion/sediment deposition following clearance of vegetation, prior to commencement of construction on the cleared Bois Jolie site or associated with failure to re-vegetate cleared areas at the earliest opportunity.
- Increase in suspended solid content and bed load of drainage courses at Bois Jolie, associated with erosion of cleared areas and construction activity.
- Creation of noise and dust nuisance during various haulage and construction operations.

- Increased road safety hazards to road users and the workforce, and inconvenience to the public associated with construction traffic, particularly in the vicinity of the worksites.
- Creation of dangers to the general public and road users arising from roadside storage of construction materials and inconsiderate roadside parking of construction plant and vehicles.
- Damage to road pavements and structures associated with haulage of materials to/from the worksites.
- Damage to and interference with public and privately owned infrastructure, arising during construction.

Construction phase impacts will be mitigated through the inclusion of specific environmental protection clauses in the contract documents, and enforcement of compliance with these during construction.

During the post-construction (operational) phase other key potential negative impacts anticipated are:

- Possibility that plans for a new polyclinic do not come to fruition, and operations remain at the renovated Dennery Village facility for the foreseeable future.
- Increased costs of national health care.
- Increased cost of access to the facility for Dennery Village residents.
- Cost and inconvenience incurred by need to relocate to renovated and then new premises.
- Illegal occupation of adjacent underutilised, Government-owned lands.
- Occupation of road reserves in the vicinity by vendors.
- Diminished aesthetics and amenity value as a result of an institutional building within an undeveloped area.
- Pollution and erosion arising from site run-off.
- Under/in-appropriate utilisation of the renovated Dennery Village site.
- Polyclinic operations compromised by future new development in the vicinity.
- Performance of the East Coast Road compromised as a result of increased traffic, including pedestrian traffic, at the access road junction with the East Coast Road.
- Road safety hazard to pedestrians trying to cross a high speed roadway.
- Noise pollution from the adjacent roadway affecting hospital users.
- Loss or reduction of use of polyclinic as a result of damage incurred to the structure or related infrastructure as a result of a natural or manmade disaster.

- Temporary increase in local traffic and associated noise levels, in particular ambulances, during a regional/national emergency.
- Loss of utilities and services in aftermath of natural or manmade disaster.
- Suboptimal duplication of specialist and other services already offered at the hospitals in Castries and Vieux Fort.

These impacts may be mitigated by:

- an articulation and public discussion of policies and plans for the health sector,
- a rationalisation of land use plans for the Bois Jolie area,
- a combination of junction, access road and hospital design features,
- enforcement of development control and traffic laws,
- effective management and maintenance of the facility and ancillary works, and
- implementation of health sector reform and UHC proposals by government.

1.4 Uncertainties in Impact Assessment

The EIA is inherently subject to some degree of uncertainty, primarily arising because the precise nature and scope of works had not been fully defined at the time that the EIA studies were carried out. A design brief had been prepared and conceptual plans prepared on the basis of that brief were under review by the Ministry of Health, but the scope of these will likely have to be reviewed due to a significant funding deficit. Recommendations are made in this EIA to reduce the scope of the proposed works, and the cost implications of these are explored further as part of the feasibility study contained in Volume 2 of 2 of this report. The recommendations for scope reduction seek to ensure that the services envisaged in the original design brief are still offered at the Dennery Polyclinic, but take greater cognisance of the national health sector reform vision and recommendations.

Other uncertainties relating to plans for development of the Bois Jolie area also introduce an element of uncertainty in the quantification of impacts. However, it is believed that the level of uncertainty regarding impact occurrence and magnitude is acceptably low and the effect of these uncertainties on the assessment of overall environmental performance of the project is insignificant because of the rigorous approach to impact assessment and mitigation which has been adopted.

2.0 INTRODUCTION

2.1 General Aspects

The Dennery Hospital originally located within Dennery Village, was forced to relocate to the Richfond Health Centre in November 2010, after the passage of Hurricane Tomas, due to the extent of hurricane-damage to the hospital building. This necessitated a relocation of health centre services from Richfond to the La Resource Health Centre. The hospital is still operating at Richfond Health Centre today.

Photo 2.1. Dennery Hospital since closure

Photo 2.2. View of inside of old Dennery Hospital to be renovated

Photo 2.3. Richfond Health Centre, occupied by Dennery Hospital operations

The project entails renovation and equipping of the hurricane-damaged Dennery hospital building in the Dennery village, and the environmental impact assessment, feasibility study, design, construction and equipping of a new polyclinic at a site at Bois Jolie. The proposed polyclinic site at Bois Jolie is owned by National Land Co, a subsidiary of the statutory authority, the National Development Corporation.

Photo 2.4. La Ressource Health Centre, accommodating both Richfond and La Ressource Health Centre services since closure of the Dennery Hosiptal and relocation of hospital services to Richfond

This EIA and FS is required to identify impacts of construction and operation of the new Dennery Polyclinic, and appropriate mitigation measures. The study also identifies impacts of adjacent activities or conditions in the vicinity, on the project, and appropriate mitigation measures. The term “environment” has been used broadly throughout, to cover social and socio-economic as well as physical and biological aspects. The fundamental objective of the environmental study described in this report was to assess the likely overall impact of the project through identification and evaluation of the potential beneficial and adverse impacts associated with implementation and subsequent operation, as well as to identify appropriate benefit enhancement and adverse impact mitigation measures aimed at improving environmental performance.

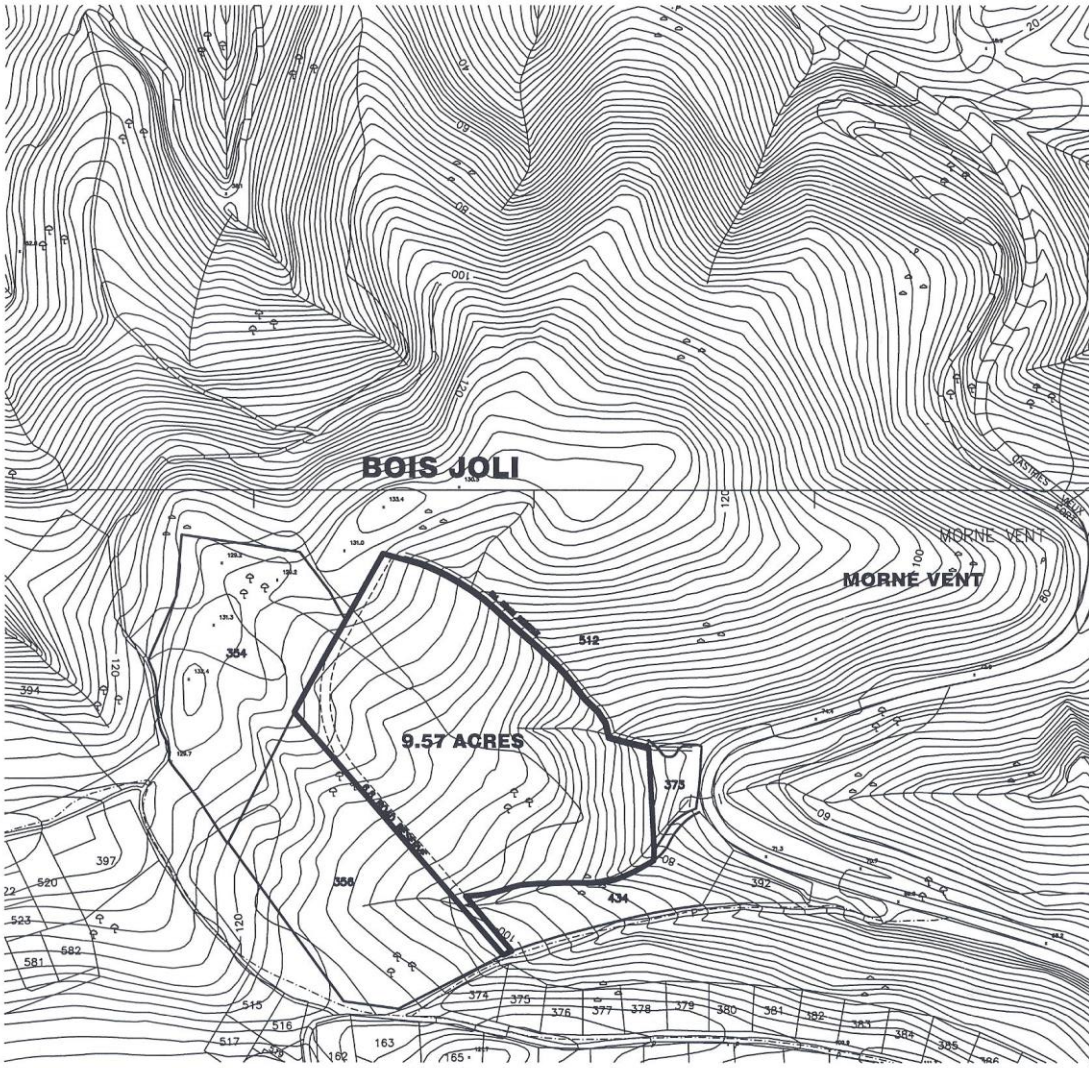

Figure 2.1. Proposed Polyclinic location

Photo 2.5. Proposed polyclinic site at Bois Jolie

It is expected that the EIA study findings will assist the designers in their selection of design features that mitigate potentially adverse impacts and enhance beneficial impacts. It will inform the relevant conditions of contract in the tender dossier. It will alert the client early to the supporting roles required to be played by various national authorities. It will also provide the basis for guiding subsequent actions by policy makers and facility managers, particularly within the MOH, which will ensure that the project is operated with due consideration for the environment.

The following are listed in Terms of Reference, to be considered in this EIA:

- Physical and biological environment.
- Socio-cultural environment.
- Land use.
- Air quality.
- Noise.
- Drainage.
- Vulnerability to natural disasters, including flood.
- Waste management.
- Transportation access.

- Legislative and regulatory considerations.
- Aesthetics.
- Energy.

It was assumed in the EIA/FS proposal that the following would also be addressed:

- Occupational and public health and safety.
- Availability of services and utilities beyond transportation and power supply.
- Wastewater management.

The full text of the TOR is reproduced in Appendix 1.

2.2 Methodology

The EIA assesses the environmental and social impacts of the proposed project, and recommends mitigation measures to respond to these. The EIA process is being conducted in advance of detailed design, and adoption of the mitigation recommendations will ensure that social and environmental issues are duly considered during the detailed design of the new polyclinic. This approach ensures that issues are identified early and are used to shape the project as it develops.

Activities to inform this EIA report and recommendations for hospital design, included:

2.2.1 Review of available literature

Literature reviewed included:

- Health Sector Reform Proposals and Plans
- Assessment of the Current Structure and Operations of the Primary Health Care System in St. Lucia
- National Vision Plan, North-east Quadrant
- Dennery Polyclinic Design Brief
- Standards for Accreditation of Pharmacies
- Relevant OECS Building Standards Documentation

as well as:

- Physical Planning and Development Act (Cap. 5.12)
- draft Physical Planning and Development (Environmental Impact Assessment) Regulations

Other relevant national (environmental) legislation and regulations, were reviewed, such as:

- Disaster Preparedness and Response Act (Cap. 14.06)

- National Conservation Authority Act (Cap. 6.01)
- draft Physical Planning and Development (Land Development) Regulations
- Public Health Act (Cap. 11.01)
- St. Lucia National Trust Act (Cap. 6.02)
- St. Lucia Solid Waste Management Authority Act (Cap. 6.10)
- Water and Sewerage Act (Cap 8.14)
- St Lucia: Environmental Profile 1991
- Compendium of Environmental Statistics (Central Statistical Office of St Lucia) 2001
- Manual for Developers 1988
- OECS Building Code
- Legal and Institutional Review of Environmental Management in Saint Lucia, 2002
- St. Lucia Development Atlas 1987
- 2001 Census data available for the surrounding communities

2.2.2 Site Visits

Site Visits were conducted by the Lead Consultant and Sub-Consultants as required.

2.2.3 Meetings, Consultations and Surveys

The following were undertaken:

- Convening of stakeholder consultations including meetings with representatives of Ministry of Health and Dennery Hospital and Health Centres management, Consultants involved in the conceptual design of the Dennery Polyclinic, Government Ministries, statutory agencies, NGOs, Parliamentary Representative, community representatives and other stakeholders
- User survey

A list of persons consulted is contained in Appendix 2. The user survey instrument and analysis are contained in Appendices 7 and 8 respectively.

These activities facilitated the determination of baseline environmental conditions, social and environmental impacts, operational costs and identification of appropriate mitigation measures.

2.3 Project Sphere of Influence

This polyclinic is intended to service Dennery and environs, and also draws clients from Bexon to the north and Mon Repos to the south. This entire catchment population will be affected by decisions regarding location of, and services to be offered at, this facility.

Potential environmental impacts are to be anticipated within existing Dennery Village site as well as within the proposed 5 acre Bois Jolie site boundary. Beyond the Bois Jolie site boundary, the following existing land uses in close proximity to the site may be affected by, or may affect, the proposed Dennery Polyclinic development:

- SDA church on the proposed site boundary;
- Private and NDC owned property on remaining boundaries;
- ravine on proposed site boundary;
- Bois Jolie access road, and residential development in the vicinity;
- East coast road, to the east of the site.

Photo 2.6 . Existing concrete access road past SDA church in Bois Jolie

Photo 2.7. Residence within Bois Jolie, near proposed polyclinic site

Photo 2.8. SDA church on proposed boundary

The Atlantic Ocean to the east also has the potential to affect both sites, or be affected by activities at the proposed locations.

The relocation of hospital operations away from Richfond, and then from Dennery Village has the potential to affect residents including service providers resident in those communities, including hospital staff, shop keepers and bus drivers.

The National Vision Plan (see Figure 2.2 below) envisaged that the hospital would be located on the periphery of Dennery Village, on a site next to the Bois Jolie residential area. It also recommends establishment of a regional transportation and welcome centre/helipad on the highway, just south of the proposed new hospital. The Vision Plan went further, to propose change of use at the original hospital site to a community centre with an iconic element/wind sculpture. The site now identified for polyclinic development is located within Bois Jolie, but some distance north of the site identified under the Vision Plan, and somewhat further removed from the Dennery Village centre.

The NDC has developed a master plan for its lands within the Dennery area, but this has not yet been submitted for planning approval. It provides for mixed use within the Bois Jolie area, including the proposed site. A number of residential subdivisions within Bois Jolie, consistent with the proposed land use, have been approved by the DCA.

Attention has been concentrated mostly on the areas identified above, with some consideration also being given to more distant, off-site impacts (such as impacts associated with the haulage of construction and waste materials) as appropriate.

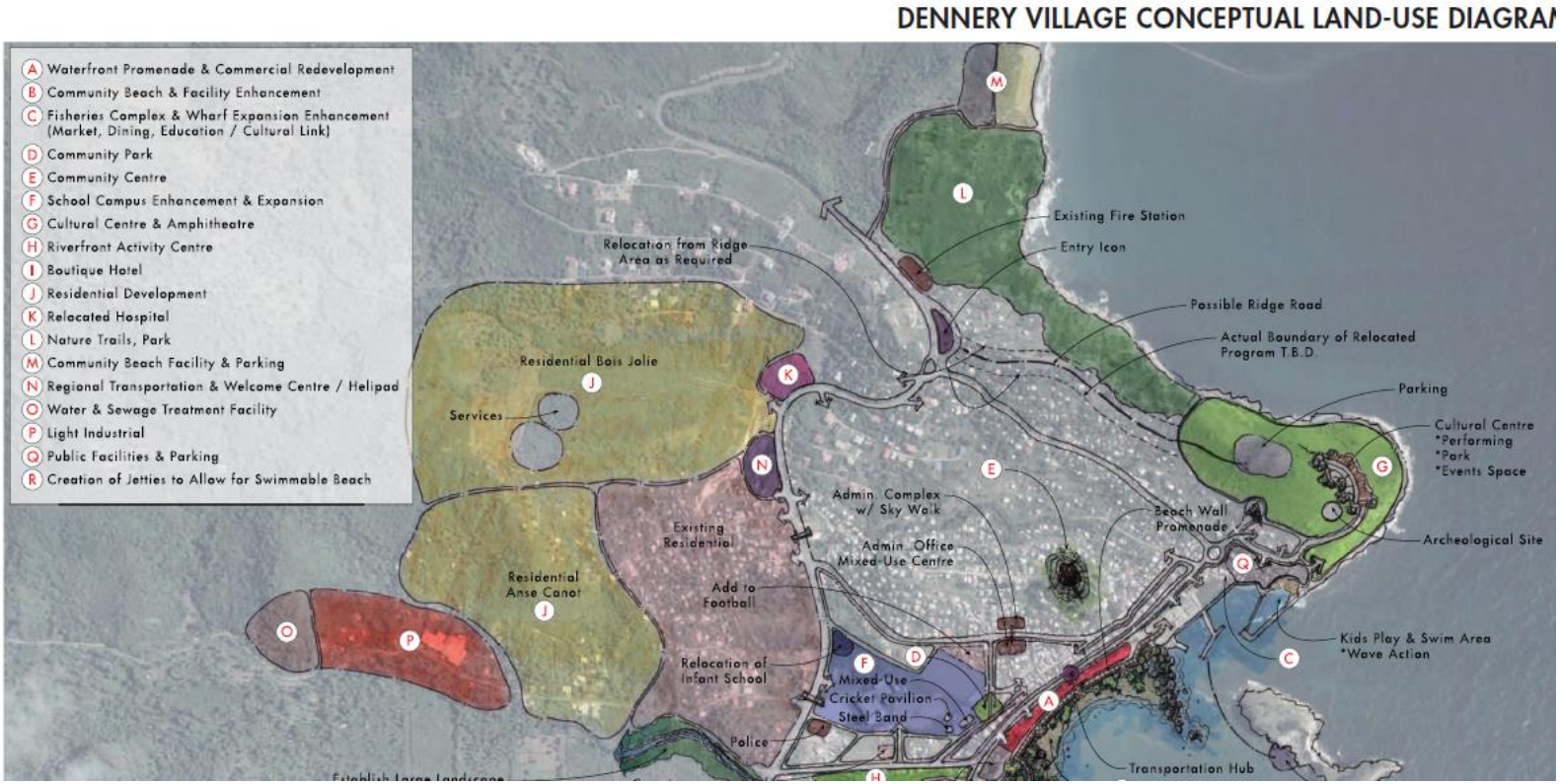

Figure 2.2. Dennery Village Conceptual Land Use Diagram (Source: National Vision Plan)

3.0 ENVIRONMENTAL POLICY, INSTITUTIONAL AND LEGISLATIVE FRAMEWORK

3.1 Government of Saint Lucia Environmental Policies and Plans

There are numerous national policies and plans relevant to sustainable development and the environment. These have had limited success due to the absence of supporting legislation. Those of relevance are described in some detail below:

3.1.1 Saint George's Declaration of Principles for Environmental Sustainability in the OECS

Regional Governments adopted the Saint George's Declaration of Principles for Environmental Sustainability in the OECS in April 2001, proclaiming the principles of sustainable development by which human conduct affecting the environment is to be guided and judged.

The twenty one principles sought to guide national development activities and decision making at the national and regional levels. These principles are based on the Principles of the UN Conference on Environment and Development Rio Declaration and Programme of Action and the subsequent SIDS Programme of Action from the UN Global Conference on Sustainable Development of Small Island Developing States.

Annex A to the Saint George's Declaration of Principles lists commitments on the parts of Governments, regional organisations and international agencies. In November 2001, the Environmental Policy Committee of the OECS endorsed the OECS Environmental Management Strategy, which established the mechanisms and actions that would give effect to the Declaration. Principle 19 required countries (including Saint Lucia) to develop a National Environmental Management Strategy (NEMS) within two years of the Declaration coming into force.

3.1.2 National Environment Policy (NEP) and National Environmental Management Strategy (NEMS)

The National Environment Policy (NEP) and National Environmental Management Strategy (NEMS) were developed in accordance with the Saint George's Declaration of Principles for Environmental Sustainability in the OECS. The NEP provides the broad framework for environmental management in Saint Lucia and establishes links with policies and programmes in all relevant sectors of economic and social development. The NEMS provides specific directions and mechanisms for more effective policy implementation and includes specific results expected and actions necessary to realize the policy objectives.

The NEP and NEMS are formal expressions of the nation's commitment to arrest and reverse trends of environmental degradation and to ensure that sound environmental management is fully integrated into the national development policy framework.

The Government and people of Saint Lucia envision a healthy and productive environment that guarantees the sustainability of development activities and processes and that contributes fully to human development and to the quality of human life, with all people and institutions aware

and having a good understanding of environmental issues, making them conscious and ready to demand, as well as play a part in, environmental conservation and management.

Main policy interventions identified are maintenance of the diversity of ecosystems, species and genes, of natural productivity of ecosystems and ecological processes; optimization of the contribution of natural and environmental resources to economic and social development; prevention and mitigation of the negative impacts of environmental change and natural disasters; maintenance and enhancement of the contribution of the environment to human health; and fulfilment of regional and international responsibilities.

The NEMS proposed establishment of a National Environmental Commission (NEC) and strengthening and repositioning of the Sustainable Development and Environment Unit (the NEC was launched in September 2008). The NEMS proposed establishment of the National Environment and Development Forum as an annual event that serves to: (a) engage civil society and other actors in the review of environmental policy and in the identification of issues and priorities, (b) disseminate information on the state of the environment and on the status of environmental policy in the country, and (c) foster cooperation and coordination among institutions and actors. The Sustainable Development and Environment Unit became the Sustainable Development and Environment Division (SDED) in 2010, although the change in nomenclature was not accompanied by a change in resource allocation. To date, a Forum has not been convened.

3.1.3 National Land Policy

Cabinet approved the green paper on a National Land Policy in 2003. The white paper (final draft) on the National Land Policy (Nov 2005) was developed by the Ministry of Physical Development, Environment and Housing, and has received Cabinet approval. This recognised the role of land management in sustainable development and economic growth. It summarised issues of land use and management in St Lucia, and proposed a broad policy framework.

The paper noted that earlier sectoral approaches to land policy were no longer appropriate, called for an integrated and coherent framework to arrest negative trends and address emerging issues, and sought to provide clear direction and guidance to all actors involved in land management, development and administration. The policy directions and instruments contained in the White Paper are consistent with commitments made by Saint Lucia under the various bi-lateral and multi-lateral agreements and conventions to which Saint Lucia is party.

3.1.4 Integrated Development Plan

In 1998 Cabinet approved the development of plans to introduce the Integrated Development Planning (IDP) process via the Ministry of Physical Planning, but there has not been much progress. It is possible that that the new SLP regime may re-introduce the process over the next several years.

3.1.5 National Vision Plan

The Saint Lucia National Vision Plan was published in October 2008 as a developmental road map for the future development of the island. The Plan was envisaged as a framework through which the island can share in a common vision. The Saint Lucia National Vision Plan provides a broad overview of Saint Lucia and the development issues it faces. There is unlikely to be support for the Vision Plan in its entirety, within the newly elected SLP regime.

3.1.6 State of the Environment (SOE) Report

Saint Lucia's first State of the Environment (SOE) Report was completed by the MOPD in 2004.

3.1.7 National Environmental Action Plan (NEAP)

The National Environmental Action Plan (NEAP) was developed as part of an international programme arising out of Agenda 21, and was to serve as the roadmap for implementation of a comprehensive environmental management programme. It had Cabinet approval, but was never fully implemented, due primarily to lack of resources and limited stakeholder buy in. The NEAP was superseded by the NEP/NEMS.

3.1.8 Biodiversity Country Study Report of Saint Lucia

Saint Lucia ratified the Convention on Biological Diversity in 1993. Saint Lucia has a wide range of habitats on land and in the sea, with diverse communities of plants and animals, some of which are found nowhere else in the world. Saint Lucia's biodiversity is threatened by a range of human activities, such as agricultural, commercial and residential development, pollution, inappropriate sewage and solid waste disposal and over-exploitation of some marine species.

The Biodiversity Country Study report of Saint Lucia (Aug 1998) provided information on the main sectors and resources, assessed the current status of biological diversity, identified issues and proposed preliminary directions. This was intended to assist in the biodiversity strategy and plan preparation. The report addressed socio-economic issues, agricultural biodiversity, forest ecosystems, marine and coastal ecosystems, freshwater ecosystems and tourism.

3.1.9 National Biodiversity Strategy and Action Plan of Saint Lucia

The Convention on Biological Diversity requires preparation of a national biodiversity strategy and action plan (NBSAP).The National Biodiversity Strategy and Action Plan sought to address issues of sustainable utilisation and conservation of Saint Lucia's biodiversity. The vision for the future of Saint Lucia's biological diversity included the following elements:

- The status is known, Saint Lucians and visitors are aware of the importance of these resources, and respect for biodiversity is integrated into the nation's culture;
- Government, NGOs, private sector and communities are conscious, active and responsible in its management, and it is taken into account within policy making processes at all levels;
- The integrity of biodiversity is maintained, and restored when possible;

- Biodiversity contributes optimally to country development and well-being of the people; and
- National, regional and international efforts aimed at conserving biodiversity are consistent, mutually supportive and effective.

Five (5) broad programme areas were identified: Planning and policy formulation; Research and monitoring; Conservation; Sustainable use; and Education and awareness.

3.1.10 A National Policy and Strategic Plan for the Development of the Agricultural Sector

A National Policy and Strategic Plan for the Development of the Agricultural Sector represented the Government's vision for the development of the agricultural, forestry and fisheries sectors, and sought to address the challenges which these sectors were facing. The sector-specific policies enunciated were predicated on the notion that the viability of the sector is indispensable to sustainable economic and social development in Saint Lucia in the medium to long term. The objectives were to increase the efficiency and competitiveness of agriculture, promote the adoption of improved/appropriate technological packages, expand and diversify agricultural, forestry and fisheries production, value-added agro-processing and the general market base, enhance the national food security status, generate new opportunities for income and employment in rural areas, conserve the natural resource base, and modernize the legislative and policy framework for optimal agricultural production and trade.

The Government proposed to implement policies and programmes that would ensure a broad appreciation of the conservation and sustainable use of natural resources which will, in time, lead to increased soil protection, soil fertility and efficient water use and rehabilitation of degraded areas.

The Ministry proposed to develop a land-zoning framework in the context of the national land policy to give special attention to management of critical lands for agriculture production, maintenance of biodiversity and provision of water.

3.1.11 A National Water Policy of Saint Lucia

The policy analysed the existing situation, and concluded that Saint Lucia was facing a situation of water stress which will worsen unless urgent action is taken. The policy is driven by a vision of a future in which all users of water resources understand and appreciate the value of water as a fragile, finite and essential resource and are sufficiently empowered whether individually or collectively to perform their respective roles in ensuring access to a safe, secure, adequate and affordable supply of fresh water. The goal of the policy is to sustain economic growth, human development and environmental sustainability by promoting and facilitating the use and management of freshwater resources in an efficient, sustainable and equitable manner that is consistent with the social, economic and environmental needs of current and future generations as well as with the country's international obligations.

The policy proposes to build capacity for integrated water resource management (IWRM), through among other things, strengthening human resource capacity to improve efficiency and effectiveness of water resource management agencies and to engender appropriate changes in

cultures and in the perception and attitudes of users of water resources. Emphasis must be placed on the efficient use of water, including measures to promote conservation and the use of appropriate technology.

The policy addressed building capacity for integrated water resources management, water for health and sanitation, food and agriculture, industry, nature and environmental sustainability, and natural disaster management.

3.1.12 Coastal Zone Management in Saint Lucia: Policy, Guidelines and Selected Projects

This document sets out the policy framework for strategies and actions and identifies selected programmes and projects for implementation.

The policy acknowledges that the coastal area is critical to Saint Lucia's cultural, environmental, social and economic development, and needs to be protected and conserved if benefits are to be sustained. The objectives of the CZM policy are to maintain the integrity and productivity of the coastal zone and resources therein, optimize the contribution of the coastal zone to social and economic development through the sustainable use of resources and the equitable sharing of benefits, and harmonise uses of the coastal zone and provide a framework for the management and resolution of resource use conflicts. The policy proposes establishment of a CZMAC interagency coordinating committee in accordance with the Physical Development and Planning Act, and a Coastal Zone Management Unit (CZMU) to serve as a secretariat to the committee. These were both established, and the CZMU was subsumed into the SDES as envisaged in the policy.

3.1.13 Saint Lucia National Climate Change Policy and Adaptation Plan

Saint Lucia ratified the United Nations Framework Convention on Climate Change (UNFCCC) in 1993. The National Climate Change Policy and Strategy is based on an acceptance that climate change is occurring, and will continue even if immediate steps are taken to reduce global warming. It accepts that the effects will have a net adverse effect on economic, social and environmental aspects of life in Saint Lucia.

The policy proposes an integrated, coordinated, holistic and participatory approach to planning for and amelioration of the effects of climate change, to ensure that the quality of life of Saint Lucians and opportunities for sustainable development are not compromised. Policy objectives are to foster development of processes, plans, strategies and approaches to avoid, minimize or adapt to negative impacts of climate change, improve knowledge and understanding of Climate Change issues in order to obtain broad-based support for and participation in Climate Change activities, and to conduct systematic research and observation to improve forecasting and inform necessary planning and response measures; foster development and application of appropriate legal and institutional systems and management mechanisms for planning and responding to climate change; and foster development of appropriate economic incentives to encourage public and private sector adaptation measures.

The implementation of the policy is monitored by the broad-based National Climate Change Committee. The strategy provides a blueprint for policy implementation in the areas of coastal

and marine resources, human settlements, terrestrial resources, terrestrial biodiversity and agriculture; tourism financial sector; human health, systematic observation; and assigns levels of priority to the various strategies and actions.

3.1.14 Saint Lucia Sustainable Energy Plan

Growth in the Saint Lucia economy, fueled largely by an expanding tourism sector, has resulted in 4.3% annual net increases in power demand. For electricity, Saint Lucia relies solely on diesel powered generating plants. Renewable energy and energy efficiency offer the potential to reduce electricity costs and protect the environment. The Plan's objectives are to ensure the existence of adequate, stable, reliable, secure energy supplies for all sectors and customers, allow reasonable incomes for businesses engaged in the local energy sector, promote energy efficiency and conservation at all levels, and maximize the use of viable renewable energy and energy efficiency alternatives, enabling Saint Lucia to become a "Sustainable Energy Demonstration Country" by 2008-12, in accordance with its announcement made at the Fifth meeting of the Conference of Parties of the UNFCC.

The plan set energy sector targets to reduce projected electricity demand, deliver stipulated proportions of installed capacity via renewable energy technologies, reduce annual consumption of diesel fuel for electricity generation and reduce GHG emissions from the electricity sector and gas and diesel in the transportation sector. Transportation sector reductions will be achieved by increased use of public transportation, introduction of high efficiency vehicles, deployment of a limited number of vehicles powered by alternative fuels, driver education and awareness to reduce fuel consumption, and improvements in road and traffic management.

The plan proposes assessment of renewable energy resources for wind, biomass, geothermal, hydro and solar energy, and promotion of Saint Lucia for renewable energy investments.

The government will:

- adopt and enforce regulations for policy implementation;
- explore alternatives to the current electricity monopoly granted to LUCELEC;
- establish a comprehensive renewable energy training initiative;
- create a dedicated renewable energy fund to provide concessional financing for feasibility studies and project investment;
- consider establishment of polices that permit companies to generate their own electricity while still maintaining a link to the power grid; and
- establish electricity regulations and an independent power regulator.

3.1.15 Energy Sector Policy and Plan for Saint Lucia

The policy acknowledges the primary responsibility of government for policy formulation in the power sector, to support exploitation of new and indigenous energy resources and reduce national energy consumption by raising energy efficiency and saving energy. The government is

responsible for setting the framework conditions for regulating the entire sector. It notes Saint Lucia's efforts to be a "Sustainable Energy Demonstration Country" by 2008-12. This effort is well behind schedule as there has been little progress with wind and geothermal energy, and some small progress with development of photovoltaic energy. An Energy Policy Advisory Committee will be established in 2011 to coordinate all activities within government, and to collaborate with the private sector in energy sector reform. For energy efficiency in the building sector, the policy calls for training of architects and engineers in the application of an Energy Efficiency Building Code to be developed, through a series of workshops. In the transport sector, government will facilitate training of automotive mechanics and driving teachers.

3.1.16 Saint Lucia National Emergency Management Plan

The National Emergency Management Organisation (NEMO) in Saint Lucia is responsible for having the Nation in a state of preparedness in case of an emergency, for responding to the needs of the Nation after a disaster and coordinating the response at local, regional and international levels. During an event NEMO is part of a larger network that comes into existence to respond to a disaster. There are 10 National Disaster Committees that belong to NEMO and 18 District Disaster Committees. During an emergency NEMO transforms into the National Emergency Operations Centre (NEOC), from which all commands are issued and to which all demands are made. It is the seat of control for the Prime Minister as Chairman of the NEOC and leader of the State. All heads of essential services locate at the NEOC. Certain Ministries (e.g. Ministry of Health, the Ministry of Works and the Ministry of Tourism) establishes a sectoral EOC that has direct and permanent communication with the NEOC. Every district establishes a District EOC that co-ordinates the response at the local level, in permanent communication with the NEOC and key institutions/organisations /facilities/ individuals within the District.

The Saint Lucia National Emergency Management Plan comprises:

1. Policies & Guidelines (for Donations and Importation of Relief Supplies, Emergency Shelter Management, Emergency Housing, Mitigation, Travel, Management and Disposal of Dead Bodies in Disasters)

2. National Emergency Plans (for Hurricane Response, Earthquake Response, Volcanic Eruption Response, Oil Spill Contingency, National Mitigation Plan, Stress Response Team Plan)

3. Sectoral Plans (The Ministry of Communications, Works, Transport and Public Utilities Plan, The Saint Lucia National Emergency Health Sector Plan, The Hospitality Industry Crisis Management Plan and The Saint Lucia Private Sector Response Plan)

4. Specific Plans (Mass Crowd Events Plan, Plan for Evacuation of Anse La Raye, Model Plan for the District Disaster Committees in Saint Lucia, The Saint Lucia Prison Emergency Plan, The Port Authority Cruise Line Ships Plan, The Saint Lucia Seaports Contingency Plan)

3.1.17 System of Protected Areas for Saint Lucia

A System of Protected Areas for Saint Lucia was prepared by the SLNT in 1992, but less than half of these have been established to date. The plan provided the basis for later establishment

of the PMA in Soufriere. The Systems Plan has been reviewed by the SLNT with assistance from the Nature Conservancy, and the resulting draft has been subject to a broad consultation process. It has not yet received Cabinet endorsement.

3.1.18 Forest Legislation, Policy and Management Plan

The Department of Forestry has drafted revised legislation and policy. The legislation is with the Attorney General Office awaiting approval, which has been pending for over one year. The Department is has developed strategic notes that will lead to a strategic plan. It is anticipated that all will be completed in 2011.

A Forest Management Plan was prepared by the Forestry Department for 1992-2002. A strategic plan has been drafted and is under review by the Department.

3.1.19 National Tourism Policy (final draft)

The draft National Tourism Policy (Oct 2003) analysed global trends and the local situation, and provides the policy framework and elements. The economic importance of tourism globally and domestically was demonstrated. Consumer surveys indicated that the country's natural and cultural base was one of its most important strengths and attractions. The vision is that Saint Lucia will be recognized internationally as having a unique, competitive and high quality product that meets the expectations of visitors sustained by a well trained and customer focused workforce, where benefits generated by tourism are widely shared. Included in the guiding principles are the promotion of a clean, healthy and safe environment, ensuring the sustainability and conservation of natural resources in the planning and development of tourism.

3.1.20 Saint Lucia Five Year Tourism Strategy and Millennium Action Plan

The approved Saint Lucia Five Year Tourism Strategy and Millennium Action Plan aims to inter alia protect the natural and cultural heritage, and achieve Green Globe certification for sustainable tourism development.

3.1.21 Tourism Strategy and Action Plan

This report by Emerging Markets Group (EMG) Ltd (2005) summarised the findings from a diagnostic analysis of St Lucia's tourism sector and drew from that report and various stakeholder consultations, to identify the main elements to be addressed. The report presented a 5 Year Strategic Action Plan.

The report noted the underlying aim to protect the environment to ensure sustainability of the tourism sector. A two-pronged approach is required – that of managing user conflicts and prevention of environmental degradation. A key component to ensuring sustainability is to provide for sharing of natural resources, hence the need for managing the needs of conflicting users. The strategy therefore proposes the:

- Determination of potential areas of conflict/competition for use of natural resources such as the coastal waters;

- Establishment of guidelines for use by various users; and
- Provision of a forum for dialogue and dispute resolution.

The strategic aim is to preserve the environment through the prevention of environmental degradation. Several strategic interventions are needed, the basis of which requires the Ministry of Tourism to play an advocacy role to effect the following:

- Water quality – the Ministry of Health (Environmental Health Dept.) to undertake either directly or through paid services for monitoring of water quality in key tourism areas and responding with appropriate measures;
- Solid waste disposal – MOH to establish guidelines for the handling of on-property refuse and solid waste, disposal of refuse and reactive materials;
- Noise pollution in key tourism zones – Ministry of Commerce to establish criteria for nightclub operations (e.g. clubs should be enclosed and air-conditioned to contain noise). This can be instituted via a new license for nightclubs or by expanding the requirements for trade licenses.

3.1.22 Other Policies and Strategies

Other policies and plans of some relevance are:

- The Action Plan for Desertification;
- The National Social Development Policy;
- The Medium Term Development Strategy;
- The OECS Development Strategy;
- The national zoning plan for agriculture and forestry.

3.2 Environmental Legislation

Environmental legislation in Saint Lucia is, at present, highly fragmented, with numerous pieces of legislation relating to various aspects of environmental protection, conservation and management. Many legal provisions remain unimplemented due to a failure to develop appropriate regulations, and consequently do not provide an effective basis for administration and enforcement. Dispersal of responsibility for administering the legislation across numerous entities as well as some overlaps in enforcement responsibilities between entities, dilute the effectiveness of control and enforcement measures and compromise the effectiveness of prevailing legal instruments. It has been recognised that consolidation, rationalisation and modernisation of the environmental legal framework is required to address the deficiencies in the present framework.

A draft Environmental Management Act was completed in 2008, to provide for the allocation of administrative responsibilities for environment management, the undertaking and coordination of environmental management and related activities. However, this has not yet been enacted,

and aspects of prevailing legislation which are of most relevance to the present project are summarised in the sections which follow:

3.2.1 Physical Planning and Development Act (Cap 5.12)

The Act makes provision for the 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 (see Section 2.3.1 for further detail regarding planning aspects). The Fourth Schedule lists matters for which EIA is ordinarily required. This project, given its size, location, level of occupation and type of activity qualifies as a project for which EIA would be required. The Act provides for the making of EIA regulations, and draft Regulations have been developed but to date have not been passed.

3.2.2 Land Conservation and Improvement Act (Cap. 5.10)

The Land Conservation and Improvement Act (Cap 5.10) provides for the establishment of the Land Conservation Board to advise the Minister for Agriculture and Lands on the general supervision of land and water resources, stimulate public interest in conservation, and coordinate efforts of other conservation bodies. The Act also provides for making protection orders for conservation and improvement of land and water.

3.2.3 Water and Sewerage Act (Cap 8.14)

The Water and Sewerage Act (Cap. 8.14) provides for the management of water resources and regulation of the delivery of water supply services and sewerage services throughout Saint Lucia. The Act establishes a Water Resources Management Agency for the management of water resources, with responsibilities to inter alia promote the sustainability of the water resources and public awareness concerning the use and management of water resources. The Act provides for the declaration of areas as gathering grounds for water supply, water control areas, and waste control areas.

The Act also provides for appointment of a Water and Sewerage Commission to regulate the delivery of water supply and sewerage services in Saint Lucia. The WRMA is to provide technical advice to the Commission.

WASCO is required to, as far as reasonably possible, provide public potable water for domestic purposes, and public sewers and sewage disposal works in compliance with public health laws in force. The Act provides for the declaration of discharges or deposition of wastes onto land, sewer or drain, water or watercourse, and of wastes or classes of waste, as controlled water quality areas, or controlled wastes or classes of wastes respectively. This is to protect public health, established and intended uses of water resources, flora and fauna, and scenic and environmental values. The Minister may take action to prevent polluting matter from entering water, or remove and dispose of polluting matter to remedy or mitigate any pollution.

3.2.4 Beach Protection Act (Cap 6.04)

Under the Beach Protection Act (Cap. 6.04) persons depositing waste or garbage on any part of the seashore are guilty of an offence, and liable for a fine or imprisonment.

3.2.5 Fisheries Act (Cap 7.15)

The Fisheries Act (Cap 7.15) provides for the promotion and regulation of fishing and fisheries in the fishery waters of Saint Lucia.

3.2.6 National Conservation Act (Cap. 6.01)

The National Conservation Act (Cap. 6.01) establishes a National Conservation Authority to, among other things, conserve natural beauty and topographic features of Saint Lucia; remove derelict objects from a beach or protected area; control, maintain or develop a beach or protected area or a public access to a beach or protected area; secure sanitary conditions on a beach or protected area; advise the Minister on the control of construction in any protected area or beach; beautify protected areas with fauna and flora; and advise the Minister on declaration of protected areas. Protected areas include any area of land or water so declared under Section 3, for the purpose of preserving or enhancing its natural beauty, flora or fauna, and creating recreational, national or marine parks.

3.2.7 Saint Lucia National Trust Act (Cap. 6.02)

The Saint Lucia National Trust Act (Cap. 6.02) establishes the SLNT with responsibility to promote and preserve submarine and subterranean areas of beauty or natural or historic interest to preserve the natural aspect, features, animal and plant life. Police officers and Trust officers have powers of arrest against persons in breach of the bye-laws.

3.2.8 Saint Lucia Solid Waste Management Authority Act (Cap. 6.10)

The Saint Lucia Solid Waste Management Authority Act (Cap. 6.10) provides for the management of waste. It establishes the Saint Lucia Solid Waste Management Authority (SWMA), provides for waste management planning, licensing of facilities including waste haulers, regulation of operations, and for powers of authorized officers.

3.2.9 Public Health Act (Cap. 11.01)

The Public Health Act (Cap. 11.01) makes the Minister of Health responsible for the prevention, treatment, limitation and suppression of disease; abatement of nuisances and removal or correction of any condition injurious to public health; prevention, treatment, limitation and suppression of disease; control of food and drugs in the interest of the public health; publishing reports, information and advice concerning public health; and public education on public health issues. The Minister has power to make regulations for the proper carrying out of the provisions of the Act. Regulations under this Act include Nuisances, Communicable and Notifiable Diseases and its amendment of 1991, Water Quality Control, Sewage and Disposal of Sewage and Liquid Industrial Waste Works, Transportation of Human Remains, Disposal of Offensive Matter, Sewage and Disposal of Sewage etc, Foods Regulations, Clothes Washing in Streams, Disposal of Corpses, and Mosquito Control. The Public Health (Water Quality Control) Regulations set standards for the purity of the water supply.

3.2.10 Public Hospitals (Management) Act (Cap. 11.03)

The Public Hospitals (Management) Act provides for the management and administration of public hospitals. It provides for establishment of a Hospitals Board for the general management and administration of any hospital (except Victoria Hospital), conferring on the Board the power to do all things necessary for the proper discharge of its functions, including preparation of annual estimates and collection of fees. The Act assigns responsibility for medical administration of hospitals to the Chief Medical Officer and provides for the appointment of a Medical Director, Medical Superintendent, specialists, consultants, medical officers, nursing and other personnel.

3.3 Disaster Preparedness and Response Act (Cap. 16.06)

The Act provides for a more effective organization of the mitigation of, preparedness for, response to and recovery from emergencies and disasters.

