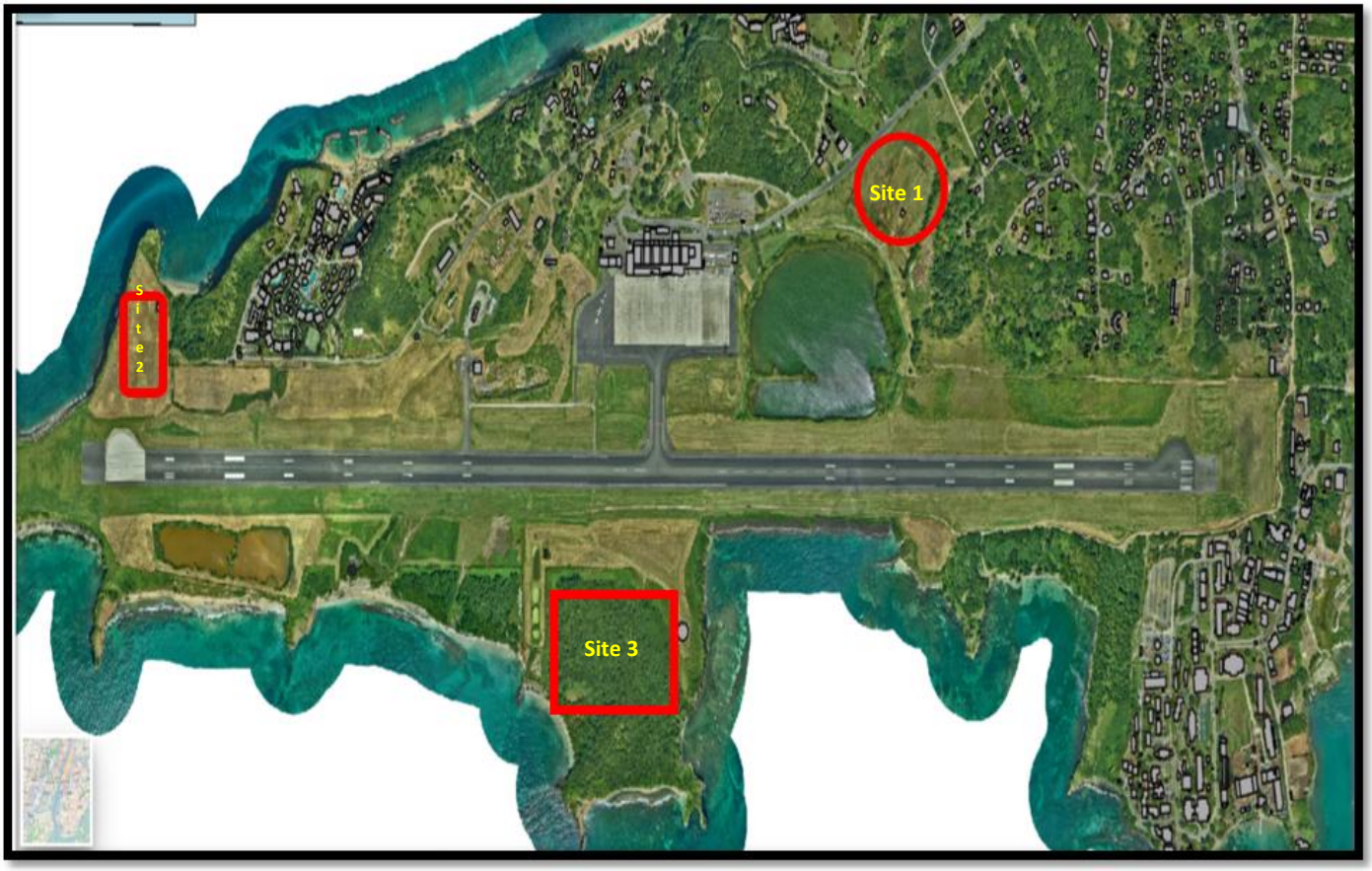
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

