



Project Number JA-L1049

Environmental and Social Assessment (ESA) and Environmental and Social Management Plan (ESMP) for the Health and Systems Strengthening Program for the Prevention and Care Management of Non-Communicable Diseases in Jamaica.



Version 1, July 25, 2018

Inter-American Development Bank (IDB)



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Abbreviations and Acronyms

Acronym	Definition	Page
AOI	Area of Influence	17
CEO	Chief Executive Officer	71
CEPF	Caribbean Islands Biodiversity Hotspot	24
EHS	Environmental, Health and Safety	7
EIA	Environmental Impact Assessment	14
ESA	Environmental and Social Assessment	1
ESIA	Environmental and Social Impact Assessment	77
ESMP	Environmental and Social Management Plan	1
GIIP	Good International Industry Practice	14
ICU	Intensive Care Unit	7
IDB	Inter-American Development Bank	1
IFC	International Finance Corporation	14
JPS	Jamaica Public Service	24
KMA	Kingston Metropolitan Area	54
KPH	Kingston Public Hospital	8
MASL	Meters Above Sea Level	41
MLSS	Ministry of Labor and Social Security	13
MOH	Ministry of Health	12
NEPA	National Environmental Planning Agency	7
NEPM	North Eastern Parks and Markets Limited	63
NERHA	North East Region Health Authority	12
NLJ	National Library of Jamaica	28
PSJ	Public Service of Jamaica	37
RDA	Regional District Authority	77
RINA	Rina Consulting S.p.A.	2
UNOPS	The United Nations Office for Project Services	65
WHO	World Health Organization	17
WLG	White Limestone Group	19
WRA	Water Resources Authority	22
WWF	World Wildlife Fund	25
WWTP	Waste Water Treatment Plant	69
YLG	Yellow Limestone Group	17

Executive Summary

The objective of this study is the conduct an Environmental and Social Assessment (ESA) and Environmental and Social management Plan (ESMP) of the Rehabilitation and Upgrade of three hospitals in Jamaica: Spanish Town Hospital, May Pen Hospital, and St. Ann's Bay Hospital. Spanish Town Hospital is located in Spanish Town, the capital of St. Catherine Parish; May Pen Hospital is located in May Pen, the capital of Clarendon Parish; and St. Ann's Bay Hospital is located in St. Ann's Bay, the capital of St. Ann Parish. The rehabilitation and upgrades of the three hospitals is conducted as part of the "Support for the Health Systems Strengthening Program for the Prevention and Care Management of non-Commutating Diseases" project.

The ESA & ESMP was carried out within the framework of the IDB's Environment and Safeguards Compliance Policy, as well as national and international laws, regulations, and procedures in the assessment and development of this project. The study includes the Environmental and Social Diagnosis of the area of influence of the Project, the Identification and Assessment of Environmental and Social Impacts, and the Environmental and Social Management Plan (ESMP). The purpose of this ESA is also to provide a general assessment regarding the Ministry of Health's (the Executing Agency) current institutional capacity through a review of publicly available documentation and stakeholder engagement.

The Environmental and Social Diagnosis considers the physical, biological, and socioeconomic context. This diagnosis was carried out using secondary public information sources, as well as on site visits conducted by the Consultant. The ESMP was developed upon the identification of environmental and social impacts expected with the rehabilitation and upgrade works that are part of the implementation of the Project.

The methodology for the identification and assessment of impacts included:

- i) identification of the main actions of the project to be executed;
- ii) identification of the main environmental and social factors present in the area of influence of the project;
- iii) a matrix of interaction between the actions of the Project and the identified environmental and social factors; and
- iv) analysis and assessment of the environmental and social impacts generated by the Project.

Preliminary public consultative forums were held at the three hospitals and included primary stakeholders largely made up of hospital staff. The benefits and risks of the project were presented to hospital staff, obtaining feedback that was incorporated in the assessment. The primary stakeholders responded positively to the development as long as mitigation measures were developed for the construction activities. The key concerns raised during consultations included dust, vibrations, noise, and continuity of care. In addition, hospital staff indicated that the management of construction workers could be a concern, due to potential patient privacy considerations. Details regarding stakeholders' observations and recommendations for the project construction phase are including in the ESA.



The anticipated negative environmental construction phase impacts are mainly located within the hospital grounds. These include impacts such as noise pollution, vibrations, airborne emissions, soil contamination, and water resource contamination, and an increased generation of solid waste. The social impacts of the project will be largely contained to hospital staff, patients, food vendors located in and near the hospital, and the communities living within the surrounding areas of the hospitals. The social impacts examined in this analysis include occupational health and safety issues, disease contamination, increased traffic on hospital grounds, community safety issues, livelihood and economic displacement, and the need to ensure grievance redress. Overall, the project is expected to have positive long-term social impacts that include improved access to healthcare and healthcare services, with improved accessibility for patients to hospitals infrastructure and services.

1 Introduction

This Environmental and Social Assessment (ESA) and Environmental and Social Management Plan (ESMP) are focused on upgrades and rehabilitation works at Spanish Town, May Pen, and St. Ann's Bay Hospitals. This project has been classified as low-medium risk Category "B," likely to have only "local and short-term negative environmental and associated social impacts for which effective mitigation measures are readily available."

Category B projects do not pose any significant environmental and social risk and impact. However, an Environmental and Social Assessment (ESA) needs to be developed, to include Environmental and Social Management Plans (ESMP) to mitigate the anticipated local and short term impacts. The ESA/ESMP report presented here, contains the following sections:

- Section 1 Introduction
- Section 2 Institutional, Legislative and Regulatory Framework
- Section 3 Executing Agency's Current Capacity
- Section 4 Environmental Context
- Section 5 Section Social Context
- Section 6 Public Consultations to Date
- Section 7 Environmental and Social Risks and Impacts
- Section 8 Environmental and Social Management Plan

To minimize and / or mitigate the identified social and environmental impacts during the construction and operation phases of the project, the following Management Plans were developed:

- Institutional Strengthening Management Plan
- Solid, Debris and Hazardous Waste Management Plan
- Medical Waste Management and Disposal Management Plan
- Occupational and Community Health and Safety Risk Management Plan
- Emergency Response Management Plan for Construction and Operation Management Plan
- Traffic Management Plan
- Wastewater (stormwater and effluent discharge) Management Plan
- Asbestos Management Plan
- Stakeholder Engagement Management Plan
- Consultation Management Plan
- Grievance Mechanism Management Plan
- Social Disturbance Management Plan
- Patient Privacy Management Plan

2 Program Description

2.1 Program Justification and Objective

The general objective of the program, “*Support for the Health Systems Strengthening Program for the Prevention and Care Management of Non-Communicable Diseases*” aims to improve the health of Jamaica’s population by strengthening comprehensive policies for the prevention of non-communicable diseases (NCD) risk factors. The program also strives towards the implementation of a chronic care model with an improved access to strengthened and integrated primary and hospital service networks. The policies supported by the program are not expected to cause significant effects on Jamaica’s environmental or social context. (IDB, 2018)

The executing agency for this program is Jamaica’s Ministry of Health (MOH). The MOH is responsible for political, fiscal, and administrative decentralization within the health system. The five main political and social problems that affect the health situation or the performance of the health services are: poverty; inadequate financing; provider and public demands for high quality health services for little cost; chronic shortages in a number of health professions; and, little control or regulation over the private health sector. (PAHO, 2018)

2.2 Program Components

The program includes the following components:

Component 1 will include the organization and consolidation of integrated health services networks. This component will also finance the upgrading and expansion of Spanish Town, May Pen, and St. Ann’s Bay Hospitals. Activities include:

- Infrastructure reform;
- Modernization and construction of new wards, surgical theaters, and intensive care units, and other functional areas);
- Finance towards the purchase of medical equipment; and
- Finance towards the improvement of infrastructure for 2-3 primary health care centers (to be defined) in the catchment areas of these hospitals.

Component 2 will focus on the improvement of management, quality, and efficiency of health services. Activities include:

- Finance of the finalization and implementation of a health information system with functionalities in patient registration, medical health records, laboratory, outpatient scheduling, pharmacy, and other relevant services;
- Review and development of norms, protocols, clinical guidelines, and care pathways; and
- Reference and cross-reference procedures within the integrated health services networks.

2.3 Activities

The table below details the specific upgrade and rehabilitation works to be completed for each hospital in the program. The rehabilitation and upgrade works will take between 6 and 10 months.

Table 2.3-1: Upgrade and Rehabilitation Works for Program

Rehabilitation / Upgrade	Spanish Town Hospital	May Pen Hospital	St. Ann's Bay Hospital
New bed ward	Yes	-	-
Construction / upgrade of ambulatory services	Yes	-	Yes
Rehabilitation / upgrade of the emergency area	Yes	-	-
Electrical systems	-	Yes	Yes
Sanitary systems	-	Yes	Yes
Construction of intensive therapy ward	-	-	Yes
Imaging construction / expansion	-	-	Yes

2.3.1 Phase 1: Pre-Construction

In order to accommodate these construction and rehabilitation upgrades, each hospital requires a well-planned, staged, and phased approach in order to limit the impacts on current operations. Phase 1 Pre-Construction activities include:

- Conduct a full assessment regarding available space within the hospital that could be used during construction.
- Develop a thorough project blueprints and schedule, explaining (in detail) the project construction and rehabilitation works that will be completed per hospital.
- Medical waste management infrastructure (disinfection facility and/or incinerator) should be included in the upgrade works blueprints.
- Determine the various phases of construction (e.g., construction scheduled, based on the final blueprints of the construction and rehabilitation works to be completed).
- Determine which activities will require the closure of wards or healthcare services, as well as any activities that will require abatement and decontamination (e.g., asbestos).
- Coordinate the procurement/rental of suitable vehicles to transport affected patients to a pre-determined neighboring hospital during construction and rehabilitation works if it is determined that the hospital needs to be closed during upgrade works.
- Appoint an Environmental, Health and Safety (EHS) Manager for each hospital to monitor adherence to its tailored environmental management plans.
- Conduct a risk assessment for all potentially hazardous construction and rehabilitation works to be conducted.
- Provide training regarding the appropriate PPEs and EHS mitigation measures to limit workplace hazards to workers and staff.
- Obtain all necessary local environmental permits; follow applicable local and international guidelines and regulations.
- Review the specifications and dimensions for all new equipment and machinery to ensure its compatibility with the construction schedule; construction plans should accommodate the

specific requirements of all new machinery and equipment. It is recommended that an architect with a specialization in health care infrastructure review applicable documents

- Develop a communication strategy to inform each parish of the construction timeline
- Conduct a launch workshop with the executing agency and contractors and subcontractors at each hospital to review requirements and timeline

2.3.2 Phase 2: Construction

Phase 2 Construction activities include:

- Provide transportation to affected patients that need to be moved to a neighboring hospital during construction and rehabilitation works
- Follow specifically tailored environmental and social management plans
- Once the construction and rehabilitation construction documents are finalized, the EHS Manager should monitor the contractor's adherence to the ESMP, IFC's General EHS Guidelines for Health Care Facilities¹, Management Plans, and International Standards

2.3.3 Phase 3: Post-Construction & Operation

Phase 3 Post-Construction and Operation activities include:

- Implement environmental and social plans during operation
- Adhere to NEPA air and water quality monitoring requirements
- Develop and implement a hospital-specific pollution prevention plan, as well as a medical waste plan (e.g., incinerator requirements, sharps management, wastewater treatment) to comply with the IFC's General EHS Guidelines for Health Care Facilities and International Standards
- Implement necessary technical EHS trainings to hospital staff and contractors

2.4 Program Locations

The hospitals to be upgraded / rehabilitated as part of Component 1 and 2 are Spanish Town Hospital, May Pen Hospital, and St. Ann's Bay Hospital.

2.4.1 Spanish Town Hospital

Spanish Town Hospital along Jamaica's southern coast was built in 1952. The hospital is located in the southeastern corner of St. Catherine Parish, the fastest growing parish in Jamaica (estimated growth of 3% per year). As of the most recent Jamaican census in 2016, the population of St. Catherine Parish was 518,000. Spanish Town Hospital mainly serves the nearby city of Portmore, a city with a population of approximately 250,000 people.

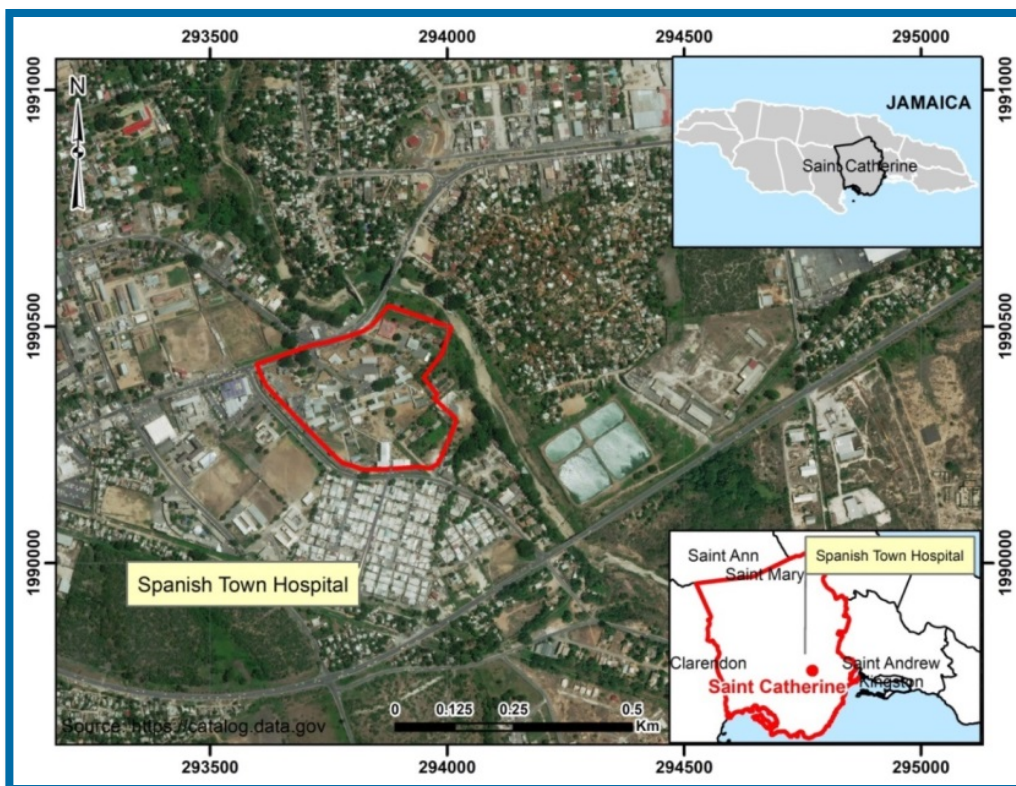
The hospital is located at the intersection of several major highways (Mandela Highway connects Spanish Town to the capital of Kingston) and is surrounded by several communities, providing

¹ IFC's General EHS Guidelines for Health Care Facilities.

care to victims of road traffic accidents and gang warfare. Furthermore, new housing projects in St. Catherine, and the increasing numbers of young families, will lead to a significant increase in stakeholder groups and patients, particularly within the pediatric population. The hospital currently services an estimated 5,000 births per year, second only to Victoria Jubilee Hospital (a hospital that specializes in obstetrics and gynecology).

Spanish Town Hospital was originally built with a 277-bed capacity, for a population of 300,000 community members. However, at present, the hospital is grossly exceeding its capacity by 153 beds, and is serving a population nearly double its intended capacity. Services currently provided at Spanish Town Hospital include: 1) pediatrics, 2) orthopedics, 3) general surgery, 4) obstetrics and gynecology, 5) general medicine, 6) dietary, 7) renal 8) colposcopy, 9) counseling, and 10) counseling. In the short term, major changes are needed in order to add an additional 100 bed units, an Intensive Care Unit (ICU), and to increase the number of operating technicians. At present, Spanish Town completely lacks an ICU unit. Considering the level of complexity at which this hospital operates and the exceedance in capacity, the lack of an ICU unit is a major identified issue. The figure below shows the physical location of Spanish Town Hospital.

Figure 2.4-1: Location of Spanish Town Hospital in St. Catherine Parish



The hospital also requires a complete upgrade of its wastewater treatment system. Currently, wastewater is treated onsite and simply discharged into the Rio Cobre. There is no regular sampling or chemical testing of the discharge to ascertain if the discharge complies with NEPA and / or international standards. The hospitals water tank and sewage system also poses a

health and safety risk to workers, hospital staff, neighboring communities and the environment, as the current capacity of its water storage system is only 30% of what it should be (65,000 gallons versus a total recommended capacity of 200,000 gallons).

In terms of the hospital's sewage system and storm water drainage system, there is a severe risk of flooding due to the proximity of the Rio Cobre, which puts the hospital at risk. The MOH has embarked on a project to rehabilitate or implement new sewage treatment systems at its health facilities to comply with regulatory requirements; however, according to the MOH business plan (2015-2018), Spanish Town Hospital is not listed under the facilities to be upgraded with a new water treatment system. At the present time, to mitigate this issue, the hospital currently relies on the use of sandbags around the Accident and Emergency (A&E) area to prevent water from flowing in. Termite and other pest infestations are also a problem for Spanish Town Hospital. Due to the year in which the hospital was constructed, and observations pointed out by the hospital's facilities manager during the site reconnaissance, Asbestos Containing Building Materials (ACBM) (e.g., asbestos insulation materials) may be present at the hospital, and specifically within the on-site generator.

Upgrading Spanish Town Hospital from "Type B" to "Type A" will require new specialties (e.g., cardiology, psychiatry, ENT, urology, ophthalmology, and dermatology) and new services (e.g., blood donation, endoscopy, ICU, and improved imaging diagnostics). Currently, space *within* Spanish Town Hospital is extremely limited and any encroachment upon this space, if not managed properly, could cause widespread ramifications, including the spread of infectious diseases. Furthermore, a lack of space and proper bed arrangements is potentially problematic during emergencies (e.g., fire or natural disasters) as evacuation routes may cause confusion, be blocked, crowded, and / or inaccessible. To manage this risk, the hospital should conduct a full assessment regarding the available space / occupancy within the hospital, including what patients may need to be moved in order to safely accommodate construction and rehabilitation works. With regard to space *outside* of the hospital, it appears as though there is enough space to accommodate new buildings, if needed.

2.4.2 May Pen Hospital

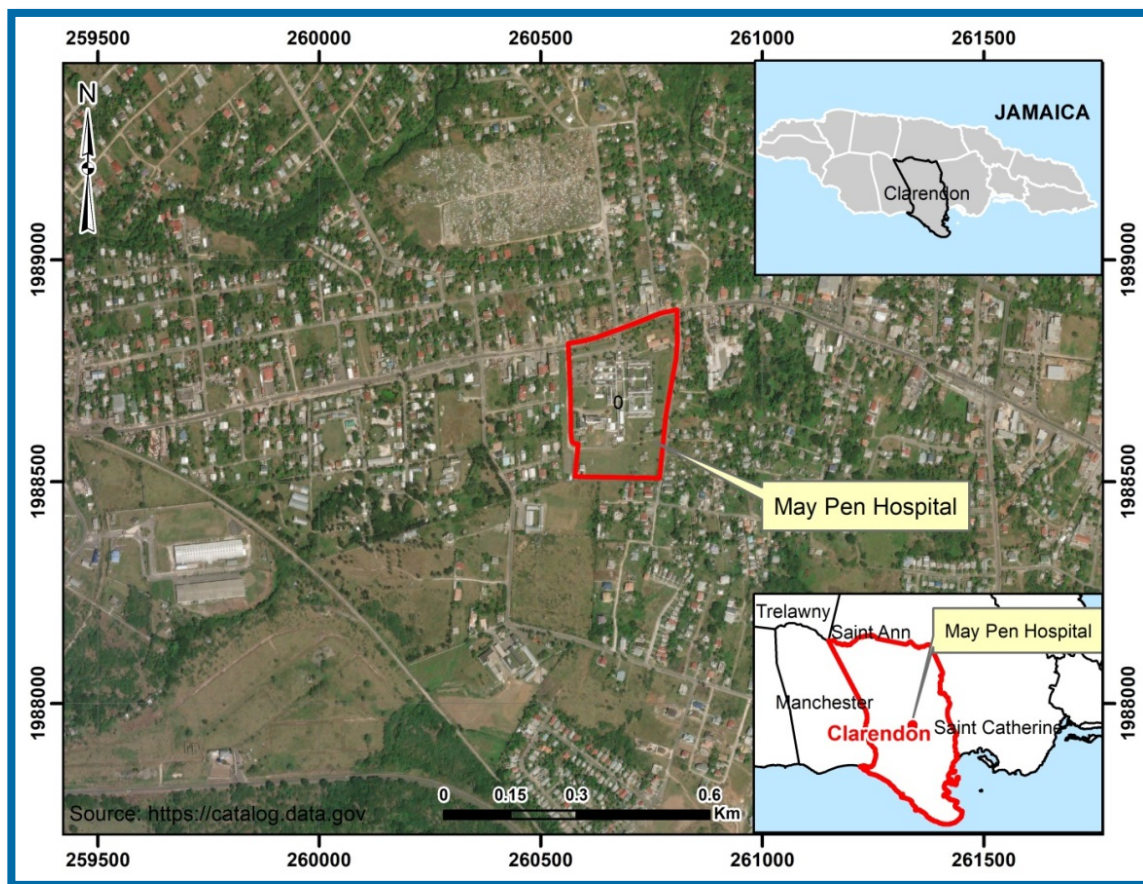
May Pen Hospital was built in 1999. The hospital is located within Clarendon Parish, along Jamaica's southern coast. May Pen is classified as a "Type C" hospital. At the time of construction, the hospitals estimated capacity was 2,000 patients per month, with 200 beds. Based on the latest census data, Clarendon Parish has a population of approximately 247,902. As of 2011, the last known census, the population of May Pen was approximately 61,548. As of 2012, May Pen Hospital was serving an estimated 4,500 patients per month (more than double its intended capacity at initial construction).

In order to upgrade May Pen Hospital from a "Type C" to "Type A" hospital, numerous changes and improvements must be considered. Structurally, the building has a significant issue with flooding and its electrical system (e.g., exposed cables, insufficient lighting protection, and risk of electric shock). The hospitals current water demand (including thermal water) is also greater than what can be provided via the current reservoir. There are also issues related to the hospitals hydraulic and mechanical systems; decontamination is urgently needed in the mechanical room, and the medical gas system needs to be revisited and supervised, due to new regulations. In

addition, the number of beds must be increased, in order to accommodate the increasing population of May Pen and other surrounding areas. The hospital also requires additional space for a laboratory unit, a physiotherapy unit, a minor operating theater, a new maternity operating theater, new x-ray equipment, and new c-arm equipment for orthopedics.

In the event of an emergency (e.g., fire or natural hazard) that requires a full evacuation, the hospital is not prepared, as it lacks fire hydrants, emergency signs, and evacuation plans. The only warning system that is currently in place is an emergency alarm, with ill timing, minimal warning, and lighting. Lastly, due to the age of the hospital, limited observations (the Operations Manager could not explicitly confirm the presence or location), and literature reviewed, ACBM may be present. The figure below shows the physical location of May Pen Hospital.

Figure 1.3.2-1: Location of May Pen Hospital in Clarendon Parish



2.4.3 St. Ann's Bay Regional Hospital

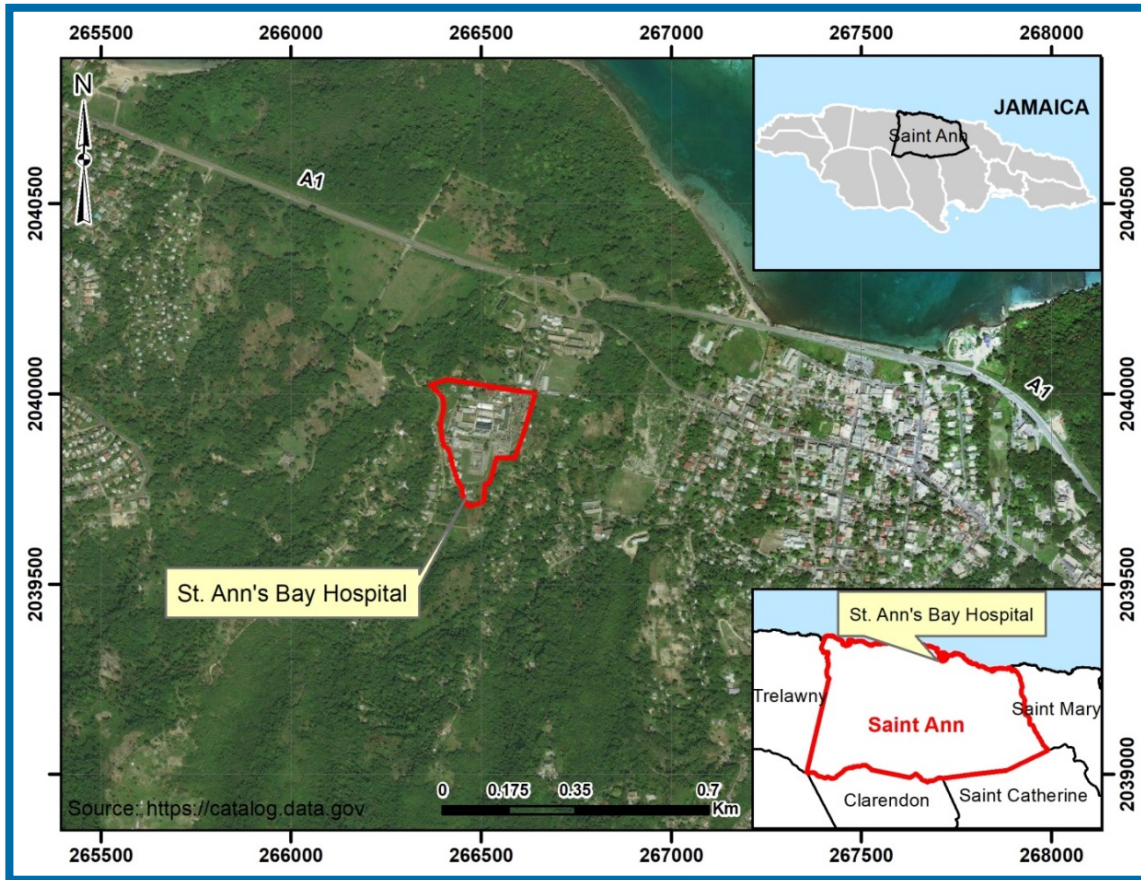
St. Ann's Bay Regional Hospital is located in St. Ann's Parish, on the northern coast of Jamaica. The parish is surrounded by St. Mary's Parish on the east, St. Catherine Parish in the south, and Trelawney Parish on the west. According to the most recent census data (2017), St. Ann's Parish has a population of approximately 174,959 people. Currently, St. Ann's Bay Hospital is the

largest healthcare facility in the area, serving patients from nearby cities such as St. Ann, St. Mary, Trelawney, Portland, Clarendon, and Manchester.

According to the chair of the North East Region Health Authority (NERHA), St. Ann's Bay Hospital serves between 350,000 and 400,000 patients per year. Classified as a "Type B" hospital, St. Ann's currently has 304 beds as of 2018 (Jamaican Information Service, 2018). Over the years, many improvements have been made to the medical equipment, the female medical ward, and overall bed capacity. The pediatric nursery has also received new medical equipment, such as incubators, infant warmers, bassinets, and suction machines.

In order to upgrade St. Ann's Bay Regional Hospital from a "Type B" to "Type A" hospital, a full diagnostic of the facility is required. The hospital also needs to improve upon its medical ward, laboratories, and clinics, and requires new x-ray, dental, ophthalmology, dialysis, CT, and MRA equipment. Additionally, overflow patients are currently kept in A&E, which is problematic and a potential safety hazard, particularly during emergencies that require evacuation. Furthermore, if more buildings or facilities are to be constructed, natural hazards and other impacts should be considered as appropriate. Lastly, due to the age of the hospital, limited observations (the Operations Manager could not explicitly confirm the presence or location), and literature reviewed, ACBM may be present. The figure below shows the location of St. Ann's Bay Regional Hospital.

Figure 1.3.3-1: Location of St. Ann's Bay Regional Hospital in St. Ann's Parish



2.5 Schedule

It is currently unclear when civil works for the upgrade and rehabilitation works will begin for each hospital, as detailed construction plans have not been provided. Once started, the schedule for implementation of the construction and rehabilitation works is expected to be 6 to 10 months.

2.6 Direct and Indirect Area of Influence

Within the area of influence (AOI), project activities are expected to be affected by the different systems that comprise the environment, or some of its natural, social, or economic components, often derived from changes in infrastructure.

Basin boundaries and physical variables associated with the operation of the hospital were taken as a physical reference for the delimitation of the area of direct environmental influence. For this project, the direct AOI is mainly located within the hospital grounds. The main variables used for the delimitation of the direct AOI is the World Health Organization's (WHO) acceptable noise standard of 55 decibels and water quality at the end of each discharge point or mixing zone

following onsite wastewater treatment. The project's indirect AOI will extend to approximately one mile from the hospital during construction works due to the additional vehicles.

2.7 Inter-American Development Bank (IDB) Requirements

The overall objective of the Environmental and Social Assessment (ESA) and Environmental and Social Management Plan (ESMP) is to ensure that all projects implemented by the IDB undergo the necessary environmental and social (E&S) assessments to identify, evaluate, and manage the associated E&S risks and impacts in a manner consistent with the IDB's Safeguard Policy procedures. This ESA utilizes national and international laws, regulations, and procedures in the assessment and development of this project. All the activities of this project will comply with all applicable IDB's policies / directives OP-703 (B.01, B.02, B.03, B.04, B.05, B.06, B.07, B.10, B.11 y B.17), OP-704, OP-761, OP-102.

2.8 Financing Cost

The program is structured into a hybrid Program, consisting of 1) a programmatic policy-based loan (PBP) (JA-L1080), aimed at consolidating regulatory measures to address the preventable causes of NCDs and to reorient health systems to address prevention and control of NCDs through people-centered primary health chronic care model; and 2) a specific investment loan (JA-L1049) that will finance activities to consolidate integrated health networks and improve the management, quality and efficiency of health services. The total cost of the loan from the IDB is \$50,000,000 USD. (IDB, 2018)

3 Institutional, Legislative and Regulatory Framework

This section of the report details the relevant Jamaican legislation and policies, as well as the relevant international safeguards including the IFC's General EHS Guidelines for Health Care Facilities, IFC Performance Standards, and all applicable IDB's policies and directives (OP-703 (B.01, B.02, B.03, B.04, B.05, B.06, B.07, B.10, B.11 y B.17), OP-704, OP-761, OP-102).

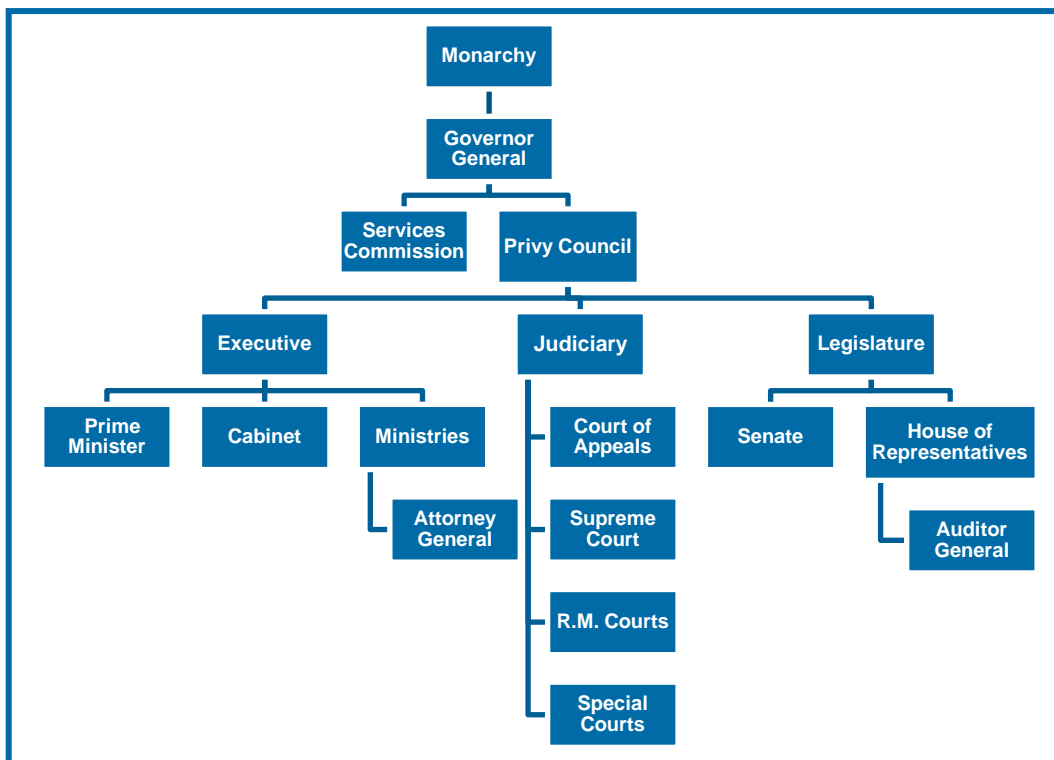
3.1 Institutional Framework

In Jamaica, the system of governance is a constitutional monarchy or limited monarchy under which The Queen, represented by a Governor-General, is head of state. Under the constitutional monarchy, there are three arms of government:

- The Executive
- The Legislature
- The Judiciary

The organizational chart below provides an overview of the Government of Jamaica.

Figure 3.1-1: Organizational Chart for the Government of Jamaica



According to the official webpage of the Government of Jamaica (2018), the Executive Branch of the Government has the following Ministries:

- Ministry of Economic Growth and Job Creation
- Ministry of Culture, Gender, Entertainment and Sport
- Ministry of Education, Youth and Information
- Ministry of Energy, Science, Technology and Telecommunications
- Ministry of Foreign Affairs and Foreign Trade
- Ministry of Health
- Ministry of Industry, Commerce, Agriculture and Fisheries
- Ministry of Justice
- Ministry of Labor and Social Security
- Ministry of Local Government and Community Development
- Ministry of National Security
- Ministry of Tourism
- Ministry of Transport and Mining
- Ministry of Finance and Public Service

An overview of the Ministries that provide the institutional framework for the Project will be described in the following sections.

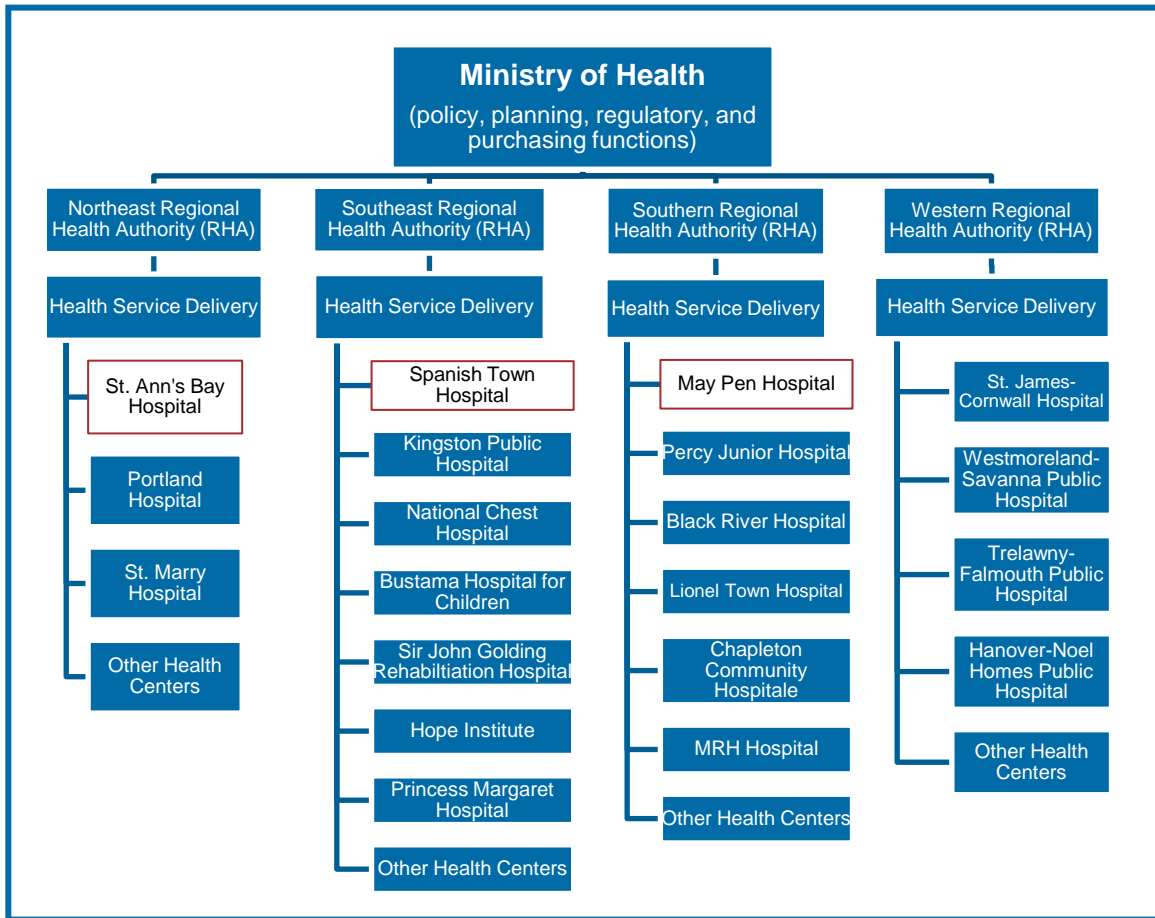
3.1.1 Ministry of Health (MOH)

Jamaica's Ministry of Health (MOH) has oversight over the following subjects:

- Health Policy and Services
- Family Planning
- Food and Drug Control
- Health Facilities (Hospitals and Health Centers)
- Juvenile Advisory Council
- Medical Services
- Medical Waste Management and Incinerator Services
- Mental Health Services
- Pesticides Control
- Drug Abuse Prevention
- Public Health
- Registration of Births and Deaths
- Specialist Committee on Child Abuse

The health system is decentralized, with four Regional Health Authorities (RHA) responsible for service delivery, as stated in the National Health Services Act of 1997. Regional Directors provide day-to-day administration of the Regional Health Authorities and report to the Boards of Management, with Board Chairmen appointed by and reporting directly to the Minister. The following chart details the organization of the health care system with respect to the facilities of the Project.

Figure 3.1-2: Organizational Chart for Health Service Delivery



In 1998, health reform under the National Health Services Act of 1997 repealed the old Hospital Act and transitioned health care institutions from central management to regional management systems (southeast, northeast, western and southern). This regional system is lacking in terms of proper guidelines, policy on waste management, insufficient training, and lack of equipment, tools, and services. (NEPA, 2007). After decentralization, health facilities maintenance is now the responsibility of the RHA.

The Waste Management Unit within MOH is responsible for detailing policies on medical waste for the MOH. The Waste Management Unit provides services to healthcare facilities to ensure proper waste management and disposal. The Unit manages Jamaica's first non-incineration automated medical waste plant that utilizes steam sterilization and shredding technology, which negates the adverse effects of burning medical waste (MOH, 2018). The MOH regulates health care under the Public Health Act (discussed below). (NEPA, 2007)

Relevant documents for the management of medical waste by the MOH are listed below:

- Management of Medical / Infectious Waste Generated at Health Care Facilities
- Ministry of Health Policy for the Management of Healthcare Waste

- Public Health Regulations
- Public Health (Nuisance) Regulations
- Regulations for Nursing Homes

3.1.2 Ministry of Labor and Social Security (MLSS)

Jamaica's Ministry of Labor and Social Security (MLSS) is responsible for promoting good working relations between employers and workers, and protecting workers' rights. (MLSS, 2018)

MLSS's mandate includes:

- Provide effective social protection and promote social inclusion
- Promote a stable industrial relations climate
- Promote productivity growth
- Ensure safety and health of workers
- Maintain an effective and efficient labor market

3.1.3 Ministry of Economic Growth and Job Creation

The Ministry of Economic Growth and Job Creation was created in March 2016, with the change of the political administration. The Ministry is charged with drafting the blueprint to drive economic growth and sustainable development in Jamaica. The Ministry has numerous portfolios but the ones that are likely to be part of this project are the following: 1) Land, Environment, and Climate Change, 2) National Environmental Planning Agency (NEPA), 3) National Works Agency (NWA), and 4) Water Resources Authority (WRA).

3.1.3.1 Land, Environment, and Climate Change

The Land, Environment, and Climate Change portfolio appoints the NRCA (re-named NEPA) to carry out the function of management of the environment through the NRCA Act. The Environmental Division is in charge of promulgating the Policy Framework for the Management of Hazardous Waste in Jamaica in accordance with the Basel Convention. (NEPA, 2007)

3.1.3.2 National Environmental and Planning Agency (NEPA)

Jamaica's National Environmental and Planning Agency (NEPA), formerly NRCA, was established in April 2001 under the Executive Agencies Act. NEPA is the primary environmental regulator in Jamaica and provides technical and administrative mandates to three statutory bodies, 1) Natural Resources & Conservation, Authority (NRCA), 2) Town & Country Planning Authority (TCPA), and 3) Land Development & Utilization Commission (LDUC). NEPA is also responsible for administering the NRCA Act of 1991. (NEPA, 2018)

NEPA's mandate includes:

- Conservation & Protection (Natural Resources Management)
- Environmental Management
- Spatial Planning
- Compliance & Enforcement
- Applications Management

- Public Education
- Policy and Research
- Legal Services & Standards Management

The hospitals will need to follow the laws, regulations, and guidelines overseen by NEPA and MOU primarily. For medical waste the following permits apply:

- Guidelines for the Management of Medical Waste
- NRCA (permits and licenses) Regulations
 - Existing waste generator: the operation of an incinerator requires a license for air emissions and effluent discharge.
 - All waste generators: a permit will be required for the installation and operation of any new incinerator and a license is required for air emissions.
 - Effluent discharge: a license is required for effluent discharge.
- NRCA (air quality) Regulations
- Procedures and Requirements for Permitting and Operating of Waste Disposal Facilities
- No guidelines regarding radioactive waste exist (or are being developed)

3.1.3.3 National Works Agency (NWA)

In October 1999, the Jamaican Government endorsed the establishment of the National Works Agency (NWA) and accorded it Executive Agency status on April 1, 2001. The NWA is responsible for managing all aspects of the road network of Jamaica, including its safety, reliability, availability, efficiency, and growth. To meet these objectives, NWA conducts routine maintenance, develops new roads, and optimizes the road network to reduce congestion. (NWA, 2018)

3.1.3.4 Water Resources Authority (WRA)

The Water Resources Authority (WRA) has responsibility for monitoring and regulating the use of surface and ground water resources of the country. The Water Resources Act of 1995 applies to the Riverton landfill site, and others. (MOJ, 1995) (NEPA, 2007)

3.1.4 Ministry of Local Government and Community Development

This Ministry provides policy, legal, technical, and administrative framework that supports service delivery and operational management by the Local Authorities and portfolio agencies,

The local authorities that are part of this Project are the following:

- St. Ann Municipal Corporation
- St. Catherine Municipal Corporation

Local Authorities are those entities at the local level through which the Department of Local Government carries out its functions within communities. Responsibilities

- Minor Water Supplies & Social Water
- Municipal Parks & Beautification
- Cemeteries

- Markets
- Abattoirs
- Pounds
- Parking facilities
- Parochial Roads
- Local Sustainable Development Planning
- Drains & Gullies
- Street Lights
- Infirmarys and other welfare services

There are two important departments within each local authority:

- The National Solid Waste Management Authority
- Local Jamaican Fire Brigades

3.1.4.1 National Solid Waste Management Authority (NSWMA)

The National Solid Waste Management Act of 2001 led to the establishment of the National Solid Waste Management Authority (NSWMA), effective April 1, 2002. The NSWMA is responsible for all matters pertaining to solid waste management, including:

- Providing standards, regulations and expertise with regard to solid waste management
- Achieving acceptable environmental standards of public waste disposal operations
- Develop capable environmental monitoring staff through training and appropriate recruitment
- Coordinating with other agencies on pollution prevention and environmental controls
- Prioritize financial resources for solid waste management in a severely constrained economy
- Enforcing national solid waste management laws

There are four Regional Offices within the NSWMA, one to serve each wasteshed. Wastesheds have been defined based on the most effective and feasible collection and disposal network that can be implemented. The table below details the organization and structure of the NSWMA. (NEPA, 2004)

Figure 3.1-3: Organization and Structure of NSWA

Regional Offices		Parishes Served	Disposal Sites within Each Region
Current Name	Proposed Name		
Metropolitan Parks and Markets Limited (MPM)	MPM Waste Management Ltd.	Kingston, St. Andrew, Clarendon, St. Thomas, St. Catherine	<ul style="list-style-type: none"> • Riverton Disposal Site in Kingston • Church Corner in St. Thomas
North eastern Parks and Markets Limited (NEPM)	NEPM Waste Management Ltd.	St. Ann, St. Mary, Portland	<ul style="list-style-type: none"> • Doctors Wood in Portland • Tobalski in St. Ann • Hadden in St. Ann
Southern Parks and Markets Limited (SPM)	SPM Waste Management Ltd.	Manchester, St. Elizabeth	<ul style="list-style-type: none"> • Martins Hill in Manchester • Myersville in St. Elizabeth
Western Parks and Markets Limited (WPM)	WPM Waste Management Ltd.	Trelawny, St. James, Hanover, Westmoreland	<ul style="list-style-type: none"> • Retirement in St. James • Grange Farm in Trelawny

Source: (NEPA, 2004)

Prior to the establishment of the NSWMA, garbage collection was vested under the respective Parish Councils within each parish. Jamaica currently has nine active disposal sites. Most hazardous materials are currently sent for disposal in landfills. (NEPA, 2004) (PIOJ, 2006)

The NSWMA does not have any international agreements for waste disposal. However, in November 2017, the Ministry of Science, Energy, and Technology of Jamaica finalized a policy regarding hazardous waste management and e-waste management in Jamaica. (Ministry of Science, Energy and Technology, 2017).