3.4 International Environmental Conventions

International environmental conventions to which Saint Lucia is a signatory are listed below.

Table 3.1. List of International Environmental Conventions to which Saint Lucia is a Signatory

Convention	Date of Entry	Responsible Department
International Convention for the Regulation of Whaling	29/6/81	Fisheries
Convention Concerning the Protection of the World Cultural and Natural Heritage	14/10/91	Forests and Lands Fisheries
Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter	23/8/85	Fisheries
Convention on the Prohibition of the Development, Production and Stockpiling of Biological and Toxic Weapons and on their Destruction	26/11/86	Sustainable Development
International Convention on Trade in Endangered Species of Wild Flora and Fauna (CITES)	15/3/83	Forests and Lands Fisheries
Convention on the Prohibition of Military or any other Hostile use of Environmental Modification Techniques	27/5/93	Sustainable Development
United Nations Convention on the Law of the Sea	27/3/85	Fisheries
Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region and Protocol on Co-operation in Combating Oil Spills	27/3/85	Environment

Convention	**Date of Entry**	**Responsible Department**
(Cartagena Convention)		
Vienna Convention for the Protection of the Ozone Layer	28/7/93	Sustainable Development
The Montreal Protocol on Substances that Deplete the Ozone Layer	28/7/93	Sustainable Development
Basel Convention on the Control of Trans-Boundary Movements of Hazardous Wastes and their Disposal	9/12/93	Sustainable Development
Protocol on Specially Protected Areas and Wildlife to the Cartagena Convention	18/1/90	Fisheries Forests and Lands
United Nations Convention on Biological Diversity	28/7/93	Agriculture, Forestry, Fisheries and the Environment
United Nations Framework Convention on Climate Change	14/6/93	Sustainable Development
Convention on the Prohibition of the Development, Production, Stockpiling, and Use of Chemical Weapons and Their Destruction	29/3/93	Sustainable Development
Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and straddling Stocks and Highly Migratory Fish Stocks	9/8/96	Fisheries
Convention to Combat Desertification	30/9/97	Forests and Lands
Protocol Concerning Pollution from Land-Based Sources and Activities (LBS Protocol) to the Cartagena Convention	29/1/08	Sustainable Development

3.5 National Standards and Guidelines

3.5.1 Guidelines for Recreational Water Quality (SLNS, 2008)

Guidelines for Recreational Water Quality (SLNS, 2010) have been developed by CEHI, and have been approved. The guidelines provide for 3 main categories of recreational activity (primary contact, secondary contact and passive recreation). Class 1 waters under the LBS Protocol include waters used for recreation. Such waters should be sufficiently free of hazard to ensure negligible risk to health and safety of the user. Any effluent into such waters must meet set criteria. Annual environmental health assessments should be carried out prior to the bathing season.

3.6 Land Use Planning Legislation

3.6.1 Physical Planning and Development Act (Cap. 5.12)

The Physical Planning and Development Act (Cap. 5.12) repeals the Town and Country Planning Ordinance (Cap. 175), and the Land Development (Interim Control) Act of 1971, and makes provision for the development of land, the assessment of environmental impacts of development, the grant of permission to develop land, and for other powers to regulate the use of land. The Act (save for Part I) took effect on July 1, 2003. The Development Control Authority (DCA) has not been dissolved, and reference to the Head of the Physical Planning and Development Division is to be construed as reference to the DCA. The Act seeks to ensure that appropriate and sustainable use is made of all publicly and privately owned land, to maintain and improve the physical environment, provide for the orderly sub-division of land and the provision of infrastructure and services, maintain and improve building construction standards to secure human health and safety, and protect the natural and cultural heritage of Saint Lucia. The Act imposes a duty to prepare physical plans on the Head of the Division in consultation with stakeholders, such plans are to be reviewed as least every five years. Once plans are approved by the House of Assembly, the prescriptions of the plan must be given principal consideration in determination of applications, and the government shall be guided by the prescriptions of the plan in the preparation of public sector projects or programmes.

Any development requires the prior written permission of the Head of the Physical Planning and Development Division. The Act stipulates certain uses or operations that are not deemed development in Section 17, and lists in the Third Schedule, classes of development that are permitted and may be undertaken without the approval of the Head. The Act also provides for modification or revocation of permission in the interest of national security, economic policy of the Government, or other material consideration, with compensation for expenditures on abortive work. The Act provides for reservation of open space and declaration of zoned areas for specific purposes. It provides for the service of Enforcement Notices and Stop Notices where development has been carried out without permission, or where there has been non-compliance with conditions of approval. The Head may enter upon the land to remedy, and may recover costs, if the notice has not been complied with. There is provision for fines for obstruction of the Head in the exercise of his powers and for non-compliance with notices. The

Head may also institute injunctions. The Minister may Gazette Special Enforcement Areas to prevent squatting or other unauthorised development.

3.6.2 Manual for Developers

The 1988 Manual for Developers was prepared by the Physical Planning Section, and is still widely used by the Department and designers. This outlines development policies, standards and guidelines, application procedures, and specific requirements of development or building activities.

3.6.3 OECS Building Code and Guidelines (draft)

The draft OECS Building Code and Building Guidelines acknowledges the natural hazards to which OECS countries are subjected. The Code seeks through introduction of building standards, to prevent or mitigate damage of extreme natural events. Codes are based on the Caribbean Uniform Building Code (CUBiC) and other regional codes. The code advocates development of an adequately staffed building inspectorate to ensure compliance, and to assist developers.

3.7 Environmental Institutional Frameworks

3.7.1 Environmental Planning and Management

Physical Planning Department

The Physical Planning Department of the Ministry of Physical Development and the Environment is the main institution responsible for land use planning and control. New planning legislation, the Physical Planning and Development Act with its EIA provisions came into effect on July 1, 2003, with the exception of Part I of the Act. Part I will take effect at the discretion of the Minister, and the Development Control Authority will then be dissolved. The Physical Planning Section undertakes forward planning studies to guide physical development, implements development control, regulation, and the general policies of the Development Control Authority, and makes technical recommendations on planning applications to the Board of the Development Control Authority. The Section also provides Geographic Information System (GIS) Services to other Ministries and agencies. The Section interacts with several other agencies in the execution of its work programme, including the Environmental Health Department of the Ministry of Health in relation to sewage management and disposal; the Ministry of Communications and Works on road and drainage design, traffic management issues and approval of electrical plans of buildings; the Fire Service on approval of plans for fire safety; the Ministry of Agriculture, Forestry and Fisheries on change of use development applications involving agricultural land and applications with implications for forestry or fisheries; SLASPA on proposed development within designated ports and over coastal waters; Commissioner of Crown Lands in relation to Crown Lands, including beaches and the sea bed; and the Saint Lucia National Trust in relation to proposed developments that may impact environmentally sensitive areas or sites of historical or cultural significance. It is anticipated that this application will be referred to most of these prior to approval, given the scope and location of this proposed development.

Generally, there are areas of conflict in development control and natural resource management. There are areas of overlap between the Physical Planning and Development Act, the National Conservation Authority Act and the Saint Lucia National Trust Act. These should be clarified with passage of the new Environmental Management Act.

Planning approval is granted by the Physical Planning and Development Division, which is the executive arm of the Development Control Authority (DCA). Approval of development plans by several agencies is required in advance of DCA approval. These include the:

- Ministry of Health,
- Ministry of Communications, Works, Transport and Public Utilities (Electrical Department), and
- the Fire Service.

Monitoring of construction will be led by the Physical Planning and Development Division. An officer is assigned to this region, and will inspect intermittently, to ensure that construction is proceeding in accordance with approved plans. Specific environmental issues will be referred to the relevant authority, if necessary.

Sustainable Development and Environment Division

The Sustainable Development and Environment Division (SDED) falls under the Ministry of Physical Development and the Environment, and is responsible for Division occasionally reviews environmental studies at the request of Physical Planning Department. Activities associated with environmental licensing, monitoring and field studies are undertaken by separate agencies. The Division is the Secretariat to the recently launched NEC and is represented on a number of Boards and Committees including the National Science and Technology Committee and the National Climate Change Committee.

National Environmental Commission

The National Environmental Commission was launched in 2008 to oversee national environmental matters.

National Emergency Management Office

The National Emergency Management Office (NEMO) is responsible for preparing the Nation for a state of emergency. The emergency might be as a result of natural phenomena (such as fire, seismic, volcanic, tsunami, flooding, landslides, storms and hurricanes); manmade disasters (such as dam failure, explosions, or oil spill) or slow onset disasters (drought, famine, and plague). NEMO has prepared a National Emergency Response Plan, with specific plans for each type of emergency. The response to hurricane, flood management, earthquake, volcanic eruption, oil spill, hazardous materials, stress management, hazard mitigation, maritime search and rescue, land search and rescue, and policies on management of dead bodies in disasters, emergency shelters, and emergency housing, have been adopted by NEMAC and will be taken to Cabinet. Some landslide and debris mapping dating back to the mid 1990's exists. With

World Bank and Caribbean Development Bank (CDB) funding, the Office in 2004 commenced preparation of national hazard maps for floods, storm surge, landslide and drought, and these were completed in 2006.

Ministry of Communications, Works, Transport and Public Utilities

The Ministry of Communications, Works, Transport and Public Utilities (MCWTPU) is responsible for the provision and management of technical services in the areas of communications, meteorology, transport, electrical safety, roads, hydraulic and building infrastructure, and utilities. Their priorities include road construction and maintenance, and drainage.

The National Water and Sewerage Commission, established under the Water and Sewerage Act (Cap. 8.14), responsible to the Minister of Public Utilities is required to regulate the granting of licenses and development and control of water supply and sewerage facilities. The Commission must work with WASCO for the purpose of conserving, redistributing or otherwise augmenting water resources.

The Ministry is represented on the Development Control Authority and the National Emergency Management Advisory Committee (NEMAC).

3.7.2 Natural Resources

Department of Forestry

The Department of Forestry in the Ministry of Agriculture, Lands, Forestry and Fisheries administers the Forest, Soil and Water Conservation (Amendment) Act and the Wildlife Protection Act. The Land Conservation Board under the Land Conservation and Improvement Act has not functioned, and little has been done under that Act. There are conflicts between the provisions of the Land Conservation and Improvement Act, and the more recent National Conservation Authority Act.

Department of Fisheries

The Department of Fisheries in the Ministry of Agriculture, Lands, Forestry and Fisheries is the lead agency responsible for the management of coastal and marine resources, although others play key roles, resulting in inter-agency conflict at times. The Department is on a number of Boards and Committees including the National Science and Technology Committee, the National Disaster Preparedness Committee and the National Climate Change Committee.

Water Resources Management Agency

The Water Resources Management Agency (WRMA) in the Ministry of Agriculture, Lands, Forestry and Fisheries, established first as a Unit under the Water Resources Management Project (2002-2005), had the objective to assure the viability of all forms of agricultural production through the sustainable management of water resources. The Unit sought to rationalise the legal framework for water resource management, undertake hydrologic

monitoring, management and rehabilitation of critical drainage basins, and public awareness activities. The Unit was replaced by the Agency under the Water and Sewage Act.

Pesticides Control Board

The Pesticides Control Board is not very active.

3.7.3 Services

Water and Sewerage Company Ltd (WASCO)

The Water and Sewerage Company Ltd (WASCO), formerly Water and Sewerage Authority (WASA), is required, as far as reasonably possible, to provide water and sewage disposal services. WASCO has focused on the provision of potable water, with sewerage operations in Castries and Rodney Bay.

Solid Waste Management Authority (SWMA)

Waste management functions of the Castries Corporation and other Councils were transferred to the Saint Lucia Solid Waste Management Authority in the late 1990s.

The Solid Waste Management Authority divided the island into 14 collection zones, and contracted out collection services in each of these. All residences are entitled to service, which varies from daily collection in urban areas to twice weekly collection in rural areas. The Authority is also responsible for management of the two sanitary landfills, and these operations were initially contracted out to the private sector. The Authority has resumed direct responsibility for the operation of both sites.

A Hazardous Waste Sub-Committee chaired by the Authority has been established upon a Cabinet directive, with broad representation. However, there is still no regime in place to provide for the management of all hazardous substances, and the generator is responsible for hazardous waste disposal.

The operations of the SWMA are governed by the Saint Lucia Solid Waste Management Authority Act (Cap. 6.10) which rationalized roles and responsibilities of the various waste management agencies.

Saint Lucia Electricity Services Ltd (LUCELEC)

St. Lucia Electricity Services Limited (LUCELEC) is the sole commercial generator, transmitter, distributor and seller of electrical energy in St. Lucia, with a customer base of nearly 60,000 residential, commercial and industrial customers.

The company was formed in 1964. By the 1970s average demand was growing by almost 30%, as hotel development and banana production transformed the economy. Two new power stations were commissioned and the 11kV sub-transmission system was erected.

The Generation Department operates a modern computerized generating facility, the Cul-de-Sac Power Station, which houses nine generators with an available capacity of 76 MW. The

system peak demand was 54.1MW in 2008, and annual load growth is expected at an average of 2.3% over the next five years.

The Transmission & Distribution Department is responsible for the design, erection, operation, maintenance and security of all facilities used to transmit, distribute and supply electricity to individual customers. This includes all poles, lines, transformers and substations. There are 7 substations, located at Cul De Sac, Castries, Union, Reduit, Soufriere, Vieux Fort and Praslin. Transmission voltage is 66kV across 73.32 miles of transmission lines. Distribution voltage is 11kV across 2566 miles of distribution lines. Customers are supplied at 240V Single Phase, and 415V three Phase.

Landline, Internet, Mobile and Entertainment (LIME)

LIME is a communications provider owned by the British based Cable & Wireless Communications plc operating in the English speaking Caribbean, including St. Lucia. The company is formed from the integrated businesses of Cable & Wireless in the Caribbean which adopted the LIME name on 3 November 2008. The history of Cable & Wireless' network build-out in the Caribbean region dates back to the 1880's. LIME operates as the native incumbent telecommunications service providers in many of the islands where they reside and offer an array of services. The company also operated mobile telecommunications under the bmobile brand from 2003 until rebranding them as LIME in 2008. The largest competitor for LIME mobile services is Digicel. LIME offers the following services in Saint Lucia:

- International and domestic voice telephone services;
- Data/IP services such as ADSL, Frame, or ISDN via the brand name Caribsurf;
- Mobile/Wireless services including Blackberry;
- other services including satellite-based communications and television services

In 2010 the Cable & Wireless plc split into Cable & Wireless Worldwide plc and Cable & Wireless Communications plc. LIME became a subsidiary of C&W Communications.

Digicel

Digicel is a mobile phone network provider covering parts of Oceania, Central America, and the Caribbean regions. The company is owned by Irishman Denis O'Brien, is incorporated in Bermuda, and based in Jamaica. It provides mobile services in 26 countries and territories throughout the Caribbean and Central America with more than six million wireless users. The company's largest competitor in the Caribbean region is LIME (Star Newspaper, 2009).

The majority of Digicel networks start up in countries where the telecommunications market has been newly liberalised. Digicel was first established in April, 2001 in Jamaica. Digicel St Lucia commenced operations in St Lucia on March 24th, 2003. The telecommunications company, tagged as the 'The Bigger Better Network,' is the fastest growing telecommunications operator in the Caribbean, and has strengthened its foothold since its launch by continuing to offer a viable and competitive alternative in the telecommunications field (Star Newspaper, 2009).

Karib Cable

Karib Cable was founded as Kelectric, a company involved in the power, utilities and cable construction industry in St. Vincent in 1987. In 1996, company founder Kelly Glass founded Kelcom International Limited with acquisition of a CATV license in St. Vincent & the Grenadines, trading as Karib Cable. By 2002, with telecommunications de-regularization throughout the OECS, Kelcom /Karib Cable negotiated ISP licenses in St. Vincent & the Grenadines and St. Lucia. Broadband internet service was launched in St. Vincent & the Grenadines. In 2007, having received its Broadband and Internet license in St. Lucia, Kelcom International Limited formulated agreements with LUCELEC and started its network roll out. In 2010, according to Karib Cable, more than 50% of the populated territory in Saint Lucia had access to Karib Cable services with the build out spreading to the south of the island (www.karibcable.com).

3.7.4 Public Health

Ministry of Health, Human Services and Family Affairs

According to a *Features of the Health Sector* presentation made by Darrel Montrope of the Ministry of Health in April 2004, the public sector dominates the administration and delivery of health care services in Saint Lucia, and the Ministry of Health bears the major responsibility for the organization of resources and services for health of the nation. The Ministry is organized into sub-divisions, which are responsible for various health programs including preventive services, health education and promotion, environmental health, hospital and curative services. Private sector health services in St. Lucia comprising medical, dental, pharmacy and laboratory, are relatively small in comparison with the public sector. Private sector services are concentrated in the capital city of Castries and its suburbs in the north. Health services in St. Lucia at the time of Mr. Montrope's presentation were provided from 33 health centres, 2 district hospitals, 1 polyclinic, 2 general hospitals, 1 mental hospital, 1 drug rehabilitation facility, 1 private hospital, approximately 70 private offices, approximately 15 private pharmacies, three private laboratories, and two private radiology facilities. This has not changed significantly in the interim, to 2011/2012 at the time of writing this report.

Out-patient services for general morbidity are decentralized, and are provided via medical clinics at the health centres, at district hospitals and through the casualty or emergency departments of acute general hospitals. In addition to routine medical clinics, the health centres and district hospitals offer special services in obstetrics/gynaecology, paediatrics, surgery, sexually transmitted diseases and mental health. Special clinics and services are also offered for diabetes, hypertension, family planning and maternal and child health (MCH).

The Environmental Health Department (EHD) within the Ministry of Health is responsible for monitoring and regulating environmental health conditions. The Department operates programme areas of vector control, food safety, water and wastewater, industrial hygiene and air pollution. The EHD collaborates with the DOF in some coastal water quality monitoring. The Department has manpower and financial constraints, and is unable to do justice to its various programme areas. As a result, institutions like WASCO and SWMA find themselves engaged in self-regulation. The overlap in functions under the Solid Waste Management Authority Act and

the Public Health Act was clarified under the new solid waste management legislation. Several studies have recommended that the EHD be re-structured to better fulfil its responsibilities.

The Ministry's Epidemiology Department collects statistics and maintains a database on the incidence of various diseases.

The Corporate Planning Unit of the Ministry manages capital projects and plant maintenance, and is supposed to collect and analyse data to inform health sector planning.

The Ministry of Health is represented on the Solid Waste Management Authority Board, the Development Control Authority and the National Emergency Management Advisory Committee (NEMAC).

Caribbean Environmental Health Institute

The Ministry of Health relies on the Caribbean Environmental Health Institute (CEHI) to perform many of its analytical functions. CEHI also provides technical assistance and support to water resource management initiatives. They undertake water quality monitoring programmes and have at their disposal a well equipped laboratory facility.

3.7.5 Key Non-Governmental Organisations

The St Lucia National Trust

Notwithstanding its mandate, the Trust's activities in the preservation of natural resources are limited. The Saint Lucia National Trust (SLNT) manages historical sites such as the Pigeon Island National Landmark, and is undertaking an Architectural Heritage Project. The Trust has drafted a Saint Lucia Heritage Property Act, which it proposes to repeal the National Trust Act. It would establish a regime to manage and conserve Saint Lucia's heritage property. The Trust is currently finalising a revised System Plan for Saint Lucia.

Archaeological and Historical Society

The Society is an NGO founded in 1954. It is custodian of many of Saint Lucia's archaeological and historical collections. There are areas of conflict with the Saint Lucia National Trust, particularly in relation to the preservation of historical buildings.

4.0 MEDIUM TERM PLANS FOR THE HEALTH SECTOR IN ST. LUCIA

The National Strategic Plan for Health (National Strategic Plan for Health: Quality Health Care for Life (2006-2011)) was developed after nine years of intensive national consultation and debate. The vision of the plan was to obtain optimal wellness within the entire population by increasing access to affordable good quality health care. The strategy enumerated a number of key challenges facing the health sector, including:

- the need for major improvements due to ageing plant and equipment;
- a need to improve the response to increasing injuries and other life threatening emergencies through an effective, coordinated and standardised national emergency medical system;
- a growing gap between health resources and expressed needs, noting a need to increase expenditure in health if policy commitments to improve health quality and increase access to a guaranteed package of health services are to be met.

Recognising health as a human right, the policy commits the Ministry of Health to seek to ensure that all persons regardless of their socio-economic situation have access to an essential package of quality services that are client-focused and responsive. Given the socio-economic status of the majority of Saint Lucians and the rising cost of health care, the majority will continue to depend on the public health system in the foreseeable future. The National Strategic Plan for Health proposes a multi-faceted approach to reduce inequity in health coverage and access, and increase financial sustainability and efficiency in the health sector.

The Strategy includes the following guidelines:

- Implement the primary health care approach and health promotion as the national health development strategy.
- Improve access to care and advance equity through delivery of client-focused and responsive health systems.
- Address the issue of health financing to achieve a minimum of 6% GDP expenditure per annum in health.
- Strengthen hospital sector and promote greater efficiency and effectiveness.

In keeping with this, the public sector will have three levels of service delivery: health centres, polyclinics and hospitals. The health centres are the community focal points for health development. The polyclinics are institutional platforms for the delivery of more specialized care and will house the multidisciplinary team (health workers and social workers) to allow for the delivery of more sophisticated services to the communities. The hospitals will operate as support for the polyclinics and will provide the secondary and tertiary care services that cannot be delivered by the polyclinics. The resulting system is an integrated, mutually supportive network of institutions and workers focused on providing

services for the communities in the most comprehensive and convenient way with minimum duplication.

4.1 Role of Health Centres and Polyclinic in the Health Service

Health sector reform consultations revealed that the public expected a higher level of performance from health institutions. They believed that health centres should offer more health services (such as laboratory tests, X- rays and specialist services), provide care after normal working hours, possess more medical personnel and basic equipment, and reduce waiting time to see doctors. The absence of such services has resulted in persons bypassing health centres and district hospitals (Dennery and Soufriere), preferring to go to the larger and more costly hospitals (Victoria and St. Jude), resulting in an overloading and inefficient functioning of the Accident and Emergency and Outpatient Departments of these secondary institutions.

The Health sector reform identified the following measures to strengthen community-based health services in the most cost effective manner:

- Broaden the role and improve the quantity and quality of services available at the health centres.

- Introduce polyclinics to support the adjacent health centres and deliver a higher level of service e.g. laboratory, X-ray and after-hours care.

In this context, each health centre is required to better respond equitably to local health needs within its catchment area, working with other sectors in promoting activities and initiatives related to health. Health centres are required to dispense medications as per prescription under the direction of polyclinic pharmacists and maintain a community health database that tracks socio-economic and health data by household and individual. The typical health centre team will include a community nurse or public health nurse, community health aides, environmental health aides, vector control officers and support staff. The services of a medical officer, family nurse practitioner (FNP), mental health practitioner, psychiatric nurse, environmental health officer, health education officer, family life educator, family case worker and a field nutrition officer are available, when necessary, from the respective polyclinic. A community-based statistical clerk will assist the team.

According to the strategy, polyclinics are designed to provide a higher level of service than that presently provided at the so-called district hospitals. Upgrading district hospitals to fully fledged hospitals is not affordable and the preferred option is to upgrade to polyclinic level with dedicated ambulance services. Polyclinics are designed to, *inter alia*, respond to complaints about lack of care after hours and inaccessibility of doctors, specialists, laboratory and radiology services. They are open 24 hours a day for urgent medical care, may have beds for limited inpatient care, and can make referrals to secondary and tertiary care hospitals. They serve a defined population, usually encompassing the catchments of several local health centres, supporting the primary health care functions of these. The precise range and volume of polyclinic services will be dictated by local health needs and the demands of the National

Health Services Plan (NHSP), which is a quantified set of service targets. 24-hour emergency and ambulance services will be coordinated by the respective hospital emergency departments, through collaboration with emergency medical technicians and the Family Nurse Practitioner (FNP) at the polyclinic. Additional services will include pharmacy, laboratory, X-ray, physiotherapy, electrocardiography, audiology screening and dental services. The polyclinics will offer regular doctors clinics Monday to Friday all day and Saturday morning. The clinics conducted at the polyclinic will complement and be coordinated with the health centre services. Specialist consultations will be arranged by appointment, and typically will be through referrals by doctors and nurses working with defined protocols. Such consultations will include general medicine, surgery, orthopaedics, obstetrics, paediatrics, mental health and other specialities or sub-specialities determined to be necessary and cost-effective. The regionalisation of health services defined by a hospital catchment area allows the development of regional clinical protocols supported by the hospital services. As for health centres, the exact services to be offered by the polyclinic will be dictated by the disease profile of the catchment area served. The team in place at the typical polyclinic will include an administrator (contracted HA III), district medical officers, nurse practitioners, nurse midwives, registered nurses, dentist, dental nurses, dental aides, family case worker, pharmacists, a mental health practitioner, psychiatric nurse, environmental health officer, health educator, family life educator, field nutrition officer, and multipurpose technician(s)[1]. Specialists will also be assigned to polyclinics. If the services to be accessed include physiotherapy, then persons with the necessary skills will be included. The amount of on-site testing to be done will be determined by needs, quality considerations and cost effectiveness.

The Strategy proposed that selected polyclinics will also provide inpatient and maternal care (mainly childbirth) for patients requiring a bed for less than 24 hours. All polyclinics will have dedicated ambulance services stationed at each polyclinic to transport patients to higher-level facilities when necessary. Ambulances will be staffed with emergency medical technicians and first responders. The polyclinic will be the source of dispatch for the community ambulance services. Other services will be determined as the situation dictates, e.g. treatment of snakebites in communities located in the interior.

By 2002, the Gros Islet polyclinic was offering limited polyclinic services. Carr *et al* (2002) in their Assessment of the Current Structure and Operations of the Primary Health Care System in St. Lucia recommended the following approach vis a vis polyclinic development:

- the conversion of the Soufriere and Dennery District Hospitals into polyclinics should be undertaken on a phased basis, after the Gros Islet Polyclinic is providing all the polyclinic services.
- clear definition of the reporting relationships for polyclinic staff, with all the staff reporting to the polyclinic Administrator, who in turn would report to the Medical Officer (Health) who then reports to the Chief Medical Officer. Staff should also have

[1] Multipurpose technicians are persons trained to take simple X-rays (long bones, chest, and skull) and perform routine laboratory tests including venipunctures.

technical supervision from the respective senior technical staff at the regional and central levels.

- development of a Polyclinic Operations Manual for each proposed polyclinic, to define the goal of the polyclinic, its organisation structure and staff reporting relationships, its functions, policies and programmes that guide operations of the polyclinic and the health centres and catchment population served.
- Polyclinic x-ray and laboratory services should be established in keeping with the level of support required in the management of referrals from health centres. At the time or the 2002 review, a study on levels of laboratory services needed to support the primary health care services was proposed.
- A study should determine the demand after 4.00 p.m. for accident and emergency and maternity services at the proposed polyclinic sites and the cost-effectiveness of establishing such services at the proposed polyclinics on a 24 hour basis.
- The Gros Islet polyclinic should be used as the pilot to determine the most appropriate staff mix based on demand for services and available resources. This experience should then be used to guide the staffing of the other polyclinics which may have additional functions such as management of patients who will only have a 24 hour stay in the polyclinic.
- The Dennery Polyclinic would serve the following health centres: La Ressource, Rich Fond, Mon Repos and Ti Rocher – Micoud.
- The need for a 24 hour service should be evaluated in the light of the most cost effective way of meeting the demand for services. The relationship with the hospitals would also need to be clarified.

4.2 Improving health infrastructure to support health reforms

The Strategic Plan proposed to enhance health sector service delivery with rehabilitation works on existing physical health infrastructure. In addition, new physical structures were to be constructed to accommodate general medical services and mental health and wellness. Some of these plans have materialised, and a new 137[2]-bed national hospital is being constructed in Castries to provide modern secondary level care, replacing the services currently offered by the Victoria Hospital. A new psychiatric hospital was constructed in Castries, and operations transferred from the Golden Hope Hospital in 2009.

The new general hospital will not be operational until 2012. In the interim, improvements to the Victoria Hospital continue. Government has retrofitted 17 of the 33 health centres. Since the writing of the Strategic Plan, SJH was severely damaged by fire (in 2009), and services were temporarily relocated to the National Stadium in Vieux Fort, where they continue to be offered to this date. The SJH Augier site is being completely rehabilitated, and services should return

[2] In the early planning stages, 187 beds were proposed, but this was reduced to contain construction costs to within available funds

there early in 2012, while plans are underway for construction of a new SJH at Beausejour, Vieux Fort[3].

4.3 Upgrading the Dennery Hospital

The Strategic Plan proposed, to ease the workloads of the Accident and Emergency departments and make clinical services more readily available, that Government will establish polyclinics in five institutions: Gros Islet Polyclinic, Victoria Hospital, Soufriere Hospital, St. Jude Hospital and Dennery Hospital. To date, the Gros Islet Polyclinic has been constructed, but so far has only offered daytime services.

When the health sector reform white paper was prepared, there was debate regarding suitability of the existing Dennery Hospital (in Dennery village) for proper emergency care, on the grounds that the location within Dennery Village made access difficult, and the existing building was unsuitable. It was suggested within the Strategic Plan that an alternative location be identified and a modern facility constructed. Whether or not within a new facility however, it was recommended that Dennery Hospital services be upgraded in budget year 2000, to include at least one more DMO, three nurses/midwifes and a storekeeper.

4.4 Role of MOH/UHC

The Strategic Plan proposes to transform the Ministry of Health, reducing its role as a provider of health services, to act more as a policy maker, co-ordinator and regulator. It will continue to be responsible for the provision of regional health care services as well as the co-ordination of twelve national priority health programmes[4]. Health services will be rationalised, and a guaranteed package of services provided, to ensure that all persons have access to services that will promote health and mitigate the impact of disease.

Health facilities have been classified into five categories. The community health services will be provided through a network of health facilities ranging from level one to level four. Hospitals (level five) will be given greater autonomy through the process of statutorisation[5], with the MOH retaining a role in monitoring performance against nationally agreed regulations and protocols. The Minister will retain ultimate responsibility for the delivery of health care in Saint Lucia and will reserve the right to require changes in the management of the health care provider institutions in the event of failures to deliver agreed services at the agreed level of quality and cost. It is expected that effective governance and management structures for community and provider institutions will be implemented, health care services will be

[3] These plans are likely to be revisited as the new SLP administration was not in support of Beausejour proposed development while in opposition

[4] The Plan identified priority health areas, including communicable and non-communicable diseases; sexual and reproductive health, child and adolescent health, oral health, food and nutrition, violence and injury, environmental health, emergency medical services, mental health and substance abuse, eye health and disabilities, social protection, child protection, welfare and care of older persons.

[5] SJH at the time of writing was being managed by a Board of Directors in accordance with St. Jude Hospital Act promulgated in 2003

rationalised for all levels of care, and there will be improved access to a guaranteed package of health and social services to all residents.

The plan anticipates that the implementation of Universal Health Care (UHC) will not only raise additional resources for health but introduce a new system of financing, health management, cost-containment and quality assurance. While UHC addresses resource needs in hospitals and pharmaceutical services, regional (community) health services and priority health area programmes will remain a core component of the Ministry and will be funded through the annual budget of the MOH.

4.5 Role of Corporate Planning Unit in the MOH

The Corporate Planning Unit was envisaged in the Health Sector Reform Plan to be responsible for gathering and analysing health data to inform health planning, and for engineering and maintenance of health infrastructure. The proposed organogram is shown in Figure 4.1. Many of the proposed positions however, are still vacant.

The Corporate Planning Unit is required to coordinate and manage all new construction and maintenance projects within the Ministry of Health. Capital projects presently being managed include:

Over the next three years, the time frame for design and construction of the new Dennery polyclinic, the following projects are planned:

- Jacmel
- Etang
- Dennery
- Entrepot

4.6 Revenue Generation Proposed in Strategic Plan

The main forms of revenue generation will continue to be tax based. The UHC revenue generation will be through a transaction-based tax that will be designed to generate $32,524,273 per annum. The criteria of national pooling of funds and risks are achieved as well as the principle of equity in health. Central Government revenues through the Consolidated Fund will remain the main source of health sector financing. There will be an increase in the allocations to health. Consolidated Fund recurrent allocations to Health will rise to include a $32,524,273 annual contribution to UHC. Other revenue generation will be through grants and donations. With the introduction of UHC the hospitals become responsible for their own capital expenditure.

Sustainability of the UHC Fund is based on the assumption that the inflows into the fund are greater than the outflows and that any excess will be reinvested for sustainable funding.

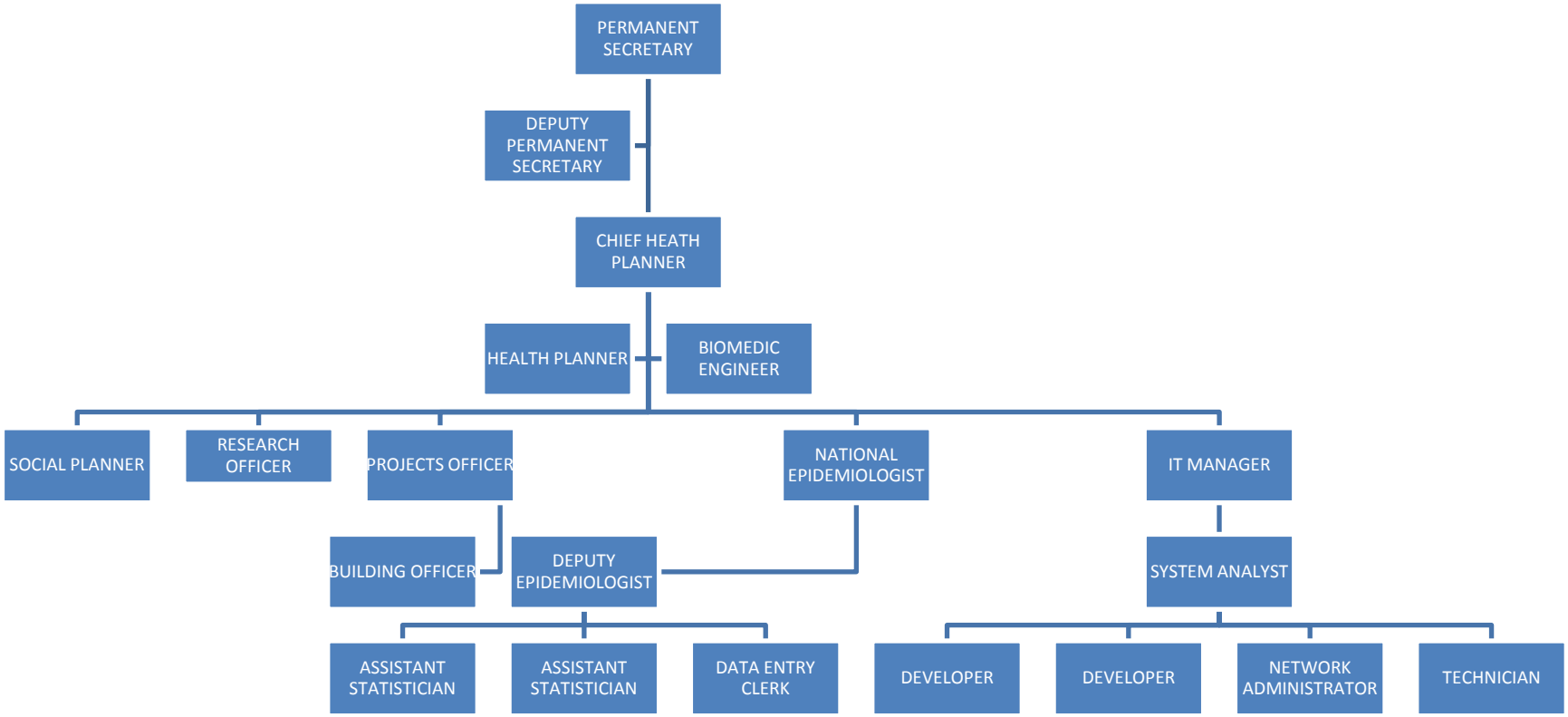

Figure 4.1. Organogram of the Corporate Planning Unit

4.7 Health Sector Reform Costs

Of relevance to this EIA and Feasibility Study are the Strategic Plan cost estimates for the Corporate Planning Unit within the MOH and the costs associated with the upgrading of the Dennery Hospital. A breakdown of these costs is provided in Appendix 3.

The Strategic Plan estimated that for Corporate Planning, annual recurrent costs would increase by $626,416 within the first three years of implementation, as a result of hiring the following staff:

- Chief Planner
- Health Planner
- Social planning officer
- Quantity Surveyor
- Legal Officer
- Information Manager
- Quality Coordinator
- Biomedical Engineer
- Maintenance Officers
- Secretary

To date the following have been hired:

- Chief Planner (acting)
- Health Planner
- Social planning officer
- Quantity Surveyor
- Biomedical Engineer
- Maintenance Officers (number?)
- Secretary
- There is also a research officer in the department
- Building officer
- Projects Officer

For Dennery Hospital, the increase would be $391,236 annually, primarily as a result of hiring and/or training a HA, PNO, EMTs and nurses/midwifes. The following would be assigned to the Dennery Hospital at no increased recurrent cost:

- FNPS

- DMO
- FCW
- health educator
- MLA
- field nutrition officer

5.0 THE PROJECT

5.1 Location and General Scope

5.1.1 Existing health services in Dennery (post Hurricane Tomas)

The Dennery Hospital operated from a hilltop site within Dennery Village for more than fifty years until damage from Hurricane Tomas in October 2010 forced its closure. The built space available for operations at that site had been diminished for several years leading up to its closure, as one of the buildings was deemed unsuitable for accommodation of patient services, due to the poor condition of that structure. Carr *et al* (2002) found that, in 2002, inpatient hospital services at the Dennery Hospital were almost nonexistent, with the main focus on Accident and Emergency Services, delivery of low risk pregnant women and health centre based services, with a high referral rate to Victoria Hospital (35%). Although it operated 24 hours per day, with 2 doctors assigned to the region, it could not accommodate admissions once operations were confined to the one building. A doctor would be on site on Mondays through Fridays from 7 am to 4 pm, and on call thereafter. Although doctors were supposed to be on site when all call, this was not always the case. Dental services were not offered at Dennery Hospital from 2009, more than one year before its closure, due to the presence of mould in the structure, which was adversely affecting the health of dental staff.

The access roads to the Dennery Hospital site are steep and narrow. This makes walking to the site strenuous. Poorly parked cars may preclude vehicular access. In 2010, accesses to the Dennery Hospital were impassable on two separate occasions due to flooding in Dennery Village. Sea blast was also a problem at Dennery Hospital. Metal parts in air conditioning units and instruments rusted quickly and maintenance costs were high.

As mentioned earlier, Hurricane Tomas in October 2010 damaged the roof of the Dennery Hospital structure, forcing a relocation to the Richfond Health Centre, where services previously offered at the Dennery Hospital (with some modification) are offered to the present day. To facilitate this, Richfond Health Centre services were in turn transferred to and combined with La Ressource Health Centre services. Both Richfond and La Ressource Health Centres are within the quarter of Dennery. Some Dennery Hospital health services were available from the Richfond Health Centre within a week of the hurricane's passage. However, the Richfond Health Centre is too small to effectively accommodate the requisite services, and both staff and patients are not comfortable in this environment. There is now one doctor assigned to the region, based at Richfond Health Centre, and conducting clinics at other health centres in the region. Ancillary services such as laboratory, pharmacy and X-ray are either limited or unavailable on site or within the community, so that patients often need to travel to Castries or Vieux Fort to access these; lab services are offered once weekly and comprise the taking of samples for testing at VH; and there are no X-ray services; pharmacy services are limited by storage and security concerns. Up to now, dental

services are not offered at the relocated health facility. Rather, a clinic has been set up at the La Ressource primary school, to serve community children.

5.1.2 Pharmacy Services

The Pharmacy Dept at Dennery Hospital serves the Dennery health region including the Bordelais Correctional Facility. Working hours are Monday to Friday, 8 am to 4 pm. The pharmacy is supplied by the MOH Central Procurement Dept. The pharmacist moves with the clinics in the region, dispensing medications as required. Under UHC, all public pharmacies dispense free medication to diabetic and hypertensive patients. Other persons eligible for free medication include holders of a Medical Social Welfare Card, registered paupers and the elderly (as per Hospital Regulations).

Pharmaceutical storage conditions and security were not up to standard at the Dennery Hospital, and are not up to standard at the Richfond Health Centre. The Pharmacist should be the sole custodian of the keys for the pharmacy supplies. Controlled substances and dangerous drugs such as pethadine and morphine require proper storage and protection. An aquatic storage cabinet is required. When conditions cannot be met, certain drugs cannot be stored, and patients may need to be sent to one of the general hospitals for such drugs.

The Pharmacist in Dennery does not have a Pharmacy Assistant, and may fill more than 100 prescriptions in a day. This is a large number, and does not facilitate proper counselling of patients, and increases risk of error. If 24 hour pharmacy services are required, three pharmacists and 3 pharmacy technicians should be available.

There is a privately run pharmacy in Dennery, but it is reportedly not very well stocked.

5.1.3 Dental Services

All dentists in the public service are part time, and typically also have private practices. They provide half day services to the public sector. They are assisted by full time dental assistants. There are 6 dentist posts in the public service structure.

Before the clinic at the old Dennery Hospital closed due to mould issues in the building in 2009, there were daily dental clinics (emergency and restorative), except on Tuesdays when the dentist worked at the Bordelais Correctional Facility. 20 dental patients per day can be expected at Dennery, if services are available.

Adult extractions cost EC$25. Fillings, cleanings and other interventions cost EC$20. For children under 18, every procedure costs EC$5. Despite this, the Senior Dental Surgeon estimates that approximately 50% of dental patients cannot pay or can only part pay,

and have to be seen gratis. A private dentist set up an office in Dennery, but has since shut down, perhaps for this reason.

Dental clinics did not resume when Dennery Hospital services relocated to Richfond Health Centre. The only dental services currently available in the region are half day clinics in the La Ressource school on Mondays and Wednesdays and the Tuesday service at Bordelais Correctional Facility. This uses a portable mobile dental unit and targets all school children in the area. The same dentist also provides La Clery Health Centre with dental services twice weekly. There is no public dental service available from La Clery southwards to Vieux Fort and back up to Soufriere. A number of patients are known to have resorted to doing extractions on themselves.

There is no biomedical technician on MOH staff to repair and maintain and service equipment. The biomedical technician from VH is assigned once weekly, but this is inadequate. Private services are available, but they are in short supply and cost exceeds available budget for this.

5.1.4 Records of clinic attendance and casualties for Dennery Hospital

Dennery Hospital administration maintains records of medical clinic attendance, and numbers of casualties. Records for 2010 and 2011 are provided below.

For 11 months over 2010 (no records for May are available):

- Medical clinic attendance: 2960 clients (ranging from 197 in December to 320 in October)
- Number of clinics held: 86
- Casualties 3510 (ranging from 221 to 398 monthly)

For January to September 2011:

- Clinic attendance exceeded 300 every month (with a high of 376 in September)
- Number of clinics held: 74
- Casualties ranged from low of 195 in April to a high of 379 in January.

5.1.5 Impact of Relocation on Dennery Hospital Services (now at Richfond Health Centre)

The change of address to Richfond Health Centre has had some implications for cost and convenience of access for both users and service providers. Most hospital staff come from Dennery, with some from Vieux Fort, so transportation costs have increased for most of these. A bus from Dennery to Richfond costs $1.50. By the time buses get to Dennery from Vieux Fort en route to Castries, they are often already full, making it difficult for staff and users from Dennery to catch a bus to Richfond. Persons travelling northbound to Richfond are required to cross the East Coast Road at a location with

poor vertical lines of sight, in order to get to the health centre. It was recognised by the MOH that Dennery patients were encountering some difficulty in getting to Richfond Health Centre, and limited services were offered for a time, on weekends from the Human Resource Centre in Dennery Village, but this very basic service was sporadic and unreliable, and did not include filling of prescriptions.