GRENLEC SOLAR PROJECT

MAURICE BISHOP INTERNATIONAL AIRPORT GRENADA



Prepared by R. Murray, D. Roberts & A. Joseph

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ACRONYMS

CCCCC	Caribbean Community Climate Change Centre
CCI	Caribbean Challenge Initiative
ESIA	Environmental and Social Impact Assessment
ESF	Environmental and Social Framework
ESMP	Environmental and Social Management Plan.
ESS	Environmental and Social Standards
GAA	Grenada Airport Authority
GAMPA	Grand Anse Marine Protected Area
GCIC	Grenada Chamber of Industry and Commerce
GFA	Grenada Football Authority
GHG	Greenhouse Gas
GoG	Government of Grenada
GRENLEC	Grenada Electricity Services Limited
GSWMA	Grenada Solid Waste Management Authority
IAGDO	Interagency Group of Development Organisations
ICZM	Integrated Coastal Zone Management
INDC	National Determined Contribution
IPP	Independent Power Producers
ICT	Information and Communication Technology
ITCZ	Inter-tropical Conversion Zone
KV	Kilo Volt
LBS	Land Base Source (of Marine Pollution)
MBIA	Maurice Bishop International Airport
MPA	Marine Protected Area
MV	Mega Volts
MW	Mega Watts
NDC	National Determined Contribution
NEP/MS	National Environmental Plan/Management Strategy
NEWLO	New Life Organisation
NSDP	National Sustainable Development Plan
OECS	Organisation of East Caribbean States
OHS	Occupational Health and Safety
PURC	Public Utility Regulatory Commission
PV	Photo Voltaic
RE	Renewable Energy
RMI	Rocky Mountain Institute
SGD	St. Georges Declaration (Principles for Environmental Sustainable)
SGU	St. Georges University
SLM	Sustainable Land Management
TAMCC	T. A Marryshow Community College
WB	World Bank

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EXECUTIVE SUMMARY

Grenada Electricity Services Limited (GRENLEC) is desirous of reducing its dependence on fossil fuel for electricity generation. This is in keeping with the National Energy Policy (NEP) that aims to achieve 100% renewable energy in both the electricity and transport sectors by 2030; the National Determined Contribution (INDC) in which Grenada commits to reducing its Greenhouse gas emissions by 30% of 2010 by 2025, with an indicative reduction of 40% of 2010 by 2030; and the National Sustainable Development Plan (NSDP) which prioritizes building a competitive green economy powered by clean, sustainable, and renewable energy at an affordable cost that respects the natural environment and improves the quality of life of the people of Grenada.

In achieving its objective, GRENLEC is partnering with Rocky Mountain Institute (RMI) the World Bank (WB) and the Caribbean Development Bank (CDB) to construct three solar plants around the airport on lands owned by Maurice Bishop International Airport. Specifically the World Bank will fund the Battery Energy Storage System (BESS), the new substation, upgrades on the transmission lines and the two access road segments. Although the three solar plants are associated facilities and will not be funded by the WB, they are included in this ESIA. The three plants will have a collective generation power of 15.1 MW amounting to roughly one half of the current installed capacity on the island. In keeping with the Physical Planning and Development Control Act, No 23, of 2016, an Environmental Impact Assessment is needed to support an application for permission to develop land if the proposed development could significantly affect the environment. This document contains the findings of an Environmental and Social Impact Assessment in support of GRENLEC's application for approval permit(s).

This document contains six sections and two appendices. Section 1 provides background information on the project including the impetus for the move to renewable energy (RE) noting that several local, regional and international agreements demand this shift and that this shift is important for Grenada's social and Economic development.

This section also includes the purpose for the ESIA which is to integrate and mainstream Environmental and Social (E&S) considerations into the project while ensuring compliance with both national and WB requirements, and the approach which includes screening, scoping, site assessment, desk review and stakeholder consultations.

The legal and regulatory framework that will guide the project implementation is provided in section 2. Included in the legislations and regulations are the Physical Planning and Development Control Act that demands the ESIA and sets its format, the Electricity Supply Act that gives GRENLEC the legal authority to generate and distribute electricity under the guidance of the Public Utilities Regulation Commission. National policies governing biological diversity, climate change issues, integrated coastal zone management and national land policy are also referenced. There are relevant regional and international agreements that will impact this project, these include the St Georges Declaration (SGD) of principles for environmental sustainability in the Organisation of East Caribbean States (OECS) and the Caribbean Challenge Initiative (CCI) both of

which call for stakeholder involvement in coastal zone management. The WB Environmental and Social Framework (ESF) and its attending Environmental and Social Standards (ESS) are essential as they bring into focus WB guiding principles for working with its Borrowing members. Eight of the ten ESSs have varying degrees of relevance for this project but ESS7 that addresses indigenous peoples and ESS9 relates to financial intermediaries are not currently relevant to this project.

A description of the project is provided in Section 3 looking at the locations, the designs, transmission/connectivity and alternatives. The sites are three vacant land areas north, east and west of the airport runway. The sites to the north and west are best described as brown fields while the site to the east is covered with vegetation. There is no endemic or endangered life form at this site. The vegetation cover is the result of regrowth, the site having been cleared for airport development in 1978. The southern tip of this site has approximately half an acre of thriving mangrove that should be protected.

Design wise, the solar panels will be mounted on low structures made of concrete or some other durable material. The electricity generated by these panels will travel either underground or overhead to the new substation to be built north of site one. All overhead electric wires will use the existing line route. There will of necessity be upgrades to some existing infrastructure to accommodate the new power surge.

In terms of Alternatives, the GRENLEC-RMI team examined five (5) different sites under ten (10) different scenarios and concluded that the three sites at the MBIA were the most feasible. This assessment examined four options for generating 15MW of electricity in Grenada: Option 1 – the GRENLEC proposal; Option 2 using multiple Independent Power Producers (IPP); Option 3 using other sources of RE (hydro, wind and ocean thermal energy); and Option 4, the Do-Nothing Option. In all cases the GRENLEC option of using the three locations at MBIA got deemed the best.