The NSWMA collaborates with NEPA on several issues related to solid waste management. Areas of collaboration include, but are not limited to: 1) enforcement, 2) NEPA's Permit and License System, 3) NSWMA's Licensing System to be introduced, and 4) site visits in respect of complaints or associated with the processing of applications. Local NSWMA Authorities also work closely with NEPA, and collaboration between the Ministry of Environment and MOH are recommended with regards to policy and operational matters related to hazardous waste and medical waste. The hospitals will need to dispose of wastes according to NSWMA laws, regulations, and standards. However, NSWMA has few applicable laws at present, and NEPA rules and guidelines (e.g., asbestos and refrigerants) are generally used as a substitute. The project will need to comply with both sets of standards. (NEPA, 2004) (NSWMA, 2018)

3.1.4.2 Jamaican Fire Brigade

The Jamaican Fire Brigade is a Statutory Body within the Office of the Prime Minister, Department of Local Government. Its central administration is headed by a Board of Directors, which sets broad policy guidelines, implemented by a Commissioner. The Fire Prevention Division is responsible for supporting the fire and rescue activities within Jamaica's Fire Brigade. The main function of the Fire Prevention Division is to assist in fire inspection and prevention for public facilities, such as hospitals. Prevention inspectors are empowered to enter any public facility, for the purpose of inspection. In 1996, the Jamaican Fire Brigade Emergency Medical Service began in partnership with the MOH. This service is charged with the rendering of pre-hospital emergency medical care and / or treatment to ill or injured persons and transporting them to recognized medical institutions. (JFB, 2018)

The Jamaican Fire Brigade Act of 1988 established the Chairman, Commissioner, and Officers in Charge for fires and other disasters (earthquakes, floods, hurricanes, windstorms, escape of dangerous fumes or fluids, explosions, oil spills, and other dangerous pollutants of the air and sea). Jamaica's Country Fires Act of 1942 is also applicable, as it governs the burning of trash and other inflammable materials. (JFB, 2018)

3.1.4.3 Parish Councils and Local Authorities

Parish Councils maintain a close relationship with the MOH. It is a statutory obligation as the Public Health Act empowers the Local Board, under Section 6(b), to carry on all activities, which appear to be requisite, advantageous, or convenient in the interest of public health. Section 7 of the Public Health Act also enables the Local Authority to make regulations relating to solid waste, nuisance, sanitation and other areas. (NEPA, 2007)

3.1.4.4 Office of Disaster Preparedness, Emergency and Management

The Office of Disaster Preparedness and Emergency Management (ODPEM) operate under the Emergency, Disaster Preparedness, and Emergency Management Act of 1993. During an emergency or significant disaster, ODPEM would interface within the medical waste realm. As with others, the Act does not refer specifically to medical waste but such emergencies would be addressed through the Hazardous Material Spill Response Plan, which is a sub-plan of the National Disaster Plan. The plan also covers hazardous waste. The ODPEM should be coordinated with the hospitals, in cases of fire or other emergencies. (NEPA, 2007)

3.1.4.5 Inland Revenue Department

The tariffs associated with disposal of waste at landfills will be stipulated by the NSWMA and the Inland Revenue Department will do collection. (NEPA, 2007)

3.1.4.6 Jamaica Bureau of Standards

The Packaging and Labeling Section of the Jamaica Bureau of Standards (JBS) includes in its portfolio the labeling of hazardous waste. The JBS regulates packaging and labeling under the Standards Act 1969. (NEPA, 2007)

3.2 Existing Legislative Framework

The existing legal framework related to the environmental and social management for the implementation of the project is described below:

3.2.1 National Environmental Requirements

3.2.1.1 National Energy Conservation and Efficiency Policy

Jamaica's National Energy Conservation and Efficiency Policy 2009 – 2030 (NECEP) provides the overarching framework for energy efficiency in Jamaica. NECEP is designed to achieve a modern, efficient, diversified, and environmentally sustainable energy sector providing affordable and accessible energy supplies with long-term energy security and supported by informed public behavior on energy issues and an appropriate policy, regulatory and institutional framework. By 2030, the country hopes to derive 30% of its energy needs from renewable sources. In addition, the country hopes to reduce its energy consumption by 15% through a diversification in the country's fuel sources. (Ministry of Energy and Mining, 2009)

3.2.1.2 National Solid Waste Management Act

The National Solid Waste Management Act of 2001 provides regulations for the management of solid waste in the country through the establishment of the National Solid Waste Management Authority (NSWMA). The NSWMA has responsibility for all matters pertaining to solid waste management in Jamaica. (NEPA, 2001) (NEPA, 2007)

3.2.1.3 National Resources Conservation Act

The National Resources Conservation Act (NRCA) of 1991 established Jamaica's National Environmental and Planning Agency (NEPA). The act provides the framework for addressing the disposal of all types of waste to include collection, storage, and recycling where appropriate. This is done through issuance of permits for waste disposal and treatment facilities such as landfills and incinerators. This act also stipulates that licenses are required for the discharge of trade or sewage effluent and for the construction or modification of facility. As part of the permit application, an Environmental Impact Assessment (EIA) may be required for this project, as described in the Guidelines for Conducting Environmental Impact Assessments (NEPA, 2007). A building permit through the Ministry of Justice, Town and Country Planning Act of 1958 and NEPA is also required. Other local requirements include:

- The Natural Resources (Hazardous Wastes) (Control of Transboundary Movements) Regulations of 2002²
- User's Guide National Resources (Hazardous Wastes) (Control of Transboundary Movements) Regulations of 2015³
- Guidelines for the Management of Asbestos of 2014⁴
- Procedures for Handling of Asbestos of 2014⁵
- Code of Practice for the Refrigeration and Air-conditioning Industry of 2008
- Building Operations and Works of Engineering Construction (Safety, Health and Welfare) Regulations of 1968
- Guidelines for Hazardous Waste Management and Disposal of e-Wastes in the Country of 2017⁶
- Occupational Health and Safety Act of 2017⁷
- Public Health Act of 1985⁸

There are no relevant legislation or guidelines related to disposal of used oils, mercury or Polychlorinated biphenyls (PCBs). However, Jamaica is a signatory of the Minamata Convention, and is required to control the disposal of mercury.

3.2.1.4 Trans-boundary Movement of Hazardous Waste

The Natural Resources (Hazardous Wastes) (Control of Transboundary Movements) Regulations, 2002 describe the requirements for importing and exporting of hazardous wastes to / from Jamaica. The process is further clarified by the User's Guide National Resources (Hazardous Wastes) (Control of Transboundary Movements) Regulations, 2015. These

² NEPA. 2002. The Natural Resources (Hazardous Wastes) [Control of Transboundary Movements](#)

³ NEPA. 2015. User's Guide for National Resources (Hazardous Waste) [Control of Transboundary Movements](#)

⁴ NEPA. 2014. Guidelines for the Management of Asbestos. [Guidelines for the Management of Asbestos](#)

⁵ NEPA. 2014. Procedures for Handling of Asbestos. [Procedures for Handling Asbestos](#)

⁶ Ministry of Economic Growth and Job Creation. 2017. [E-waste Policy and Regulatory Framework](#)

⁷ Ministry of Labor and Social Security. 2017. [Occupational Health and Safety, 2017](#)

⁸ Ministry of Public Health. 1985. [Public Health Act, 1985](#)

documents clarify what type of waste are included, process for applying for an import / export permit, inspection of wastes, notification requirements and use of approved forms. The rules are consistent with requirements under the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal. The fundamental requirements include providing notice, consent by both countries, and tracking for movement of wastes across national boundaries. Mercury containing materials (i.e., lightbulbs), asbestos, Freon, or other hazardous materials that may result from the project would fall under these regulations if they were to be exported for final disposal. (Natural Resources Conservation Authority Act, 2002)

3.2.1.5 Management of Asbestos

The Guidelines for the Management of Asbestos and the Procedures for Handling of Asbestos, (2014), outline the procedures to be taken for the management of asbestos. They indicate notification requirements, minimum safety requirements, sampling requirements, quality control and assurance for taking and handling samples, and reporting requirements. These guidelines also detail the procedures for testing and abating asbestos. The appendices of the guidelines contain supplemental information, as well as, form templates for reporting. It is currently unclear if the project may involve construction or rehabilitation work that will require removal of asbestos, but based on a review of publicly available information, it is highly likely that asbestos will be present. If disturbance or removal of asbestos is required, all works related to abate, transport, and dispose of asbestos would need to follow international standards (NEPA, 2014).

3.2.1.6 Occupational Health and Safety

Jamaica's Factories Act of 1968, establishes regulations for "Building Operations and Works of Engineering Construction (Safety, Health and Welfare). These regulations describe requirements for protecting workers from hazards often found in construction sites, including work at heights (i.e., scaffolding, ladders, harnesses, hoists, platforms, etc.), hot works, heavy lifting, explosives, work near water, transportation, excavation, and demolition. The regulations also include provisions for the use of safety equipment (e.g., PPEs), supervisions, inspection, and first aid. All requirements are adhere to the IFC's General EHS Guidelines for Health Care Facilities and International Standards within the construction industry. All construction activities undertaken for the hospital construction and rehabilitation works will need to follow these regulations, the IFC's General EHS Guidelines for Health Care Facilities, and International Standards expected for the construction industry. (ILO, 1968)

3.2.1.7 Management of Refrigeration and Air-conditioning Units

The Code of Practice for the Refrigeration and Air-conditioning Industry, 2008 was developed to meet the recommendations of the Montreal Protocol. The Code of Practice provides information for servicing refrigeration systems and defines minimum standards of good practices in refrigeration (NEPA, 2008). The guidelines stress recovery, reuse, and recycling of refrigerates to the extent possible. Currently, there are no facilities in Jamaica capable of disposing of refrigerants, so spent refrigerants are often stored locally in perpetuity. NEPA has trained local refrigeration technicians within the country in best practices and proper disposal techniques, and there are a number of companies in Jamaica that are licensed to store or dispose of refrigerants. A key component of the hospital upgrade will be to ensure proper use of refrigerators and air

conditioning units. These guidelines should be applied according to the IFC's General EHS Guidelines for Health Care Facilities Guidelines and International Standards. (NEPA, 2008)

3.2.1.8 Public Health Act of 1985

The Public Health Act of 1985 (originally the Public Health Act of 1974 and amended in 1996) establishes the Central Health Committee with the local bodies being resident under the Parish Council of respective parishes. The functions and powers of the local boards are also outlined under this Act for the enforcement of all regulations and orders. There are provisions under Section 14, which empowers the designated Minister to make regulations relating to air and soil pollution, occupational diseases and employment health hazards and for the control and destruction of rodents, mosquitoes and other insects, termites, and other vermin. Further, the Public Health (i.e., air, soil, and water pollution) Regulations of 1976 aim at controlling, reducing, removing, or preventing air, soil, and water pollution in all possible forms. Whilst these laws relate to this project, no formal requirement for consultation or guidelines on consultation exists under these or their supporting regulations. Section 7 of the Public Health Act gives power to the MOH to make regulations pertaining to solid waste and healthcare waste. Section 20 of the Public Health Act gives the MOH "right of entry upon private premises." (Ministry of Public Health, 1985) (NEPA, 2007)

3.2.1.9 Others

Other Acts, which apply indirectly or directly to the management of hazardous and non-hazardous medical waste, but which do not directly address the issue include:

- The Dangerous Drug Act of 1948
- The Food and Drug Act of 1964
- The Pharmacy Act of 1966
- The National Health Services Act of 1997
- The Water Resources Act of 1995
- The Disaster Preparedness and Emergency Management Act of 1993

3.2.2 Existing Policies

3.2.2.1 Jamaica National Environmental Action Plan (JaNEAP), 2006 – 2009

The Government of Jamaica had adopted the global approach of environmental management for sustainable development, which is intended to "encourage environmental, economic, and social development in such a manner that would ensure that the quality of life for future generations is adequately maintained." The JaNEAP framework defines policies related to:

- Natural resources and systems for initiating sustainable development
- Urban and rural infrastructure development and health
- Legal, regulatory, administrative, and institutional systems

To support this framework, JaNEAP proposes the adoption of an integrated Environmental Economic Policy Instrument, including:

- The polluter pays principle

- The user pays principle, and
- Incentive techniques.

JaNEAP also works to address problems of industrial effluents, hazardous wastes, and toxic chemicals in collaboration with NRCA, NEPA, and NSWMP. (JaNEAP, 2006) (NEPA, 2007)

3.2.2.2 National Solid Waste Management Policy of Jamaica (NSWMP)

Jamaica's National Solid Waste Management Policy (NSWMP) addresses the management of solid waste through the conduct of several framework mechanisms. The mechanisms include:

- Regulatory framework
- Institutional framework
- Cost recovery
- Operational issues relating to collection, transportation, and final disposal
- Waste minimization
- Waste processing
- Hazardous and medical waste
- Public education
- Relationship to other national policies and legislation
- Enforcement

These mechanisms are governed under NSWMP and define responsibilities such as licensing, tipping, tipping fees, containerization, equipment, performance, criteria, dumping, littering, recycling, waste processing, waste to air, air and seaports waste, hazardous and medical waste. Legislation with regards to specific solid waste management is also incorporated into the new NSWMA Act. The Act holds NSWMA as the responsible management agency. NSWMP also defines roles for the private sector, through a competitive tendering process. Certified contractors must submit proposals in accordance with standards stipulated by NSWMP. (NEPA, 2007)

3.3 Relevant International Safeguards

3.3.1 World Health Organization

Safe Disposal of Unwanted Pharmaceuticals in and after Emergencies

The World Health Organization's *National Guidelines on Safe Disposal of Unwanted Pharmaceuticals in and after Emergencies* (1999) include steps and recommendations that need to be followed in order to dispose of unwanted waste or expired pharmaceuticals. The steps required include the identification of pharmaceutical waste, sorting of pharmaceutical waste by category, and filling out the relevant forms to seek authority from the authorities in charge of disposing such waste. Upon obtaining all the relevant approvals, the disposal of the pharmaceutical waste shall be effected under the supervision of the local pharmaceutical waste disposal team or the Waste Management Team. (WHO, 1999)

The recommended methods for disposing of unwanted pharmaceuticals include:

- The use of either medium temperatures incineration at a minimum of 850°C or high temperature incineration exceeding 1200°C with two chamber incinerator for solids, semisolids and powders for controlled substances (e.g., anti-neoplastics).
- Engineered sanitary landfill to be used for disposal of expired or unwanted pharmaceuticals.
- Sewer disposal for diluted liquids, syrups, intravenous fluids, small quantities of diluted disinfectants and antiseptics.

These guidelines are also relevant in informing the generator of pharmaceutical wastes on safe disposal methods. Each hospital should have a contracted licensed waste handler who disposes the pharmaceutical wastes in the manner provided by the legal framework, the IFC's General EHS Guidelines for Health Care Facilities, and International Standards. (WHO, 1999)

Safety in Healthcare Laboratories

The World Health Organization's Safety in Healthcare Laboratories (1997) is a manual intended for healthcare laboratory workers and those responsible for laboratory administration and planning. It provides key guidelines for health and safety in the laboratory activities. These guidelines will be useful during operations phase, following construction and rehabilitation. (WHO, 1997)

3.3.2 World Bank Group

General Environmental, Health, and Safety Guidelines

The World Bank's General Environment, Health, and Safety (EHS) Guidelines (2007) contain performance levels and measures for development of industrial projects that are considered to be achievable in new facilities at reasonable costs by existing technology. Under these guidelines, the World Bank has several guidelines many of which are applicable to various components of the proposed project namely:

- EHS Guidelines - Air Emissions and Ambient Air Quality
- EHS Guidelines - Waste Management
- EHS Guidelines - Health Care Facilities
- EHS Guidelines - Hazardous Materials Management
- EHS Guidelines - Construction and Decommissioning

These guidelines are meant for all types of projects with "significant" emissions, sources of air emissions, and potential for significant impacts to ambient air quality to prevent or minimize impacts by ensuring that emissions do not result in pollutant concentrations that reach or exceed relevant ambient quality guidelines and standards. They require the application of national legislated standard, or in their absence, the current WHO Air Quality Guidelines, or other internationally recognized sources. In this project, there will be fugitive air emissions, which are expected during construction and operation phases of the project. These guidelines are useful as they give control and monitoring measures. (World Bank Group, 2007)

The Waste Management EHS Guidelines apply to the management of non-hazardous and hazardous waste. The hospitals will be a major generator of both hazardous and non-hazardous waste. These guidelines provide categories of various wastes and a summary of treatment and

disposal options, as well as guidance on waste on-site handling, collection, treatment, and disposal for both the proponent and the contractors during construction and operation phases respectively. This report greatly adopts the guidance while formulating the environmental management plan. (World Bank Group, 2007)

The Noise EHS Guidelines address the impacts of noise beyond the property boundary of the facility in question. These guidelines are applicable during the construction phase, whereby construction equipment and activities are expected to emit noise. Permissible noise levels should be in accordance with NEPA regulations, to ensure noise levels are maintained as low as reasonably practicable. (World Bank Group, 2007)

The Occupational Safety and Health Guidelines guide employers and supervisors in fulfilling their obligation to implement all reasonable precautions to protect the health and safety of workers. The guidelines provide guidance and examples of reasonable precautions to implement in managing principal risks to occupational health and safety. The guidelines also describe how facility operation workplace design should be undertaken to prevent occupational health and safety risks and hazards. (World Bank Group, 2007)

Construction and Decommissioning EHS Guidelines provide additional and specific guidance on prevention and control of community health and safety impacts that may occur during new project development, at the end of the project life cycle, or due to expansion, or modification of existing project facilities. (World Bank Group, 2007)

3.3.3 Basel Convention

Jamaica is a signatory to the Basel Convention on the transboundary movement of hazardous wastes. The MOH accepts the principles of the Convention and applies them to the local policy and guidelines, where appropriate. Specific to medical waste under the Basel Convention is the Technical Guideline on the Environmentally Sound Management of Biomedical and Healthcare Waste. (NEPA, 2007)

3.3.4 IDB Safeguard Requirements

IDB policies outline the need for stakeholder analysis, engagement planning, consultation, and participation as key to the construction and operation phases of development.

- OP-102 – Access to Information is an IDB Policy that supports the conduct of public consultations to ensure that public access to pertinent project information is not withheld from the stakeholders. IDB Guidelines on Consultation and Stakeholder Engagement in IDB Projects indicate that stakeholder identification, scheduling of communication, and methods of communication are required.
- OP-703 – Environment and Safeguards Compliance indicate that consultations for Category “A” and “B” are a critical part of the pre-construction, during construction and operational phases of a project. Appropriate information will be provided in location(s), format(s) and language(s) to allow for affected parties to be meaningfully consulted, to form an opinion and to comment on the proposed course of action. Affected parties should be kept informed of

those project-related environmental and associated social mitigation measures affecting them, as defined in the ESMP.

- OP-704 – The Disaster Risk Management Policy addresses two lines of action: prevention and mitigation of disasters and post disaster response, including physical damage. Dialogue will be initiated with the affected countries on the topic of vulnerability due to natural hazards and risk management. If disaster potential is high, there will be a disaster risk assessment provided to the affected country. Project teams will address the identified possibilities of exposure to natural hazards during the pre-construction phase, as well as the level of exposure. New investments will be made to reduce vulnerability to future disasters.
- OP-761 – The Operational Policy on Gender Equality in Development addresses the needs of both men and women and the investment in woman empowerment as a stride to accelerate the steps to gender equality. There will be studies conducted in gender specific cases that will be dialogued with the countries. There will be new innovative practices aimed at addressing gender issues. During pre-construction phases, there will be an analysis of gender issues acquired. Equal participation of men and women will occur during the public consultation of the project. If there are potential negative impacts on gender equality identified during the preparation phase, there will be a social impact and a risk assessment created in a timely manner.

A formal Consultation and Stakeholder Engagement Plan must be developed for all projects that are likely to have major social and / or environmental impacts or that pose significant risks. The plan should also include a detailed description of the procedures for managing complaints and grievances, both during construction and after the project has been commissioned. The advantage of having a formal plan is that it demonstrates commitment, defines responsibilities, and ensures that adequate funds are available to carry out the program of consultation and stakeholder engagement.

There are no applicable formal requirements for consultation by the Government of Jamaica outside of the requirements associated with the EIA process. This plan has been developed according to the IDB's technical note on Meaningful Stakeholder Consultation.

Figure 3.3-1: Operation Compliance with IDB Safeguard Policies

Policies / Directives	Policy / Directive Applicable?	Rationale for Applicability of Policy / Directive	Actions Required during Preparation & Analysis
OP-703 Environment and Safeguards Compliance Policy			
B.2 Country Laws and Regulations	Yes	The Program must comply with Jamaica ESHS laws and regulations.	This ESA assessed the ESHS requirements of the Jamaican regulations and defines measures to guarantee compliance.
B.3 Screening and Classification	Yes	The Program is expected to cause mostly local and short-term negative environmental and social impacts for which effective mitigation	The classification was confirmed to be a "Category B" Project.

Policies / Directives	Policy / Directive Applicable?	Rationale for Applicability of Policy / Directive	Actions Required during Preparation & Analysis
		measures are readily available, and as such a Category “B” classification has been assigned.	
B.4 Other Risk Factors	Yes	More information was needed. The Executing Agency (MOH) might not have the capacity to ensure the proper management of all ESHS aspects of the Program.	This ESA assessed the institutional capacity of the MOH to manage the ESHS risks and impacts identified, and proposes strengthening measures, as needed.
B.5 Environmental Assessment and Plans Requirements	Yes	Due to the activities and infrastructure being financed, an ESA and ESMP are required.	This ESA and ESMP address the potential ESHS impacts and risks caused by the works in the three hospitals (Spanish Town, May Pen, and St. Ann's Bay).
B.5 Social Assessment and Plans Requirements (including Livelihood Restoration Plan ⁹)	Yes		
B.6 Consultation	Yes	Category “B” Project operations require at least one consultation with affected and interested parties during preparation.	This ESA and ESMP identified the affected population and other stakeholders to be consulted on the potential environmental and social impacts of the Program. The ESA and ESMP also propose a methodology to guarantee consultations are meaningful, gender-sensitive, and socio-culturally appropriate. Based on this, the Execution Agency (MOH) will carry out and document one round of consultations. The Consultation Reports will be published in IDB's Web page prior to OPC. The ESA and ESMP also includes a Stakeholder Engagement Plan and a Grievance Mechanism to be implemented during execution of the Program.
B.7 Supervision	Yes	The bank will supervise	The ESMR will establish ESHS

⁹ OP-703 applies when livelihood impacts are not significant and don't lead to physical displacement (see *Transitional Guidance in instruments for Physical Displacement, Economic Displacement and Economic Losses under OP-710 and OP-703 (TG-005)* for more information)

Policies / Directives	Policy / Directive Applicable?	Rationale for Applicability of Policy / Directive	Actions Required during Preparation & Analysis
and Compliance		compliance with the ESHS requirements established in the ESMP, the ESMR, the Loan Agreement, and IDB's safeguards policies.	requirements to be incorporated in the loan agreement and the Program Operational Manual.
B.8 Transboundary Impacts	N/A	N/A	N/A
B.9 Natural Habitats	N/A	The Program will be carried out in urbanized areas, within already existing structures.	N/A
B.9 Invasive Species	N/A	The Program will not introduce invasive species.	N/A
B.9 Cultural Sites	N/A	The Program will be carried out in urbanized areas, within already existing structures.	N/A
B.10 Hazardous Materials	Yes	Hazardous materials, such as gasoline, diesel fuel, oil and lubricants will be used during construction. Hazardous materials such as asbestos, hydro-fluorocarbons and others hazardous materials might appear during demolition works. The operation will entail the generation of hospital effluents and solid bioinfectious waste.	This ESA and ESMP include plans and measures as needed for the management and final disposal of hospital effluents and bioinfectious solid waste and other hazardous materials.
B.11 Pollution Prevention and Abatement	Yes	Construction works and operation of the project is expected to cause moderate pollution (e.g., air, noise, water, and soil).	This ESA and ESMP include specific plans and mitigation measures to ensure pollution prevention and monitoring during all phases.
B.12 Projects Under Construction	N/A	Program is not under construction.	N/A
B.13 Noninvestment Lending and Flexible Lending Instruments	N/A	Program is a specific investment loan.	N/A

Policies / Directives	Policy / Directive Applicable?	Rationale for Applicability of Policy / Directive	Actions Required during Preparation & Analysis
B.14 Multiple Phase and Repeat Loans	N/A	Program is not a multiple phase or a repeat loan.	N/A
B.15 Co-financing Operations	N/A	No co-financing institutions.	N/A
B.16 In-Country Systems	N/A	Country Systems are not being used for this Program. Bank's policies will be applied.	N/A
B.17 Procurement	Yes	Contractor's contracts will include references to IDB ESHS requirements.	Contractor agreements will include reference to IDB ESHS requirements.
OP-704 Natural Disaster Risk Management Policy			
A.2 Analysis and management of Type 2 risk scenario	N/A	The Program is not expected to exacerbate risks to human life, property, the environment and the Program itself.	NA
A.2 Contingency planning (emergency response plan, community health and safety plan, occupational health and safety plan)	Contingency planning	A Type 1 Natural Disasters Risk has been assessed as "moderate", mainly due to hurricanes and tropical storms. There may be risks to the Program and to the workforce and hospitals users during construction and hospital users during operation.	This ESA and ESMP determine the necessary plans and measures (e.g., emergency response, community and occupational health and safety) for the Program.
OP-710 Operational Policy on Involuntary Resettlement			
Resettlement Minimization	N/A	No physical displacement is anticipated as a result of the Program.	This ESA verifies that involuntary resettlement was not provoked by this Program.
Resettlement Plan Consultations	N/A		
Impoverishment Risk Analysis	N/A		
Resettlement Plan and / or Resettlement Framework Requirement	N/A		
Livelihood	N/A		

Policies / Directives	Policy / Directive Applicable?	Rationale for Applicability of Policy / Directive	Actions Required during Preparation & Analysis
Restoration Program Requirement ¹⁰			
Consent (Indigenous Peoples and other Rural Ethnic Minorities)	N/A		
OP-765 Operational Policy on Indigenous Peoples			
Sociocultural Evaluation Requirement	N/A	There is no remaining indigenous populations in Jamaica.	N/A
Good-faith Negotiations and proper documentation	N/A		
Agreement with Affected Indigenous Peoples	N/A		
Indigenous Peoples Compensation, and Development Plan and / or Framework Requirement	N/A		
Discrimination Issues	N/A		
Transborder Impacts	N/A		
Impacts on Isolated Indigenous Peoples	N/A		
OP-761 Operational Policy on Gender Equality in Development			
Consultation and effective participation of women and men	Yes	Women are frequently the primary household caregivers are key stakeholders for the	The Consultation Plan and Stakeholders Engagement Plan included in the ESA / ESMP propose gender-sensitive approaches and

¹⁰ OP-710 applies when livelihood impacts lead to physical displacement (see *Transitional Guidance in instruments for Physical Displacement, Economic Displacement and Economic Losses under OP-710 and OP-703* (TG-005) for more information)

Policies / Directives	Policy / Directive Applicable?	Rationale for Applicability of Policy / Directive	Actions Required during Preparation & Analysis
		activities and infrastructure financed by the Program. To promote that their opinions are heard and taken into consideration, the Program will carry out gender-sensitive consultations.	methodologies to promote equitable participation of women and men during preparation and operation of the Program.
Application of safeguard and risk ¹¹ analysis	No	No gender-based adverse impacts or risk of exclusion is anticipated.	The risk of gender-based exclusion was assessed in the ESA / ESMP and reviewed by the IDB. No gender-based adverse impacts or risk of exclusion are anticipated.
OP-102 Access to Information Policy			
Disclosure of relevant Environmental and Social Assessments Prior to Analysis Mission, QRR, OPC and submission of the operation for Board consideration	Yes	A fit-for-disclosure ESA / ESMP must be disclosed prior to the analysis mission in IDB's web page.	A fit-for-disclosure ESA and ESMP will be published on the IDB's Web page prior to the analysis mission. IDB will disclose the final versions of the documents, including the Consultation Reports, prior to QRR and / or OPC.
Provisions for Disclosure of Environmental and Social Documents during Project Implementation	Yes	In the case that new relevant environmental and social documents are delivered during Program implementation, they will also be made available to the public.	The Bank will publish all new relevant ESHS documents that will be developed during the Program's implementation.

11 Risks may include: (i) Unequal access to project benefits/ compensation measures, (ii) Men or women disproportionately affected due to gender factors, (iii) Non-compliance with applicable legislation related to equality between men and women, (iv) Increased risk of gender-based violence, including sexual exploitation, human trafficking and sexually transmitted diseases, and (v) Disregard of women's ownership rights.

4 Executing Agency's Current Capacity

The Project has been classified as Category B, as it is expected to cause mostly local and temporary negative environmental and social impacts. The MOH as the executing agency will need to implement adequate measures to prevent, mitigate, and / or manage the anticipated environmental and social impacts. As part of the ESA, an evaluation of the current capacity and technical strengthening needs for the MOH was conducted to assess if the MOH has the capacity to manage environmental, social, health and safety and labor issues involved for the implementation of the Program. The table below presents a summary of the main environmental and social issues that need to be addressed by the MOH, the current situation (evaluation of institutional capacity), and recommendations for technical strengthening within the MOH.

Figure 3.3-1: Evaluation of Institutional Capacity and Recommendations for Technical Strengthening

Project Related Environmental and Social Issues	Current Situation	Recommendations for Technical Strengthening
Inadequate Sewage / Wastewater Treatment Plant	The current sewage / wastewater treatment plans at the studied hospitals are inadequate. The UNOPS assessment provided by IDB did not include an evaluation of the current condition of the sewage or wastewater treatment plant at each facility. It is not known if the upgrade of these plants is part of the Project's rehabilitation works. The MOH Business Plan (2015-2018) indicates that the MOH has embarked on a project to rehabilitate or implement a new sewage treatment system at its health facilities island-wide to comply with regulatory requirements. Fourteen institutions were identified for immediate attention. May Pen and Saint Ann are included in this identification. No construction works for these upgrades were observed during the site visits. It is not known if the procurement for these upgrades has been finalized.	The design for the upgrade or new design of the sewage water treatment plants should be included as part of the rehabilitation works for each hospital. Particular attention should be focus on determining the anticipated quality of hospital water for the design of the treatment facility. Maintenance of the treatment facilities should be coordinated by each hospital operations manager with the oversight of the RHAs. Frequent sampling and monitoring should be established by the Environmental Health Unit of the MOH as part of their oversight functions. It would be helpful to understand the plans for May Pen and Saint Ann given their identification as needing immediate attention.
Inadequate Stormwater Management	Localized flooding is recurrent at the studied hospitals. The UNOPS assessment did not include an evaluation of the stormwater system. At the time of this writing, there was no available information about any plan to properly manage stormwater	Rehabilitation and upgrade works should include the design of a stormwater management plan for hospital grounds that provide drainage ditches, sand filters, bioretention areas, and other BMPs for stormwater management. The stormwater management plan should

Project Related Environmental and Social Issues	Current Situation	Recommendations for Technical Strengthening
	runoff within the hospital plots. Stormwater runoff carries surface pollutants if no pollution prevention is in place. NEPA does not have any guidelines for addressing runoff from hospitals or the use of BMP for controlling non-point source stormwater runoff.	be integrated within a pollution prevention plan at each hospital.
Medical Waste	The Waste Management Unit within the MOH provides services to healthcare facilities to ensure proper waste management and disposal. The Unit manages Jamaica's first non-incineration automated medical waste plant that utilizes steam sterilization and shredding technology, which negates the adverse effects of burning medical waste. The 2017-2018 MOH business plans describe the establishment of medical waste facilities at selected health care facilities as a medium-term key action.	The design and space allocation of medical waste facilities should be incorporated into the rehabilitation works for the studied hospital as a short-term action. Maintenance of these facilities should be included in the pollution prevention plan at each hospital
Potential Presence of ACBM at the Hospitals	Since 1999, the MOH has been trying to address the potential health concern of hospital workers who may be exposed to ACBM. In that same timeframe, the MOH requested that the Sparkman Center for Global Health provide assistance in training employees to help address asbestos pollution identified in some hospitals (Scarlett, 2007). In 2014, NEPA developed guidelines for asbestos management. The 2016-2017 MOH Annual Report indicated that ACBM were removed from Cornwall Hospital. There is no specific policy for addressing ACBM at hospitals. In 2007, Scarlett also indicated that the Environmental Health Unit had tried to procure air-monitoring equipment. No information was located in either central or local government documents on the status of any training or equipment acquired.	The MOH should establish an asbestos testing and abatement policy for hospitals to phase out this contaminant. The RHAs should establish a management program at each hospital under their jurisdiction. Contractors hired by the MOH for hospital rehabilitation works should be required to provide asbestos testing and abatement works per NEPA guidelines.
Compliance with Environmental Regulations	Hospitals are not complying with environmental regulations (MOH, 2018).	Establish coordination between the MOH and NEPA to work jointly to bring the hospitals into compliance. This could be done by assigning one full-time staff at each agency and establishing liaisons at each institution to

Project Related Environmental and Social Issues	Current Situation	Recommendations for Technical Strengthening
		<p>develop a compliance plan with concrete milestones. Establish pollution prevention plans at each hospital to be monitored by the RHAs with supervision by the MOH. An environmental specialist may need to be hired by each RHA to ensure that the pollution prevention plans are implemented within a specified date frame.</p>
Grievance Mechanism	<p>The RHAs have on their websites a complaint mechanism. The steps in this mechanism are as follows:</p> <ul style="list-style-type: none"> • Complaints are made to the MOH, the Regional Office, or any Health Care Facility (Health Centre or Hospital). • The Complaints Receivable Officer documents the complaint on the Client Complaint Form, which is signed by the complainant –or– the Client Complaint Form can be completed online or downloaded from the website. • The Complaint Form is sent to the CEO of the facility, the Parish Manager, the Senior Medical Officer, the Hospital Administrator, or the Medical Officer of Health. • Complaints are acknowledged within 1 to 5 days following receipt. • The process of investigation and resolution begins within 1 to 3 days after the receipt of the complaint depending on its nature. • The complainant is kept informed of the status of the investigation. • A face-to-face meeting is arranged at the convenience of the complainant in order to satisfy and resolve the complaint. • The agreed resolution is implemented. • If the complainant is not satisfied with the outcome, the matter may be referred to a higher level within the organization or to the Ministry of Health. • The process can be stopped at any time if the 	<p>The MOH has a formal grievance mechanism to address patient concerns with care. However, staff at all three hospitals indicated the system could be improved to make it clearer where complaints can be filed at hospitals, and it is possible that complaints are not being addressed within the period indicated. Staff noted that, in the past, there were more localized grievance systems and that these could be more effective. They suggested creating a “key point of contact” formally identified and prominently communicated to patients at each hospital to receive formal grievances and to coordinate communication about them between the MOH and hospital, as well as follow up on the complaints and ensure their resolution.</p>

Project Related Environmental and Social Issues	Current Situation	Recommendations for Technical Strengthening
	complainant indicates this in writing to the person to whom the complaint was sent.	
Natural Hazards Risks	All three hospitals are currently experience similar levels of natural hazard risk. Natural hazards include: flooding, storm surge, hurricanes, tropical storms, seismic activity, karstification, land subsidence, and high winds.	All three hospitals currently have Emergency Preparedness and Response Plans. However, it is unclear how detailed the plans, as they were not made available upon request. Establish coordination between the MOH, NEPA, RHA, Fire brigades and the Disaster Preparedness and Emergency Management Unit within each municipality corporation, to better respond to natural hazard risks and vulnerabilities. Full vulnerability assessments should be conducted by the MOH prior to commencement of works, with particular emphasis on flooding, karstification, seismic activity, and land subsidence. Construction designs should follow Seismic Building Code, per Jamaica's National Building Code, to comply with the regulations pertaining to structures that are considered critical to human welfare (i.e., hospitals).

5 Environmental Context

5.1 Environmental Context Summary Table

Figure 5.1-1: Environmental and Biological Baseline Summary Table

Hospital	Topography	Soils	Geology	Water Resources	Climate	Biology	Natural Hazards
Spanish Town	Flat (less than 5% slope) and 31 meters ASL	Sedimentary, surrounded by karst.	Post-eocene marine strata, limestone alluvial deposits.	Rio Cobre watershed, limestone aquifers.	Dry, tropical climate	No endemic species	Hurricanes, sea level rise, seismic activity, landslides, karst land subsidence, instability, and sinkholes.
May Pen	Gently sloping.	Carbonate sedimentary (i.e., karst).	Post-eocene marine strata.	Rio Minho watershed, limestone aquifers.	Dry, tropical climate	No endemic species	Hurricanes, sea level rise, seismic activity, landslides, karst land subsidence, instability, and sinkholes.
St. Ann's Bay	Gently sloping, 16 meters ASL.	Mixed sedimentary.	Quaternary alluvium.	Rio Bueno-White watershed.	Wet, tropical climate	No endemic species	Hurricanes, sea level rise, seismic activity, landslides, karst land subsidence, instability, and sinkholes.

5.2 Spanish Town Hospital

5.2.1 Physical Environmental Baseline

5.2.1.1 Topography

The island of Jamaica has a high percentage of flat, gently sloping, and steep land. The topography of St. Catherine's Parish has been shaped largely by volcanic succession, giving rise to a landscape of carved river valleys, intervening steep slopes, and ridges. Sandstones and clays of the "Guys Hill Formation" (YLG) have also lead to the formation of gullied landscapes, with shallowly carved stream systems and moderate drainage densities. The gullies in this area are generally short, but well defined. Spanish Town Hospital is located in the alluvial plain of the Rio Cobre watershed. According to topographical maps, the area appears to be relatively flat, with the majority of slopes being less than 5 percent.

5.2.1.2 Drainage and Soils

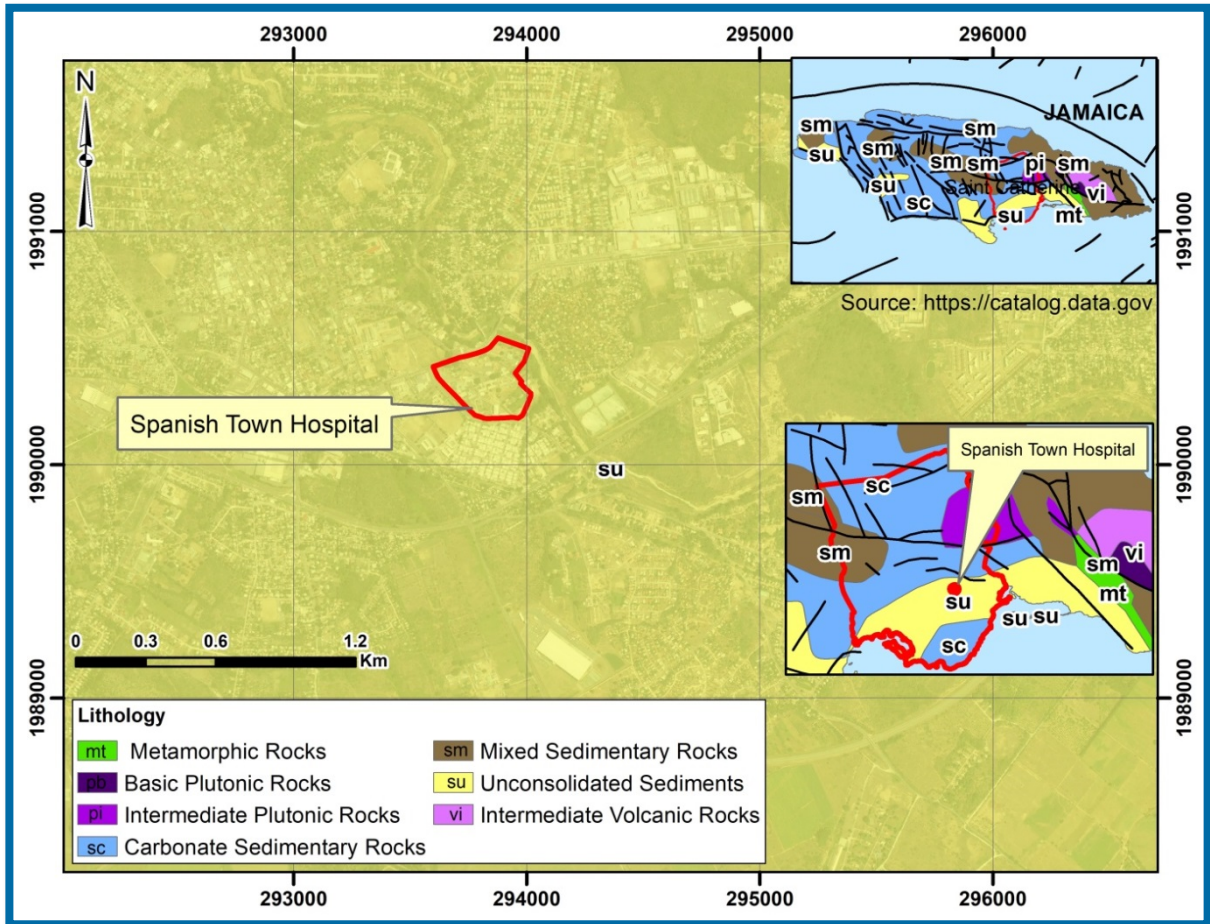
Jamaica is composed of the following eight types of soils, 1) recent alluvial soils, 2) old alluvial soils, 3) red, brown, and yellow colored soils derived from hard white limestone, 4) mart soils and

soils derived from soft white limestones and yellow limestone soils, 5) Richmond shale soils, 6) purple conglomerate soils, 7) soils derived from other shale conglomerates, tuffs, and sandstones, 8) soils derived from granite and porphyry (see table below). Jamaica's mountainous topography, high rainfall, and in many cases, poor soil management practices all contribute to soil loss and erosion. The figure below displays the parent material and lithology for St. Catherine Parish (Spanish Town Hospital). (Ministry of Agriculture, 1964)

Table 5.2-1: Major Soil Types and Characteristics of Jamaica

Soil Type	Characteristics
Recent Alluvial Soils	These soils occur within Jamaica's floodplains and along the banks of main river systems, including the Rio Cobre, Rio Miho, Wag Water, Rio Grande, Swift River, Plantain Garden River, Johnson River, Yallahs River, and the Milk River. Soils within this region vary according to texture but are generally formed by sand, loam, and clay loam. Recent alluvial soils are classified with poor surface runoff and internal drainage corresponds to the soils percentages of sand, loam, and clay.
Old Alluvial Soils	These soils are typically heavier in texture and contain higher levels of acid than recent alluvial soils. Old alluvial soils are commonly found in St. Catherine (Spanish Town) and Clarendon (May Pen) Parish. These soils are classified as moderately deep, with rapid to slow internal drainage depending on clay composition. All soil types within this group are also typically classified as having poor surface runoff.
Red, Brown and Yellow Colored Soils, derived from hard White Limestone	These soils are found throughout Jamaica's central and western plains and contain higher levels of iron and aluminum oxide. These soils are classified as deep, with very rapid to slow internal drainage depending on clay composition. Surface runoff or drainage is also classified as fair to poor.
Marl Soils and Soils derived from Soft White Limestone or Yellow Limestone	These soils occur mainly along Jamaica's northern coast and along the eastern side of the island, at areas below 212.12 meters (700 feet). Generally, these soils are dark in color and are under laid with marl. These soils tend to be heavier in texture and contain high levels of free limestone. Surface runoff or drainage is generally classified as poor to rapid, depending on clay composition.
Richmond Shale Soils	These soils occur mainly along Jamaica's southern coast. The parent material for these soils is shale. Within a high weathering potential, these soils are generally found along steeper, more incised topographies. Surface runoff or drainage is generally classified as good to poor, with rapid to fair internal drainage.
Purple Conglomerate Soils	These shallow soils occur throughout Jamaica's steeper slopes and are highly erodible. These soils are found within upper Clarendon Parish (May Pen Hospital) and are classified as having rapid internal drainage and rapid runoff.
Soils derived from other Shales	These soils are found in some areas of Clarendon Parish (May Pen Hospital) and are typically formed by heavy clays with high acidity. Surface runoff or drainage is generally classified as rapid, with highly erodible soil.
Soils derived from Granite Prophyry	These soils are found in parts of St. Catherine Parish (Spanish Town Hospital) and are generally comprised of weather rock, with eroded topsoil. These soils are very shallow and typically have rapid runoff and erosion potential.