The Richfond Health Centre structure is small, and not all Dennery Hospital services could be fully accommodated. A 24 hour service is no longer provided, and this was a source of complaint for many persons spoken to. The Richfond service is operated 7am to 7pm daily, staffed by a CHN, an RN and an Attendant. Although there is a doctor on call thereafter, there is no way for the public to contact the doctor.

Clinics offered at Richfond Health Centre are as follows:

- medical clinic twice weekly (on Mondays and Fridays),
- chronic disease (diabetes and hypertension) once monthly,
- STI clinic (once weekly),
- skin specialist (once weekly),
- gynaecology (twice monthly),
- lab services once weekly.

There are two beds available plus a cot in the office. If a casualty comes in when there is a medical clinic underway, there may be cause to move people from bed to bed. If casualties are not transferred to VH or SJH quickly, or the ambulance is delayed, it can be chaos, particularly if more casualties arrive.

5.1.6 Impact of Relocation on Services at La Ressource Health Centre

Relocation of Richfond Health Centre services to the La Ressource Health Centre has made service provision more challenging at that facility. There are now 2 CHNs stationed there. Services are offered from Monday through Friday, from 8 am to 4 pm. and on Saturdays from 8 am to 12.30 pm (dressings only). Sometimes 2 clinics are running concurrently at that location, and there are only 4 rooms available. There were many complaints about the severe congestion at La Ressource Health Centre, both from staff interviewed, and from users surveyed. The staff indicated that there is insufficient seating so that many persons are required to sit outside. There is nowhere for staff to sit, eat and put their personal effects, and some of these have been stolen. Food items also get stolen from the fridge.

Clinics/services offered include:

- child health,
- ante natal,
- post natal,
- family planning,
- cancer screening,

- diabetic and hypertensive,
- home visits,
- school immunisations,
- dressings.

These are all conducted by the CHNs. Other clinics are conducted by DMOs or visiting specialists.

When there are emergencies in the region, the DMO may be at La Ressource Health Centre doing clinics, with the result that there is no doctor available at the Richfond Health Centre. Because of this, emergency patients are often not taken to the Richfond Unit, but to the La Ressource Health Centre, usually by ambulance (see ambulance at La Ressource Health Centre in Photo 2.4. When that happens the clinics are disrupted so that the emergency may be attended to. That may require clearing the room, bringing in equipment, etc.

5.1.7 Impact of Relocation on Patient Origin

Dennery residents are reportedly now less likely to access medical services, as they have further to travel in order to do so, and this increases cost and inconvenience to them. Richfond residents who used to go to Richfond Health Centre are less likely now to go to the La Ressource Health Centre to access relocated services there. However, it is expected that most of these will continue to go to the Richfond facility, as long as services required are available there.

5.1.8 Staffing, Supplies and Maintenance

Even with limited services presently being offered, these is insufficient staff. There are a number of tokenised positions within the existing structure, so that posts cannot be filled.

The following standards were applied to estimate the staffing needs of the regional health services for the period 2006-2011:

Medical Officers: approximately 1:8,000 population

Family Nurse Practitioner: approximately1:10,000 population

Community Health Nurse: approximately1:3,000 population

Community Health Aide: approximately1:2,000 population

Pharmacists: approximately1:8,000 population

Public Health Nurse Supervisor: 1 per health region, with the exception of 2 PHNS for region 8 (Castries)

Health Centre Attendant: in principle one attendant per health facility of level 2 and 3 and two attendants per health facility of level 4 (with the exception of 3 attendants for Castries health centre)

Lack of adequate security is also a concern for staff, particularly as the facility serves Bordelais Correctional facility, and "the Gulf" is a violent area within the region.

Health centre staff complain of the inadequacy of maintenance services. All repairs are centrally managed, and response to service calls is reportedly slow and inefficient.

Supplies are often insufficient, and nurses tell of instances where toilet paper and paper towel run out, and they are obliged to buy supplies with their own funds, or do without.

5.1.9 Ambulance Services

There is currently one ambulance stationed at the Dennery Fire Station. The Station is responsible for the area from the top of the Barre de l'Isle to Praslin. Even if calls are first taken to Dennery Hospital/Richfond Health Centre/La Ressource Health Centre, they may then be transferred to SJH or VH. A round trip may take 1.5 hours, leaving the region uncovered for the duration. The ambulance also gets called out for non-emergency transfers and transportation to routine appointments. This accounts for up to 20% or their calls. The ambulance is serviced in Castries, during which time a replacement is not provided. Rather, the Micoud ambulance is then required to also cover this area.

The Fire Station is understaffed, with the result that response vehicles often respond with less than the recommended numbers on board. This diminishes the quality of service offered. Retirees are not immediately replaced, as it is difficult to predict when persons will retire, and recruits require 6 months of training. Training of firemen is not offered routinely, but when a sufficient number of recruits are available. Leave commitments cannot be fully honoured from year to year, with some staff accumulating more than 100 days of leave. Of the total Fire Station staff complement, 50% are EMTs or First Responders.

If the polyclinic is open 24 hours per day, full ambulance service is also required 24 hours per day. Sufficient numbers of EMTs and drivers would be required. Health Centre staff advised that a midwife typically accompanies a late labour transfer, but in other situations, hospital staff do not accompany transfers. This requires the EMTs to be adequately trained.

5.1.10 Project Rationale

The Strategic Plan for Health proposed to upgrade Dennery Hospital services, preferable within a new facility. According to Carr *et al* (2002) the Dennery Polyclinic would serve the following health centres:

- La Ressource,
- Rich Fond,

- Mon Repos and
- Ti Rocher – Micoud.

Within Dennery North and South combined (served by La Resource and Richfond Health Centres), there is a population of more than 12,000 according to the findings of the 2010 census. The population in close proximity to Mon Repos and Ti Rocher Health Centres numbers almost 3000. The Bordelais Correctional facility is also located within this region, and is served by the Dennery Hospital.

Dennery is equidistant from the two main hospitals in the north and south of Saint Lucia, journeys that take approximately half an hour by car along the East Coast Road. A facility near the Dennery Highway has the potential to serve an important role in stabilisation of East Coast Road accident victims, as well other casualties within the region.

Staff of the Richfond facility report that persons from Bexon and Mon Repos opt to come to the Dennery facility for medical services, rather than go to Victoria Hospital or St. Jude Hospital, reportedly due to shorter waiting times.

5.1.11 Proposed World Bank Support

Under this World Bank-funded project, the hurricane-damaged building at Dennery village is to be rehabilitated and equipped, so that emergency services may return there temporarily, while the new polyclinic is designed and constructed. The World Bank is also funding hospital equipment procurement for the renovated facility. Government of Saint Lucia is committed to demolish the other (derelict) building at that site before services are returned there. The renovated structure is intended to accommodate most of the services that were offered at that site before the passage of Hurricane Tomas. The World Bank will also finance the feasibility study, environmental impact assessment, construction and equipping of the new polyclinic at Bois Jolie in the quarter of Dennery. Conceptual planning of the proposed new facility, in accordance with the MOH design brief (See Appendix 4), already underway, is being financed under a separate project.

World Bank funding available is as follows:

Dennery Hospital renovation: EC$462,000

Dennery Hospital equipment: EC$105,000

Bois Jolie building and equipment: EC$4,590,000

It may be possible to phase the proposed development to fit available funds, and apply for additional funding under the World Bank Disaster Vulnerability Reduction Programme.

5.1.12 Proposed Renovation of Dennery Hospital

The old hospital will be renovated, but it is too small to offer services required in this region. It likely will only offer the 12 hour per day service. There is only one doctor's office and the emergency room available. As such, the doctor would have to see clients in emergency behind a screen, and there will be no privacy or confidentiality. There can only be 1 clinic at a time. At the present time, there may be up to 3 doctors on site simultaneously, running clinics. It is assumed that both dental and pharmacy services will also be accommodated there.

5.1.13 Proposed Polyclinic Services

The range of services to be offered at the new polyclinic at the new site will be expanded from that offered at the Dennery Village facility before the roof was severely damaged by Hurricane Tomas. Services intended to be offered include, for this Level 4 (polyclinic) facility:

- Daily Medical Clinics five days per week;
- Radiology;
- Ultrasound;
- Laboratory;
- Health promotion;
- Minor surgery;
- Reproductive health clinics;
- Specialist clinics;
- Physiotherapy;
- Foot care;
- Asthma bay;
- Daily dental services;
- Nutrition;
- Community Mental Health Services;
- Counseling Services;
- Environmental health services;
- Emergency medical services;
- Other medical and non-medical services as necessary;
- Support services and administrative offices;

- Health radio system for emergency response – base station for the region;
- Centralized Laundry and Sterilization Services;
- Regional Pharmacy Services - Storage of supplies;
- Conference and meeting room;
- Staff lounge;
- Self catering staff quarters;
- Health Education Office.

Staff at the health centres specifically recommended the following specialist clinics:

- STDs
- Obstetrics and gynaecology
- Antenatal
- diabetic and hypertensive
- opthalmic
- internist

According to the design brief developed by the Ministry, the Polyclinic is to have 4 to 6 beds for patient observation and/or stabilisation prior to their transfer to another facility if required.

Preliminary cost estimates for the Bois Jolie works proposed exceed the budget available under the World Bank project (EC$4,590,000). Development in accordance with the conceptual plan prepared in response to the design brief is estimated to cost EC$8,000,000 for construction (excluding equipment) and EC$2,000,000 for external works.

5.1.14 EIA and FS Objective

This EIA and FS is required to identify impacts of renovation of the Dennery Hospital and construction and operation of the new polyclinic at Bois Jolie, and appropriate mitigation and enhancement measures. A financial and economic assessment of options is required. The study is also required to identify impacts of adjacent activities or conditions in the vicinity, on the project sites, and appropriate mitigation or enhancement measures. It is expected that the EIA study findings will assist the designers in their selection of design features that mitigate potentially adverse impacts and enhance beneficial impacts. It will inform the relevant conditions of contract in the tender dossier. It will alert the Client early to the supporting roles required to be played by various national authorities. It will also provide the basis for guiding subsequent actions by policy makers and facility managers, particularly within the MOH and Dennery polyclinic management, which will ensure that the project is operated with due

consideration for the environment, and optimises potential benefits to the community served, and the national health sector.

5.2 Present Status

5.2.1 Land and Property Acquisition

The old Dennery Hospital is located on Crown Lands.

The proposed polyclinic site at Bois Jolie, Dennery is to be extracted from a larger parcel (no 512) owned by National Land Co, a subsidiary company of the National Development Corporation, a statutory authority. National Development Corporation is a statutory authority. A Cabinet Memorandum was submitted requesting a portion of 1.5 acres for the polyclinic. However, the concept planner recommends that a portion of approximately 4 acres be acquired. This will necessitate a new memorandum being submitted.

The Bois Jolie site is adjacent to the SDA church, with no other structures in the immediate vicinity. The site is sloping but suitable for development, and the site boundaries can be optimised based on project needs and site geography.

Proposed Bois Jolie site boundaries comprise a proposed road reserve along the SDA Church boundary from the existing concrete road, an adjacent privately owned property, the boundary of the larger NDC parcel 512 and the location of a natural drainage course (concept designer recommends designation of a drain reserve) to the north.

Suitable road access exists from the East Coast Road past the SDA church. A road from this, into the site will have to be constructed.

5.2.2 Funding, Designs and Tender Documents

World Bank project funds are available for the following:

- renovation and equipping of the old Dennery Hospital
- environmental impact assessment, feasibility study(feasibility study is being financed by the government of Saint Lucia, detailed design (facilitated through the Caribbean Development Bank), preparation of tender documentation and construction of the new polyclinic

Available funds are as follows:

- Dennery Hospital Renovation US$172,000
- Dennery Hospital Equipment US$40,000
- New polyclinic building and equipment US$1.7m

Polyclinic conceptual planning under another project is well advanced on the basis of a design brief provided by the Ministry of Health, and these plans have been presented to

the Ministry of Health. Ministry of Health comments have been returned to the concept planners. Preliminary cost estimates are US$2.96m for building construction (excluding equipment) and US$741,000 for external works.
There is a significant funding deficit, which may be addressed by any, or a combination, of the following:

- identifying additional funds,
- scaling back the scope of works, and/or
- phasing proposed works.

Another World Bank funded project, the Disaster Vulnerability Reduction Programme, will commence in 2012, and it is possible that additional funds could be made available for a second phase of works on the polyclinic project.

5.2.3 Location and Availability of Services for Construction and Operation

Water

There is already a water supply to the Dennery Hospital. MOH will have to apply for reconnection at the appropriate time.

A 4" WASCO pipeline runs from the East Coast Road, along the southern road verge of the concrete roadway that approaches the proposed site. The pipeline runs past the SDA church on the proposed site's south-western boundary, and continues along both forks in the road thereafter.

There is a 50,000 gallon tank on the hill above the church. Most households at Bois Jolie have water storage tanks due to the unreliability of service there.

Dennery and environs have suffered from poor water supply for many years, but the system is being upgraded. Two new Dynasand filters are now in operation at the treatment plant at Bois Joile. Pre-treatment at that site has also been upgraded.

Sewage

There is no municipal sewerage system in this community. All sewage is treated by onsite systems, whether septic tank or pit latrine.

Power

The old Dennery Hospital before its closure had a power supply, and there is a HT line in close proximity, which will satisfy construction power supply requirements. The transformer was relocated after its closure. For power to be reinstated at that site, the MOH should write to LUCELEC, first to apply for a construction supply, and for a permanent connection (pending electrical certification by MCW) thereafter.

There is an LT service at Bois Jolie, on overhead lines along the existing concrete access road, that loops all the way around, and back to the highway closer to Dennery village. As such, a construction power supply is available close to the site. However, that line is not 3 phase. It is likely that a 3 phase supply will be required for polyclinic operations, in which case it may be extended from existing 3 phase supply near the WASCO water treatment plant, or from the highway and along the concrete road. Under the first option, a third line would have to be run approximately half a mile to the site. With the second option, the full three phase supply would have to be run approximately a quarter of a mile, from the highway. Cost will dictate which is the preferred option. With either option, three 50 kVA transformers (total power 150 kVA) would be required.

Telecommunications

LIME has internet, telephone and cable vision services running along the highway as well as the concrete road into Bois Jolie. It is anticipated that there is enough duct space to accommodate all polyclinic requirements. Depending on the proposed entry point into the site, LIME may need to install a new joint box on the existing track. A line would then be laid to the equipment room on site.

LIME and Digicel mobile phone signals are both strong on the prospective sites.

Solid Waste

Waste from Dennery is collected by a private contractor (Southshore) contracted by the SWMA to serve this district, and hauled to Deglos landfill site in Cul de Sac. Waste in Dennery and environs (including Bois Jolie) is collected curbside, on Mondays and Thursdays. There is also a once monthly bulky waste collection service.

Collection contracts are re-tendered every 5 years.

Biomedical Waste

A system for biomedical waste management is managed by SWMA. Specialised 240 L containers are provided by SWMA to biomedical waste generators including Dennery Hospital. Biomedical waste containers are collected from generators once weekly, in a specialised vehicle[6] (with the capacity to hold 20 containers) operated by a private contractor. Waste is collected from hospitals, health centres and other biomedical waste generators around the island. Some 20 bins per week of biomedical waste are

[6] The collector has two specialized vehicles. Vehicles are stainless steel lined and sealed, with equipment to properly secure bins.

generated nationally. This service is provided at no charge to government institutions, while private facilities pay.

The waste is transported to an autoclave facility located at Deglos, where biomedical waste is stored and treated twice weekly. The refrigerated storage container at Deglos has a 70 container capacity.

Waste generators are required to properly segregate their waste, so that unnecessary treatment is avoided. Continuous training is required as staff become complacent and supervision is often inadequate.

Since it entered into operation several years ago, the autoclave has failed once due to a faulty valve, and this was repaired within a week. In the event of autoclave failure, the refrigerated storage facility at the same site has more than 3 weeks storage capacity at current generation rates. In the event of prolonged system failure, the SWMA could revert to deep burial of biomedical waste at the 2 waste disposal sites (Vieux Fort and Deglos).

5.3 Options for Reducing Project Scope

The funding deficit has been noted above. In light of this, it is likely that the proposed development will have to be reduced in scope and/or phased in order to reduce the initial investment cost required to achieve the fundamental objective of significantly improving health care available in this region while complementing upgraded hospital services to soon become available at both the new general hospital in Castries and the renovated SJH.

A polyclinic of the scale and orientation envisaged in the conceptual plan will also require significant staff increases. There are two significant implications in this regard. The first is the increased recurrent cost to the government of hiring staff at all levels, during a recession and at a time when the 2 general hospitals will likely also be hiring new staff. The second is that specialist staff with the requisite qualifications are unlikely to be available over the short to medium term. There are already professional staff shortages at the two general hospitals, even in advance of commissioning of those upgraded facilities.

Priorities for a first phase of polyclinic development in Dennery are as follows:

- Primary health care services
- Emergency services (24 hours)
- Diagnostic services
- Administration

These are also the main priorities for the full development, but consideration can be given to scaling back the proposed development, while achieving the stipulated priorities.

The following are recommended:

1. Within primary care services, provide up to 8 consulting rooms to accommodate the DMO daily clinics, the FNP daily clinics, and visiting specialists, including nutritionist, podiatrist, counsellors, etc. One of these rooms should contain ultrasound and colposcopy equipment, for use by the visiting obstetrician/gynaecologist or ultrasound technician. This equipment should be accessible to ER, or consideration given to providing a second, mobile ultrasound in the ER. Visiting specialist rooms should also include a consulting room equipped for an opthalmologist. When there are spare rooms available, a clinic can use up to two rooms to reduce time lost between patients.
2. Remove sexual and reproductive health and pediatric areas, and combine these services with ER and/or primary health care services. This is premised on a recommendation that deliveries should routinely take place at one of the general hospitals rather than in the community setting. In this scenario, sexual and reproductive health and pediatric clinics would be within the consulting rooms designated for specialist, DMO and/or FNP clinic services. Emergency deliveries at this site should be infrequent, and managed in the minor operating theatre. This pre-supposes:
    - a policy decision to deliver all babies in a hospital, and
    - a significant improvement in the EMS, to ensure that women in labour are transported to one or other general hospital quickly, and that EMTs are trained to do emergency deliveries.
3. Provide a common waiting area to accommodate all patients waiting for clinics, managed by a nurse and a receptionist. A small triage room should be attached to this waiting area. A children's play room/area should also be attached/incorporated within this space. Receptionist should be positioned to see consulting room doors so that patients can be dispatched promptly.
4. Upgrade physical exercise space to also be used as a staff gym, with appropriate guidelines for use. A small physiotherapist office could be attached to this space.
5. Provide a space for patient health education and incorporate nutrition demonstration within this space. Such space could also be used for staff training, with appropriate guidelines for use. A small office to accommodate a nutritionist and a physiotherapist (possibly alternately) could be attached.
6. Reduce dental space to accommodate 1 fixed dental chair, and another mobile chair to be brought in as required. An adjacent room should be provided for dental x-ray and counselling.
7. Amend ER space as follows:
    - include asthma bay;
    - reduce number of nurse & doctor offices within ER to one, on the premise that this space can be shared. The staff lounge can also be used by staff on call;

- separate ER waiting area and staff lounge while keeping both in close proximity to ER and observation area;
- reduce number of observation beds from 6 to approximately 3.

It is assumed that the ER will be staffed by a DMO, a RN and a Nursing Assistant, with 3 shifts, supported by EMTs when they are not out on a call. A policy decision is recommended to require staff on call are to remain on the premises.

8. Reduce on site lab to point of care testing facilities close to ER waiting area i.e. provide phlebotomy chair with capacity to do CBC, basic Chemistry, Cardiac enzymes, HBA1C, urinalysis and microalbumin testing. This assumes that most laboratory testing will be done off site, and samples will be transported routinely, with results conveyed electronically.
9. Remove CT scan from diagnostic area. Retain X ray and reduce lab as described above.
10. Keep social services layout as envisaged, as part of phase 2 development. Use clinic consulting rooms and health education spaces for these as required during phase 1.
11. Reduce number and/or size of conference spaces. One can be provided within administration, and the patient health education room can also be used for staff meetings and training, as earlier mentioned.
12. Include an IT room as part of administration. This should allow reduction of space allocated for records storage, assuming IT will be used routinely for accessing patient and other information. This requires protocols to be developed for managing information, and training of all users in IT system use.
13. Locate health education office and environmental health with other admin services (offices for PNO, FNP, HR etc), and provide 1 secretary for these.

These reduced services should preferably be accommodated within two single storey buildings linked by covered ramp, with a footprint similar to that envisaged in the conceptual plan. The upper building would accommodate ER and diagnostic services, and the lower building would accommodate primary health care and administration. A second floor could be constructed on the lower building in a subsequent phase of development, if required.

5.4 Approved Development Plans for the General Area

Most of the undeveloped lands in the general area are owned and managed by the NDC, and the NDC has drafted a masterplan for lands under its control. This plan does not yet have planning approval. The Bois Jolie area on NDC's masterplan is shown as mixed use, but is not detailed. Construction of a polyclinic in this area is consistent with the proposed mixed use.

The National Vision Plan provides for residential development at Bois Jolie, with space for hospital relocation. At the old Dennery Hospital site, the Vision Plan provides for community centre development. Residential subdivisions within Bois Jolie to the west of

the proposed site, have been granted planning approval, and are about to be surveyed by the NDC. Sales will commence in 2012.

The PS, MOH advised that consideration is also being given to erecting a senior citizens home in the same area.

5.5 Construction Works

The following description of the construction works, at this pre-design stage, is not comprehensive or definitive. It has been prepared to provide background information relevant to the EIA and a context for the identification and assessment of environmental impacts that may be anticipated during the construction and operational phases. All measures given are approximate, and are intended to indicate an order of magnitude sufficient to allow identification and evaluation of impacts with a reasonable degree of confidence.

5.5.1 Site Clearance

The Dennery Village site is sloping. The structure to be renovated exists, and no vegetation is to be cleared to enable these works. Vegetation across the site is mainly grass, and no site clearance is required.

The Bois Jolie site is also a sloping site, with a difference in elevation of approximately 14 m between the high and low boundaries of the proposed site. It is covered by patches of secondary deciduous seasonal ('dry') forest interspersed with a more open savannah. Clearing will be restricted to removal of the vegetation and surface soil containing organic matter within the building footprint, and within areas to be used for internal access routes, parking, and service structures. Trees outside of building footprints will not be removed.

5.5.2 Earthworks

The Dennery Village site will not require earthworks.

The Bois Jolie site will need to be benched to accommodate the proposed structures at the levels proposed. Cut material will, to the extent suitable, be used for fill, whether for building, road or parking area foundations, or spread on site. Excess cut material will be hauled off site. be used. Based on geotechnical information available, it is not envisaged that piled foundations will be required.

5.5.3 Drainage Works

The Dennery Village site is well drained. No significant drainage works will be required.

The Bois Jolie site is sloping and well drained. The proposed site boundaries are defined by drainage courses on 2 sides. On the southern boundary, a drainage course runs between the proposed site and the small parcel no 434. This watercourse originates from the SDA church site, and a culvert will have to be placed under the proposed site

access road to convey water along the proposed boundary. A second drainage course defines the proposed north eastern boundary. Both of these drainage courses cross under the East Coast road. These are small drainage courses that likely only convey significant quantities of water during heavy rains.

Site drainage will be designed to convey surface runoff to existing roadside drains and waterways. Surface water including roof water drainage from within the active site area will be directed away from the main structure to the boundary watercourses.

5.5.4 Building Works

Works at Dennery Village will comprise demolition of the old building within the site, and renovation of the hurricane damaged structure. The first will be the responsibility of the Ministry of Health, while the second will be funded by the World Bank. The structure to be demolished has an asbestos roof, so appropriate precautions will be required to protect workers and neighbours during this activity.

Available land space is not a building constraint at the Bois Jolie site. Because of the sloping nature of the site, two buildings built along the site contours and connected with ramps are planned. At the top of the site will be a single storey building, with a floor elevation of 118 m amsl. Lower down the site, a two storey building with a lower floor elevation of 115 m is proposed. The second floor level will coincide with the floor level of the single storey building behind. Parking will be at the lowest level of the site, at average elevation of 110 m amsl.

It is likely that the structural form of the hospital will be in-situ concrete beam and slab frames with rendered blockwork walls, all materials commonly used throughout Saint Lucia, and readily available. Roof will be flat to accommodate services and future expansion.

A water tank will be built on the upper site, and a wastewater treatment plant will be located downslope of the buildings. A service building will be located at the site entrance, to accommodate laundry, maintenance, storage, electricals and generator, and garbage room.

The conceptual plan proposes an arrangement of services as follows. As one progresses upwards, restrictions to access increase:

Block A (lower building), west wing, ground floor - primary care, general practitioners - consulting rooms, isolation room (communicable diseases), decontamination room, triage areas, asthma bay, physiotherapy and exercise bay, pharmacy, toilets (male and female with disabled access).

Block A (lower building), east wing, ground floor- information and interactive services - sexual health and family planning, weight management and dietary services, diabetes and hypertension, social services, mental health, environmental health (with separate entrance as they sometimes handle chemicals), community health education services, administration (records, reception).

Block A (lower building) west wing (shown as east wing on the plan, but proposed during user consultation to interchange east and west wings to improve access to maternity and delivery from ambulance bay and emergency bridge link), first floor - Reproductive health, obs/gynae - consultation rooms, exam rooms, labour, delivery, paediatrics (with reception, access to outside), sterilisation, nursery, infant care demonstration area.

Block A (lower building), east wing, first floor - administration, meeting rooms, family nurse practitioner, dental, opthalmology, X-ray (Dental), larger conference room, staff areas, on call rooms.

Back block, west wing - Emergency service room - Observation room for overnight stays, Minor operating theatre, Doctors and nurses offices, Ambulance bay, Lobby.

Back block, east wing - Diagnostics, Staff lounge and change room, lab, ECG, pulse, radiology, ultrasound, staircase for access to roof and services (mainly A/C), with possibilty to expand in future.

5.5.5 Landscaping Works

Landscaping works will form an important element of the project and enhance the appearance of the facility, from the perspective of hospital staff and users, as well as nearby residents.

The flora study conducted as part of this EIA (see Appendix 5) recommends that as many of the established trees as possible should be kept, to help stabilize the site and transpire water to reduce potential water logging in wet spells. These trees will also provide some shade at least for the wet season. They will also help protect the site from strong desiccating Atlantic winds which will make it difficult to establish cultivated species. One wild species present on the site, *Calliandra purpurea* (minizyé), is hardy and very attractive and should be incorporated into the gardens. The site is large so perhaps there will be open park-like spaces which will already have some trees in them, especially white cedars. In these areas the consultant has suggested some hardy drought-tolerant tree species some of which are colourful and some of which are evergreen and will keep their leaves year round, giving some precious shade.

It is assumed that there will be flower beds and shrubs planted around the buildings and along the access road. During most years there will be a long dry season and presumably only an occasional watering will be possible and limited funding will be available for gardeners. For that reason recommendations are made for planting of relatively hardy shrubs and trees, which would require little maintenance, once established, apart from pruning and perhaps a monthly watering during the worst of the dry season. However for the first few years all plants will need regular watering during the dry season until the rooting systems become established. Most recommended plants are readily available locally.

5.6 Intersections and Access

There are a number of routes available through the Dennery Village to the Dennery Hospital. All traverse low lying flood prone areas however, and access to the Hospital by both users and staff is therefore at risk of being compromised during high rainfall events. The access roads are flanked with village development (residential, institutional, commercial land use) on both sides and are steep, winding and narrow in places, particularly as they approach the Hospital site. Access can also be compromised at times if vehicles are badly parked along these routes.

The East Coast road is a two lane highway in very good condition. It is quite heavily trafficked as it is the main road on the east coast connecting all east coast communities to one another as well as to Castries in the north and Vieux Fort in the south. The international airport in Vieux Fort by itself generates significant traffic along this road. Vehicles tend to travel over the speed limit on this road, and there is therefore a relatively high risk of accidents. There are two existing junctions into Bois Jolie off the East Coast Road, and these are connected by a ring road traversing the area. It is presumed that the existing junctions between the East Coast road and the Bois Jolie area will remain at their present locations, and that the one closest to the site will be the primary access. There is a large hairpin bend on the highway, within 100m of the existing northern junction into Bois Jolie. The southern junction is located on a bend in the East Coast Road, and is less safe for vehicles attempting to exit onto the highway.

The ring road within Bois Jolie is not paved along its entire length, although the section from the northernmost junction to the vicinity of the site is concrete paved, and averages a width of 5.5m. The existing concrete access road does not reach the proposed site boundary, and a short access road and associated drainage will need to be built under the project. A road reserve is proposed by the concept planner to continue along the boundary of the proposed site into the remainder of NDC owned lands.

As plans for the Bois Jolie area materialise, the Bois Jolie area will become more heavily trafficked, and with more parking taking place along the access roads.

There is no provision existing for safe pedestrian movement or access across the East coast road. There are no bus shelters in the vicinity of the primary Bois Jolie junction.

Within the site, a roundabout close to the site entrance will direct traffic up to the buildings or down to the carpark. Roads will run along the front of the lower building and up to the ambulance bays at the upper building.

5.7 Other Construction Aspects

As the World Bank is financing these works, contracting will be in accordance with World Bank rules, using standard World Bank Forms of Contract. It is anticipated that Special Conditions of Contract will include sections applicable to the control of specific

construction social and environmental impacts identified in this EIA, and these are expected to provide an effective basis for environmental management of this project.

5.8 Contractual Matters

The contractors will establish within the site, temporary office accommodation for site staff and the supervising engineer's and client's staff, together with plant and material storage areas. No residential accommodation for the workforce will be included, and the contractor is expected to transport the workforce to site on a daily basis.

Arrangements for temporary use of adjacent land for the contractors' field bases is unlikely to be necessary, but if required, will be made directly with the NDC. There is no shortage of open land space within the immediate environs of the site for this purpose.

Contractors normally obtain asphalt and bulk concrete from batching plants which are already installed at permanent sites in various locations. It is considered unlikely that temporary installations would be required at the site, in view of the scale and location of the works, which is within reasonable haulage distance of asphalt and concrete plants.

Fine aggregates are often in short supply in St. Lucia, and will likely be imported by suppliers. Other aggregates will have to be hauled from quarries across the country. The closest quarries are in Vieux Fort and Cul de Sac.

The impact on local employment will depend somewhat on construction methods employed and extent of local sub-contractor participation, but the workforce (including supervisors) is expected to average 40 persons. This is likely to build-up and may peak at a maximum of 60 persons and then tail-off as the project comes to a conclusion. Estimated contract duration is approximately 12 - 14 months. After this there will be a twelve month maintenance period (with a minimal workforce) in which defects will be remedied and commissioning of systems and equipment will take place.

Conventional construction plant will be deployed for the construction, and may include bulldozers, graders, excavators, dump and other trucks, water tankers, rollers and concrete mixers. During building construction, a crane may be needed to lift and position pre-cast elements if this form of construction is adopted. A pile driver will be required if it is determined that piles are necessary for foundations; however, this is deemed quite unlikely at this stage.

5.9 Construction Arrangements

Day-to-day construction supervision and contract administration will be the responsibility of the Supervisor appointed by the Client. The Project Manager on the Supervisor's team will be a senior member of the Supervisor's staff. Contract administration and oversight of the work of the Supervisor will be provided by staff of

the Corporate Planning Unit of the Ministry of Health, one of whom will be selected to act as the Employer's Representative under the terms of the construction contract.

5.10 Implementation Schedule

It is expected that the overall project works will be carried out over a period of 12 to 14 months.

Completion of designs and approval of tender documents is scheduled for mid 2012. Tenders are likely to be issued soon thereafter, evaluated, a recommendation made and a contract awarded by to late 2012. Completion of construction is anticipated late in 2013 or early 2014.

6.0 ENVIRONMENTAL BASELINE CONDITIONS

6.1 Physical Aspects

6.1.1 Physiography

The island of Saint Lucia lies near 14 degrees north latitude and 61 degrees west longitude or about 5000 kilometres west of the West African coast. It is part of the Eastern Caribbean archipelago. Neighbouring islands are Martinique 24 miles to the north, Saint Vincent 21 miles to the south and Barbados 100 miles to the southeast. Saint Lucia is of volcanic origin and occupies an area of 238 square miles. The interior is rugged and mountainous but there several coastal and river valleys. The island lies within the northeast Trade Wind belt and enjoys a tropical maritime climate.

The sites are located on the east coast, in district of Dennery.

6.1.2 Geology and Soils

According to Saint Lucia Development Atlas (1987), both sites comprise agglomerate tuffs or tuffs, sedimentary rocks of the middle tertiary, central series.

6.1.3 Climate and Climate Change

Saint Lucia receives an average of 136 cm total rainfall per year. 35 years of data shows a uni-modal rainfall pattern, with one rainy season from July to November and one dry season from January to May. 70% of total annual rain falls during the main wet season, with peak months of September to November accounting for 40% of the annual total. The rainy season also coincides with the period of highest tropical storm activity. There is significant inter-annual variability in rainfall records. Rainfall is influenced by the El Niño Southern Oscillation (ENSO) and fluctuations in other large scale climate systems. An El Niño episode generally brings with it warmer and drier conditions, while La Niña brings colder wetter conditions (Climate Studies Group, 2009).

Rainfall is significantly higher over the mountainous interior than coastal areas due to orographic effects. The northernmost and southernmost areas of the island are the driest. Heaviest rainfall comes from tropical cyclones, tropical waves, the Inter Tropical Convergence Zone and Upper Level troughs.

Mean temperatures are relatively steady throughout the year with an approximate range of 2^{O}C. Highest temperatures occur between May and October and lowest between January and March. Maximum temperatures can reach a high of 32^{O}C and minimum temperatures a low of around 20^{O}C (Climate Studies Group, 2009).

Relative humidity hardly varies, tending to be in the high 70%, year round. It is highest during warm periods (Climate Studies Group, 2009).

The dry period occurring in the first half of the year brings with it higher than normal wind speeds. Stronger winds are also experienced during periods of high tropical storm

activity (Climate Studies Group, 2009). Winds are generally out of the east between 070 degrees and 100 degrees at an average speed of about 16 m.p.h.

Some of the outstanding rainfall events on record are:

- the passage of tropical storm Debby on 10 September, 1994.
- the passage of a tropical wave on 26 October, 1996.
- a convective flare-up associated with a deep layered trough on 21 February, 2000.
- The passage of Hurricane Tomas on October 31, 2010.

Widespread flooding, landslides and substantial damage to infrastructure resulted from all the above events.

Significant cyclonic events to affect Saint Lucia include the following:

- The most significant wind event on record occurred with the passage of Hurricane Allen on the night of 04 August, 1980. The eye of Hurricane Allen passed just south of Saint Lucia, packing 115 mph winds with gusts up to 130 mph. There was significant damage and six persons killed (http://www.hurricanecity.com/city/saintlucia.htm).
- Tropical Storm Debby made landfall on St. Lucia on September 10, 1994 with winds of 65 mph (100 km/h). After becoming a tropical storm, Debby rapidly intensified, and nearly reached hurricane status on September 10 with maximum sustained winds of 70 mph (110 km/h). In St. Lucia, Debby's heavy rains caused several landslides that killed four people. The landslides blocked main roads and closed an airport and flooding was reported in Anse La Raye. Debby's winds damaged much of the banana crop in St. Lucia (http://en.wikipedia.org/wiki/Tropical_Storm_Debby_(1994)).
- In 1999 Hurricane Lenny became known for its unusual motion from west-to-east across the Caribbean, instead of the usual east-to-west across the Atlantic. Lenny brought damaging surf to western shores of the entire Eastern Caribbean island chain, resulting in significant damage on a number of the islands. Many residents had to evacuate their homes as huge waves threatened and in a number of cases, destroyed many buildings. Soufriere took the brunt of Lenny's wrath (http://groups.yahoo.com/group/slunemo/message/890).
- In 2007 Hurricane Dean passed between Martinique and St Lucia with 100 mph winds. Strong winds and heavy seas caused extensive damage along the north and west coasts of St. Lucia, including damage to bridges, roofs, and utility poles. One death was reported (http://www.hurricanecity.com/city/saintlucia.htm).
- Saint Lucia experienced continuous rains commencing Monday October 6, 2008. Upon clearing the island chain the Tropical Wave developed into Hurricane Omar and began on a return path in a northeasterly direction towards the island chain. On October 15 Hurricane Omar further developed into a category three

hurricane. On the morning of October 16, heavy sea action began to occur in Soufriere and Anse la Raye (French & Emmanuel, 2008).

- On 31 October, 2010, Hurricane Tomas passed 29 miles (46.7 km) south of Saint Lucia as an intensifying cyclone, with 92 mph (148 km/h) winds. Later that day it became better organized and winds increased to 100 mph (160 km/h), a Category 2 hurricane on the Saffir-Simpson scale. Hurricane Tomas then weakened due to the shear and dry air, and by November 1st had diminished to tropical storm status, described as a "highly sheared tropical cyclone", because the circulation became dislocated from the convection by more than 100 miles (160 km). Winds were estimated to have decreased to 45 mph (75 km/h) by that time, although an area of thunderstorms reformed northeast of the centre. Over the subsequent day a total of 668 mm total rainfall was recorded at Desrache. The 1 in 100 year daily rainfall for this location was estimated to be 155 mm, leading experts to conclude that Hurricane Tomas was an extreme event with regards to rainfall, well in excess of a 100 year event. The Saint Lucia Met Office indicated that in terms of total daily rainfall, this event was classified as a one in 180 year event. (UNECLAC, 2010).

According to the Climate Studies Group (2009) the following can be noted about the current and future climate of St. Lucia:

- There is evidence to suggest that the climate of St. Lucia is changing.
- Minimum temperatures have increased at a rate of ~0.16^{o}C per decade, and maximum temperatures at ~0.20^{o}C per decade.
- There is no statistically significant trend in rainfall which shows considerable inter-annual variability.
- The warming trend is expected to continue. The country is projected to be warmer by up to 1.2 ^{o}C by the 2030s, 2.1 ^{o}C by the 2060s, and 3.6 ^{o}C by the end of the century.
- The projected rate of warming is marginally more rapid for December, January, February (DJF) and September, October, November (SON).
- The frequency of very hot days and nights will increase, while very cool days and nights will decrease.
- There is a likelihood that the country will be drier (in the mean) by the end of the century.
- Global Climate Models show a median decrease of up to 22% for annual rainfall. while the Regional Climate Model suggests a decrease of up to 57%.
- Climate change will likely make the dry period early in the year and June-July drier.

- Hurricane intensity is likely to increase (as indicated by stronger peak winds and more rainfall) but not necessarily hurricane frequency.
- Caribbean sea levels are projected to rise by up to 0.24 m by mid century.
- Sea surface temperatures in the Caribbean are projected to warm, perhaps up to 2oC by the end of the century.

In most small island developing states, and Saint Lucia is no exception, characteristics such as small human population, dependence on few economic sectors, an inherent vulnerability to natural disasters such as storm surges, floods, droughts, tsunamis and cyclones, and vulnerability to internal and global economic developments make these countries socially and economically vulnerable. Climate change with altered weather patterns and sea level rise will adversely affect life in these countries through a number of environmental, social, and economic effects, including threats to natural habitats, loss of habitable and agricultural lands, coastal erosion, increased intensity and frequency of cyclonic events, decreased food and water security, and adverse impacts on human health (http://www.climate.org/climatelab/Small_Island_Developing_States).

Increased shoreline regression rates are projected to take place as vulnerable coastlines erode. Coastal reefs protect the coast from storm surges, but reef degradation as a result of pollution and climate change increase coastal vulnerability. Much economic activity and infrastructure is located near the coast, and coastal land loss and erosion are likely to result in displacement of human populations. An increase in the intensity and frequency of extreme weather events will cause inundation, widespread damage to infrastructure, and loss of coastal agriculture. More frequent natural disasters will result in costly societal effects such as food and water shortages, injury and loss of human life (http://www.climate.org/climatelab/Small_Island_Developing_States).

Potential Impacts of Climate Change on Human Health

Climate-related health issues in tropical regions include malnutrition, vector-borne diseases, water-borne diseases, heat stress, respiratory problems, and disaster response to climate and weather events. Increased mean surface air temperatures are expected to alter the frequency and distribution of diseases. Inhabitants of small island nations such as Saint Lucia may suffer from an increased incidence of non-vector as well as vector-borne diseases, including malaria, filariasis and dengue fever. Higher average air temperatures will also cause more frequent heat waves, and consequently, higher rates of respiratory problems, illness and mortality, particularly among the very young and the elderly. Water-borne diseases such as cholera and diarrheal diseases caused by organisms such as giardia, salmonella and cryptosporidium may spread more quickly. Prolonged drought conditions can impact agricultural output and shrink livestock populations, and floods can decimate food stocks and strip soil of its fertility for many growing seasons. In extreme cases the direct impacts on food supplies may even result in malnutrition, dehydration, or

starvation in vulnerable populations (http://www.climate.org/climatelab/Small_Island_Developing_States).

6.1.4 Air Quality and Ambient Noise

The old Dennery Hospital is within the Dennery Village, and downwind of village activity. The Bois Jolie site is is within an undeveloped area downwind of the East Coast Road, a public roadway with medium traffic volumes. There are no quantitative measures of air quality or ambient noise taken in Saint Lucia, and no legislation or designated authority for the regulation of these. However, air quality at both sites is expected to be good, as the sites are both exposed to the north-east Trade Winds and windswept.

Noise on these sites would normally be related to village activity and road traffic respectively.

6.1.5 Vulnerability to Natural Hazards

These sites are vulnerable to different hazards.

The Dennery Village site is vulnerable (in order of decreasing risk) to wind, earthquake, storm surge, tsunami and volcanic eruption. Site approaches are highly vulnerable to flood and storm surge.

The Bois Jolie site is vulnerable (in order of decreasing risk) to wind, earthquake, volcanic eruption, tsunami and volcanic eruption.

Storm Surge and Wind

Saint Lucia is subject to dominant north-easterly winds, with direction between 70° and 90° and wind speed between 4 and 10 m/s, 90% of the time. St. Lucia is susceptible to tropical storms and hurricanes. From 1851 to 2007, there were 15 hurricanes passing within a 100-km radius from the island with wind speeds higher than 33 m/s. Hurricane Lenny in 1999 and Hurricane Omar in 2008 generated significant wave heights on the south-west coast of Saint Lucia, and significantly affected the Soufriere Bay.

The Caribbean Uniform Building Code and the BNSIINCST/OAS/BAPE Wind Code set out the basic wind parameters for the design of buildings in St Lucia. The normal requirement is the 1-in-5O-year wind, i.e. a wind speed which on average is not expected to be exceeded more than once in 50 years. In St Lucia this produces a basic 3-second gust wind speed of 58 m/s. Louis (2010) recommends that the basic wind speed adjusted for climate change for occupancy category II buildings is 62m/s and for occupancy category III and IV is 67 m/s.