Baseline conditions for Grenada in general and the project sites specifically are presented in Section 4. Baseline conditions address the volcanic origin of the island and the presence of the active underwater volcano Kick-em-Jenny are provided. As it relates to climate, the report draws from Grenada's Second National Communication to the United Nations Framework Convention on Climate Change in discussing the changes in rainfall pattern, the elevated temperatures and the frequency and intensity of tropical storms and hurricanes.

Some social statistics for the community surrounding the project site are presented pointing to the mixed socioeconomic conditions in St. George, the parish in which the project is located. This parish has the second highest percentage of poor on the island and the island's premier tertiary education institution, St. Georges University, located in True Blue.

While two of the three sites earmarked for solar development are brown fields, the third site outside the airport fence east of the runway is virtually covered with vegetation. While the economic value of the vegetation cover is relatively low, its contribution to global environmental

benefits cannot be discounted. The assessment recommends that the mangrove vegetation at the southern end of the site be preserved.

Section 5 provides the analysis of the potential impacts of this project. WB category and screening criteria were used to determine E&S risks and potential impacts. Appropriate mitigation measures to address potentially harmful environmental and/or social consequences likely to result from the installation and operation of the solar plants are provided.

Each of the three sites was examined individually. Site 1 presented with a pond at the lower elevation and the substation at the higher elevation. The pond is connected to the sea by a tunnel that's built over. This makes it possible for pollution resulting from work on the substation and site one to enter the marine environment. Mitigation measures are provided to prevent construction works on the substation from impacting/polluting the pond and ultimately the coastal marine environment. Site 2 is enclosed within the MBIA fence and poses minimal challenge to the immediate environs. However, there is a world outside the fence that must be considered i.e the coastal sea, a small vegetation cluster and a hotel resort less than I Km away. Negative impacts from work at site two can include habitat loss, marine pollution and dust impact on the hotel and its human population. Sediment and dust mitigation could including screens, sprinklers and sedimentation ponds. Site 3 is currently covered with vegetation and is home to a small family of birds. Given the requirements for airport security, protecting the bird population in their current habitat will not be permitted. It is therefore recommended to trap and remove the birds and to conserve the fringe mangrove at the southernmost end.

To really understand the social landscape, extensive stakeholder consultations (through one-on-one interviews and focus groups with Non-government Organisations (NGOs), the private sector and departments of Government) were conducted. In addition to historic data on the sites and personal expectations, the consultations revealed the concerns and interest of Independent Power Producers (IPPs), private institutions like St. Georges University (SGU) and the Calliste Fishermen Cooperative. The IPPs feel left out, they argue that GRENLEC is making no provision for their involvement, the SGU would like to be involved in the production since they see themselves as one of the largest consumer on the island while the Fishermen Cooperative wants to know how they can get in on the market.

1.0 INTRODUCTION

1.1 Project Background.

The Grenada Electricity Services Limited (GRENLEC) is seeking to increase the resilience of its electricity network, while reducing its dependence on diesel (fossil fuel) for electricity generation. This is in keeping with the principles and objectives of the National Energy Policy (NEP) which aim to obtaining energy security, energy independence, energy efficiency and green energy among other immediate energy issues[1]. Like many other Caribbean countries, Grenada is a signatory to the Paris Agreement and has established a Nationally Determined Contribution of 40% reduction in emissions below 2010 levels by 2030. These all will serve to achieve the objective of limiting the environmental health impacts of energy usage. In addition, the island nation aims to achieve 100% renewable energy in both the electricity and transport sectors by 2030.

Further, Grenada is on board with the Caribbean Efficient and Green Energy Buildings (CEGEB) Program, a regional Series of Projects (SoP) designed to address common challenges in the energy sector that countries in the region face. The Caribbean Efficient and Green-Energy Buildings Project is the first proposed project in the series and will include Grenada, Saint Lucia and Guyana. The World Bank will be supporting Grenada's Ministry of Climate Resilience, the Environment and Renewable Energy in implementing the Project.

As a major partner in the energy sector in Grenada, GRENLEC is proposing the installation of a micro-grid consisting of three (3) ground mount utility-scale solar farms, a battery energy storage system, and a new substation all on lands owned by the Maurice Bishop International Airport (MBIA). The proposed system would be designed to decouple from the Grenada grid to provide localized electricity during grid outage situations.

This project involves the construction of three small solar plants, a substation, upgrade to transmission lines in the vicinity of the MBIA and the construction of two road sections to improve access to sites one and three. The sites under consideration are i), a thirteen (13) acre plot north of Hardy Bay, ii) A seven (7) acre plot west of the runway and iii) a sixteen (16) acre lot outside the airport fence to the south east. Sites one and two are devoid of vegetation and most of site three has been cleared several times for airport security reasons, the latest clearing as late as 2006[2].