Figure 5.2-1: Parent Material Lithology of St. Catherine Parish (Spanish Town Hospital)



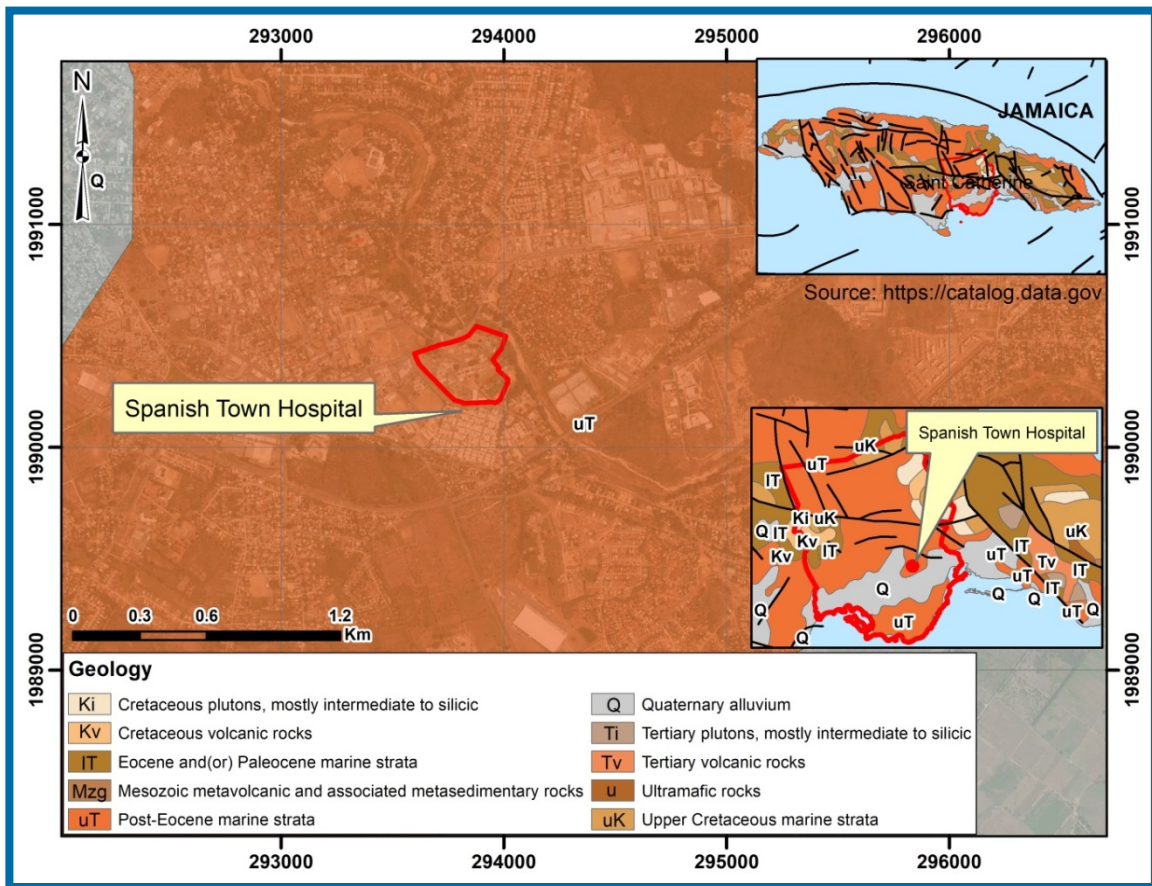
5.2.1.3 Geology

More than half of Jamaica's surface is composed of white limestone. Underneath this white limestone are layers of yellow limestone, older metamorphic rocks, and igneous rock. The geology of St. Catherine Parish is made of four geological deposits: basement succession (Cretaceous), the Yellow Limestone Group (YLG), the White Limestone Group (WLG), and overlying alluvial deposits. The rocks and minerals of the Cretaceous basement are largely volcanic in composition and origin, with associated sedimentary rock. The figure below displays the geology with St. Catherine Parish. (Mitchell, Mandal, & Miller, 2015) (Ministry of Agriculture, 1964)

The geomorphology of the Yellow Limestone Group (YLG) is largely comprised of medium-scale depressions and rounded residual hills, while the White Limestone Group is largely comprised of karst sediments, which include dolines, cockpits, towers, poljes, stream sinks, dry valley networks, caves, and springs. The resulting soil formations, as discussed above, consist largely of sedimentary gravels, sands, loamy materials, and clay. A combination of incised gullies, valley

systems, and soil profiles make this area highly prone to flooding. (CL Environmental, 2004) (Mitchell, Mandal, & Miller, 2015)

Figure 5.2-2: Geology of St. Catherine's Parish



5.2.1.4 Water Resources

Water resources are defined as all surface water bodies and groundwater systems including, rivers, streams, canals, gullies, lakes, estuarine waters, floodplains, aquifers, and other aquatic habitats. These resources are typically grouped into watershed or river basins.

Watersheds

Watersheds consist of surface water and all underlying groundwater that drains into a common outlet. Jamaica has 26 distinct Watershed Management Units. Spanish Town Hospital is located within Jamaica's Rio Cobre watershed boundary. (NEPA, 2008)

Fresh Water

Jamaica's largest river is the Rio Minho (92.5 kilometers in length) followed by the Rio Cobre (50.9 kilometers in length). The Rio Cobre flows through St. Catherine Parish (Spanish Town

Hospital). The Rio Cobre flows from north to south, with a mean discharge of approximately 6.2 m³ per second. During peak flow periods, the river can reach up to 283 m³ per second. South of Spanish Town, tributaries to the Rio Cobre (Duhaney and Ferry River) converge and discharge directly into Hunt's Bay at a rate of approximately 2.8 m³ per second. Groundwater from limestone-alluvial bases provides the headwaters for the Rio Cobre and its tributaries. Freshwater in Spanish Town originates from the headwaters of the Rio Cobre, as well as from other smaller rivers and tributaries that converge with the Rio Cobre. (Environmental Solutions Limited, 2004) (National Library of Jamaica, 2000)

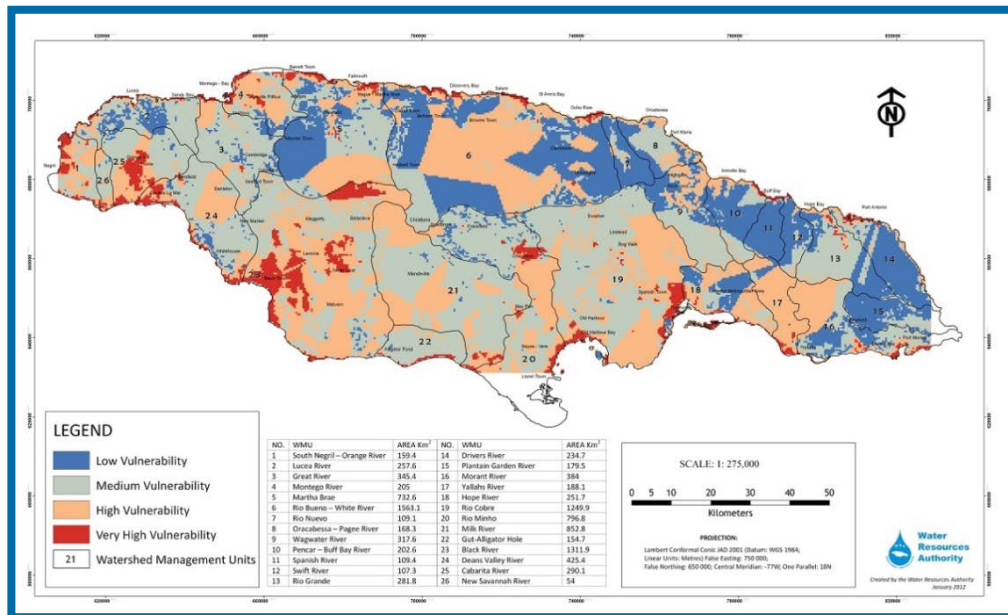
Groundwater

Fresh groundwater can be found in limestone aquifers, due to fractures and solution cavities. The depth of Jamaica's groundwater can vary, but it is typically less than 100 meters in depth. Hand pumps are typically used in the more mountainous areas of St. Catherine Parish. In this region, the thickness of the aquifer has an approximate average of 500 meters. Unfortunately, Spanish Town suffers from an over pumping of groundwater, which has caused increasing levels of saltwater intrusion. Furthermore, despite having a central sewage system and 15 sewage treatment plants, the main method for sewage disposal in Spanish Town is through hand-dug soak away pits. In addition to other environmental hazards, these pits are contaminated with fecal coliform. The figure below displays Jamaica's Limestone aquifer vulnerability. (U.S. Army Corps of Engineers, 2000)

Estuarine and Coastal Waters

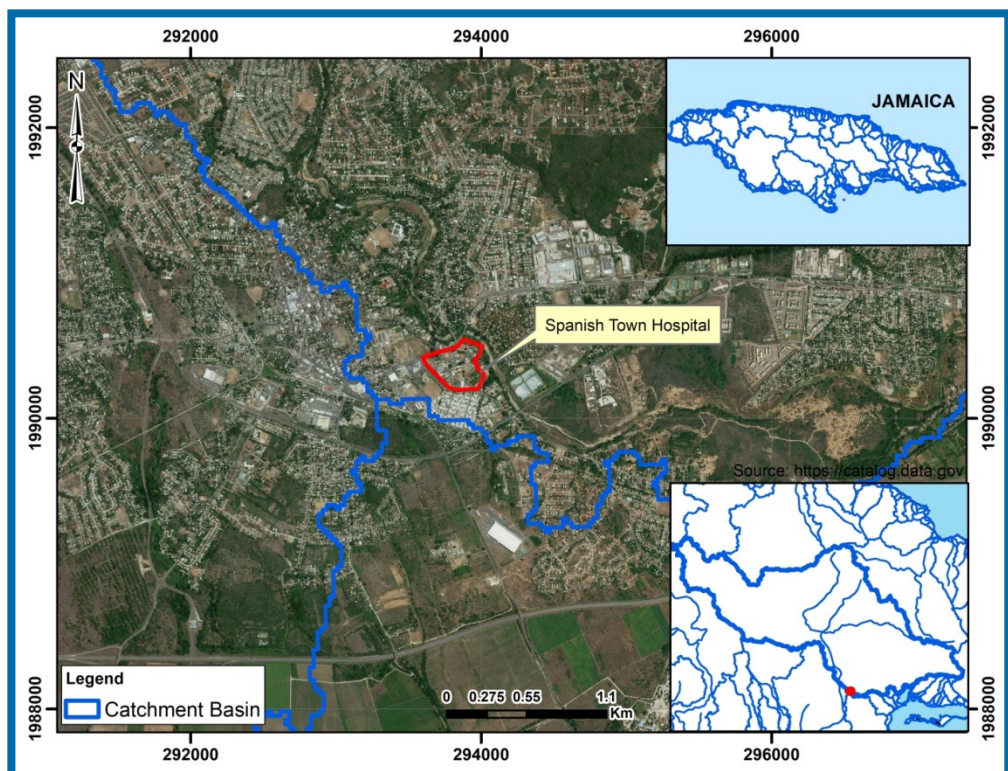
Estuaries (including bays and tidal rivers) are bodies of water that provide transition zones between fresh river water and saline ocean water. The Rio Cobre, located adjacent to Spanish Town Hospital, discharges directly into the Atlantic Ocean via Hunt's Bay. The figure below details the Rio Cobre Watershed and Catchment Basin, in relation to Spanish Town Hospital.

Figure 5.2-3: Jamaica's Limestone Aquifer Vulnerability



Source: (WRA, 2018)

Figure 5.2-4: Rio Cobre Watershed and Catchment Basin



Floodplains

The Water Resources Authority (WRA) of Jamaica has prepared maps of the floodplains for several rivers in Jamaica, including the Yallahs River, Hope River, and a section of the Rio Cobre. Due to the relatively low-lying and flat alluvial plane topography between Spanish Town and the coastline of Jamaica, rainfall accumulation can occur rapidly, with water flowing directly into the rivers mentioned above. Historically, the Rio Cobre has been classified as a high-risk area for flooding. (Environmental Solutions Limited, 2004)

There are two primary types of flooding in Jamaica:

- Riverine floodplains occur along rivers, streams, gullies, or lakes where overbank flooding may occur, inundating land areas. Due to its flat topography, low elevation, and close proximity to large river bodies, Spanish Town is especially prone to riverine flooding. While 50 and 100 year flooding events have been recorded along the Rio Cobre, no significant historical flooding has been recorded in this area yet, due to high-flow rates and sufficient flood control structures (e.g., Rio Cobre dykes). However, without a significant increase in engineered flood control structures and mitigation measures, Jamaica will likely see an increase in flood risk vulnerability due to climate change. (Environmental Solutions Limited, 2004)
- Coastal floodplains along Jamaica's southern coastline are subjected to both sea level rise and land subsidence. Since the 1990s, sea level rise in the Caribbean has been approximately 3.2 mm per year. By the end of the century, Jamaica is expected to see an approximate increase of 0.43 – 0.67 meters, depending on low-high carbon scenarios. Jamaica's maximum high-carbon scenario projection is 1.05 meters, by the end of the century. Situated 31 meters above sea level, Spanish Town is relatively protected from coastal inundation and storm surge. However, as climate change impacts continue to increase, Spanish Town may begin to experience new or worsening levels of coastal inundation, particularly in relation to severe weather events.

5.2.1.5 Climate Conditions

Precipitation and Humidity

Rainfall within Jamaica is highly variable, due to the influence of El Nino and other weather events. The wet season is categorized as “bi-modal” or, double peaked. Based on historical climate modeling (1940 – 2010), the intensity and occurrence of extreme rainfall events appears to be increasing. Compared to other Parishes in Jamaica, the Parish of St. Catherine is generally considered a dry area, receiving approximately 1276 mm (or 50 inches) of rainfall per year. Rainy season for the Parish typically occurs between May and October, when monthly rainfall averages double, or in some cases triple. Dry season typically occurs between December to April and June to August. The table below shows the mean 30-year rainfall normal between 1971 and 2000. Months with higher rainfall averages tend to correlate with higher levels of humidity, while months with lower rainfall average correlate with lower levels of humidity. St. Catherine Parish typically experiences humidity levels between 74% in July and 82% in October.

Table 5.2.1.5-1: Mean 30-year Rainfall Totals between 1971 and 2000

Parish	January	February	March	April	May	June	July	August	September	October	November	December	30-year Average Annual Total (in mm)
St. Catherine	53	55	61	91	156	110	85	129	172	188	115	62	1276

Source: (Meteorological Service of Jamaica, 2018)

Temperature

Land surface temperatures in Jamaica vary according to the month and are largely dependent on solar insolation. Average temperatures within St. Catherine Parish vary from season to season. During winter months, the temperature is approximately 16 degrees Celsius, while the maximum average temperature during summer months is approximately 32 degrees Celsius.

Table 5.2.1.5-2: Mean 16-year Temperature Totals between 1992 and 2008

Parish	January	February	March	April	May	June	July	August	September	October	November	December	30-year Average Annual Total (in Celsius)
St. Catherine	25.4	25.0	25.3	26.2	26.9	27.5	27.8	27.8	28.0	27.1	26.4	25.7	26.60

Wind

There is insufficient historical data on wind for Jamaica. Currently, wind patterns are only monitored regularly at Norman Manly International Airport (Kingston) and Sangster International Airport (Montego Bay). Summer months, between June and August, typically see the highest wind speeds per hours. Wind speeds between September and January tend to be less intense, and are typically below 10 kilometers an hour. (NEPA, 2018)

5.2.1.6 Energy Sources

The local energy utility, Jamaica Public Service (JPS), supplies the entire electrical system for Spanish Town Hospital with two feeders. One feeder is used for the hospital's emergencies, and the other for the rest of the hospital's energy needs. Together, these feeders provide approximately 28 kV of energy to Spanish Town Hospital.

The energy supply is separated into three main categories: Motherhood sector (300 kVA), Emergency (250 kVA), and all other buildings (three sources of 1500 kVA). After a review of publicly available information, it is apparent that the 1500 kVA system is incorrectly installed. The connections are exposed and lack insulation, there are signs of short circuits, and the general arrangement of the system is confusing. The following image shows an example of the system.

In addition, there are two generators that are used for the motherhood building (311 kVA) and another generator for the emergency circuits in other wards (320 kVA). However, as with the

example above, the systems are incorrectly installed and therefore pose a safety risk to patients due to many exposed parts and improperly installed machinery.

5.2.2 Biological Baseline

5.2.2.1 Flora

Jamaica is part of the Caribbean Islands biodiversity hotspot (CEPF). Terrestrial ecoregions include the Jamaican Moist Forests (EoE) and the Jamaican Dry Forests (EoE). The CEPF is home to approximately 11,000 native species of seed plants, 7,868 of which are endemic. Jamaica alone has 3,003 species of flowering plants and 597 fern species. Of these totals, 830 (28%) of Jamaica's flowering plants and 82 (14%) of Jamaica's fern species are endemic. The plants *Portlandia* and *Jacaima* are also endemic to the country. (CEPF, 2018) (WWF, 2018)

The surrounding areas of Spanish Town contain various species of flora, although there are no endemic or endangered plants currently identified within the city. The table summarizes the local plant species found in Spanish Town. In addition to the plant species listed below, the surrounding areas of the city also contain species such as *Blighia sapida* (Ackee), Lead Tree, *Guazuma ulmifolia* (Bastard Cedar), *Ziziphus mauritania* (Coolie Plum), Mango and *Momordica balsamina* (Cerasee). Historically, a significant portion of St. Catherine's parish consisted of Sugarcane, but no longer does as of the late 20th century. (CL Environmental, 2004)

Table 5.2.2-1: Plant Species Found within Spanish Town, Jamaica

Family	Botanical	Common Name	Abundance	Habit
Anacardiaceae	<i>Mangifera indica</i>	Mango	Rare	Tree
Asclepiadaceae	<i>Calotropis procera</i>	French Cotton	Occasional	Tree
Gramineae	<i>Saccharum officinarum</i>	Sugar Cane	Occasional	Grass
Lamiceae	<i>Leonotis nepetifolia</i>	Christmas Candlestick	Occasional	Herb
Liliaceae	<i>Sansevieria metallica</i>	Mother-in-Law's Tongue	Occasional	Tree
Mimosaceae	<i>Acacia farnesinana</i>	Sweet Acacia	Occasional	Shrub
Mimosaceae	<i>Acacia tortuosa</i>	Wild Poponax	Occasional	Shrub
Mimosaceae	<i>Leucaena leucocephala</i>	Lead Tree	Occasional	Shrub/Tree
Mimosaceae	<i>Samanea saman</i>	Guango	Rare	Tree

5.2.2.2 Terrestrial Wildlife

Terrestrial wildlife are species of animals that live predominantly on land. Historically, the CEPF supported 92 terrestrial mammal species, of which 23 are now considered extinct. Of the remaining 69 species, 51 are considered endemic to the hotspot and 27 are globally threatened.

However, due the loss of habitat and lack of vegetation in Spanish Town, the fauna within this particular area is not very diverse. There are no known endemic species in St. Catherine's Parish, and species that are present, occur in small numbers.

Bird Species

One hundred and thirteen bird species are present in Jamaica, 23 of which are endemic. The total number of bird species in Jamaica nearly doubles during winter months, due to migratory patterns from North America. The table below details the species currently present in St. Catherine, Jamaica. (CL Environmental, 2004) (WWF, 2018)

Table 5.2.2.2-1: Bird Species Found in St. Catherine, Jamaica

Family	Species Name	Common Name	Status
Ardeidae	<i>Bubulcus ibis</i>	Cattle Egret	Very Common
Cathartidae	<i>Cathartes aura</i>	Turkey Vulture	Common Resident
Columbidae	<i>Zenaida asiatica</i>	White-winged Dove	Very Common
Cuculidae	<i>Crotophaga ani</i>	Smooth-billed Ani	Common Resident
Emberizidae	<i>Tiaris bicolor</i>	Black-faced Grassquit	Common Resident

Mammals

Mammals unique to Jamaica include the Jamaican Hutia (*Geocapromys brownii*), the Jamaican Fig-eating Bat (*Ariteus flavescens*), the Jamaican Flower Bat (*Phyllonycteris aphylla*), the Jamaican Greater Funnel-eared Bat (*Natalus jamaicensis*), and the Jamaican Red Bat (*Lasiurus degelidus*). The sole remaining extant species of native mammal to exist in Jamaica is the Jamaican Hutia. The current status of this species is unknown. (WWF, 2018) In terms of species that have been identified in St. Catherine Parish, the most commonly seen species are wild dogs and mongoose. (CL Environmental, 2004)

Invertebrates

Jamaica has 134 types of moth and butterfly species, including the *Papilio homerus* and *Eurytides marcellinus*. Of these species, 20 are endemic to Jamaica. In addition, many of the more than 500 endemic species of Jamaican land snails, such as species of *Pleurodonte* and *Annularia pulchrum* are found in the country. (WWF, 2018) Other invertebrates, such as dragonflies, mosquitos, ladybugs, flies, bees, wasps, termites, land crabs, fiddler crabs, and shrimp are also found in Jamaica. The table below details the species of butterflies that are currently found in St. Catherine Parish, Jamaica. (CL Environmental, 2004)

Table 5.2.2.2-2: Butterfly Species Found in St. Catherine, Jamaica (1993)

Common Name	Scientific Name	Distribution
Julia	<i>Dryas iulia Delila</i>	Island-wide
Antillean Great White	<i>Ascia monuste eubotea</i>	Island-wide
Buckeye	<i>Precis evarete zonalis</i>	Island-wide
Maerula	<i>Anteos maerula maerula</i>	Island-wide
Cloudless orange	<i>Phoebis agarithe cubana</i>	Island-wide
Statira	<i>Aphrisa statira cubana</i>	Island-wide
Antillean malachite	<i>Siproeta stelenus stelenus</i>	Island-wide

Reptile and Amphibians

All of Jamaica's native amphibians are endemic including the Jamaican Peak Frog (*Eleutherodactylus alticola* (Caribherp)), the Jamaican Cave Frog (*Eleutherodactylus cundalli*), the Western Yellow-bellied Frog (*Eleutherodactylus pantone*), the Jamaican Masked Frog (*Eleutherodactylus luteolus*), the Jamaican Laughing Tree Frog (*Osteopilus ocellatus*), and the Jamaican Snoring Tree Frog (*Osteopilus crucialis*). In addition to being endemic, these species are also endangered. (WWF, 2018)

Twenty seven endemic reptile species are found in Jamaica. Species include the Jamaican Iguana (*Cyclura collie*), the Jamaican Twig (Anole *Anolis*), the Bluefields Anole *Anolis*, the Blue Mountain Anole (*Anolis reconditus*), the Jamaican Giant Gecko (*Tarentola albertschwartzi*), a dwarf gecko (*Sphaerodactylus semasiops*), the Jamaican Ameiva (*Ameiva dorsalis*), the Jamaican Skink (*Spondylurus fulgidus*), the Limestone Forest Galliwasp (*Celestus barbouri*), the Jamaican Boa (*Epicrates subflavus*), the Jamaican Racer (*Hypsirhynchus*), and the Jamaican Blindsnake (*Typhlops jamaicensis*). (WWF, 2018)

The endangered American crocodile (*Crocodylus acutus*) also occurs in Jamaica, mainly along the country's southern coast, with particular abundance in the Black River Morass region. The endemic and critically endangered Jamaican rock iguana (*Cyclura collei*) is also present in the Hellshire Hills, approximately 20 kilometers west of Kingston. Jamaica iguana populations declined rapidly in the beginning of the 19th century due to the introduction of the Indian mongoose (*Herpestes auropunctatus*), the predation of dogs, and habitat destruction. (WWF, 2018) The table below details the species of reptiles that are currently found in St. Catherine Parish, Jamaica. (CL Environmental, 2004)

Table 5.2.2.2-3: Reptile Species found in St. Catherine, Jamaica (2004)

Scientific Name	Status	Distribution
<i>Anolis lineatopus</i>	Endemic	Island-wide
<i>Anolis graham</i>	Endemic	Island-wide
<i>Anolis valencienni</i>	Endemic	Island-wide

Source: (Identification based on Brown and Heineman, 1972)

Fish

The families of the ten most abundant finfish species caught in Jamaica are Gerriedae (maccabacks), Sparidae (breams), Lutjanidae (snappers), Carangidae (jacks), Clupeidae (sprats and herrings), Haemulidae (grunts), Scaridae (parrotfishes), Centropomidae (snooks), Mugilidae (sea mullets), and Sphyraenidae (barracudas). The only crustacean families currently found in Jamaica are Palinuridae (spiny lobsters) and Penaeidae (marine shrimps). Marine fisheries in Jamaica are almost entirely artisanal, with an estimated 20,000 Jamaicans relying on fish as their main source of diet and income. Based on a review of publicly available information, it is widely believed that the collapse of fish species within Jamaica's waterbodies is due largely in part to gross pollution, shoreline construction, and the destruction of habitat. In terms of species that occur specifically in St. Catherine Parish, studies have reported the following species, snook, mullet, tarpon, and perch. (Environmental Solutions Limited, 2004)

5.2.3 Natural Hazards

Hurricanes & Wind

Located in warm Caribbean waters, hurricanes in Jamaica are a yearly occurrence and are typically affected by El Nino / La Nina weather patterns. Between the start of hurricane season in June, until the end of the season in November, Jamaica experiences an average of 10 tropical storms or hurricanes. Although the majority of hurricanes pass Jamaica off its southern coast, varying levels of wind and precipitation are seen throughout most of the island, depending on the intensity of the storm. According to the U.S. National Hurricane Center, approximately 70% of all hurricanes to affect Jamaica have landed in the country's southern coast, where Spanish Town is located.

The passage of Hurricane Ivan in 2004 and Dean in 2007 were two of Jamaica's most severe storms, both of which took a nearly identical path along Jamaica's southern coastline. The resulting impacts from these storms included damages to infrastructure, crops, airborne debris, flooding, intensified, and more frequent rainfall, erosion of rivers and gully banks, mudflows, and disruption of public services. Hurricane Ivan specifically resulted in one of Jamaica's worst storm surge events, which left Jamaica's southern coastline highly inundated, with residents in Port Royal unable to reach the mainland. (NEPA, 2018) (Smith Warner International Ltd. , 2017)

The Caribbean region is expected to be one of earliest and most impacted areas with regards to climate change, particularly as tropical storms and hurricanes intensify and become more frequent.

Seismicity

Approximately 200 earthquakes occur in Jamaica per year, many of which are minor (magnitudes of less than 4.0). Jamaica's most seismically active areas is the Blue Mountain block, along the Montpelier-Newmarket belt in western Jamaica. In eastern Jamaica, there is the Plantain Garden fault, with collides into the Yallahs, Blue Mountain, Wagwater, and Silver Hill fault lines. (University of the West Indies, 2018)

Due to Spanish Town's proximity to the Wagwater Fault, it is also prone to seismic activity. Furthermore, due to the area's high concentrations of alluvial soils, Spanish Town is also prone to liquidation due to the acceleration of seismic waves. Although the majority of Jamaica's earthquakes have been concentrated in eastern and western Jamaica, the entire island typically feels the effects of a strong (>4.0 magnitude) earthquake. (NEPA, 2018)

Two of Jamaica's strongest earthquakes occurred in Port Royal in 1962 and in Kingston in 1907. Following substantial infrastructure damages, these two events displayed the region's vulnerability and susceptibility to liquefaction and ground failure during moderately sized earthquakes. Possible damages to hospital structures and associated facilities could have a significant long-term impact on stakeholders dependent on these social services. (Environmental Solutions Limited, 2015)

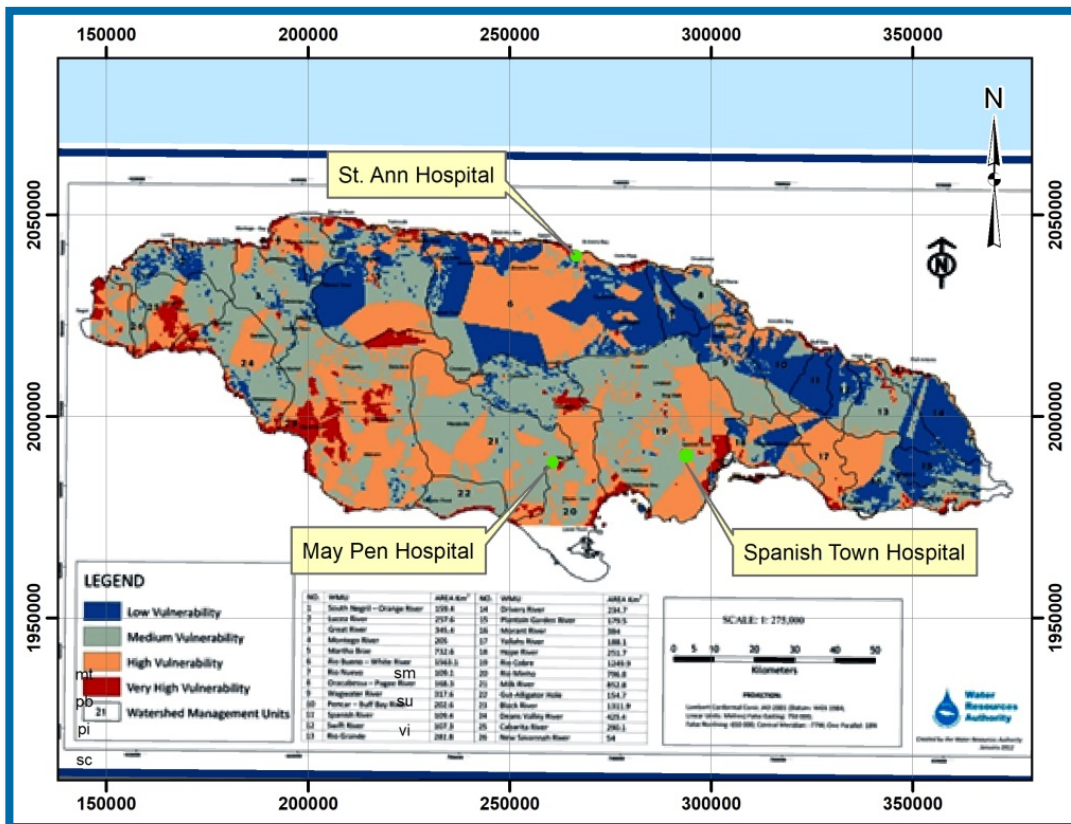
Landslides & Mudslides

Landslides and mudslides can occur in Jamaica following intense, frequent, and localized precipitation. Most commonly, they are associated with tropical storms and hurricanes. The two most recent mudslides to occur in Jamaica were in 2001 during Hurricane Michelle and in 2004 during Hurricane Ivan. During each storm, several roads and other property damages occurred. Due to the nature of Spanish Town's topography, geology, and soils, landslides and mudslides are unlikely to affect Spanish Town Hospital directly. (NLJ, 2012)

Karst Landscape

In Jamaica, the karstification of the White and Yellow Limestone Groups has resulted in a landscape varying from gently rolling, soil-covered, alluvial plains, to deep jungles and incised slopes. Erosion of this limestone has created a distinct topography, known as Cockpit karst. Cockpits are distinct from typical karst, in that these formations are typically deeper and non-circular. Sinkholes, caves, and land subsidence are all distinguishing features of karst landscapes. The figure below shows Spanish Town Hospital is located within a "high vulnerability" area for karst geologic hazards. Depending on the rehabilitation works (e.g., excavation for foundations), a more detailed geologic assessment, focusing on karst, should be conducted.

Table 5.2-2: Hospital Locations and Corresponding Karst Vulnerabilities



5.3 May Pen Hospital

5.3.1 Physical Environmental Baseline

5.3.1.1 Topography

The topography throughout Clarendon Parish is largely consistent with gently sloping. There are a few steeper hills present in Shutes Gully, while hills that are more moderate exist along the Old Harbor Bypass Road. (NEPA, 2007)

5.3.1.2 Drainage and Soils

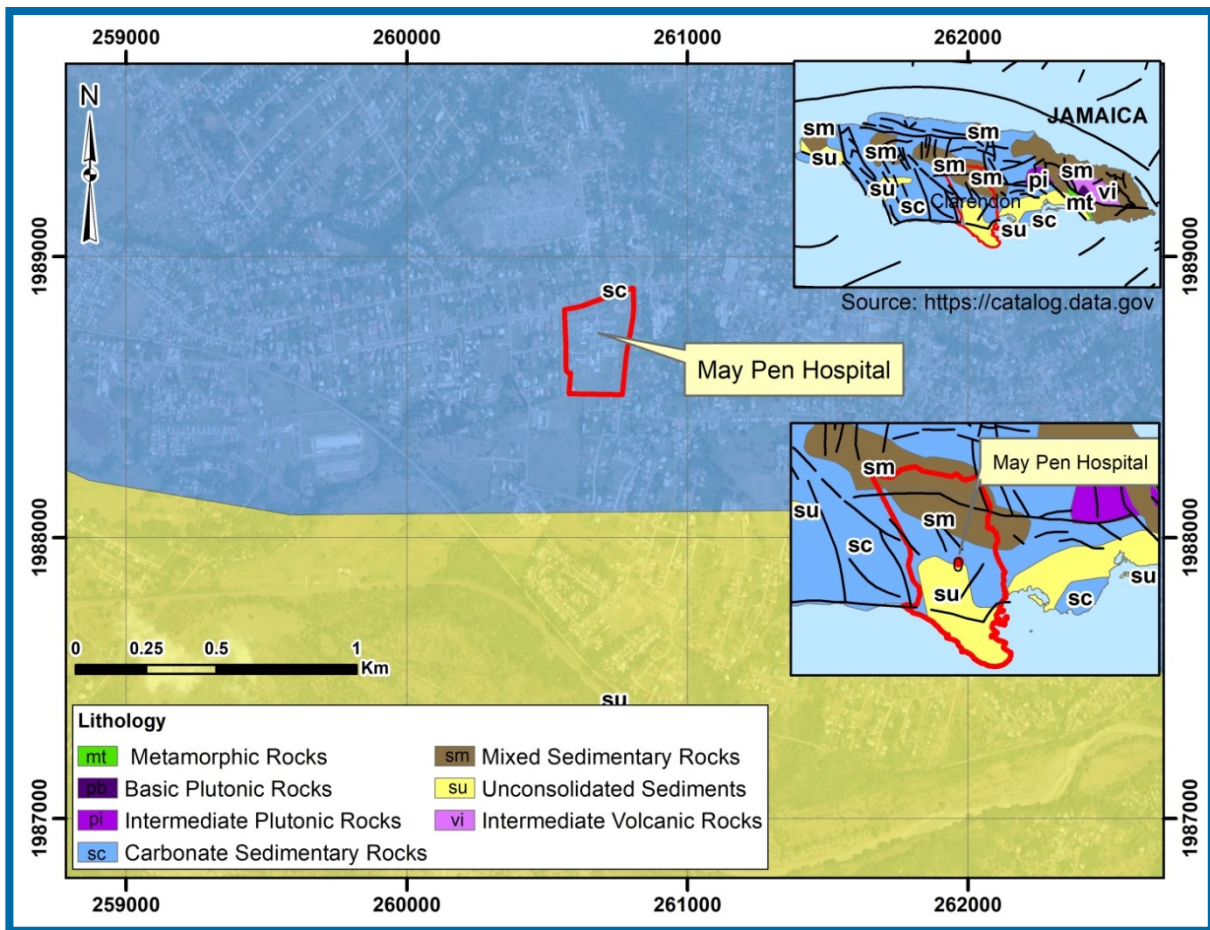
Jamaica is composed of the following eight types of soils, 1) recent alluvial soils, 2) old alluvial soils, 3) red, brown, and yellow colored soils derived from hard white limestone, 4) marl soils and soils derived from soft white limestones and yellow limestone soils, 5) Richmond shale soils, 6) purple conglomerate soils, 7) soils derived from other shale conglomerates, tuffs, and sandstones, 8) soils derived from granite and porphyry (see table below). Jamaica's mountainous topography, high rainfall, and in many cases, poor soil management practices all contribute to soil loss and erosion. The figure below displays the parent material and lithology for Clarendon Parish (May Pen Hospital). (Ministry of Agriculture, 1964)

Table 5.3-1: Major Soil Types and Characteristics of Jamaica

Soil Type	Characteristics
Recent Alluvial Soils	These soils occur within Jamaica's floodplains and along the banks of main river systems, including the Rio Cobre, Rio Miho, Wag Water, Rio Grande, Swift River, Plantain Garden River, Johnson River, Yallahs River, and the Milk River. Soils within this region vary according to texture but are generally formed by sand, loam, and clay loam. Recent alluvial soils are classified with poor surface runoff and internal drainage corresponds to the soils percentages of sand, loam, and clay.
Old Alluvial Soils	These soils are typically heavier in texture and contain higher levels of acid than recent alluvial soils. Old alluvial soils are commonly found in St. Catherine (Spanish Town) and Clarendon (May Pen) Parish. These soils are classified as moderately deep, with rapid to slow internal drainage depending on clay composition. All soil types within this group are also typically classified as having poor surface runoff.
Red, Brown and Yellow Colored Soils, derived from hard White Limestone	These soils are found throughout Jamaica's central and western plains and contain higher levels of iron and aluminum oxide. These soils are classified as deep, with very rapid to slow internal drainage depending on clay composition. Surface runoff or drainage is also classified as fair to poor.
Marl Soils and Soils derived from Soft White Limestone or Yellow Limestone	These soils occur mainly along Jamaica's northern coast and along the eastern side of the island, at areas below 212.12 meters (700 feet). Generally, these soils are dark in color and are under laid with marl. These soils tend to be heavier in texture and contain high levels of free limestone. Surface runoff or drainage is generally classified as poor to rapid, depending on clay composition.
Richmond Shale Soils	These soils occur mainly along Jamaica's southern coast. The parent material for these soils is shale. Within a high weathering potential, these soils are generally found along steeper, more incised topographies. Surface runoff or drainage is generally classified as good to poor, with rapid to fair internal drainage.

Soil Type	Characteristics
Purple Conglomerate Soils	These shallow soils occur throughout Jamaica's steeper slopes and are highly erodible. These soils are found within upper Clarendon Parish (May Pen Hospital) and are classified as having rapid internal drainage and rapid runoff.
Soils derived from other Shales	These soils are found in some areas of Clarendon Parish (May Pen Hospital) and are typically formed by heavy clays with high acidity. Surface runoff or drainage is generally classified as rapid, with highly erodible soil.
Soils derived from Granite Prophyry	These soils are found in parts of St. Catherine Parish (Spanish Town Hospital) and are generally comprised of weather rock, with eroded topsoil. These soils are very shallow and typically have rapid runoff and erosion potential.

Table 5.3.1.2-1: Parent Material Lithology of Clarendon Parish (May Pen Hospital)



5.3.1.3 Geology

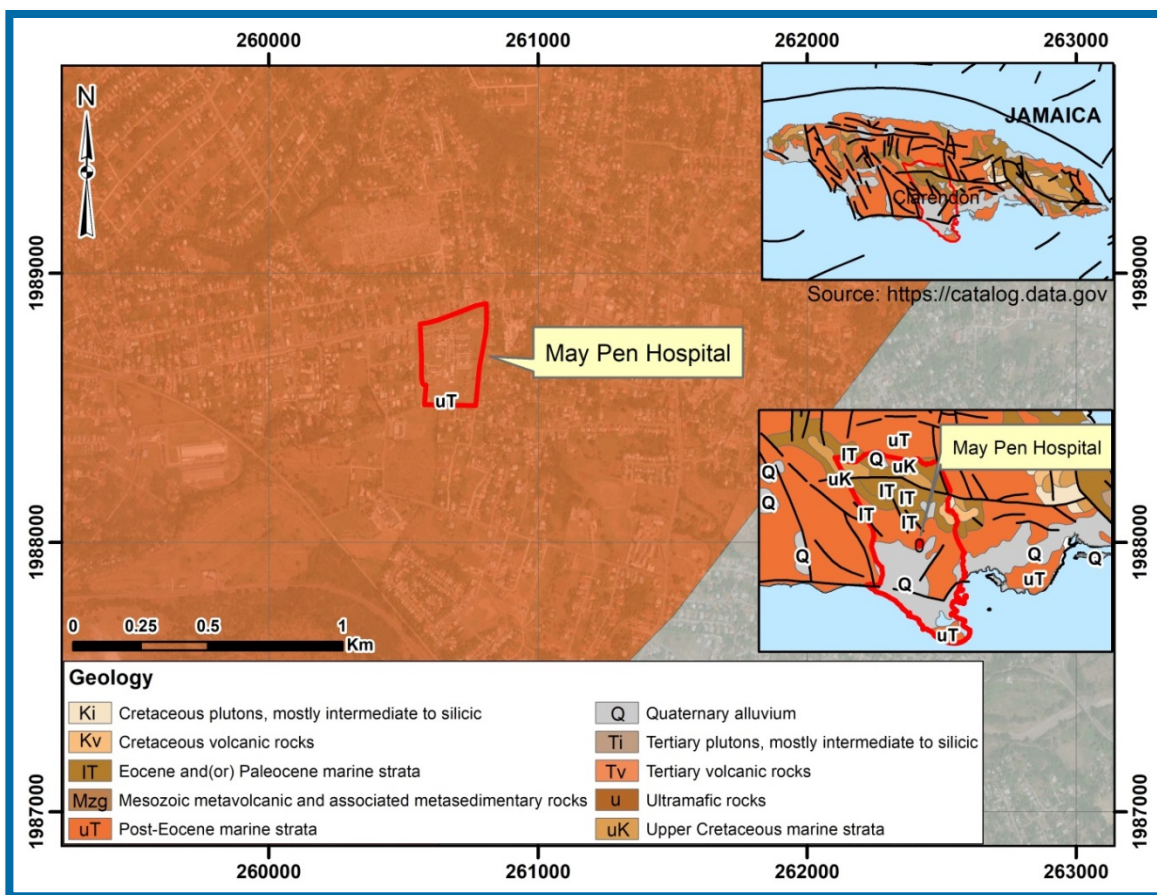
Jamaica is an island on the northwestern part of the Caribbean Plate. It has had a long and varied geological history that directly relates to the evolution of the Caribbean Plate and the North American and South American plates. More than half of Jamaica's surface is composed of white limestone. Underneath this white limestone are layers of yellow limestone, older metamorphic

rocks, and igneous rock. Volcanic and metamorphic rocks compose the rest of the northern area of the Parish. (Ministry of Agriculture, 1964)

Based on a review of publicly available information regarding the distribution of rock outcrops of Clarendon Parish, it is unlikely that the soil in this region is very thick (less than one meter of thickness, on average). The beds of Clarendon Parish are composed of limestone and occasionally, contain mollusk macrofossils as well as ubiquitous microfossils. Newly formed drainage areas, as well as areas where surface mining has occurred, allow the limestone to have significant surface exposure. These beds, which are a part of the Newport Formation, limit surface draining capacity and in turn, contribute to southern Jamaica's dry ecology. (NEPA, 2007)

Although this area is still being studied, evidence suggests that this area does not contain a fault line, as significant displacement has not occurred. Additionally, rocks and minerals typically associated with fault lines have not been discovered at this location. The figure below shows the Geology of Clarendon Parish. The following figure below shows the Geology of Clarendon Parish (May Pen Hospital). (NEPA, 2007)

Table 5.3.1.3-1: Geology of Clarendon Parish



5.3.1.4 Water Resources

Water resources are defined as all surface water bodies and groundwater systems including, rivers, streams, canals, gullies, lakes, estuarine waters, floodplains, aquifers, and other aquatic habitats. These resources are typically grouped into watershed or river basins.