Storm surges are associated with hurricanes and consist of unusual volumes of water flowing onto shorelines. Such surges have been responsible for much of the damage caused by hurricanes, especially in large, low-lying coastal settlements. Storm surges are complex phenomena which behave quite differently from one shoreline to another. The several main components governing their behaviour are contained in Table 6.1 below:

Table 6.1. Main components governing storm surge

Astronomical Tide:	Water levels due to tidal variation; Highest Astronomical Tide HAT Mean High Water Springs MHWS Mean High Water Neaps MHWN Mean Sea Level MSL Mean Low Water Neaps MLWN Mean Low Water Springs MLWS Lowest Astronomical Tide LAT
Initial Water Level:	elevated basin-wide water levels cause4 by larger storms;
Pressure Deficit:	elevated water levels caused by low pressure Systems;
Inland Runoff:	raised water levels in rivers and sea outfalls due to prolonged rainfall;
Current Surge:	ocean currents caused by high winds leading to the "piling up" of shallow waters;
Wave Setup:	water accumulating from continuous trains of waves on breaking on shoreline;
Wave Action & Runup:	effect of actual waves superimposed on the above factors.

As well as causing flooding and damage to coastal structures, storm surges may also precipitate flooding further inland through the blockage of the outfalls of drainage systems.

A combination of Spring Tide, Tidal Surge, and High Waves could result in a maximum water level of some 4 to 6 feet above static high tide conditions i.e. up to 8 feet above Chart Datum.

The natural hazard maps developed by Kinetic Analysis Corporation (2005) for storm surge and wind provide the following for coastal areas in the Dennery area (see Table 6.2).

Table 6.2. Coastal Storm, Wave and Wind Hazard on the east coast of Saint Lucia (Marmelles Pointe to Mandele Pointe)

Level of Risk	**Coastal Storm Surge and Wave Hazard**	**Wind Hazard (2 min avg. wind speed)**
50 year maximum likelihood event (will be experienced one or more times in average lifetime)	1.0 -2.0 m	35-40 m/s
100 year maximum likelihood event (might be experienced once in average lifetime)	2.0 – 3 m (high waves)	45-50 m/s
100 year 90% prediction limit (rarely experienced in an average lifetime)	4 – 5 m (high waves)	65-70 m/s

Volcanic Eruption

Risks of volcanic eruption are low for this location. The so-called Qualibou Volcano in Soufriere last erupted in 1766.

The Soufrière Volcanic Centre, located in the southwestern region of the island, is the focus of the most recent volcanic activity in Saint Lucia. It comprises a series of different volcanic vents and a vigorous high-temperature geothermal field manifested at the Sulphur Springs area. It is located within the Qualibou depression, an arcuate structure that formed about 300 thousand years ago due to an extremely large gravity slide (see Figure 6.1 below).

An intense and violent phase of volcanic activity occurred at the Soufrière Volcanic Centre between 40 and 20 thousand years ago when a series of major eruptions produced numerous dacitic[7] pyroclastic flows and surges[8] that flowed down all major valleys in the southern half of Saint Lucia and produced the deposits that now make up the southern slopes of the island. The deposits formed during these explosive eruptions have been divided into two main groups: the Choiseul and the Belfond pumice deposits (Wright *et al*, 1984). It has been proposed that these explosive eruptions occurred from within the Qualibou depression, and led to the formation of a semi-circular volcanic collapse feature known as the Qualibou caldera (Wohletz *et al*, 1986). Others claim that the radial distribution of the numerous pyroclastic flow deposits in southern Saint Lucia suggests that they did not come from within the Qualibou depression at all, rather from small vents in the Central Highlands (e.g. Mt. Grand Magazine and Piton St. Esprit) (Roobol *et al*, 1983 and Wright *et al*, 1984). The nature of the Choiseul and Belfond pyroclastic flow deposits indicate a particular style of eruption. They were formed by explosive eruptions that generated a buoyant eruption column[9] which subsequently collapsed to produce pyroclastic flows. Such eruptions are particularly devastating, because the pyroclastic flows that are generated can travel out from the vent in all directions.

[7] Dacite. A type of volcanic rock with 63-70% SiO2.

[8] Pyroclastic flows and surges. A pyroclastic flow is a hot (100-600 0C), fast-moving (>100km/hr) mixture of ash, rock fragments and gas. They usually travel down valleys and cause total destruction of the area over which they flow. Pyroclastic flows have been the main cause of destruction and loss of life in Montserrat since 1995. A pyroclastic surge is a dilute turbulent cloud of gases and rock debris that moves above the ground surface at great speeds. These form in a similar way to pyroclastic flows, but their effects are more widespread. Pyroclastic surges can be either hot or cold.

[9] Eruption column. Explosive eruptions generate abundant ash and other volcanic particles which are carried up into the atmosphere by expanding hot gases to produce a buoyant eruption column.

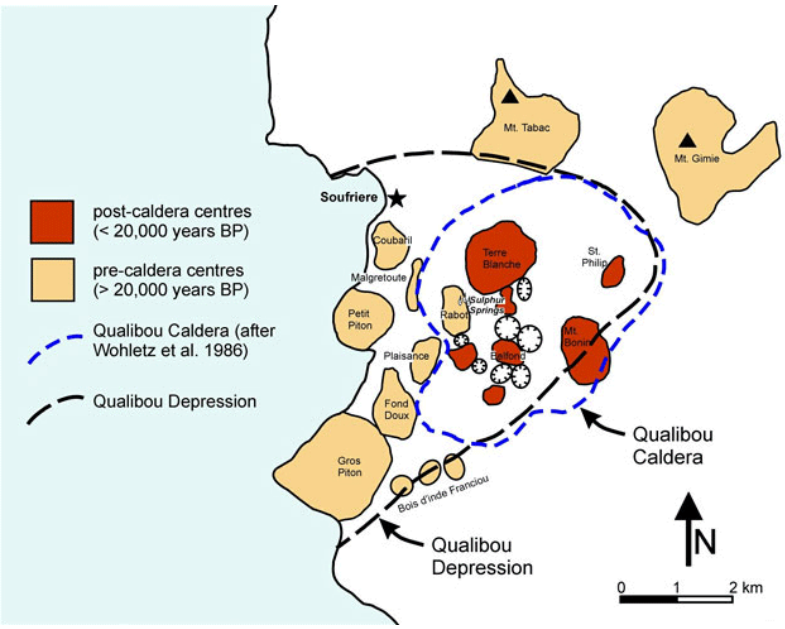

Figure 6.1 Map of the main vents of the Soufrière Volcanic Centre (Source Soufrière Volcanic Centre University of the West Indies Website)

After the phase of explosive activity that formed the Choiseul and Belfond pyroclastic deposits a series of small lava domes (e.g. Terre Blanche, Belfond) and explosion craters (e.g. La Dauphine estate) formed near the centre of the depression. Some minor dome-collapse pyroclastic flow deposits (block and ash flow deposits) are associated with the lava domes, indicating a history of dome growth and collapse. Thin deposits of pyroclastic material surround the explosion craters, and these probably formed during minor, short-lived, explosive events. Field relations indicate that the explosion craters are younger than the adjacent Belfond lava dome. Unfortunately none of these domes or craters has been dated and it is therefore impossible to say with certainty when the last magmatic eruption[10] occurred in Saint Lucia. The presence of the relatively young (< 20,000 years) lava domes and craters together with the active geothermal field at Sulphur Springs indicates that the Soufrière Volcanic Centre is potentially active and may erupt again.

Historical eruptions in the Caribbean are generally regarded as those that have occurred since European settlement and the introduction of written records of the region. In Saint Lucia European settlement began in the early 1600s but was intermittent for most of the 17th century, changing hands several times between the French and English. There have been no historical magmatic eruptions in Saint Lucia, i.e. eruptions involving

[10] Magmatic eruption. Eruptions involving the release of magma (molten rock) at the surface of the Earth. Magmatic eruptions may be either explosive or effusive. Explosive magmatic eruptions occur when dissolved gases in a rising magma expand to form gas bubbles which then burst as the magma nears the Earth's surface, leading to explosive fragmentation of the magma.

the effusive[11] or explosive ejection of magma at the surface of the Earth. There have, however, been several minor phreatic (steam) explosions from the Sulphur Springs area in historic times. The last one occurred in about 1766 and was described by Lefort de Latour (1787) as a 'minor explosion…… which spread a thin layer of cinders far and wide'. These 'cinders' (ash) probably represented fragments of old rock blasted apart by expanding steam rather than fragments of new magma.

The occurrence of occasional swarms of shallow earthquakes together with the vigorous hot spring activity in southern Saint Lucia indicate that this area is still potentially active and the island can therefore expect volcanic eruptions in the future. The Soufrière Volcanic Centre is the most likely location for future eruptions in Saint Lucia. There are four different scenarios for future activity at this centre; in order of decreasing probability these are:

1) a phreatic (steam) or hydrothermal eruption from the Sulphur Springs area;

2) a small explosive magmatic eruption forming an explosion crater in the Belfond area;

3) an effusive[11] magmatic dome-forming eruption within the Qualibou Caldera and

4) a large explosive magmatic eruption from either the Central Highlands or from within the Qualibou Caldera.

A phreatic (steam) or hydrothermal eruption from the Sulphur Springs geothermal field would be relatively small, and would only affect the area directly surrounding Sulphur Springs. Phreatic and hydrothermal eruptions do not erupt fresh magma, and tend to be short lived (a few hours or days). A prolonged series of large phreatic eruptions may, however, herald the onset of an actual magmatic eruption.

Flood

Drainage structures in Saint Lucia are generally designed for rainfall events having return periods of up to 20 years. Such systems are likely to become overloaded and cause some degree of flooding when rainstorms are experienced with return periods greater than 20 years. Generally, lower lying areas will be more susceptible to flooding than higher and sloping ground. The damage caused by flooding depends on the type and elevation of facilities in the location. The results of flooding may range from the inconvenience of temporarily submerged driveways to the loss of equipment and finishes inside flooded buildings and consequential disruption of functions. Access to the old Dennery Hospital has been severed on a number of occasions, during high rainfall events.

[11] Effusive eruption. Effusive eruptions occur when molten rock (lava) reaches the Earth's surface and erupts passively. The products of these eruptions are lava flows and lava domes. They generally occur when the gas content of the magma is low.

Tsunamis

Tsunamis (sometimes colloquially called tidal waves) are usually caused by tectonic earthquakes and volcanic eruptions. Landslides and underwater explosions have also been known to cause tsunamis. There are few historical records of tsunamis in the Caribbean. A tsunami wave may carry huge quantities of sand, rocks, vessels and debris, as well as water. However, according to the Caribbean Compass (August 1999) article, eruption of Kick ‘em Jenny, a submerged volcano off the north coast of Grenada, could cause a tsunami in the region. "Kick 'em Jenny's eruptions are frequent, but small," said Dr. John Shepherd, Head of Seismic Research at the Seismic Research Unit (SRU) in Trinidad. "Our hypothetical worst case scenario was for forty-meter waves in the Grenadines, but the realistic worst case scenario is for fifteen-meter waves and in the most likely scenario, waves would probably not be much worse than the swell from a near-miss hurricane." The SRU's "high probability" predictions (based on Kick 'em Jenny's 1939 eruption, which caused a 1- to 2-meter tsunami in Barbados) forecast a 3 meter wave at Grenada's north coast, diminishing to under one meter by the time it reaches Port of Spain (Trinidad) (Caribbean Compass, August 1999). Recent studies by Martin Smith and John Shepherd have identified future eruptions of the Kick 'em Jenny volcano as a potential tsunami hazard to St Lucia. The travel time would be about 30 minutes from eruption at source to Castries and the final run-up value on the St Lucia west coast would be about 1.8 metres for a realistic scenario. The 1755 Lisbon earthquake produced tsunami waves in Barbados and, probably, in St Lucia as well. Such an event, with a return period of a few hundred years, could produce tsunami waves on St Lucia's east coast of between 2 and 5 metres.

It is conceivable that a wave in the order of 5 m in height could have some minor effect at the proposed location.

6.2 Biological Aspects

6.2.1 Vegetation and Wildlife

Studies of the flora and fauna within the site were undertaken by Roger Graveson and Adams Toussaint respectively, for the purposes of this EIA. Some of their findings are contained below. Their reports are reproduced in entirety in Appendices 5 & 6 respectively, to this report.

Flora

There is no intention to alter vegetation at the Dennery Village site, and no floral assessment was done there.

The Bois Jolie site is covered by patches of secondary deciduous seasonal forest (‘dry’) forest interspersed with a more open savannah. This is normally a result of frequent past disturbances, possibly periodic clearing for charcoal, burning for grazing and growing cassava. Most plants found were species which tend to become common in

degraded environments. The analysis of the flora present on the Bois Jolie site reveals no botanical issues with regard to its proposed development. No rare or endangered species are present on the site and the habitat itself is much degraded with poor biodiversity. Surrounding areas have similar vegetation. Thus no mitigations are required.

Fauna

A fauna inventory conducted at the Bois Jolie site in November 2011 revealed that the secondary dry forest habitat, which is the dominant vegetation type on the proposed Polyclinic site, is very poor in fauna diversity. While there were some species that occurred in high frequency, species richness in the various taxonomic groups was very poor. The faunal taxa found included mammals, birds, reptiles, amphibians, insects and other invertebrates.

The site is located within an ecological zone which consists of secondary habitats that have been frequently altered for agriculture, housing and has a high frequency of alien invasive species. Consequently, species listed for this site are sufficiently resilient to anthropogenic disruption of their habitat. Moreover, the majority of the vertebrates and invertebrates occurring in the project sites are very widespread in Saint Lucia.

While the habitats found on the site are not significant and are not considered to be biodiversity hotspots, the site is located between two biodiversity hotspot areas (the Northeast Coast and the East coast dry forest habitat) and appears to provide connectivity between these two habitats. While it may appear to be a corridor, its effectiveness may have been disrupted by the Castries Vieux Fort Highway which bisects the habitat. There is also increasing housing development in the adjacent lands to the east and southeast of the site which may also have compromised the faunal diversity of the site.

6.2.2 Protected Areas

There are no protected areas within either of these sites. The Dennery Waterworks Reserve lies further inland.

The Saint Lucia National Trust (established by the Saint Lucia National Trust Act of 1975) currently manages 26 sites, most of which are of historic and cultural interest. Some Trust sites are of significant ecological importance. The following islands off the Dennery coast are vested in the Trust:

- Dennery Islands (2.80 Ha)
- Bateaux Island (1.40 Ha)
- Rouche Island (1.40 Ha)
- L'Islet a Ramier (Ramier Island) (0.50 Ha)

The Protected Areas System Plan (Draft) (Haffey, 2009) proposes that the Dennery Island be declared a Nature Reserve, as it supports an island habitat, and is of potential importance as a refuge for rare/threatened/endemic species, if these are introduced there and alien species have been eradicated.

The Systems plan also recommends creation of the Mandele Protected Landscape, an area of 2060 hectares from Martelly Point in the south to the Dennery River in the north. The landscape is characterized by dry deciduous forest and scrub vegetation which supports most of the surviving population of the endangered white breasted thrasher. The area also encompasses a large part of the Dennery Waterworks Forest Reserve.

The Systems Plan-proposed East Coast Marine Protected Area (MPA) extends from Pigeon Island in the north and along the east coast to Mathurin Point near the southern tip of the island. The Area from the north of Giromon Point in Anse Louvette Bay to the Fond D'Or River in Fond D'Or Bay also forms part of the Systems plan-proposed Iyanola National Park (Haffey, 2009).

6.2.3 History and Development

The Dennery Hospital site was searched for any evidence of earlier occupation or use of the site prior to the establishment of a Hospital in the late nineteenth century. Nothing unusual was found. The likelihood of finding Amerindian artefacts was slight, because of the extent of tabling or levelling of the hilltop for the construction of firstly, a possible eighteenth century Estate Mansion and secondly, the later intervention for the Dennery Hospital. Nothing was found to suggest such an event had occurred prior to the construction of the hospital. Apparently it was never used as a fort for the protection of the historic Bay of Anse Canot below, since a quick search of the existing historical records and old maps revealed no such thing.

It is obvious from the secondary scrub vegetation that the Bois Joli site must have once been in agriculture, probably growing sugar cane. If it was in cane the sugar factory was located in the lower valley overlooking Fond d'Or bay less than a mile to the north-east of the site. Nothing of any interest was found after a very quick cursory walk across a couple of accessible areas. See Appendix 9 for the full archaeological assessment.

6.3 Social and Socio-Economic Aspects

6.3.1 Sources of Socio-economic Data

The 2001 Population and Housing Census Report (2001) and the 2010 Population and Housing Census (Preliminary Report) (2011) provide much data of relevance to the study area. The St. Lucia Core Welfare Indicators Questionnaire (CWIQ) Survey (2004), designed to collect the minimum amount of information needed to identify and classify

target groups and to provide basic welfare indicators for monitoring poverty alleviation programmes, was also referred to. The Poverty Assessment (2006) survey provided additional information on educational attainment and to some extent, the health status of the population, including the poorer sections of the society.

6.3.2 Assumptions Regarding Dennery Polyclinic Catchment Area

It is expected that most polyclinic users will originate from within the district of Dennery, although Dennery Hospital staff advise that some persons from as far as Bexon to the north and Mon Repos to the south do opt to use the Dennery facility. The following analysis looks, where data is available to do so, at socio economic indicators in Dennery and environs, relative to national averages.

6.3.3 Constituency populations

The Census 2010 data provides information on the population distribution across constituencies in Saint Lucia, and this is provided in Table 6.3 below. Although the population within Dennery appears to have shifted between the north and south constituencies, the Dennery population overall has not grown significantly between the 2001 and 2010 censuses. This is typical of most constituencies in the south, except for Anse La Raye/ Canaries and Soufriere on the west coast where populations increased. Overall rate of population growth in the north significantly exceeded the growth in the south, with the Gros Islet constituency continuing to register the greatest population increase (40%). In 2001, total population in northern constituencies exceeded that in the southern constituencies by 10,000 persons (6.5% of the total population). In 2010, the population difference between north and south grew to 16,135 persons (9.7% of total population).

Table 6.4 shows numbers of households, business places and institutions by Constituency. Figures were not available for institutions in 2010, but while numbers of institutions were fairly well distributed across the island in 2001 (with ratio of institutions to households ranging from 0.1% to 0.5% in the different constituencies), business places were concentrated in Castries Central, Vieux Fort South and Gros Islet. Districts of Anse La Raye/Canaries and Choiseul had the smallest number of business places, compared with other constituencies. In 2010, the number of business places in southern constituencies had grown faster than in the north, 19% in the south, versus 3% in the north. In Dennery, number of business places grew 22% from 2001 to 2010.

Table 6.3. Estimated Household Population by Political Constituency and Gender (Source: 2001 Census Report and 2010 Census Preliminary Report)

CONSTITUENCIES	TOTAL 2001	TOTAL 2010	Change 2001 to 201	% change
GROS-ISLET	**16,043**	**22,493**	**6,450**	**40**
BABONNEAU	**11,858**	**12,723**	**865**	**7**
CASTRIES NORTH	**9,968**	**11,825**	**1,857**	**19**
CASTRIES EAST	**12,064**	**11,939**	**-125**	**-1**
CASTRIES CENTRAL	**8,357**	**7,398**	**-959**	**-11**
CASTRIES SOUTH-EAST	**16,836**	**14,983**	**-1,853**	**-11**
CASTRIES SOUTH	**8,647**	**9,504**	**857**	**10**
Sub-total (northern Constituencies)	**83,773**	**90,865**	**7,092**	**8**
ANSE-LA-RAYE\ CANARIES	**5,717**	**8,291**	**2,574**	**45**
SOUFRIERE	**7,342**	**8,472**	**1,130**	**15**
CHOISEUL	**6,370**	**6,098**	**-272**	**-4**
LABORIE	**10,036**	**8,691**	**-1,345**	**-13**
VIEUX-FORT SOUTH	**8,401**	**9,140**	**739**	**9**
VIEUX-FORT NORTH	**8,174**	**7,131**	**-1,043**	**-13**
MICOUD SOUTH	**7,293**	**7,326**	**33**	**0**
MICOUD NORTH	**7,466**	**6,982**	**-484**	**-6**
DENNERY SOUTH	**7,050**	**4,920**	**-2,130**	**-30**
DENNERY NORTH	**5,686**	**7,679**	**1,993**	**35**
Sub-total (southern Constituencies)	**73,535**	**74,730**	**1,195**	**2**
TOTAL [12]	**157,490**	**165,595**	**8,105**	**5**

[12] Includes not stated, which is not included in table

Table 6.4. Number of Private Households, Dwellings, Business Places and Institutions by Constituency (Source: 2001 Census Report and 2010 Census Preliminary Report)

CONSTITUENCIES	Business Places 2001	Business Places 2010	Institutions 2001
TOTAL CASTRIES	3295	3,360	68
GROS-ISLET	860	1,282	37
BABONNEAU	371	NA	12
Sub-total (northern Constituencies)	**4,526**	**4,642**	**117**
ANSE-LA-RAYE\CANARIES	199	339	13
SOUFRIERE	371	435	22
CHOISEUL	203	259	21
LABORIE	330	261	6
TOTAL VIEUX FORT	940	1175	11
TOTAL MICOUD	518	559	5
TOTAL DENNERY	378	463	14
Sub-total (southern Constituencies)	**2,939**	**3,491**	**92**

In Table 6.5, populations in the various communities within Dennery are shown. The village of Dennery has the highest population, exceeding 4,000 persons. Table 6.6 provides community populations in Micoud communities expected to use the Dennery Polyclinic.

Table 6.5. Enumerated Population in Dennery by Settlement 2010 (Source: 2010 Census Preliminary Report)

Settlement	TOTAL POPULATION
DENNERY VILLAGE	4120
BOIS JOLI	230
LUMIERE	134
LA CAYE	705
AU LEON/DESPINOZE/LA PELLE/LUMIERE	2292
GADETTE	649
FOND PITIT/MARDI GRAS/DERNIERE RIVIERE	846
MABOUYA	331
BELMONT/GRANDE RAVINE/RICHFOND	1813
DUBONNET	298
MORNE PANACHE/GRANDE RIVIERE	1206
ERRAND/ATHENS	32
BY PASS/ROCKY LANE	386
BEAUJOLAIS	440

Table 6.6. Enumerated Population in Micoud Settlements Expected to use Dennery Polyclinic (Source: 2010 Census Preliminary Report)

Settlement	TOTAL POPULATION
LOMBARD/PATIENCE	1700
MON REPOS/PRASLIN	1100
MAMIKU	47

6.3.4 Health, Education and Poverty

Poverty

According to the Poverty Assessment (2006), Government of Saint Lucia has, as a policy invested heavily in education and health, and both sectors account for a large share of public expenditure, with the objective to universalize certain health and education services. The reach of such programmes and services to the poor is an indicator of the achievement of this objective.

The Poverty Assessment (2006) found that generally, poverty in Saint Lucia was a rural phenomenon, with prevalence rates in excess of 35% in rural districts. The poverty gap was highest in Anse La Raye/Canaries (at 17.7), followed by Micoud, Soufriere and then Dennery (at 11.4). 34% of the Dennery population was poor. The Poverty Assessment (2006) also found that 51% of those living below the poverty line were below age 20. The report concluded that there was a coexistence of children and adult females living within specific districts where their social and economic well being was either impaired or under threat from external shocks.

Health

Immunisation

According to the CWIQ Survey (2004), most children under the age of five (95%) participated in the first two development assessments programmes at 6 weeks and 3 months. While vaccination rates were over 71% for DPT, BCG and Polio 1, 2 and 3, the CWIQ Survey (2004) concluded that vaccination rates may be higher since some respondents were unable to verify the vaccines received due to the unavailability of some health cards, and that St. Lucia's health performance was in line with the MDG target for vaccinations. The Poverty Assessment (2006) data also suggested that the vast majority of children were immunised by age five years.

Reproductive Health Care and Child Delivery

The Poverty Assessment (2006) noted that women's physical and mental health could be affected by poverty. Early and multiple pregnancies, poor diet, inability to access or afford health services, and the stress and anxiety of having sole responsibility for their families all take a toll on their health. In addition the health of those who are victims of abuse and domestic violence, and those who have multiple sexual partners or are engaged in the sex trade, is threatened.

Pre- natal care is one of the primary health care services available to all females of childbearing age. 96% of all the women surveyed in the CWIQ Survey (2004) who had a live birth during the year preceding the survey reported that they had pre-natal care. The survey also revealed that most births were of females within the age group of 25-29 years and to a lesser extent 20-24 years. Whereas teenage pregnancy at the national

level was 3% of all live births in the previous year, the urban poor recorded a rate three times higher (CWIQ Survey, 2004).

Reported cases of delivery at a hospital showed no discrimination between rural and urban and those who were poor. Overall, 97% of females reported that their delivery took place at a hospital in the past five years. The districts of Anse La Raye/Canaries recorded the largest percentage of the females (6.2%) using the health centre for delivery. This may have been one of the reasons why some of the population were dissatisfied with the adequacy of trained professionals (CWIQ Survey, 2004). Generally nurses/midwives were responsible for delivery of the nation's babies; 82% of deliveries done in the previous five years were assisted by nurses/midwives. The two districts where a notable percentage of deliveries were done by other individuals were Dennery (4%) and Rural Castries (3%) (CWIQ Survey, 2004).

Disease and Injury

Although CWIQ was not designed to be an accurate morbidity survey, reported illnesses were mainly bronchial infections/flu (26.3%) of which the majority of cases were reported by persons below 50 years. Hypertension/diabetes (24.5%) were the third leading responses recorded mainly among females above 50 years. Reported cases of fever (6.8%) affected mainly children below the age of 10 years. Males within the age group 30-49 years recorded the highest rate of accidents (15.1%), which was more than twice that of females (6.4%) for the same age group. These results were compared with information from the Chief Medical Officer's Report which revealed that during the period 1998- 2002, 68% of all deaths by accidents were among males below 45 years of age; 35% were within the 25-44 age group (CWIQ Survey, 2004).

A significant number of older persons were not in good health. Both elderly women and men suffered from diabetes, hypertension, alcoholism, rheumatism, arthritis and asthma. Eye problems were also common. A few men suffered from prostate cancer. All complained about the high cost of health care and the difficulties they experienced in accessing health services (Poverty Assessment, 2006).

While the incidence of communicable diseases has fallen generally, and there seems to be an effective public programme to attack the most recent challenge created by the HIV/AIDS pandemic, chronic disease has been on the increase. The Poverty Assessment (2006) collected data on the main lifetime diseases among persons who indicated that they are suffering from some disease. The prevalence rates relate to five main lifestyle diseases notably diabetes, high blood pressure, heart disease, cancer and HIV/AIDS. Data on the prevalence of HIV/AIDS were not forthcoming and precluded any further analyses. Table 6.6 shows the number of persons suffering from the main lifestyle diseases and their specific prevalence rates relative to all persons who indicated that they were suffering from diseases. The Poverty Assessment (2006) noted that, in interpreting these results, differential levels of awareness, knowledge and pursuit of treatment likely to be associated with socio-economic status must be considered. The

results indicated that socio-economic status (as gleaned from the quintile groups) had no impact on the pattern of lifestyle diseases affecting the population.

Irrespective of per capita consumption quintile, Table 6.6 shows that high blood pressure was the most prevalent lifestyle disease affecting persons with diseases in St. Lucia. In every quintile group, Table 6.6 also shows that the prevalence of diabetes ranked second to high blood pressure as a lifetime disease. In each of the quintile groups, more than three fifths of persons with diseases reported suffering from high blood pressure while more than one quarter reported suffering from diabetes. Heart diseases were more prevalent than cancer in each of the quintile groups.

With reference to persons who claim to have had a disease, the highest prevalence rates among persons claiming to be living with a heart condition or cancer were observed for persons in the wealthiest quintile. For persons claiming to be living with diabetes, higher prevalence rates were observed among persons in wealthier quintiles than among those in the two poorest quintiles.

The Poverty Assessment (2006) noted that the differential prevalence rates across socio-economic status groups were likely to be a function of status differentials on awareness of the onset of specific diseases. The better-off are more likely to display a different approach to access to treatment, interpretation of diagnosis and orientation towards reporting the condition. For persons living with high blood pressure, there was no clear pattern of variation in prevalence rates across socioeconomic status except for persons in the poorest quintile for whom a slightly lower prevalence rate was observed. This might reflect greater information on health matters among higher quintiles. The Poverty Assessment (2006) identified a need for:

Table 6.7. Persons Suffering from Disease by Type of Disease and Quintiles, Number and Percentage (Source: Poverty Assessment, 2006)

Per Capita Consumption	Diabetes		High Blood Pressure		Heart Condition		Cancer		HIV/AIDS	
	N	%	N	%	N	%	N	%	N	%
Poorest	771	28.7	1711	63.7	194	7.2	41	1.5	-	-
II	915	29.2	2099	67.0	347	11.1	41	1.3	-	-
III	1440	38.7	2501	67.3	307	8.3	79	2.1	-	-
IV	1601	35.2	3095	68.1	483	10.6	77	1.7	-	-
Richest	2569	37.6	4598	67.3	1151	16.9	189	2.8	-	-

- social marketing of wellness to encourage changed behaviours to improve management of health and control incidence of chronic diseases, and spread of HIV/AIDS;
- greater public health education programmes across the population targeting persons from poorer strata, to raise awareness and promote proactivism with respect to treating with the main lifestyle diseases;

- intensification of possible strategies such as institutionalising Employee Assistance Programmes to counsel and treat employees who might be at risk of succumbing to the various lifestyle diseases.

6.3.5 Access to Medical Services

Access to health care was determined in the CWIQ Survey (2004) by the ability of household members to reach an equipped health facility within fifteen minutes. At the national level 56.1 % of the population indicated that they had access to a medical facility. However there was a significant difference in terms of accessibility to health facilities between the populations residing in urban as compared to those in rural areas and a greater difference between the rural poor (36.7%) and the urban poor (60.7%). The districts that reported the poorest access to health facilities were Dennery (41.3%), Laborie (37.1%) and Choiseul (22.8%).

6.3.6 Need for Medical Services

The need for medical services was defined for persons who were sick or injured in the four week preceding the CWIQ Survey (2004). 11% of the population noted that they were sick or injured with more females than males indicating a need for medical services. The older persons and the youngest ones had the greatest needs recording 21.2% and 15.5% respectively. Need was higher in the rural areas (12%) as compared to the urban areas (9%). The districts of Soufriere, Choiseul and Dennery reported the greatest need with rates of 20.2%, 18.8% and 16.6% respectively being reported. It was noted that whereas the households in Choiseul had a high need they had the lowest access level to medical services. In several communities surveyed for the Poverty Assessment (2006) residents were particularly concerned about the unavailability of health services.

6.3.7 Use of Health Care Facilities

Good personal health enhances individual prospects of pursuing educational opportunities, obtaining education credentials and participating in productive enterprise through participating in the labour force; access to quality health care is essential. In the CWIQ Survey (2004), use was defined for persons who consulted a health provider in the four weeks preceding the survey. At the national level, 15% of the population consulted a health provider. The poor both in the rural and urban areas reported greater use of the facilities than the non poor in the reference period. Analysis by socio-economic group revealed that the unemployed recorded the greatest use (20.2 %). When comparing need and use a similar trend emerged, children below the age of ten (31.3%) and adults sixty years and above (29.7%) reported the greatest use of the facility. The leading health provider was the public hospital with 37.5% of the population reporting using it. However 69% of the population of Anse La Raye/ Canaries and 54% of those in Choiseul reported using the health centres for their main health needs. Three-quarters of the persons who used the hospital did so as a result of accidental injury (CWIQ Survey, 2004).

Individuals' use of health care facilities was also gauged in the Poverty Assessment (2006) in accordance with the type of medical facility first visited during the previous thirty days as a result of an illness or injury. 87.8 per cent of persons who reported having a main lifestyle disease or had, in the previous 30 days, experienced other forms of illness or injury due to accidents, indicated that they had either first visited a public hospital, a community health clinic or a private physician/ dentist.

Table 6.8. Percentage Distribution of Persons with Main Lifestyle Diseases or Illness and Injury due to Accidents in the Past 30 days by Type of Place First Visited for Medical Attention according to Per Capita Consumption Quintiles (Source: Poverty Assessment, 2006)

Per Capita Consumption Quintiles	Poorest	II	III	IV	Richest	All St Lucia
Place First Visit Made	%	%	%	%	%	%
Public Hospital	33.7	26.8	34.7	29.3	24.5	29.1
Private Hospital	1.5	-	-	7.2	10.8	5.0
Community Health Clinic	30.1	35.2	33.3	26.4	13.9	25.9
Polyclinic	2.8	5.0	-	2.7	2.7	2.6
Private Doctor/Dentist	24.5	30.6	29.9	28.2	43.4	32.8
Out of state hospital	-	-	-	1.8	1.3	0.8
Pharmacy/Chemist	2.8	1.2	1.0	1.8	2.6	2.0
Other	3.0	1.2	-	2.7	0.7	1.4
Not Stated	1.5	-	1.1	-	-	0.4
All St Lucia	100.0	100.0	100.0	100.0	100.0	100.0

In the poorest quintile group, the majority of individuals used public hospitals (33.7%) with lower percentages using community health clinics (30.1%) and private physicians/dentists (24.5%). In the case of the wealthiest quintile group, the majority of individuals used private physicians/dentists (43.4%) with lower percentages using public hospitals (24.5%) and community health clinics (13.9%). The proportion of individuals visiting private physicians/dentists was lower in the poorest quintile than in any of the wealthier quintiles. There was relatively greater use of private hospitals among individuals belonging to the two wealthiest quintiles than among their counterparts from the poorer quintiles. The use of private hospitals was most pronounced among the members of the wealthiest quintile. The Poverty Assessment (2006) concluded that there was a divide in the services and use thereof between the poor and the non-poor. The latter were less likely to use public facilities and, instead to seek the care of private providers.

Assuming that the individuals were seeking similar medical services from different sources that may differ in the quality of their service delivery, some attention ought to be placed in redressing any imbalance that might arise in terms of differential access to quality services across socio-economic status groups (Poverty Assessment, 2006). The relatively greater use of private physicians/dentists and private hospitals among

individuals from wealthier quintiles relative to their counterparts from the poorest quintile is a critical determinant that could facilitate public policy reform geared towards improving health delivery systems. This may have implications for the redistribution of health coverage and resources that could provide better access to quality health care among poorer sub-populations. Moreover, other implications might include building capacity in public hospitals and community health care facilities to render health care services at higher standards that are deemed to be acceptable and in line with best practices.

6.3.8 Satisfaction with Medical Services

Satisfaction was defined in the CWIQ Survey (2004) as persons who had consulted a health provider during the prior four week period and had no problems with the service. Generally there was a high level of satisfaction (80%) among users of health services. The highest level of satisfaction was recorded in the districts of Micoud (94.3%), Vieux Fort (93.8%) and Castries urban (91.5%). The lowest level of satisfaction was reported by the district of Dennery (56.9%) and Soufriere (64.5%). The unemployed reported the highest level of satisfaction (84.2%).

6.3.9 Dissatisfaction with Medical Services

Out of the small percentage of the population that expressed dissatisfaction with the service, the majority cited long wait (54.0%) and cost (43.6%) as their major dissatisfactions. The longer waiting periods were recorded by persons in the districts of Micoud, Choiseul and Soufriere. The Anse La Raye/Canaries populations were mainly dissatisfied with lack of trained professionals (CWIQ Survey, 2004). St. Lucia suffered the problem of emigration of doctors and nurses and this meant that there were not the requisite numbers of personnel to supply services at the public health care facilities, creating long wait for service on the part of the public (Poverty Assessment, 2006).

6.3.10 Health Insurance Coverage

Health insurance coverage includes individuals' coverage by private health insurance, employee medical plan, National Insurance Scheme or Social Welfare. The majority of individuals (72.5 per cent of the national population), did not have any medical coverage, as opposed to just 26.3 per cent who had such coverage (See Table 6.8). This pattern persisted irrespective of individuals' socio-economic status group. Notwithstanding, persons belonging to the poorest quintile were least likely to have insurance coverage which generally increased with a progression to wealthier quintiles, in particular, the two wealthiest quintiles. While just 5.7 per cent of the persons belonging to the poorest quintile were estimated to have health insurance coverage, the corresponding proportion among persons from the wealthiest quintile was estimated to be 40.9 per cent. According to the Poverty Assessment (2006) this helps explain outcomes indicating relatively greater use of private hospitals among persons belonging to the two wealthiest quintiles.

Table 6.9. Percentage Distribution of Population by Health Insurance Coverage according to Per Capita Consumption Quintiles (Source: Poverty Assessment, 2006)

Per Capita Consumption Quintiles	Poorest	II	III	IV	Richest	All St Lucia
Insurance	%	%	%	%	%	%
Yes	5.7	21.7	16.1	31.6	40.9	26.3
No	92.8	75.9	83.9	67.5	57.8	72.5
Not Stated	1.5	2.3	-	0.9	1.4	1.2
All St Lucia	100.0	100.0	100.0	100.0	100.0	100.0

Another issue that affected the quality of services being offered was the attitude of the providers, including issues of confidentiality in the case of health service providers, and in the user friendliness of services provided. Residents confirmed that these issues influenced their decision on whether to use the service or not (Poverty Assessment, 2006).

6.3.11 Universal Health Care

The Poverty Assessment (2006) found that the reach of primary health care was universal and the vast majority of the population had access to public facilities well distributed across the country. The CWIQ Survey (2004) assessed the main welfare indicators of access to, need and use of, and satisfaction with, the medical services provided. In St. Lucia, primary health care services were expected to provide basic preventative and health care services at minimum or no cost. Access to health care was determined by the ability of household members to reach an equipped health facility within fifteen minutes. At the national level 56.1 % of the population indicated that they had access to a medical facility. However there was a significant difference in terms of accessibility to health facilities between the populations residing in urban as compared to those in rural areas and a greater difference between the rural poor (36.7%) and the urban poor (60.7%). The districts that reported the poorest access to health facilities were Dennery (41.3%), Laborie (37.1%) and Choiseul (22.8%) (CWIQ Survey, 2004).

The Government in the mid 2000s announced the phased introduction of universal health care, and subsequently launched this through a pilot project focusing on free treatment of persons with diabetes[13] or with diabetes accompanied by hypertension. There was to be comprehensive care for ambulatory patients with anti-diabetes and anti-hypertension medications provided free of charge.

[13] Diabetes was the leading cause of death in St. Lucia and, according to the then Prime Minister, as reported in the Poverty Assessment (2006), 20 percent of persons aged over 40 years suffered with diabetes: more critically, about half of those afflicted did not know that they were diabetic. According to the St. Lucia Core Welfare Indicators Questionnaire (CWIQ) Survey 2004, the Chief Medical Officer's Report stated that Diabetes Mellitus ranked number one amongst the top ten causes of death for the years 2000, 2001 and 2002.

6.3.12 Literacy and education

According to the CWIQ Survey (2004) poor persons who live in urban and rural areas recorded literacy rates that were significantly below the national level, with literacy among the rural poor estimated at 62.1 percent. The rate of literacy in urban areas, estimated at 92.7 percent, was 4 percentage points higher than the national rate. Older persons had lower literacy levels, with only 62% of over 60 year olds being literate; this figure fell to 53% in rural areas.

Education levels (as documented in the 2010 Census Preliminary Report) in Dennery in 2010 and 2001 are compared with national averages in Tables 6.8 and 6.9. In both years, the largest group comprised those who had attained primary level education or lower. This group was larger in Dennery (56% in 2001, decreasing to 51.8% in 2010) than nationally (52% in 2001, decreasing to 46.9% in 2010). The proportion of persons attaining secondary/non-tertiary level education in 2010 was higher in the country overall (24.9% in 2001, increasing to 34.7% in 2010) than in Dennery (16.6% in 2001, increasing to 19.4% in 2010). The proportion of persons attaining university level education was also higher nationally (2.7% in 2001 increasing to 3.9% in 2010), compared to Dennery (0.6% in 2001, increasing to 1.7% in 2010). 12.3% of persons in Dennery had no education in 2010 (down from 13.6% in 2001), compared with 8.9% nationally (down from 11.4% in 2001). It can be concluded that education levels are improving in both Denney and nationally, likely a result of universal secondary education, although levels in Dennery continue to lag national averages.

Access to primary school education was defined in the CWIQ Survey (2004) as the percentage of students of primary school age (ages 6 to 11) that could get from their homes to the nearest primary school in less than 15 minutes, using their normal means of transportation (including walking). Access to secondary schooling was defined using the same measure for students of secondary school age (ages 12 to 16). Persons who live in urban areas had better access to educational facilities than their rural counterparts, with the poor in both the rural and urban communities having a little less access than the non-poor in their respective areas. Choiseul had the lowest primary education access ratios (48%), much lower than the 65% reported at the national level. Soufriere, Anse La Raye and Laborie recorded a substantially lower access when it came to secondary schools. The national estimate of timely access to secondary school education was 33%. A broader measure of access was obtained by asking all households how far the nearest schools were. Using this measure, the national average for good access to primary was 67% and to secondary, 41% (CWIQ Survey, 2004).

Table 6.10. Percentage Household Population by Highest Level of Formal Education and District, 2010 (Source: 2010 Census Preliminary Report)

Level of Education	National Average 2010	Dennery 2010
Daycare/Nursery	1.3	1.1

Level of Education	National Average 2010	Dennery 2010
Pre-school	7.9	7.2
Pre-primary (Infant) or Primary	37.7	43.5
Lower/Junior Secondary/Senior Primary	7.6	9.2
Upper Secondary (Forms 4 & 5)	19.8	5.9
Post Secondary, Non-Tertiary	7.3	4.3
University/Tertiary (Bachelors)	2.1	1.3
University/Tertiary (Masters)	1.1	0.4
University/Tertiary (PhD)	0.1	0.0
Other	1.2	0.8
None	8.9	12.3
Not Stated	4.4	4.0

Table 6.11. Percentage Household Population by Highest Level of Formal Education and District, 2001 (Source: 2010 Census Preliminary Report)

Level of Education	National Average 2001	Dennery 2001
Daycare/Nursery	1.0	0.9
Pre-school	3.3	3.8
Infant	2.5	2.6
Primary (1 - 3 yrs)	6.9	8.1
Primary (4 - 7 yrs)	38.3	40.6
Secondary	19.8	14.0
Pre-University/ Post Secondary/ College	5.1	2.8
University	2.7	0.6
Other	1.7	2.6
None	11.4	13.6
Not Stated	7.3	10.6

The CWIQ Survey (2004) recorded important differences between the net enrolment of boys and girls in secondary education, where the ratio for girls was over 14 % higher than that of boys. There was also a marked difference in the enrolment rates of rural and urban dwellers. The rural poor recorded a secondary school net enrolment ratio of 68%, significantly lower than that of any other group, including the urban poor. The more significant reasons given for not enrolling in (or not attending) school were that it was too expensive and that it was not necessary. The CWIQ Survey (2004) hypothesized that the modest enrolment ratio of the rural poor was because persons in these areas are primarily engaged in farming activities and may see no essential link between their means of making a living and secondary schooling.

Children interviewed under the Poverty Assessment (2006) saw education as a route out of poverty. All of the women interviewed were concerned about being able to feed their children, provide health care and send them to school. While they also saw education as a way of moving out of poverty, for many the cost of education was prohibitive. The study noted the absence of day nurseries and preschool in some communities, or the parents' inability to pay for these, resulting in the lack of preparedness of many young children to enter primary school. Absence of electricity, telephones, computers and internet affected children's performance in schools and limited their ability to do homework. School performance was often affected by parents' ability to afford lunch, transportation, school books, and other vital supplies.

The Poverty Assessment ascertained that most (approximately 60%) household heads had attained a maximum of a primary school education. 22% had a secondary school education, and 4% a university education. In poor households, heads were more likely to have attained a maximum of a primary education compared to their non-poor counterparts. The report also suggested an inequitable distribution of resources between sexes with respect to persons attaining a post-secondary certification and at the same time being among the ranks of the poorest in Saint Lucia. However, relatively more females than males attaining a maximum of school leaving certification had progressed to the wealthiest two quintiles. Typically, the results demonstrated that attainment of certification enhanced one's socio-economic status and facilitated the prospects of being among the ranks of the non-poor.