This proposed development is estimated to generate 15.1 MW of electricity, approximately 32.9% of GRENLEC's installed capacity. To accommodate this boost in electricity, new transmission lines will need to be constructed between the airport and the Grand Anse substation. The intent is to follow the existing pole route so that there is no displacement of residents or acquisition of private lands.

[1] National Energy Policy, A Low Carbon Development Strategy for Grenada, Carriacou and Petite Martinique.
[2] Report from Ground Maintenance at MBIA

In keeping with Grenada's Planning and Development Control Act of 2016, an Environmental and Social Impact Assessment is required for environmentally sensitive projects. The findings of the ESIA are the subject of this report.

1.2 Purpose and Scope of This ESIA

The purpose of this ESIA is to ensure that the installation and operation of the proposed microgrid is carried out in an environment friendly and socially benign manner according to national and international standards. This document should be used as a guide during project preparation and implementation to ensure that environmental and social concerns are integrated into planning, implementation, and monitoring of project supported activities. To ensure good environmental and social risk management of the proposed project, this ESIA provides mechanisms for ensuring adequate levels of environmental and social considerations are integrated into each stage of the project-cycle. The specific objectives of this ESIA are to:

- Integrate the environmental and social concerns into the identification, design and implementation of all project interventions in order to ensure that those are environmentally sustainable and socially feasible;
- Ensure all relevant environmental and social issues are mainstreamed into the design and implementation of the project;
- Consider in an integrated manner the potential environmental and social risks, benefits and impacts of the project and identify measures to avoid, minimize and manage risks and impacts while enhancing benefits;
- Ensure compliance with national and World Bank requirements. The ESIA will facilitate compliance with the policies (Acts and Regulations) of the Government of Grenada, as well as with the World Bank's Environmental and Social Standards (ESSs) of the Environmental and Social Framework (ESF).

The ESIA examined the physical, biological and social conditions of the sites for the three solar plants, the substation and the two road segments. It identified impacts (negative and positive) likely to result from the implementation of the activities necessary for the implementation of all aspects of the project including the upgrading of some transmission lines connecting Grand Anse substation to the new substation to be built at MBIA. The assessment provides mitigation measures to offset negative impacts and discuss alternative locations and technologies to that presented for the solar plants.

1.3 Approaches and Methodology

The assessment used a multipronged approach as follows:

1. **Screening**: This assessment used a screening checklist (Appendix 1) to determine the level of assessment needed.

2. **Scoping**: Scoping assessment to narrow down onto the critical issues that will require assessment during the study and identified elements such as relevant policies and legislation, possible impacts and preliminary measures to avoid, manage, or mitigate identified impacts.

3. **Research/Desk review**: Examination of documents including the Laws of Grenada, policy statements, multilateral environmental agreements (MEAs), cabinet decisions and relevant historic records; discussion with the Client, Landowner (MBIA) and community members.

4. **Site assessment**: Site visits were undertaken to physically inspect the site characteristics, their biological diversity and also to determine anticipated impacts.

5. **Stakeholders Consultations:** Stakeholder engagement is critical in identifying social impacts and agreeing on appropriate mitigation responses. This assessment used seven (7) small groups, nine (9) one-on-one face to face meetings and four sessions on the zoom platform to engage a total of fifty two (52) persons from a wide stakeholder population.

6. **Reporting and documentation**: The final output from the foregoing is this ESIA Report produced in accordance with the requirements of the Physical Planning Department of Grenada containing information obtained from site assessment, literature search, stakeholder consultations and the laws of Grenada; shared with stakeholders and potential investors.

2.0 LEGAL AND REGULATORY FRAMEWORK

2.1 Introduction

Environmental management in Grenada is governed by several different policy and legislative instruments, operationalized through the work of national agencies in collaboration with other regional, and international entities. This section elaborates on the policy, legal, regulatory, and institutional framework within which the proposed solar project is expected to operate.

2.2 National Policies

2.2.1 National Environmental Management Policy and Strategy

Grenada's National Environmental Policy and Management Strategy (NEP/MS) prioritizes the environment as central to social and economic development. Although planned for update in 2024, the present NEP/MS is considered the flagship instrument for environmental sustainability within the state of Grenada. Seven interrelated principles underpin this instrument,[3] all of which are applicable to the proposed venture. While all of the objectives are somewhat related to the project, three (3) are of particular significance:

- Biodiversity conservation
- Preventing the negative impacts of environmental change and natural disasters, with a clear focus on building resilience in these systems
- Optimizing the contribution of the environment to the production and trade of economic goods and services.

2.2.2 National Climate Change Policy for Grenada, Carriacou and Petite Martinique

The existing policy for the State of Grenada recognizes the reality that climate change is "upon us" and that urgent and decisive actions are required to combat this crisis. It therefore envisions an empowered society with the capacities to manage climate induced risks through pursuit of a low carbon development pathway while building resilience at all levels. The proposed solar project supports attainment of the policy's outcome to reduce greenhouse gas (GHG) emissions, consistent with the Nationally Determined Contributions (see Section 2.2.3).