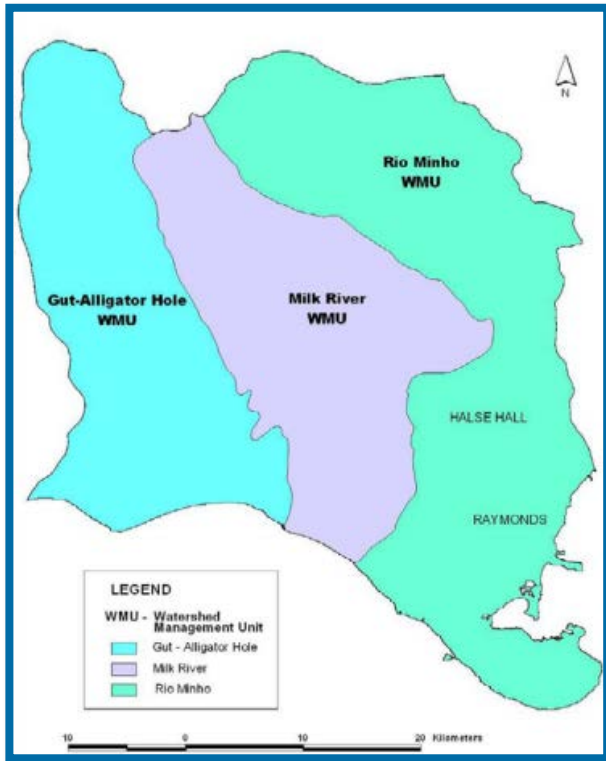
Watersheds

Watersheds consist of surface water and all underlying groundwater that drains into a common outlet. Jamaica has 26 distinct Watershed Management Units. May Pen Hospital is located within Jamaica's Rio Minho watershed boundary. (NEPA, 2008)

Freshwater

Jamaica's largest river is the Rio Minho (92.5 kilometers in length) followed by the Rio Cobre (50.9 kilometers in length). The Rio Minho flows through Clarendon Parish (May Pen Hospital). Clarendon's watershed basin has an area of 1,705 km², with three sub-basins, the Rio Minho, Milk River, and Gut-Alligator Hole. The figure below displays the three sub-basins of Clarendon Parish. Most of the freshwater in Clarendon Parish comes from Rio Minho. Flow from the Rio Minho runs north to south, but volume is largely dependent on the season. In addition, the river loses approximately 20 million cubic meters of water annual, as it is deposited into a limestone aquifer, just north of May Pen. Due to the flatness of the topography in the area and a high concentration of clays in the soil, ponding tends to occur. As with Spanish Town, there is a scarcity of fresh water in the swamp and morass areas, where most of the drainage occurs underground due to underlying limestone formations. (NEPA, 2007) (Conrad Douglas & Associates, Ltd., 2005)

Table 5.3.1.4-1: Three Hydrologic Basins in Clarendon Parish, Jamaica



Source: (Conrad Douglas & Associates, Ltd., 2005)

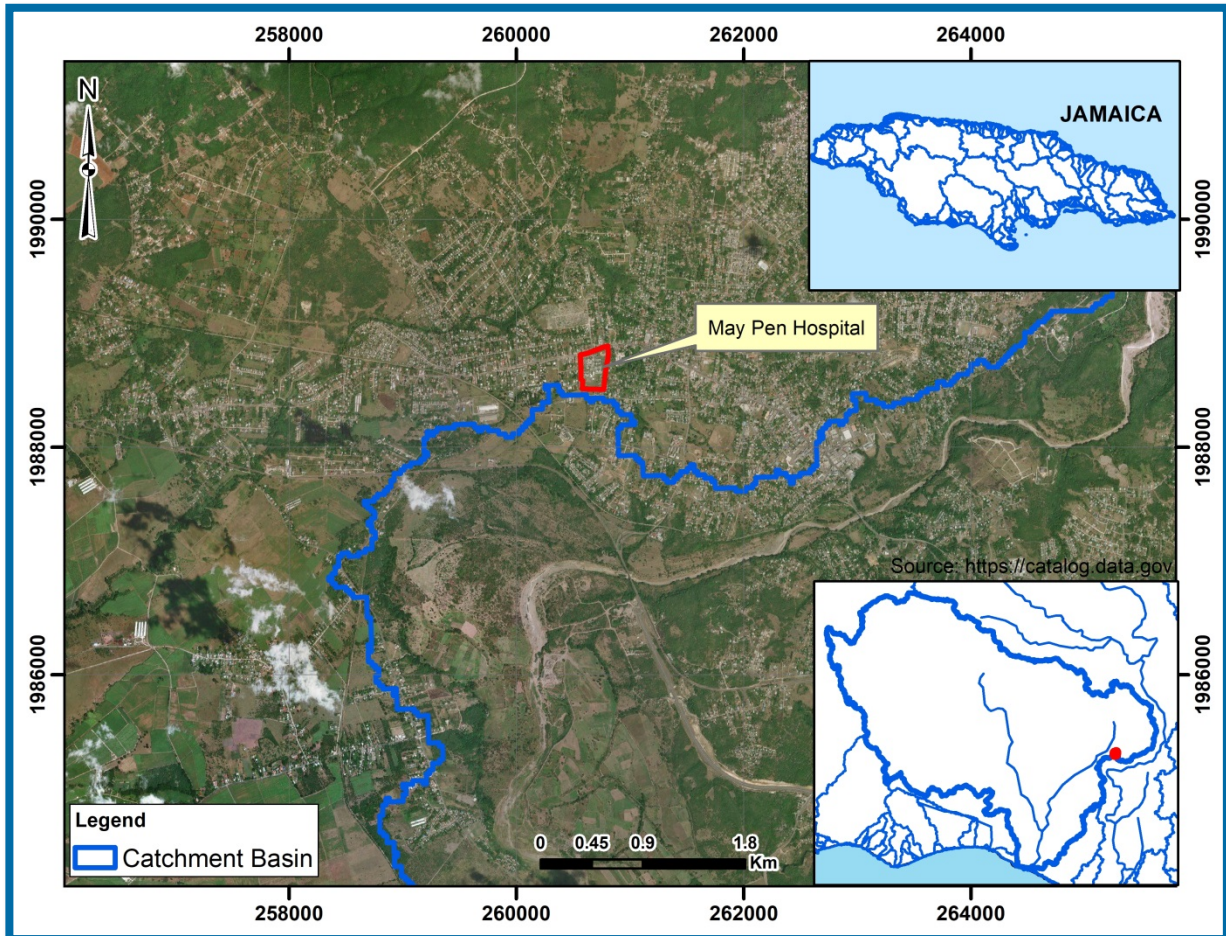
Groundwater

Fresh groundwater can be found in limestone aquifers, due to fractures and solution cavities. The depth of Jamaica's groundwater can vary, but it is typically less than 100 meters in depth. In this region, the thickness of the aquifer has an approximate average of 500 meters. Unfortunately, Clarendon Parish suffers from an over pumping of groundwater, which has caused increasing levels of saltwater intrusion. In addition, these contaminated waters contain high levels of sodium, calcium, chloride (as high as 1,000 milligrams per liter), and bicarbonate. Furthermore, despite having access 7 sewage treatment plants, the main method for sewage disposal in Clarendon Parish is through hand-dug soak-away pits. In addition to other environmental hazards, these pits are likely contaminated with high levels of fecal coliform. (U.S. Army Corps of Engineers, 2000)

Estuarine and Coastal Waters

Estuaries (including bays and tidal rivers) are bodies of water that provide transition zones between fresh river water and saline ocean water. The Rio Minho, located close to May Pen Hospital, discharges directly into the Atlantic Ocean. The figure below details the Rio Minho Watershed and Catchment Basin, in related to May Pen Hospital.

Table 4.4.1.4-1: Rio Minho Watershed and Catchment Basin



Floodplains

Due to its varying topography, limestone deposits, and close proximity to waterways, May Pen is prone to several forms of flooding.

There are two primary types of flooding are:

- Riverine floodplains occur along rivers, streams, gullies, or lakes where overbank flooding may occur, inundating land areas. Due to its flat topography, low elevation, and close proximity to large river bodies, May Pen is especially prone to riverine flooding. Historically, the worst flooding in Clarendon Parish has resulted from overtopping river flows, particularly the Rio Minho. During one of the areas worst flooding events, in September 1915, both the Rio Minho and the Thomas River overtopped their banks and resulted in unparalleled damages to agricultural resources and infrastructure. Casualties from this flooding event were also reported. Historically, the Rio Minho has been classified as a high-risk area for flooding. Without a significant increase in engineered flood control structures and mitigation

measures, Jamaica will likely see an increase in flood risk vulnerability due to climate change. (Environmental Solutions Limited, 2004)

- Coastal floodplains along Jamaica’s southern coastline are subjected to both sea level rise and land subsidence. Since the 1990s, sea level rise in the Caribbean has been approximately 3.2 mm per year. By the end of the century, Jamaica is expected to see an approximate increase of 0.43 – 0.67 meters, depending on low-high carbon scenarios. Jamaica’s maximum high-carbon scenario projection is 1.05 meters, by the end of the century. May Pen is relatively protected from coastal inundation and storm surge. However, as climate change impacts continue to increase, Spanish Town may begin to experience new or worsening levels of coastal inundation, particularly in relation to severe weather events.

5.3.1.5 Climate Conditions

Precipitation and Humidity

Rainfall within Jamaica is highly variable, due to the influence of El Nino and other weather events. The wet season is categorized as “bi-modal,” with two distinct periods of rainfall. Based on historical climate modeling (1940 – 2010), the intensity and occurrence of extreme rainfall events appears to be increasing. Based on historical climate modeling (1940 – 2010), the intensity and occurrence of extreme rainfall events appears to be increasing. Compared to other Parishes in Jamaica, the Parish of Clarendon is generally considered a dry area, receiving approximately 1153 mm (or 43 inches) of rainfall per year. Rainy season for this Parish typically occurs between May and October, with peaks in May, September, and October. Dry season typically occurs between December to April, and June through July. The table below details the mean 30-year rainfall totals that occur within Clarendon Parish. As with other areas of the island, months with higher rainfall averages tend to correlate with higher levels of humidity, while months with lower rainfall average correlate with lower levels of humidity. According to the data collected by the Bodles Research Center, the lowest humidity is typically recorded during July (72%). The highest humidity typically occurs between the months of September and October (79%).

Table 5.3.1.5-1: Mean 30-year Rainfall Totals between 1971 and 2000

Parish	January	February	March	April	May	June	July	August	September	October	November	December	30-year Average Annual Total (in mm)
Clarendon	45	40	56	68	139	94	57	113	171	209	111	49	1153

Source: (Meteorological Service of Jamaica, 2018)

Temperature

Land surface temperatures in Jamaica vary according to the month and are largely dependent on solar insolation. According to the Bodles Research Station, located in Clarendon Parish, the highest temperature ever recorded was 32.4 degrees Celsius (July). The lowest temperature ever recorded was 16.9 degrees in (January). The table below shows the maximum and minimum temperatures recorded at Bodles Research Station in 2006.

Table 4.4.1.5-2: Temperature Extremes Recorded in Bodles Research Station, Clarendon Parish (2006)

Month	Maximum Temperature (Celsius)	Minimum Temperature (Celsius)
January	30.5	17.5
February	30.6	17.6
March	30.2	18
April	30.9	18.7
May	31	20
June	32	20.5
July	33	20.3
August	33	20.3
September	32.6	22
October	32	20.3
November	31	19.8
December	31.4	18

Source: (Meteorological Service of Jamaica, 2018)

Wind

There is insufficient historical data on wind for Jamaica. Currently, wind patterns are only monitored regularly at Norman Manly International Airport (Kingston) and Sangster International Airport (Montego Bay). Summer months, between June and August, typically see the highest wind speeds per hours. Wind speeds between September and January tend to be less intense, and are typically below 10 kilometers an hour. (NEPA, 2018)

Historical wind data that is available for May Pen, suggests that the summer months, between June and August, typically see the highest wind speeds per hour. Wind speeds between September and January tend to be less intense, and are typically below 10 kilometers an hour. (NEPA, 2018) Winds from the east-south-easterly direction are also present during the day near May Pen Hospital. These winds have an average speed of 33 kilometers per hour (18 knots). At night, these winds change to a northern direction, after the daytime winds combine with the land surface breezes. These winds have an average speed of 13 kilometers per hour (7 knots), which is significantly lower than the daytime winds. Along the coast, during the months of June and July, wind speeds can increase to up to 48 kilometers per hour (26 knots). According to the Bogles Research Centre, the wind speeds in the May Pen area have an average speed of about 21 km/hour during June and 10.2 km/hr in July; wind speeds decrease, the further inland you move. (NEPA, 2007)

5.3.1.6 Energy Sources

The local power company, Public Service of Jamaica (PSJ), supplies all of the electrical systems to May Pen Hospital through a 13.8 kV feeder, which is located outside of the building, until it reaches the service entrance. Once the feeder reaches the service entrance, it goes underground through insulated cables all the way to the power transformer. However, after a

review of publicly available information, it appears that protective devices have not been installed properly (e.g., numerous exposed wires).

May Pen Hospital's substation is made up of a 1999 kVA 13.8 / Delta 0/24 kV transformer, which is then isolated and cooled with mineral oil. The maintenance of the transformer requires the following tasks: cleaning, oil level checks, safety signage reviews, safety fence painting reviews, treatment of reinforcing corrosion spots on the transformer protective paint, and maintenance on grounding connections, among others. In addition, May Pen Hospital has a set of a 560-kVA generator's in place to supply the hospital's emergency circuits. (U.S. Army Corps of Engineers, 2000)

5.3.2 Biological Baseline

5.3.2.1 Flora

Jamaica is part of the Caribbean Islands biodiversity hotspot (CEPF). Terrestrial ecoregions include the Jamaican Moist Forests (EoE) and the Jamaican Dry Forests (EoE). The CEPF is home to approximately 11,000 native species of seed plants, 7,868 of which are endemic. Jamaica alone has 3,003 species of flowering plants and 597 fern species. Of these totals, 830 (28%) of Jamaica's flowering plants and 82 (14%) of Jamaica's fern species are endemic. The plants *Portlandia* and *Jacaima* are also endemic to the country. (CEPF, 2018) (WWF, 2018)

In 2006, an assessment was conducted to determine the flora present in the areas surrounding May Pen. In general, dry vegetation, open grassed areas, trees, and shrubs were catalogued for the area. Burnt areas were also observed, with an unknown cause for the potential fires. Seven of the flora species most common to Clarendon Parish are the following: *Lantana* sps. Broom weed (*Sida acuta*), Guava (*Psidium guajava*), Rosemary (*Croton linearis*), Devils Horsewhip (*Achyranthes indica*), Castor Oil (*Ricinus communis*), Trumpet trees (*Cecropia peltate*), and Cowitch (*Tragia volubilis*). There are no known endemic or endangered plant species within Clarendon Parish. (NEPA, 2007)

5.3.2.2 Terrestrial Wildlife

Terrestrial wildlife are species of animals that live predominantly on land. Historically, the CEPF supported 92 terrestrial mammal species, of which 23 are now considered extinct. Of the remaining 69 species, 51 are considered endemic to the hotspot and 27 are globally threatened.

However, due the loss of habitat and lack of vegetation in May pen, the fauna within this particular area is not very diverse. There are no known endemic species in Clarendon Parish, and species that are present, occur in small numbers.

Bird Species

One hundred and thirteen bird species are present in Jamaica, 23 of which are endemic. The total number of bird species in Jamaica nearly doubles during winter months, due to migratory patterns from North America. The table below details the species currently present in Clarendon Parish, Jamaica. (CL Environmental, 2004) (WWF, 2018)

Table 4.4.2.2-1: Bird Species Found in Clarendon Parish, Jamaica

Family Name	Scientific Name	Common Name	Feeding Habit
Apodidae	<i>Tachornis phaeicobia</i>	Antillean Palm Swift	Insectivore
Apodidae	<i>Streptoprocne zonaris</i>	White-Collared swift	Insectivore
Ardelidae	<i>Bubulcus ibis</i>	Cattle Egret	Omnivore
Cathartidae	<i>Cathartes aura</i>	Turkey Buzzard	Scavenger
Charadriidae	<i>Charadrius vociferous</i>	Killdeer	Omnivore
Columbidae	<i>Columbina passerina</i>	Ground Dove	Frugivore
Columbidae	<i>Zenaida aurita</i>	Mourning Dove	Frugivore
Cuculidae	<i>Crotophaga ani</i>	Smooth-billed Ani	Omnivore
Emberizinae	<i>Tiaras olivacea</i>	Yellow-faced Grassquit	Frugivore
Falconidae	<i>Falco sparverius</i>	American Kestrel	Carnivore
Mimidae	<i>Mimus polyglottos</i>	Northern Mockingbird	Omnivore
Scolopacidae	<i>Actitis macularia</i>	Spotted sandpiper	Omnivore
Sturnidae	<i>Sturnus vulgaris</i>	European Starling	Frugivore
Trochilidae	<i>Mellisuga minima</i>	Vervain	Nectarivore
Tyrannidae	<i>Tyrannous dominicensis</i>	Gray Kingbird	Insectivore

Mammals

Mammals unique to Jamaica include the Jamaican Hutia (*Geocapromys brownii*), the Jamaican Fig-eating Bat (*Ariteus flavescens*), the Jamaican Flower Bat (*Phyllonycteris aphylla*), the Jamaican Greater Funnel-eared Bat (*Natalus jamaicensis*), and the Jamaican Red Bat (*Lasiurus degelidus*). The sole remaining extant species of native mammal to exist in Jamaica is the Jamaican Hutia. The current status of this species is unknown. (WWF, 2018) In terms of species that have been identified in Clarendon Parish, the most commonly seen species are wild dogs and mongoose. (CL Environmental, 2004)

Invertebrates

Jamaica has 134 types of moth and butterfly species, including the *Papilio homerus* and *Eurytides marcellinus*. Of these species, 20 are endemic to Jamaica. In addition, many of the more than 500 endemic species of Jamaican land snails, such as species of *Pleurodonte* and *Annularia pulchrum* are found in the country. (WWF, 2018) Other invertebrates, such as dragonflies, mosquitos, ladybugs, stinkbugs, flies, bees, wasps, beetles, ants, termites, land crabs, fiddler crabs, and shrimp are also found in Jamaica. (CL Environmental, 2004)

Reptiles and Amphibians

All of Jamaica's native amphibians are endemic including the Jamaican Peak Frog (*Eleutherodactylus alticola* (Caribherp)), the Jamaican Cave Frog (*Eleutherodactylus cundalli*), the Western Yellow-bellied Frog (*Eleutherodactylus pantone*), the Jamaican Masked Frog (*Eleutherodactylus luteolus*), the Jamaican Laughing Tree Frog (*Osteopilus ocellatus*), and the Jamaican Snoring Tree Frog (*Osteopilus crucialis*). In addition to being endemic, these species are also endangered. (WWF, 2018)

Twenty seven endemic reptile species are found in Jamaica. Species include the Jamaican Iguana (*Cyclura collie*), the Jamaican Twig (Anole *Anolis*), the Bluefields Anole *Anolis*, the Blue Mountain Anole (*Anolis reconditus*), the Jamaican Giant Gecko (*Tarentola albertschwartzii*), a dwarf gecko (*Sphaerodactylus semasiops*), the Jamaican Ameiva (*Ameiva dorsalis*), the Jamaican Skink (*Spondylurus fulgidus*), the Limestone Forest Galliwasp (*Celestus barbouri*), the Jamaican Boa (*Epicrates subflavus*), the Jamaican Racer (*Hypsirhynchus*), and the Jamaican Blindsnake (*Typhlops jamaicensis*). (WWF, 2018)

The endangered American crocodile (*Crocodylus acutus*) also occurs in Jamaica, mainly along the country's southern coast, with particular abundance in the Black River Morass region. The endemic and critically endangered Jamaican rock iguana (*Cyclura collei*) is also present in the Hellshire Hills, approximately 20 kilometers west of Kingston. Jamaica iguana populations declined rapidly in the beginning of the 19th century due to the introduction of the Indian mongoose (*Herpestes auropunctatus*), the predation of dogs, and habitat destruction. (WWF, 2018)

Fish

The families of the ten most abundant finfish species caught in Jamaica are Gerriidae (maccabacks), Sparidae (breams), Lutjanidae (snappers), Carangidae (jacks), Clupeidae (sprats and herrings), Haemulidae (grunts), Scaridae (parrotfishes), Centropomidae (snooks), Mugilidae (sea mullets), and Sphyrnidae (barracudas). The only crustacean families currently found in Jamaica are Palinuridae (spiny lobsters) and Penaeidae (marine shrimps). Marine fisheries in Jamaica are almost entirely artisanal, with an estimated 20,000 Jamaicans relying on fish as their main source of diet and income. Based on a review of publicly available information, it is widely believed that the collapse of fish species within Jamaica's waterbodies is due largely in part to gross pollution, shoreline construction, and the destruction of habitat. In terms of species that occur specifically in St. Catherine Parish, studies have reported the following species, snook, mullet, tarpon, and perch. (Environmental Solutions Limited, 2004)

5.3.3 Natural Hazards

Hurricanes & Wind

Located in warm Caribbean waters, hurricanes in Jamaica are a yearly occurrence and are typically affected by El Nino / La Nina weather patterns. Between the start of hurricane season in June, until the end of the season in November, Jamaica experiences an average of 10 tropical storms or hurricanes. Although the majority of hurricanes pass Jamaica off its southern coast, varying levels of wind and precipitation are seen throughout most of the island, depending on the intensity of the storm. According to the U.S. National Hurricane Center, approximately 70% of all hurricanes to affect Jamaica have landed in the country's southern coast, where May Pen is located.

The passage of Hurricane Ivan in 2004 and Dean in 2007 were two of Jamaica's most severe storms, both of which took a nearly identical path along Jamaica's southern coastline. The resulting impacts from these storms included damages to infrastructure, crops, airborne debris, flooding, intensified, and more frequent rainfall, erosion of rivers and gully banks, mudflows, and

disruption of public services. Hurricane Ivan specifically resulted in one of Jamaica's worst storm surge events, which left Jamaica's southern coastline highly inundated, with residents in Port Royal unable to reach the mainland. (NEPA, 2018) (Smith Warner International Ltd. , 2017)

The Caribbean region is expected to be one of earliest and most impacted areas with regards to climate change, particularly as tropical storms and hurricanes intensify and become more frequent.

Seismicity

Approximately 200 earthquakes occur in Jamaica per year, many of which are minor (magnitudes of less than 4.0). Jamaica's most seismically active areas is the Blue Mountain block, along the Montpelier-Newmarket belt in western Jamaica. In eastern Jamaica, there is the Plantain Garden fault, with collides into the Yallahs, Blue Mountain, Wagwater, and Silver Hill fault lines. (University of the West Indies, 2018)

Although the majority of Jamaica's earthquakes have been concentrated in eastern and western Jamaica, the entire island typically feels the effects of a strong (>4.0 magnitude) earthquake. Due to Spanish Town's proximity to the Wagwater Fault, it is also prone to seismic activity. Furthermore, due to the area's high concentrations of alluvial soils, May Pen is also prone to liquidation due to the acceleration of seismic waves. (NEPA, 2018)

Two of Jamaica's strongest earthquakes occurred in Port Royal in 1962 and in Kingston in 1907. Following substantial infrastructure damages, these two events displayed the region's vulnerability and susceptibility to liquefaction and ground failure during moderately sized earthquakes. Possible damages to hospital structures and associated facilities could have a significant long-term impact on stakeholders dependent on these social services. (Environmental Solutions Limited, 2015)

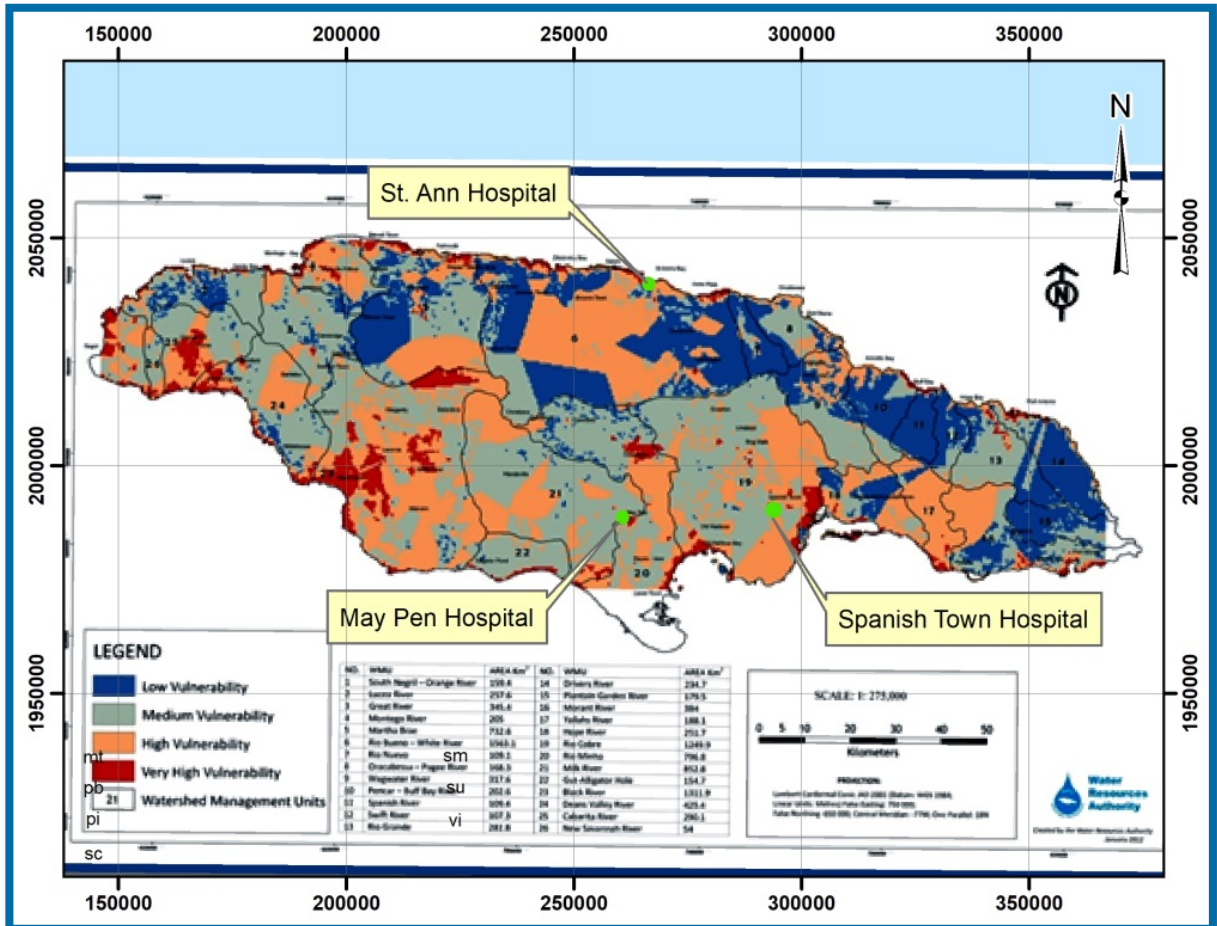
Landslides & Mudslides

Landslides and mudslides can occur in Jamaica following intense, frequent, and localized precipitation. Most commonly, they are associated with tropical storms and hurricanes. The two most recent mudslides to occur in Jamaica were in 2001 during Hurricane Michelle and in 2004 during Hurricane Ivan. During each storm, several roads and other property damages occurred. However, due to the nature of Map Pen Hospital's location, landslides and mudslides are unlikely to affect May Pen Hospital directly. (NLJ, 2012)

Karst Landscape

In Jamaica, the karstification of the White and Yellow Limestone Groups, has resulted in a landscape varying from gently rolling, soil-covered, alluvial plans, to deep jungles and incised slopes. Erosion of this limestone has created a distinct topography, known as Cockpit karst. Cockpits are distinct from typical karst, in that these formations are typically deeper and non-circular. Sinkholes, caves, and land subsidence are all distinguishing features of karst landscapes. As shown below, May Pen Hospital is located within a "very high vulnerability" area for karst geologic hazards. Depending on the rehabilitation works (e.g., excavation for foundations) a more detailed geologic assessment, focusing on karst, should be conducted.

Table 5.3-2: Hospital Locations and Corresponding Karst Vulnerabilities



Source: (WRA, 2018)

5.4 St. Ann's Bay Hospital

5.4.1 Physical Environmental Baseline

5.4.1.1 Topography

The island of Jamaica has a high percentage of flat, gently sloping, and steep land. St. Ann's Bay Hospital is located in St. Ann, the largest parish in Jamaica. The highest point in the parish is in the Dry Harbour Mountains, at 762 meters. The hospital ground has an elevation between 40 meters above sea level (MASL) and 16 MASL. The property slopes to the northwest towards Church River located at approximately 200 meters.

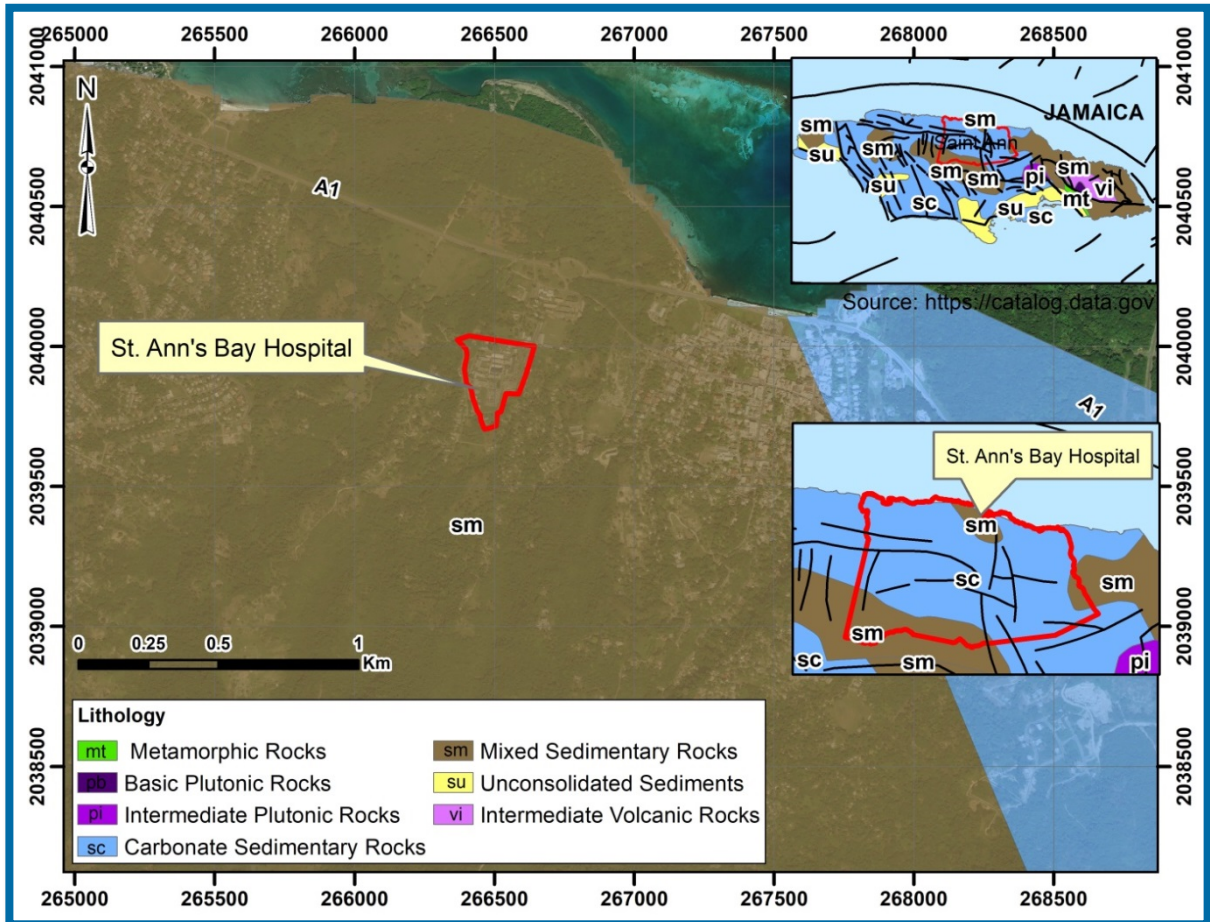
5.4.1.2 Drainage and Soils

Jamaica is composed of the following eight types of soils, 1) recent alluvial soils, 2) old alluvial soils, 3) red, brown, and yellow colored soils derived from hard white limestone, 4) marl soils and soils derived from soft white limestones and yellow limestone soils, 5) Richmond shale soils, 6) purple conglomerate soils, 7) soils derived from other shale conglomerates, tuffs, and sandstones, 8) soils derived from granite and porphyry (see table below). Jamaica's mountainous topography, high rainfall, and in many cases, poor soil management practices all contribute to soil loss and erosion. The table below displays the parent material and lithology for St. Ann's Parish (St. Ann's Bay Hospital). (Ministry of Agriculture, 1964)

Table 5.4-1: Major Soil Types and Characteristics of Jamaica

Soil Type	Characteristics
Recent Alluvial Soils	These soils occur within Jamaica's floodplains and along the banks of main river systems, including the Rio Cobre, Rio Miho, Wag Water, Rio Grande, Swift River, Plantain Garden River, Johnson River, Yallahs River, and the Milk River. Soils within this region vary according to texture but are generally formed by sand, loam, and clay loam. Recent alluvial soils are classified with poor surface runoff and internal drainage corresponds to the soils percentages of sand, loam, and clay.
Old Alluvial Soils	These soils are typically heavier in texture and contain higher levels of acid than recent alluvial soils. Old alluvial soils are commonly found in St. Catherine (Spanish Town) and Clarendon (May Pen) Parish. These soils are classified as moderately deep, with rapid to slow internal drainage depending on clay composition. All soil types within this group are also typically classified as having poor surface runoff.
Red, Brown and Yellow Colored Soils, derived from hard White Limestone	These soils are found throughout Jamaica's central and western plains and contain higher levels of iron and aluminum oxide. These soils are classified as deep, with very rapid to slow internal drainage depending on clay composition. Surface runoff or drainage is also classified as fair to poor.
Marl Soils and Soils derived from Soft White Limestone or Yellow Limestone	These soils occur mainly along Jamaica's northern coast and along the eastern side of the island, at areas below 212.12 meters (700 feet). Generally, these soils are dark in color and are under laid with marl. These soils tend to be heavier in texture and contain high levels of free limestone. Surface runoff or drainage is generally classified as poor to rapid, depending on clay composition.
Richmond Shale Soils	These soils occur mainly along Jamaica's southern coast. The parent material for these soils is shale. Within a high weathering potential, these soils are generally found along steeper, more incised topographies. Surface runoff or drainage is generally classified as good to poor, with rapid to fair internal drainage.
Purple Conglomerate Soils	These shallow soils occur throughout Jamaica's steeper slopes and are highly erodible. These soils are found within upper Clarendon Parish (May Pen Hospital) and are classified as having rapid internal drainage and rapid runoff.
Soils derived from other Shales	These soils are found in some areas of Clarendon Parish (May Pen Hospital) and are typically formed by heavy clays with high acidity. Surface runoff or drainage is generally classified as rapid, with highly erodible soil.
Soils derived from Granite Propyry	These soils are found in parts of St. Catherine Parish (Spanish Town Hospital) and are generally comprised of weather rock, with eroded topsoil. These soils are very shallow and typically have rapid runoff and erosion potential.

Table 5.4-2: Parent Material Lithology of St. Ann's Parish (St. Ann's Bay Hospital)



5.4.1.3 Geology

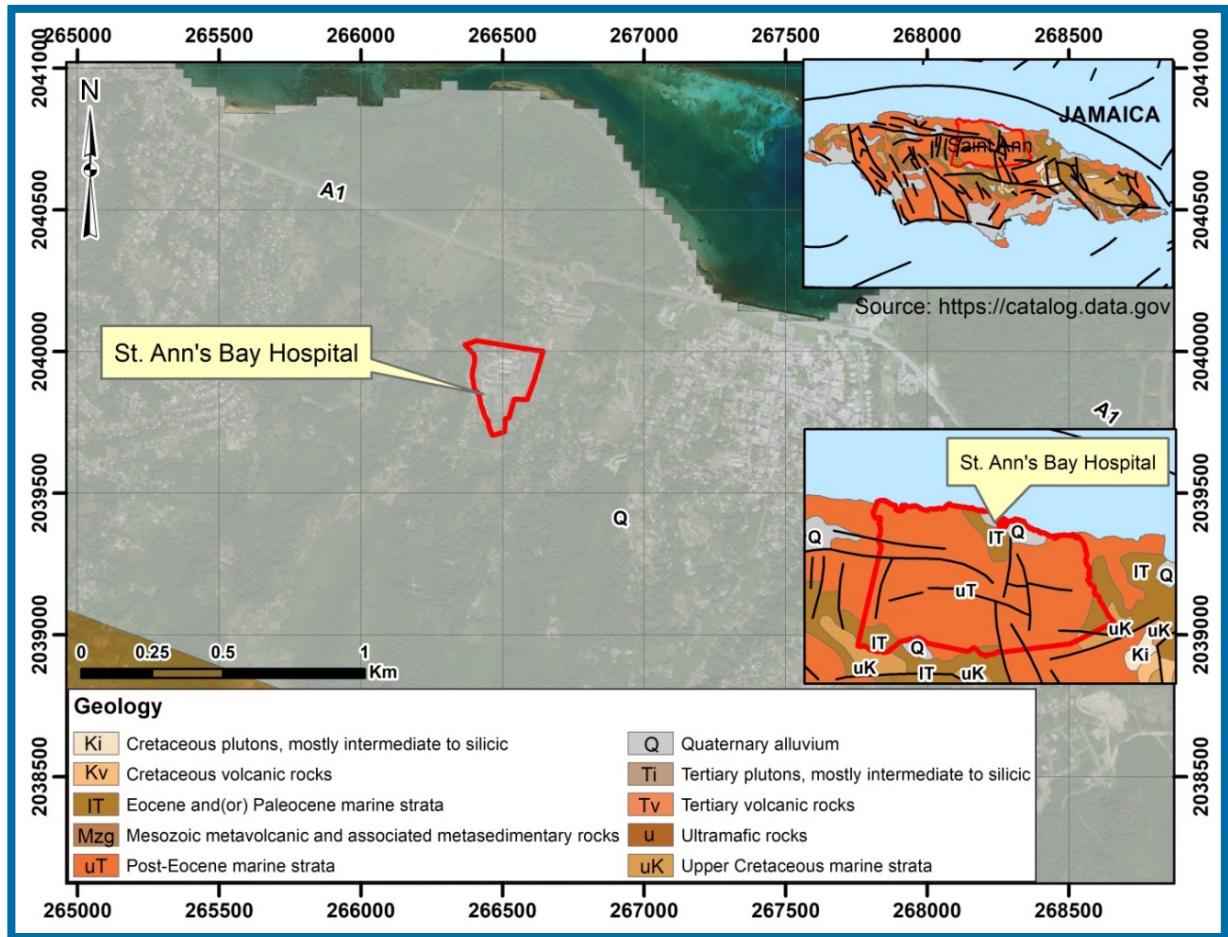
More than half of Jamaica's surface is composed of white limestone. Underneath this white limestone are layers of yellow limestone, older metamorphic rocks, and igneous rock. (Ministry of Agriculture, 1964)

St. Ann parish is comprised of limestone (the Younger Coastal Group) and the Montpelier Formation. The Younger Coastal Group is common in the eastern parts of the island and the oldest types of limestone can be found in these areas. These are characterized by a yellowish light brown color, as well as containing rounded pebbles and carbonates in the form of shells and corals. These factors might be an indication of past lagoon environments or recently created coastlines. The Montpelier Formation is composed of soft chalky deposits and might occasionally show exposures of chert nodules. These were deposited in the Miocene era. Volcanic and metamorphic basement rock compose the remaining parts of the parish. (NEPA, 2012)

The majority of the soils on the coastline of St. Ann's Bay consist of coarse, poorly sorted, calcareous sand, including various smooth pebbles. Aside from these types of soils, the main

type of soil in this area is the Hopegate Formation. Accordingly, this type of soil is generally soft but rubbly at depth. When planning the hospitals structurally, this must be taken into account, especially when slopes are present. These soils might erode when there is heavy rainfall. Finally, there is no contamination in the soils in St. Ann's Bay. (Environmental Science and Technology Limited, 2004)

Table 5.4-3: Geology of St. Ann's Parish



5.4.1.4 Water Resources

Water resources are defined as all surface water bodies and groundwater systems including, rivers, streams, canals, gullies, lakes, estuarine waters, floodplains, aquifers, and other aquatic habitats. These resources are typically grouped into watershed or river basins.

Watersheds

Watersheds consist of surface water and all underlying groundwater that drains into a common outlet. Jamaica has 26 distinct Watershed Management Units. St. Anna's Bay Hospital is

located within Jamaica's Rio Bueno-White River watershed boundary. Locally, the hospital is located in the Church River watershed. (NEPA, 2008)

The Water Resources Authority (WRA) describes the parish's hydrology as a hydrological divide of the Rio Bueno. Additionally, it runs along the White River channel. Potentially due to the geomorphology of the northern area of the island, the Rio Bueno Drainage basin is the largest on the island. Although it is an extensive basin, it has a relatively low surface area for flowing water, which leads to low chances of denudation due to hydrological erosion. Despite that, there is surface draining on the eastern reaches of the White River. (NEPA, 2012)

Fresh Water

The Church River is located directly adjacent to St. Ann's Bay Hospital and discharges into the Atlantic Ocean. St. Ann's Bay is also within close proximity to the Negro River, which also discharges into the Atlantic Ocean. Similarly, to Spanish Town and May Pen, St. Ann's fresh water mostly comes from the major streams into the Parish. Small amounts of fresh water also come from the Rio Bueno, the Laughlands Great River, Pear Tree Bottom, Roaring River, Cave River, and the White River. Depending on the season, fresh water is also available from the Pedro River. Unlike the other basins, the streams in St. Ann's Bay tend to have a higher sustained base flow from limestone aquifer. Thus, their flows are not a highly dependent on rainfall and tend to be steadier. The natural outlets for the Cave and Pedro Rivers are sinkholes, while the water from the Cave River flows underground to the Dornock Head Rising. (U.S. Army Corps of Engineers, 2000) (NEPA, 2008)

Groundwater

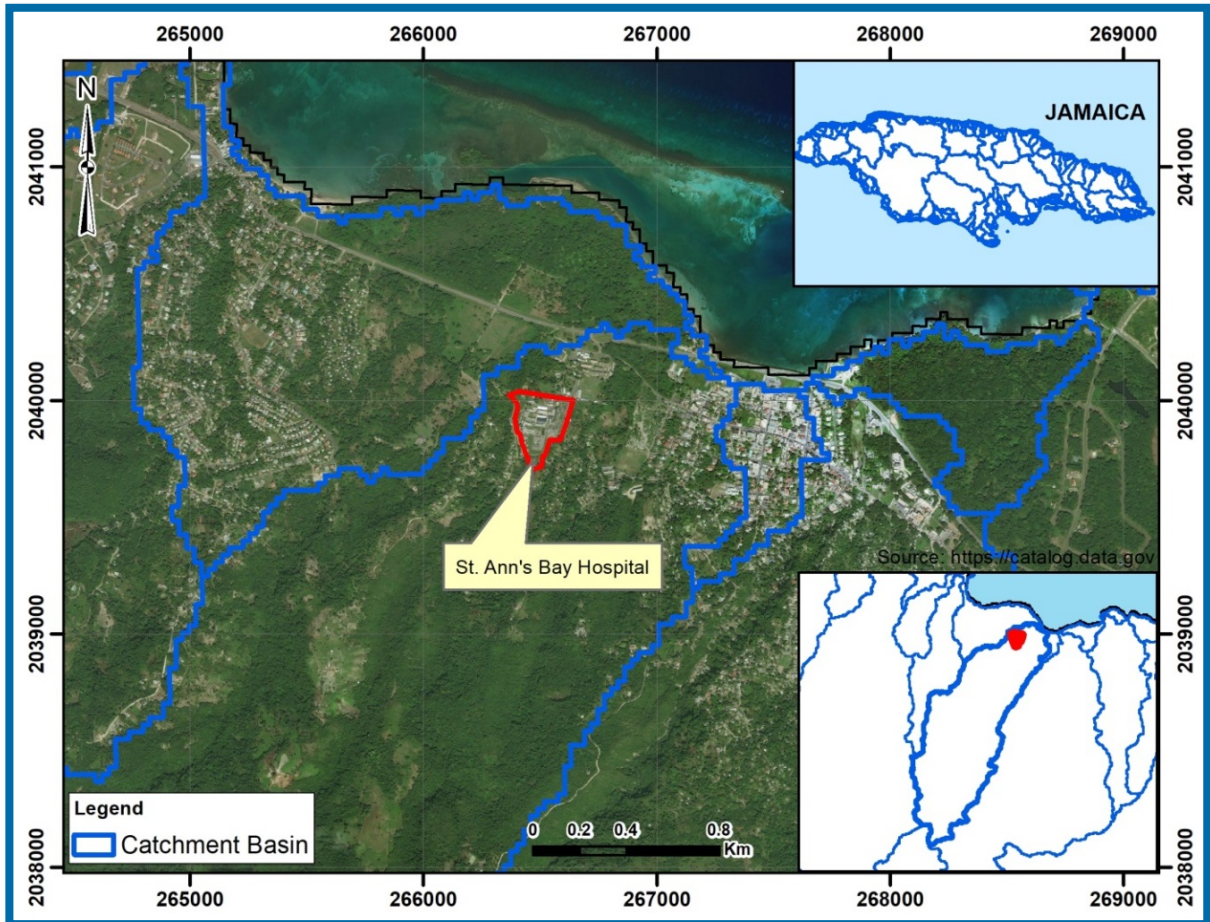
Fresh ground water is generally supplied via fractures and solution cavities in the limestone aquifers. This limestone usually exists over basement rock and is thickest along the coastline. Similar to previously mentioned aquifers, the depth of the water is variable but is generally less than 100 meters. Again, these areas might benefit from the use of hand pump wells, but will ultimately depend on encountering water-bearing fractures. As with other underground fresh water sources, sodium and hydrogen-ion concentrations have been increasing due to contamination from bauxite mining. (U.S. Army Corps of Engineers, 2000)

Despite having 2 sewage treatment plants, the main method for sewage disposal in St. Ann's Bay is through hand-dug soak-away pits. In addition to other environmental hazards, these pits are likely contaminated with high levels of fecal coliform. (U.S. Army Corps of Engineers, 2000)

Estuarine and Coastal Waters

Estuaries (including bays and tidal rivers) are bodies of water that provide transition zones between fresh river water and saline ocean water. The Church River is located directly adjacent to St. Ann's Bay Hospital and discharges into the Atlantic Ocean. St. Ann's Bay is also within close proximity to the Negro River, which also discharges into the Atlantic Ocean. (NEPA, 2008) The figure below details the Rio Cobre Watershed and Catchment Basin, related to St. Ann's Bay Hospital.

Table 5.4-4: Hydrology of St. Ann's Parish



Floodplains

The Water Resources Authority (WRA) of Jamaica has prepared maps of the floodplains for several rivers in Jamaica, including the Yallahs River, Hope River, and a section of the Rio Cobre. Due to the relatively low-lying and flat alluvial plane topography between St. Ann's Bay and the coastline of Jamaica, rainfall accumulation can occur rapidly, with water flowing directly into the rivers mentioned above.

There two primary types of flooding are:

- Riverine floodplains occur along rivers, streams, gullies, or lakes where overbank flooding may occur, inundating land areas. Due to its elevation and proximity to waterways, St. Ann's Bay is prone to several forms of flooding including riverine, pluvial, storm surge, sheet flow, and ponding. However, riverine flooding is most common and is typically caused by hurricanes or other significant storms. Historically, one of St. Ann's worst flooding events occurred in September 1876, following the effects of a hurricane. In August 1915, another hurricane passed over Bluff Bay in St. Mary's, causing significant infrastructure damage and

loss of life. In recent history, St. Ann's was also impacted by Hurricane Charley in 2004, which caused significant flooding and infrastructural damage throughout the Parish. Without a significant increase in engineered flood control structures and mitigation measures, Jamaica will likely see an increase in flood risk vulnerability due to climate change. (Environmental Solutions Limited, 2004) (NLJ, 2012)

- Coastal floodplains along Jamaica's southern coastline are subjected to both sea level rise and land subsidence. Since the 1990s, sea level rise in the Caribbean has been approximately 3.2 mm per year. By the end of the century, Jamaica is expected to see an approximate increase of 0.43 – 0.67 meters, depending on low-high carbon scenarios. Jamaica's maximum high-carbon scenario projection is 1.05 meters, by the end of the century. Located directly along the coastline, St. Ann's Bay may begin to experience new or worsening levels of coastal inundation, particularly in relation to severe weather events.