6.3.13 Some Other Socio-Economic Indicators

Some socio-economic indicators for Dennery are compared with Castries and national averages below. These support or reinforce some of the foregoing observations from the CWIQ Survey (2004) and the Poverty Assessment (2006).

Average size of household is an important indicator in determining the welfare of households. A comparison of the census results of 1991, 2001 and 2010 reveals that all the districts in Saint Lucia experienced a decline in their average household size; the average decreased from 4.0 persons to 3.2 persons and then to 2.8 persons per household. In Dennery the decline was 3.3 persons per household in 2001 to 2.9 persons per household in 2010. The standard of living within Saint Lucian households improved steadily over the same ten year period. Many more households across the island attained access to basic amenities. The CWIQ Survey (2004) found that the average household size was 3.4 persons, with no significant difference between the average size of rural and urban households (3.4 and 3.3). The rural poor had a higher average size of 3.9 (CWIQ Survey, 2004).

Data on type of toilet facilities is provided in Table 6.10. There was (and still is) no well functioning municipal sewerage system in most communities. Exceptions are Castries and Gros Islet.

Pit latrine was the most common toilet facility in Denney in 2001, found in 47.2% of households. Prevalent of pit latrines had declined to 42.6% in 2010, and septic tank was then the most prevalent form of sewage disposal in Dennery (45.4%). In 2001, 18% of households in Dennery had no toilet facilities. This declined to 8.7% in 2010. Standards in Dennery lagged national standards both in 2001 and 2010, with septic tanks being used in 62.8% of households in 2010, and pit latrines in 23.1%. The St. Lucia Core Welfare Indicators Questionnaire (CWIQ) Survey (2004) results were consistent with the census data, and found that only two thirds of households had a flush toilet, while the other third used pit latrines.

Table 6.12. % Households with Toilet Facilities (Source: 2010 Census Preliminary Report)

District	Linked to sewer	Septic tank	Pit latrine	Other	None	Not stated
Dennery 2001	1.2	29.7	47.2	2.8	18.0	1.1
Dennery 2010	1.5	45.4	42.6	1.9	8.7	---
Total Island 2001	5.3	47.2	35.3	1.0	9.2	1.9
Total island 2010	6.6	62.8	23.1	1.3	6.2	---

As can be seen in Table 6.11, lighting by electricity in households in Dennery was lower than the national average in 2001 and 2010, although the increase from 2001 (79.1%) to 2010 (90.4%) was significant. Lighting by other (unspecified) sources in Dennery decreased from 10.9% in 2001 to 5.0% in 2010, more than twice the national average in both years.

Table 6.13. % Households with Lighting (Source: 2010 Census Preliminary Report)

District	Gas	Kerosene	Electricity	Other	None	Not stated
Dennery 2001	0.2	6.7	79.1	10.9	1.8	1.3
Dennery 2010	0.3	1.7	90.4	5.0	1.7	---
Total Island 2001	0.2	5.1	86.6	4.5	1.1	2.5
Total Island 2010	0.2	1.3	94.2	2.6	1.2	---

Some households used more than 1 source of water. In 2010 public water supply piped into dwelling was less common in Dennery, at 60.1%, compared with 79.6% nationally. However, in Dennery, the increase in households with this amenity was significant, from 39.9% in 2001. In 2010, public supply piped into yard was still significant (17.5%) in Dennery, as was standpipe (9.2%), although the prevalence of these had decreased significantly from 2001, when they were 29.4% and 18.5% respectively. By 2010, nationally, water supply to households from these sources was much lower, at 8.5% and

4.4% respectively. This information is contained in Table 6.12. Use of a public standpipe and public tank will be at no cost to the consumer, so it appears that significant numbers of persons in Dennery may have preferred to access "free" water at some inconvenience, rather than pay for the convenience of having it piped into their homes. It may be also that water sources were not reliable, and users may have had no option but to seek other sources at times.

Table 6.14. % Households with Source of Water Supply (Source: 2010 Census Preliminary Report)

District	Private piped to dwelling	Private catch-ment not piped	Private catch-ment piped	Public piped into dwelling	Public piped into yard	Public stand-pipe	Public well or tank	Other	Not stated
Dennery 2001	1.8	0.3	0.8	39.9	29.4	18.5	48.9	10.9	1.1
Dennery 2010	0.5	1.7	---	60.1	17.5	9.2	---	8.9	2.0 (Truck)
Total Island 2001	2.4	1.2	.6	58.4	19.5	8.5	.3	7.0	2.1
Total Island 2010	0.4	1.6	---	79.6	8.5	4.4	---	5.3	0.2 (Truck)

Table 6.13 provides information on household source of cooking fuel. In 2001, use of gas/LPG for cooking was the most common source of cooking fuel across Saint Lucia. Prevalence of use of this supply increased from more than 83% in Dennery and nationally to more than 92% in 2010. Use of wood and charcoal decreased significantly both in Dennery and nationally, to 2.3% and less than 3.1% respectively.

Table 6.15. % Households with Cooking Fuel (Source: 2010 Census Preliminary Report)

District	Charcoal	Wood	Gas/LPG	Kerosene	Electricity	Other	Not stated
Dennery 2001	7.6	6.1	83.2	0.2	0.2	1.1	1.6
Dennery 2010	2.8	2.3	92.7	0.1	0.3	1.7	---
Total Island 2001	7	5.1	85	.2	.4	1.0	1.3
Total Island 2010	3.1	2.3	92.3	.2	.4	2.0	---

As can be seen in Table 6.14, in both 2001 and 2010 Dennery had lower internet connection rates than nationally, although connections increased significantly both in Dennery and nationally. In 2010, 19.8% of households in Dennery had internet connections.

Table 6.16. % Households with Internet Connection (Source: 2010 Census Preliminary Report)

District	Internet connection	No internet connection
Dennery 2001	2.2	97.8
Dennery 2010	19.8	80.2
Total Island 2001	6.7	92.5
Total Island 2010	26.5	73.5

Table 6.15 shows that a significantly lower proportion of households in Dennery owned computers (4.6% in 2001 and 26% in 2010) than nationally (13.1% in 2001 and 38.6% in 2010).

Table 6.17. % Households with Computer Ownership (Source: 2001 Census Report)

District	Own computer	Do not own computer
Dennery 2001	4.6	95.4
Dennery 2010	26.0	74.0
Total Island 2001	13.1	84.6
Total Island 2010	38.6	44.8

Table 6.18. % Households with TV Set Ownership (Source: 2001 Census Report)

District	Has
Dennery 2001	64.6
Dennery 2010	79.9
Total Island 2001	79
Total Island 2010	86.4

Ownership of TV sets was lower in Dennery (64.6% in 2001 and 79.9% in 2010) than nationally (79% in 2001 and 86.4% in 2010). Data is contained in Table 6.16.

Cable vision service in Dennery increased significantly from 2001 (26.7%) to 2010 (68.6%), but was still lower than the national average of 44% in 2001 and 75% in 2010 (see table 6.17).

Table 6.19. % Households with Cable Vision Service (Source: 2010 Census Preliminary Report)

District	Has
Dennery 2001	26.7
Dennery 2010	68.6
Total Island 2001	44
Total Island 2010	75.0

Table 6.18 provides information on household telephone service. Fewer than nationally, had telephone service in Dennery in both 2001 and 2010. Prevalence of fixed lines decreased from 2001 to 2010, from 48.1% in Dennery to 31.5%, while households with cellular phones in that community increased from 6.6% to 77.6^ over the same period. Trends were similar nationally, although households with access were higher in all instances. Cell phone coverage by LIME and Digicel has increased over the period, and the services became more affordable.

Table 6.20. % Households with Telephone Service (Source: 2010 Census Preliminary Report)

District	Has fixed line	Has cellular
Dennery 2001	48.1	6.6
Dennery 2010	31.5	77.6
Total Island 2001	60.2	13.7
Total Island 2010	41.6	85.1

As can be seen in Table 6.19, vehicle ownership rates were lower in Dennery than nationally in 2001 and again in 2010. Both in Dennery and nationally, households having ownership of a vehicle increased from 2001 to 2010.

Table 6.21. % Households with Vehicles Owned (Source: 2010 Census Preliminary Report)

District	None	One	Two	Three	Four or more	Not stated
Dennery 2001	84.0	12.8	1.2	0.1	0.1	1.7
Dennery 2010	81.1	16.2	2.1	0.4	0.2	---
Total Island 2001	72	20.8	4.2	.7	.3	1.9
Total Island 2010	69.2	23.9	5.5	1.0	.3	---

The St. Lucia Core Welfare Indicators Questionnaire (CWIQ) Survey 2004 found that 92.5% of households lived within 15 minutes of public transport. There was noticeable variation, with lower access reported in Soufriere, Choiseul and Dennery, where 20 to 30% reported having public transport more than 15 minutes away.

Access to all weather roads was high, with 97% being less than 15 minutes away. Access to a supermarket was lower for most households; three quarter's lived within 15 minutes, with lower percentages in rural areas (St. Lucia Core Welfare Indicators Questionnaire (CWIQ) Survey 2004).

As can be seen from Table 6.20, the Census (2001) found that unemployment rate in Dennery exceeded the national rate (22.8% and 17.3%). Unemployment in 2010 increased, to 24.1% in Dennery and 20.6% nationally. Unemployment was higher among females than males in Dennery and nationally.

Table 6.22. % Population Unemployed (Source: 2010 Census Preliminary Report)

District	Unemployment rate (male)	Unemployment rate (female)	Unemployment rate (total)
Dennery 2001	17.6	29.9	22.8
Dennery 2010	22	27	24.1
Total Island 2001	15.5	19.4	17.3
Total Island 2010	19	22	20.6

The CWIQ Survey (2004) results were again consistent with the Census (2001) results. CWIQ (2004) defined the unemployed as persons age 15 and above available for work but who did not work during the reference period of the four weeks preceding the survey. The CWIQ estimate of overall unemployment was 18.8%. 92% of the unemployed population did not work because no work was available. More than one third of household heads were unemployed (37.6%). The incidence of unemployment was higher among female household heads than male household heads, with half of female household heads unemployed compared to slightly more than one quarter of the male household heads. The unemployment rate in the rural and urban population was almost equal (18.7% and 19.0% respectively). However, there was a significant difference in the poorest households – 30% of the rural poor population were unemployed compared with 38% of the urban poor population. Persons within the age group 15-29 recorded the highest unemployment level (26.5% male and 38.1% female) (CWIQ Survey, 2004).

For St Lucia, youth (i.e. age 15-24) unemployment stood at 39.2% (compared to 25.2% in the1998 Labour Force Survey). The unemployment rates for males and females (35.2% & 43.6% respectively) almost equal that of the inactive population (35.8% & 43.8% respectively). It was also noted that the male population ages 17-19 recorded the highest unemployment level (53.5%) whiles the females population ages 15-16 recorded the highest unemployment level (100%) (CWIQ Survey, 2004).

The Poverty Assessment (2006) noted that the finances of the households were very fragile and were dependent on the ability of household members to obtain employment that would produce enough money to meet needs. There was differential capacity; in the elderly single person households where individuals were unable to work, they depended on small pensions, welfare, and help from children or other relatives and friends. Many of them were vulnerable and lacked food and their dietary, nutritional and health needs were not being met because of lack of money. Women faced graver hardships in coping with poverty than men. The survey data demonstrated that they faced higher unemployment. In the PPA, women were of the view that poverty affected women more than men, especially women who were single parents and grandmothers who were solely responsible for the welfare of their children and grandchildren.

Several elderly persons admitted to being poor and provided reasons for their condition. Indeed, the circumstances that these elderly persons face are often reflective of the families they have created through the mating and fertility experiences they have had as young persons. Among the reasons cited were: age and the inability to work, ill health or sickness, responsibility for supporting children, including children with disabilities, or grandchildren, lack of support by adult children and lack of access to resources. There is a grave concern about the plight of the elderly and about persons with disabilities. The lack of a regular and steady income, the small amount of money that a few receive from the government, their inability to eat balanced meals regularly, their poor health, isolation and social exclusion are issues seen to need urgent attention.

While there was poverty, estimated indigence was low and while there were households, according to the results of the PPA, that claimed to have nutrition and eating challenges, there did not seem to be wide-spread problems of under-nutrition among children. There were however, pockets of children at risk, especially in some of the rural communities. The poor elderly, and moreso those who were not in receipt of public assistance, may have been hard-pressed to secure balanced meals. School feeding does not reach all children in need, and it is nonexistent at the secondary level, with the result that there are students of poor homes who go to school hungry.

6.3.14 Dependency

The overall dependency ratio is 0.6, indicating that less than one person is dependent on each economically active person. There was no significant difference in the dependency ratio for rural and urban areas however the poorest quintile had a higher dependency ratio of 1.0. The districts of Dennery had a dependency ratio above the national ratio, at 0.7. Households containing 7 or more persons and persons in the unemployed socio – economic group also had slightly higher dependency ratios (0.7 and 0.8 respectively) (CWIQ Survey, 2004).

6.3.15 Findings of the Richfond and La Ressource Health Centre User survey

The user survey was conducted in mid-November 2011. 100 respondents were surveyed, forty from the La ressource Health Centre, forty from the Richfond Health Centre and twenty from Dennery Village. Users at La Ressource Health Centre tended to be older than their counterparts at Richfond Health centre. Users at both facilities were predominantly female. The majority of users (97.5%) were residents of Saint Lucia. Most users were low income, with household incomes of less than EC$2500 monthly, and with a significant number earning less than EC$1000 monthly. Unemployment was quite high at all locations surveyed, with high numbers of self employed in Dennery Village. Most employed/self employed persons were engaged in agriculture and services. Most respondents did not have private health insurance. Some had NIC coverage.

Most users tended to go to the health facility closest to their place of residence, although a significant number preferred to go to La Ressource because they liked the

staff there. A small number of La Resource users also came from communities outside of the health region.

Most health centre users were there to attend medical clinics, and a large number accessed child health services. This is not surprising since surveys were deliberately conducted during these clinics. There was a broader range of services available at La Ressource Health Centre than at Richfond, and these were also used by significant numbers of those surveyed.

Relocation of services from Dennery to Richfond and from Richfond to La Ressource had a number of effects, both positive and negative. The La Ressource health centre was now too congested, an observation borne out by discussions with the staff there. Some persons found it easier and faster to get to the Richfond facility than to Dennery, the significant exception being Dennery residents who complained of increased time and transportation costs to get to the Richfond facility. Significant numbers of those surveyed had had to travel to SJH or VH since Dennery Hospital closure, to access medical or specialty services there. A significant number had opted to use private services for a number of reasons, including unavailability of the required service, possibly because the Dennery facility was closed, shorter waiting times, dissatisfaction with publicly available services or a specialist referral.

Most respondents were aware that the Dennery Hospital is to be repaired and renovated, and that emergency and primary health care services will soon return to that location temporarily. Even more were aware of Government's plan to build a new medical facility at Bois Jolie to offer all the services that used to be offered at the Dennery Hospital. An overwhelming majority (more than 90%) thought that a new Dennery Medical facility was required to improve service range and quality and make services more accessible and affordable.

Although more supported than did not, there were mixed views about the suitability of the proposed Bois Jolie location, with least support for this location coming from Dennery. Many Dennery residents would prefer the facility to remain in the original location. La Ressource Health Centre users were most supportive of the proposed Bois Jolie location. This may be because they appear to be the most inconvenienced by current arrangements, and a location on the East Coast Road rather than within the village would be easier for persons from that general area to access. Richfond Health Centre users may be anticipated to be less supportive than La Ressource counterparts as they have now grown accustomed to "hospital" services within Richfond and any relocation site will be less convenient for them. Reasons selected (from a number of possible reasons offered to them) by those in support of relocation to the Bois Jolie site were availability of space for development, ease of access from the highway, less flood prone access and less sea blast. Of those who did not support relocation out of Dennery village to Bois Jolie, reasons (selected from options given) were that access would be more difficult, and that they were accustomed to the original location. Despite this, large numbers thought that the relocation would have no effect on them. Significant

numbers of Dennery residents reiterated the expected increased access time and transportation cost to them. Conversely, significant numbers of La Ressource Health Centre users said that it would be quicker and easier to get to the Bois Jolie location. Users of the available medical facilities tended to be repeat users, and the impact of possible increased cost and inconvenience to them cannot be discounted.

Respondents typically rated services at Dennery Hospital before its closure as average or higher. Dissatisfaction with the Dennery Hospital before it closed related to, among other things, the condition of the premises, poor customer service, lack/quality of staff, equipment and medication, long waiting times, need for accident and emergency service and admissions, extended opening hours, and improved dental services.

Respondents were informed of services intended to be offered at the new Dennery polyclinic at Bois Jolie, and asked whether anything else was required. They did not request any services additional to what was on offer, except for kidney treatment, by which they presumably meant dialysis facilities. Some specifically requested improved customer service, staff and equipment.

Survey instrument and full survey results and analysis are contained in Appendices 7 and 8 respectively.

6.4 Trends in Baseline Conditions

Impacts of climate change are expected to increase. In particular, extreme cyclonic events can be expected to increase in intensity. This translates to an increase in peak wind speeds and precipitation intensity and volume during such events. Rainfall patterns are also expected to change, resulting in more extreme drought and flood conditions. In 2010 alone, Saint Lucia experienced a drought in the dry season followed by Hurricane Tomas in October. Rainfall volumes during Hurricane Tomas were estimated by UNECLAC (2010) to be in the order of a 1:180 year event. The combination of the drought event followed by rainfall during Hurricane Tomas in the same year was estimated to be in excess of 1:1000 years. The economic impact of more frequent extreme weather conditions will have the net result of, *inter alia,* making a greater proportion of the population more vulnerable, less resilient, and less able to afford health care.

Sea level rise associated with climate change will not affect these sites directly for many years, but can be expected to adversely impact all nearby coastal developments, in particular the Dennery Village, making this area more susceptible to storm surge, flooding and inundation. Temperatures are also projected to increase, with the frequency of very hot days increasing. All of these factors have the potential to change, inter alia, the profile of health needs in these communities.

Civil unrest and instability in the Middle East can be expected to cause oil prices to fluctuate, and this is occurring during a period of low economic activity in Saint Lucia. The “pass through mechanism” used for pricing fuel on the local market, introduced by

the government in 2010, increases the adverse impact of fuel prices on the population when prices on the world market are high. This, as well as the increasing cost of other necessities as a result of increased fuel prices internationally, will drive up the cost of living, pushing more people into poverty. Crime, already on the rise, can be expected to further increase, unless crime prevention programmes are increased and sustained.

A number of the elements recommended under the National Vision Plan, whether deliberately or coincidentally, have been or are being implemented. These include residential development within Bois Jolie by NDC, waterfront improvements including limited sewage treatment facilities within Dennery Village by the Government, and development of a number of eco-tourism sites within the broader Dennery area. Location of the polyclinic within Bois Jolie is also broadly in conformance with the Vision Plan. The National Vision Plan, if it comes to full fruition, could transform Dennery and potentially increase the demands on health and all other services, as well as improve socio-economic conditions of many persons in these communities.

With National Vision Plan implementation, demand for all services (water, sewage treatment, power supply, telecommunications) will escalate significantly, and the providers of all of these services may have to install or increase capacity. Water supply improvements required to meet these increased demands by an under-resourced service provider (WASCO), in a climate scenario where water resources are depleting, will be particularly challenging. Power and telecommunications service providers are likely to readily meet this challenge. Provision of sewage treatment will be a greater challenge, as there is no municipal sewerage service available in this area[14]. It is noted that the Vision Plan has identified lands for a sewage treatment plant. If the area develops as envisaged under the Vision Plan, such development should include an appropriately designed municipal sewerage scheme, to protect recreational water quality in the areas.

Financing for most elements within the National Vision Plan has not been confirmed, and it is possible that there will be little support within the new government administration for the Vision Plan. It is difficult to predict therefore which, if any, elements will proceed at what time. In the absence of the Vision Plan coming into full realisation, this area would likely develop more or less in accordance with the draft NDC land use plan, which anticipates housing and touristic development on much of the unused lands in this area.

Even if the Vision Plans materialise, the socio-economic status of the local population that is served by the polyclinic will have to transition from what obtains at this time. The Dennery community and environs is still reliant to a significant extent on income from agriculture, in particular bananas, and is at risk of becoming even poorer as

[14] A sewerage system is now being installed at Dennery Waterfront to service a number of properties in the vicinity

international arrangements continue to become less favorable[15]. This effect may be cushioned to some degree by the ongoing efforts supported by the EU to develop the earlier mentioned eco-agro tourism sites that create alternate employment opportunities and increase economic activity in the community.

The poverty prevalence rate in Dennery was high when the Poverty Assessment was undertaken in 2006. Since then, the global recession has impacted negatively on the national economy, and in the absence of more recent data to ascertain trends, the situation in this community is unlikely to have improved, and is more likely to have further deteriorated. Under these circumstances, unemployment rates have likely increased and fewer persons will be able to afford health services that have to be paid for.

The Poverty Assessment (2006) found that the reach of primary health care was universal and the vast majority of the population had access to public facilities well distributed across the country. Quality of primary health care including immunisation rates and pre-natal care in most communities was generally acceptable. Poorest access to health facilities were reported however, in Dennery, Laborie and Choiseul, and the greatest need for medical services was noted in districts of Dennery, Choiseul and Soufriere. The lowest level of satisfaction with medical services was reported by the districts of Dennery and Soufriere (notably, these communities are the most distant from SJH and VH). The Poverty Assessment (2006) also found that health of the elderly was a concern, as they complained about the cost and difficulty in accessing health services. Oldest and youngest in the population were identified as having the greatest need for medical services. These findings pre-dated the closure of Dennery Hospital, and the situation for Dennery Village residents in particular, has deteriorated further.

This situation may be mitigated as a new SLP government came into power in December 2011, with a manifesto commitment to institute UHC proposals which were developed by a previous SLP government before they lost the 2006 elections. It is anticipated that this government will pursue UHC more vigorously than the previous administration. A commitment to UHC and health sector reform is necessary to improve community health services and access to a basket of health services by all, including improvements to health services available in Dennery.

As unemployment (already relatively higher in most southern communities, and higher among women and youth) increases, health insurance coverage of the population can be expected to decrease. In 2006, the Poverty Assessment found that the majority (72.5% of the population) did not have any medical coverage, with persons in the poorest quintile least likely to have coverage. Populations in rural southern communities including Dennery tend to have lower education levels and lower access to schools. For some, secondary schooling was not seen as necessary, while, for others who saw it as a route out of poverty, the cost of education was prohibitive. An examination of other

[15] For example, the December 2009 deal between the EU and Latin American countries to significantly cut tariffs on Latin American bananas, ending a 15 year World Trade dispute, took effect in 2010

socio-economic indicators such as household access to toilet facilities, public water supply, lighting from electricity, LPG gas for cooking, television, telephone, computers, internet and vehicle ownership bear out the conclusion that Dennery (as well as other southern community) households are typically lower income with fewer amenities than their counterparts in the north.

UHC implementation will offer the public a guaranteed package of services in hospitals and pharmaceutical services while regional (community) health services and priority health area programmes will remain a core component of the Ministry's work programme and will be funded through the annual budget of the MOH. The intention is to, *inter alia*, increase access to a well defined package of necessary health services, reduce the impact of poverty on access health services and protect the vulnerable. Implementation of UHC will mitigate many of the poverty issues, reducing vulnerability of the already vulnerable, particularly among the poor, women, elderly and children.

Ambient noise and air pollution close to the proposed polyclinic are not considered to be cause for concern. Traffic in the immediate vicinity will not be high as this rural residential area develops. Traffic on the East Coast road is likely to continue to increase, but will remain at moderate levels for some time yet. Traffic noise and traffic-generated air pollution levels may to increase at least slightly, as a result of both national growth in traffic and growth which is more specifically associated with development in the project area and its environs. In the case of air pollutants, it seems unlikely that any future ambient air quality standards would be breached as a result of increased traffic flows along the adjacent roadways.

7.0 IMPACTS, BENEFIT ENHANCEMENT AND MITIGATION MEASURES

7.1 Overview of Impacts and Recommended Measures

Tables 7.1, 7.2 and 7.3 provide a summary and overview of potential direct and indirect, on-site and off-site impacts associated with the project according to the phase (pre-construction, construction, post-construction respectively) in which they may occur. Impacts are subdivided into groups associated with component activities. The benefit enhancement and mitigation measures which will be adopted are also indicated in the tables.

The tables identify:

- Impacts which are unlikely to occur, or are unlikely to be significant, because the nature and scope of works and/or the operational characteristics of the project are such that the causal agents responsible for impact are either absent or are of negligible magnitude, or sensitive receptors do not exist.
- Key beneficial and adverse impacts, classified into those which are of moderate or high significance and are likely to have a major influence on the overall environmental performance of the project.
- Minor beneficial and adverse impacts which are either not significant or are of low significance.

The significance level of potential impacts was assessed subjectively, taking into account such factors as areal extent and/or numbers of separate locations/persons which might be affected, duration, reversibility, likelihood of occurrence and severity, the latter referring to the degree of change from the baseline state and taking into account the value ascribed to the environmental component or components likely to be affected.

Evaluation of potential impact significance is based on the assumption that no specific action will be taken to prevent an impact occurring, or to minimise occurrence. In this respect, the assessment presents a “worst case” scenario.

The key beneficial and adverse impacts are extracted from the tables and summarised in Sections 7.2 and 7.3 respectively. In Section 7.4, proposed enhancement and mitigation measures extracted from the tables are re-organised to facilitate their use by the relevant parties responsible for policy making, polyclinic or access road design, contract preparation or facility management.

As is the case for many construction projects, the number of potentially adverse impacts is far greater than the number of potentially beneficial impacts during the pre-construction and construction phases. This is because a rigorous approach has been taken to impact identification, and also reflects the fact that construction works of the type proposed involve a wide range of activities, many of which are potentially damaging to the environment. The excess of potentially adverse impacts should not

necessarily be construed as indicating that the project is environmentally unacceptable. Conclusions regarding the overall environmental performance of the project are set out in Section 7.5, and take into account residual impacts, assuming full adoption of the specified benefit enhancement and mitigation measures.

In the interest of enhancing overall environmental performance of the project, benefit enhancement and adverse impact mitigation measures have been specified in relation to all significant impacts, even in cases where a low level of impact can be anticipated.

7.2 Pre-Construction Impacts

The actions and impacts discussed in the following Table 7.1 are organised as follows:

1. Occupation of Richfond Health Centre by Dennery Hospital, and combination of Richfond and La Ressource health centre services at La Ressource.

1.1 Low staff morale.

1.2 Reduced availability and quality of care while operating out of temporary health centre facility.

1.3 Inconvenience of travelling to relocated facility in Richfond from Dennery village.

1.4 Inconvenience of travelling to Castries or Vieux Fort to access services that are unavailable at the Richfond facility.

1.5 More convenient access to hospital facilities.

1.6 Less convenient access to hospital facilities.

1.7 Reduced safety for persons crossing the East Coast Road to access the Richfond facility.

2 Execution of site surveys/investigations.

2.1 Creation of public uncertainty in the project area regarding the project and effects it may have on communities, particularly site users and other occupiers close to the project site, arising from the presence of survey and investigation teams.

2.2 Habitat destruction and disturbance to wildlife arising directly and indirectly from the need to cut survey lines and access tracks for site investigations.

3 Land & property acquisition and change of proposed use to accommodate the works.

3.1 Social disruption & financial loss associated with displacement from land which needs to be acquired to accommodate the project works.

3.2 Increased value of adjacent lands.

3.3 Provision of improved public utilities to properties in the vicinity.

3.4 Demand for change of use from residential to medical related and other more polyclinic- compatible use in the adjacent residential areas.

3.5 Stimulation of land speculation, giving rise to higher land prices in the area.

3.6 Stimulation of illegal construction on vacant lands, in order to obtain compensation/relocation fraudulently.

4 Project design and supervision

4.1 Design brief exceeds funding availability.

4.2 Inability of Corporate Planning Unit to manage design, construction and maintenance of new and/or existing plant.

Table 7.1: Anticipated Pre-Construction Impacts and Recommended Impact Mitigation/Benefit Enhancement Measures

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
1. Occupation of Richfond Health Centre by Dennery Hospital, and combination of Richfond and La Ressource health centre services at La Ressource.	1.1 Low staff morale.	Staff to be kept informed of development plans, and how they fit into these presently and in the future. Staff to be consulted regarding detailed planning for the renovations and the new polyclinic. Staff to be continually exposed to training and skills upgrading. Sufficient resources to be made available for polyclinic operations, even in temporary facilities, while planning for new facility is ongoing.				-	At the time of writing, staff had been struggling to operate in an environment that is not designed for Dennery hospital level of operations for more than 1 year. Level of staff (and user) complaints is reportedly high. Staff at both health centre facilities complain of having to work in cramped conditions, resulting in poor levels of service being provided.
	1.2 Reduced availability and quality of care while operating out of temporary health centre facility.	Relocation to renovated Dennery Village facility to be expedited. Schedule of services offered, as well as any changes made to this, to be well publicised across the				-	Most operations were able to resume quite quickly in the temporary facility, after the hurricane. However, services have had to be scaled down, and

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
	1.3 Inconvenience of travelling to relocated facility in Richfond from Dennery village. 1.4 Inconvenience of travelling to Castries or Vieux Fort to access services that are unavailable at the Richfond facility.	area served, and efforts made to strictly adhere to published schedules.					hours of service have been reduced from 24hrs to 12 hrs per day, 7 days per week. Although doctors are on call after hours during the week, there is no way for them to be reached after 7 pm, as the facility is closed. As a result, more people have to seek emergency medical attention in Castries or Vieux Fort, or wait for the following day to go to the temporary Richfond facility. It was recognised that access to medical services had been made particularly difficult for vulnerable persons from Dennery Village, and a basic Saturday clinic was offered for a period. But it was stopped without advising the public. Some persons complain that services at Richfond are also unreliable as they are not sure whether that facility will be open or not. This situation is unacceptable in case of emergency.
	1.5 More convenient access to hospital facilities.			+			The Richfond location is more convenient for persons in that vicinity than the original Dennery Village location, because it is closer to their homes and is located on the East Coast Road, a common bus route.

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
	1.6 Less convenient access to hospital facilities.			▬			The Richfond location is less convenient for persons from Dennery Village than the original Dennery Village location, because it is located well beyond the village, approximately 4 km.
	1.7 Reduced safety for persons crossing the East Coast Road to access the Richfond facility.	A pedestrian crossing, traffic calming device and a bus stop to be constructed at a suitable location in close proximity to the Richfond facility junction, with sidewalk to be constructed from the crossing to the junction.			▬		Persons travelling northwards along the East Coast Road have to cross the Road to access the Richfond facility. The road junction between the East Coast Road and the access road to the Richfond facility is located near a change in vertical road alignment that reduces lines of sight, making crossing the road by pedestrians at that location risky.
2 Execution of site surveys/investigations.	2.1 Creation of public uncertainty in the project area regarding the project and effects it may have on communities, particularly site users and other occupiers close to the project site, arising from the presence of survey and investigation teams.	The Corporate Planning Unit of the MOH to undertake community sensitizations to inform communities within the Region, of plans and proposals, and seek their endorsement of project plans.	▬				No survey work is required for the hospital renovation. The polyclinic site is in a very low profile area, and it is unlikely that the public is aware of the small amount of site investigation that has been conducted to date. There have been no public consultations regarding this site, except for the user survey conducted as part of this EIA.
	2.2 Habitat destruction and disturbance to wildlife arising directly and indirectly from the need to cut survey lines and	Extent of cutting to be minimised, and mature vegetation to be preserved to the extent possible.	▬				No clearing is required for the hospital renovation. The Bois Jolie area is of low floral value, and survey would require little if any habitat

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
	access tracks for site investigations.						destruction given the topography and vegetation.
3 Land & property acquisition and change of proposed use to accommodate the works.	3.1 Social disruption & financial loss associated with displacement from land which needs to be acquired to accommodate the project works.	The renovation works at the Dennery Village hospital site to be designed to accommodate future plans for that property after the transfer to the polyclinic site at Bois Jolie.	-				The hospital renovation site is owned by Government. The Bois Jolie lands are currently under public (NDC) ownership and are not in active use. The proposal to utilise lands in Bois Jolie for a polyclinic are consistent with both NDC and National Vision Plans for the area.
	3.2 Increased value of adjacent lands.	Planning authorities to ensure that development proposals for this area meet requisite standards. Suitable infrastructure (telecommunications, water, road access, power) to be installed to appropriately service the polyclinic and the general area. NDC and DCA to propose/approve appropriate and compatible adjacent land uses.			+		As the proposed mixed use/residential development expands in the Bois Jolie area, the value of these lands will increase in market value, a benefit to the landowner, NDC and other existing owners. Most residents are expected to welcome polyclinic development in close proximity to their homes.
	3.3 Provision of improved public utilities to properties in the vicinity.	Completion of installation of services (power, water, telecommunications) in advance of construction, with the capacity to fully service proposed development in the area.		+			Infrastructure in this area is already at a relatively high standard. New infrastructure installed to service the site and other development envisioned in the Vision Plan will also service the lands in the vicinity. These lands will increase in value, among other things, by virtue of access to improved services that are likely to be maintained to a

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
							high standard because an important health facility is located there.
	3.4 Demand for change of use from residential to medical related and other more polyclinic-compatible use in the adjacent residential areas.	NDC to be approached to designate a number of lots in the vicinity for compatible use (private medical or other public institutional use).			▬		The NDC and Vision Plans call for residential/mixed use in the Bois Jolie area. Medical related use is consistent, particularly with the NDC plan. Because the Dennery community is not very affluent, there is not a large market for private services. The demand from the private sector for such development is therefore not expected to be very high. There may be a demand however for compatible institutional use. There was some discussion of placing a senior citizens home in close proximity.
	3.5 Stimulation of land speculation, giving rise to higher land prices in the area.	Price of lands in this area to be set by NDC to encourage target market to invest. Consideration to be given to restricting amount of land sold to a single owner, or imposing other development conditions on prospective developers.	▬				The Bois Jolie lands are controlled by a State owner (NDC), reducing this risk.
	3.6 Stimulation of illegal construction on vacant lands, in order to obtain compensation/relocation fraudulently.	NDC to continue to police these lands to discourage such activity. Immediate action to be taken by relevant authorities in the event of illegal occupation in this area.		▬			Illegal occupation of lands in this community does not appear to be as prevalent as on other NDC controlled lands (e.g. in Vieux Fort). The adjacent residential

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
							community would be likely to report any illegal activity to the relevant authorities, to protect their own interests.
4 Project design and supervision	4.1 Design brief exceeds funding availability.	Options are to reduce the scope of work, perhaps by phasing it, or to source additional funds, or a combination of these. See Section 5.3 for recommendations for reducing scope. Extensive consultation with the users in the planning of the new polyclinic is desirable notwithstanding the time required to be spent undertaking such an exercise, to ensure flexibility and efficiency in the use of space.				▬	Bids for the renovation at Dennery Village slightly exceed the Architect's estimate. The cost estimate for the polyclinic conceptual design developed in accordance with the design brief significantly exceeds the available funding from the World Bank for this project.
	4.2 Inability of Corporate Planning Unit to manage design, construction and maintenance of new and/or existing plant.	The Corporate Planning Unit Structure to be reviewed in light of present and short term demands on it, and vacant positions to be filled accordingly.			▬		Corporate Planning Unit within the MOH is required to manage maintenance of existing plant as well as supervise the design and construction of new health facilities. Many posts in the Unit structure are not filled, and demands on the Unit are already high, and will increase over the next 3 years, the design/ construction phase of this Dennery polyclinic project.

7.3 Construction Impacts

The actions and impacts discussed in the following Table 7.2 are organised as follows:

1. Procurement of works and supplies.

1.1 Increase in local economic activity.

1.2 Creation of construction employment opportunities for local residents.

2. Workforce deployment

2.1 Development of social friction between the contractor's workforce and local communities.

2.2 Health and safety hazards to the workforce arising from participating in an inherently dangerous occupation.

2.3 Environmental damage caused by the workforce.

2.4 Increase in prostitution and transmission of STDs, arising from the presence of a large residential workforce in base camps.

3 General construction operations.

3.1 Land and water pollution and public health hazards arising from inappropriate/inadequate liquid waste disposal practices and spillages/leakages of contaminating materials at the worksite.

3.2 Land and water pollution, public health hazards and landscape degradation/ reduction in amenity value, arising from inappropriate/ inadequate solid waste disposal practices.

3.3 Increase in snake population on this site.

3.4 Loss of or damage to cultural heritage, arising from execution of the works.

3.5 Competition for scarce water resources with existing users, through consumption for construction purposes.

3.6 Competition with existing users for power supply during construction.

3.7 Competition with existing users for telecommunications services during construction.

3.8 Damage to and interference with public and privately owned services.

3.9 Creation of dust nuisance.

3.10 Creation of noise nuisance and air pollution caused by haulage vehicles/ construction plant and machinery operation.

3.11 Noise and vibration nuisance caused by pile driving for foundations.

3.121Interference with traffic and operations of users of adjacent sites and environs.

3.13 Increased road safety hazards and inconvenience to road users and the general public caused by the construction works interfering with normal traffic flow.

3.14 Hazards associated with roadside storage of construction materials and parking of plant and vehicles.

3.15 Land sterilisation/ reduction in post-construction land use options, adverse roadside or landscape visual impact and public health and safety hazards, arising from inadequate worksite clearance on completion of construction works.

4 Site clearance.

4.1 Increased erosion/ sediment deposition arising from clearance of vegetation.

4.2 Loss of valuable habitat and disturbance to rare or endangered wildlife, and encroachment on protected areas, arising from land clearance.

4.3 Change in hydraulic regimes of nearby watercourses.

4.4 Smoke and odour nuisance and bush fires arising from on-site burning of cleared vegetation, fire damage to surrounding properties/vegetation, water/soil pollution arising from the use of herbicides in vegetation clearance, and damage to property/vegetation arising from excessive clearance of vegetation.

4.5 Noise, vibration & dust nuisance from site clearance.

5 Haulage of construction materials and deployment of heavy plant.

5.1 Damage to existing road pavements and structures caused by overloaded haulage traffic.

5.2 Generation of road safety hazards on haul routes.

6 Earthworks.

6.1 Initiation of instability arising from changes in natural slope geometry, with adverse implications for workforce safety during construction, road safety on the adjacent highway, and major increases in the silt load of drains and watercourses affecting marine and freshwater life.

6.2 Impedance of natural drainage patterns resulting from construction activity across natural drainage lines, giving rise to increased incidence of flooding within the site.

6.3 Increased risk of mosquito breeding within the site.

6.4 Erosion of earthworks resulting in impairment of drainage system function and increased silt loading of watercourses affecting downstream freshwater life forms, and water quality.

7 Concrete works.

7.1 Dust and other air pollution arising from the operation of concrete plant.

7.2 Pollution of watercourses and fish kills, resulting from entry of cement dust, fresh concrete and mixer wash water.

7.3 Depletion of finite non-renewable natural resources.

Table 7.2. Anticipated Construction Impacts and Recommended Impact Mitigation/Benefit Enhancement Measures

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
1. Procurement of works and supplies.	1.1 Increase in local economic activity.	The contract structure is to encourage and maximise participation of local firms, sub-contractors, labourers, suppliers of services and equipment, once these are available and meet requisite standards. Local companies to be eligible for the same tax and duty concessions available to outside suppliers.				+	There is sufficient local capacity to design and develop this project. The local business community would benefit from the opportunity to bid on supply of equipment, materials and services (contractors, service providers) for the establishment and operation of the facility. If locally supplied products meet the standards specified and are

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
							economically priced then there is nothing preventing them from being given orders by the main contractor for the project. Building supplies procured from local companies would have a greater impact on the local economy than supplies procured overseas. To supply specialist equipment, however, local firms may have to align themselves with international suppliers, and this is less likely to be cost effective.
	1.2 Creation of construction employment opportunities for local residents.	The desirability of maximising local employment as a means of contributing to alleviation of local unemployment/underemployment to be emphasised at the pre-tender meeting with contractors, and at the pre-award meeting with the selected contractor. The selected facility design and specifications and contract structure to encourage selection of labour intensive construction methods rather than plant intensive, and maximise participation of local labourers, suppliers of services and equipment, and sub-contractors. Prospective contractors to be provided with the Labour Department's published Employer/Employee Guide.				+	Unemployment in Dennery is quite high,3.5% higher than national rates. New employment opportunities during construction will be created. The impact will depend somewhat on construction methods employed and extent of local contractor participation, but the workforce (including supervisors) is expected to average 35 persons. This is likely to build-up and may peak at a maximum of55 persons and then tail-off as the project comes to a conclusion. Estimated contract duration is approximately 12 to 14 months. After this there will be a twelve month maintenance period (with a minimal workforce) in which defects will be remedied and commissioning of systems

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
							and equipment will take place. Local contractors usually bring in most of their permanent workforce on a daily basis from outside the immediate project area. However, new employment opportunities, mainly for unskilled labourers, watchmen etc, will arise for residents in the immediate area. Unemployment is high in Dennery, so the potential impact is significant. Expatriate contractors will likely bring in senior and middle level staff from outside of St. Lucia.
2. Workforce deployment	2.1 Development of social friction between the contractor's workforce and local communities.	Contract to require assignment of responsibility for dealing with complaints from the general public to a named individual from the site staff, designated Public Liaison Officer, whose name and contact details will be shown on the project signboard. A complaints register to be maintained, which sets out details of the complainant, the nature of the complaint, action taken, and other relevant matters. The register to be open for inspection by the Engineer and Client's Representative. Site security to be continuous, to discourage criminal activity in the area.			▬		In Dennery Village, approach roads are narrow and built up, and any obstruction by construction traffic will be a significant inconvenience to neighbours. At Bois Jolie, interference with access to properties will not be a major issue as long as the East Coast Road and new concrete access road are kept free flowing, and contractor vehicles are not parked on either of these. This is important to facilitate continued free flow on the East Coast Road, and uninterrupted vehicular access to the Bois Jolie residential community beyond and adjacent SDA church. There is potential for conflict with church goers, due to

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
		Site to be lit at night. Vendors not to become established on the public road. Provision to be made within the site and later, within the hospital grounds, to accommodate a number of vendors. Vendor operations to be subject to terms and conditions enshrined in formal agreements. Relevant authorities to ensure that SDA church makes adequate provision for parking, to ensure that there is adequate access for construction traffic and later, for emergency and other traffic to the polyclinic. Adequate provision to be made within the site to ensure that contractor employee vehicles are not parked on the public roadways.					possible noise and dust generated during construction, and competition for parking. Impact of noise and dust will be worsened as the church is located downwind of the prospective site. The proposed Bois Jolie site is large, and there is sufficient unoccupied adjacent space to accommodate all requisite contractor activity without interfering with traffic on adjacent roadways. Contractor/local community disputes concerning real or perceived issues may arise during the construction period. In the interest of good community relations on the part of government and the contractor, these should be taken seriously, and remedial action initiated where this is appropriate. Vending from the public road should be prevented, as it will be difficult to remove such persons once the hospital is operational.
	2.2 Health and safety hazards to the workforce arising from participating in an inherently dangerous occupation.	Works contract to assign the contractor full responsibility for the adequacy, stability and safety of all operations and methods of construction; to require the contractor to have full regard for the safety of all persons entitled to				▬	Construction is a relatively dangerous occupation and accidents will undoubtedly occur. Some contractors, unless they are properly managed, pay little attention to worker health and safety. Dennery is more or less

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
		be on the site; to require the contractor to keep the site and works in an orderly state appropriate to avoidance of dangers. Works Contract to specify that the standards and guidelines regarding health and safety shall be the Factories Regulations (Cap 106 of 1948), Employees (Occupational Health and Safety) Act (No. 10 of 1985) and the draft Labour Code. Works Contract to require that the contractor designate a senior member of his site staff, with an approved qualification in Health & Safety, as Health and Safety Officer with the responsibility to ensure that all workforce health and safety matters are properly and fully addressed, including workforce training, continuous assessment of health and safety issues. A deputy is also to be designated by the Contractor to act during temporary absences of the Health and Safety Officer from the site. Contract to require the contractor's method statements to be accompanied by a Health and Safety Plan, for approval of the Engineer, and all activities to be conducted in accordance with the					equidistant from the 2 hospitals capable of treating major accident victims, and such cases will have to be taken there. The Polyclinic at Richfond, and then the renovated facility at Dennery Village, will be able to treat minor cases, or stabilise more serious cases for transfer. Snake bite is not likely on this site as it is not known for Fer de Lance, however, it is a possibility. Ambulance services are inadequate as there is only one ambulance at Dennery Fire Station, and this serves the whole region between Castries and Micoud. It is possible for it to be occupied (possibly on a non-emergency call) in the event of a site emergency, and therefore unavailable. In such a case, Micoud ambulance would have to be called. The old hospital building to be demolished at Dennery Village has an asbestos roof in poor condition. Removal of this must be done using appropriate precautions to protect workers and nearby residents from asbestos fibre inhalation.