2.2.3 Nationally Determined Contributions

Grenada prepared its Second Nationally Determined Contribution (NDC) in 2020 pursuant to Article 4 of the Paris Agreement. The State commits to reducing its GHG by 40% of the 2010 emission levels by 2030 through four priority sectors:

[3] Precautionary approach, equitable distribution of benefits, accountability and transparency, public participation, compliance with the rule of law, public awareness and education.

- Energy (including domestic transport)
- Forestry
- Waste
- IPPU (cooling sector).

GRENLEC's proposed solar project supports pursuit of the NDC's ambitious target through increased investment in clean sources of energy. Determination of the GHG emissions avoided through the proposed solar intervention would be useful in the NDC's reporting process.

2.2.4 Integrated Coastal Zone Management Policy for Grenada, Carriacou and Petite Martinique

Grenada's Coastal Zone Policy is positioned within frameworks and institutional systems that demand sustainable use of coastal and ocean areas and their resources. Governance, ecological and socioeconomic dimensions, and the interaction between these three aspects form the basis of the integrated coastal zone management (ICZM) program.

According to the Climate Risk Atlas for Grenada and the Second National Communication, the country has already experienced significant losses due to sea level rise, elevated sea surface temperatures, and increasing intensity of storms and hurricanes (GoG,[4] 2017; Caribsave, 2012). To reverse this trend, there must be an immediate national response for adaptation to improve and increase the resilience of key marine ecosystems to ensure protection and conservation of habitats and species. This strategic response is captured through the State's National Adaptation Plan which is currently being updated.

2.2.5 Revised Forest Policy for Grenada Carriacou and Petite Martinique

The Revised Policy is designed to maximize the contribution of forests to Grenada's environmentally sound social and economic development and to ensure the resilience and sustainability of the resource. While most of the policy's objectives are directly or indirectly relevant to the proposed project, the policy's focus on promoting sustainable management of wetlands (e.g., mangroves) and dry forest ecosystems are particularly important due to the resident vegetative communities found within the proposed project sites (Objective 4). While clearing of vegetation is an inevitable action of the proposed project, preservation of existing mangrove forest should be considered.

2.2.6 National Land Policy

Grenada National Land Policy tackles key issues affecting the sustainable management of land resources. The main priorities addressed were the limited land available for housing in urban areas, changing land use patterns, the absence of an institutional framework for integrated

[4] Government of Grenada (GoG).

natural resource management, existing gaps in the policy and legal framework, and mechanisms for building resilience to climate change. The policy therefore envisions the establishment of the enabling framework for sustainable land management (SLM) and ecosystem resilience to allow for the following:

- A safe, clean and pristine natural environment
- Conservation of biodiversity and ecosystem integrity
- Maintenance of a distinct archipelagic landscape/seascape
- Building and maintaining resilience to climate change
- Promoting/advancing balanced national development
- Supporting agricultural productivity and food security and improved access to land for housing.

2.2.7 National Energy Policy for Grenada

Building on the work done in 2011, government is in the process of finalizing a National Energy Policy and Action Plan for Grenada. The 12-year instrument (2023-2035) developed in sync with the National Sustainable Development Plan (NSDP) prioritizes building a competitive green economy powered by clean, sustainable, and renewable energy at an affordable cost that respects the natural environment and improves the quality of life of the people of Grenada, Carriacou and Petite Martinique. The policy is structured around three overarching themes: A thriving economy, energy independence, and a sustainable, resilient energy sector. Grenlec's proposed renewable energy (RE) intervention is consistent with the thrust of the policy, in particular Goal 3 which seeks to accelerate transition from fossil fuels to a more sustainable mix of RE sources.

2.2.8 National Sustainable Development Plan (NSDP)

The NSDP articulates Grenada's premier development trajectory for the 15-year period 2020-2035. It imagines and desires a resilient and prosperous Grenada, with a caring and conscious citizenry that promotes human dignity that realizes it full potential through sustainable progress for all. Energy security and efficiency is one of eight (8) development outcomes anticipated through the Plan's implementation with a strong focus on renewable energy technologies. The proposed solar project by GRENLEC is aligned with the government's national plan for advancement in the medium to long term. Maximizing the benefits available through this intervention for attaining energy security built on clean sources of power, while minimizing the negative impacts on the environmental and social systems is a top priority.

2.2.9 Gender Equality Policy and Action Plan (GEPAP)

Grenada's Gender Policy 2014-2024 recognizes and appreciates the differences between men and women and seeks to achieve equality, through a focus also on equity. The GEPAP aims to guide and inform the development of gender-responsive policies, plans and programmes; allocate the necessary resources to achieve this; and monitor and evaluate gender equality and

equity outcomes. It is intended to be used as a guide by the private sector to support gender responsive and socially responsible business activities, and by civil society to provide complementary services to advance gender equality. The Policy and Action Plan also provides a platform for dialogue among state/private sector/civil society agencies, fostering collaboration and accountability with respect to the needs of men and women, and to gender equality.