5.4.1.5 Current Climate Conditions

Precipitation and Humidity

Rainfall within Jamaica is highly variable, due to the influence of El Nino and other weather events. The wet season is categorized as "bi-modal" or, with two distinct periods of rainfall. Based on historical climate modeling (1940 – 2010), the intensity and occurrence of extreme rainfall events appears to be increasing. Compared to other Parishes in Jamaica, the Parish of St. Ann is generally wetter on average. The table below shows the mean 30-year rainfall normals between 1971 and 2000. Dry season typically occurs between February and April, with a second dry period in July. The highest rainfall totals typically occur from September to January, with a secondary rainfall peak in April or May. Months with higher rainfall averages tend to correlate with higher levels of humidity, while months with lower rainfall average correlate with lower levels of humidity. Throughout the year, humidity in St. Ann's typically ranges from 82 to 86%, while the relative humidity in the afternoon from February to October can range from 75 to 78%.

Table 5.4-5: Mean 30-year Rainfall Totals between 1971 and 2000

Parish	January	February	March	April	May	June	July	August	September	October	November	December	30-year Average Annual Total (in mm)
St. Ann	103	82	71	93	158	95	67	96	103	169	168	117	1324

Source: (Meteorological Service of Jamaica, 2018)

Temperature

Land surface temperatures in Jamaica vary according to the month and are largely dependent on solar insolation. Average temperatures within St. Ann's vary from season to season. Between the months of November and May, the mean maximum temperature typically does not exceed 30 degrees Celsius, but ranges between 19 and 21 degrees. The hottest months in St. Ann's are typically June through October.

Wind

There is insufficient historical data on wind for Jamaica. Currently, wind patterns are only monitored regularly at Norman Manly International Airport (Kingston) and Sangster International Airport (Montego Bay). Summer months, between June and August, typically see the highest wind speeds per hours. Wind speeds between September and January tend to be less intense, and are typically below 10 kilometers an hour. (NEPA, 2018)

St. Ann's Parish is typically affected by northeast trade winds, with an average speed of 15 knots. Due to the location of St. Ann's hospital, the area is also affected by nighttime and daytime land breezes. (Environmental Management Consultants (Caribbean) Ltd., 2006)

5.4.2 Biological Baseline

Flora

Jamaica is part of the Caribbean Islands biodiversity hotspot (CEPF). Terrestrial ecoregions include the Jamaican Moist Forests (EoE) and the Jamaican Dry Forests (EoE). The CEPF is home to approximately 11,000 native species of seed plants, 7,868 of which are endemic. Jamaica alone has 3,003 species of flowering plants and 597 fern species. Of these totals, 830 (28%) of Jamaica's flowering plants and 82 (14%) of Jamaica's fern species are endemic. The plants *Portlandia* and *Jacaima* are also endemic to the country. (CEPF, 2018) (WWF, 2018)

The type of forest that surrounds the areas of St. Ann's Bay, is classified as *Modified Dry Limestone Forest*. In a more general classification, this forest is a *Tall open Dry Forest*. Some of the trees in this forest might be 8-15 meters tall. Generally, there are not many shrubs present in these types of forests and although there is an extensive distributed seedling flora, there are not many herbs. There are many vines present, although not many species.

Within St. Ann's there are approximately 700 trees per hectare that have 10-centimeter diameters. Fifty-five of these species belong to 31 different families. Three of those species, *Coccoloba longifolia*, *Hernandia jamaicensis*, and *Euphorbia alata* are endemic to Jamaica. The five most common trees in the forest are *Licaria triandra* (Pepperlead Sweetwood), *Brosimum alicastrum* (Breadnut), *Bursera simaruba* (Red Birch), *Guazuma ulmifolia* (Bastard Cedar), and *Catalpa longissimi* (Yoke Wood, French Oak, Mast Wood). This forest is in the *Early Secondary* successional stage of its development. The more dominant species of the forest have a life span of about 10-25 years. (Environmental Management Consultants (Caribbean) Ltd., 2006)

5.4.2.1 Terrestrial Wildlife

Terrestrial wildlife are species of animals that live predominantly on land. Historically, the CEPF supported 92 terrestrial mammal species, of which 23 are now considered extinct. Of the remaining 69 species, 51 are considered endemic to the hotspot and 27 are globally threatened. Of the 20 species protected by Jamaican law, only 6 are terrestrial. These include the Coney Crocodile, the Iguana, the Giant Swallowtail Butterfly, the Yellow Snake, and the Jamaican Kite Swallowtail Butterfly.

However, due the loss of habitat and lack of vegetation in St. Ann's Bay, the fauna within this particular area is not very diverse. There are no known endemic species in St. Ann's Parish, and species that are present, occur in small numbers.

Bird Species

One hundred and thirteen bird species are present in Jamaica, 23 of which are endemic. The total number of bird species in Jamaica nearly doubles during winter months, due to migratory patterns from North America. The table below details the species currently present in St. Ann's Bay, Jamaica. Species of concern / endangerment include the *Myriarchus stolidus stolidus* (Tom Fool), *Dendroica pharetra* (Ants Bird, Ants Picker), and *Mellisuga minima minima* (Bee Hummingbird, Little).

Table 5.4-6: Bird Species Found in St. Ann's Bay

Species	Common Name	Abundance
<i>Cathartes aura</i>	Turkey Vulture	Frequent
<i>Coereba flaveola</i>	Bananaquit	Frequent
<i>Fregata magnificens</i>	Magnificent Frigatebird	Frequent
<i>Bubulcus ibis</i>	Cattle Egret	Occasional
<i>Columbina passerine</i>	Common Ground Dove	Occasional
<i>Egretta caerulea</i>	Little Blue Heron	Occasional
<i>Icterus leucopteryx</i>	Jamaican Oriole	Occasional
<i>Loxipasser anoxanthus</i>	Yellow-shouldered Grassquit	Occasional
<i>Pelecanus occidentalis</i>	Brown Pelican	Occasional
<i>Tiaris bicolor</i>	Black-faced Grassquit	Occasional
<i>Actitis macularius</i>	Spotted Sandpiper	Rare
<i>Buteo jamaicensis</i>	Red-tailed Hawk	Rare
<i>Dendroica caerulescens</i>	Black-throated Blue Warbler	Rare
<i>Egretta thula</i>	Snowy Egret	Rare
<i>Forpus passerines</i>	Green-rumped Parrotlet	Rare
<i>Geothlypis trichas</i>	Common Yellowthroat	Rare
<i>Hyetornis pluvialis</i>	Chestnut-bellied Cuckoo	Rare
<i>Loxigilla violacea</i>	Greater Antillean Bullfinch	Rare
<i>Melanerpes radiolatus</i>	Jamaican Woodpecker	Rare
<i>Mimus polyglottos</i>	Northern Mockingbird	Rare
<i>Mniotilta varia</i>	Black-and-white Warbler	Rare
<i>Myiarchus Validus</i>	Rufous-tailed Flycatcher	Rare
<i>Parula Americana</i>	Nothern Parula	Rare
<i>Patagioenas leucocephala</i>	White-crowned Pigeon	Rare
<i>Quiscalus niger</i>	Greaater Antillean Grackle	Rare
<i>Setophaga ruticilla</i>	American Redstart	Rare
<i>Todus todus</i>	Jamaican Tody	Rare
<i>Tyrannus caudifasciatus</i>	Loggerhead Kingbird	Rare
<i>Vireo altiloquus</i>	Black-whiskered Vireo	Rare
<i>Zenaida aurita</i>	Zenaida Dove	Rare

Mammals

Mammals unique to Jamaica include the Jamaican Hutia (*Geocapromys brownii*), the Jamaican Fig-eating Bat (*Ariteus flavescens*), the Jamaican Flower Bat (*Phyllonycteris aphylla*), the Jamaican Greater Funnel-eared Bat (*Natalus jamaicensis*), and the Jamaican Red Bat (*Lasiurus degelidus*). The sole remaining extant species of native mammal to exist in Jamaica is the Jamaican Hutia. The current status of this species is unknown. (WWF, 2018)

Invertebrates

Jamaica has 134 types of moth and butterfly species, including the *Papilio homerus* and *Eurytides marcellinus*. Of these species, 20 are endemic to Jamaica. In addition, many of the more than 500 endemic species of Jamaican land snails, such as species of *Pleurodonte* and *Annularia pulchrum* are found in the country. Other invertebrates, such as dragonflies, mosquitos, ladybugs, flies, bees, wasps, termites, land crabs, fiddler crabs, and shrimp are also found in Jamaica. (WWF, 2018)

Moth and butterfly species present in St Ann's Parish include:

- *Dryas julia delila* (*Julia*)
- *Eurema leuce*
- *Heliconius charithonia* simulator (*Zebra Longwing*)
- *Leptotes cassius theonus* (*Cassius Blue*)
- *Phoebis sennae* (*Cloudless Sulphur*)
- *Phoebis trite*
- *Siproeta stelenes stelenes* (*Antillean Malachite*)

Reptiles and Amphibians

All of Jamaica's native amphibians are endemic including the Jamaican Peak Frog (*Eleutherodactylus alticola* (Caribherp)), the Jamaican Cave Frog (*Eleutherodactylus cundalli*), the Western Yellow-bellied Frog (*Eleutherodactylus pantone*), the Jamaican Masked Frog (*Eleutherodactylus luteolus*), the Jamaican Laughing Tree Frog (*Osteopilus ocellatus*), and the Jamaican Snoring Tree Frog (*Osteopilus crucialis*). In addition to being endemic, these species are also endangered. (WWF, 2018)

Twenty seven endemic reptile species are found in Jamaica. Species include the Jamaican Iguana (*Cyclura collie*), the Jamaican Twig (Anole Anolis), the Bluefields Anole Anolis, the Blue Mountain Anole (*Anolis reconditus*), the Jamaican Giant Gecko (*Tarentola albertschwartzii*), a dwarf gecko (*Sphaerodactylus semasiops*), the Jamaican Ameiva (*Ameiva dorsalis*), the Jamaican Skink (*Spondylurus fulgidus*), the Limestone Forest Galliwasp (*Celestus barbouri*), the Jamaican Boa (*Epicrates subflavus*), the Jamaican Racer (*Hypsirhynchus*), and the Jamaican Blindsnake (*Typhlops jamaicensis*). (WWF, 2018)

The endangered American crocodile (*Crocodylus acutus*) also occurs in Jamaica, mainly along the country's southern coast, with particular abundance in the Black River Morass region. The endemic and critically endangered Jamaican rock iguana (*Cyclura collei*) is also present in the Hellshire Hills, approximately 20 kilometers west of Kingston. Jamaica iguana populations

declined rapidly in the beginning of the 19th century due to the introduction of the Indian mongoose (*Herpestes auropunctatus*), the predation of dogs, and habitat destruction. (CL Environmental, 2004) (WWF, 2018)

The only species that might be present in northern Jamaica is the Yellow Snake (*Epicrates subflavus*). This species has been greatly affected by habitat loss and predation from other animals and is therefore, highly uncommon. Terrestrial lizards are also present in the area. (Environmental Management Consultants (Caribbean) Ltd., 2006)

Fish

The families of the ten most abundant finfish species caught in Jamaica are Gerriedae (maccabacks), Sparidae (breams), Lutjanidae (snappers), Carangidae (jacks), Clupeidae (sprats and herrings), Haemulidae (grunts), Scaridae (parrotfishes), Centropomidae (snooks), Mugilidae (sea mullets), and Sphyraenidae (barracudas). The only crustacean families currently found in Jamaica are Palinuridae (spiny lobsters) and Penaeidae (marine shrimps). Marine fisheries in Jamaica are almost entirely artisanal, with an estimated 20,000 Jamaicans relying on fish as their main source of diet and income. Based on a review of publicly available information, it is widely believed that the collapse of fish species within Jamaica's waterbodies is due largely in part to gross pollution, shoreline construction, and the destruction of habitat. In terms of species that occur specifically in St. Catherine Parish, studies have reported the following species, snook, mullet, tarpon, and perch. (Environmental Solutions Limited, 2004)

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Hurricanes & Wind

Located in warm Caribbean waters, hurricanes in Jamaica are a yearly occurrence and are typically affected by El Nino / La Nina weather patterns. Between the start of hurricane season in June, until the end of the season in November, Jamaica experiences an average of 10 tropical storms or hurricanes. Although the majority of hurricanes pass Jamaica off its southern coast, varying levels of wind and precipitation are seen throughout most of the island, depending on the intensity of the storm. According to the U.S. National Hurricane Center, approximately 70% of all hurricanes to affect Jamaica have landed in the country's southern coast, where Spanish Town is located.

The passage of Hurricane Ivan in 2004 and Dean in 2007 were two of Jamaica's most severe storms, both of which took a nearly identical path along Jamaica's southern coastline. The resulting impacts from these storms included damages to infrastructure, crops, airborne debris, flooding, intensified and more frequent rainfall, erosion of rivers and gully banks, mudflows, and disruption of public services. Hurricane Ivan specifically resulted in one of Jamaica's worst storm surge events, which left Jamaica's southern coastline highly inundated, with residents in Port Royal unable to reach the mainland. (NEPA, 2018) (Smith Warner International Ltd. , 2017)

The Caribbean region is expected to be one of earliest and most impacted areas with regards to climate change, particularly as tropical storms and hurricanes intensify and become more frequent.

Seismicity

Approximately 200 earthquakes occur in Jamaica per year, many of which are minor (magnitudes of less than 4.0). Jamaica's most seismically active areas is the Blue Mountain block, along the Montpelier-Newmarket belt in western Jamaica. In eastern Jamaica, there is the Plantain Garden fault, with collides into the Yallahs, Blue Mountain, Wagwater, and Silver Hill fault lines. (University of the West Indies, 2018)

In northern Jamaica, the main transform boundary is the Duanvale Fault line. Although the majority of Jamaica's earthquakes have been concentrated in eastern and western Jamaica, the entire island typically feels the effects of a strong (>4.0 magnitude) earthquake. (Environmental Management Consultants (Caribbean) Ltd., 2006) (NEPA, 2018)

Two of Jamaica's strongest earthquakes occurred in Port Royal in 1962 and in Kingston in 1907. Following substantial infrastructure damages, these two events displayed the region's vulnerability and susceptibility to liquefaction and ground failure during moderately sized earthquakes. Possible damages to hospital structures and associated facilities could have a significant long-term impact on stakeholders dependent on these social services. (Environmental Solutions Limited, 2015)

Landslides & Mudslides

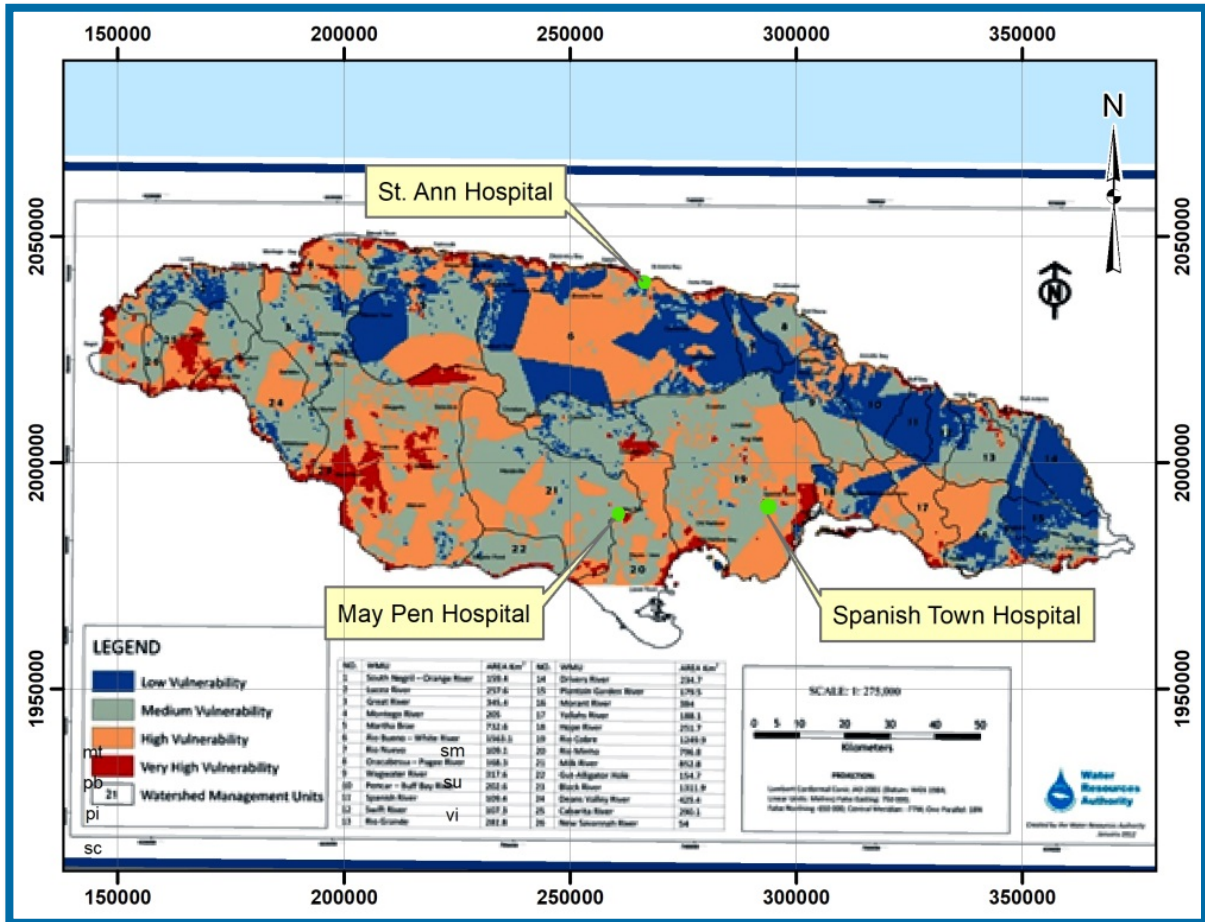
Landslides and mudslides can occur in Jamaica following intense, frequent, and localized precipitation. Most commonly, they are associated with tropical storms and hurricanes. The two most recent mudslides to occur in Jamaica were in 2001 during Hurricane Michelle and in 2004 during Hurricane Ivan. During each storm, several roads and other property damages occurred.

The landslides that occur in St. Ann mainly occur along escarpments in soft, less indurated lithologies. These can be seen on the sides of many of the main roads in the area. These landslides are called "minor rotational slumping." Usually, the limestone that is abundant in St. Ann is very stable, even at steep angles, but if there are faults, there may be some rock slippage or falling. (Environmental Management Consultants (Caribbean) Ltd., 2006)

Karst Landscape

In Jamaica, the karstification of the White and Yellow Limestone Groups, has resulted in a landscape varying from gently rolling, soil-covered, alluvial plains, to deep jungles and incised slopes. Erosion of this limestone has created a distinct topography, known as Cockpit karst. Cockpits are distinct from typical karst, in that these formations are typically deeper and non-circular. Sinkholes, caves, and land subsidence are all distinguishing features of karst landscapes. As shown on the figure below, St. Ann's Bay Hospital is located within a "very high vulnerability" area for karst geologic hazards. Depending on the rehabilitation works (e.g., excavation for foundation) a more detailed geologic assessment, focusing on karst, should be conducted.

Table 5.4-7: Hospital Locations and Corresponding Karst Vulnerabilities



Source: (WRA, 2018)

5.5 Potential Environmental Liabilities

Based on the field visits and literature review, the following liabilities are present at the following hospitals:

Spanish Town Hospital Liabilities:

- Exposure to personnel and patients to asbestos¹² containing building materials. According to our site reconnaissance visit, literature review, and based on the age of the building, asbestos

¹² It is unclear if the project work will require the removal of asbestos, but considering the age of the hospitals, asbestos is likely to be present. If the removal or disturbance of asbestos is required, all related works to abate, transport, or dispose of asbestos should follow the associated ESMPs. (Scarlett, Delzell, Sathakumar, Oostenstad, & Postlethwait, 2012)

containing building materials may be present in the hospital. Currently, the hospital does not have an asbestos management plan in place.

- Exposure to personnel and trash pickers to infectious diseases from improper disposal of medical waste
- Exposure to fluorescent light bulbs and thermostats that contain mercury. During the field visit, these hazardous materials were observed.
- Exposure to air conditioning units that contain refrigerants. During the field visits, these hazardous materials were observed.
- Contamination of nearby water bodies from the improper treatment and discharge of wastewater effluents. According to the MOH Business plan, the hospitals are not complying with effluent discharge limits.
- Contamination of vulnerable karstic aquifers due to the lack of pollution prevention plans at the hospital grounds. Pollution prevention plans are not in place at this hospital.

St. Ann Hospital Liabilities:

- Exposure to personnel and patients to asbestos¹³ containing building materials. According to our site reconnaissance visit, literature review, and based on the age of the building, asbestos containing building materials may be present in the hospital. Currently, the hospital does not have an asbestos management plan in place.
- Exposure to personnel and trash pickers to infectious diseases from improper disposal of medical waste
- Exposure to fluorescent light bulbs and thermostats that contain mercury. During the field visit, these hazardous materials were observed.
- Exposure to air conditioning units that contain refrigerants. During the field visits, these hazardous materials were observed.
- Contamination of nearby water bodies from the improper treatment and discharge of wastewater effluents. According to the MOH Business plan, the hospitals are not complying with effluent discharge limits.
- Contamination of vulnerable karstic aquifers due to the lack of pollution prevention plans at the hospital grounds. Pollution prevention plans are not in place at this hospital.

May Pen Hospital Liabilities:

- Exposure to personnel and patients to asbestos¹⁴ containing building materials. According to our site reconnaissance visit, literature review, and based on the age of the building, asbestos containing building materials may be present in the hospital. Currently, the hospital does not have an asbestos management plan in place.

¹³ It is unclear if the project work will require the removal of asbestos, but considering the age of the hospitals, asbestos is likely to be present. If the removal or disturbance of asbestos is required, all related works to abate, transport, or dispose of asbestos should follow the associated ESMPs. (Scarlett, Delzell, Sathiakumar, Oostenstad, & Postlethwait, 2012)

¹⁴ It is unclear if the project work will require the removal of asbestos, but considering the age of the hospitals, asbestos is likely to be present. If the removal or disturbance of asbestos is required, all related works to abate, transport, or dispose of asbestos should follow the associated ESMPs. (Scarlett, Delzell, Sathiakumar, Oostenstad, & Postlethwait, 2012)

- Exposure to personnel and trash pickers to infectious diseases from improper disposal of medical waste
- Exposure to fluorescent light bulbs and thermostats that contain mercury. During the field visit, these hazardous materials were observed.
- Exposure to air conditioning units that contain refrigerants. During the field visits, these hazardous materials were observed.
- Contamination of nearby water bodies from the improper treatment and discharge of wastewater effluents. According to the MOH Business plan, the hospitals are not complying with effluent discharge limits.
- Contamination of vulnerable karstic aquifers due to the lack of pollution prevention plans at the hospital grounds. Pollution prevention plans are not in place at this hospital.

6 Social Context

6.1 Spanish Town Hospital

The Spanish Town Hospital is located in the parish of St. Catherine. St. Catherine Parish is the fastest growing parish in the island and continues to experience an increasing demand on its services, as it serves rapidly growing communities such as Portmore, Eltham, and Ensom City. The following table summarizes the number of housing units, dwellings, and households classified into urban and rural areas in the parish of St. Catherine. This table is based on the 2011 Census that was conducted by the Statistical Institute of Jamaica.

Table 6.1-1: Parish Populations by Urban and Rural Classification for St. Catherine

Units, Households, and Dwellings	Urban	Rural	Total
Housing Units	94,093	35,747	129,840
Households	123,651	39,584	163,235
Dwellings	118,631	38,308	156,939
Total	336,375	113,639	450,014

Source: (Census of Jamaica, 2011)

Spanish Town Hospital is the largest “Type B” Hospital on the island, with statistics comparable to Kingston’s Public Hospital, a “Type A” facility. The hospital services a high population area from St. Catherine Parish, Kingston Parish, St. Andrew Parish, Clarendon Parish, St. Mary Parish, and St. Ann Parish. In total, the hospital serves approximately 200,000 people per year.

Spanish Town is also within close proximity to three major highways, which contributes to an increasing number of motor vehicle accidents and victims. Furthermore, new housing projects in St. Catherine, and the increasing numbers of young families, will lead to a significant increase in patients, particularly within the pediatric population. Spanish Town Hospital is surrounded by dense residential communities, a prison, and commercial and industrial facilities. The Rio Cobre, the hospitals main source of water, is located less than 1,000 feet from the hospital.

6.1.1 Public Services and Infrastructure

Emergency Services

There are two hospitals in St. Catherine Parish: Spanish Town Hospital and Linstead Public Hospital. Linstead Police Station and Fire Station located near Spanish Town Hospital.

Water Treatment

Spanish Town has its own water treatment plant. The facility has a capacity of 4 million gallons per day and sources water directly from the Rio Cobre. This plant provides water to many surrounding areas, including Metropolitan Spanish Town.

Waste Management

MPM Waste Management manages non-hazardous waste collection and disposal in Spanish Town, using Riverton Landfill as its disposal site. Medical waste is picked up three times per week by the Waste Management Unit across from Kingston Public Hospital (KPH). KPH is the contracted authority, responsible for handling and dispose of medical waste for Spanish Town Hospital. However, it is unclear whether this waste is being transported, handled, and disposed of according to the IFC's General EHS Guidelines for Health Care Facilities and International Standards.

6.1.2 Key Social Organizations

A key organization includes the Parish Council. According to the Jamaican Ministry of Local Government and Community Development, Parish Councils are entities in a local level where the Department of Local Government can carry out different functions in communities, such as the following:

- Minor Water Supplies & Social Water
- Municipal Parks & Beautification
- Cemeteries
- Markets
- Abattoirs
- Pounds
- Parking facilities
- Parochial Roads
- Local Sustainable Development Planning
- Drains & Gullies
- Street Lights
- Infirmaryes¹⁵

There is a political and administrative branch within the councils. Within the political branch, there are Councilors, led by the Mayor who determines policies. On the administrative branch, a Head Manager advises and implements policies of the council. This Head Manager is also the Secretary of the Council. Councils have the legislative authority to create by-laws, regulations, and rules for the specific parish they govern. The Mayor of the St. Catherine's Council is Mr. Norman Scott; 40 councilors reside under him. The list below details the Council's current responsibilities within St. Catherine Parish.

- Determine the manner of the keeping of swine, goats, sheep, dog, horse, cattle, and poultry;
- Determine the opening and boundaries of any public place (not including the main road);
- Stop and / or regulate meetings in any thoroughfare or public place;
- Grant licenses for public amusement;
- Determine the management of sewage on property in town;
- Regulate rivers and the people and vehicles using the rivers; and
- Regulate the removal of houses over any thoroughfare or places.

¹⁵ Infirmaryes are funded by the Ministry of Local Government through the local authority while the hospitals are funded by the MOH.

6.2 May Pen Hospital

May Pen Hospital is located in the parish of Clarendon. Based on the latest population statistics (2018), Clarendon Parish has a population of approximately 247,902 people. As of 2011, the last known census, the population of the May Pen community was approximately 61,548.

The following table summarizes the number of housing units, dwellings, and households classified into urban and rural areas in Clarendon Parish. This table is based on the 2011 Census that was conducted by the Statistical Institute of Jamaica.

Table 6.2-1: Parish Populations by Urban and Rural Classification for Clarendon Parish

Units, Households, and Dwellings	Urban	Rural	Total
Housing Units	23,581	45,601	69,182
Households	26,943	49,938	76,881
Dwellings	25,844	48,710	74,554
Total	76,368	144,249	220,617

Source: (Census of Jamaica, 2011)

May Pen Hospital is classified as a “Type C” Hospital. As of 2012, May Pen Hospital was serving an estimated 4,500 patients per month (more than double its intended capacity at initial construction). May Pen Hospital is primarily surrounded by low-income residential communities. The only nearby “industrial” facility is a bag juice “factory” container. Other adjacent property includes a cemetery to the north, two schools, and the Denbigh Agricultural Showground.

Adjacent to the hospital are several homes along the street. As a result, some of the community members pass through the hospital grounds a shortcut to arrive at the local school. In addition, the hospital staff noted the boundary fence is inadequate, and goats and other animals can often be seen grazing on the hospital grounds. However, as discussed with hospital staff, the hospital grounds are not the main feeding source for the goats. The image below shows the goats, as observed during the site visit.

Figure 6.2-1: Goats Feeding on May Pen Hospital Grounds



Street food vendors (approximately 8 to 10) are also present directly across from the hospital. Street food vendors provide a critical food delivery service to staff and patients, as the hospital does not currently have a canteen. Although street vending is considered illegal directly within the hospital grounds, there are street vendors that stand in front of the hospital and sneak onto the grounds. At present, construction designs regarding street vendors have not been determined. However, a designated location for permanent placement of street vendors is recommended.

6.2.1 Public Services and Infrastructure

Emergency Services

There are 31 health centers in Clarendon Parish: nine “Type 3” health centers, ten “Type 2” health centers, and twelve “Type 1” health centers. The parish is divided into nine health districts, comprised of the previously mentioned health centers. Each health district has a “Type 3” full service center, with curative, maternal, child, dental, mental, and environmental services. There are three hospitals in Clarendon Parish: May Pen Hospital, Lionel Town Hospital, and Chapeltown Community Hospital. There is also a police station, a police records office, and a fire station within the parish.

Water Treatment

There are seven wastewater (sewage) treatment plans in Clarendon Parish, categorized by treatment plant, type of facility, and capacity. They are:

- Bushy Park Housing; Aerated Lagoon; 0.15
- Hayes No. 1 Housing; Waste Stabilization Ponds; 0.07
- Hayes No. 2 Housing; Waste Stabilization Ponds; 0.2
- Paisely Pen Housing; Oxidation Ditch; 0.05
- Crofts Hill; Oxidation Ditch; 0.05
- Lionel Town Housing; Aerated Lagoon; 0.04
- Mineral Heights Housing; Contact Stabilization; 0.35 (National Water Commission, 2018)

Waste Management

MPM Waste Management Ltd. Covers the Parish of Clarendon. Waste generated in Clarendon Parish is disposed of at the Riverton Wasteshed.

6.2.2 Key Social Organizations

The Clarendon Parish Council, or the Clarendon Municipal Corporation, has 22 councilors that are each responsible for a specific area of the parish. Mr. Winston L. Maragh is the Mayor of May Pen. The following are some of the responsibilities of the Corporation:

- Developing, managing, and maintaining infrastructure and public facilities such as parochial roads, water supplies, drains and gullies, parks, recreational centers, markets, abattoirs, ponds, cemeteries, transportation centers and public sanitary conveniences;

- Regulating powers in respect of building and planning approvals and development center, licensing of trades and businesses, street parking, control of public vending centers;
- Coordinating inter-agency collaboration among Non-Governmental organizations (N.G.O.s) community based organizations (C.B.O.s) and government agencies, which operate in the parish and are engaged in the delivery of local service or local development.

6.3 St. Ann's Bay Regional Hospital

St. Ann's Bay Regional Hospital is located within St. Ann Parish. In 2011, the population in St. Ann's Parish was 172,362. Of this population, 86,662 were male and 85,699 were female. The largest portion of the population is in between the ages of 10 and 19. Population decreases as age increases after the age of 19, similar to St. Catherine and Clarendon Parishes. St. Ann's Parish has the smallest population in comparison to St. Catherine and Clarendon Parishes. The following table summarizes the number of housing units, dwellings, and households classified into urban and rural areas in the parish of St. Ann. This table is based on the 2011 Census that was conducted by the Statistical Institute of Jamaica.

Table 6.3-1: Parish Populations by Urban and Rural Classification for St. Ann's Parish

Units, Households, and Dwellings	Urban	Rural	Total
Housing Units	13,930	32,607	46,537
Households	17,081	36,561	53,642
Dwellings	16,548	35,441	51,989
Total	47,559	104,609	152,168

Source: (Census of Jamaica, 2011)

St. Ann's Bay Regional Hospital is located within the parish of St. Ann. The hospital is the leading "Type B" hospital in the area, serving as the primary health care facility for three parishes, as well as several adjoining parishes. Patient traffic also includes local tourists, as the hospital is located within the popular resort town of Ocho Rios. St. Ann's Bay is surrounded by residential communities (including a squatters' settlement), a cemetery, a historic Catholic Church, the historic "Seville Great House," and a school.

Approximately 50 to 100 meters in front of the hospital, located within an empty lot across from the only entrance to the hospital, are several food vendors. As a result, hospital and construction traffic would be required to pass directly by the vendors. The images below present the locations and context for the food vendors present at St. Ann's Bay Regional Hospital.

Figure 6.3-1: Historical Catholic Church near St. Ann's Bay Regional Hospital



Figure 6.3-2a: Food Vendors Located Outside of St. Ann's Bay Regional Hospital



Figure 6.3-3b: Food Vendors Located Outside of St. Ann's Bay Regional Hospital



6.3.1 Public Services and Infrastructure

Emergency Services

There are 27 health service facilities in St. Ann's Parish. Of this total, 25 are health centers, one is a community hospital, and one is a general hospital (i.e., St. Ann's Bay Regional Hospital). St. Ann's Bay Regional Hospital is located near the northern coastline of the Parish. In addition, there is a police station and three fire stations within the Parish. (NEPA, 2012)

Water Treatment

Wastewater from the hospital is discharged directly into a nearby stream, known as "Church River." There are two wastewater (sewage) treatment plans in St. Ann Parish, categorized by treatment plant, type of facility, and capacity. They are:

- Moneague Housing; Oxidation Ditch; N/A
- Steer Town; Oxidation Ditch; 0.04 (National Water Commission, 2018)

Waste Management

Solid waste produced in St. Ann's Parish is collected and disposed of by North Eastern Parks and Markets Limited (NEPM). The two approved disposal sites within the Parish are Haddon Landfill (3.88 hectares) and Tobolski Landfill (4.94 hectares). (EEM, 2012)

6.3.2 Key Social Organizations

The St. Ann Parish Council, or the St. Ann Municipal Corporation, is led by Mr. Michael Belnavis, Mayor of St. Ann's Bay. The Council is made up of 16 councilors, divided into 4 areas of the parish. The following list shows some of the roles and functions of the St. Ann Municipal Corporation:

- Construction and maintenance of drains and gullies;
- Maintenance of minor water supply schemes;
- Management and maintenance of the infirmary¹⁶ for the accommodation / care of the poor;
- Maintenance of public cemeteries;
- Licensing of places of amusement, hotels, motels and lodging houses; barbers and hairdressers and butchers;
- Local planning authority for the regulating and approving of building and subdivisions as well as advertisement signs.

6.4 Potential Social Liabilities

There are no potential social liabilities to report at this time.

¹⁶ Infirmaries are funded by the Ministry of Local Government through the local authority while the hospitals are funded by the MOH

7 Public Consultations to Date

Initial public consultations were conducted June 25 - 27th 2018 at Spanish Town Hospital, St. Ann's Bay Hospital, and May Pen Hospital.

7.1 Stakeholders Identified and Consultation Objectives

Given that there is only preliminary information regarding the type of construction that may take place at the three hospitals, the objective of this first round of consultations was to solicit feedback from key hospital staff and the CEO on how to best engage stakeholders in the design, construction, and operations phases of the project and understand previous impacts of construction work at the hospital and staff's main concerns.

Key hospital staff included department heads from the laboratory, general surgery, nursing, securing, maintenance, and key administrative staff (see Appendix 8.2 for full attendance list).

The main questions posed to stakeholders included:

- What stakeholders need to be considered throughout the consultation process?
- What are the best ways to engage stakeholders throughout the consultation process?
- How to best engage surrounding communities?
- What previous impacts hospital staff have been subject to with prior construction projects?
- Staff concerns regarding the next phase of construction.

The format chosen for the consultations was an open meeting held at the hospital whereby the Ministry of Health Planning Division provided context regarding the IDB loan and the intentions of the program to be financed by the loan. The format allowed participants to ask question while the MOH posed the main questions above.

7.2 Stakeholder Feedback

7.2.1 Stakeholders to be Engaged and How to Engage Stakeholders

The majority of stakeholders stand to benefit from the upgrades to the hospital. Upgrades in terms of material and infrastructure is intended to facilitate providing better health care services to patients. It is also intended to provide a better working environment for staff. Hospital staff identified a few categories of stakeholders that need to be considered and engaged at different points of the process both to address concerns and because they may (and should) influence the project outcomes including final design and feedback on necessary design features such as wash stations.

Hospital Staff

Staff suggested that senior staff and operational staff that are closer to the ground be engaged on preliminary designs for any construction. Past designs have not duly considered issues related to infectious disease including appropriately placed washing stations. At Saint Ann's Bay, staff

specifically mentioned that nurses were not consulted in the design at the hospital and there was no nursing station, no bathroom, not enough washing stations, and no storage or change room in one of the constructed areas.

Staff further suggested that staff be updated on a regular basis on any updates to construction since construction timelines tend to run over and to provide information on how staff feedback has been incorporated. Staff suggested that posters as well as supervisors announce a town hall meeting for all staff interested in attending. Posters or written materials should be posted and staff should be able to provide feedback in written form after the meeting. Staff further suggested a town hall meeting be held in the morning and in the evening to accommodate different staff shifts.

Infection Control Department at the MOH

The infection control department at the Ministry level was considered a key stakeholder that needed to be engaged regarding preliminary project design to ensure adequate consideration is given to infection control. This has been an issue in past project design.

Patients

Staff generally agreed that all patients could be engaged to participate in a town hall style meeting especially if there are to be direct impact on patient's care such as having to move certain services to a different clinic. Staff did not seem to believe there was a need to differentiate between different types of patients such as elderly or maternity patients. Staff suggested that flyers be posted at the hospital and that town hall sessions take place on "high" clinic days, which are Monday through Thursday at the hospital.

Surrounding Community

Each hospital had a different perspective on community engagement. Spanish Town Hospital suggested that engaging the community was critical to the success of any construction project as the project could be subject to extortion by the community for jobs and money. It was suggested that community members were not actually interested in working though they had been hired in the past, this led to cost, and time overruns. Spanish Town staff suggested that the community needs to be engaged through the Parish Council and police.

May Pen suggested that the community members be engaged regarding requests for work, the need to tie up their goats that roam on hospital property, and trespassing on hospital grounds as shortcuts to the high school. It would be important to find alternate pathways because otherwise community members are likely to make a hole in the existing fence that may create safety risks. May Pen staff suggested that community members be engaged through the Member of Parliament and the Parish Council. St. Ann's Bay staff suggested that the local schools be engaged and the communities impacted by them. Staff also suggested the Parish Council could support in this aspect.

Food Vendors

Staff at all hospitals thought that food vendors would need to be engaged as they provide a critical service to patients and staff. Staff at all three of the hospitals bought food from vendors

given limited or no canteen options. Given the small number of vendors (5-20) at each hospital, vendors could be invited directly to a group meeting to discuss issues included a new location during construction.

7.2.2 Anticipated Risks and Impacts

The information below reflects stakeholders concerns regarding *prior* construction activities. Hospital staff have experienced impacts during construction activities and shared a number of their concerns based on previous experience.

7.2.2.1 Spanish Town

- During prior works, staff were not kept well informed about construction even when there were time overruns that impacted their work. They are concern that the information regarding proposed works will not be provided on time.
- Fumes due to paint in the wards and near nursery.
- Dust and noise including jack hammers that impacted staff and patients. The noise was especially detrimental to the operating theaters, labs, and the nursery.
- Cracked walls due to lack of consideration regarding soil type.
- Poor material choices that are subject to termites and termite re-infestation.
- Heavy vehicles disrupt outside and internal roads creating traffic and dust especially near the maternity ward.
- It is not feasible to relocate the operating theater as previously done. Standards were not up to an acceptable level.

Suggestions

- Air-conditioning unit filters need to be cleaned more often during construction due to dust. Otherwise, they are subject to breakdown.

7.2.2.2 St. Ann's Bay

- There is only one entrance / exit so during construction there is increased human traffic that hinders staff from doing their job and infringes on staff privacy.
- Noise affects the nursery and maternity ward as well as other areas of the hospital.
- Water supply has been cut off during construction. Sometimes staff are given forewarning however the actual cut off did not correspond to the times indicated.
- Pipes burst and no water was available.
- Telecommunications were cut off and there was no phone service.
- Loss of electricity due to construction. Staff were notified but wrong times were posted.
- Construction workers block patient areas and are noisy and smoking ganja.
- Worksite safety needs to be made an important concern for construction workers.
- Poor designs that did not consider nurses needs such as wash stations.

Suggestions

- Look at the possibility of creating an alternative entrance at the back of the hospital in order to lessen the burden on the one entrance/exit during construction.

7.2.3 May Pen

- Limited parking becomes muddy during construction.
- Dust
- Jack hammer noise impacted patients and staff.
- Need to ensure security on site.
- Construction workers are often in slippers and smoking ganja.
- If food vendors are impacted it is not clear how patients and staff will get food.

7.2.4 Grievance Mechanism Feedback

The MOH has a formal and functioning grievance mechanism to address patient concerns with care. However, staff, at all three hospitals, suggested what has worked well in the past is a hospital committee that included a key point of contact designated by the CEO. This point of contact would coordinate closely with a Project Manager designated by the Regional Office and a Project Manager designated from the MOH.

The hospital point of contact should be made known to all staff so issues could be raised. This should include a phone number or an email address. Regular meetings for the committee should be held at least monthly. Reporting to all staff should be a part of regularly scheduled consultation with staff through the MOH. The MOH should further provide contact information at the MOH or through the contracted construction firm to accept grievances, complaints, and suggestions.

7.2.5 Key Recommendation from Staff

It cannot be overemphasized how important and strongly staff felt about the need for any project design to consider an adequate canteen for staff and patients especially at St. Ann's Bay and May Pen hospitals. Staff do not have proper or adequate areas to rest and eat. Staff and patients are subject to eating outside of hospital premises. Providing an adequate canteen space could further help to mitigate impacts to informal vendors if they are incorporated into the canteen space.

8 Environmental and Social Risks and Impacts

This chapter discusses the potential positive and negative risk and impacts of construction, operation, and maintenance phases of the proposed project. Since this proposed project is within currently existing hospitals, the majority of the environmental and social impacts associated with this project will be associated with construction activities.

8.1 Methodology

The methodology will include the following phases:

1. Identification actions of the program to be executed
2. Identification environmental and social factors present in the area of influence of the program
3. Elaboration of the matrix of interaction between actions of the program and identified environmental and social factors
4. Analysis and assessments of the environmental and social risk and impacts generated by the program

The process of determining impacts was done through documentation review, site reconnaissance visits, and stakeholder engagement.

The anticipated environmental and social risk and impacts of the proposed program are based on, compliance with the relevant Jamaican legislation and regulatory framework, the IFC's General EHS Guidelines for Health Care Facilities, and applicable IDB policies and directives.

8.2 Main Program Actions

The main objective of the program is to rehabilitate (i.e., upgrade and expand) three hospitals in Jamaica as part of the "Support for the Health Systems Strengthening Program for the Prevention and Care Management of Non-Communicable Diseases" project, financed in part by the IDB.

Within Jamaica's public sector, health services are delivered through a network of primary, secondary, and tertiary healthcare facilities comprising of twenty-five (25) hospitals, of which twenty-three (23) are classified according to type (i.e., A, B, or C), specializations, bed capacity, and services offered. The remaining two hospitals are quasi-public sector hospitals that operate within a private sector health care market. The hospitals that are part of this Environmental and Social Assessment are detailed in the table below.

Table 8.2-1: Hospital Improvements

Hospital	Location	Current Type	Proposed Type
Spanish Town	Spanish Town, St. Catherine Parish	B	A
May Pen	May Pen, Clarendon Parish	C	A
St. Ann's Bay	St. Ann's Bay, St. Ann's Parish	B	A

The upgrade of the hospitals to the proposed type will include expansion works, which include current infrastructure improvements, purchase of medical equipment, and the construction of new wards, surgical theatres, and intensive care units, among other functional areas.

As part of the technical assistance to the Program, the MOH of Jamaica engaged the United Nations Office of Project Services (UNOPS) to conduct a study, entitled, “Needs Assessment and Analysis of Alternatives for the Strengthening of the Infrastructure and Medical Equipment.” The assessment included an evaluation of each hospital’s current infrastructure and medical equipment.

8.3 Environmental and Social Risk and Impacts Matrix

An impact matrix (below) has been constructed that can be considered as a two dimensional control matrix. One dimension shows the main activities of the Project (construction and operation phases) and the other shows the environmental and social categories that may be affected. A “-” is shown in the constructed matrix when it is estimated that there will be no impact, an “X” when the impact is considered low, an “XX” when the impact is considered moderate, and “XXX” when the impact is considered “high”.