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
		Plan. Labour department to be requested to review the Health and safety plan provided by the Contractor. Specialist advice is to be procured and abided by, for the removal of the asbestos roof at Dennery Village. Contract to require provision of adequate on-site first aid facilities with qualified first-aiders, together with approved evacuation plans/procedures for seriously injured persons. Contract to require provision of protective helmets, safety boots, protective clothing, gloves, ear mufflers, dust masks, shower facilities and enclosures appropriate for worker decontamination, etc, appropriate to the activities being undertaken by the workforce, and make it a condition of employment that these are worn when appropriate. Contract to require the contractor to provide lights, guards, fencing, signage etc for protection of the works or for the safety and convenience of the public or others. Contractor to be required to carry the specified insurances. Accidents to be promptly reported to the Labour Department and					

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
		requisite procedures followed. Near misses to be recorded by the Health and Safety Officer, and a training programme designed to mitigate these. MOH to ensure that there is an adequate stock of anti-venom at both general hospitals.					
	2.3 Environmental damage caused by the workforce.	Contract to require the contractor to take all reasonable steps to protect the environment on- and off-site, and to avoid damage or nuisance to persons or property arising from pollution, noise or other issues arising as a consequence of his methods of operation. Contract to give the Engineer the authority to order immediate suspension or a halt to any activity which is causing, or is likely to cause significant environmental damage, and to require the contractor to make good any such damage at his own expense, in accordance with the instructions of the Engineer. The Engineer also to have the power to require the immediate and permanent dismissal from site of any member of the workforce who is committing or has committed acts prejudicial to the environment including trapping or killing of any wildlife (except vermin),		▬			This areas are both of relatively low ecological value, and not immediately adjacent to a major watercourse. The soil in this area drains poorly. The Dennery Village site is within a densely developed area. The Bois Jolie site is located within a large, undeveloped area and the proportion of affected lands is small.

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
		unsanctioned felling of trees, theft or interference with property, washing of tools in waterways and offensive behavior.					
	2.4 Increase in prostitution and transmission of STDs, arising from the presence of a large residential workforce in base camps.	Not applicable (see comment).	▬				Incidence of AIDS/HIV in particular is an increasing problem, and is often associated with construction workers based away from home. This is unlikely to be a significant issue in this project as there is not expected to be any residential labour camps. Most of the workforce will be local, possibly transported by the contractor from outside the immediate project area on a daily basis, with the remainder living at home nearby.
3 General construction operations.	3.1 Land and water pollution and public health hazards arising from inappropriate/inadequate liquid waste disposal practices and spillages/leakages of contaminating materials at the worksite.	Contract to require all necessary precautions to be taken by the contractor to prevent land and water pollution, make the contractor responsible at his own cost for taking immediate remedial action and payment of compensation for any environmental damage resulting from his actions. Location of chemical and gas storage within the worksite to be approved by the Engineer. Information of chemical locations, contents, appropriate emergency response and other details to be readily accessible to site			▬		Sanitary arrangements, fuel storage/refuelling and plant/vehicle servicing areas have the greatest potential for causing land and water pollution, and contractors' site pollution controls are often inadequate. There are no significant watercourses within or on the boundary of the site. A seasonal watercourse is located on the sites proposed north eastern boundary. The coastal area beyond is proposed to be part of a marine protected area under the draft Systems Plan. Adjacent coastal areas are used extensively for

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
		management and at a specified location offsite, in the event of spill or injury. Procedures in the handling of chemicals or other hazardous material and in event of emergency to be clearly posted on the container(s). Contract to require the provision of adequate non-polluting worksite sanitary facilities, and prohibit the use of worksite pit latrines. Contract to require adoption of pollution prevention measures relating to fuel and oil storage/ dispensing arrangements, to prohibit other than emergency maintenance of equipment and vehicles on the site, and require usage of spillage trays during on-site refuelling of minor equipment. Contract to require waste oils arising from servicing of construction equipment to be disposed of at an appropriate recycling facility, accepted as such by the SWMA. Contract to prohibit washing of vehicles, plant and tools in or adjacent to any watercourse, whether seasonal or not. All washing to be carried out at designated areas within the work site which have been approved by the Engineer, and these are to be					fishing. Groundwater resources are not significant vis a vis public water supply, but localised contamination which affects water quality must be considered a moderate risk, in view of the costs and difficulties associated with post-contamination remedial action. Localised land contamination is undesirable, particularly in view of the future use of this site as an important health facility.

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
		provided with oil/grease traps.					
	3.2 Land and water pollution, public health hazards and landscape degradation/ reduction in amenity value, arising from inappropriate/ inadequate solid waste disposal practices.	Contract to require all necessary precautions to be taken by the contractor to prevent land and water pollution, make the contractor responsible at his own cost for taking immediate remedial action and payment of compensation for any environmental damage resulting from his actions. Contractor to abide by the provision of the Waste Management Act of 2004, the Litter Act of 1983 and its amendments (1985 and 1993), and the Public Health Act and Regulations of 1975. Solid waste not to be permitted to enter the drainage channels. Engineer to have the power to require the immediate and permanent dismissal from site of any member of the workforce who is committing or has committed acts prejudicial to the environment. Contract to require the provision of adequate non-polluting worksite sanitary facilities, including provision of sufficient number of adequate waste receptacles at suitable locations across the site and regular collection services provided by a licensed collector. If contractor is hauling his own		▬			The roadway verges in this community are well maintained, and litter and garbage are not evident. Contractors' waste storage and disposal arrangements are often inadequate. Fly tipping of construction wastes is a problem in undeveloped areas across much of St. Lucia, and contractors may dump excavated material, spoil and other wastes at the side of the road or tip it down slopes or into watercourses, and onto unoccupied land. There will be significant cut and fill at the Bois Jolie site, potentially generating large quantities of various forms of waste, including vegetative material from land clearance, excavated soil materials from bench and foundation construction and grading of land (where this material is unsuitable for use as fill elsewhere in the works). SWMA accept construction waste at the commercial rate at both the Deglos and Vieux Fort Disposal Sites, but encourage it's minimisation. Green waste quantities are expected to be small.

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
		waste, legislated requirements for proper containment of the waste must be observed, and disposal must be to an approved location. Contractor to be encouraged to separate green waste for composting by himself or at one of the disposal sites. Soil/spoil should be kept separate from other construction waste, reused where possible, or taken to one of the SWM Disposal Sites.					
	3.3 Increase in snake population on this site.	Rodent population to be controlled during construction by properly managing waste as described in Section 3.2above, particularly food waste, as rodents attract snakes. Cleared wood and brush to be removed from the site immediately.			-		This area is known for Boa Constrictors but not Fer de Lance. There is a tendency for persons to kill all snakes, whether or not they are poisonous. This is discouraged by the Forestry Department.
	3.4 Loss of or damage to cultural heritage, arising from execution of the works.	The contract to require the contractor to take all reasonable precautions to prevent removal of or damage to articles of antiquity etc arising from accidental discoveries of such on the site, for such finds to be reported immediately to the Engineer, and for them to be dealt with in accordance with the instructions of the Engineer. The Engineer to report any discoveries to the St. Lucia National Trust. In the event that the	-				All works will be within existing building footprints at Dennery Village. Given the secondary nature of the vegetation across most of the Bois Jolie site, it is concluded that these lands were under cultivation in the past. There was no surficial evidence found by Heritage Consultant Robert Devaux (see Appendix 9 for his report) or any significant archaeological value at either site.

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
		Trust fails to advise the Engineer of an appropriate course of action within 48 hours of receiving notification of discoveries, the Engineer to use his discretion in instructing the contractor how to proceed.					
	3.5 Competition for scarce water resources with existing users, through consumption for construction purposes.	WASCO to be provided with a programme and estimates of water supply requirements for construction and post construction purposes at this design stage, so that appropriate provisions can be made (and costed) without adversely affecting adjacent community supplies, and a provisional sum for connection to water supply allowed for in the contract. Contractor to arrange for all connections (temporary and permanent) to the water supply. In the event the contractor is likely to exceed the demand estimates significantly, he is to be required to consult with WASCO, so that a mutually agreeable solution may be arrived at, and the impact on the adjacent community water supplies minimised. Contractor to be required to conserve water. Contractor to install sufficient water storage on site.			▬		Significant quantities of water are likely to be needed for construction purposes especially if there is in-situ concrete production, and for dust suppression. However, the construction demand will be significantly lower than the estimated operational demand. Abstraction from watercourses is not expected to be a feature of the contractor's methodology as there are no large watercourses in the vicinity, and water quality will have to be rigorously controlled for construction purposes. Contractors in St. Lucia generally use WASCO piped supplies. There has been preliminary consultation with WASCO concerning provision of a water supply for construction purposes. Infrastructure to service the Dennery Village site is already in place. There is a pipe borne potable water supply in Bois Jolie, on the nearby concrete road (4"

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
		Government to ensure that WASCO has adequate resources to develop requisite water supplies to meet future needs in this region.					pipe on south side of concrete road), but water supply in this community is unreliable year round. Most residences in the area have on-site water storage. Development of improved water treatment at the WASCO Dennery water treatment plant will alleviate some of the rainy season issues, as the new plant is better able to treat turbid raw water supplies. Supplementary sources of raw water need to be developed to supply this community to alleviate the dry season issues. This will be even more critical as and when vision plans materialise, and demands increase. Water conservation efforts by the contractor will be important in view of the limited water supply.
	3.6 Competition with existing users for power supply during construction.	LUCELEC to be provided with estimates and programme of power supply requirements for construction and post construction purposes at the design stage, so that appropriate provisions can be made (and costed) and a provisional sum for connection to power supply allowed for in the contract. The contractor to arrange for all connections (temporary and permanent) to the power supply.			▬		LUCELEC assures that their system capacity is adequate to meet anticipated construction requirements along with existing community requirements, and that options to increase generation capacity via a plant at Derriere Morne, Vieux Fort are under review. A plant should be commissioned there within 2013/14. This will increase national generating capacity.

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
		In the event the contractor is likely to exceed the pre-construction demand estimates significantly, he is to be required to consult with LUCELEC, so that the impact on the adjacent community can be minimised.					
	3.7 Competition with existing users for telecommunications services during construction.	Cable and Wireless Ltd and Karib Cable to be provided with details of telecoms requirements and design proposals for construction and post construction purposes at the design stage, so that options for these services can be evaluated, the best value (cost, desirable features, reliability) service selected, appropriate provisions can be made (and costed) and a provisional sum for connections allowed for in the contract.		-			Cable and Wireless Ltd/LIME assures that their system capacity is more than adequate to meet existing community requirements along with anticipated construction/ operations requirements. LIME infrastructure runs along the East Coast Road and the new concrete access road in Bois Jolie. The Dennery Village site service simple needs to be reinstated. Karib Cable also has infrastructure in this area, and offers the same fixed line services as LIME. If facility designers collaborate with LIME and other telecoms providers at the design stage, capital and operational costs for telecoms infrastructure can be significantly reduced. LIME and Digicel both offer cellular phone service in this area.
	3.8 Damage to and interference with public and privately owned services.	Designers to clearly show location of all services within and in the vicinity of the sites. These should be identified in collaboration with			-		All services were within the Dennery Village site. There are no services currently located within or on the boundary of the Bois Jolie

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
		the service providers. Contract to require contractors to locate and flag all services within or on the site boundary, to avoid unnecessary damage to these. Contract to require all reasonable precautions to be taken by the contractor to protect services during construction and to require any damage arising from the contractor's operations to be repaired and reinstated forthwith by the contractor (or the authority concerned), at the expense of the contractor, unless he can demonstrate that such damage could not have been foreseen.					site. There are services within the nearby Bois Jolie concrete road reserve boundaries (telecommunications, water and 11 kVA power lines above ground). Interruptions to all these services should be avoided to avoid public inconvenience due to discontinuity of service, traffic disruption in the area of damage, and possible adverse public health impacts.
	3.9 Creation of dust nuisance.	Contract to require the contractor to take all reasonable steps to protect the environment on- and off-site, and to avoid damage or nuisance to persons or property arising from pollution, noise or other causes arising as a consequence of his methods of operation. Contract to require appropriate measures to be taken to minimise dust generation including regular watering of works sections where dust is likely to cause nuisance, aggregate and soil stockpiles, and the adoption of site clearance procedures which minimise dust generation.			▬		Dust caused by the operation of contractors' equipment and construction, and transfer of soil from the site to the road surface on the wheels/tracks of equipment, is a major source of annoyance to road users. Contractors generally take little or no action to minimise dust nuisance within their worksite or on adjacent roads. The Dennery Village site is surrounded by residents, so impacts in that area are potentially significant. In Bois Jolie, there are no residents immediately downwind (prevailing winds), but the SDA

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
		Contract to require that all material to be stockpiled within the worksite and public roads to be kept clean and free of mud, soil and other materials, and to authorise the Engineer to make other arrangements to have work done at the contractor's expense, should the contractor fail to undertake prompt dust abatement measures. Contract to forbid stockpiling of material along the roadway. Stockpiling of materials at any other site must be pre-approved by the Engineer and other statutory authorities, and contractual conditions applying to the care and maintenance of the worksite should apply to any other site in use by the contractor.					church is there, so dust generation could be a major problem for church users. Services are held on Wednesdays, Saturdays and Sundays.
	3.10 Creation of noise nuisance and air pollution caused by haulage vehicles/ construction plant and machinery operation.	Contract to require the contractor to take all reasonable steps to protect the environment on- and off-site, and to avoid damage or nuisance to persons or property arising from pollution, noise or other causes arising as a consequence of his methods of operation. Where construction activities take place outside the hours of 7am to 7pm, the Engineer shall have the discretion to require appropriate measures to be adopted by the contractor to reduce noise levels.			▬		Air pollution is not expected to be a major problem in Bois Jolie in view of the predominantly rural setting of the site, the absence of neighbours, its exposed location, and the relatively constant and high wind speeds experienced in the project area. This will be more of an issue at Dennery Village because that area is surrounded by residences. Plant noise does not usually give rise to significant nuisance, except in the case of pile driving (at this

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
		Contract to require all vehicles to be maintained in accordance with the manufacturer's original specifications and to give the Engineer powers to require immediate rectification, or the immediate removal from site for repair or maintenance, of any vehicles/plant/machinery which emit undue smoke or noise. At Bois Jolie, Contractor to be required to limit activities that generate excessive noise, during church services.					stage, piling is considered unlikely to be necessary). However, many contractors' haulage vehicles emit undue smoke and noise, and may give rise to nuisance to those who live close to the roadway along haul routes.
	3.11 Noise and vibration nuisance caused by pile driving for foundations.	Contract to require the contractor to take all reasonable steps to protect the environment on- and off-site, and to avoid damage or nuisance to persons or property arising from pollution, noise or other causes arising as a consequence of his methods of operation. Contract to require all activities to be conducted in a manner which minimises nuisance to the general public and occupiers of premises in the vicinity of the site. Where construction activities take place outside the hours of 7am to 7pm, the Engineer shall have the discretion to require appropriate measures to be adopted by the contractor to reduce noise levels.	▬				Piling will not occur at Dennery Village, and is highly unlikely at Bois Jolie.

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
	3.121Interference with traffic and operations of users of adjacent sites and environs.	Noise, dust and air pollution to be mitigated to extent possible, as described above. Access roads to be kept free and clear. Contract to require all operations to be carried out so as not to interfere unnecessarily or improperly with the convenience of the public, or access to and use and occupation of public or private roads, footpaths and properties. Relevant authorities to require church to develop onsite parking. No parking to be effected along the concrete roadway from the junction with the East Coast road up to the church.			▬		The public access roads to the Dennery Village site are narrow, steep and built up on either side. The public roadway (East Coast road and concrete access road) to Bois Jolie is adequate to accommodate traffic related to all sites operating in the vicinity. Traffic levels at the Church are relatively high when services are offered, three times weekly. Church goers presently park on the concrete road as the church has no car park.
	3.13 Increased road safety hazards and inconvenience to road users and the general public caused by the construction works interfering with normal traffic flow.	Authorities to limit parking during working hours on approach roads to the Dennery Hospital, for the construction period and beyond. Contract to require that at all times, the contractor shall take care to protect the public and facilitate the uninterrupted flow of traffic during his operations and use of construction plant. Contract to require appropriate signage(designs approved by the Transport Board) to be placed on either side of the junction between Bois Jolie and the East Coast to alert other road users to the			▬		Contractors often pay little attention to the disruption caused by their activities. The adjacent East Coast Road does not convey high traffic volumes but traffic does tend to be high speed along this straight, good riding quality section of roadway, so that obstructions should be avoided to minimise potential safety risk to vehicles, pedestrians and the workforce.

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
		possibility of slow construction traffic/heavy equipment crossing lanes, etc.					
	3.14 Hazards associated with roadside storage of construction materials and parking of plant and vehicles.	Contract to require the contractor to advise the Engineer of his proposed arrangements for the temporary storage of construction materials and wastes within the worksite. Parking areas for employees' private vehicles to be located within the worksite, in approved areas. No parking or stockpiling of materials to be allowed along the public roadway. Stockpiles on sites other than the worksite to be subject to the approval of the Engineer and other relevant authorities and to be managed (care and maintenance) as if they were within the worksite. No materials shall be stored so that they encroach on, or in any way adversely affect operation of, sections of roadway and sidewalks which are in use by the public, impede access to premises or side roads and tracks, or result in siltation or blockage of drains.		▬			Contractors commonly store construction materials temporarily at the roadside and make little or no provision for preventing encroachment on the carriageway or footpaths, causing inconvenience/hazard to road users and pedestrians. Plant is often left overnight close to road margins with no lighting or warning signs, and during the day, workforce vehicles and construction plant are often parked with little consideration for the convenience and safety of road users. These sites are sufficiently spacious and there should be no need to use roadsides for storage or parking.
	3.15 Land sterilisation/ reduction in post-construction land use options, adverse roadside or landscape visual impact	The contract to require that, on the issue of a Taking-Over Certificate, the contractor shall clear away and remove from the site all equipment, surplus material, rubbish and		▬			Contractors do not always clean up worksites adequately, and the Engineer must ensure that they comply with their contractual requirements.

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
	and public health and safety hazards, arising from inadequate worksite clearance on completion of construction works.	temporary works, and shall leave the site in a clean and workmanlike condition to the satisfaction of the Engineer. Lands beyond the boundaries of the worksite are not to be used by the Contractor for any purpose, unless he has the pre-approval of the Engineer, owner and other statutory authorities. In the event other lands are affected, the conditions stipulated in the Taking Over Certificate should also apply to these.					
4 Site clearance.	4.1 Increased erosion/ sediment deposition arising from clearance of vegetation.	Landscaping design to preserve as much of the natural vegetation and tree cover as possible, to reduce on extent of cleared areas, particularly in the areas of secondary use. Designer to identify all trees to be retained within the site on the site plans. Contract to require Contractor to mark all trees to be retained. Contract to require contractor to take all reasonable steps to minimise erosion and siltation. Contractor to clear areas just in advance of construction, to minimise length of exposure of cleared areas. Contractor to be required to re-vegetate cleared areas within 2			▬		Vegetation clearance will be necessary within the building footprints, parking area and access roads, and for general site clearance and grading. The soils on the worksite will become more susceptible to erosion when disturbed by construction works, and rainfall intensities are high. Unless suitable control measures are adopted, significant erosion of cleared areas is likely.

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
		weeks of clearance.					
	4.2 Loss of valuable habitat and disturbance to rare or endangered wildlife, and encroachment on protected areas, arising from land clearance.	Designer/Contractor to minimise the clearing of trees in the area, as recommended by both the Botanist and wildlife Specialist. Designer to develop appropriate drainage and landscaping plan. Designer to provide for establishment of a buffer strip between the polyclinic and remaining dry forest vegetation, as per wildlife specialist recommendation.		▬			The vegetation on both sites is secondary, and there is no rare or endangered wildlife at either site. Neither site is within protected areas. Work on this site will not affect nearby proposed protected areas. The Botanist's report indicated that there is little of floristic interest at this site (See Appendix 5). The report of the wildlife expert (See Appendix 6) indicated that habitats found on the site are not significant and are not considered to be biodiversity hotspots.
	4.3 Change in hydraulic regimes of nearby watercourses.	Designs to minimize extent of lands to be cleared, and provide for silt traps/curtains for surface water entering drainage channels. Existing drainage channels to be kept clear during site clearance and earthworks. Drainage plans to be constructed early in construction phase, to facilitate improved site drainage.	▬				Hydraulic regime is not expected to be significantly affected, as runoff from the site is not expected to be increased to the extent that it would have such an effect. The total site area will measure no more than 5 acres, and the building footprint will be much smaller.
	4.4 Smoke and odour nuisance and bush fires arising from on-site burning of cleared vegetation, fire damage to surrounding properties/vegetation, water/soil pollution arising	Contract to prohibit burning or burial as a means of cleared vegetation disposal - all such material having to be disposed of at the SWMA waste disposal site or composted on site. Contract to prohibit the use of herbicides in vegetation clearance		▬			Moderate quantities of vegetative matter will arise from land clearance. The possibility of causing smoke and/or odour nuisance, particularly to SDA church goers and the small number of Bois Jolie residents in close proximity is

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
	from the use of herbicides in vegetation clearance, and damage to property/vegetation arising from excessive clearance of vegetation.	or suppression of re-growth. Contract to limit extent of site clearance as described above.					high. The potential for incidental fire damage to vegetation on adjacent property during burning operations is moderate, higher in the dry season, in view of the consistently high wind speeds experienced in the area. Bush fires result in significant fire damage to natural vegetation in many areas of the country during the dry season. Disposal by burning on-site is therefore not acceptable. The use of herbicides in vegetation clearance is unacceptable in view of the risks of watercourse pollution, health hazards to spray operators, especially if they are unprotected and untrained, and of collateral damage to neighbouring vegetation if spray drift occurs as a result of high wind speeds. Excess clearance of vegetation beyond that necessary to accommodate the works and to provide adequate working space is a not-uncommon feature on construction sites, and can result in the unnecessary loss of mature trees. If limited space or expertise precludes the contractor from composting on site, SWMA waste

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
							disposal site will accept vegetative wastes, at the commercial rate.
	4.5 Noise, vibration & dust nuisance from site clearance.	Contract to require the contractor to take all reasonable steps to protect the environment on- and off-site, and to avoid damage or nuisance to persons or property arising from pollution, noise or other causes arising as a consequence of his methods of operation. Contract to require all activities to be conducted in a manner which minimises nuisance to the general public including adjacent road users and occupiers of premises in close proximity to the site. Contract to require use of clearance methods which minimise dust generation. Where construction activities take place outside the hours of 7am to 7pm, the Engineer shall have the discretion to require appropriate measures to be adopted by the contractor to reduce noise levels.		-			Site clearance will be necessary as described above. The potential for dust nuisance is highest for the church immediately adjacent to and downwind of the site. Nuisance for residents is low as there are few houses located nearby.
5 Haulage of construction materials and deployment of heavy plant.	5.1 Damage to existing road pavements and structures caused by overloaded haulage traffic.	Contract to require the contractor to adopt every reasonable means to prevent damage to roads or bridges on routes to the site by his (or his subcontractors') traffic. Contract to make the contractor responsible for the cost of reinstatement of pavement or structures which have been			-		Significant volumes of construction materials and construction wastes of various types will have to be hauled on public roads. Overloading of contractors' vehicles and heavy, tracked equipment riding on pavement surfaces can contribute significantly to pavement damage.

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
		damaged by his (or his subcontractors') haulage traffic. Contract to require all haulage to be carried out using vehicles of types and capacities appropriate to task and to require compliance with gross vehicle weight restrictions imposed by vehicle licensing authorities and all laws and regulations pertaining to vehicle use on public roads. Contract to require tracked equipment to be transported to site on appropriate transporters, and not to track directly on the road pavement.					
	5.2 Generation of road safety hazards on haul routes.	Contract to require all operations to be carried out so as not to interfere unnecessarily or improperly with the convenience of the public, or access to and use and occupation of public or private roads and properties. Contract to require load sheets to be used when material susceptible to fugitive dust is hauled on public roads, all tailgates and dropsides to be properly secured, no overloading of loose materials above truck sides, and all loads to be properly secured. Contract to require compliance with speed restrictions imposed by the relevant authorities.			▬		All haulage of construction materials and wastes will be on public roads. Loaded construction traffic moves slowly and can cause congestion. Overloading constitutes a road safety hazard. Conversely, unladen traffic often travels quickly, increasing the risk of accidents involving other vehicles and pedestrians. Deposition of soil on public roads from tracks and tyres, or spillage from overloaded trays, where plant and vehicles leave construction sites and borrow or quarry areas, can increase the risk of skidding under wet conditions and dust nuisance under dry conditions.

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
		Contract to require all haulage to be carried out using vehicles of types and capacities appropriate to task and to require compliance with gross vehicle weight restrictions imposed by vehicle licensing authorities and all laws and regulations pertaining to vehicle use on public roads. Contract to require particular care to be taken to ensure that concrete mix trucks and fuel tankers are loaded and driven in a manner which does not result in spillage, and makes the contractor responsible, at his own cost, for cleaning up spillages or shed loads without undue delay. Contract to require public roads which have material deposited on them as a result of the contractor's activities, to be kept clean and free of mud, soil and other materials.					
6 Earthworks.	6.1 Initiation of instability arising from changes in natural slope geometry, with adverse implications for workforce safety during construction, road safety on the adjacent highway, and major increases in the silt load of drains and watercourses affecting	Designer to provide for retaining backslopes of benches in between buildings. In other areas backslopes to be cut to stable angles, and re-vegetated with appropriate drainage. The contract to assign the contractor full responsibility for the adequacy, stability and safety of all operations and methods of				▬	Slope instability is an inherent feature of the landscape within the project areas as these are sloping sites. There will be no change in slopes at the Dennery Village site. At Bois Jolie, the site will be benched, with bench heights ~3m. Excavated faces between the buildings will be supported with retaining walls.

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
	marine and freshwater life.	construction, as well as to have full regard for the safety of all persons entitled to be on the site and to keep the site and works in an orderly state appropriate to avoidance of dangers. Contract to require construction to be carried out such as not to promote instability during construction. Contractor to be required to submit for the approval of the Engineer, prior to commencement of excavation works, a method statement and detailed plan setting out precisely how the works are to be implemented, the specific measures which will be taken to minimise instability during construction (including details of any temporary works), and the emergency procedures to be adopted in the event of instability developing. All works to be carried out in accordance with the approved plans. Contractor's method statements to provide full details of siltation suppression measures. Contract to require battering back or shoring of excavation sides. Contract to require effective measures to be taken to minimise					Soil on the upper part of the site does not drain well and is prone to seasonal water logging. Soil at lower elevations of the site is thin and rocky.

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
		silt increase in waterways, such as use of silt traps, silt curtains, rapid re-vegetation, etc.					
	6.2 Impedance of natural drainage patterns resulting from construction activity across natural drainage lines, giving rise to increased incidence of flooding within the site. 6.3 Increased risk of mosquito breeding within the site. 6.4 Erosion of earthworks resulting in impairment of drainage system function and increased silt loading of watercourses affecting downstream freshwater life forms, and water quality.	Contract to require contractor to take all reasonable steps to minimise erosion, siltation and incidence of standing water. Contract to require exposed surfaces to be landscaped or otherwise protected against erosion with minimum delay, and to set out requirements concerning establishment and maintenance of effective vegetative cover. Contract to require adequate precautions to be taken during earthworks to prevent soil material entering or blocking drainage channels and natural watercourses. Contract to require early construction and continuous maintenance of site drainage plans.			▬		At Bois Jolie, there is roadside drainage on the concrete access road as well as natural seasonal watercourses within and on the site boundary. Any imported top soil (if any) is likely to be highly erodible, especially as this is a sloping site. Rainfall intensities can be high and can give rise to significant erosion and sediment deposition problems unless suitable control measures are adopted. Dengue Fever, transmitted by the mosquito, is often a threat in St. Lucia.
7 Concrete works.	7.1 Dust and other air pollution arising from the operation of concrete plant.	Contract to require all moveable plant to be fitted with effective dust suppression equipment and to be operated and maintained in accordance with the manufacturer's manuals. Contractor to obtain all necessary permits and approvals from the relevant authorities before operation of such plant commences. In the event of concrete being supplied by a sub-contractor, the		▬			It is not known at this stage of the planning to what extent concrete will be used, and to what extent it will be mixed *in situ.* However, concerns relating to dust cited earlier also apply here.

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
		contract to require the contractor to demonstrate to the satisfaction of the Engineer, that the plant operator is in possession of all necessary permits, authorisations etc and is in compliance with any conditions imposed by the relevant authorities, when seeking approval of material sources.					
	7.2 Pollution of watercourses and fish kills, resulting from entry of cement dust, fresh concrete and mixer wash water.	Contractor to mix concrete in mixing bays constructed for that purpose, to contain cement dust, fresh concrete, lime and petroleum products so that these do not pollute water bodies.	▬				Cement dust, fresh concrete and mixer wash water can give rise to significant pollution of watercourses and major fish kills. There are no significant watercourses immediately adjacent to this site, and contamination of watercourses is unlikely, even if concrete will be mixed on site.
	7.3 Depletion of finite non-renewable natural resources.		▬				Project requirements for coarse and fine aggregates will be moderate. Most fine aggregate used in Saint Lucia is imported from within the region. Demand for coarse aggregate and crushed stone is typically met locally, but this is expected to result in a marginal impact in terms of resource depletion, in view of the quantities needed.

7.4 Post-Construction Impacts

The actions and impacts discussed in the following Table 7.2 are organised as follows:

1 New polyclinic operating from a new site in Dennery within a reformed health sector.

1.1 Upgraded health services available to the public from a new, modern facility.

1.2 Better organization of health services and improved quality of care, resulting in a reduction in incidence of disease, and increased survival rates.

1.3 Modern polyclinic with more efficient layout and adjacencies, in an environment more conducive to healing.

1.4 Improved infectious disease control.

1.5 Inefficient observation room design.

1.6 Improved patient comfort and safety.

1.7 Improved staff facilities.

1.8 Compliance with national standards in health care.

1.9 Introduction or expansion of new specialities.

1.10 Improved occupational health and safety within the Dennery polyclinic facility.

1.11 Increased cost of transportation to facility.

1.12 Reduced cost of transportation to facility.

1.13 Increased demand on ambulance services.

1.14 Increased costs of national health care.

1.15 Susceptibility of facility and equipment to high winds and sea blast.

1.16 Reduced equipment performance and life due to highly saline environment.

1.17 Increase in noise levels emanating from the hospital, affecting properties adjacent to the hospital.

1.18 Increase in noise level emanating from increased traffic on the adjacent roadway, affecting the hospital.

1.19 Noise from the church during services.

1.20 Increase in air pollution from road traffic.

1.21 Mosquito infestation, particularly after rains.

1.22 Roosting of native bats within the hospital building.

1.23 Infestation of the area with snakes.

1.24 Wildfire spread to or from this area.

1.25 Improved rodent control

1.26 Poor or intermittent service from public utilities.

1.27 Waste water discharge into the environment.

1.28 More efficient use of public utilities.

1.29 Improved medical and other equipment performance and longevity.

1.30 Increase in local and national employment opportunities.

1.31 Loss of income to bus drivers, vendors and shopkeepers in Dennery Village.

1.32 Inconvenience to workers due to change of location.

1.33 Illegal occupation of adjacent underutilised lands.

1.34 Occupation of road reserves in the vicinity by vendors.

1.35 Diminished aesthetics and amenity value as a result of an institutional building within an undeveloped area.

1.36 Improved hospital security.

1.37 Possible leakage or explosion of fuel or medical gas stored on site.

1.38 Increased biomedical waste generation.

1.39 Improved solid waste management.

1.40 Pollution arising from site run-off.

1.41 Improved drainage of site.

1.42 Social friction between hospital users and the adjacent communities.

2 Dennery polyclinic to be part of integrated national health services, with inter and intranet services.

2.1 Reduced volume of paper consumed.

2.2 More efficient communication between, and access to information by, the various health service providers, regardless of physical location, resulting in more effective patient care.

2.3 Improved access to and use of real time data and information.

3 New, modern equipment procured for use in the new general hospital.

3.1 An incremental improvement in technology, resulting in improved access, and improved quality of public health service available to the community served.

4 Decommissioning of hospital services at Richfond Health Centre/ Commissioning of renovated Dennery Hospital/ Decommissioning of renovated Dennery hospital / Commissioning of Dennery polyclinic at Bois Jolie.

4.1 Organisationally, new protocols and a new/ improved structure should prompt improvements in quality of service offered at the new/improved facilities.

4.2 Cost and inconvenience incurred by need to relocate to new/ renovated premises.

4.3 Under/inappropriate utilisation of the recently renovated Dennery Village site.

4.4 Reinstatement of Richfond and La Ressource health centre operations.

5 Development on adjacent lands.

5.1 Incompatible future new development in the vicinity.

6 Increased vehicular and pedestrian traffic off the East Coast Road into Bois Jolie.

6.1 Reduced effectiveness of the East Coast roadway as a result of increased traffic, including pedestrian traffic.

6.2 Improved, more efficient access to hospital facilities by the public and emergency vehicles.

6.3 Road safety hazard to pedestrians trying to cross a high speed roadway.

6.4 Improved national emergency medical service (NEMS) to resuscitate and move people more quickly.

7 Use of hospital under national emergency conditions.

7.1 Loss or reduction of use of hospital as a result of damage incurred to the hospital during the national emergency.

7.2 Temporary increase in local traffic, in particular ambulances.

7.3 Increase in noise levels.

7.4 Loss of utilities and services in aftermath of disaster.

8 Use of adjacent open spaces as an evacuation site.

8.1 Possible conflict with adjacent community.

Table 7.3. Anticipated Post-Construction Impacts and Recommended Impact Mitigation/Benefit Enhancement Measures

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
1 New polyclinic operating from a new site in Dennery within a reformed health sector.	1.1 Upgraded health services available to the public from a new, modern facility.	Services to be offered at the new Dennery polyclinic to complement those offered at the new general hospital in Castries, the renovated SJH, and the upgraded health centres across Saint Lucia. Relationships between these				+	The new general hospital under construction in Castries was designed as a modern, 21st century national facility with new technology and efficient layout to concentrate, centralise and more efficiently operate certain

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
		facilities to be clarified. Planners to be cognisant of the likely impact of climate change on disease profiles, and ensure that designs of these various facilities are sufficiently flexible to accommodate anticipated changes over time. Plans for Dennry polyclinic to be deliberate and well thought out, with adequate user and public consultation. Community health services offered (via polyclinics and health centres) to be improved and appropriate public education undertaken, to ensure that the new general hospital and renovated SJH can truly function as referral hospitals. Adequate budget to be made available for equipping, staffing and maintaining all health facilities and other public health service providers. Polyclinic design and services (buildings, systems, HR, protocols, administration) to be to appropriate national or international standards. Dialysis services to be considered at this location, with requisite resources, only if costs of making these services available at this site can be justified. X-ray and laboratory services to be					specialty services. Well done, such services could be offered to the OECS sub-region. The St. Jude (general) Hospital in Augier is also being renovated, after the fire of 2009. Both facilities will become operational in 2012. It is likely that plans for a new hospital at Beausejour to replace the Augier SJH facility will be revisited, as the new SLP administration was not in favour of such plans while in opposition. Climate change is anticipated to affect the frequency and distribution of diseases, and the new/renovated hospitals must be able to adjust to these changes over time. SJH presently operates out of a temporary Stadium location, until the renovations at the Augier site are complete. Renovations at Augier are designed to reinstate services as they were before the fire, and the footprint of the facility at Augier has not been expanded or modified, and the layout has not changed significantly since1963. This poses some efficiency and other challenges for the operation of a modern hospital. The SJH Augier site has also been somewhat

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
		established in keeping with level of support required in management of health centre referrals (Carr *et al*, 2002). Appropriate provision to be made for storage of pharmacy supplies at Bordelais Correctional Facility (to meet in-house needs), serviced by a visiting pharmacist.					compromised by extensive squatting within its south east boundary, although there remain significant open spaces adjacent to the site that could conceivably accommodate expanded facilities at that location. Improved services within Dennery enables users to access improved services closer to home, family and friends, reducing transportation costs and time lost if travel to one of the general hospitals can be avoided. A new building alone does not guarantee improved health services. Significant and sustained investment is also required in staff, equipment, supplies, maintenance. Most of these are inadequate, even for present levels of service. 24 hour service in this region is required because it is relatively remote from both general hospitals, and offers the potential to reduce the burden on A&E services there; there is a high level of gang violence in this region; the Bordelais Correctional Facility is in this region and need to be served; there is a high incidence of

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
							diabetes, asthma and renal failure in this region.
	1.2 Better organization of health services and improved quality of care, resulting in a reduction in incidence of disease, and increased survival rates.	The MOH and the government to commit to, prioritize and implement health sector reform proposals (including health financing and management restructuring) prior to commissioning of both new hospitals and the new Dennery polyclinic. A Polyclinic Operations Manual to be developed to define the goal of the polyclinic, organisational structure, staff reporting relationships, functions, policies, and programmes (Carr *et al*, 2002). Community health services to be improved and higher standards maintained to complement new hospital services. HR management to be continually improved. MOH management to continually review available manpower resources, and identify trainable staff. Training needs to be determined. An integrated programme of training and continuing professional development for all levels of professional and paramedical ancillary staff facilitated by study leave and tax benefits to be provided, with relevant specialties				+	Many targets were set in the health sector reform plan, and most of these have not yet been achieved. Government has retrofitted more than half of the 33 health centres, demonstrating a commitment to health sector reform and improved community services. The two hospitals (new in Castries and renovated in Augier) should catalyse true re-structuring of the health sector. For them to operate as referral/emergency hospitals, community health services must be significantly upgraded, with 24 hour service available at polyclinics. Health sector reform, new hospitals and health financing must occur together for any/all to succeed. To this end, adequate resources and policy shifts are required. The long term vision is to reduce total no. of hospitalizations with increased community health and reformed mental health care. Although improved community services may increase hospitalization rates for the first 5-10 years, the health profile of the next generation should also

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
		to be placed on government's priority list for training. Staff at all levels to be trained or retrained in customer service, customer care, IT, new technology, best practices, and oriented to systems to be implemented in the polyclinic. Health planners to be cognisant of the likely impact of climate change on disease profiles, and ensure that design is sufficiently flexible to accommodate anticipated changes over time.					improve. The national plan must be flexible enough to deal with possible increased demand in the short to medium term as a result of improved community services e.g. improved antenatal care will result in more pregnancies surviving. Babies not doing well will do better, and babies dying will survive; the net effect will be more babies requiring acute care.
	1.3 Modern polyclinic with more efficient layout and adjacencies, in an environment more conducive to healing.	The new SLP administration to be engaged regarding the way forward, given funding constraints. Options in light of the funding deficit, are to phase the development and/or to identify additional funds to finance the gap. Planning of the new hospital to be done in close consultation with stakeholders including Corporate Planning Unit and user groups comprising all levels of polyclinic staff, to agree, *inter alia,* potential space sharing, effective adjacencies, separation of activities, access, location of entry and exit points to avoid cross contamination and facilitate free flow, particularly in a mass casualty situation.				+	The facilities at Richfond and later at the renovated Dennery Village location cannot accommodate services required in Dennery to properly fit in with health sector reform plan. Although infrequent, design to be cognisant of the need to respond to a possible mass casualty, as major road accidents on the East Coast Road are possible. User design brief estimated space, staff, material and equipment resources required. Draft concept plans have been presented to users by the designers, based on the design brief prepared by users themselves, and user feedback has been given. However,

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
		Users and designers to collaborate to plan the phased development of the proposed polyclinic (space, staff, supply and equipment requirements), in light of the funding deficit for its construction and equipping. Government to ensure recurrent resources are adequate to finance the agreed requirements.					preliminary costs of the full proposed development exceed funding available from the World Bank, although more funding may be available under another World Bank Project, to commence in 2012. Extensive consultation with the users in the planning of the new polyclinic is desirable notwithstanding the time required to be spent undertaking such an exercise, to ensure flexibility and efficiency in the use of space, and most effective adjacencies.
	1.4 Improved infectious disease control.	Infectious disease control plan to be developed and kept current, with appropriate training for all staff (CDC, CAREC). Provisions for isolation and decontamination should be incorporated into a phase 1 proposal if this development is to be phased.			+		Isolation and decontamination rooms are included in the conceptual design. Health professionals practice barrier nursing and other management protocols to prevent spread of infection. There will be no wards at the polyclinic, but a small number of beds are to be provided for observation.
	1.5 Inefficient observation room design.	Patients to be easily accessible from the nurse's station. Nurse's stations to be sufficiently soundproof that patients cannot hear discussions within. Adequate sluice rooms to be provided for domestics; dirty rooms for used dressings, equipment (e.g.			-		New design is not constrained by an existing footprint, and offers an opportunity to provide facilities that facilitate efficient operations. Observation room(s) will be built in the new polyclinic for up to 6 people.

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
		bedpan) cleaning, etc. Facilities to be provided for nurses to heat and eat food, in the vicinity of the observation room.					
	1.6 Improved patient comfort and safety.	Paediatric facilities design to be cheerful. Waiting rooms for lab and theatre to be cheerful, comfortable and welcoming. Privacy of patients to be protected through design and various security measures. Access for wheelchairs to be provided, including to toilets. Appropriate signage to be provided to guide hospital users. Alarm to be provided in emergency, theatre and recovery.			+		Places where patients are wary of going need to be made welcoming. Some persons spend many hours in such locations within the polyclinic (e.g. 2 hour sugars, elderly).
	1.7 Improved staff facilities.	User groups to be consulted regarding desirable facilities. Adequate provision to made for lockers, changing rooms, showers, washrooms, etc. Rest room/lounge, stayover rooms for nurses and other staff to be provided. Staff to be provided with access to exercise facilities. Lunch room for staff with fridge and microwave to be provided. Adequate parking and safe pedestrian access from the East Coast Road; and adequate subsidized transportation for staff			+		Public transportation is not regulated, and is often unavailable at the late/early hours required by nursing staff. Exercise facilities would particularly facilitate on-call staff who have to stay in. Staff could also pay for after hour child care services if space was made available for that purpose.