The stakeholder consultation for this project took full cognizance of the role of women and men in development and sought to integrate measures from the GEPAP including gender equality to promote capacity building and resource distribution in environment, education, good health, sexual and reproductive health; *assessing the implications for women and men of any planned action, including legislation, policies or programmes, in all areas and at all levels;* to position women in the workforce in all phases of the proposed project.

2.2.10 Grenada Airport Authority Related Instruments

The Grenada Airport Authority (GAA) is a statutory corporation responsible for the management, control and supervision of all operations at the MBIA (GAA, n.d.), the site for the proposed project. The Authority has developed various policies and guidelines of relevance to the design, construction, and operation of the proposed solar plant. Applicable instruments are presented in Appendix 3. Ensuring compliance with these policies and guidelines during the construction and operational phases is required to maintain the high level of security at the Airport while preventing and/or mitigating any risk or impacts to aviation activities.

2.3 Legislation and Regulations

Over recent decades, Grenada has enacted and amended several pieces of legislation and regulations that support the country's environmental management efforts aimed at protecting, conserving, enhancing and restoring its natural resources. The ones most relevant to this activity are referenced hereunder.

2.3.1 The Physical Planning and Development Control Act, No 23, of 2016

The Act makes provision for the orderly and progressive development of land and to preserve and improve associated amenities. It also grants permission to develop and use land, for the regulation of building construction and related matters, and to protect the natural and cultural heritage.

Part IV, Section 22 makes provision for the conduct of an Environmental Impact Assessment to support an application for permission to develop land if the proposed development could significantly affect the environment. Schedule III outlines projects for which an environmental impact assessment is normally required. While solar projects are not included specifically in this Schedule, the Act makes provision for the Authority to identify any such projects that in their perspective should be reviewed through the environmental impact assessment process. For this project, the Planning and Development Authority will review the ESIA. Planning approval is necessary for the execution of the project.

Section 22 (4) provides for the drafting of regulations under the Act to guide the conduct of Environmental Impact Assessments. These instruments, however, are not available.

Part VII of the Act makes provision for the adoption of a building code with respect to the design and construction of buildings and the provision of services, fittings, and equipment. The Act notes that no development permit shall be issued for any building operations where the plans are not in accordance with the Building Code and related matters. Such approval is issued for the overall project and not for individual activities under the project.

2.3.2 Public Utilities Regulatory Commission Act, 2016, Amended 2017

This legal instrument establishes the Public Utilities Regulatory Commission (PURC) to determine rates for public utilities and to perform certain other functions respecting such entities. Section 17 specifies the functions of the Commission, which includes inter alia regulating the public utility sector and enforcing the terms and conditions of any license granted or issued pursuant to the Act.

2.3.3 Electricity Supply Act No. 19 of 2016, Amended 2017

This Act makes provision for the regular, efficient, co-coordinated, and economical supply of electricity, and the development of electricity supply from renewable energy resources, and for connected purposes. Part III provides a framework for the accelerated development of the supply of electricity from renewable resources and for the efficient generation and use of electricity to transition to an affordable, low-carbon, energy network. Part V, Section 26 (B) indicates that every licensee or permit holder shall facilitate the use of renewable energy resources for the generation of electricity which is consistent with the proposed solar project. Part IV speaks to licensing. The requirements and powers for licensee or permit holders to supply electricity is outlined in Part V. GRENLEC's compliance to applicable aspects of this Act are required.

2.3.4 Electricity (Generation Expansion Planning and Competitive Procurement) Regulations, 2022

The Office of the PURC has promulgated several regulations which govern energy generation and renewable energy systems. The most applicable for the proposed solar project is the Generation Expansion and Competitive Procurement Regulation. The regulation specifies that a network licensee shall prepare its sustainability and expansion plans in accordance with Section 37 of the Act and these regulations. Procurement of new generation capacities shall be subject to the rules established in the Act and these regulations.

Part III makes provision for expansion planning and underscores that a network licensee shall in consultation with the Commission/PURC carry out an Infrastructure Gap Analysis to guide the future investment in generation, transmission, and distribution of electricity. This analysis should also analyze the environmental cost and constraints, taking into consideration existing energy sources in Grenada including their economic, environment, and efficiency features and concerns. On completion of the gap analysis, the licensee shall consult with sectorial stakeholders and

subsequently submit the gap analysis and prioritized projects for the Commission's approval (Sections 6 and 8).

Further, Sections IV and V address matters pertaining to transaction and procurement of a generation project and contract management.