Project Stages		Construction Phase												Operations Phase					
Environmental & Social Issues	Associated risk and Impacts	Vegetation Removal	Clearings	Demolition and Disassembly	Milling of Existing Pavements	Construction of Buildings and Structures	Pavements and Access Areas	Machinery Operations	Machinery Washing and Maintenance	Storage Areas	Asbestos Abatement	Rehabilitation Works	Installation of New Equipment	Air Emissions (Boiler House / Heating System)	Waste Disposal (Medical waste, domestic)	Discharges from the WWTP	Safety Hazards	Vehicle Traffic & Maintenance	Pest Control
Air Quality	C1 Chemical quality of the air	-	-	x	x	x	x	x	-	-	xxx	-	-	x	-	-	x	x	x
	C2 Physical quality of the air	-	-	x	x	x	x	x	-	-	-	-	-	x	-	-	x	-	-
Climate	CL1 Microclimatic changes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Edaphology	E1 Soil removal	x	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-
	E2 Erosive processes	x	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-
	E3 Edaphic characteristics	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-
Fauna	F1 Modification of habitats	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	F2 Variation in fauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vegetation	FL1 Variation in flora	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	FL2 Potential productivity	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Geology	G1 Geomorphologic changes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hydrology	H1 Water quality	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	-	-	-
	H2 Surface hydrology	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	-	-	-
	H3 Underground hydrology	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	-	-	-
Landscape	P1 Landscape	x	x	-	-	-	-	-	-	-	-	-	-	-	x	x	-	x	x
Socioeconomic	SO1 Social acceptability	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	SO2 Economic activity	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	SO3 Increase in communications	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	SO4 Labor, employment	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	SO5 Rent per capita	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Project Stages		Construction Phase												Operations Phase					
Environmental & Social Issues	Associated risk and Impacts	Vegetation Removal	Clearings	Demolition and Disassembly	Milling of Existing Pavements	Construction of Buildings and Structures	Pavements and Access Areas	Machinery Operations	Machinery Washing and Maintenance	Storage Areas	Asbestos Abatement	Rehabilitation Works	Installation of New Equipment	Air Emissions (Boiler House / Heating System)	Waste Disposal (Medical waste, domestic)	Discharges from the WWTP	Safety Hazards	Vehicle Traffic & Maintenance	Pest Control
	SO6 Health and Wellness	-	X	X	X	X	-	-	-	-	XXX	X	-	-	-	-	-	-	-
	SO7 Land Use Change	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	SO8 Economic Displacement	-	-	X	X	X	X	X	X	-	-	X	X	-	-	-	X	X	X
	SO9 Patient Privacy	-	-	X	-	X	X	-	-	X	-	X	X	-	-	-	-	-	-
	SO10 Healthcare Service Disruption	-	-	X	-	X	X	-	-	XX	XX	X	X	X	X	X	X	X	X
	SO11 Social Disturbances	-	-	X	X	X	X	X	X	XX	XX	X	X	X	X	X	X	X	X
Cultural Heritage	PC1 Archeological Sites	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Key: "-" = none, "X" = low, "XX" = medium, "XXX" = high

8.5 Construction Phase

8.5.1 Environmental Risk and Impacts Table

Table 8.5-1: Summary of Potential Construction Phase Impacts

No.	Impact	Type of Risk and Impact
1.	Noise and vibration	Negative, short-term, low impact, localized
2.	Airborne emissions and contaminants	Negative, short-term, medium impact, localized
3.	Soil and water pollution	Negative, short-term, medium impact, localized
4.	Increased generation of solid waste	Negative, long-term, medium impact, localized
5.	Occupational health and safety risks	Negative, short-term, medium impact, localized
6.	Increased traffic generation	Negative, short-term, low impact, localized
7.	Degradation of soil, landscape, and soil erosion	Negative, long-term, medium impact, localized
8.	Use of temporary construction sites	Negative, short-term, low impact, localized
9.	“Green” procurement and enhancement measures	Positive, long-term, low impact, localized

8.5.2 Environmental Risk and Impact Analysis

8.5.2.1 Potential Negative Risks and Impacts

Noise and Vibration

Noise is commonly one of the most adverse consequences of a project’s construction phase. Nonetheless, high noise levels are expected within the AOI during the construction phase. Temporary (6 to 10 months) high noise levels will result mainly from the use of heavy equipment, including bulldozers, generators, graders, dump trucks, heavy vehicles, jackhammers, and concrete mixers. Key receptors include hospital staff, construction workers, patients, and surrounding communities. Although the level of noise discomfort can be subjective, the project should conform to International Best Practices, the IFC’s General EHS Guidelines, and Guidelines for Health Care Facilities regarding noise, to ensure that noise levels are maintained, particularly during nighttime hours. Localized and temporary vibration from the use of equipment and tools is also anticipated. Noise and vibration impacts are expected to be localized, and are classified as “low” impact.

Airborne Emissions and Contaminants

Temporary (6 to 10 months) and localized air pollution from dust and other emissions is a potential, “medium impact,” adverse environmental concern during the construction phase of the project. Dust and other emissions can be generated by the demolition of buildings, removal of topsoil, excavation activities, vehicle movement, and materials handling. Dust particles can pollute the atmosphere and cause health and safety hazards for workers, hospital staff, patients, and surrounding communities. Furthermore, dust particles can affect unprotected machinery and equipment, if it is allowed to settle. Emissions from diesel construction vehicles and increased vehicular traffic will also lead to an increase in fine particulate matter, sulfur dioxide, carbon monoxide, and hydrocarbons – all of which will lead to changes in air quality. Airborne contaminants that can have a major impact include the removal of asbestos if not done properly.

Soil and Water Pollution

The proposed construction activities will have temporary adverse impacts on local water and soil quality if contractors and hospital staff do not enforce the proper management of oil, fuel, lubricants, and other hazardous waste (e.g., fluorescent light bulbs and thermostats that contain mercury, air conditioning units that contain refrigerants, and asbestos containing materials). Spillage and untreated runoff from oil and other substances and the improper handling, transport, or disposal of hazardous and non-hazardous waste can lead to polluted freshwater, groundwater, and ocean waterbodies, as well as polluted soils. Soil and water pollution impacts are expected to be localized, and are classified as “medium” impact.

Increased Generation of Solid Waste

The proposed activities will increase the generation of solid waste long-term at the site during preparation, construction, and operation phases. The waste may consist of the wood, metal cuttings, excavated materials, cement, paint, containers, solvent, and glass among other things. Some of these materials also contain hazardous materials (e.g., fluorescent light bulbs and thermostats that contain mercury, air conditioning units that contain refrigerants, and asbestos containing materials) and / or are not biodegradable and can have long-term effects on the environment and public health. Increased food waste from construction workers and other contracted staff will also be generated. Solid waste impacts are expected to be localized, and are classified as “medium” impact.

Occupational Health and Safety Risks

The proposed activities pose several potential adverse, short-term occupational health and safety (OHS) risks to workers and operative personal in the hospital (including patients and family members of patients), some of which could be life threatening if not managed properly. Dangerous jobs, such as work at heights, hot works, excavations, work in confined spaces, demolition, asbestos removal, handling of chemical products, and electrical works (among others) should all be managed according to a hazardous risk assessment. Other hazards could occur due to increased and / or disorganized vehicular and pedestrian traffic. OHS impacts are expected to be localized, and are classified as “medium” impact.

Increased Traffic Generation

The proposed activities pose several potential adverse and localized traffic impacts, including congestion along hospital routes, adjoining roads, and within hospital boundaries, which could lead to safety hazards, inconveniences, vehicular and pedestrian accidents, and time delays for hospital vehicles (e.g., ambulances). Flow of traffic on or near the proposed road will be affected and diversions may need to be done to manage traffic. Traffic generation impacts are expected to be short-term, and are classified as “low” impact.

Degradation of Soil, Landscape, and Soil Erosion

The proposed activities pose several adverse and localized impacts to soil, landscape, and erosion. During construction, appropriate erosion prevention and control measures should be in place to prevent any unnecessary soil loss. If not prevented, soil loss can lead to long-term environmental ramifications, such as flooding and topographic instability. Prolonged soil loss and erosion also contribute to a lack of

biodiversity, flora, and fauna. If not managed properly, soil, landscape, and erosion-related degradation are expected to be long-term, and are classified as “medium” impact.

Use of Temporary Construction Sites

The use of temporary construction sites pose several localized and temporary (6 to 10 months) potential OHS and environmental risks to workers, hospital staff, and patients. Any generated waste, particularly hazardous waste (e.g., asbestos, mercury, refrigerants) should be handled, stored, and transported safely and in accordance with general EHS Guidelines. Waste should also have designated disposal sites, which are free from obstruction and away from hospital staff, visitors, and patients. Furthermore, temporary construction sites should be blocked off from hospital staff, visitors, patients, and other pedestrians to prevent injury within the work place. Impacts from temporary construction sites are expected to be short-term and “low” impact.

8.5.2.2 Potential Positive Impacts

Green Procurement and Enhancement Measures

Earth materials needed for construction in Jamaica are generally obtained from quarry operations. The contractor should be conscious of the sources of these materials, as illegal quarry sites can cause medium to long-term negative environmental impacts. The contractor and hospital should ensure that contractors and other vendors conform to hygiene and safety standards regarding food handling and supply, and that, when possible, materials are being sourced with sustainability in mind. Impacts from green procurement and enhancement measures are expected to be positive, long-term, localized, and are classified as “low impact”.

8.5.3 Social Risks and Impacts Analysis

Economic Displacement

Increased construction traffic and works may require food vendors to be relocated permanently or temporarily. Local food vendors have set up stalls directly outside of the hospitals and inside hospital premises. Relocating vendors may affect both the economic cost to vendors and create changes to a critical service (food supply) provided to patients and staff at the hospital. Food access on the premises of the hospital is not satisfactory and the service that the food vendors provided is critical. If vendors are impacted, baseline data of this affected group will need to be collected. This will allow the MOH to measure impact.

Healthcare Service Disruption

Construction activities may require for certain patient services to be moved to outside facilities or clinics. This could prove to be a hardship for some patients depending on the accessibility of the temporary facilities. Hospital staff also mentioned that patient services have decreased in quality in the past when the services have been moved to less than adequate facilities. In addition, recovering patients are particularly susceptible to respiratory issues from airborne emissions, asbestos, and other contaminants. Furthermore, patients and health care workers are also at risk from medical waste contamination and the transmission of infectious diseases.

Patient Privacy

The proposed works may expose patient medical records to potential disclosure, undermining patient privacy and confidentiality. In 2018, the MOH announced that it would be moving toward the electronic storage of patient medical records in an effort to safeguard patient privacy, and appears to have initiated pilot projects in that regard. Nonetheless, the majority of health facilities do not use an electronic system. At three hospitals, records are kept as shown in the figure below:

Social Disturbance

The construction works may cause disturbance to the local population with interactions of construction workers with residential communities. The movement of trucks and other equipment in the project area during the works implementation will cause noise and dust if the works will be in dry weather. This noise and dust may also affect the businesses near the construction works such as the food vendors that supply the hospital. In the case of May Pen, goat grazing may be impacted to a limited extent. Spanish Town and St. Ann's Bay communities were cited as potential areas of conflict during the construction phase.

Road Safety

This may be exacerbated because of road works. This will mainly be due to increased traffic from the construction vehicles and equipment. There are no particular areas of concern as there will be adequate traffic management if required.

8.6 Operation and Maintenance Phase

8.6.1 Environmental Impacts Table

Table 8.6-1: Summary of Potential Operation and Maintenance Phase Impacts

No.	Impact	Type
1.	Improper Waste Management	Negative, long-term, medium impact, localized
2.	Increased Risk of OHS Incidents	Negative, long-term, medium impact, localized
3.	Increased Effluent Waste and Surface / Stormwater Runoff	Negative, long-term, medium impact, widespread
4.	Increased Water Demand	Negative, long-term, medium impact, widespread
5.	Increased Traffic Volume	Negative, long-term, low impact, localized
6.	Increased Air Contaminants and CO ₂ Emissions	Negative, long-term, low impact, localized
7.	Increased Impacts to Water and Soil Quality	Negative, long-term, medium impact, localized

8.6.2 Environmental Risk and Impact Analysis

8.6.2.1 Potential Negative Risks and Impacts

Improper Waste Management

As with all the expansion of all facilities, localized domestic and hazardous waste generation is expected. Since the various medical procedures require specific medical examinations, chemicals, and

materials, several types of hazardous waste is expected. If not disposed of properly, medical waste can pose a long-term risk to public health and the environment. Improper waste management can also result from the incorrect categorization or utilization of materials. A few risks include, air quality (e.g., if hazardous materials are being burned on-site), stormwater contamination, and the spread of infectious disease (e.g., squatters with access to dumpsites). Part of waste management is related to medical waste. The management of medical waste is a coordinated effort that involves internal and external activities including training of health care personnel and the implementation of infrastructure and containers for proper disposal. The improper disposal of medical waste is anticipated to have a long-term impact on OHS issues and the environment, and is classified as “medium” impact.

Increased Risk of OHS Incidents

Hospital staff and other hospital attendants will continue to be exposed to potential, localized OHS risks, if not managed properly. OHS risks include, but are not limited to, fire safety, safe access routes, clearly defined pedestrian pathways, electrical hazards, eye hazards, radiation hazards, ventilation, use of Personal Protective Equipment (PPEs), and safety signage. Impacts due to increased OHS risks are considered “long-term” and are classified as “medium” impact.

Increased Effluent Waste and Surface / Stormwater Runoff

The operation of the project will lead to an increased local demand for proper sewage disposal, wastewater treatment, and waste management. Stormwater runoff from the roof, pavement, and other areas of the hospital will also lead to higher storm water velocity and drainage system demands. Impacts from increasing effluent waste and surface / stormwater runoff is considered “long-term” and is classified as “medium” impact.

Increased Water Demand

An increase in local water use and demand is anticipated for the rehabilitation and expansion of all three hospitals. Therefore, it is important that each hospital adopt its own best management practices regarding sustainable water use and consumption. Impacts from increasing water demand are considered “long-term” and are classified as “medium” impact.

Increased Traffic Volume

Increased patient volume, coupled with increased localized traffic volumes along hospital routes, adjoining roads, and within hospital boundaries could lead to safety hazards, inconveniences, vehicular and pedestrian accidents, and time delays for hospital vehicles (e.g., ambulances) during the operation stages of each hospital. Hospitals should ensure that roads, pathways, and access ways are properly maintained to account for increased vehicular traffic. Impacts from increasing traffic volumes are considered “long-term” and are classified as “low” impact.

Increased Air Contaminants and CO₂ Emissions

Once in operation, localized airborne emissions are expected to increase in accordance with each hospitals rehabilitation and expansion. Therefore, it is important that each hospital adopt its own best management practices regarding sustainable (e.g., renewable) energy use. Furthermore, as more waste is generated, the hospitals should ensure that if waste is being burned on-site, it is being done

properly according to International Standards. Improper management of airborne emissions (including gasoline) can cause long-term and widespread human health, safety, and environmental impacts.

Airborne emissions, such as CO₂, dust particulates, toxic particulates, and chemical fumes, among others, can contribute to environmental, human health, and safety impacts. Once operational, the hospitals should conduct an assessment to determine which areas of the hospital require personal protective equipment (PPEs) for staff. Patients and visitors, on the other hands, should be kept in areas free from air contaminants. Impacts from increased emissions are considered “long-term” and are classified as “low” impact.

Impacts to Water and Soil Quality

Impacts to local water and soil qualities due to improper maintenance of water supply, wastewater systems, drainage systems, vehicles and equipment, boiler house, and electrical sub-stations can lead to long-term and widespread human health, safety, and environmental impacts. Once operational, the hospitals should ensure they are complying with all local and intentional guidelines, regarding the proper management and monitoring of water and soil quality. Impacts to water and soil quality are considered “long-term” and are classified as “medium” impact.

8.6.2.2 Potential Positive Impacts

Improved Coordination, Handling, and Disposal of Medical Waste

Once operational, the hospital should refer to the associated ESMPs, international best practices, and related regulatory guidance from NEPA. Better control and management of medical waste, particularly hazardous waste, would greatly benefit local communities, hospital staff, and Jamaica as a whole.

8.6.3 Social Risk and Impact Analysis

8.6.3.1 Potential Negative Risks and Impacts

No negative social impacts are anticipated (assuming all mitigation measures and plans in place).

8.6.3.2 Potential Positive Impacts

The operational activities after this project is commissioned will have positive long-term social impacts that include the following:

- a. Improved access to healthcare and healthcare services
- b. Improved accessibility for patients to parish hospitals infrastructure and services for patients and staff.

9 Environmental and Social Management Plan (ESMP)

The implementation of the rehabilitation and expansion activities for the Jamaican hospitals generates both positive and negative environmental and social impacts within the area of influence (AOI). Therefore, it is necessary to develop an Environmental and Social Management Plan (ESMP). An ESMP is a basic instrument of environmental and social management and a firm commitment during the development of rehabilitation and improvement in activities, in order to mitigate, prevent, or reduce the environmental and social risk and impacts that were identified and evaluated throughout the integral process of the environmental and social risk and impact assessment.

9.1 Institutional Strengthening Recommendations

Based on our evaluation, it appears that MOH requires additional skilled resources to implement management plans specifically focused on environmental issues, with a strong emphasis on oversight and compliance. We note that it may be useful to conduct an institutional strengthening review to determine where to best locate hospital-focused environmental compliance and oversight resources; for example, it may be helpful to evaluate whether MOH or NEPA are the best agency in which to base the recommended staff. Based on our limited review, and the troubling compliance issues around wastewater management and hazardous waste disposal at the hospital level, we suggest locating at least one trained environmental staff at MOH, with joint reporting obligations to MOH and NEPA. Following are the proposed activities that need to be incorporated.

Ministry of Health

- Expand the responsibilities of the MOH, or create a new division to oversee all environmental compliance at the hospital level. With these added responsibilities, new staff needs to be hired.
- One full-time staff to oversee hospital compliance with environmental regulations. At least one full-time environmental specialist staff person should be hired to liaise with NEPA to develop a plan for bringing the hospital into compliance with all environmental regulations, including discharge limits, and disposal solid and hazardous waste. The staff also should be responsible for establishing guidelines along with NEPA for pollution prevention plans at each hospital and implementing key performance indicators at each hospital.
- Increase staff in the Waste Management Unit to oversee hospital disposal of hazardous waste and medical waste. The staff should be responsible for upgrading and developing the procedures and guidelines to be implemented in each hospital, oversee compliance and implement key performance indicators.
- Staff should cross-report to MOH and NEPA to ensure adequate environmental resource support.
- If environmental specialists with the adequate expertise are not available, the position could be outsourced to a third party company with the mandate to provide capacity building to less experienced personnel.

- Maintenance coordinators at RHA should be properly trained in environmental compliance by MOH (or an appropriate third party) and required to report to the MOH on a regular basis.
- Develop/upgrade regulations for handling medical records at the hospital level. Responsibility for compliance should be at the Regional Health Administration (RHA) level with oversight by MOH.

9.2 Guidelines for Security of Medical Records and Patient Privacy

During construction and operation, measures should be taken to ensure the safeguarding of medical records.

During Construction

- Create a locked, supervised medical record room or area in a zone protected from the construction works and in accordance with all other safety codes (water, fire, sprinkler systems, etc.) in which to store patient medical records.
- Assign staff to monitor the medical record room and ensure that only authorized staff is allowed to access patient medical records.
- Develop and maintain an emergency plan in the event of fire, water or other natural or man-made events that enable to medical records to be removed to a safe and secure location.

During Operations

- Assign staff to monitor the medical record room and ensure that only authorized staff is allowed to access patient medical records.
- Create an electronic record controlled exclusively by staff authorized to supervise the medical record area in which is logged the date, time, name and title of all individuals who requested or gained access to patient medical records, the records accessed, and indicating if any records were removed and when the records are returned.
- Maintain an emergency plan in the event of fire, water or other natural or man-made events that enable to medical records to be removed to a safe and secure location.

9.3 Pre-Construction Phase

Based on field observations and a desktop review, the following activities must be conducted or implemented, prior to the construction phase, to guarantee compliance with environmental and safety guidelines. The activities are discussed below.

Spanish Town Hospital

- Procure lockers and/or assign a record room or area in a zone protected from the construction works and in accordance with all other safety codes (water, fire, sprinkler systems, etc.) in which to store patient medical records
- Conduct a full assessment regarding available space within the hospital that could be used during construction.
- Develop a thorough project blueprints and schedule, explaining (in detail) the project construction and rehabilitation works that will be completed per hospital.

- Medical waste management infrastructure (disinfection facility and/or incinerator) should be included in the upgrade works blueprints.
- Determine the various phases of construction (e.g., construction scheduled, based on the final blueprints of the construction and rehabilitation works to be completed).
- Determine which activities will require the closure of wards or healthcare services, as well as any activities that will require abatement and decontamination (e.g., asbestos).
- Coordinate the procurement/rental of suitable vehicles to transport affected patients to a pre-determined neighboring hospital during construction and rehabilitation works if it is determined that the hospital needs to be closed during upgrade works.
- Appoint an Environmental, Health, and Safety (EHS) Manager for each hospital to monitor adherence to its tailored environmental management plans, including identifying training needs for hospital staff and update the emergency response plan.
- Conduct an asbestos assessment, including testing, to determine the presence and quantity of ACM.
- Conduct an environmental audit to quantify hazardous materials on site and determine best appropriate location and storage type. The audit should include oxygen and propane tanks.
- Develop stormwater management plans in conjunction with future construction works to determine upgrades and maintenance.
- Inspect the current wastewater treatment plant system and determine demand and current capacity. The assessment should include testing of hospital effluent discharges.
- Provide training regarding the appropriate PPEs and EHS mitigation measures to limit workplace hazards to workers and staff.
- Obtain all necessary local environmental permits; follow applicable local and international guidelines and regulations.
- Review the specifications and dimensions for all new equipment and machinery to ensure its compatibility with the construction schedule; construction plans should accommodate the specific requirements of all new machinery and equipment. It is recommended that an architect with a specialization in health care infrastructure review applicable documents.
- Develop a communication strategy to inform each parish of the construction timeline.
- Conduct a launch workshop with the executing agency and contractors and subcontractors at each hospital to review requirements and timeline.

May Pen Hospital

- Procure lockers and/or assign a record room or area in a zone protected from the construction works and in accordance with all other safety codes (water, fire, sprinkler systems, etc.) in which to store patient medical records.
- Conduct a full assessment regarding available space within the hospital that could be used during construction.
- Develop a thorough project blueprints and schedule, explaining (in detail) the project construction and rehabilitation works that will be completed per hospital.
- Medical waste management infrastructure (disinfection facility and/or incinerator) should be included in the upgrade works blueprints.
- Determine the various phases of construction (e.g., construction scheduled, based on the final blueprints of the construction and rehabilitation works to be completed).

- Determine which activities will require the closure of wards or healthcare services, as well as any activities that will require abatement and decontamination (e.g., asbestos).
- Coordinate the procurement/rental of suitable vehicles to transport affected patients to a pre-determined neighboring hospital during construction and rehabilitation works if it is determined that the hospital needs to be closed during upgrade works.
- Appoint an Environmental, Health, and Safety (EHS) Manager for each hospital to monitor adherence to its tailored environmental management plans, including identifying training needs for hospital staff and update the emergency respond plan.
- Conduct an asbestos assessment, including testing, to determine the presence and quantity of ACBM.
- Conduct an environmental audit to quantify hazardous materials on site and determine best appropriate location and storage type. The audit should include oxygen and propane tanks.
- Develop stormwater management plans in conjunction with future construction works to determine upgrades and maintenance.
- Inspect the current waste water treatment plant system and determine demand and current capacity. The assessment should include testing of hospital effluent discharges
- Provide training regarding the appropriate PPEs and EHS mitigation measures to limit workplace hazards to workers and staff.
- Obtain all necessary local environmental permits; follow applicable local and international guidelines and regulations.
- Review the specifications and dimensions for all new equipment and machinery to ensure its compatibility with the construction schedule; construction plans should accommodate the specific requirements of all new machinery and equipment. It is recommended that an architect with a specialization in health care infrastructure review applicable documents.
- Develop a communication strategy to inform each parish of the construction timeline.
- Conduct a launch workshop with the executing agency and contractors and subcontractors at each hospital to review requirements and timeline.

St. Ann's Bay Regional Hospital

- Procure lockers and / or assign a record room or area in a zone protected from the construction works and in accordance with all other safety codes (water, fire, sprinkler systems, etc.) in which to store patient medical records
- Conduct a full assessment regarding available space within the hospital that could be used during construction.
- Develop a thorough project blueprints and schedule, explaining (in detail) the project construction and rehabilitation works that will be completed per hospital.
- Medical waste management infrastructure (disinfection facility and/or incinerator) should be included in the upgrade works blueprints.
- Determine the various phases of construction (e.g., construction scheduled, based on the final blueprints of the construction and rehabilitation works to be completed).
- Determine which activities will require the closure of wards or healthcare services, as well as any activities that will require abatement and decontamination (e.g., asbestos).
- Coordinate the procurement/rental of suitable vehicles to transport affected patients to a pre-determined neighboring hospital during construction and rehabilitation works if it is determined that the hospital needs to be closed during upgrade works.

- Appoint an Environmental, Health and Safety (EHS) Manager for each hospital to monitor adherence to its tailored environmental management plans, including identifying training needs for hospital staff and update the emergency response plan.
- Conduct an asbestos assessment, including testing, to determine the presence and quantity of ACM.
- Conduct an environmental audit to quantify hazardous materials on site and determine best appropriate location and storage type. The audit should include oxygen and propane tanks.
- Develop stormwater management plans in conjunction with future construction works to determine upgrades and maintenance.
- Inspect the current wastewater treatment plant system and determine demand and current capacity. The assessment should include testing of hospital effluent discharges
- Provide training regarding the appropriate PPEs and EHS mitigation measures to limit workplace hazards to workers and staff.
- Obtain all necessary local environmental permits; follow applicable local and international guidelines and regulations.
- Review the specifications and dimensions for all new equipment and machinery to ensure its compatibility with the construction schedule; construction plans should accommodate the specific requirements of all new machinery and equipment. It is recommended that an architect with a specialization in health care infrastructure review applicable documents.
- Develop a communication strategy to inform each parish of the construction timeline.
- Conduct a launch workshop with the executing agency and contractors and subcontractors at each hospital to review requirements and timeline.

9.4 Construction Phase

9.4.1 Debris Waste Management Plan

In the construction stage, debris waste will be generated. The following measures will be taken to manage this kind of waste during construction:

Conditioning

- Generated debris waste will be stacked in designated, appropriately marked areas.
- These areas will be covered or watered while they are in the facilities to avoid the generation of dust.

Collection

- The established collection route sheets will be strictly followed, as well as the frequencies and schedules of internal collection.
- After carrying out the waste, it has to be weighed and registered.

Transportation

- Construction or demolition waste will be removed every week.
- Transportation will be made through the service of a company duly registered and authorized to provide this service. It must transport the solid waste to a sanitary landfill authorized by the corresponding authority.

- Before transport, ESHS personnel must be verified that the vehicles are equipped with safety equipment, such as fire extinguishers, first aid kit, toolboxes, etc.

Final Disposition

- Final disposal will be made through the service of a company duly registered and authorized to provide this service.
- The companies that perform the final disposal in the landfill must have the proper authorization of the competent authorities and municipalities in their jurisdiction. Currently, waste is disposed in the Clarendon Landfill.

9.4.2 Solid and Hazardous Waste Management Plan

In the construction stage, solid waste to be generated is anticipated to be paint containers, metal waste, etc., which can be hazardous waste or common waste (recyclable and non-recyclable).

- Common waste generated by workers, which can be domestic, recyclable such as paper, cardboard, glass, etc. or non-recyclable.
- Hazardous waste like painting packaging, epoxies, varnishes etc.

The following measures will be taken to manage the waste during construction:

Minimization

- The following measures must be enforced to reduce the production of the waste detailed above:
 - Separate and classify mixtures of various types of waste with unknown compositions to ensure their proper disposal.
 - Be aware that the use of materials and products that generate hazardous waste could be substituted by less polluting materials.
 - Avoid the generation of odors from decomposing organic components.
 - Obtain agreements for the return of containers and packaging to the suppliers.
 - Train personnel in waste minimization.

Conditioning

- Storage and temporary storage points will be established in the expansion, construction, and rehabilitation site.
- Select the types of containers or bins and determine the quantity to be used for each area.
- Determine the quantity, color and capacity of the bags (must be at least 20% greater than the capacity of the container) to be used according to the type of waste.
- Avoid bagging organic residues (food remains) containing liquids.
- The personnel in charge of the cleaning will place the containers with their respective bags in the generation points.
- Strategically place containers as close as possible to the generation source.
- Verify the fulfillment of the conditioning according to the type and volume of waste generated by the service.
- The bags containing solid waste, conditioned by the waste generators, must be hermetically sealed before they are deposited in the corresponding containers.

- The tanks for the deposit of the waste must be differentiated and labeled according to the type of waste that belongs in them and must be located in strategic and visible places.
- Hazardous construction waste, which may be the packaging of paints, epoxies, varnishes, etc., will be segregated from recyclables such as steel and wood.
- Common and hazardous solid waste will be collected and transported to the Central Storage, to be later transported and brought to its final disposal by an authorized company.

Primary Storage

- In this stage waste management is carried out by the waste generator and the cleaning personnel. It consists in the generated waste being deposited in the receptacles or buckets for its subsequent internal collection. The objective of primary storage is to appropriately dispose of generated waste, while also differentiating the various types of waste in different containers. All the generators of hospital waste will be responsible for the correct execution of the primary storage.
- Receptacles and garbage cans are needed for primary storage, and should have appropriate colors, volumes and quantities. The primary storage process is aimed at achieving primary segregation of waste in: organic waste, inorganic recyclable waste, and hazardous waste. All receptacles and pans should look distinctive and have colors that allow generators to quickly recognize them.
- For the primary storage of hazardous solid waste, rigid containers such as fiberglass, stainless steel, high-density polyethylene or other rigid materials may be used to avoid the exposure of the waste.
- The primary storage of the waste in each receptacle will only be up to 80% capacity of the bag.
- The waste will remain in the receptacles until the cleaning personnel collect and deliver in the temporary storage for the respective differentiation; after this, the waste will be transported to the Central Storage, according to schedules and collection frequencies of the collection route sheet.

Collection

- This activity is carried out by the personnel in charge of the transfer to Central Storage.
- The established collection route sheets will be strictly followed, as well as the frequencies and schedules of internal collection.
- The operator responsible for the collection of solid waste will be responsible for verifying that the waste is sealed and delivered according to the colors established for its disposal.
- After carrying out the waste collection, the number of bags or receptacles and the operator's name will be registered, the waste being coded for subsequent weighing.

Central Storage

It is an infrastructure where waste from primary storage accumulates and activities prior to final disposal are carried out, such as segregation, characterization and conditioning. The Storage Patio will have the following facilities:

- Office: is the space provided for the administration of documents and logistics.
- Warehouse: space where cleaning products are stored, such as detergents, bleaches, disinfectants, etc., as well as cleaning equipment (brooms, mops, among others).

- Hygienic services and changing rooms
- Changing rooms: exclusively for authorized company staff that operates the Treatment System.
- Spaces dedicated to the segregation and storage of common recoverable and non-recoverable waste and hazardous waste (biomedical, special, and other).

Transportation and Final Disposition

- A company must be hired that transports the solid waste to a sanitary landfill authorized by the corresponding authority.
- The transport is in charge of a waste company, which has the authorizations to transport non-hazardous waste as hazardous waste which is transported considering the following distribution:
 - Recyclable waste: marketing
 - Common waste: sanitary landfill
 - Hazardous waste: safety stuffing, especial landfill for hazardous waste
- Before transport, ESS personnel must be verified that the vehicles are equipped with safety equipment, such as fire extinguishers, first aid kit, toolboxes, etc.
- The companies that perform the final disposal in the landfill must have the proper authorization of the competent authorities and municipalities in their jurisdiction. Currently, waste is disposed in the Clarendon Landfill.

9.4.3 Waste Management Plan

- During construction, domestic wastewater will be generated by workers, for which portable sanitary units will be used, which must be evacuated and discharged by an authorized company, often established according to the need for maintenance. The chemical baths are mainly a autonomous system, which contain sewage connections and special installations, which due to its construction characteristics is portable and totally dismountable.
- For the rental and maintenance of the portable chemical baths, the services of a duly authorized service provider will be contracted, who will have to perform the maintenance service of the portable toilets in the necessary frequency, according to the frequency of use that they give during the constructive maintenance activities. In addition, the service provider will be responsible for the transfer, installation, removal, drainage, cleaning and disinfection of the units. This procedure will mainly consist of emptying the deposit, hygiene and placement of the new unit during the days that are required, and guaranteeing the sanitary conditions.
- Do not allow the dumping of leftovers, such as paints, solvents, additives for concrete, glue, resins and in general, any product that by its quality or composition are necessarily toxic and harmful to the environment. These residues should be stored in cylinders with a lid for subsequent treatment as hazardous waste and their final disposal in the authorized security landfill.

9.4.4 Asbestos Management Plan

Based on the age of the hospitals and preliminary observations during the site reconnaissance Asbestos Containing Building Materials (ACBM) are present in a minimal quantitate by the installations in the three hospitals.

Where asbestos materials are in good condition and unlikely to be disturbed they do not present a risk. However, where the materials are in poor condition or are disturbed or damaged, asbestos fibres may be released into the air. If these fibres are breathed in they can cause serious lung diseases, including cancers. Asbestos is considered hazardous material and should be handled according to local and international regulations.

9.4.4.1 Acceptable Workplace Exposure Limits / Standards

The National Resources Conservation Authority within NEPA has established guidelines for the management of asbestos (February 2014). The NEPA's guidelines was developed to document the Agency's procedures and requirements for the abatement and removal of Asbestos Containing Materials. It is intended to support the Agency's environmental management, and applies to all parties responsible for premises that contain asbestos or are suspected to contain asbestos. The guidelines are also relevant to all contractors recognized by NEPA and approved to safely and professionally abate asbestos.

Table 9.4-1: Acceptable Asbestos Work Exposure Standards

Form of Asbestos	Work Exposure Standards
Chrysotile	An Average concentration over any 4 hour period of 0.1 fibre per millilitre of air
Amosite, crocidolite, fibrous actinolite, fibrous anthophyllite, and fibrous tremolite	An average concentration over any 4 hour period of 0.1 fibres per millilitre of air

Source: (NEPA, 2014)

9.4.4.2 Asbestos Survey for Rehabilitation and / or Demolition Works

Prior to any construction work, an asbestos survey should be conducted at each hospital. The survey to be conducted should be done by an authorized contractor (See Appendix B). The survey must locate and identify all ACBM before any construction work begins at a stated location or on stated equipment at the hospitals. It involves destructive inspection and asbestos disturbance. The survey should determine if the suspected ACBM is friable or non-friable. Samples should be sent to a certified laboratory. The area surveyed must be vacated during the survey and certified 'fit for reoccupation' before people use it again.

9.4.4.3 Asbestos Abatement Work Plan for Each Hospital

The authorized contractor should develop an asbestos abatement work plan tailored to each specific hospital and rehabilitation works and it should contain at a minimum the following items:

- Identification
- Preparation

- Removal
- Decontamination

The contractor in charge of the construction phase will be the responsible of supervise the work of the authorized contractor who will develop the asbestos abatement plan.

9.4.5 Traffic Management Plan

During the construction phase, there will be vehicles that enter and leave the area of rehabilitation and expansion of hospitals, which can cause an impact on vehicular traffic in the surroundings, for which the following measures will be taken:

Liabilities

ESHS department and the construction contractor will be in charge of the Traffic Management Plan Compliance

Prevention Measures

The design of the hospital includes ample parking lots, which include exclusive parking for loading and unloading vehicles, with vehicle accesses duly planned.

Mitigation Measures during Construction

Construction activities may affect the normal traffic pattern around the hospitals. The additional traffic will be caused by vehicles and trucks bringing construction materials (concrete, tools, equipment, workers, etc.). The main activities to be conducted to mitigate the impact are:

- During the construction phase, establish lookouts (especially at peak times) for when heavy machinery maneuvers and / or vehicles inside and outside the project.
- Use of preventive road signs inside and outside the work site.
- Personnel who will be in charge of vehicle ordering and parking control will be hired.
- Carry out road safety campaigns for customers and contractors.
- Mitigate any situation that may alter the development and operating conditions of the road network in the surroundings, allowing fluid access for the users of the project and minimizing the interference in the circulation of vehicles not linked to the hospital's own activity.

Noise and vibration, airborne emissions and contaminants

- A schedule for loading and unloading material will be established
- The transported material will be covered to avoid the emission of dust particles
- The vehicles that works in the construction, will be in perfect condition, and will have preventive and corrective maintenance to reduce gas and noise emissions
- The drivers will be trained in noise prevention, speed control, hydrocarbons spills, and in safety road

9.4.6 Occupational and Community Health and Safety Risk Management Plan

9.4.6.1 Safety Measures

Safety measures including use of warning signs and barricading will be employed to safeguard the working areas. The use of roads within the community will need to be designated with proper signage and a clear footpath that allows for pedestrian traffic will need to be in place. Vehicles will need to be able to use these existing roads while avoiding the project area without much inconvenience to them. Therefore, the active working areas will be fenced from areas to which the public have access.

Specific measures within the community will need to be addressed to ensure community safety for pedestrians and schoolchildren using footpaths on the hospital grounds in order to reach school. A clear footpath on hospital grounds could be created. Fencing measures will need to be taken to keep out community goats that might cause accidents. The security management system is repaired under the principles of planning, organization, management, execution, and control – aimed at identifying, evaluating, and controlling all actions, emissions, and conditions that could affect the health or physical integrity of workers, cause damage to property, interrupt processes or degrade the work environment.

For the various activities for construction phase such as: demolition, earth works, rehabilitation, finish, etc., safe work procedures will be prepared, the workers will be trained, and their compliance will be supervised responsibly. Regarding personal safety equipment, the following will be provided: helmets, eye protectors, hearing protectors, gloves, safety boots, and respirators. If any additional equipment is needed, it will be provided according to the risk and work area of the personnel.

9.4.6.2 Environmental and Safety Training Plans

The contractor staff will attend orientation talks, which will include discussions on environmental issues, Occupational Health and Safety and other plans that are linked to their work. This will be coordinated with each area manager after reviewing the experience and knowledge of the worker, in order to provide adequate training. The company will develop training programs for workers that are mentioned below:

Table 9.4-2: Staff Induction

Groups	Activities
Applicants to work	Short induction on the company's safety policies.
New workers	General induction on safety and on the tasks that they will develop in their work, focusing on safety, first aid, occupational health, environment, etc.
Permanent workers	Periodic update on security issues and on special techniques related to their work. This training should be carried out according to a program, both internally and externally.

New workers will be trained for the correct use of tools and equipment, for compliance with safety procedures and emergency response according to the nature of their work, for the proper use of safety equipment, and on the psychology of human behavior at work. Worker training will be

reinforced through notices, posters, signage, and all possible means, periodically carrying out the respective follow-up.

The Head of Safety of the contractor will statistically record the accidents, the critical works where these occur frequently, their causes and all the details relate to these events, in order to take the measures of prevention and correction, and reinforce the training taking these cases into consideration. Additional training procedures will be developed, as necessary, to reflect the level and type of technical knowledge required for a specific position. The training will include on-the-job training, as well as training through talks and discussions aimed at specific work activities. The level of training will increase within the level of responsibility of the employee, the complexity of the team and the process involved. Some topics to be discussed in the trainings are:

- Occupational Health
- First Aid
- Ergonomics: General guidelines and recommendations.
- Occupational Health and Safety and Environmental Policy
- Environmental aspects: solid waste management, noise control, effluents management, etc.
- Unsafe acts: dangers and risk.
- Report of accidents and incidents.
- Waste Management

9.4.6.3 Measures to Minimize Disruptions on Health Services during Construction and Lessen Burden on Patients and Caregivers

Disruptions to patients and their caregivers shall be minimized on the project site by ensuring that patient service areas are easily accessible through the creation of safe and designated passage areas for patients. In addition, hospital and construction staff need to consider accessibility for patients and caregivers if healthcare services are to be moved to other wards or areas of the city.

If services are to be moved outside of the hospital, this will require a good planning for the MOH and conduct consultations with staff and patients to ensure that concerns and issues are addressed. Transportation may need to be provided for hospital users to transport them to other hospitals, keeping out the grievances mechanism.

Further, construction workers will need to be sensitized when working in areas near patients including the need to ensure that dust and noise provisions are adequately addressed.

It is recommended that all generators and heavy-duty equipment be insulated or placed in enclosures to minimize ambient noise levels.

9.4.7 Emergency Response Management Plan

A Contingency Plan has been established, in order to be prepared for emergencies or unforeseeable situations that could have adverse effects on the environment.

A Contingency Committee will be formed that will be in charge of coordinating the main actions, the human and physical resources to be mobilized in cases of emergencies and will make the basic decisions to be followed before and after the emergency. In cases of higher-level

emergencies that require external participation, the contingency plan considers the following contacts: Police, Fire, and nearby medical centers.

For the application of the Contingency Plan, one must have the necessary means of communication and mobility, and materials such as fire extinguishers, medical kits, safety tapes, absorbent cloths, various tools, personal protective equipment (boots with steel tips, helmets, dust respirators, safety glasses), among others.

The present plan contemplates emergency situations such as the occurrence of earthquakes, fires and spills of hydrocarbons.

9.4.7.1 Hydrocarbon Spills

Hydrocarbon spills are considered potential emergency situations due to any leakage, spill or failure during the use and handling of hydrocarbons (fuels, lubricants and greases) that are used in the construction activities of the hospital. The machinery used in the transport of materials or diverse equipment can have a spill of hydrocarbons in the work zone, for which the following measures should be taken:

Prevention and Minimization of Risks

Operational Control

- The staff and workers will receive training in Hydrocarbon Spill Management.
- Contractors must prove that they have training in spill response.

Engineering Control

- All units will have an anti-spillage kit, for the control of oil spills.
- There will be a preventive maintenance plan for all vehicles and equipment.

Response Procedure

- Stop the leak from the source if possible. Remove any material that may catch fire.
- Dike, use sandbags, sausages, absorbent cloths or other measures to prevent their expansion, select the appropriate one according to the degree of the spill and immediate availability.
- Divert the spill to avoid contact with water courses that may be found near the spill site.
- Clean the spill by removing the contaminated soil manually by using lamps, which will be removed and collected in special cylinders located in isolated areas and properly marked. This waste is considered hazardous and must be transported by a vehicle from an authorized company to a safety landfill.
- Use hydrocarbon absorbers and remove contaminated soil.
- If the spill affected any body of water, the hydrocarbon must be removed from the surface, with absorbent in bulk, cloths, and sausages.
- The absorbers and EPP with hydrocarbons must be bagged, sealed and transferred to the temporary solid waste storage.

Operations Normalization

- After the removal of the spilled material and the cleaning of the affected areas, the site will be inspected to assess the need to carry out repair actions, change equipment, etc.
- If repair actions are required, normal activities in said area will be paralyzed until the end of the repair actions, after which it will be notified for normal operation.

Training and Follow-up

- The personnel in charge of fuel operations and the driving personnel will be trained periodically, in terms of techniques, response procedures, etc.
- Waste such as contaminated soils, absorbent cloths, PPE, among others used to act against spills, should be transferred to the transitory area for temporary storage until their departure with a company authorized to the Security Landfill.
- The person responsible for the spill fills the Contaminated Soil Report Format when leaving the floor in the transitory zone tiles.
- Make the report within 48 hours of the spill, where you must detail the root cause of the spill and action plans to prevent it from happening again.
- The income of the Report will be monitored.
- Verify that all the hazardous waste generated in the activity of cleaning and pick up of the spill is transferred to the Solid Waste Storage Yard for its later evacuation to the Landfill.

9.4.8 Monitoring and ESHS Supervision

9.4.8.1 Responsibilities

- The ESHS report will be done by the contractor, and must be presented to the ESHS chief of each hospital.
- The ESHS chief of each hospital will send the report to BID

9.4.8.2 Objectives

Establish the necessary actions to monitor the implementation and the degree of effectiveness of each of the measures designed by the Environmental and Social Management Plan.

9.4.8.3 Construction Phase

During the construction phase, 4 monitoring measures have been designed to evaluate the implementation of management measures and their degree of effectiveness. The following table presents the relationship of follow-up measures.

Table 9.4-3: Follow-up Measures during Construction Phase

Management Measure	Monitoring or Follow-up Measure
Waste Management	Waste management follow-up
Solid Waste Management	Monitoring of solid waste managing
Occupational Health and Safety Measures	Monitoring of occupational health and safety management
Rainfall and Effluent Management Measures	Monitoring of rain and effluent management
This Stakeholder Engagement Plan (SEP)	Monitoring of SEP

9.4.8.4 Waste Management Follow-up

To verify compliance with the environmental management measure aimed at the management of the clearing, proceed as follows:

- Compliance Indicator:
 - A record of the amount of material transferred to the authorized sanitary landfill will be kept.
 - Register of cisterns used for the moistening.
- Period
 - Monthly during construction
 - A record of the amount of water used for wetting every month will be kept
- Committed Limit
 - Achieve that the clearing is taken to an adequate final disposition and that it does not generate particulate material

9.4.8.5 Monitoring of Solid Waste Management

- Compliance Indicator:
 - Solid Waste Management Declaration
 - Manifests of hazardous solid waste
- Period
 - The solid waste management declaration will be annual but the management registration is monthly.
 - Solid waste manifests must be requested each time the final disposal of hazardous waste must be made
- Committed Limit
 - Solid waste will be properly segregated and must have an adequate final disposition according to its classification.

9.4.8.6 Monitoring of Occupational Health and Safety Management

- Compliance Indicator:
 - Occupational health controls of the personnel;
 - Inductions and Training
 - Safety Inspections
 - Reports of incidents or occupational accidents
 - Reports of environmental incidents or accidents.
- Period
 - The occupational health control will be carried out annually
 - Inductions will be carried out every time a new worker enters to work
 - Training will be carried out once a month
 - Safety inspections will be carried out on a daily basis
- Committed Limit
 - All personnel in charge of the operation will comply with their occupational health assessments.
- Reports to the Authority

- In case of incidents or occupational or environmental accidents, the report will be sent to the corresponding authority. Health reports will be archived and will be available at the request of the authority.