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
		working late shifts to be provided.					
	1.8 Compliance with national standards in health care.	A Quality Management System (QMS) to be developed before commissioning of the polyclinic. Periodic audits by the MOH to be conducted, to ensure appropriate corrective action is taken. A risk assessment for infectious agents, human pathological waste, blood and blood products, cytotoxic and other waste e.g. mercury from thermometers, sphygmomanometers; lab reagents, dental fillings, to be undertaken. An Environmental Management System (EMS) to be developed. A suitable member of staff to be identified to perform the role of environmental manager, to implement and maintain the EMS.			+		Existing national standards are limited to occupational health and safety, public health including sewage treatment effluent, fire safety. Medical service standards to govern the operations of all staff are required to ensure safety and effective medical attention in keeping with best practices. The Bureau of Standards can support but not undertake relevant training, and can assist in identification of suitable accredited organizations to undertake audits.
	1.9 Introduction or expansion of new specialities.	In accordance with the proposed health sector strategy/ continuum of care from a community level up to the hospital level, specialty clinics (type and frequency) to be offered at the polyclinic and health centres as dictated by the community health profile. MOH to undertake a needs assessment of services, including specialist services, required at this location, to complement those already available or planned to be offered			+		There are venemous snakes (Fer de Lance) in this region.

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
		at the new general hospital and the renovated SJH. Specialty training for staff/recruitment of adequately trained staff to be initiated. Anti venom to be stocked at this location, and staff trained in appropriate snake bite response. Design to be sufficiently flexible to efficiently incorporate foreseeable new specialities in the future.					
	1.10 Improved occupational health and safety within the Dennery polyclinic facility.	Design (building and equipment) to meet international health and safety standards for such facilities. A committee for safety issues to be established. A designated health and safety officer on the Ministry staff to be responsible for training and continuous assessment; to ensure compliance with health and safety clauses of the various union agreements, appropriate insurance, emergency evacuation plan, noise control, appropriate chemical and gas storage, biomedical, hazardous and other waste management, air pollution control, surface water control, accident reduction and investigation, protective clothing provision and use, etc. Polyclinic management to develop a Health and Safety Plan to ensure protection of employees, patients			+		There was a concern that nurses when travelling with patients in the ambulance (at high speed), are not covered by insurance in the event of accident.

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
		and adjacent land users. Plan to be regularly updated. Appropriate signage to be erected in hazardous areas.					
	1.11 Increased cost of transportation to facility.	Provisions for transportation to be made for the elderly, paupers and the health card carrying public. This may be in the form of a polyclinic transport service that picks up patients at designated points at scheduled times (likely to coincide with certain clinics such as the Diabetic and Hypertensive clinic). Cost of this service should be free or subsidised, particularly for the more vulnerable. This service may be provided by either the public or private sector. Available ambulance services to be increased as described in Section 1.13 below.			-		Dennery Village residents are accustomed to having a health facility within the village. Relocation of the facility to the village outskirts makes access less convenient and more costly for them, particularly for the elderly and chronically ill who must visit frequently. The new location is likely to increase the demand for non-emergency ambulance services, particularly from within Dennery Village.
	1.12 Reduced cost of transportation to facility.	See recommendations in Section 1.11 above.			+		Access for persons from areas other than Dennery Village is improved, as this location is more convenient for person who need to traverse the highway to get to Dennery village.
	1.13 Increased demand on ambulance services.	A policy decision is required regarding responsibility for management of ambulance services (Fire Service or Ministry of Health) and resources (staff, operations, supplies, maintenance) transferred/provided accordingly.				-	There is only 1 ambulance in Dennery, based at the Dennery Fire Station. This is insufficient, particularly as it is used for transporting patients to routine doctor appointments, non-emergencies or transfer calls

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		A vehicle to perform non emergency ambulance services to be procured, to be based at either the Fire Station or the Polyclinic. Such vehicle could also be used to transport staff within the region. A second ambulance to be assigned to service this region, attached to either the Fire Station or to the Dennery Hospital. Requisite staff to be hired to meet the requirements of 24 hour service, and to be appropriately experienced and trained. Ambulance fleet maintenance to be programmed, with replacement vehicles available as needed.					(from Dennery facility to VH or SJH). An estimated 20% of their trips are non emergency calls. Round trip times to Castries or Vieux Fort may exceed 1.5 hours, during which time an emergency may arise. The appliances at the Fire Station are subject to severe sea blast, shortening their useful life and increasing maintenance requirements. Ambulances are typically attached to the Fire Service. In theory additional ambulances should be attached to the Fire Service on the premise that the Service has a fleet to manage, and will be better equipped to maintain the services (staffing) and the equipment. However, appropriate fleet management appears not to be practised, and staffing levels are inadequate for the equipment on hand. The benefit of attaching an ambulance to the polyclinic is that there is ready access to the vehicle, and ambulance staff may be assigned other tasks within the polyclinic when not out on a call. Improved health services within Dennery should reduce the

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							frequency with which patients are transferred to a general hospital.
	1.14 Increased costs of national health care.	Polyclinic conversion in Dennery and Soufriere to be on a phased basis, after Gros Islet conversion to polyclinc is complete (Carr et al, 2002). A study to ascertain demand for after hours and 24 hour A&E and maternity services to be undertaken (Carr et al, 2002). Use Gros Islet polyclinic as a pilot to determine most appropriate staff mix. Dialysis services to be considered for this location, with requisite resources, only if costs of making these services available at this site can be justified. Revenue mechanism to support UHC to be instituted at the earliest, and certainly in advance of commencement of operations in new hospitals and polyclinics. Universal health care coverage to be provided to users. PR to be implemented to encourage the public to make adequate NHI contributions in exchange for a good standard of health service.			▬		Resources available for polyclinic construction are lower than estimated cost of the facility if it is to fully meet the design brief requirements. Significant staff increases will also be required to increase to a 24 hour per day service, with upgraded services to be offered. This Dennery polyclinic development coincides with significant improvements to the general hospitals in Castries and Vieux Fort. This will exert significant pressure on recurrent resources of government if services are to be adequate. Fees currently charged to patients do not cover costs, and there is a high delinquency rate. Many patients in this community cannot afford to pay fees, even at current levels. Paupers (earning less than EC$10,000 pa) and the elderly (65 years and over) are currently exempt from payment. Government proposes to implement universal health care, a tax based system of raising revenue and providing universal access (free of direct charges) to

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
							a guaranteed package of services (local and overseas treatment, pharmaceutical, blood bank, development fund, contingency fund). A first module was to be implemented in 2005, to be fully introduced by 2008 if revenue mechanisms were in place (proposed mechanisms included NIC contribution increased, environmental levy increased from 1.5% to 3 or 4%; VAT, salary deductions, 50% contribution from consolidated fund which currently contributes $30m pa). Based on VH and SJH costs at the time, universal health care was expected to cost approximately $60m pa. UHC and revenue mechanisms are yet to be implemented in 2011. Carr et al (2002) recommended that polyclinic conversion in Dennery (and Soufriere) should be phased.
	1.15 Susceptibility of facility and equipment to high winds and sea blast. 1.16 Reduced equipment performance and life due to highly saline environment.	Landscape designer to include for landscaped buffers/wind breaks. Building designers to specify building finishes that are salt resistant. Building openings to be sized to minimise impact of winds on building contents.				▬	This site, although further inland than either the Dennery fire station or the old Dennery Hospital, is, like those facilities, exposed to coastal winds that are likely to be high in salinity. The general area is also susceptible to high winds.

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		Sensitive equipment to be stored in rooms that are designed to reduce environmental salinity (e.g. air conditioning, located on leeward side of building). Equipment to be routinely maintained to a schedule.					
	1.17 Increase in noise levels emanating from the hospital, affecting properties adjacent to the hospital. 1.18 Increase in noise level emanating from increased traffic on the adjacent roadway, affecting the hospital. 1.19 Noise from the church during services.	Hospital and environs to be designated a quiet zone. New legislation may be required to facilitate this. Berms and vegetation to be integrated creatively in the drainage/landscaping plan, to buffer the hospital structures and their prospective neighbours to absorb/reflect noise. Landowner (NDC) to provide for transitional uses on the hospital boundary, such as open space and hospital related institutional, commercial and residential use.		▬			There is currently little development in close proximity to the proposed site. There are plans for mixed use/residential development in the area, and the SDA church is on the adjacent lot. The proposed site is quite spacious and this space can be planned to effectively buffer any future adjacent development. The church has service 3 days per week. The church is downwind from the proposed site and impact is not expected to be significant. The level of emergency vehicle traffic in the vicinity of the site is expected to increase, but imposition of a quiet zone should mitigate this. Increase in traffic levels on the highway as a result of this project implementation is expected to be low: Any significant future increase in the numbers of vehicles using the highway will be the result of natural growth in vehicle

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							registrations and non-project-related development within the project area and beyond, as this is the most important link between north and south of Saint Lucia traverse this community. Any significant future increase in noise levels associated with traffic growth is therefore not project-related.
	1.20 Increase in air pollution from road traffic.		▬				Traffic levels on the adjacent roadway will not be high enough to result in significant air pollution at this site. The exposed location of most sections of the road coupled with the relatively high wind speeds will naturally assist in traffic fume dispersal.
	1.21 Mosquito infestation, particularly after rains.	Hospital to be designed with insect screens. All possible sources of standing water within the hospital site to be eliminated.		▬			Wind is expected to keep mosquito populations down at this location.
	1.22 Roosting of native bats within the hospital building.	All external vents and windows to be screened with bat screening or netting. All screens to be monitor and maintained as part of overall maintenance plan. All windows and doors to be properly sealed. Walls to be routinely inspected for gaps and openings (e.g. between soffits and facia) that may permit			▬		Bats were observed at this site, and these normally roost in buildings, so the polyclinic may be attractive to them, unless appropriate measures are taken. Conservation of bats is important for pest control.

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		bat entry, and these to be sealed. Should bats make their way into the building, electronic (ultrasound) devices to be installed.					
	1.23 Infestation of the area with snakes.	A 5m buffer strip to be established and maintained between the site and the remaining dry forest vegetation. Rodent population to be controlled during both construction and operation, as described in Section 1.25 below, as these attract snakes. Grassed grounds to be well maintained: • grass to be kept low, • cleared wood and brush to be removed from the site immediately; • food waste to be properly managed to minimise rodent population.					Fer de Lance is not prevalent is this area, but are prevalent in the nearby Dennery Knob and Praslin. Boa Constrictors have been sighted in Bois Jolie. Efforts are to be made to reduce the presence of snakes on this site. Snakes need cover to hunt and hide.
	1.24 Wildfire spread to or from this area.	A 5m buffer strip to be established and maintained between the site and the remaining dry forest vegetation. Fire resistant construction materials to be used. Debris (flammable material) accumulation within the site to be minimised. Both entrances and the route from the East Coast Road through Bois			▬		This area is prone to wildfire, and spread of fire can be mitigated with buffer strips (dirt tracks or low grass).

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		Jolie to be maintained to provide access options for emergency vehicles, and egress options for persons at the facility. Wildfire evacuation drills to be performed annually. Hydrants to be no more than 300' apart and accessible to fire appliances. Hydrants to be installed on 4" lines, with dedicated and separate fire infrastructure. NDC subdivision plans to be cognisant of wildfire risk (buffer strips, development density, etc).					
	1.25 Improved rodent control	Rodent prevention designs to be incorporated throughout e.g..L shaped foundations to discourage burrowing; tightly fitting, self closing doors, bottom plated openings, sealed/screened openings, screened drainage pipes, etc. Kitchen and food preparation areas to meet Food Regulations under Public Health Act. Vector Management plan to be incorporated into the overall maintenance plan. Landscaping design to lend itself to easy maintenance of grounds, and minimise overgrowth potential.			+		MOH (EHD) recommend that designers be guided by Ben Freedman's Sanitarians Handbook, OECS Building Code, and Food Regulations under the Public Health Act. Overgrowth harbours rodents and should be avoided.
	1.26 Poor or intermittent service from public utilities.	Designers to engage in early and continuous dialogue with service providers.		-			There is infrastructure (including telecommunications) near the site boundary, but the WASCO

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		Utility designs within the site to conform with specifications of service providers. A number of recommendations made to improve water supply in Vieux Fort (Morgan, 2007) are also applicable here: 1. Vegetate river buffer zones to reduce turbidity 2. Reduce leakages and other system losses 3. Engage in public education to encourage conservation (at industry and individual levels) 4. Develop new intake to ameliorate dry season shortfalls 5. Improve storage capacity to improve supply For sewage, on site treatment capacity to be developed, to effluent standards stipulated in the Health Regulations.					system in particular needs significant capacity upgrading to appropriately meet the water needs of this new proposed facility, as well as of other development planned for this area, while continuing to meet the needs of existing customers. Residents attempt to mitigate this with on site storage.
	1.27 Waste water discharge into the environment.	Appropriate waste water treatment option/technology to be selected based on assessment of costs, system reliability and performance. WASCO and the Water and Sewerage Commission to be advised of proposed sewage treatment option selection and capacity at design stage. Selected option to be robust, with low			▬		There is no municipal sewage system in the area. Septic tank technology for wastewater treatment would be unacceptable, as the number of persons using the facility will be high, and ground conditions are not suitable. Dennery Village site operates on a septic tank.

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		maintenance requirements, while achieving requisite effluent quality standards. Sewage plant to meet the more stringent of effluent standards in Health guidelines (20/30) and Recreational Water Quality Standards (depends on receiving water body characteristics). On-site treatment effluent to be recycled for landscape irrigation. Irrigation system to be drip type rather than spray. Effluent quality to be properly and regularly monitored by an independent, competent authority. Adequate resources to be made available to maintain waste water treatment plant properly. Maintenance to be by properly trained personnel, outsourced if necessary. Grease traps to be provided on kitchen wastes.					Although the vision plan calls for development of water and sewage treatment services, WASCO has no immediate plans for a municipal sewage system within the area. In the event of future construction of a municipal system, it would be expected that the polyclinic would hook up. If a package plant is installed on-site, there is concern that maintenance of a package plant on site with public funds will be deficient, and effluent quality standards will not always be met. With on-site treatment, there will be an increased volume of relatively poorer quality water discharging from the site that will ultimately end up on the Dennery coastline. This may adversely affect downstream users, and threaten touristic development plans on or near the coastline. Recycling of treated effluent on site must be subject to effluent quality, and the selected application system must avoid generation of aerosols. Although there is currently no significant adjacent development currently, this is planned, and would be affected if sewage treatment is ineffective or fails,

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							with impacts such as odour and health. A license from the Water and Sewerage Commission is not currently required for discharge of wastes in this area as the Minister has not to date declared the area, waste or class of wastes as a controlled water quality area, or controlled waste or class of wastes, respectively.
	1.28 More efficient use of public utilities. 1.29 Improved medical and other equipment performance and longevity.	Efficient M and E and plumbing designs to be developed for both the Dennery Hospital renovation and the new Bois Jolie facility. Use to be made of energy and water conservation devices. Use to be made of renewable energy sources (solar, wind) where feasible. Solar panels to be used to power heating and air conditioning requirements on a day to day basis, and to supplement standby supplies. A/C use to be minimised and natural ventilation to be maximised, particularly in waiting rooms, observation rooms and other areas that do not house sensitive equipment, or equipment susceptible to corrosion. Power supply to be stable and steady to protect sensitive medical				+	It is likely that the old Dennery Hospital facility suffered from faulty electricals and plumbing, given the age of that facility. However, plumbing and electrical works will be improved as part of the renovation works, improving the efficiency and costs of operations and protecting sensitive (new) medical equipment there. However, a new polyclinic offers the opportunity to further increase efficiencies and reduce cost through energy efficient designs and modern installations that conserve water and electricity, and use renewable energy sources. This may better ensure continuity of operations in the aftermath of a disaster. A/C is necessary only in designated areas such as labour

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		and other equipment. On site infrastructure to be properly monitored and maintained.					rooms, theatres, enclosed doctors' offices, and other locations housing sensitive of other equipment susceptible to corrosion. Solar panels may be installed as roofing or cladding. Development must be cognisant of need to adapt to climate change adaptation, particularly in the areas of water and energy conservation. Although the utility bill may not be reduced due to the increased size and scale of operations of the facility, use of these is expected to be more efficient.
	1.30 Increase in local and national employment opportunities.	Training priorities to be identified based on needs assessment and young people from the community and beyond to be encourage to pursue these. Land use plan to anticipate ancillary uses and create opportunities for local entrepreneurs.		+			Staff levels should increase if scope of services and hours of service are extended. Impact of this in the immediate vicinity may be minor as most staff will transfer from the old facility, and supplemented with specialists who will not necessarily reside within populations of adjacent communities. However, more unskilled jobs should also be available.
	1.31 Loss of income to bus drivers, vendors and shopkeepers in Dennery Village. 1.32 Inconvenience to	New polyclinic design to accommodate shops and vendors in appropriate facilities. Land use plan to anticipate need for supporting residential,		-			There will be a shift in transport requirements for both staff and patients as the location of the facility moves, but this is not expected to have a significant

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	workers due to change of location.	commercial and institutional space, to be available well in advance of polyclinic completion, and priced to encourage local investment.					overall effect on costs to service users, or income to bus drivers. Neighbouring lands are not (yet) subdivided for development into supporting uses, to accommodate shops, residences, etc.
	1.33 Illegal occupation of adjacent underutilised lands.	Lands to be actively policed by the landowners NDC, supported by enforcement of the law by development control authorities to limit activity on public road reserves and within vacant lands.		▬			These lands are very attractive for development. However, residents in the area are expected to police and promptly report illegal development.
	1.34 Occupation of road reserves in the vicinity by vendors.	Area to be policed by the DCA and police. Signage to be erected indicating no vendors allowed. Physical barriers to be erected in locations likely to be attractive to vendors. Booths/kiosks to be designed into the hospital proposals, and selected vendors organized to regulate themselves. Traffic management plans on the nearby East Coast Road to incorporate the nearby La Pointe Lookout, as vending at this location may complement polyclinic development.			▬		The nearby La Pointe Lookout point may benefit from increased traffic in this area, particularly if the traffic calming plans are cognisant of this potential opportunity.
	1.35 Diminished aesthetics and amenity value as a result of an institutional building within	Architectural design and landscaping to be consistent with plans for this general area. Landscaping designs and building		▬			Plans are for mixed/residential use. Littering does not currently appear to be significant in this

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	an undeveloped area.	finishes to be low maintenance. Solid waste receptacles to be provided in vicinity of laybys/bus shelters.					general area. Increased traffic to and from the polyclinic may increase incidence of littering.
	1.36 Improved hospital security.	Security measures to be designed to protect staff and patients, particularly in A&E and theatre. Measures to include restricted access and alarm systems Staff to have ID cards and badges, so patients can identify them. Adequate perimeter fencing and security lighting of entire compound, with manned security at the entry/exit point(s) are required. Medicine cupboards and trolleys to be under lock and key. Grazing animals (sheep, goats) to be kept off compound.				+	This facility will treat prisoners from the Bordelais Correctional Facility. These are usually accompanied by a Correction Officer. The facility will also receive casualties from "The Gulf", a gang ridden and violent area within the Dennery community. Staff feel vulnerable when attending to such patients, and were of the view that the police should know to come without being called when there are incidents of this nature. Overall design must ensure that effective security can be put into place (secure from outsiders/ intruders, security of persons (workers, other patients)/property within).
.	1.37 Possible leakage or explosion of fuel or medical gas stored on site.	Storage sites for gases and other material with a potential fire risk to be designed to appropriate standards including provision of leakage and fire alarms, sufficiently distant and preferably located upwind from the facility. Storage facilities to be routinely inspected under a documented maintenance programme.		-			

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		Up to date information of explosive and other toxic/hazardous materials, including locations, contents, appropriate emergency response and other details to be readily accessible to polyclinic management and to emergency response services, in the event of spill or injury. Procedures in the handling of chemicals (including protective clothing required) and in event of emergency to be clearly posted on the plant or storage containers. Fire protection measures to meet Fire Department's specifications. Design to provide for fire hydrants to be installed to WASCO and Fire Department specifications. Minimum quantities of oxygen to be stored on site. Buildings to be secure, with manned entrances, and appropriate security measures in dangerous drug and hazardous material storage areas. Evacuation procedures for the polyclinic to be developed and drills regularly undertaken to ensure that all personnel are capable of fulfilling their responsibilities. Evacuation routes and safety points to be clearly defined.					

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	1.38 Increased biomedical waste generation.	Continuous training in waste (particularly biomedical waste) management to be provided to all polyclinic staff. Biomedical waste management plan to be designed to suit site conditions and kept current. Separate housing for solid and biomedical waste to be provided. Each waste generating station in the polyclinic to have appropriate containers for biomedical waste.		▬			Under the Waste Management Act of 2004, a plan for waste/ biomedical waste must be articulated. Currently collection and disposal of both biomedical and solid waste from public health facilities is a SWMA responsibility (services provided by private contractors commissioned by SWMA). The SWMA biomedical waste programme offers to government institutions, free biomedical waste collection in a privately operated specialised vehicle, with storage, treatment and disposal at Deglos. Autoclave capacity at Deglos is 1000 L, batch loaded automatically. Waste is macerated, all operations are computer controlled. The sterilization phase is 138°C at 3.8 bars for 10 mins, to achieve an 8 log kill. The entire process takes 1 hour. The autoclave is run 6 hrs per day, twice weekly. The autoclave is sized to serve the entire island. The autoclave has failed once (due to a faulty valve) and this was repaired within a week. Storage capacity at Deglos is 1 month at current generation rates. Deep burial is always an

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							option if autoclave downtime extends beyond this. Solid and hazardous waste management systems at health facilities need continuous training and capacity development. Health and safety issues need reinforcing and enforcing. Red bins are available from the SWMA. Audits are conducted periodically by SWMA and training in biomedical waste management is offered intermittently by SWMA. Transportation of biomedical waste in specialised vehicles meets the following requirements: - workers adequately clothed - bins secure, waterproof, with sealed lids to preclude spillage in the vehicle. At the Dennery facility no cytotoxic waste is generated, and this is not expected to change as cancer treatment will not be conducted here. SWMA does not have capacity to deal with cytotoxic waste.
	1.39 Improved solid waste management.	A solid waste management plan to be prepared. Separate housing for solid and biomedical waste to be provided. Storage for solid waste to be		+			Solid waste is currently collected twice weekly (Mon and Thurs) from Dennery. Bulky waste (end of life equipment) is also removed by SWMA which

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		ventilated and sized to contain the number of bins required based on a twice weekly collection for solid waste; floors and walls to be tiled, with access to hot and cold water, and drain to sewage treatment. Safe access to be provided for orderlies and to allow wheeling of bins. Access and turning space for compactor vehicle at storage room to be provided. Within the hospital, 240 L bins to be used, and 770 L bins to be used in the storage area for solid waste. Each waste generating station in the hospital to have one black and one red bin (240 L each). Green waste, if separated on site, to be removed promptly due to the snake concerns, and transported to other location for composting, or to the Deglos landfill site if necessary.					provides a once monthly basic bulky waste collection service to residential and institutional consumers. Ventilated solid waste storage will result in improved rodent control. Composting at this site is not desirable due to snake concerns.
	1.40 Pollution arising from site run-off.	All wastewater including laundry and grey water to be intercepted and treated to international standards. Parking area to be semi-permeable to increase surface water infiltration and reduce runoff rates. Vegetative cover to be maintained. Roof water to be harvested for non-potable use, such as site irrigation where possible.			▬		The polyclinic footprint is expected to be less than 2,000 m^2. The site area exceeds 16,000 m^2. Site coverage will be less than 1/8 of the total site area. As such, run off rates are not expected to increase significantly from what currently obtains. Roof water is harvested at both health centres, and this has

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		If roof water is harvested for potable use, treatment filters are to changed routinely.					alleviated water shortages there. However, filters are not changed as required.
	1.41 Improved drainage of site.	Drainage plan to reduce likelihood of standing water within the site. Drainage to be routinely inspected and maintained by hospital maintenance staff.		+			This site is not flood prone, although soils in the upper area are poorly drained, so that there is the possibility of standing water on the site during the rainy season.
	1.42 Social friction between hospital users and the adjacent communities.	A community representative to be invited to serve on the hospital Board. General area to be regularly patrolled by the police to deter criminal activity. Other pertinent laws to be enforced by the relevant authorities (development control, speed limits, etc). Authorities to require development of onsite parking at the SDA church.		-			The greatest initial impact may be on SDA worshippers at the neighbouring SDA church. This will be minimal, as all polyclinic operations will be conducted within site boundaries and traffic is not going to significantly increase due to polyclinic operations. Church goers do park in the concrete access road as there is no parking at the church site, and this will pose a problem for polyclinic operations if not addressed.
2 Dennery polyclinic to be part of integrated national health services, with inter and intranet services.	2.1 Reduced volume of paper consumed. 2.2 More efficient communication between, and access to information by, the various health service providers, regardless of physical location, resulting in more	ICT systems to be installed with adequate security and confidentiality of information maintained. The polyclinic to be well connected to hospitals and health centres. ICT system to facilitate teleconferencing, telemedicine etc. and provision of training and on line			+		The divide between hospital and community must be bridged. A steady flow of information between hospitals and communities is desirable. A number of services could be provided via the inter and intranet services to be developed, to improve service

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	effective patient care.	consultation, providing a continuum of care between the hospital and community services.					delivery generally, and at this location in particular. All medical records should be accessible on the network. Billing and prescriptions could also be done online.
	2.3 Improved access to and use of real time data and information.	MOH Research unit to be strengthened to fully utilize available information. Policy makers to be receptive to recommendations based on such research, so that policy, protocols and actions in health and other sectors are informed. Environmental health research and surveillance to be improved, using intelligence gathered by the hospital.			+		More practical local research is required e.g. real time diabetes data (who, how, protocols followed, effectiveness in reducing morbidity and mortality); trauma (violence and injury); tracking of trauma (location, etc) e.g. motor vehicle incidents, murders, injury, incest; location of infectious/communicable disease victims, so that methods to reduce or remove incidents can be devised and implemented, and policy, health and social services be better informed.
3 New, modern equipment procured for use in the new general hospital.	3.1 An incremental improvement in technology, resulting in improved access, and improved quality of public health service available to the community served.	List of equipment required for the new polyclinic to be developed on the premise that equipment procured for Dennery Hospital renovation will be transferred. Comprehensive equipment maintenance plan to be developed. MOH Maintenance section to be adequately sized and equipped. Maintenance to be outsourced if necessary. Adequate equipment operator and			+		When procuring equipment, the MOH typically asks suppliers to provide assisted foreign travel, warrantee, first level replacement parts for service and follow up visits. As part of reinstating the Dennery hospital, some new equipment is to be procured. Equipment suitable for transfer will likely be taken from there, where it will no longer be

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		maintenance training to be provided. Medical technologists to be sent on training well in advance of construction completion. Training in medical technology to be put on the government priority list.					required, to the new polyclinic. This will reduce on future equipment costs, a benefit in a situation where funds available are insufficient to meet stipulated requirements. There is a shortage of medical technologists to service medical equipment, and this increases equipment downtime and potentially reduces equipment life.
4 Decommissioning of hospital services at Richfond Health Centre/ Commissioning of renovated Dennery Hospital/ Decommissioning of renovated Dennery hospital / Commissioning of Dennery polyclinic at Bois Jolie.	4.1 Organisationally, new protocols and a new/ improved structure should prompt improvements in quality of service offered at the new/improved facilities.	An in-house Change Management team to be established to plan and implement the decommissioning /commissioning process. Team building strategies that reinforce desirable behaviors, and change undesirable behaviors to be implemented. An orientation programme to be implemented to facilitate early familiarization with new facilities, duties in the new environment, etc. MOH to capitalise on the experience of the current facility managers and staff in both the renovated and new facility commissioning. MOH to collaborate with facility managers in identification of specialist training requirements for Dennery polyclinic vis a vis national requirements, and to support			+		

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
		training requests. Staff, equipment and supplies requirements to be adequately resourced by the MOH in advance of facilities commissioning.					
	4.2 Cost and inconvenience incurred by need to relocate to new/ renovated premises.	Relocation activities to be properly planned to optimise efficiency and minimise disruption to staff and patients, and damage to sensitive medical equipment.			▬		The Dennery Hospital operations were forced to relocate to the Richfond Health Centre in November 2010 when Hurricane Tomas effectively destroyed much of the Dennery Village facility. It is expected that they will temporarily relocate to the renovated Dennery Village site in mid 2012, and then to the new Bois Joile polyclinic when that is completed. These moves are highly disruptive to both patients and staff, reduce efficiency and effectiveness of operations during the transition and commissioning, incur losses as materials and equipment may be adversely affected by shifting and re-installation.
	4.3 Under/inappropriate utilisation of the recently renovated Dennery Village site.	Plans for future use of renovated Dennery Hospital to be finalized, with appropriate consultation, before decommissioning.		▬			The Dennery Village facility will be rendered vacant once the Bois Jolie facility is commissioned. It will, at that time, be a recently renovated building, at significant cost, designed to offer health services. However, it is unlikely to be so specialised as to not be

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
							adaptable to other use with minor modification. The Vision Plan proposes community use, and this or other potential use should be explored. It is important to put the building into active use almost immediately, or there is a risk that it will be vandalised or illegally occupied.
	4.4 Reinstatement of Richfond and La Ressource health centre operations.	Expedite relocation back to renovated Dennery Village facility. Richfond and L Ressource facilities to be prepared to revert to normal level of use, in good state of repair. Community to be informed of changes to services.				+	Many people believe that the effort to reinstate the Dennery Hospital have taken too long. Use of the Richfond Health Centre has disrupted all normal community health services within the region.
5 Development on adjacent lands.	5.1 Incompatible future new development in the vicinity.	Landowner NDC to plan compatible development. Development control and guidelines for development within the adjacent areas to be developed. Appropriate inclusion of allied services and green/ recreational space within the proposed adjacent development to be made.			-		The vision plan has broadly defined the type of development that should occur in this area, and these proposals would be compatible with polyclinic operations. The polyclinic site is large enough to allow erection of natural buffers against ambient noise from the east coast road or adjacent development.
6 Increased vehicular and pedestrian traffic off the East Coast Road into Bois Jolie.	6.1 Reduced effectiveness of the East Coast roadway as a result of increased traffic, including pedestrian traffic.	Plan for future construction (if traffic levels warrant) of a roundabout rather than traffic lights to allow continuous flow of traffic on the Highway. Parking not to be allowed on the		-			Traffic levels in this area do not currently warrant construction of a roundabout or traffic lights, but as the area develops, this may be required, and should be monitored. A roundabout is lower

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
		Highway or access road. Sufficient parking for staff and visitors to be provided within the hospital compound. Sidewalks, bus shelters and a crossover for pedestrians to be provided, on the East Coast Road.					maintenance than traffic lights, and would facilitate turning of southbound traffic into the Bois Jolie. Poorly maintained traffic lights would be a safety concern. Sidewalks and crossings along the highway are required, and this will change the nature of the highway use. Traffic calming devices to slow vehicles to enable persons to cross safely may also be required. Pedestrian right of way at crossings are often not respected by motorists, and a crossover would remove this conflict. The crossover would however, make access for less ambulant pedestrians (wheelchairs, persons on crutches, elderly) more difficult. It is expected though, that buses would usually drop such persons as close as possible to the polyclinic entrance. If pedestrian crossings are used, central islands with appropriate safety barriers should be provided. Sidewalks along the highway may also change the nature of the highway use.
	6.2 Improved, more efficient access to hospital facilities by the public and	Traffic/pedestrian management & control system to be instituted. Design to incorporate bus				+	The proposed Bois Jolie location is more easily accessible, so relocation improves public

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
	emergency vehicles.	stops/laybys. A crossover on the Highway for pedestrians to be constructed. Appropriate pedestrian access to be provided from the highway to the hospital. A shuttle service from Dennery Village to be instituted. Road signs to be erected to direct drivers to the new polyclinic. Low growth vegetation in the vicinity of junctions to be planned, not obstructing lines of sight. Secure, manned access, clear of vendors, taxis, and other activity to be provided for emergency vehicles. Adequate, dedicated parking and traffic control to be provided for emergency vehicles.					access to health facilities. Safe pedestrian access along the concrete road up to the site entrance should be provided.
	6.3 Road safety hazard to pedestrians trying to cross a high speed roadway.	Patrols by traffic police to be increased, and speed limit more rigorously enforced. Crossover/pedestrian crossing/traffic calming to be provided.			-		Cross-highway access is required by pedestrians and those who use minibus services. Pregnant women, women with children, unaccompanied children, the elderly and infirm are potentially the most affected, since they would have most difficulty in crossing, especially if they are ill or carrying a bulky or heavy load.
	6.4 Improved national emergency medical service (NEMS) to	EMS services to be raised to international standards. An agency dedicated to EMS,		+			EMS is secondary to fire response within the Fire Dept. Ambulances are not certified; not

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
	resuscitate and move people more quickly.	independent of the fire service to be established, preferably located in close proximity to the hospital (with ambulance garage, classrooms for in-service training, storage of equipment). EMTs to be properly trained, with consideration given to offering an EMT course at SALCC. A central dispatch agency with trained dispatchers to be established, to receive calls and route them to the appropriate agency(s) – police, fire, EMS. Dispatchers to be trained to interrogate callers, to inform EMS or other services of their requirements, and to advise callers on first aid to be administered. Continuous public education to be provided on how to access and use the facilities. Continuous public education on first aid to be provided.					all EMTs are adequately trained. EMTs should be able to intubate etc. Staff report that the Fire Service typically calls into the polyclinic so that the team there can be prepared for the patient's arrival already informed of the patient's condition. A technical committee (First Aid Committee) of the Bureau of Standards was working on standards for an Emergency Medical Services System, to merge and streamline emergency and medical services (pre-hospital care). The status of this exercise is not known. The public needs to be aware of appropriate response to emergencies, so they do not unintentionally do more harm than good when trying to assist the injured.
7 Use of hospital under national emergency conditions.	7.1 Loss or reduction of use of hospital as a result of damage incurred to the hospital during the national emergency.	Hospital and ancillary works to be adequately designed against disasters such as earthquake, hurricane, fires and flood. Designer to comply with PAHO guidelines for earthquake and hurricane resistant design of structural and non-structural components of hospitals.				▬	Availability of open space adjacent to facility, and upwind, is a benefit, as this provides an ideal location for evacuation from the hospital. NEMO endorses the recommendations of PAHO and FEMA to mitigate against earthquake.

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
		Appropriate emergency exits and fire safety precautions to be provided. Designer to design using maximum wind speeds revised in cognisance of climate change impacts. Utilities (including telephone and electricity) to run underground. Manned security to be in place at every entrance and exit (service or public), and security equipped with the resources to maintain data as to the identity of persons within the facility at any one time. Sufficient open space to be reserved adjacent to the hospital, preferably upwind, for evacuation of users in event of disaster. Disaster preparedness and mass casualty response plans to be prepared, and staff prepared to respond to disaster situations, including mass casualty and evacuation procedures. Authorities to be able to account for all patients, especially in the event of disaster/evacuation.					
	7.2 Temporary increase in local traffic, in particular ambulances. 7.7 Increase in noise levels.	Junction and access road design to be adequate for use by large numbers of emergency and other vehicles.	▬				Numbers of neighbours are currently very low. However, if plans develop in accordance with the Vision Plan, it is expected that residents and other users in the vicinity would not object strongly to the inconvenience

Actions Affecting Environmental Resources &/ Values	Potential Environmental Impact	Mitigation/Benefit Enhancement Measures	Non-Sig.	Low	Med	High	Comments
							and noise of emergency and other vehicles in the area, in a disaster situation. They may also be affected by the disaster, and require access to the nearby polyclinic services.
	7.4 Loss of utilities and services in aftermath of disaster.	Sufficient back up services to be provided (water storage, power generation and fuel supply, emergency communications system). Adequate stock of essential emergency supplies to be maintained. Operational budget of the hospital to facilitate the upkeep of emergency stocks. Redundancies to be introduced into the systems to reduce the risk of interrupted services.				▬	Polyclinics provide an essential service, and the utility companies as a policy, prioritise repairs required to facilitate resumption of such services in the aftermath of a disaster. Both LUCELEC and LIME are likely to design redundancies into the systems serving the hospital. Capacity of back up water storage on site should be in the order of 7 days. WASCO typically recommends 3 days for less critical users.
8 Use of adjacent open spaces as an evacuation site.	8.1 Possible conflict with adjacent community.	Include community in development of evacuation and disaster response plans, and in planning of drills. Establish a community relations committee.	▬				Such use is expected to be very infrequent. There will be sufficient space within the site boundaries for this purpose, and no need to use adjacent spaces.

7.5 Key Potentially Beneficial Impacts

With the exception of the creation of construction employment opportunities for local residents, sub contractors and suppliers during the construction phase, key potentially beneficial impacts associated with project implementation are primarily related to the incremental improvements that can be expected in the post-construction (operational) phase as a result of moving first from Richfond Health Centre to a renovated Dennery Village facility, and then to a new Bois Jolie facility. Service improvements will not be sufficient at the interim renovated Dennery Hospital, but will relieve the stress experienced at the two health centres since services were relocated there, and will return primary health care services to the Dennery Village, where they have lacking since Hurricane Tomas in October 2010.

It is assumed that health sector reform and introduction of UHC will complement and benefit Dennery polyclinic operations when they are offered from a new facility at Bois Jolie. Such improvements include:

- Better organization of health services, an incremental improvement in technology and introduction of new or expansion of existing specialities, resulting in a reduction in incidence of disease, increased survival rates and a higher standard of public health service.
- More efficient communication between, and access to information by, the various health service providers, regardless of physical location, resulting in more effective patient care. Improved access to and use of real time data and information.

The main potentially beneficial impacts of a new polyclinic at Bois Jolie are summarised as follows:

- A modern health facility with sufficient space, efficient layout and adjacencies. The new environment will be more conducive to healing. Patient and staff comfort will be improved.
- New, modern equipment procured for use in the new hospital, resulting in an incremental improvement in technology, improved access, and improved quality of public health service.
- Improved patient facilities.
- Improved hospital security.
- Improved occupational health and safety.
- Improved staff facilities.
- More efficient use of utility supplies as a result of operating from well designed new premises with energy and water conservation technologies incorporated, resulting in improved equipment performance and longevity.

- Increased value of adjacent lands.

Benefit enhancement measures are premised on the incorporation of appropriate features into the project designs, a political and financial commitment to health sector reform and UHC, improved utilities in the general area and adoption of a high standard of routine and periodic maintenance by facility managers, so that benefits are sustained in the long term. See Section 7.4 for detailed benefit enhancement measures recommended.

7.6 Key Potentially Adverse Impacts

The principal potentially adverse impacts associated with the project relate to all phases (pre-construction, construction and operations).

Potential adverse impacts during pre-construction and construction phases are as follows:

- Under/inappropriate utilisation of the recently renovated Dennery Village site upon decommissioning.
- Health and safety hazards to the workforce, arising from participation in an inherently dangerous occupation.
- Land and water pollution arising from inadequate disposal of liquid wastes and spillages of contaminating materials at the worksite.
- Land and water pollution, public health hazards and landscape amenity value degradation arising from inadequate disposal of solid wastes arising at the worksite.
- Creation of noise and dust nuisance during various haulage and construction operations.
- Land sterilisation, adverse roadside/landscape visual impact and public health and safety hazards, associated with inadequate post-construction site clearance.
- Diminished aesthetics and amenity value as a result of an institutional building within an undeveloped area.
- Damage to and interference with public infrastructure, arising during construction.
- Increased road safety hazards to road users and the workforce, and inconvenience to the public associated with construction traffic, particularly in the vicinity of the worksite.
- Damage to road pavements and structures associated with haulage of materials to/from the worksite.

- Increase in traffic congestion and road safety hazards associated with the haulage of construction materials to and/or earthworks spoil from the site.
- Creation of dangers to the general public and road users arising from roadside storage of construction materials and inconsiderate roadside parking of construction plant and vehicles.
- Enhancement of erosion/sediment deposition following clearance of vegetation, prior to commencement of construction on cleared sites.
- Smoke and odour nuisance and damage to vegetation and property arising from on-site burning of cleared vegetation.
- Erosion/sediment deposition effects associated with failure to re-vegetate cleared areas at the earliest opportunity.
- Increase in suspended solid content and bed load of drainage into adjacent watercourses with erosion of cleared areas and construction activity within the building footprint and areas of other ancillary works.
- Pollution of water bodies and watercourses arising from cement-containing material. Construction phase impacts will be mitigated through the inclusion of specific environmental protection clauses in the contract documents, and enforcing compliance with them during construction.

See Section 7.4 for detailed mitigation recommendations.

During the post-construction (operational) phase key potential negative impacts anticipated are:

- Increased national costs of health care, due to, *inter alia*, sub-optimal polyclinic development.
- Costs and inconvenience incurred by need to move DH operations first, back to the renovated, and then to the new, premises.
- Diminished aesthetics and amenity value as a result of an institutional building within a predominantly residential area.
- Polyclinic operations adversely affected by future new development in the vicinity.
- Reduced effectiveness of the East Coast Road roadway as a result of increased traffic, including pedestrian traffic.
- Road safety hazards to pedestrians crossing the East Coast Road to access the new polyclinic.
- Occupation of road reserves in the vicinity by vendors.
- Competition for scarce water resources and other public utilities with the Dennery community.

- Possibility of bats roosting in the building.
- Possibility of mosquito infestation, particularly after heavy rains.
- Pollution arising from site run-off.
- Loss or reduction of use of the polyclinic as a result of damage incurred to the structure during a national emergency.
- Loss of utilities and services in the aftermath of disaster.

These impacts may be mitigated by the incorporation of appropriate considerations in formulating project designs, routine maintenance of facilities, introduction of UHC, policing by the relevant authorities and health sector reform. See Section 7.4 for details.

7.7 Proposed Mitigation and Enhancement Measures

7.7.1 General Considerations

While the onus is on the contractor in the construction phase to implement many of the measures recommended, some of these do need to be initiated or responded to appropriately by some other agency, usually a department of government. As such, all relevant agencies should be made aware of their responsibilities well in advance of the commencement of works. Most pre-construction and post construction recommendations are to be implemented by the Ministry of Health, whether Corporate Planning Unit, polyclinic management or the government.

The following sections are organised into pre-construction, construction and construction phases, based on the timing of the anticipated impact. However, the recommendations may need to be implemented earlier, during design, construction and/or operation. Some recommendations also need to be implemented over more than one phase of the works. These will appear under the phase where they are first relevant, and mention is made there of the other phases. They are not repeated under subsequent phases.

Likewise, although many recommendations are relevant in more than one sphere of concern, they are not repeated, unless their repetition is required in order to make a particular recommendation complete.

7.7.2 Mitigation and Benefit Enhancement Measures – Design and Construction

The following are recommended in the pre-construction phase, to minimise adverse impacts and enhance benefits:

COMMUNITY RELATIONS

Design

Community consultations to be convened to inform communities of plans and proposals, and seek their input in project design.

Management

Community meetings and/or meetings with a committee representing the communities to be intermittently, at least annually through design and construction phases, to keep the communities informed and involved.

SITE INVESTIGATION

Pre-Design

Mature vegetation to be preserved to the extent possible, during site investigations and surveys.

LAND ACQUISITION

Pre-Design

Proposed boundaries to be developed in collaboration with NDC, so that agreed boundaries can be submitted to Cabinet for lands to be divested.

SITE AND UTILITY ACCESS

Design

Appropriate information to be made available to the utilities, so that they may design and programme their works accordingly.

Management - Government

Highway and junction to be adequately maintained by government.

PLANNING AND DEVELOPMENT CONTROL

Design - Government

Land use plans (Vision Plan, NDC draft plan) for this area to be rationalised in collaboration with MOPD and statutory referral agencies, subjected to requisite public scrutiny and comment before finalisation, and laid before Parliament for approval.