2.3.5 Electricity (Generation Expansion Planning and Competitive Procurement) Regulations, 2022

The Office of the PURC has promulgated several regulations which govern energy generation and renewable energy systems. The most applicable for the proposed solar project is the Generation Expansion and Competitive Procurement Regulation. Under the Act the Minister may, by Order, declare any area of the fishery waters to be a fishing priority area where he or she considers that special measures are necessary to ensure that authorized fishing within the area is not impeded or otherwise interfered with (Part III, Section 21). Further, Section 23 provides for the establishment of Marine Protected Areas (MPA) such as the Grand Anse MPA which is located adjacent to the proposed project site. Amendments to the Act are documented in Act No. 25 of 1989, Act No. 1 of 1999.

2.3.6 Grenada's Electricity Supply Act # 19

Sections 38 and 40 of Grenada's Electricity Supply Act # 19 which makes provision for network licensee to erect or fix in, on, under or over any land, or off-shore, any pipe, electric line or other works or apparatus used or to be used in the installation or working of its undertaking. Section 38 .(1) states that Subject to sub-sections (2) and (3) a network licensee may, erect or fix in, on, under or over any land, or off-shore, any pipe, electric line or other works or apparatus used or to be used in the installation or working of its undertaking. (2) A network licensee shall first give notice in writing of its intention to the owner or occupier of any land, including any public body, if the owner or occupier can be ascertained, or (if he or she cannot be so ascertained) post up such a notice conspicuously on the land in question for a period of at least fourteen days prior to commencing any erection or fixing any work or apparatus in, on, under or over such land. (3) If the owner or occupier shall, within fourteen days from the service or posting up of such a notice, give notice in writing to the network licensee of his or her objection thereto, the network licensee shall not enter upon the land in question.

40. (1) It shall be lawful for a network licensee and, subject to receiving the permission of the Chief Technical Officer and the network licensee making good to the reasonable satisfaction of the Chief Technical Officer (Works) or successor all damage occasioned thereby, to erect, place or replace pipes and electric lines along or under or over any road, street or bridge in Grenada, to remove or repair any such pipe or electric line and, for the purpose of erecting, placing, replacing, removing or repairing the same within such road, street or bridge to break up and excavate any such road, street or bridge, subject to the following conditions:

(a) the network licensee shall give to the Chief Technical Officer (Works) or successor written notice of its intention, specifying the time at which it will begin to do so and the portion of the road, street or bridge proposed to be broken up and excavated, the notice to be given at least seven days before the commencement of the work, unless the work is to remedy a dangerous situation or a situation that has interrupted or imminently threatens to interrupt the supply of electricity, in which case notice may be dispensed with.

2.3.7 Fisheries (Marine Protected Area) Regulations, 2001

This regulation functions within the power conferred by Section 40 of the Fisheries Act (Act No. 15). It makes provision for the establishment of a Management Authority which comprises the MPA Manager and a multi-sectorial Management Committee (Sections 3 and 4). Prohibited actions within MPAs are presented in Section 6. These include inter alia:

- Destroys, damages, or injures any animal or plant,
- Takes or damages any artefacts.
- Anchors a vessel except in the anchoring zone.
- Dumps any refuse, abandoned vehicle, toxic or other waste, bilge, oil or other petroleum product …or any substance which does or is likely to destroy or reduce ammonites of the area.

2.3.8 Integrated Coastal Zone Management Act, 2019

This Act establishes the enabling framework to facilitate the integrated management of the coastal resources for the conservation and enhancement of those resources in the State of Grenada. Part II, Section 4 specifies that a draft Coastal Zone Management Plan shall be prepared for the approval of the Minister. This shall include among other matters standards for environmental impact assessment for development that may affect the conservation and management of coastal resources. The Plan should also outline standards for early warning systems for coastal hazards. While a necessity, such a Plan is not yet available.

Part III outlines measures for the preservation, protection, and enhancement of coastal resources within restricted areas, including the biodiversity, beauty and archaeological interest within the area. The Grand Anse MPA around the project site is considered a prohibited area as established in Section 13 of the Act. An order under subsection (1) of the act may restrict or prohibit the removal of species of such flora or fauna or other items from the prohibited area (it should be noted that no site to be occupied or cleared by this project is classified as Prohibited Area, all lands to be occupied by this project are owned by MBIA); such removal can be considered an offense unless they are removed by or on behalf of the Director. Section 22 makes it an offense to damage any regulated coastal resource within MPAs. Similarly, Section 22 cautions that anyone who carries out any kind of sand mining from any beach commits an offence, unless such material is removed by or on behalf of the Director or with his/her approval as is the case of the Gravel and Concrete Emulsion Production Corporation.

Penalties are addressed in Part V of the Act. Compliance to the intent of the Act to ensure the conservation and enhancement of the adjacent MPA and other parts of the marine and coastal ecosystems is pivotal.

2.3.9 Waste Management Act No. 16 of 2001

The Waste Management Act No 16 of 2001 provides for the management of waste in conformity with best environmental practices and related matters. This Act builds upon the Solid waste Management Act No 11 of 1995, which established the Solid Waste Management Authority. The Authority is responsible for the development of solid waste management facilities and improving the coverage and effectiveness of solid waste storage, collection and disposal facilities of Grenada.