9.4.8.7 Monitoring of Rain and Effluent Management

- Compliance Indicator:
 - Monitoring of the effluent to be discharged to the body of water
- Period:
 - Monthly
- Committed Limit
 - Comply with current regulations.

9.4.8.8 Monitoring of Social Management

- Compliance Indicator:
 - Grievances reports
 - Grievances attended
 - Reports of social conflict.
- Period
 - The social management will be carried out daily
- Committed Limit
 - 100 % of grievances attended.

9.4.9 Monitoring and Supervision ESHS Compliance Report

Responsibilities

- The ESHS report will be done by the contractor, and must be presented to the ESHS chief of each hospital.
- The ESHS chief of each hospital will send the report to BID

Frequency

- The ESHS report will be done by the contractor, and must be presented to the ESHS chief of each hospital every month.
- The ESHS chief of each hospital will send the report to BID each semiannual (each 6 month)

Indicators

- Monitoring of the effluent to be discharged to the body of water
- Occupational health controls of the personnel;
- Inductions and Training
- Safety Inspections
- Reports of incidents or occupational accidents
- Reports of environmental incidents or accidents.
- Solid Waste Management Declaration
- Manifests of hazardous solid waste
- A record of the amount of material transferred to the authorized sanitary landfill will be kept.

- Register of cisterns used for the moistening.

Report

The ESHS compliance report will contain the results of the management. It must contain at least the following:

- Reach
- Period
- Trainings
- Inspections
- Statistics of accidents and incidents
- Summaries of indicator compliances for each ESHS specific plan.
- Photographic Panel
- Annex

9.5 Operation Phase

9.5.1 Solid and Hazardous Waste

The hospitals in question generate the following types of solid waste during operation:

- Common household waste (organic)
- Recyclable common waste: packaging, bottles, paper, cardboard
- Sweeping or cleaning residues
- Food remains
- Medical waste: bio-contaminated and special waste, sharp waste and other hazardous waste. The medical waste management plan is presented separately.
- The management of solid waste during the operation will be carried out in the following steps:

Minimization

- The following measures must be enforced to reduce the production of the waste detailed above:
 - Separate and classify mixtures of various types of waste with unknown compositions to ensure their proper disposal.
 - Be aware that the use of materials and products that generate hazardous waste could be substituted by less polluting materials.
 - Avoid the generation of odors from decomposing organic components.
 - Obtain agreements for the return of containers and packaging to the suppliers.
 - Train personnel in waste minimization.

Conditioning

- Select the types of containers or bins and determine the quantity to be used for each generator or service area, while considering capacity, form and material of manufacture.
- Determine the quantity, color and capacity of the bags (must be at least 20% greater than the capacity of the container) to be used according to the type of waste.
- Avoid bagging organic residues (food remains) containing liquids.

- The personnel in charge of the cleaning will place the containers with their respective bags in the generation points and service areas of the hospital.
- Strategically place containers as close as possible to the generation source.
- Verify the fulfillment of the conditioning according to the type and volume of waste generated by the service.
- The bags containing solid waste, conditioned by the waste generators, must be hermetically sealed before they are deposited in the corresponding containers.
- The tanks for the deposit of the waste must be differentiated and labeled according to the type of waste that belongs in them and must be located in strategic and visible places.
- It should be noted that classified waste could potentially be generated as special hazardous (batteries, toner cartridges, ink, fluorescents, spotlights) which will be stored in labeled cylinders that specify the waste.

Primary Storage

- In this stage waste management is carried out by the waste generator and the cleaning personnel. It consists in the generated waste being deposited in the receptacles or buckets for its subsequent internal collection. The objective of primary storage is to appropriately dispose of generated waste, while also differentiating the various types of waste in different containers. All the generators of hospital waste will be responsible for the correct execution of the primary storage.
- Receptacles and garbage cans are needed for primary storage, and should have appropriate colors, volumes and quantities. The primary storage process is aimed at achieving primary segregation of waste in: organic waste, inorganic recyclable waste, and hazardous waste. All receptacles and pans should look distinctive and have colors that allow generators to quickly recognize them.
- For the primary storage of hazardous solid waste, rigid containers such as fiberglass, stainless steel, high density polyethylene or other rigid materials may be used to avoid the exposure of the waste.
- The primary storage of the waste in each receptacle will only be up to 80% capacity of the bag.
- The waste will remain in the receptacles until the cleaning personnel collect and deliver in the temporary storage for the respective differentiation; after this, the waste will be transported to the Central Storage, according to schedules and collection frequencies of the collection route sheet.

Collection

- This activity is carried out by the personnel in charge of the transfer to Central Storage.
- The established collection route sheets will be strictly followed, as well as the frequencies and schedules of internal collection.
- The operator responsible for the collection of solid waste will be responsible for verifying that the waste is sealed and delivered according to the colors established for its disposal.
- After carrying out the waste collection, the number of bags or receptacles and the operator's name will be registered, the waste being coded for subsequent weighing.

Central Storage

It is an infrastructure where waste from primary storage accumulates and activities prior to final disposal are carried out, such as segregation, characterization and conditioning. The Storage Patio will have the following facilities:

- Office, is the space provided for the administration of documents and logistics.
- Warehouse, space where cleaning products are stored, such as detergents, bleaches, disinfectants, etc., as well as cleaning equipment (brooms, mops, among others).
- Hygienic services and changing rooms
- Changing rooms, exclusively for authorized company staff that operates the Treatment System.
- Spaces dedicated to the segregation and storage of common recoverable and non-recoverable waste and hazardous waste (biomedical, special, and other).

Final Disposition

- A company must be hired that transports the solid waste to a sanitary landfill authorized by the corresponding authority.
- The transport is in charge of a waste company, which has the authorizations to transport non-hazardous waste as hazardous waste which is transported considering the following distribution:
 - Recyclable waste: marketing
 - Common waste: sanitary landfill
 - Hazardous waste: safety stuffing
- Before transport, ESS personnel must be verified that the vehicles are equipped with safety equipment, such as fire extinguishers, first aid kit, toolboxes, etc.
- The companies that perform the final disposal in the landfill must have the proper authorization of the competent authorities and municipalities in their jurisdiction. Currently, waste is disposed in the Clarendon Landfill.

9.5.2 Medical Waste Management and Disposal Plan

In the hospitals, medical waste and special waste will be generated during the operation of the facilities. Medical waste is hazardous waste generated in the process of medical care. Furthermore, it is contaminated with infectious agents, or may contain concentrations of microorganisms that are potentially dangerous for the person who comes in contact with them.

The following list contains the anticipated medical waste to be generated at each hospital:

- Patient care: solid waste contaminated or in contact with secretions, excretions and other organic liquids from patient care, including the remains of food and drinks from them. It includes the residues of parenteral and whole nutrition and the disposable medical instruments used.
- Biological: composed by cultures, inocula, biological samples, mixtures of microorganisms and inoculated culture media from the clinical or research laboratory, expired or unused vaccines, filter of air aspirators of areas contaminated by infectious agents and any residue contaminated by biological agents. It also includes expired, damaged, or used biological products, which were discharged according to current administrative procedures.

- Bags containing human blood and blood products: materials or bags with human blood content, blood samples for analysis, serum, plasma and other byproducts or blood products, both expired or used.
- Surgical and Anatomical-Pathological Residues: Composed of tissues, organs, placentas, anatomical parts or remains of dead fetuses. These result from medical and surgical procedures and solid waste contaminated with blood or others.
- Sharp points: these include hypodermic needles, with or without syringes, pipettes, scalpels, lancets, culture plates, suture needles, and needle catheters, other objects of broken or whole glasses or short sharp objects thrown away, as well as bottles of ampoules.

Special waste is hazardous waste generated in the Support Medical Services, with physical and chemical characteristics that can be corrosive, flammable, toxic, explosive or reactive and of potential danger to an exposed person. Special waste can be classified as follows:

- Hazardous Chemical Residues: with toxic, corrosive, flammable, explosive, reactive, genotoxic or mutagenic characteristics, such as pharmaceutical products (chemotherapeutic), chemical products not used, solvents, acids and strong bases, chromic acid (used in cleaning laboratory glasses), mercury thermometers, solutions for development of x-rays, used lubricating oils, containers with petroleum products, toner, batteries, among others.
- Pharmaceutical waste: partially used, deteriorated, expired, contaminated or generated as a result of medical care and research.
- Radioactive waste: composed of radioactive materials or contaminated with radioisotopes.

For a successful waste management system, a systemic approach needs to be adopted both within and outside the facilities. These activities include the following:

- Segregation of waste at source and primary storage
- Effective sharp management
- Collection and internal transportation of waste
- Appropriate technologies for waste management (to be determined by UNOPS)
- Occupational safety and infection control
- Off-site facilities for transportation, final treatment and disposal of infectious waste

Segregation and Primary Storage

- Segregation consists of separation (classification) at the point of generation, according to its type (bio contaminated and special) in the corresponding container that is differentiated by colors; red (bio contaminated) and yellow (special).
- Clearly designated waste storage area. The storage well must be well ventilated
- There must be containers placed in areas where medical, special and sharp waste will be generated.
- The containers must have the following characteristics: surgical steel material and / or seamless high density polyethylene, with a thickness of no less than 2 mm, funnel-shaped, inverted, red, and yellow with an international symbol with a lid; a half moon or pedal, resistant to perforations and filtrations, material that prevents bacterial growth, with a mechanism that makes it impossible to spill its contents for the best sanitary risk control, and it must also be washable. The containers located in the identified areas will have a capacity of approximately 30 L.

- The containers will contain red high density polyethylene bags for bio contaminated waste, and yellow for special waste.
- Puncture-cutting waste containers must be rigid, waterproof, and resistant to transfer to the cutting material with a capacity of 0.5 to 20 liters with the lid on, which seals to prevent spills, and it must be properly labeled.
- Effective sharp management

Good sharps management practices help in reducing infections. HIV or hepatitis transmission through contaminated blood has triggered improvement in sharps safety and management. No studies are available on the percentage of HIV contamination from poor management of medical waste. There is the danger that syringes will be recovered from transfer depots and disposal sites by waste pickers for recycling (i.e., by drug users)

- Disinfection
- Effective needle destruction or mutilation (e.g., use mechanical or electrical needle cutters)
- Proper training of health providers

Collection and Internal Transportation of Waste

- Establish frequency for waste pick-up. The current frequency of waste collection may need to be adjusted as the rehabilitated hospitals will serve more patients.
- Those responsible for the collection will be established and the routes will be enabled, and internal / external signage will be implemented.
- The vehicle container must have an articulated lid on the body and rotating wheels.
- The use of the forklift must comply with the hours stipulated for the collection, then it must be disinfected.
- All cleaning personnel who use the vehicle should check the cleanliness of the container after the transfer of solid waste.
- Obtain vehicles with a capacity of 200 liters, high density polyethylene material, washable, smooth internal surfaces, with blunt edges and equipped with an articulated lid. Thickness: no less than 7mm. Form: variable. Requirement: car type with wheels of rotating type, stable, hermetic cover, waterproof, washable and light color.
- The solid waste transfer vehicles of the hospital will not be used for any other purpose.
- Hospital staff must have received mandatory Biosecurity and hospital solid waste management training.
- The cleaning staff should have long-sleeved jackets, long pants and caps that are all made of resistant materials and light colors. Additionally, industrial PVC gloves impervious and resistant to corrosive substances, as well as shoes that are impermeable to corrosive substances or light-colored cut boots. White, semifacial and waterproof masks that allow natural breathing, colorless panoramic lenses with resistant plastics, flexible plastic frames and side protection and a valve for ventilation.

Occupational safety

Occupational safety measures are important for safeguarding the health of health-care workers and others collecting and treating waste, along with the added advantages of ensuring infection

control and patient safety. Health care workers at the three hospitals should be trained in the following:

- Infectious agents
- Chemical hazards
- Physical hazards
- Prevention controls
- Work stress

Transportation and Final Disposal of Waste

- For some waste at the hospital, incineration is used as a treatment process. In May Pen Hospital hazardous waste is burned onsite, so the incineration equipment will be repaired. In St. Ann's Bay hospital, the incinerator is functional, but need repair and maintenance. In Spanish Town Hospital, there is no incinerator.
- The rest of the bio contaminated solid waste is evacuated by an authorized company, which renders its services on a daily basis at the established time, and is in charge of the treatment of the aforementioned waste currently, waste is disposed in the Clarendon Landfill.
- The characteristics of the transport vehicle should be the following: the model is a van type with internal coating with the presence of stainless steel or other washable material, it is used exclusively for that type of service, and it is duly identified.
- The personnel in charge of external transportation are wearing the corresponding clothing and accessories (cap, mask, gloves, and boots).
- The external transport of waste is duly coordinated, programmed, and executed according to the established contract.

9.5.3 Wastewater Management Plan

The effluents generated in the hospital's operations consist mainly of storm water runoff from the paved surfaces and from the sanitary wastewater from the services for the public and employees.

The strategies to prevent and control the impact of storm water runoff rainwater are:

- Implementation of sand filters or other best management practices (BMP) to minimize pollutants generally present in storm water runoff,
- Implementation of a pollution prevention plan at each hospital.

The strategies to control domestic discharges are:

- Installation of a domestic wastewater treatment plant on site to treat the domestic effluent prior to discharge. The design should take into account the added population to be served by each hospital.

9.5.4 Grievance Mechanism and Public Consultations

With the aim of establishing and maintaining a harmonious relationship between the stakeholders and the Project, the Claims and Complaints Absolution Program will be implemented, whose general objective is to create a system that allows timely response to complaints from residents who are perceived to be affected or harmed by any aspect of the Project.

The objectives are the following:

- Ensure a fair and rapid response by the representatives of the Project to the questions, concerns and / or complaints of the stakeholders, so that they do not become negative impacts;
- Provide alternative methods to solve potential complaints in substitution of legal actions between the parties;
- Properly document complaints and claims, elaborating respective formats for each stage of the process; and
- Build a process of mutual trust with local and regional groups of interest.

9.5.5 Occupational and Community Health and Safety Risk Management Plan

9.5.5.1 Environmental and Safety Training Plans

Each hospital must develop a comprehensive training program on a daily, weekly and annual basis, emphasizing technical training and safety, with a focus on the development of skills and behavior. These programs will be developed taking into account the following provisions:

- New workers will receive induction or general orientation training of no less than 8 hours.
- The adequate training for the job will consist of the theoretical-practical learning of how to correctly, quickly, conscientiously, and safely complete tasks.

The Training Program is designed for all operators, workers and leaders of areas. The program covers the topics of safety, environment, and communities which will be touched on during daily talks and trainings. The topics that should be included in the program are:

- Occupational Health: following the risk analysis in Occupational Health based on the activities developed by the collaborators, training the personnel a proactive attitude in the prevention of occupational diseases
- First Aid
- Cardiopulmonary resuscitation (theoretical-practical).
- Ergonomics: General guidelines and recommendations.
- Occupational Health and Safety Policy, Environmental
- Environmental aspects: noise, solid waste management, effluent management, water saving
- Unsafe acts: dangers and risk.
- Report of accidents and incidents.
- Waste Management

The permanent training of personnel in terms of environment, safety and occupational health, and emergency response is an essential element for compliance with the Environmental Management Plan. The guidelines will be the basis for the development and implementation of specific training programs based on the number of personnel, training level and requirements of each job.

Training for Brigade

During an emergency, there are many difficulties, situations and circumstances (foreseen and unforeseen) that demand effort and knowledge of the personnel. But the human lives that are in danger and that need help are the priority, which is why personnel will be trained to know what to

do in these situations, and how to immobilize and transfer wounded patients. The staff of the brigade will receive training in first aid and firefighting, carrying out practices with equipment available to the rescue station. The training will be aimed at the entire hospital community, who does not necessarily have previous knowledge related to the subject.

Emergency Plan and Transfer of Wounded

- Emergency Plan
- Injuries
- Transfer of Poly traumatized Patients
- Practical Patient Immobilization and Transfer Station

Fire Fighting

The purpose of this training is to provide basic knowledge in the fight against fire, handling and use of fire extinguishers. The related topics are:

- Presentation
- Fire behavior
- Methods of Extinction
- Fire Extinguishing Agents
- Theoretical Evaluation
- Practice Station
- Cardiopulmonary resuscitation (CPR)

Basic Life Support and Early Defibrillation

- Presentation
- Sudden death
- Cardiopulmonary resuscitation
- Automatic External Defibrillation (AED)
- Practice CPR station and use of DEA
- Theoretical Evaluation

Drills

Within the activities of the emergency committee, the head of hospital security will be responsible for approving the "Programming of Drills," referring to the response to environmental impact emergencies, in order to verify the effectiveness of the response procedures.

- Training for rescue personnel
- The rescue personnel must be trained in the following subjects:
- Familiarization with the hospital
- Emergency Communications Systems
- Equipment and tools
- Extinguishing agents and combustion chemistry
- Assistance for emergency evacuation
- Clothing and respiratory protection equipment
- Adaptation and use of structural equipment for the rescue and extinction of fires

- Firefighting operations
- Emergency Plan
- Basic life support and CPR
- All rescue personnel participate in supervised practices related to the tasks to be performed during an emergency, under supervision:
 - Immobilization and transportation of the injured.
 - Defibrillator operation
 - Control of leaks and spills of hazardous materials

9.5.5.2 Control of Occupational Hazards

This subprogram contains guidelines to ensure that there are no safety problems that put the workers at risk during the execution of the activities. Its purpose is to establish the methodology for the identification of hazards, assessment of occupational risks and determination control measures for activities that present significant risks, in order to reduce these risks to acceptable levels for the organization.

The identification of hazards, evaluation and control of risks will be updated at least once a year or when the working conditions change or any damage to the health or safety of the worker have been evidenced. To identify the greatest number of hazards in their activities, those responsible for each area will consider the dangers resulting from:

- The design of work areas, processes, facilities, machinery / equipment, operating procedures and work organization, including their adaptation to human capabilities.
- Routine, non-routine and emergency activities.
- Human behavior and capabilities, as well as other human factors.
- Identified dangers that originate outside the workplace and are performing functions under the control of the organization, capable of affecting the health and safety of people.
- Infrastructure, equipment and materials in the workplace, whether provided by the organization or by others.
- Changes or proposals for change in the organization, its activities or materials.
- Modifications to the management system, including temporary changes.
- Any applicable legal obligation related to the risk assessment and the implementation of the necessary controls.
- Additionally, the following will be taken into account in the risk assessment:
 - The risk factors that may affect the functions of procreation of workers.
 - The focus on gender and protection of women workers.

After assessing the risks of each activity, the work team will suggest the control measures for those hazards that reached the "high" risk level. To control risks, regulations should be proposed taking into account the following hierarchy:

- Elimination of the Danger: modify the design to eliminate the danger; for example, introduce mechanical lifting devices to eliminate the danger of manual loading, etc.
- Substitution of the Danger: replace with a less dangerous material or reduce the energy of the system; for example, reduce force, amperage, pressure, temperature, etc.
- Engineering controls: use of new technologies; for example, install ventilation systems, machine guards, gears, soundproof booths, etc.

- Signaling / warnings and / or administrative controls: Its effectiveness depends on human decisions; for example, safety procedures, equipment inspection, safety signs, dangerous area marking, photo luminous signs, markings for pedestrian paths, sirens / alarm lights, alarms, access controls, safe work systems, work permits and labeling, etc.
- Personal protective equipment: as a final control measure, PPE will be delivered to workers; for example, safety glasses, hearing protectors, face shields, harnesses and safety slings, respirators and gloves, etc.

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9.5.5.3 Internal Inspections

Inspection is one of the main tools that helps to identify the acts and / or substandard conditions in the work areas, with the aim of correcting and improving working conditions; for this, different types of inspections are available:

- Planned: those that are carried out through work schedules.
- Unforeseen: those that can be done at any time of the day without prior notice.

Of the inspections, the following can be mentioned:

- Planned and unexpected inspections: carried out at the facilities by the people in charge of each area. These are detailed in the "Annual Occupational Health and Safety Program".
- Inspections to emergency response teams: made to fire extinguishers, fire hoses, smoke detectors, emergency lights, among others; for the Airport Security area with the support of the SEI Firefighters. These are detailed in the "Annual Occupational Health and Safety Program."
- Unplanned inspections: carried out in the environments where the personnel, contractors, etc. work.

9.5.6 Emergency Response Management Plan

A Contingency Plan has been established, in order to be prepared for emergencies or unforeseeable situations that could have adverse effects on the environment.

A Contingency Committee will be formed that will be in charge of coordinating the main actions, the human and physical resources to be mobilized in cases of emergencies, and will make the basic decisions to be followed before and after the emergency. In cases of higher-level emergencies that require external participation, the contingency plan considers the following contacts: Police, Fire, and nearby medical centers.

For the application of the Contingency Plan, one must have the necessary means of communication and mobility, and materials such as fire extinguishers, medical kits, safety tapes, absorbent cloths, various tools, personal protective equipment (boots with steel tips, helmets, dust respirators, safety glasses), among others.

The present plan contemplates emergency situations such as the occurrence of earthquakes, fires and spills of hydrocarbons.

9.5.6.1 Fire

Prevention and Minimization of Risks

Operational Control

- Form an emergency committee, which is properly trained to act in case of fire.

- Avoid the accumulation of garbage deposits in the vicinity of combustible and flammable materials.
- If incipient fire is suspected, act quickly using the extinguishers that will be located in a visible place.
- Flammable liquids must be kept away from sources of combustion.
- The critical areas must have a complete signaling system according to the current regulations, making use of the color code and signals.
- Part of the training of the personnel that enters to work will be the correct use of extinguishers, fire alarms, and for specific cases -according to type of work or work-, activation of hoses, pumps or foam system.
- All the installations will have the plans of evacuation in case of fires published in a visible place, indicating the location of extinguishers and alarms.
- The escape routes of all the facilities will be properly signaled.
- All personnel will be responsible for eliminating, controlling and informing the head of the corresponding area about the conditions and / or actions that may cause a fire situation.
- The initiation of open fires in the entire area of operations of the mine or its surroundings shall be prohibited.
- The personnel that enters the different facilities must be instructed in the accesses and / or exits, as well as in the evacuation routes.

Engineering Control

- Have engineering designs that contemplate the safety standards necessary to avoid the occurrence of short circuits, cable crossing or any other similar event that could cause a fire event.
- All the areas (treatment plant, machine yard, warehouses, etc.) will have devices in case of fire according to the activities that are carried out in those areas (extinguishers, hoses network and water tanks).
- All zones will have an immediate alarm system.

Response Procedure

- Before the occurrence of fires, the brigades of the zone will request the evacuation of the involved area and will look to identify the point of origin of the fire to control it with the emergency teams.
- Proceed to extinguish the fire with the use of fire extinguishers.
- If the fire cannot be extinguished, alarm systems will be activated to request help from other groups and the firefighting team, indicating the location, personnel affected-if any-and evacuation procedures that are being carried out.
- Communicate with the emergency committee.
- If the fire cannot be controlled or the help is not sufficient, it will be notified by means of radios, flashes of lights and personal notices indicating the location of the fire and the escape route(s) to be taken.
- If necessary, as required by the firefighting team, external support will be requested.
- Inventory and registration of the personnel that has been evacuated will be carried out to identify possible victims. Likewise, the first medical attention will be given in safe places and according to this; its referral to specialized institutions will be evaluated.

Operations Normalization

- Once the fire is controlled and extinguished, the trained personnel will evaluate the situation to authorize the entry of rescue personnel and to estimate the damages.
- Once all the areas involved have been evacuated and inspected, access will be restricted and the necessary cleaning, restoration and reconstruction procedures will be activated.
- The causes of the fire will be investigated and corrective measures will be proposed.

Training and Follow-up

- All personnel entering the hospital will be trained in extinguisher management, evacuation routes and fire response procedures.
- Training in first aid and personal protection in case of fire will be given every six months.
- The firefighting team will carry out periodic drills.

9.5.6.2 Seismic Hazards

The prevention measures against probable seismic movements will be the following:

- A week before starting the activities and whenever considered necessary, discussions will be held, which will serve to indicate the measures before, during and after an earthquake.
- Establish security zones in the area of activity of the project.
- Carry out simulations to deal with seismic movements through the committee or emergency brigade, which must have the corresponding training.

The actions that must be followed during the occurrence of seismic movements must consist of:

- Move away from demolition or construction areas during movement.
- Evacuate towards the established safety zone.
- Stay calm.

After the occurrence of a seismic movement, the following activities must be carried out:

- Personnel accountability.
- Search and identification of accident victims.
- If there were injuries, call fire department immediately, or request ambulances if necessary.
- The injured must receive the necessary first aid before the arrival of specialized assistance, by the emergency committee.
- Assessment of damage to equipment and the environment.

9.5.7 Traffic Management Plan

During the operation, there will be an increase in vehicular traffic due to the entrance of patients and providers to hospitals, the following measures will be taken:

- There will be adequate road signs in the external and internal part of the hospital.
- Each hospital has personnel who will be in charge of vehicle ordering and parking control.
- It is recommended to carry out road safety campaigns for customers and contractors.

- Mitigate any situation that may alter the development and operating conditions of the road network in the surroundings, allowing fluid access for the users of the project and minimizing the interference in the circulation of vehicles not linked to the hospital's own activity.

Liabilities

ESHS department will be in charge of the Traffic Management Plan Compliance

Prevention Measures

The design of the hospital includes ample parking lots, which include exclusive parking for loading and unloading vehicles, with vehicle accesses duly planned.

Mitigation Measures during Operation

The main activities to be conducted to mitigate the impact are:

- Use of preventive road signs inside and outside the work site.
- Personnel who will be in charge of vehicle ordering and parking control will be hired.
- Carry out road safety campaigns for customers and contractors.
- Mitigate any situation that may alter the development and operating conditions of the road network in the surroundings, allowing fluid access for the users of the project and minimizing the interference in the circulation of vehicles not linked to the hospital's own activity.

Noise and vibration, airborne emissions and contaminants

- Safety road campaigns will be done
- All hospitals providers will have the maintenance certification
- The drivers will be trained in noise prevention, speed control, hydrocarbons spills, and in safety road

9.5.8 Wastewater Management Plan

The effluents generated in the hospital's operations consist mainly of storm water runoff from the paved surfaces, and from the sanitary wastewater from the services for the public and employees. Once the final plans have been completed for each hospital, a wastewater management plan should be developed. The plan should include storm water and effluent discharge management.

- The strategies to prevent and control the impact of rainwater and wastewater are:
 - Sewer storm water channeled through gutters and channels;
 - The draining system will be improved for reduce potential flooding.
 - Frequent cleaning and maintenance of the sewer system;
 - Domestic wastewater collected and discharged into the sewer system.

9.6 Monitoring and ESHS Supervision

9.6.1 Objectives

Establish the necessary actions to monitor the implementation and the degree of effectiveness of each of the measures designed by the Environmental and social Management Plan.

9.6.2 Operations Phase

As in the construction phase, during the operation 4 environmental and social monitoring measures have been designed, which allow the implementation of the measures contemplated in the plan to be evaluated. The following table presents the list of monitoring measures that will be used to evaluate the implementation and effectiveness of environmental and social management measures during the operation.

Table 9.6-1: Environmental Monitoring Measures

Management Measure	Monitoring or Follow-up Measure
Solid Waste Management	Monitoring of solid waste managing
Occupational Health and Safety Measures	Monitoring of occupational health and safety management
Rainfall and Effluent Management Measures	Monitoring of rain and effluent management
Stakeholder Engagement Plan	Monitoring of SEP

9.6.3 Monitoring of Solid Waste Management

- Compliance Indicator:
 - Solid Waste Management Declaration
 - Manifests of hazardous solid waste
- Period
 - The solid waste management declaration will be annual
 - Solid waste manifests must be requested each time the final disposal of hazardous waste must be made
- Committed Limit
 - Solid waste will be properly segregated and must have an adequate final disposition according to its classification.

9.6.4 Monitoring of Occupational Health and Safety Management

- Compliance Indicator:
 - Annual reports of occupational health controls of the personnel;
 - Reports of incidents or occupational accidents
 - Reports of environmental incidents or accidents.
- Period
 - The occupational health control will be carried out annually

- Safety and environmental inspections will be carried out on a daily basis
- Committed Limit
 - All personnel in charge of the operation will comply with their occupational health assessments.
- Reports to the Authority
 - In case of incidents or occupational or environmental accidents, the report will be sent to the corresponding authority. Health reports will be archived and will be available at the request of the authority.

9.6.5 Monitoring of Rain and Effluent Management

- Compliance Indicator:
 - Channels maintenance
- Period:
 - Monthly

9.6.6 Monitoring of social management

- Compliance Indicator:
 - Grievances reports
 - Grievances attended
 - Reports of social conflict
- Period
 - The social management will be carried out daily
- Committed Limit
 - 100% of grievances attended.

9.7 Monitoring and Supervision ESHS Report

Responsibilities

- The ESHS report will be done by the ESHS chief of each hospital.
- The ESHS chief of each hospital will send the report to BID

Frequency

- The ESHS report must be presented to the ESHS chief of each hospital every month.
- The ESHS chief of each hospital will send the report to BID each semiannual (each 6 month)

Indicators

- Monitoring of the effluent to be discharged to the body of water
- Occupational health controls of the personnel;
- Inductions and Training
- Safety Inspections
- Reports of incidents or occupational accidents
- Reports of environmental incidents or accidents.
- Solid Waste Management Declaration

- Manifests of hazardous solid waste
- A record of the amount of material transferred to the authorized sanitary landfill will be kept.
- Register of cisterns used for the moistening.

Report

The ESHS compliance report will contain the results of the management. It must contain at least the following:

- Reach
- Period
- Trainings
- Inspections
- Statistics of accidents and incidents
- Summaries of indicator compliances for each ESHS specific plan.
- Photographic Panel
- Annex

9.8 Stakeholder Engagement Plan

This Stakeholder Engagement Plan (SEP) describes procedures for interactions with Project stakeholders during the construction and operation phases, with particular focus on project affected parties. The SEP also outlines a third-party grievance mechanism to allow stakeholders bringing questions and concerns to the attention of the Project. The SEP is designed to promote Project objectives in stakeholder engagement (i) by providing good public information, (ii) effectively communicating with all stakeholders, (iii) developing positive relationships with local communities and other interested parties.

The SEP is a 'living document' which will be periodically updated by the Ministry of Health (MOH) to summarize results achieved including (i) recording consultations undertaken, issues raised, and actions taken; (ii) updating to describe lessons learned and any changes to the consultation process; and (iii) updating the stakeholder group list and outline the schedule for on- going and future interactions.

This Stakeholder Engagement Plan is designed to ensure effective engagement with local communities and other key stakeholders during the construction phase of the hospitals in May Pen, St. Ann's Bay, and Spanish Town.

The MOH is committed to continuous consultation throughout the construction phase. The MOH will be responsible for implementing decisions that impact consultation activities and proposed decisions for implementation to ensure that any impacts and mitigation measures will be agreed and implemented.

9.8.1 Purpose and Objectives

The purpose of the SEP is to establish and maintain a constructive, inclusive, and meaningful relationship with all affected people by the Project in order to obtain broad support. The objectives of stakeholder engagement are:

- To ensure timely provision of relevant and understandable information;
- To create a process that provides opportunities for stakeholders to express their views, concerns, and complaints and allow the MOH to respond to them;
- Maintain awareness of safety and environmental issues among communities in the vicinity of Project;
- Manage and monitor the effectiveness of any corrective actions implemented as a result of stakeholder concerns or complaints during Project activities;
- Manage and report on the closing of stakeholder concerns and complaints.
- Stakeholder engagement will include an on-going communication process based on:
- Public disclosure of appropriate information so as to enable meaningful, accessible, and continues communication to consultation with stakeholders;
- Meaningful consultations with potentially affected parties;
- A procedure by which people can make comments or complaints.

9.8.2 Stakeholder Identification and Analysis

In order to develop a public information and consultation strategy, the MOH will identify and directly engage relevant stakeholders before starting of construction activities.

Project stakeholders are the various individuals, groups or communities who:

- Will be affected or are likely to be affected, positively or negatively, and directly or indirectly by the Project (“Project Affected Parties”, PAPs), particularly those directly and adversely affected by Project activities, including those who are disadvantaged or vulnerable; or
- May have an interest in the Project and/or the ability to influence its outcomes, either positively or negatively (“other influential/interested groups”).

The MOH will identify and directly engage several groups of stakeholders, to develop a continuous public information, consultation and communication strategy. It will organize detailed stakeholder identification analysis that specifies and enumerates which groups are the most affected by the Project, how, and to what degree. The proponent will map the key components, as follows:

- Project activities, both on site and the surrounding area, that may result in local environmental or social impacts;
- Directly affected, indirectly affected, and vulnerable groups in the impacted zones.

With RINA’s support, the MOH has conducted a preliminary stakeholder mapping, and verified the analysis through direct consultation with stakeholders or credible and trustworthy representatives. The outcomes of this process will need to be collected in a Stakeholder Register, which will be continuously updated. Although the Project does not foresee any construction outside of the hospital grounds, the ESA has assessed there may be potential economic displacement to food vendors. This is a stakeholder group that will need to be engaged. Table below gives an overview of the main Project stakeholders. These are defined based on preliminary stakeholder mapping and direct consultation with stakeholders. More details on Project stakeholders will be given based on the results of the stakeholders’ identification process that MOH will carry out.

Table 9.8-1: Overview of Main Project Stakeholders

Stakeholder Group	Impact / Involvement	How to Engage
Affected Parties		
Senior and Operational Hospital Staff	<p>Senior staff and operational staff will be impacted by construction noise, vibrations, and dust. They will also have a direct understanding on how impacts are affecting patients and can provide suggestions for mitigation measures and highlighting particular concerns.</p> <p>They will be impacted on a day to day basis during operations on the construction designs and should be consulted on preliminary designs for any construction. Past designs have not duly considered issues related to infectious disease including appropriately placed washing stations. At Saint Ann's Bay, staff specifically mentioned that nurses were not consulted in the design at the hospital and there was no nursing station, no bathroom, not enough washing stations, and no storage or change room in one of the constructed areas.</p>	<p>Engage and update on a regular basis on any updates to construction especially if construction timelines tend to run over and to provide information on how staff feedback has been incorporated. Staff suggested that posters as well as supervisors announce a town hall meeting for all staff interested in attending. Posters or written materials should be posted and staff should be able to provide feedback in written form after the meeting. Staff further suggested a town hall meeting be held in the morning and in the evening to accommodate different staff shifts.</p>
Patients	<p>There will be direct impact on patient's care such as dust, noise, vibrations, and privacy issues due to increased construction workers. There are potentially even greater impacts if services have to move to different clinics. Initial feedback from stakeholder consultations indicated that there was not a need to differentiate between different types of patients including elderly or maternity patients.</p>	<p>During preliminary stakeholder consultations generally agreed that all patients could be engaged to participate in a town hall style meeting. Flyers can be posted at the hospital and that town hall sessions take place on "high" clinic days which are often Monday through Thursday at the hospital but would need to be determined hospital by hospital.</p>
Project Affected Communities	<p>Each hospital had a different perspective on community engagement. Spanish Town Hospital suggested that engaging the community was critical to the success of any construction project as the project could be subject to extortion by the community for jobs and money. May Pen suggested that the community members be engaged regarding requests for work, the need to tie up their goats that roam on hospital property, and trespassing on hospital grounds as shortcuts to the high school. It would be important to find alternate pathways because otherwise</p>	<p>Spanish Town hospital staff suggested that the community needs to be engaged through the Parish Council and police.</p> <p>May Pen hospital staff suggested that community members be engaged through the Member of Parliament and the Parish Council. St. Ann's Bay communities might be best engaged through the Parish Council according to key stakeholders at St. Ann's Bay hospital.</p>

Stakeholder Group	Impact / Involvement	How to Engage
	community members are likely to make a hole in the existing fence that may create safety risks. St. Ann's Bay staff suggested that the local schools be engaged and the communities impacted by them.	
Food Vendors	Food vendors are likely to be impacted by construction activities including traffic and changes to access to the hospital during construction activities. They provide a critical service to patients and staff. Staff at all three of the hospitals bought food from vendors given limited or no canteen options.	The vendors (5-20) at each hospital, vendors could be invited directly to a group meeting to discuss issues included a new location during construction.
Contractor workers and employees (Project workers)	They will benefit from the source of income. However they represent a risk if labor is not properly managed with regards to interacting/interfering with patient care.	This can be done through the contractor and supervision by the MOH team charged with managing consultation and stakeholder engagement.

9.8.3 Socio-economic Baseline of Food Vendors

If there are expected to be significant impacts on the food vendors (both formal and informal vendors serving the hospitals) then a dedicated approach and resources will be necessary to ensure that their livelihoods are not negatively impacted.

A baseline survey will need to be taken of all food vendors regarding living conditions, household composition, education, income and description of economic activity, housing structure, livestock, crops, and another relevant information. This information will be necessary to establish a baseline and will require designate MOH staff to monitor the conditions of the food vendors to ensure their livelihoods are not negatively impacted.

At Spanish Town Hospital, there are between 20 and 30 vendors, outside and on the hospital premises. At St. Ann's Bay Hospital, there are between 10 to 20 informal vendors outside of the hospital and a formal restaurant on the edge of the hospital grounds. At May Pen Hospital, there are between 10 and 20 informal vendors outside of the hospital grounds and between 10 and 20 ambulant vendors that sell food on the grounds.

9.8.4 Verification of Stakeholder Representatives

Identifying stakeholders' representatives is a key step in developing a SEP. When identifying stakeholder representatives the proponent will assess to what extent specific individuals represent particular groups and how and what they communicate to their respective constituents. Legitimate stakeholder representatives include but are not limited to:

- Informal community leaders;
- Elected local and party representatives and leaders (e.g. neighborhood, town, and city elected or appointed representatives);

- Leaders of local associations, civic or other community-based organizations (e.g. local community service organizations, NGOs, women's groups, etc.);
- Religious leaders.

9.8.5 Summary of Previous Stakeholder Engagement Activities Conducted by Ministry of Health to Date

Initial public consultations were conducted June 25th, 26th, and 27th 2018 at Spanish Town Hospital, St. Ann's Bay Hospital, and May Pen Hospital. Given that there is only preliminary information regarding the type of construction that may take place at the three hospitals, the objective of this first round of consultations was to solicit feedback from key hospital staff and the CEO on how to best engage stakeholders in the design, construction, and operations phases of the project and understand previous impacts of construction work at the hospital and staff's main concerns.

Key hospital staff included department heads from the laboratory, general surgery, nursing, securing, maintenance, and key administrative staff. (See Annex for full attendance.)

The main questions posed to stakeholders included:

- What stakeholders need to be considered throughout the consultation process?
- What are the best ways to engage stakeholders throughout the consultation process?
- How to best engage surrounding communities?
- What previous impacts hospital staff have been subject to with prior construction projects?
- Staff concerns regarding the next phase of construction.

The format chosen for the consultations was an open meeting held at the hospital whereby the Ministry of Health Planning Division provided context regarding the IDB loan and the intentions of the program to be financed by the loan. The format allowed for participants to ask question while the MOH posed the main questions above.

9.8.6 Monitoring and Reporting

The SEP will be updated in order to reflect changes in Project activities, area of influence, and stakeholders. SEP implementation is under the direct responsibility of the Community Liaison Officer (CLO) while Project Director is responsible for its monitoring.

Consultations and grievance registers recording relevant information in tabular form shall be updated on an on-going basis. For each consultation, the responsible SEP manager will complete a consultation form detailing the date, time, location, type of stakeholders, number of participants, topic of the consultation, issues raised, responses given, action taken or to be taken and timelines.

Bi-annual reports will be prepared reporting activities developed and will include an update on the grievance process, grievances received and addressed/closed or pending, recurrent grievances, and any recommendation or action taken to decrease the number of grievances.

9.8.7 Resources and Responsibility

9.8.7.1 Stakeholder Engagement Plan Implementation

The implementation of the Stakeholder Engagement and Consultation Plans is the responsibility of the MOH.

It is assumed that the Project will have a Project Director designated at the MOH. It will be important that a Community Liaison Officer (CLO), specifically trained for this scope, and should report directly to the Project Director.

The CLO will coordinate the implementation of the SEP activities and consultation activities and keep on going contacts with any field managers or contractors during the construction phase. Any contractors or subcontractors will be briefed in order to be aware of the commitments taken by the Project in the SEP and the approach to dealing with stakeholders.

The CLO has a mandate over the socio-economic baseline work that may need to be conducted regarding any economic displacement of informal vendors.

The CLO has a general control function of the grievance mechanism process.

The engagement with stakeholders will be managed and maintained by the CLO who will coordinate with the Project Director on community matters that impact the site and works. The Project Director is responsible for the conduct and coordination of communications with all key external stakeholders.

Based on initial consultations with senior hospital staff it is further suggested that the MOH continue to implement the hospital committee structure that has been used to address issues during past construction works. This committee structure includes a key point of contact designated by the CEO. This point of contact would coordinate closely with the Project Manager designated by the Regional Office and a Project Manager designated from the MOH. Regular committee meetings should be held at least monthly. Reporting back to all staff should be a part of regularly scheduled consultation with staff through the MOH and can be coordinated with the CLO. The hospital point of contact should be made known to all hospital staff so issues can be raised. This should include a phone number and an email address.

The development of the activities foreseen by this SEP might imply the need to involve professionals in the fields of communication and socio-economic baseline analysis and surveys. These professionals shall have experience in dealing with similar projects and with stakeholder engagement.

9.8.7.2 Consultation Grievance Process Implementation and Management

The MOH has an existing grievance mechanism however this does not cover the grievances that may arise under the project construction.

It will be important that a Grievance Officer, specifically trained for this scope, be designated by the MOH. This may be an existing staff member within one of the MOH departments or within the contracted construction company. The Grievance Officer is responsible for the grievance

mechanism under the direct coordination of the CLO and Project Director. Depending on the nature of the issue/grievance, the Grievance Officer may bring grievances directly to the attention of the Project Director. The final decision on any action in response to the grievance that impacts on the community or project shall be taken and signed-off by the Project Director.

While the Grievance Officer has the overall responsibility for stewardship of the grievance mechanism process and documentation, from receipt to closeout. The Grievance Officer should collect and receive grievances through the methods defined in Section 9.8.1 and should further manage the databases of grievances and responses. The Officer can assign investigation and resolution to a delegate however the overall responsibility remains with the Grievance Officer.

It is the role of the Project Director to review and endorse grievance resolution, as appropriate. The Director should ensure that the Grievance Officer has the appropriate level of training to handle the role and responsibilities. She should also provide oversight on the grievance process and monitor consistency of resolutions and responses.

9.8.7.3 Stakeholder Engagement Plan Update and Review

The responsibility for the update/amendment of this document lies with the MOH Project Director, in close collaboration with the CLO and Grievance Officer.

9.8.7.4 Budget

The budget for the SEP implementation will consider the following items throughout the Project construction:

- Cost of human resources: remuneration of the CLO and Grievance Officer, when necessary;
- Training of the CLO, Grievance Officer.
- Organization of the consultation activities as outlined in the SEP;
- Production of the consultation materials and tools;
- Costs of conducting and monitoring the social base line studies, if necessary; and
- Monitoring activities costs, in case of external monitoring of SEP effectiveness.

9.9 Grievance Mechanism Plan

The purpose of the grievance mechanism is to ensure that all requests and complaints from individuals, groups, and local communities are dealt with systematically in a timely manner with appropriate corrective actions being implemented and the complainant being informed of the outcome.

While the MOH has an existing grievance mechanism for registering patient complaints and grievances regarding care the current mechanism will need to modify or create a grievance mechanism to address Project grievances.

The MOH will establish channels for the submission of Project grievances. The grievance mechanism will be in place throughout the entire construction phase and will be presented to the public during consultations. It applies to all grievances that arise as a consequence of any construction activity.

The Grievance Officer is responsible for the grievance mechanism under the direct coordination of the CLO and Project Director. Depending on the nature of the issue/grievance, the CLO may bring grievances directly to the attention of the Project Director. The final decision on any action in response to the grievance that impacts on the community or project shall be taken and signed-off by the Project Director. All MOH staff members and contractors that interact with external stakeholders will be made familiar with the grievance mechanism. Roles and responsibilities related to the grievance mechanism are presented in Section 9.6.7.

All complaints will be logged and processed and addressed within a fixed time, communicated to the complainant, as shown in Section 9.8.3. The procedure is summarized below:

- Grievances will be logged within a Grievance Register and an acknowledgement of receipt of complaint will be issued to the complainant within five working days;
- In case an immediate corrective action is not possible or sufficient, MOH will inform complainant of the proposed long-term corrective action, specifying a deadline, or explain why action is not required within 10 working days from grievance acknowledgement;
- MOH will work with the construction contractor to identify responsibilities and internal deadline for corrective action(s);
- MOH will work with the construction contractor to follow up the implementation of the corrective measure;
- MOH will inform the complainant in writing and in person of the corrective action and record the closure of the grievance within 20 working days from grievance acknowledgement; if the resolution is not accepted, it may be reviewed to identify alternative corrective actions. A revised resolution may be proposed. If the resolution is then accepted by the stakeholder, the grievance will be closed. If not accepted, and no further improvements can be made, then external remedies may be pursued.

Complaints will be resolved within a period that will not exceed 25 working days in total from their receipt and registration date. As part of the grievance process, the MOH will log each grievance and document the action taken. It will regularly review the database of received grievances to identify and analyze any recurrent issues and trends. The MOH's contractors will collaborate for the effective implementation of the grievance mechanism. The MOH will be responsible for addressing all Project related grievances including those involving MOH contractors (if any). There are no restrictions on the type of issue a stakeholder can raise under this procedure.