Development guidelines to be designed for this area to discourage undesirable activity within adjacent areas. This should include requirements for an appropriate inclusion of green/recreational space. Development plans for the area should be prepared in consultation with relevant authorities.

Land use plan to anticipate need for supporting residential, commercial and institutional space, to be available well in advance of polyclinic completion, priced to encourage local investment and designed to create opportunities for local entrepreneurs.

Suitable infrastructure (telecommunications, water, access, power) to be installed to appropriately service this area.

Development plans for the area to limit the number of access/egress points off the East Coast Road, to enable traffic to continue to safely attain design speeds.

Plan for future construction (when traffic levels warrant) of a roundabout rather than traffic lights to allow continuous flow of traffic on the Highway.

New hospital design to accommodate shops and vendors in appropriate facilities.

Architectural design and landscaping to be consistent with plans for this general area.

Management - Government

Strict development control to be enforced in this area, to prevent encroachment and illegal activity within adjacent areas.

Signage to be erected indicating no vendors allowed.

Physical barriers to be erected in locations likely to be attractive to vendors.

PLANS FOR NEW POLYCLINIC AT BOIS JOLIE REDUCED DUE TO LACK OF FUNDING

Design

Renovation works to be properly designed and executed, to ensure that this facility is as well suited to purpose as possible, within the known constraints.

Improvements making Dennery Village operation more cost effective and environmentally friendly to be instituted (improved waste management, improved electricals and plumbing, energy and water conservation measures, increased water storage, improved medical equipment, etc).

Dennery Hospital management to be integral in decision making processes for both Dennery Village and Bois Jolie sites.

Users to be properly consulted, to ensure that issues that prevailed with the old design are addressed to the extent possible, to improve operations and functionality at the new Bois Jolie site.

Experience at Gros Islet polyclinic to inform plans for Dennery Polyclinic, including development of a Polyclinic Operations Manual, to define the goal of the polyclinic, its organisation structure and staff reporting relationships, its functions, policies and programmes that guide operations of the polyclinic and the health centres and catchment population served.

A study to be undertaken of need for after hour services and 24 hour services.

Facilities such as x-ray and laboratory to be established in keeping with the level of support required in the management of referrals from health centres.

Rooms to be designed to be multi-functional to the extent possible to reduce space requirements, and facilitate sharing of space e.g. clinic consulting rooms, meeting spaces, exercise room.

Layouts and adjacencies to be planned cognisant of the need to minimise staffing requirements.

See Section 5.3 for more detailed recommendations for reducing project scope.

CONTRACT MANAGEMENT

Pre-Construction - Government

Corporate Planning Unit to be strengthened to facilitate management of this and other Works Contracts falling under the MOH during this period.

WATER SUPPLY

Pre-Design

WASCO to be provided with estimates of water supply requirements for construction and post construction purposes at the design stage, so that appropriate provisions can be made without adversely affecting the adjacent community supplies, and an adequate provisional sum for connection to water supply allowed for in the contract.

Pre-Design - Government

Access road designers to obtain details of WASCO infrastructure in areas where they cross over the WASCO pipelines so their works can be planned, and disruption to water supplies avoided.

SURFACE WATER MANAGEMENT

Design

Parking area to be semi-permeable to increase surface water infiltration and reduce runoff rates.

Vegetative cover to be maintained.

Surface runoff to be intercepted for site irrigation where possible.

Culvert below proposed access road and attendant drainage within the site to be constructed to convey water from the SDA church.

LOCAL EMPLOYMENT OPPORTUNITIES

Policy – Government

A sector wide policy framework to be developed, with a public policy towards the private sector.

Local companies to be allowed the same tax and duty concessions available to outside suppliers.

Government to create a fiscal environment that enables the private sector to expand support services such as accommodation, transportation, training and re-training, and any other identified through a process of consultation with the private sector.

Contract

Contract structure to encourage and maximise participation of local firms, sub-contractors, labourers, suppliers of services and equipment, once these are available and meet requisite standards.

The desirability of maximising local employment as a means of contributing to alleviation of local unemployment/underemployment to be emphasised at the pre-tender meeting of contractors, and at the pre-award meeting with the selected contractor.

The contract structure to encourage selection of labour intensive construction methods rather than plant intensive, and maximise participation of local suppliers of services, equipment, and sub-contractors.

Prospective contractors to be provided with the Labour Department's published Employer/Employee Guide.

PROTECTION OF THE ENVIRONMENT

Contract

Contract to require the contractor to take all reasonable steps to protect the environment on- and off-site, and to avoid damage or nuisance to persons or property arising from pollution, noise or other issues arising as a consequence of his methods of operation.

Contract to require all necessary precautions to be taken by the contractor to prevent land and water pollution, make the contractor responsible at his own cost for taking immediate remedial action and payment of compensation for any environmental damage resulting from his actions.

Contract to give the Engineer the authority to order immediate suspension or a halt to any activity which is causing, or is likely to cause significant environmental damage, and to require the contractor to make good any such damage at his own expense, in accordance with the instructions of the Engineer. The Engineer also to have the power to require the immediate and permanent dismissal from site of any member of the workforce who is committing or has committed acts prejudicial to the environment including trapping or killing of any wildlife (except vermin), unsanctioned felling of trees, theft or interference with property, washing of tools in the watercourse, offensive behavior and the collection of plants.

Contract to require particular care to be taken when activities are carried out in or in the vicinity of watercourses or water bodies to ensure that pollution does not occur.

HANDLING OF PUBLIC COMPLAINTS AND COMMUNITY RELATIONS

Contract

Contract to require assignment of responsibility for dealing with complaints from the general public to a named individual from the Contractor's site staff, designated Public Liaison Officer, whose name and contact details should be shown on the project signboard. A complaints register is to be maintained, which sets out the date and details of the complainant, the nature of the complaint, action taken, and other relevant matters. The register should be open for inspection by the Engineer.

Management – All Contractual Parties

Continuous briefing of user groups on status and design details.

SITE SECURITY, HEALTH AND SAFETY

Design

Security measures to be designed to protect staff and patients, particularly in ER and minor operating theatre. Measures may include restricted access, security cameras at strategic points, alarm systems, PA systems.

Adequate perimeter fencing and security lighting of entire compound, with manned security at all entry and exit points are required.

Contract

Site security to be continuous, to discourage criminal activity in the area.

The site to be lit at night.

The Contract to assign the contractor full responsibility for the adequacy, stability and safety of all operations and methods of construction; to require the contractor to have full regard for the safety of all persons entitled to be on the site; to require the contractor to keep the site and works in an orderly state appropriate to avoidance of dangers.

The Contract to specify that the standards and guidelines regarding health and safety shall be The Factories Regulations (Cap 106 of 1948), Employees (Occupational Health and Safety) Act (No. 10 of 1985) and relevant European Council Directives including 89/391 (framework), 89/655 (Work Equipment), 89/656 (Personal Protective Equipment) and 90/269 (Manual Handling of Loads).

The Contract to require that the contractor designate a senior member of his site staff, with an approved qualification in Health & Safety, as Health and Safety Officer, with the responsibility to ensure that all workforce health and safety matters are properly and fully addressed, including workforce training, and continuous assessment of health and safety issues.

Contract to require the contractor's method statements to be accompanied by a Health and Safety Plan, for approval of the Engineer, and all activities to be conducted in accordance with the Plan. Health and safety plan to be provided to the Labour Department for their review. Comments of the Labour Department to be incorporated into the Contractor’s Method Statements as appropriate.

Contract to require provision of adequate on-site first aid facilities with qualified first-aiders, together with approved evacuation plans/procedures for seriously injured persons. These may be included in the Health and Safety Plan.

Contract to require provision of protective helmets, safety boots, protective clothing, ear mufflers, dust masks etc, appropriate to the activities being undertaken by the

workforce, and make it a condition of employment that these are worn when appropriate.

Contract to require the contractor to provide lights, guards, fencing etc for protection of the works or for the safety and convenience of the public or others.

Contractor to carry the specified insurances.

Accidents to be promptly reported to the Labour Department and requisite procedures as laid down in the relevant legislation to be followed by Contractor. Near misses to be recorded by the Contractor's Health and Safety Officer, and the training programme designed to mitigate these.

All works to be carried out in accordance with the approved plans.

Management - Government

Vendors not to be allowed to become established on the public road.

Labour Department to review contractor's Health and Safety Plan.

Hospital operations

Staff to have ID cards and badges, so patients can identify them.

Medicine cupboards and trolleys to be under lock and key.

Grazing animals (sheep, goats) to be kept off compound.

Security to be adequately trained and armed, with a 24 hour per day presence.

SITE CLEARANCE

Contract

Contract to require contractor to take all reasonable steps to minimise erosion and siltation.

Contract to restrict the limits of areas to be cleared to those defined by the Engineer.

Contract to require the contractor to obtain approval of the Engineer for felling of any trees.

Contract to prohibit burning or burial as a means of disposal of cleared vegetation. All such material to be disposed of at the SWMA landfill site, composted on site, or made available to other users.

Contract to prohibit the use of herbicides in vegetation clearance or suppression of re-growth.

LANDSCAPING

Design

Landscaping plan in design should preserve as much of the natural vegetation and tree cover as possible, to reduce on extent of cleared areas, particularly in areas of secondary use.

Recommended species (See Appendix 10) to be used in the landscape design.

Selected species should not generate large quantities of clippings or green waste, as accumulation of these is to be minimised to discourage snakes.

Landscaping designs to be low maintenance.

Landscaping to be designed to reduce wind speeds and noise transmission across site boundaries.

Landscaping to enhance slope stability in benched areas.

SITE STABILITY AND EROSION/SEDIMENTATION COMTROL

Design

Design to minimize extent of lands to be cleared and provide for silt traps/curtains at appropriate locations.

Design to ensure that cut slopes are stabilised or otherwise retained.

Contract

Contract to require construction to be carried out such as not to promote instability during construction. Contractor to be required to submit for the approval of the Engineer, prior to commencement of excavation works, a method statement and detailed plan setting out precisely how the works are to be implemented, including the specific measures which will be taken to minimise instability during construction (including details of any temporary works), and the emergency procedures to be adopted in the event of instability developing.

Contract to require battering back or shoring of excavation sides.

Contract to require contractor to take all reasonable steps to minimise erosion and siltation.

Contract to require adequate precautions to be taken during earthworks to prevent soil material entering or blocking drainage channels and natural watercourses.

Contract to require effective measures to be taken to minimise silt increase in waterways, such as use of silt traps, silt curtains etc, and the use of settling ponds in cases where dewatering is needed.

Contractor's method statements to provide full details of siltation suppression measures.

Contract to set out requirements concerning establishment and maintenance of effective vegetative cover to minimise erosion.

Contract to require exposed areas to be grassed or otherwise protected against erosion with minimum delay.

All works to be carried out in accordance with the approved plans.

CHEMICAL AND FUEL STORAGE AND MANAGEMENT

Contract

Location of chemical and gas storage within the worksite to be approved by the Engineer.

Information of chemical locations, contents, appropriate emergency response and other details to be readily accessible to site management and at a specified location offsite, in the event of spill or injury. Procedures in the handling of chemicals or other hazardous material and in event of emergency to be clearly posted on the container.

Contract to require adoption of pollution prevention measures relating to fuel and oil storage/dispensing arrangements, to prohibit other than emergency maintenance of equipment and vehicles on the site, and require usage of spillage trays during on-site refueling of minor equipment.

WASTE MANAGEMENT

Contract

Contract to require waste oils arising from servicing of construction equipment to be disposed of at a licensed recycling facility.

Contract to prohibit washing of vehicles, plant and tools in or adjacent to any ravine or drainage course. All washing to be carried out at designated areas within the work site which have been approved by the Engineer, and are provided with oil/grease traps.

Contract to require the provision of adequate non-polluting worksite sanitary facilities, and prohibit the use of worksite pit latrines.

Contractor to abide by the provisions of the Waste Management Act of 2004, the Litter Act of 1983 and its amendments (1985 and 1993), and the Public Health Act of 1975 and its Regulations.

Contract to prohibit the entry of solid waste into drainage channels.

Contract to require the provision of a sufficient number of adequate waste receptacles across the site and regular collection services provided by a licensed collector. If contractor is hauling his own waste, legal requirements for proper containment of the waste to be observed, and disposal to be to an approved location.

Green and other waste not to be allowed to accumulate on site, to discourage rodents and snakes.

Soil/spoil should be kept separate from other construction waste, reused where possible, or taken to disposal at an approved site.

PROTECTION OF CULTURAL HERITAGE

Contract

The contract to require the contractor to take all reasonable precautions to prevent removal of or damage to articles of antiquity etc arising from accidental discoveries of such on the site, for such finds to be reported immediately to the Engineer, and for them to be dealt with in accordance with the instructions of the Engineer.

The Engineer to report any discoveries to the St. Lucia National Trust. In the event that the Trust fails to advise the Engineer of an appropriate course of action within 48 hours of their receiving notification of discoveries, the Engineer to use his discretion in instructing the contractor how to proceed.

WATER, ELECTRICITY AND OTHER SERVICES

Design

Drainage, roadways and other works in vicinity of existing pipelines to be appropriately designed.

Redundancies to be designed into the systems to reduce the risk of service discontinuity.

Designers to collaborate continuously with and abide by specifications of utility companies.

Power supply to be stable and steady to protect sensitive medical and other equipment.

Contract

The contractor to arrange for all connections (temporary and permanent) to the utilities.

In the event the contractor is likely to exceed the pre-construction demand estimates significantly, he is to be required to consult with WASCO and/or LUCELEC, so that a mutually agreeable solution may be arrived at, and the impact on Vieux Fort communities minimised.

Contractor to be required to conserve water and power.

Contract to require the contractor to identify and locate existing services on the site.

Contractor to clearly delimit installed locations on as-built drawings.

Contract to require all reasonable precautions to be taken by the contractor to protect services during construction and to require any damage arising from the contractor's operations to be repaired and reinstated forthwith by the contractor (or the authority concerned), at the expense of the contractor.

Contractor to facilitate supervision of utility installation works by the relevant service providers where this work is not being undertaken directly by the service provider.

Development – Government

Phased installation of services (power, water, telecommunications) to commence in advance of construction, with the capacity to fully service proposed development in the area (including Vision Plans).

For water (Dale Morgan, 2007), the following to be undertaken:

1. Improve reliability of area intakes
2. Vegetate river buffer zones to reduce turbidity
3. Reduce leakages and other system losses
4. Engage in public education to encourage conservation (at industry and individual levels)
5. Develop new intake(s) to ameliorate dry season shortfalls
6. Improve storage capacity to improve supply
7. Develop Troumassee Reservoir in the medium to long term.

DUST CONTROL

Contract

Contract to require appropriate measures to be taken to minimise dust generation including regular watering of works sections where dust is likely to cause nuisance, aggregate and soil stockpiles, and the adoption of site clearance procedures which minimise dust generation.

Contract to require that all material to be stockpiled within the worksite, public roads to be kept clean and free of mud, soil and other materials, and to authorise the Engineer to

make other arrangements to have work done at the contractor's expense, should the contractor fail to undertake prompt dust abatement measures.

Contract to require all moveable plant to be fitted with effective dust suppression equipment and to be operated and maintained in accordance with the manufacturer's manuals. Contractor to obtain all necessary permits and approvals from the relevant authorities before operation of such plant commences.

CONCRETE SUPPLIERS AND CONCRETE WORKS

Contract

In the event of concrete being supplied by a sub-contractor, the contract to require the contractor to demonstrate to the satisfaction of the Engineer, that the plant operator is in possession of all necessary permits, authorisations etc and is in compliance with any conditions imposed by the relevant authorities.

Contract to require particular care to be taken when activities are carried out in the vicinity of watercourses or water bodies to ensure that pollution does not occur. Special precautions are to be taken to ensure that materials such as cement dust, fresh concrete, lime and petroleum products do not pollute water bodies.

NOISE AND OTHER NUISANCE ABATEMENT

Contract

Contract to require all activities to be conducted in a manner which minimises nuisance to the general public. Where construction activities take place outside the hours of 7am to 7pm, the Engineer shall have the discretion to require appropriate measures to be adopted by the contractor to reduce noise levels.

Contract to require all vehicles to be maintained in accordance with manufacturer's original specifications and to give the Engineer powers to require immediate rectification, or the immediate removal from site for repair or maintenance, of any vehicles/ plant/ machinery which emit undue smoke or noise.

TRAFFIC MANAGEMENT, HAULAGE AND SITE ACCESS

Design - Government

Junction and access road design to be adequate for use by emergency vehicles, and to anticipate development on a scale envisaged under the Vision Plan.

Development Control and traffic management authorities to require SDA church to provide adequate on-site parking for worshippers, and to prohibit parking on the concrete road approaching the proposed polyclinic site from the East Coast Road.

Contract

Access road to be kept free and clear.

Noise, dust and air pollution generated by construction traffic to be mitigated as described above.

Appropriate signage to be provided on either side of the junction with the East Coast Road to alert other road users to possibility of slow construction traffic/heavy equipment crossing lanes etc., subject to the approval of the Transport Board.

Contract to require that at all times, the contractor shall take care to protect the public and facilitate the uninterrupted flow of traffic during his operations and use of construction plant.

Contract to require all operations to be carried out so as not to interfere unnecessarily or improperly with the convenience of the public, or access to and use and occupation of public or private roads, footpaths and properties.

Contract to require the contractor to adopt every reasonable means to prevent damage to roads or bridges communicating with or en route to the site by his, or his subcontractors' traffic.

Contract to make the contractor responsible for the cost of reinstatement of pavement or structures which have been damaged by his or his subcontractors' haulage traffic.

Contract to require all haulage to be carried out using vehicles of types and capacities appropriate to task and to require compliance with gross vehicle weight restrictions imposed by vehicle licensing authorities and all laws and regulations pertaining to vehicle use on public roads.

Contract to require tracked equipment to be transported to site on appropriate transporters, and not to track directly on the public road pavement.

Contract to require load sheets to be used when material susceptible to fugitive dust is hauled on public roads, all tailgates and dropsides to be properly secured, no overloading of loose materials above truck sides, and all loads to be properly secured.

Contract to require compliance with speed restrictions imposed by the relevant authorities.

Contract to require particular care to be taken to ensure that concrete mix trucks and fuel tankers are loaded and driven in a manner which does not result in spillage, and make the contractor responsible, at his own cost, for cleaning up spillages or shed loads without undue delay.

Contract to require public roads which have material deposited on them as a result of the contractor's activities, to be kept clean and free of mud, soil and other materials.

PARKING/STOCKPILING OF MATERIALS

Contract

Contract to require the contractor to advise the Engineer of his proposed arrangements for the temporary storage of construction materials and wastes within the worksite.

Parking areas for employees' private vehicles to be located within the worksite, in approved areas.

No parking or stockpiling of materials to be allowed along the public roadways.

Lands beyond the boundaries of the worksite are not to be used by the Contractor for any purpose, unless he has the pre-approval of the owner, Engineer and other statutory authorities.

Stockpiles on sites other than the worksite to be subject to the approval of the Engineer and relevant statutory authorities, and contractual conditions applying to the care and maintenance of the worksite to apply to any other site in use by the contractor.

No materials shall be stored so that they encroach on, or in any way adversely affect operation of, sections of roadway and sidewalks/road reserves which are in use by the public, impede access to premises or side roads and tracks, or result in siltation or blockage of drains.

SITE CLEAN UP AND CONDITIONS OF TAKING OVER CERTIFICATE

Contract

The contract to require that, on the issue of a Taking-Over Certificate, the contractor shall clear away and remove from the site all equipment, surplus material, rubbish and temporary works, and shall leave the site in a clean and workmanlike condition to the satisfaction of the Engineer.

In the event other lands are affected, the conditions stipulated in the Taking Over Certificate should also apply to these.

7.7.3 Mitigation and Benefit Enhancement Measures – Post Construction

Some of the recommendations made below are quite detailed, and may trespass within the realm of design. They are not meant to be exhaustive, but are recorded here because they were raised as issues of particular concern by stakeholders during interviews.

STAFF MORALE

Design

Staff to be kept informed of national health sector plans, and how they fit into these presently and in the future.

Staff to be continuously consulted regarding detailed planning for Dennery Village and Bois Jolie.

Staff to be continually exposed to training and skills upgrading.

Sufficient resources to be made available for community health facility operations, even in temporary facilities, while planning for new facility is ongoing.

RELOCATION, COMMISSIONING AND DE-COMMISSIONING

Design

Plans for future use of the renovated Dennery Village facility to be finalized, with appropriate consultation, before decommissioning.

Relocation activities to be properly planned to optimise efficiency and minimise disruption to staff and patients.

Relocation back to renovated Dennery Village facility to be expedited.

Management

An in-house Change Management team to be established to plan and implement the decommissioning /commissioning process, with appropriate support from the central agency.

Team building strategies that reinforce desirable behaviors, and change undesirable behaviors to be implemented.

A strong orientation programme to be implemented to facilitate early familiarization with new facilities, duties in the new environment, etc.

MOH management to capitalise on the experience of the current facility staff in the new/ renovated facility commissioning.

Health Centres at La Ressource and Richfond to be returned to normal use in good state of repair.

POSSIBLE FUTURE EXPANSION

Pre-Design - Government

Adjacent lands to be designated for development complementary to adjacent polyclinic use.

Design

Design to be sufficiently flexible to efficiently incorporate foreseeable new specialities in the future.

OPTIMISE EFFICIENCIES AND BUILD IN FLEXIBILITY

Pre-Design

MOH Planning Department and user groups including all levels of health facility staff, to agree, *inter alia,* requirements of Dennery Polyclinic in the national context, staff and patient requirements, an acceptable Schedule of Accommodation (within the constraints of available resources), effective adjacencies, separation of activities, access, location of entry and exit points to avoid cross contamination and facilitate free flow, particularly in a mass casualty situation.

Design

Design to be premised on the need for efficiency in use of space, staff and other resources. Waiting and clinic spaces to be multifunctional. See Section 5.3 of this report for further recommendations in this regard.

Polyclinic design to be to international health facility standards.

Separation of activities to be ensured.

Entry and exit points to be set out to avoid cross contamination and facilitate free flow, particularly in mass casualty situation.

Patients in observation to be easily visible from the nurse's station. Nurse's station to be sufficiently soundproof that patients cannot hear discussions within.

Efficient M and E and plumbing designs to be developed.

Use to be made of energy and water conservation devices.

Use to be made of renewable energy resources (solar, wind) where feasible. Use to be made of solar power for heating, cooling and other purposes.

A/C use to be minimised, and natural ventilation maximized, particularly in patient accommodation.

Power supply to be stable and steady.

Spaces housing sensitive equipment to be air conditioned.

HEALTH SECTOR REFORM

Policy - Government

The MOH and the government to commit to, prioritize and fully implement health sector reform proposals (including health financing and management restructuring) prior to commissioning of the new hospitals and polyclinics.

Plans for future (complementary) use of VH and St. Jude Hospital to be finalized in the context of health sector reform, and staff informed accordingly.

National plans for location of required specialist services to be finalised, whether these be within the new general hospital or SJH.

Community health services to be improved.

Management – Hospital Management and Government

Government to capitalise on the experience of the current health facility leadership and staff in management of transition activities from Richfond Health Centre, first to Dennery Village renovated facility, and finally to Bois Jolie in new facility commissioning.

Health facility services (systems, HR, protocols, administration) to be to international standards.

A appropriate Quality Management System (QMS) to be developed before commissioning of the new hospital.

Periodic audits by the MOH to be conducted, to ensure appropriate corrective action is taken.

Community health services offered via polyclinics and health centres to be improved and appropriate public education undertaken, to ensure that the new general hospital and SJH can truly function as referral hospitals.

Adequate budget to be made available for equipping, staffing and maintaining hospitals, polyclinics and other public health service providers.

HR Management – Dennery Hospital Management/Government

A review of manpower requirements versus manpower available in the context of health sector reform plans is required. Training needs to be determined. An integrated programme of training and continuing professional development for all levels of professional and paramedical ancillary staff facilitated by study leave and tax benefits to be provided, with relevant specialties to be placed on government's priority list for training.

Staff at all levels to be trained or retrained in customer service, customer care, IT, new technology, best practices, and oriented to systems to be implemented in the renovated/new facilities.

MOH to identify national specialist training requirements, and to support training opportunities.

Specialty training to be provided for staff/adequately trained staff to be recruited.

Private Sector Participation - Government

Private sector to provide support services (accommodation, transportation, ancillary specialist services, training and re-training) where feasible.

System of contracting of medical consultant's services to be improved. Their roles must be properly defined. Information of their availability to be made freely available to the public.

Management of Information - Government

ICT systems to ensure that adequate security and confidentiality of information is maintained.

The polyclinic to be well connected to local health centres, hospitals, offices and internationally; the ICT system to facilitate teleconferencing, telemedicine etc. and provision of training and on line consultation, providing a continuum of care between the hospital and community services.

MOH Research unit to be strengthened to fully utilize available information.

Policy makers to be receptive to recommendations based on such research, so that policy, protocols and actions in health and other sectors are informed. Environmental health research and surveillance also to be improved, using intelligence gathered by the health facilities.

UNIVERSAL HEALTH CARE

Management - Government

Universal health care coverage to be provided.

Revenue mechanism to support UHC to be instituted at the earliest, and certainly in advance of commencement of operations in new hospitals and polyclinics.

Public awareness and education programmes to be implemented to encourage the public to make adequate NHI contributions in exchange for a good standard of service.

NOISE AND OTHER NUISANCE TO ADJACENT RESIDENTS

Design

Berms and vegetation to be used between the hospital structures and their neighbours to absorb/reflect noise.

Management - Government

The hospital and environs to be designated as a quiet zone, with appropriate new legislation promulgated to facilitate this if necessary.

COMMUNITY RELATIONS

Management - Government

Regular meetings between the community and polyclinic management to be convened.

Pertinent laws to be rigorously enforced by the relevant authorities (development control, speed limits, etc).

TRANSPORTATION

Design

Free/subsidised transportation to and from the polyclinic to be provided for the vulnerable, disabled and chronically ill.

ACCESS AND TRAFFIC MANAGEMENT

Policy - Government

Number of access/egress points off the Highway to be limited, to enable highway traffic to continue to safely attain design speeds.

Access Road Design - Government

Low growth vegetation in the vicinity of junctions to be planned, not obstructing lines of sight.

Road signs to be erected to direct drivers to the new polyclinic.

Signage to be erected on the highway indicating no vendors allowed.

Physical barriers to be erected in locations likely to be attractive to vendors.

A pedestrian/vehicular traffic management & control system to be instituted.

Junction design to incorporate bus stops/laybys.

A crossover on the Highway for pedestrians to be constructed.

Appropriate pedestrian access to be provided from the highway to the hospital.

Hospital Design

Sufficient parking for staff and visitors to be provided within the hospital compound.

Booths/kiosks to be designed into the hospital proposals.

Secure, manned entrance way, clear of vendors and other activity to be provided.

Adequate, dedicated parking and traffic control to be provided for emergency vehicles.

Management - Government

No parking to be allowed on the East Coast Road.

Active policing and use of lands by landowners, supported by enforcement of the law by development control authorities to limit activity on public road reserves.

Patrols by traffic police to be increased, and speed limit more rigorously enforced.

Selected vendors to occupy booths within the compound to be organized to regulate themselves.

HEALTH AND SAFETY

Design

Design to facilitate provision of selected services.

Design (building and equipment) to meet international health and safety standards for health facilities.

Countertops and cupboards in dental and pharmacy spaces to be stainless steel.

Building finishes not to encourage growth of mould.

Appropriate signage to be erected in hazardous areas.

An isolation/decontamination area for emerging infectious diseases to be provided in accordance with national protocols to be developed.

Adequate sluice rooms for domestics; dirty rooms for used dressings, equipment (e.g. bedpan) cleaning etc to be provided.

An alarm to be provided in ER and minor ops theatre.

Management – Hospital Management in collaboration with Government

A risk assessment for infectious agents, human pathological waste, blood and blood products, other waste (e.g. mercury from thermometers, sphygmomanometers; lab reagents, dental fillings) to be undertaken.

An Environmental Management System (EMS) to be developed. A member of staff to also be designated environmental manager required to ensure, among other things, that the emergency evacuation plan is current, noise control measures are in place, chemical and gas storage is appropriate, waste management is appropriate, air pollution controls are appropriate, surface water is controlled, etc.

MOH to supply Labour Department with a Health and Safety Plan, to ensure protection of employees, patients and adjacent residents. Plan to be regularly updated.

A designated health and safety officer on hospital staff to be responsible for training and continuous assessment; to ensure compliance with health and safety clauses of the various union agreements, appropriate insurances are kept current, accident reduction and investigation, protective clothing is provided and used, etc.

Infectious disease control plan to be developed and kept current, with appropriate training for all staff.

STAFF FACILITIES

Design

Facilities to be provided for on call staff to heat and eat food, in the vicinity of the ER and observation area.

Adequate provision of lockers, changing rooms, showers, washrooms, etc. to be made.

Management - Government

Adequate transportation for staff working late shifts to be provided.

PATIENT FACILITIES

Design

Paediatric waiting and treatment space design to be cheerful.

A playroom to be provided for paediatric patients to play and eat.

Waiting room for ER to be cheerful, comfortable and welcoming.

Privacy of patients to be protected through design and various security measures.

Appropriate visitor seating areas to be provided in every Dept.

Access for wheelchairs to be provided, including to toilets.

Appropriate internal signage to guide hospital users to be provided.

FIRE SAFETY

Design

Fire protection measures to meet Fire Department's specifications.

Design to provide for fire hydrants to be installed to WASCO and Fire Department specifications.

Fire safety precautions to be clearly posted.

WASTE WATER MANAGEMENT

Planning- Government

For sewage, municipal collection and treatment capacity to be developed.

Monitoring – hospital management

Effluent quality to be properly and regularly monitored by an independent, competent authority.

Design

Appropriate waste water on-site treatment technology to be selected.

All wastewater including laundry and grey water to be intercepted and treated to international standards.

WASCO and the Water and Sewerage Commission to be advised of proposed sewage treatment plant selection and capacity at design stage.

Selected treatment system to be robust, with low maintenance requirements, while achieving requisite effluent quality standards. Sewage plant to meet the more stringent of effluent standards in Health guidelines (20/30) and Recreational Water Quality Standards (including Land Based Sources of Marine pollution protocols which depend on receiving water body characteristics).

If on-site treatment is selected, effluent to be recycled for landscape irrigation. Irrigation system to be drip type rather than spray.

Grease traps to be provided on kitchen wastes.

Management and Operations – Government and Hospital Management

Adequate resources to be made available to maintain waste water treatment plant properly. Maintenance to be by properly trained personnel, outsourced if necessary.

Effluent quality to be properly monitored by an independent, competent authority.

Adequate resources to be made available to properly maintain waste water treatment plant by adequately trained personnel, outsourced if necessary.

SOLID AND BIOMEDICAL WASTE MANAGEMENT

Junction Design - Government

Solid waste receptacles to be provided in vicinity of laybys/bus shelters.

Polyclinic Design

Separate housing to be provided for solid and biomedical waste.

- storage space to be ventilated;
- floors and walls to be tiled, with access to hot and cold water, and drain to waste water treatment;
- provide safe access for orderlies and to allow wheeling of bins (particularly important for biomedical waste);
- provide access and turning space required for an open back truck or compactor truck.

Each waste generating station in the hospital to have one black and one red bin, suitably sized.

Within the hospital, 240 L bins to be used, with 770 L bins to be used in the storage area for solid waste.

Management – Government and Polyclinic Management

Continuous training in waste (particularly biomedical waste) management to be provided for all staff.

Biomedical waste management plan to be revised and kept current.

A solid waste management plan to be prepared.

Green and other yard waste to be cleared promptly.

RODENT AND BAT CONTROL

Design

Rodent prevention designs to be incorporated throughout eg.L shaped foundations to discourage burrowing; tightly fitting, self closing doors, bottom plated openings, sealed/screened openings, screened drainage pipes, etc.

Kitchen and food preparation areas to meet Food Regulations under Public Health Act.

Landscaping design to lend itself to easy maintenance of grounds.

All external vents and windows to be screened with bat screening or netting.

All windows and doors to be properly sealed.

Monitoring plan

All screens to be monitor and maintained as part of overall maintenance plan.

Walls to be routinely inspected for gaps and openings (e.g. between soffits and facia) that may permit bat/snake entry, and these to be sealed.

Should bats make their way into the building, electronic (ultrasound) devices to be installed.

Management – Hospital Management

A Vector Management plan to be incorporated into the overall maintenance plan.

Vector management plan to include the neighbouring community.

INSECT CONTROL

Design

Hospital to be designed with insect screens.

Management

All sources of standing water within the hospital site to be eliminated.

FUEL AND CHEMICAL MANAGEMENT

Design

Storage sites to be designed to appropriate standards including provision of leakage and fire alarms, sufficiently distant and preferably located downwind from the hospital facility.

Fuel tanks to have secondary containment.

Procedures in the handling of chemicals (including protective clothing required) and in event of emergency to be clearly posted on the plant or storage containers.

Management – Polyclinic management

Up to date information of explosive and other toxic/hazardous materials, including locations, contents, appropriate emergency response and other details to be readily accessible to hospital management and to emergency response services, in the event of spill or injury.

Fuel and chemical storage facilities to be routinely inspected under a documented maintenance programme.

MEDICAL EQUIPMENT

Procurement Planning

Inventory and assessment of available equipment to be taken, and list of equipment required to be developed on that basis.

FACILITIES AND EQUIPMENT MAINTENANCE

Design

Building finishes to be low maintenance.

Maintenance section to be adequately sized and equipped.

Management – Polyclinic Management

A comprehensive maintenance plan to be developed.

Maintenance to be outsourced if necessary.

Training – Government and Polyclinic Management

Adequate equipment operator and maintenance training (in specialist medical equipment) to be provided.

Medical technologists to be sent on training prior to construction completion.

Training in medical technology to be put on the government priority list.

SECURITY

Design

Building to be secure, with manned entrances, and appropriate security measures in hazardous material and drug storage areas.

Secure perimeter fencing (or other enclosure) and continuous manned security to be in place at the site entrance and exit.

Security measures required to protect staff and patients, particularly in ER and theatre, to include restricted access, security cameras at strategic points, alarm systems, PA systems.

Adequate security lighting of entire compound to be provided.

Medicine cupboards and trolleys to be kept under lock and key.

Management – Polyclinic Management

Police patrols in the area to be increased.

Staff to have ID cards and badges, so patients can identify them.

Grazing animals (sheep, goats) to be kept off compound.

DISASTER PREPAREDNESS AND RESPONSE

Design issues

Hospital and ancillary works to be adequately designed against disasters such as earthquake, hurricane, fire, landslide, flood.

Adequate back up services to be provided (water supply, power generation and fuel supply, emergency communications system).

Evacuation routes, emergency exits and safety points to be clearly defined.

Utilities (power, telecommunication) to be run underground.

Management issues – Polyclinic Management

Disaster preparedness and mass casualty response plans to be developed and staff prepared to respond to disaster situations, including mass casualty and evacuation procedures.

Emergency response drills to be regularly undertaken.

Systems to be developed to enable the authorities to account for all patients, especially in the event of disaster/evacuation.

Adequate stock of essential emergency supplies to be maintained.

Operational budget of the polyclinic to facilitate the upkeep of stocks.

Community to be included in development of evacuation and disaster response plans, and in planning of drills.

EMS SERVICES

Policy and Management Issues - Government

An agency dedicated to EMS to be established, independent of the fire service, to be managed by a Medical Director attached to the main general hospital ER. EMS agency to have an ambulance garage, classrooms for in-service training and storage of equipment.

EMS services to be raised to international standards.

A central dispatch agency to be established with trained dispatchers, to receive calls and route them to the appropriate agency(s) – police, fire, EMS. Dispatchers to be trained to interrogate callers, to inform EMS or other services of their requirements, and to advise callers on first aid to be administered.

EMTs to be properly trained.

Continuous public education to be provided on how to access and use the EMS.

Continuous public education to be provided on first aid.

Sufficient staff levels and other resources to be provided to the EMS.

Dennery polyclinic to have 2 ambulances assigned, given distance to the general hospitals. Ambulances to be suitable staffed (3 shifts each with a driver/first responder and EMT).

EMTs assigned to Dennery Polyclinic to assist in the polyclinic ER when not on call.

7.7.4 Uncertainties in Impact Assessment

Many of the possible benefits of this project will derive from a commitment to health sector reform. However, the pace at which health sector reform including UHC will be implemented is unknown. To date, targets set in the National Strategic Plan for Health have not been met. It is possible that commissioning of the new general hospital in Castries and the reconstructed SJH in Vieux Fort may catalyse health sector reform implementation, but this remains to be seen.

This EIA was prepared during the project conceptual design phase. Design briefs had been prepared by the Ministry of Health, and preliminary layouts on this basis were prepared. Because of funding constraints however, it will likely not be possible to build the facility as envisaged unless significant additional funds are identified. Given that the new general hospital and renovated SJH are being commissioned during the same period, it is unlikely that identification of additional funds for Dennery Polyclinic will be a short term priority for the Government. It is recommended therefore, that the scope of the proposed development be scaled back considerably, to fit the available funding, but to a phased design, on the assumption that the facility will be expanded to the scale originally envisaged, over time.

In light of the funding constraints, the precise nature and scope of works and the form of the proposed structure and ancillary works are likely to be re-defined. The EIA is therefore inherently subject to a number of uncertainties. However, It is believed that the level of uncertainty regarding impact occurrence and magnitude is acceptably low and, in terms of assessment of the effects on overall environmental performance of the project, is insignificant, because:

- A rigorous approach has been taken to impact identification, taking into account the likelihood of occurrence and other characteristics of a very wide range of potential impacts, based on experience of broadly similar projects elsewhere, as well as on consultation with a number of local bodies with relevant environmental and other interests.
- A rigorous approach has been adopted in relation to adverse impact minimisation and avoidance and to beneficial impact enhancement, such that effective control of impacts will be possible, regardless of the effect which uncertainties regarding the precise nature and scope of the works may have on the nature and extent of predicted impacts.

Before the EIA was commissioned, Cabinet had been requested to approve the use of a 1.5 acre site at Bois Jolie for new polyclinic development. It is not clear whether a Conclusion in this regard was ever returned to the Ministry of Health. Since then, there has been a regime change, and the conceptual plan has been developed. It is recommended that a revised application be made to Cabinet, to ensure that there is support for the use of Bois Jolie lands for this purpose (notwithstanding their

compatibility with overall plans for this general area), and to increase the area of land being requested to at least 5 acres.

A number of options may be considered to reduce the scope of the proposed Bois Jolie development (refer to Section 5.3 of this report). But many of these are contingent on national health policy and protocols, such as:

1. baby delivery. To reduce on community health care costs, and ensure that all deliveries are subject to the same quality of care, deliveries should all take place at a general hospital, where obstetricians and paediatricians are more readily available if necessary. If routine deliveries are planned within communities at the polyclinic level, then these specialists need to be available, and this will be at considerable recurrent cost. Notwithstanding, there should still be a capability to manage emergency deliveries at the polyclinic.

2. accident victim and other serious injury handling. These should be triaged at the accident site and transported directly to a general hospital. This will require upgrading of EMS to provide an adequate on site response, and will dictate the level of service available at the polyclinic ER.

3. Management of EMS including ambulance services. In the Dennery region there is need to increase the number of ambulances and EMTs, particularly if a 24 hour service is to be offered at the Dennery polyclinic, as well as to facilitate the movement of women in labour and accident victims as noted in 1 and 2 above. At a national level, the management of ambulances and other EMS services needs to be reviewed. All should be under the purview of a single agency. Consideration should be given to removing ambulances from the management of the Fire Service, or establishing upgraded EMS services within the Fire Service.

4. dialysis availability. There was a call from a number of persons for dialysis service to be offered at the Dennery polyclinic. It needs to be determined whether the numbers of cases within this health region warrant a dialysis unit at this location, as the costs of its operation (primarily staffing) would need to be justified.

7.7.5 Overall Project Environmental Performance

Although a large number of potentially adverse environmental impacts have been identified, all can be mitigated satisfactorily through adoption of the specified mitigation measures, and residual impacts can be reduced to acceptable levels, provided that the measures are fully adopted and/or enforced. From a strictly environmental impact perspective therefore, there are no grounds for concluding that the project as currently conceived should not proceed.

The beneficial impacts associated with the project relate primarily to health service improvements within the Dennery Region. The overall long-term benefits of project implementation outweigh the adverse impacts, as health services in this community are

currently highly inadequate. There are implications for health care costs, and the proposed development must be efficiently designed to effectively complement concurrent improvements in health services, particularly in the general hospitals, at a national level. As noted in the previous section, a number of policy decisions therefore need to be made, to properly define the service to be offered at the Dennery Polyclinic and guide that project design, optimising national health care costs, while delivering the quality of care envisaged under the Health Sector Reform Plan.

7.7.6 Analysis of Alternatives

The "Do Nothing" Alternative

The "do nothing" alternative is unlikely, given that tenders have been invited for the renovation of the old Dennery Village facility. This alone would still be insufficient, however, as that facility was already inadequate before its operations had to be terminated due to the damage caused by Hurricane Tomas. From an environmental viewpoint, the "do-nothing" alternative has merit in that the adverse impacts associated with construction and subsequent operation would not occur. However, from a socio-economic viewpoint, the possible benefits of improved health services would be foregone. It is noted that without health sector reform, the significant improvements in public health services that are possible will not be fully achieved, regardless of whether or not a new polyclinic is built. Taken overall, the long-term beneficial impacts of the project significantly outweigh the mostly short-term adverse impacts associated with the construction phase, all of which can be reduced to an acceptable level through adoption/enforcement of the specified mitigation measures.

Other Alternatives

Alternative sites have not been seriously considered for the new facility. A location close to Dennery Village is preferable as, since closure of the Dennery Hospital, the closest primary health care services are at La Ressource and Richfond Health Centres, and this poses significant transportation costs on Dennery Village users. A location close to the East Coast Road is convenient for persons within the region who need to access emergency and specialist services to be offered at the polyclinic. Many areas within Dennery tend to be flood prone, and this further limits the location options available.

7.8 Next Steps

Should renovation of the Dennery Hospital and construction of a new polyclinic at Bois Jolie proceed, efficient implementation of the recommended measures is necessary to avoid, minimise or offset adverse impacts and to promote beneficial impacts, resulting in an enhancement of the overall environmental performance of the project. Effective

environmental management can only be achieved if it is carried out within a formalised framework based on some fundamental general principles. These are:

- Environmental management should be fully integrated within the overall project management framework, directed towards achieving an environmentally sustainable project which meets its intended purpose, functions efficiently throughout its life, and results in minimal adverse environmental impact.
- Environmental management should not be considered as separate from other activities relating to preparation, implementation and subsequent operation of the project.
- Individual management/monitoring responsibilities and functions need to be clearly defined to ensure that there are no gaps which might prejudice environmental performance of the project.
- Procedures relating to environmental management should be formulated to cause minimum disruption to, and fully integrate with, other aspects of project management. The usual management structure, reporting systems and meetings should be used for environmental management.
- Successful environmental management requires a strong commitment at all levels of project management, and in all bodies concerned, if it is to achieve worthwhile results. Effective and timely liaison between the various relevant bodies is also vital.

Environmental monitoring is a basic tool to provide information for decision-making by project management. It should be organised in a manner that facilitates the early recognition of potential problems, so that appropriate remedial action can be initiated before serious environmental damage, danger or inconvenience have been caused.

The Bid document, addendum 1 to 6 and clarifications 1 and 2 can be accessed via the following:
https://drive.google.com/drive/folders/0B4DrCcOaCQj9QVBfY2ZuSEpNd2s?usp=sharing