The MOH reserves the right not to address a complaint which it reasonably considers amounts to no more than general, unspecified, and therefore un-actionable dissatisfaction with the company, is otherwise malicious in nature, or concerns a matter for which the company has no formal responsibility.

The personal details of Complainants should only be made available to those involved in the resolution of the grievance in question, and the MOH and other groups must follow policies related to protecting personal data when handling the grievance.

The MOH will accept, log, and seek to address grievances contained in anonymous grievance forms, but, due to the anonymous source of the grievance, will not be able to respond directly to the Complainant.

The MOH will stress that there will be no costs or retribution associated with lodging grievances.

The grievance mechanism does not replace existing Jamaican legal processes, or MOH administrative processes already in use. In addition, this grievance mechanism does not impede access to other judicial or administrative remedies that might be available under domestic law or through existing arbitration procedures, or substitute for feedback mechanisms provided through collective agreements.

To facilitate tracking, evaluation and response to grievances, standardized information should be collected and recorded on the Grievance Recording Form. As a best practice, the CLO and Grievance Officer should always carry the Grievance Recording Form and a grievance mechanism brochure or contact information, if available, when they conduct field visits or community meetings.

9.9.1 Channels to Submit Grievances

Channels and methods to raise grievances include:

- Verbally/In Person
- To MOH Grievance Officer or Construction Contractor Representative

As the MOH Grievance Officer will not always be present in the field to receive grievances, then people may also submit grievances to the MOH via a local office located at the hospital. The Customer Care office already exists within each hospital and could likely take on this function however the MOH may choose to create a different office within the hospital if it so wishes.

The MOH Grievance Officer will collect grievances informally through these stakeholders, however, it will be important for the Grievance Officer to assess whether grievances are being accurately captured, shared and managed in a timely manner.

- During town-halls and other community meetings.
- During hospital committee meetings.
- The MOH will need to establish a contact email address that will be posted at the Project site in various and easily accessible locations.
- The MOH will need to establish a contact telephone number that will be posted at the Project site in various and easily accessible locations.
- The MOH will need to establish a mail address that will be posted at the Project site in various and easily accessible locations.

9.9.1.1 Disclosure of the Grievance Mechanism

The grievance mechanism procedure will be publicized and communicated in a manner appropriate to the scope and nature of the project, and in a manner appropriate to the audience (i.e. method of delivery, language, etc.). In particular, the MOH will publicize and communicate the process to those most likely to use it: local communities, hospital staff, patients, and contractors.

Notification will include:

- A summary of the procedure and how it can/should be used;
- Details of the process, such as who is responsible for receiving and responding to grievances, and any external parties that can receive grievances;
- When stakeholders can expect a response, and
- Safeguards in place to ensure confidentiality.
- The MOH will communicate this grievance mechanism procedure during town-hall meetings or engagements with local/Parish government and community members. A handout / brochure will be provided with information about the grievance mechanism and contact details.
- During the consultation process, the MOH will solicit feedback on how the procedure could be improved. This information will be taken into consideration when revising this procedure.

9.9.1.2 The Grievance Process

The grievance process is summarized in the following list.

A detailed description of the process is provided in the following paragraphs.

- Receive and Register
- Acknowledge
- Screen
- Investigate
- Respond
- Appeal or Resolve Successfully
- Follow-Up and Closeout

9.9.1.3 Registering Grievances

Grievances will be logged in the Grievance Register within two days of receiving the grievance. The Grievance Officer can assign the grievance to a case owner when it is logged however the Grievance officer is ultimately responsible for:

- Defining and implementing resolution actions;
- Investigating the grievance;
- Consulting relevant departments or persons within the organization;
- Making sure resolution actions are completed;
- Tracking progress of individual grievances;
- Aggregating and forwarding feedback to Complainants;
- Documenting resolution actions;
- Gaining necessary approvals from, and reporting to, management.
- While no response is necessary for anonymous grievances, these will be logged and reported with other grievances to facilitate continuous improvement.

9.9.1.4 Acknowledging Grievances

The Grievance Officer will formally acknowledge grievance within 5 working days of the submission of the grievance, informing the Complainant that the MOH's objective is to respond within 20 working days.

Verbal and then written feedback will be provided so that a record of correspondence is retained and recorded.

Acknowledgement should include a summary of the grievance, MOH's approach to responding to the grievance, and an estimated timeframe in which the final response will be issued. If needed, use the acknowledgement opportunity to clarify issues from the grievance or request further information if required.

If grievance is considered out-of-scope for the grievance mechanism (see Section 9.8.6), the Grievance Officer should draft a response for signature by the Project Director explaining why it is out-of-scope and providing any guidance of where to go to get the issue addressed (if possible). In cases where another entity (e.g. another government agency) should be responsible for handling the grievance, Grievance Officer will share the grievance with the appropriate actor (unless the grievance could result in potential reprisal) and inform the Complainant that the grievance has been shared with the appropriate body/person. If appropriate, Grievance Officer may also provide details to the Complainant on any specific follow up that MOH has completed with the relevant entity to share information for them to address the issue.

9.9.1.5 Screening

Each grievance will be screened from Level 1 to 3, per definitions provided in the following table, in order to determine the appropriate response.

"Routine" issues will be managed through the grievance mechanism. "Potentially Significant" grievances will be flagged and managed via the Project Director.

Table 9.9-1: Screening Table

Level	Description	Issue Type	Management Approach
1	Grievance for which there is already an MOH approved response and an answer can be provided immediately. This level also includes grievances that are out of scope.	Routine	Through the Grievance Officer. Utilize approved answers to handle response.
2	Grievance characterized by being a one-time situation, local in nature, and that will not impact MOH's reputation.	Routine	Define grievance response plan and draft a response and other management approval.
3	Repeated, widespread or high-profile grievances that may result in a negative impact on MOH's activities and/or reputation. Level 3 grievances indicate a gap in a management plan or procedure, or that a serious breach in MOH's policies or Jamaican law has occurred	Potentially Significant	Prioritize through Project Management and define appropriate management strategy.

9.9.1.6 Investigation

The Grievance Officer or her delegate will lead grievance investigation, when needed, which could include collecting relevant documents, making site visits, consulting appropriate internal

staff, contacting external stakeholders, and other activities. Investigation findings will be used to document decision-making process and inform proposed remedy.

9.9.1.7 Response

Before responding to the Complainant, the Grievance Officer or her delegate will complete the following:

Level 1 Grievances - Grievance Officer/Delegate informs Project Director and then utilizes recently approved answers to respond to Complainant.

Level 2 Grievances - Grievance Owner defines plan for grievance response and crafts the draft response for Project Director approval;

Level 3 Grievances – Grievance Owner works directly with Project Director and other external parties to define plan for grievance response, then drafts response which needs to be approved by Project Director.

Once the response has been approved, the Grievance Officer will take final, approved language and respond formally using appropriate communication vehicle in the appropriate languages.

The Grievance Owner is responsible for ensuring all information on the grievance is documented and actions tracked in the Grievance Register.

9.9.1.8 Follow-up and Closure

If the Complainant accepts the proposed resolution, the agreed actions are implemented.

The Grievance Officer or her delegate is responsible for assigning action parties, actions, and deadlines to implement the resolution. These are recorded in the Grievance Register with any supporting documentation. If necessary, monitoring arrangements will be put in place to verify implementation.

After resolution, the grievance should be formally closed. This includes requesting the Complainant sign a completion form to document satisfaction with resolution actions, documenting actions taken, and closing out in the Grievance Register.

9.9.1.9 Appeal

In cases where a Complainant is unsatisfied with and/or unwilling to accept the resolution actions proposed, the grievance may be escalated to an Appeals Committee for review and final decision.

The Appeals Committee reviews the case and determines if further reasonable action is possible. If options for reasonable, justified corrective actions are exhausted, a written notice should be provided to the Claimant notifying him or her that their grievance is being closed. Supporting documentation of resolution actions and the Grievance Mechanism Procedure may be sent with the notice. Examples include paid invoices, written agreements, photographs, emails, etc. If an address is not available, the Complainant may be notified by telephone or in person.

9.9.1.10 Public Grievance Form

PUBLIC GRIEVANCE FORM	
Reference No:	
Full Name	
Contact Information Please mark how you wish to be contacted (mail, telephone, e-mail).	By Post: Please provide mailing address: _____ _____ _____ By Telephone: By E-mail
Preferred Language for communication	English Asante Twi Other
Description of Incident or Grievance: What happened? Where did it happen? To whom did it happen? What is the result of the problem?	
Date of Incident / Grievance	One time incident/grievance (date) Happened more than once (how many times?) On-going (currently experiencing problem)
What would you like to see happen to resolve the problem?	

9.10 Consultation Plan

The IDB establishes in its Operational Policy on the Environment (OP-703) that Category "B" operations have certain responsibilities for managing their environmental and social risks. OP-703 provides guidance on how to identify risks and impacts, and is designed to help avoid, mitigate, and manage risks and impacts as a way of doing business in a sustainable way.

The objective of public participation is to establish and maintain constructive relations with the local population. The nature and frequency of actions related to public participation are determined by the level of the Project-related risks and adverse impacts. OP-703 establishes that Category B operations must develop instances of consultations with affected parties, at least once, and preferably during the preparation or revision of the Environmental and Social Analysis (ESA) and the Environmental and Social Management Plan (ESMP). The possibility of conducting consultations with other "interested" parties to allow a wider range of experiences and perspectives is also mentioned. It is necessary to ensure timely access to full and reliable information.

Effective consultations shall be:

- Based on advanced provision of required and adequate information including draft documents and plans;
- Started at an early stage of social and environmental assessment;
- Focused on identified risks and adverse impacts on social and natural environment, and on proposed measures and actions for their prevention, minimization, mitigation; or
- Conducted on a regular basis as the risks and impacts arise.
- Undertaking consultation in an inclusive and culturally appropriate manner;
- Tailoring the process to address the needs of disadvantaged or vulnerable groups.

The MOH will keep ongoing consultations with identified stakeholders at key points of the construction phase. Consultation activities will not be limited to a single meeting with stakeholders but will entail at least two to three meetings or discussions for affected parties to learn about the Project details, be informed of the potential impacts, and of planned mitigation measures. This will be followed by written records and agreements. These activities are valuable for the MOH to understand stakeholder concerns, gain feedback, identify potential risks and act pre-emptively to ensure positive outcomes during the construction phase.

9.10.1 Strategy and Disclosure

The MOH will prepare information to be disclosed in advance and in a format adapted and suitable to the different stakeholder groups. It will identify multiple and preferred communication channels to convey information on Project activities and mitigation of identified impacts or occurrence of new impacts, to be fully transparent and informative. In addition, the venue and timing of meetings will be adapted to stakeholders' preference and needs, making available printed copies of the SEP document.

The documents and information that will be disclosed on the MOH website should include;

- Consultation Plan;
- ESA executive summary;
- Information on construction schedule and impacts;
- Grievance Mechanism;
- MOH Community Liaison Officer contact information.

9.10.2 Consultation Milestones

When the IDB talks about "consultations" it refers to a constructive dialogue between the affected parties and the proponent of the projects, in which each participant listens to the opinions, interests, expectations and proposals of the others. Special emphasis is placed on it being a meaningful consultation, from which concrete actions emerge that take into account the concerns and interests of the other parties. For this project it will be important to understand affected parties, like hospital staff and perhaps patients, opinions and expectations, during design, construction, and operation. This would likely include taking time early in the process to understand how hospital staff think they are able to best do their work during the construction phase.

The Consultation Plan aims at establishing and maintain transparent and reliable information exchange ensuring social participation and is specifically aimed at reaching stakeholders identified.

The following table presents detailed milestones for consultation according to different phases of construction and defines the purpose and target audiences for consultation. All actions provided for in this document shall be disseminated in a timely manner and the dissemination of the results shall be the ultimate responsibility of the MOH. The activities under this plan shall take place in a suitable location, compatible with the size of the vent, ensuring the comfort and safety of participants. Printed materials shall be produced (brochure, phone number, email, newsletter, poster, etc.) for events with high numbers of participants.

Table 9.10-1: Milestones during Construction Phase

Milestones	Actions
1. Guide the technical team responsible for the implementation of the Stakeholder Engagement and Consultation Plan	<ul style="list-style-type: none"> • Purpose: Guide the team responsible for the implementation of the plans on the procedures for the dissemination and transfer of information on the Project in order to minimize doubts of the project stakeholders. • Target Audience: Internal • When: Prior to commencing stakeholder engagement / consultations
2. Support the creation of a hospital committee to contribute to the dialogue between the MOH and stakeholders during the construction phase	<ul style="list-style-type: none"> • Purpose: To support the creation of a committee made up of representatives of the hospital, the Regional Authority, the MOH and patients to facilitate dialogue. • Target audience: Hospital staff, MOH, and Regional representatives. • Description: During the preparation of the ESA, visits and meetings with key hospital staff were held. These activities included identifying the stakeholders and mechanisms that work effectively to raise concerns. Stakeholders identified an existing mechanism that has worked during past construction. This mechanism included a committee that includes a representative from the MOH, a representative of the Regional Authority, and a representative from the hospital. This could further include a patient advocate. Through this Plan the MOH will support the creation of a Committee The team responsible for executing the Plan will provide a point of contact to attend the meetings of the Committee. In this way, the Committee shall be informed about the specificities that each phase of the project will present. • Medium: Meetings • When: Prior to commencement on site then quarterly thereafter as well as when needed to address specific and extraordinary issues.
3. Establish and maintain a channel of communication between the project team and the community.	<ul style="list-style-type: none"> • Purpose: To inform the community in general. The implementation of communication and interaction actions with the community shall enhance the client's relations with the local community, manage expectations, and ensure a better understanding about the characteristics of the project. • Target audience: internal/external including Parish Council and MPs and community members • Description: creation of the channel of communication with various segments of the community including the Parish Council. • Medium: Forum, Print, Digital media and Bulletin boards. • When: Prior to commencement on site then quarterly thereafter or emergency meeting to address specific and extraneous issues
4. Produce disclosure materials which show the	<ul style="list-style-type: none"> • Purpose: In order to comply with the information disclosure commitment of this SEP, MOH will prepare the following materials:

Milestones	Actions
characteristics of the Project and ESA finalization including potential impacts	<ul style="list-style-type: none"> – Preliminary Project Designs – Brochures and posters – according to demand and the detailing of the Plan, and in the light of events to be designed; – Manual of conduct of the employee – in the initial phase of the project implementation; – Newsletters / Digital material - according to the demand. • All material must introduce plain, clear and objective language. Plain language means using simple words commonly used, avoiding where possible the technical terms, words that are not usually used, slang and colloquial terms. When it is necessary to use technical terms, this should be followed by a little explanation to facilitate understanding. • The disclosure material must include: <ul style="list-style-type: none"> – Purpose, need and importance of the project; – General features of the project; – Environmental licensing process; – Main benefits; – Main impacts – Main mitigation efforts; – Summary of actions taken / expected; – Contact information of the CLO. • Target Audience: All Stakeholders. • Medium: Meetings, Handouts and Bulletin boards. • When: Continually review and update, as necessary.
5. Guide project contractors of the works on standards, ESMP, and code of conducts and the grievance mechanism	<ul style="list-style-type: none"> • Purpose: Raise awareness of contractors and site workers on standards and code of conducts to facilitate the cohabitation with hospital staff and patients including commitments from key Environmental, Health and Safety, and grievance mechanism. • Target audience: Contractors / Project workers. • Description: Dissemination of printed material containing information on standards, procedures and plans. • Medium: Meetings and Handouts. • When: Prior to commencement of the employment relationship.

Table 9.10-2: Stakeholder Groups, cont.

Stakeholder Group including Sub-Categories	Nature of their Stake / Impact	Key Characteristics	How the Project will Engage	Appropriate Forums and Methods
Senior and Operational Hospital Staff	Senior staff and operational staff will be impacted by construction noise, vibrations, and dust. They will be impacted on a day-to-day basis during operations on the construction designs and should be consulted on	Doctors, nurses, and maintenance staff. While they represent different units of the hospital they will be able to provide valuable input for final project design.	Engage and update on a regular basis on any updates to construction especially if construction timelines tend to run over and to provide information on how staff feedback has been incorporated. Staff suggested that posters as well as supervisors announce a town hall meeting for all	Town hall meetings at the hospital. It was suggested that morning and afternoon sessions be offered on different days to contemplate different shifts.

Stakeholder Group including Sub-Categories	Nature of their Stake / Impact	Key Characteristics	How the Project will Engage	Appropriate Forums and Methods
	preliminary designs for any construction.		staff interested in attending. Posters or written materials should be posted and staff should be able to provide feedback in written form after the meeting. Staff further suggested a town hall meeting be held in the morning and in the evening to accommodate different staff shifts.	
Patients	<p>There will be direct impact on patient's care such as dust, noise, vibrations, and privacy issues due to increased construction workers.</p> <p>There are potentially even greater impacts if services have to move to different clinics.</p> <p>Feedback from stakeholder consultations indicated that there was not a need to differentiate between most types of patients such as elderly or maternity patients. However, respiratory patients may be impacted during construction.</p>	<p>The hospital provides free services to patients.</p> <p>Some patients may be in lower economic sub-groups unable to pay for private services.</p>	Flyers can be posted at the hospital and that town hall sessions take place on "high" clinic days, which are often Monday through Thursday at the hospital but would need to be determined hospital by hospital.	During preliminary stakeholder consultations generally agreed that all patients could be engaged to participate in a town hall style meeting
Respiratory Patients	There will be direct impact on	The hospital provides free	Flyers can be posted at the hospital and that	During preliminary stakeholder

Stakeholder Group including Sub-Categories	Nature of their Stake / Impact	Key Characteristics	How the Project will Engage	Appropriate Forums and Methods
	<p>patient's care such as dust, noise, vibrations, and privacy issues due to increased construction workers.</p> <p>There are potentially even greater impacts if services have to move to different clinics. Feedback from stakeholder consultations indicated that there was not a need to differentiate between most types of patients such as elderly or maternity patients. However, respiratory patients may be impacted during construction.</p>	<p>services to patients. Some patients may be in lower economic sub-groups unable to pay for private services.</p>	<p>town hall sessions take place on "high" clinic days, which are often Monday through Thursday at the hospital but would need to be determined hospital by hospital.</p>	<p>consultations generally agreed that all patients could be engaged to participate in a town hall style meeting</p>
Project Affected Communities	<p>Each hospital had a different perspective on community engagement. Spanish Town Hospital suggested that engaging the community was critical to the success of any construction project as the project could be subject to extortion by the community for</p>	<p>Communities near the hospitals will vary in key characteristics including education levels, socio-economic status, etc. Some community members will be interested in job opportunities in construction generated by the project.</p>	<p>Spanish Town hospital staff suggested that the community needs to be engaged through the Parish Council and police. St. Ann's Bay communities might be best engaged through the Parish Council according to key stakeholders at St. Ann's Bay hospital. May Pen hospital staff suggested that community members be engaged through the Member of Parliament and the Parish Council.</p>	<p>Each community will be different and Parish Council, Police, and Members of Parliament will need to be further consulted regarding the proper fora for each of the three communities especially given concerns regarding violence.</p>

Stakeholder Group including Sub-Categories	Nature of their Stake / Impact	Key Characteristics	How the Project will Engage	Appropriate Forums and Methods
	<p>jobs and money. May Pen suggested that the community members be engaged regarding requests for work, the need to tie up their goats that roam on hospital property, and trespassing on hospital grounds as shortcuts to the high school. It would be important to find alternate pathways because otherwise community members are likely to make a hole in the existing fence that may create safety risks. St. Ann's Bay staff suggested that the local schools be engaged and the communities impacted by them.</p>			
Food Vendors	<p>Food vendors may be impacted by construction depending on how construction activities are organized. This could include increased traffic and changes to</p>	<p>Vendors provide a critical service to patients and staff. Staff at all three of the hospitals bought food from vendors given limited or no canteen options. Most food vendors participate in the informal sector.</p>	<p>The vendors (10-30) at each hospital, vendors could be invited directly to a group meeting to discuss issues included a new location during construction.</p>	<p>Meetings at the hospital are a possible option since vendors are located next to the hospital. However, vendors should be directly consulted regarding the appropriate forum.</p>

Stakeholder Group including Sub-Categories	Nature of their Stake / Impact	Key Characteristics	How the Project will Engage	Appropriate Forums and Methods
	access to the hospital during construction activities.			
Construction Contractor workers and employees (Project workers)	They will benefit from the source of income. However, they represent a risk if labor is not properly managed with regards to interacting / interfering with patient care.	Many construction workers may be day laborers and may have limited education.	This can be done through the contractor and supervision by the MOH team charged with managing consultation and stakeholder engagement.	Meetings at the contractors' offices or on hospital grounds are possible options.
Families of Patients	If families cannot visit relatives due to construction disruption, if they have to visit a relative who is treated at a hospital further away.	Most impacted families are likely to be of lower socio-economic classes with a lack of access to transportation.	Flyers can be posted at the hospital and that town hall sessions take place on "high" clinic days, which are often Monday through Thursday at the hospital but would need to be determined hospital by hospital.	During preliminary stakeholder consultations generally agreed that all patients could be engaged to participate in a town hall style meeting

9.10.2.1 Outreach

In order to convene for each event, information needs to be designed and provided. Depending on cultural appropriateness, this could include posters, brochures and other dissemination materials. Invitations should be sent (by email or in person) to those actors who have been identified in the mapping and an acknowledgment of receipt must be obtained. Here is an example of an invitation:

Table 9.10-3: Template for Outreach

<p>Address, [day] and [month] of 2018</p> <p>Dear Sir / Madam:</p> <p>We would like to invite you to participate in an information meeting on the Project [complete name and a two line description should be included], which will be carried out on [complete day] of June, at [complete hours], in [complete establishment name and full address].</p> <p>During the meeting, the following topics will be discussed:</p>
--

1. Details of the Program and the Project [complete names] and main interventions (works) to be carried out;
2. Benefits associated with the operation of the Project;
3. Involved parties and institutional responsibilities;
4. Outline of the applicable regulatory framework and standards of relevance;
5. Potential environmental and social impacts,
6. Management and mitigation measures that will be taken;
7. Mechanisms established to address claims and resolve conflicts; and
8. Overview of the management plans associated with the Project.

Regards,

Ministry of Health

Information about the event should also be made available on each of the hospital's website and the MOH website, in local newspapers, posters put in strategic places (such as local market and the hospitals receptions) and in other media. Communication tools should be designed to be easily understandable by public and contain the following information:

- Implementing Agency / Institution
- Reason (project to be socialized)
- Place (name of establishment and full address) and time and a map
- E-mail and contact telephone number for inquiries about the event

The information should be posted at least one week in advance of the event, in order to guarantee a sufficient period for the audiences identified to be duly notified.

9.10.2.2 Practical Aspects for Consultation

Checklist Practical Aspects to Consider for Consultations		
Barriers	Yes / No	Examples of Strategies
Absence of childcare services		Childcare service is provided on the consultation site or there is a person in charge for the task Childcare costs included in the budget of the consultation event. Childcare subsidies are considered
Lack of transportation or access to the site where the consultation takes place		Transportation subsidies are considered The site where the consultation takes place is accessible by public transport Logistics assistance is provided
The consultation site is accessible to people with some type of		A place that has accessible infrastructure has been chosen An accessibility plan is developed

Checklist Practical Aspects to Consider for Consultations		
disability and elderly people		
Facilitators' lack of awareness regarding a gender approach		Trainings are developed for the facilitators or they are facilitators with experience in the subject Collaborate with an NGO that can provide a gendered perspective to staff
Inconvenient Time of Event		Meeting alternatives are offered Meetings are held when the children are at school Meetings are held to interfere as little as possible with regular work schedules

9.10.2.3 Characteristics of the Event

Each event will be coordinated by persons with experience in similar dynamics, ensuring that the presentation is culturally appropriate. Graphic support materials, such as slide presentations, maps, pictures and videos, should be used to facilitate the event. Leaflets summarizing main information and contact numbers should be distributed.

All documents consulted should be made available in hard copies, which will then need to be accessible at the hospitals for later consultation. The MOH should further consider other places to make hard copies available such as municipal government offices for later consultation, during office hours. There will also be a copy of them at the headquarters of the MOH.

Finally, in all consultation events, key aspects that will ensure the participation of women and vulnerable groups will be considered:

- Identify the need to address and issues that affect men and women differently.
- Take into account socio-cultural aspects. In some circumstances, it is more comfortable for women that the people facilitating the meetings are also women.
- Consider convenient times and places. Accessible places should be proposed that guarantee the participation of elderly people and people with some type of disability, and who are in a radius that allows to attend walking or public transport with ease, among other issues.
- Develop a guidelines guide that considers specific questions oriented towards women and issues that are usually of greater concern to this group.
- Do not forget that "women" is a very heterogeneous group (age, socioeconomic status, ethnicity, religion, etc.) and that within it there may be diverse interests and priorities that should be addressed.

9.10.2.4 Documenting the Consultation Process

The MOH will need to document the contributions and concerns of participants, the responses provided, and how stakeholder views will be reflected in project design, implementation, institutional mechanisms, decisions, or in other ways.

Minutes, as well as a photographic record (preferably audio / video) that can provide evidence of the presentation should be taken. Minutes of the meetings including the list of participants will be

recorded and appended to a final report that will summarize main outcomes. The final report is the responsibility of MOH. The contributions can be logged as follows:

Table 9.10-4: Model Log to Register Responses

Model Log to Register Responses		
Transcription of questions, doubts, and recommendations	Responses	How stakeholder views will be reflected in project (design, implementation, etc.)

Participants should be asked to sign attendance sheets. The attendance forms must request: name and surname of the participant, institution they represent (if applicable), telephone number, email and signature.

Table 9.10-5: Model Attendance Log

Model Attendance Log			
Name and Surname	Institution	Telephone	Email

9.11 Estimated Costs

Table 9.11-1: Costs of the Environmental Management Plan

Description	Unit	Metered	Cost (USD)	Partial (USD)	Total (USD)
Environmental and Social Management Plan					
Construction Phase					
Institutional Strengthening Management Plan					
Solid, Debris, and Hazardous Waste Management Plan					
Medical Waste Management and Disposal Management Plan					
Occupational and Community Health and Safety Risk Management Plan					
Emergency Response Management Plan					
Traffic Management Plan					
Wastewater (stormwater and effluent discharge) Management Plan					
Asbestos Management Plan					
Stakeholder Engagement Management					
Consultation Management Plan					
Grievance Mechanism Management Plan					



Description	Unit	Metered	Cost (USD)	Partial (USD)	Total (USD)
Social Disturbance Management Plan					
Patient Privacy Management Plan					
Operation Phase					
Solid Waste Management					
Health and Safety Management					
Rain and Effluent Management					
Traffic Plan					

10 Conclusions and Recommendations

The program has been classified as a low-medium risk Category “B” project, likely to have only “local and short-term negative environmental impacts and associated social impacts for which effective mitigation measures are readily available.” To manage these risks, a fit-for purpose ESMP has been provided. Key impacts / risks (summarized in the table below) are related to:

Impact / Risk	Mitigation Measures
<p>Potential contamination of soil and groundwater resources from the improper handling and disposal of waste (hazardous and non-hazardous), including:</p> <ul style="list-style-type: none"> Asbestos containing materials Infectious waste Fluorescent lightbulbs and thermostats that contain mercury Air conditioning units that contain refrigerants 	<ul style="list-style-type: none"> Safely handle, transport, and dispose of all hazardous materials, including, but not limited to: asbestos materials, infectious disease waste, and mercury containing materials to an approved landfill / waste disposal site. Collect and safely store all fluorescent light bulbs, thermostats, and other waste that may contain mercury. Hire a certified asbestos specialist to screen activities that may require asbestos abatement. If there are any high-risk activities, such as pipe insulation, ensure that an asbestos survey is conducted beforehand. If asbestos is found, hire a certified contractor to remove or manage the asbestos.
<p>Capacity of hospitals to implement and enforce pollution prevention plan (air emissions, particulate matter, wastewater, soil, etc.).</p>	<ul style="list-style-type: none"> Implement a Waste Management Plan (hazardous and non-hazardous medical waste).

10.1 Environmental and Social Management Plan

- The environmental and safety management will be in charge of the ESHS department, under the responsibility of the ESHS head, who will report to the operations management of each hospital
- The person responsible for carrying out the environmental management measures during the construction is the contractor, who will report to the Head of the ESHS Department of each hospital
- The environmental management measures in the construction stage are: Dismantling management, handling of hazardous and non-hazardous solid waste, management of occupational health and safety, and management of rainfall (runoff water), and generated domestic effluents.
- Environmental management measures during the operation stage are: common, hazardous and biomedical solid waste management; management of occupational health and safety and management of rains (runoff water) and domestic effluents
- Compliance with environmental management measures will be monitored, through the use of indicators
- An ESHS report will be prepared monthly, and a report will be sent to the BID every six months

11 Appendices

11.1 Appendix A: Site Visit Photos

11.2 Appendix B: Ministry of Health Jamaica – IDB Consultation Report

11.3 Appendix C: Contact Information for Waste Recyclers and Disposers in Jamaica

Appendix A: Site Visit Photos and Observations

Spanish Town Hospital



1a: Exposed conductors to live electrical equipment presents a safety hazard to staff.



1b: Exposed conductors to live electrical equipment presents a safety hazard to staff.



2a: Equipment out of order throughout the facility (autoclave shown).



2b: Equipment out of order throughout the facility (autoclave shown).



3: Possible asbestos insulation on exhaust pipe from backup generator.



4a: Possible fuel tank not protected (fenced) and close to electrical lines.



4b: Possible fuel tank not protected (fenced) and close to electrical lines.



4c: Combustible fuel tank not labeled or protected.



5: Fire extinguisher not accessible or properly managed.



6: Facility only has one functional ambulance.



7: Improper storage of chemicals.



8: Medical waste storage.



9: Use of aluminum ladders is not recommended near live electrical lines.



10: Sand bags used to reduce flooding at patient reception area.



11a: Evidence of flooding (roof of lab).



11b: Evidence of flooding (roof of lab).



11c: Evidence of flooding (roof of lab).



12a: Improper storage of chemicals.



12b: General waste collected in hazardous waste containers.



13: Patients housed in waiting areas due to overcrowded patient areas.



14: Water treatment facility is not fully function or up to standard.



15: Biohazardous waste disposal.

May Pen Hospital



1: Incinerated hazardous waste awaiting pick up and disposal.



2: Exposed drive belt over wet flood presents a safety hazard to hospital staff (laundry facility).



3a: Inadequate space available to store medical records.



3b: Inadequate space available to store medical records.



4: Combustible fuel tank not protected (fenced).



5a: Roof damage is evidence of flooding.



5b: Roof damage is evidence of flooding.



6: Treated wastewater empties into a gully, approximately 1 kilometer from the hospital.



7: Inadequate space in the physiotherapy lab.



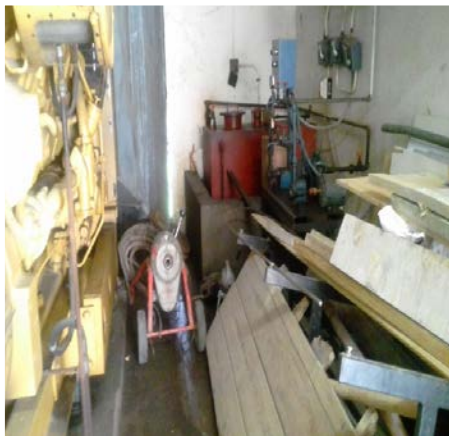
8a: Water treatment facility is not fully functional and not up to standards.



8b: Water treatment facility is not fully functional and not up to standards



8c: Water treatment facility is not fully functional and not up to standards.



9: Pathways blocked and insufficient access (generators on left).

St. Ann's Bay Regional Hospital



1: Exposed conductors to live electrical equipment presents a safety hazard to staff.



2a: Inadequate space available to store medical records.



2b: Inadequate space available to store medical records.



3a: Structural damage leading to water leaks.



3b: Structural damage leading to water leaks



3c: Structural damage leading to water leaks.



4: Fire alarm not functional.



5: Rodent control.



6: Informal vendors near hospital entrance.



7: Historical church adjacent to hospital property.



8a: Water treatment facility is not fully functional and not up to standards.



8b: Water treatment facility is not fully functional and not up to standards.



8c: Water treatment facility is not fully functional and not up to standards.



9: Treater wastewater discharge or nearby stream.



10: Hospital incinerator.



11a: Fence surrounding wastewater treatment facility is damaged.



11b: Fence surrounding wastewater treatment facility is damaged.

Stakeholder Consultation Meeting with Ministry of Health



1: Senior hospital staff in attendance of MOH Planning Department Consultations.



2: Mr. Harold Daniel from the MOH Planning Department presenting the risks and benefits of the project to senior hospital staff.

Appendix B: Ministry of Health Jamaica – IDB Consultation Report and Meeting Minutes

Overview

Three focus group discussions were conducted between June 25-27, 2018 with staff of the Spanish Town, St Ann's Bay and May Pen hospitals respectively. Each group discussion had at least one representative from the different departments of the hospital, as well as the CEO in attendance. The discussions were guided by a set of predetermined questions (See page 8). Each session was recorded and lasted approximately 1 hour.

Spanish Town Hospital, June 25, 2018

The findings from the group discussion at the Spanish Town Hospital are as follows:

Spanish Town Hospital Findings	
•	During past construction projects, service delivery at the hospital was affected by noise from the constant knocking and drilling, as well as dust and fumes emitted during painting. The nurses indicated that in the past, patients in wards close to where construction was taking place were affected by dust and noise.
•	Other concerns regarding the effect of dust emitted during construction were raised by staff from the surgery unit. They noted that the air conditioning units used in operating theatres may be polluted by dust if construction were to take place close to these areas.
•	Staff were also concerned about construction that was just underway at the hospital which will be near the nursery and the effect of the dust and noise on service users and staff at this facility.
•	The hospital is surrounded by volatile communities which raise several security concerns, for example, past construction projects were affected by extortionists and residents entering the compound to seek jobs on construction sites. The issue of extortionist affecting construction projects was a major concern raised by participants. What often happens in these situations is that unscrupulous persons from the community would demand contractors and other persons associated with construction projects to pay them a fee as a means of guaranteeing 'security' to ensure the project goes unaffected by the surrounding criminal activities.
•	The soil topography and other environmental factors must be considered throughout construction as there have been cases in the past where the foundation of buildings was not properly constructed - causing serious structural issues.
•	The hospital has a serious problem with termites, so care should be taken as to the type of materials used during construction.
•	Through the present construction project implemented under the Programme for the Reduction of Maternal and Child Mortality (PROMAC), a local committee which includes staff from the hospital, the project engineer and project manager, have direct responsibility for decisions concerning the project. This committee allows hospital staff to be aware and involved in the process, as well as forms part of the grievance process as complaints are directed to the project engineer.
•	There is usually no one at the hospital assigned to manage complaints regarding construction projects directly.

Spanish Town Hospital Findings

- Participants noted that the present complaints system has some deficiencies as complaints either come through the Ministry of Health or the Region, instead of being directed to the hospital first.

From the concerns mentioned, several recommendations were offered to improve future construction projects.

Recommendations

- In past construction projects, the hospital perimeter fencing was raised to prevent residents from interfering with the construction site. This could be a strategy used in future projects.
- Ensure regular maintenance of air conditioning units, especially those in operating theatres, as cleaning activities may need to be increased given the dust from construction.
- Find ways to manage community engagement to prevent interference from residents who would seek to disrupt construction projects. This should involve the police, members of parliament and other community representatives from the outset to address security concerns, especially to prevent extortionist from affecting project outcomes.
- Conduct feasibility studies to identify environmental, social, and structural factors to consider before construction.
- The strategy used by PROMAC to use a local committee to keep staff involved in the construction process and manage complaints should be considered for future construction projects. A community representative should be included on the committee to get the community involved in the process. The project officer for the region should be a part of this committee, especially as it relates to handling complaints.
- A combination of approaches should be used to inform staff, patients, and surrounding communities of the construction project. Staff recommended using general staff meetings, town halls and different forms of electronic communication such as emails and WhatsApp as a means of keeping persons informed and an avenue to offer feedback. It was also suggested that it would be best to meet with staff in the morning and consult with patients on Mondays and Thursdays to capture a wide cross-section of patients as these are the most active clinic days.
- Ministry of Health needs to consider setting up a proper communication network designed by the Information & Technology department at the ministry to disseminate information throughout the life of the project.

St. Ann's Bay Hospital, June 26, 2018

From the St. Ann's Bay staff, the following issues were raised:

St. Ann's Bay Staff Concerns

- Staff mentioned as one of their main concerns, the impact of the dust and noise during construction, especially as it relates to how it affects the nursery and patients on the ward.
- In past construction projects, they experienced issues such as reduced water supply to wards, limited telecommunication services due to phone lines damaged during construction and loss of electricity.
- Staff also had issues with construction workers loitering in front of the accident and

St. Ann's Bay Staff Concerns
emergency unit.
<ul style="list-style-type: none"> There were also complaints regarding the behaviour of construction workers in terms of noise level and the smoking of marijuana.
<ul style="list-style-type: none"> Some staff raised concerns about the mechanisms in place to ensure the safety of construction workers while on site.
<ul style="list-style-type: none"> One major concern raised by staff was the fact that there was only one gate to enter and exit the hospital, which has implications on managing the increased flow of traffic that would occur due to trucks moving material in and out of the hospital.
<ul style="list-style-type: none"> Another logistical concern was the two schools in close proximity to the hospital and how the traffic from that area in addition to that caused by construction would affect access to the hospital.
<ul style="list-style-type: none"> Staff also mentioned that past construction projects did not involve them from the initial phases (i.e. design and planning) and by the time construction was complete they were left with buildings that did not adequately meet their needs. This concern was raised by nurses and radiography staff, who complained about facilities that did not have enough handwashing areas and changing rooms.

The following recommendations were made:

Recommendations
<ul style="list-style-type: none"> Create an alternative entrance to the hospital which would help to manage traffic flow during construction. There are two possible sites which could be used, both involve going through a community thus the necessary buy-in from residents would need to be sought, as well as the requisite local parish approvals. One site would require additional approval from the tourist board as it would involve driving through the Seville Heritage Park.
<ul style="list-style-type: none"> Find ways to engage staff in the architectural design and planning phases of future construction projects, as staff are a key primary end user and would, therefore, have some amount of insight as to what the facility needs.
<ul style="list-style-type: none"> Future infrastructure projects should address issues related to improving staff well-being, such as constructing a cafeteria where staff can buy food safely and have somewhere to sit and eat.
<ul style="list-style-type: none"> Improve consultation with staff and patients before and during project lifespan.
<ul style="list-style-type: none"> Ensure mechanisms are in place to address water shortage issues, limited light and telecommunication services during construction.

May Pen Hospital, June 27, 2018

This was the smallest of the three groups. The concerns raised by staff are listed below:

May Pen Staff Concerns
<ul style="list-style-type: none"> The usual issues related to noise and dust during construction was raised.
<ul style="list-style-type: none"> Staff also stated that there is often limited parking during construction, forcing persons to park on the lawn which causes damage and inconvenience users as the lawn gets muddy when it rains.
<ul style="list-style-type: none"> If construction required the relocation of patients, the staff mentioned that adequate space

May Pen Staff Concerns

was not available to move patients to other areas.

- The issue of security was raised and the possibility of extortion occurring from residents in surrounding communities. There were also challenges in past construction projects to control the flow of community members coming onto construction sites to seek jobs, as the existing parameter fencing is not secure.

Recommendations

- Engage staff in preliminary project design. Project plans should be shared with stakeholders before implementation. Project plans could be sent to senior staff who would get feedback from their junior staff and then share it in stakeholder consultation meetings.
- Improve parameter fencing to prevent persons from entering the hospital and harassing contractors for work during the project. Engagement of the community and political representatives, and the police was also mooted as a means of reducing the security risks.
- The Ministry should design a way to assist staff on the ground at the respective hospitals to educate the public about what is taking place.
- There needs to be a process in place where complaints can be made more generally to relay it directly to the contractor. Typically, complaints go to the project manager who is a staff of the Southern Regional Health Authority who then deals with the issue.
- Use town hall meetings, media releases and ongoing communication with the regional communication department as a means of disseminating information regarding the project.
- A 24-hour cafeteria is needed at the hospital for staff and patients.

Way Forward

The Ministry of Health will note the concerns and recommendations coming from the different hospitals and use them as much as is possible in implementing construction projects.

Focus Group Guide

Est. Time	Question
5 mins	<ul style="list-style-type: none"> • What improvements, if any, have you seen in your time at this facility?
15 mins	<ul style="list-style-type: none"> • In instances where there has been construction in the past, how has it affected your ability to do your work? Probe: impact of noise; construction workers; security concerns; differences in impact across departments
10 mins	2a. What should be done to prevent these things from impacting your work and minimize disruptions to service delivery in future construction projects?
10 mins	2b. How did the construction affect other persons who interact with the hospital? Probe: patients; caregivers; vendors, etc.
10 mins	2c. How satisfied were you with how the construction was managed? Probe: how it was communicated to staff, patients, surrounding communities; how complaints & concerns were addressed
10 mins	<ul style="list-style-type: none"> • What are the challenges, if any, that could possibly arise with surrounding

Est. Time	Question
	communities during construction? What can be done to minimize these challenges?
10 mins	<ul style="list-style-type: none"> What kind of support do you think is required from MoH and the Regions to support?
10 mins	<ul style="list-style-type: none"> What mechanisms do you think should be in place for staff, patients and any other interest groups to report issues/problems during the construction phase?
TOTAL ESTIMATED TIME: 1hr & 20mins	

Appendix C: Contact Information for Waste Recyclers and Disposers in Jamaica

Material	Company	Phone	Location	Contact
Plastic Bottles , Plastic bags, Shredded Paper, Old Newspaper, Packaging Foam, Foam Lunch Boxes , Aluminum, Tin	360 Recycle	809-2909 or 840-5426	21 Rousseau Road, Kingston 5	Mr Scheed Cole Keisha Delisser-Cole admin@360cycleja.com sustainabledesign@360cycleja.com
Plastic Bottles	Recycling Partners of Jamaica • Recycle Now	948 7381	22A Lyndhurst Road, Kingston 5 and 79 Harbour Street, Kingston	recyclingpartnersjaltd@gmail.com
		948-7381 960 3695	123 Constant Spring Road Unit #5 Kingston 8 (Jamaica Environment Trust Office)	
		485-4371	RPJL & St Mary PDC Depot Stennet Street, Trinity Port Maria	
		948-7381 or 429-5738	Martin's Hill Disposal Site Grove Place, Manchester	
		472-3912 or 797-2404	Genesis Recycling Church Street, Morant Bay, St. Thomas	
		631 8015	National Recycling 1 Coconut Road Grove Ocho Rios (Petcom Gas Station)	Mr. Dooche
		857-6484	CA Recycling Greenwood Montego Bay	Mr. Ainswort
		904-2971 or 573 0245	Ricova Jamaica Incorporated Ltd 22 Clarendon Park Tollgate Clarendon	
Cardboard	Jamaica Recyclers	758-8700	164 Spanish Town Rd. Kgn11	Samantha Phillipson sphillipson@jamaicarecycles.com
Plastic Bottles	Sweet Craft Limited	931-9744	2 Shortwood Road, Kingston 8	Beverly Scarlett
Plastic Bottles, Paper, Phonebook, Magazines Cardboard, Newspaper	Hear the Children's Cry	929-0431, 822-0413 or 882-7658	2 Lancelin Ave Off Molyne's Road 2A Lyndhurst Road	Mark Lewin Odenni Ayee Ms. Grant

Material	Company	Phone	Location	Contact
				Jomo Miller
Newspaper	Jamaica Society for the Prevention of Cruelty to Animals JSPCA	929-0320	10 Winchester Road, Kingston	
Glass bottles	Garbage Disposal & Sanitation Services (GDSS)	757-4377	223 Marcus Garvey Drive Kingston 11	Dorothea Gordon-Smith Lucianna Gordon-Smith
Toner cartridges/Ink Cartridges	Cartridge World	960-6733	Shop 11 Southdale Plaza Kingston 10	Tony Cardoza Kedan Beckford
Printer / Toner cartridges	Global Ink		10 Waterloo Avenue Kingston 10	
Printer / Toner cartridges	Printware Online Jamaica Limited	960-4785	Unit 18, 85 Hagley Park Road Kingston 10 (The Domes)	Kimone Forbes
Computers, Printer / Toner Cartridges and Inks	Cartridge Collectors & Associates	387-2230, 321 5204 or 8562475		Keith Stewart
Used car batteries	Caribbean Export and Recycling Co. Ltd	382-6729	87-91 First Street, Newport West, Kingston	Anthony (Tony) Wilson
Used car batteries	INET Jamaica Limited	371-2583	30 Warminster Avenue, Kingston 20	Kirk-Lyle Hall
Used car batteries	Tropical Battery Company Limited	923-6231	14 Ashenheim Road, Kingston 11	Marc Melville
Used car batteries	Ronclif Company Limited	865-0016	22 Grove Road, Kingston 10	Rudolph Jones Clifton Jones



Material	Company	Phone	Location	Contact
Used car batteries	CM Recycling Company Limited	758-3781	383 Spanish Town Road Kingston 11	Hilroy McFarlane
Used car batteries	Barry's Auto Solution	383-0527	26 Deanery Road Kingston 3	Barry Hibbert
Medical Waste and Non-Medical Waste (Paper, Confidential Documents, Consumable Products, Food Waste, Contra Bands, Sundries Item, Phone Cards)	Waste Management Ministry of Health	967-9335 or 948-4497	15 - 17 Drummond Street Kingston	Mrs. Ava Armstrong-Hall Mrs. Annika Andrews-Sappleton

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