The proposed solar project will use the facilities provided for under the Act to safely dispose of any waste it may generate (see Part V). Importantly, Section 29 of the Act prescribes that the Authority must prepare and maintain contingency plans for among other things restoration of waste management services following a hurricane or other natural disaster.

2.3.10 Forest Soil and Water Conservation Act 34 of 1984

The Act makes provision for the establishment of a Forestry Department and to effect the permanent preservation of tree cover so as to prevent soil erosion and flooding and to protect water supplies among other matters.

2.3.11 Noise Control Act No. 7 of 2006

This Act provides for the regulation and control of noise. It is structured around the premise that every person in Grenada shall observe the basic principle that the making or continuance of excessive noise shall be deemed to be unreasonable and shall be actionable under this Act. Section 9 of this Act outlines the prior consent required for work on construction site. A person who intends to carry out works on a construction site as outlined in Section 10 shall make an application to the Minister for consent. Any person who carries out works or permits the works to be carried out, in contravention of any condition attached to the consent under Section 9 is guilty of an offence. The Act also makes provision for limiting the noise emitted at construction site by adopting best practices and to protect persons in the locality in which the works are conducted. Penalties under this Act are presented in Section 28.

2.3.12 Employment Act, 1999 (Amended)

The Act establishes the Department of Labour, headed by a Labour Commissioner. Part IV outlines the fundamental principles guiding employment within the State. Section 25 prohibits forced labour. As set out in Section 26, no person shall discriminate against any employee on grounds such as race, colour, national extraction, social origin, sex, status, age or disability with respect to recruitment, promotion, terms of employment, termination or other matters related

to employment. Such offences are liable to summary conviction to a fine not exceeding EC$10,000 and not exceeding three years in prison or both (Section 25). The Act also makes arrangement for equal pay for equal work (Section 27).

2.3.13 Domestic Violence Act, 2010

This Act provides increased protection for victims of domestic violence and makes provision for the granting of protection orders, and for matters connected to this issue. The Act was amended by SRO 15 of 2011.

Other applicable pieces of legislation that addresses domestic violence in Grenada are the Criminal Code, Cap 1 and related amendment, and the Common law.

2.4 Applicable Regional Agreements

2.4.1 Revised St. Georges Declaration of Principles for Sustainable Development

Grenada is a signatory to the Revised St. Georges Declaration of Principles on Environmental Sustainability in the OECS, hereinafter call SDG 2040. The 2040 agenda is enshrined in the Islands Systems Management Framework which recognizes the imperative of integrated planning and management for economic, social and ecological resilience (OECS, 2020). SDG 2040 agenda envisions a healthy and productive environment, supporting the well-being and aspirations of the Eastern Caribbean. Sustainable energy and climate and disaster resilience are two of six strategic priorities promoted through SDG 2040.

2.4.2 The Caribbean Challenge Initiative

The Caribbean Challenge Initiative (CCI) is a commitment by Caribbean Countries including Grenada to:

- Conserve and effectively manage at least 20% of their nearshore environments by 2020 (the 20-20 goal).

- Ensure that these conserved areas are effectively managed into the future through a reliable, long-term finance structure (CCI, n.d.).

The proposed project should be designed, constructed and operated within a manner that respects these strategic goals and the intent of the CCI.

2.5 World Bank Development Standards and Multilateral Environmental Agreements

2.5.1 World Bank Environmental and Social Performance Standards

The World Bank has operationalized an Environmental and Social Framework (ESF) which establishes its commitment to sustainable development. Integral to the ESF are a set of Environmental and Social Standards (ESS) which outlines the requirements for Borrowers' (The

World Bank, 2017). Six of these standards have direct relevance to the proposed project as described in Table 2. Integration of the underpinning principles and practices of these ESS are required in the design, construction, and operation of the proposed solar plant.

Table 2 World Bank ESSs

ESS Standard	Relevance
ESS1 Assessment and Management of Environmental and Social Risks and Impacts	ESS1 seeks to assess, manage, and monitor environmental and social risks and impacts associated with the proposed project. This standard is therefore relevant due to the likely risks and impacts associated with the proposed project, including but not limited to (i) destruction of vegetative communities, (ii) safety risk to aviation activities at MBIA, (iii) generation and disposal of hazardous and non- hazardous waste, (iv) risk of forced labor in global supply chain for solar panels and solar component, and (v) occupational health and safety. Such risks and impacts are identified and managed through the risk management strategies in the ESIA and ESMP.
ESS2 Labor and Working Conditions	ESS2 aims to promote good worker-management relationships and maximize the benefits derived from employment opportunities provided through the proposed project. It is therefore important that the proposed project adopts employment practices that are non-discriminatory and transparent, reduce likely risks in the supply chain as is feasible, promote safe work approaches and practices, and treats workers fairly.
ESS3 Resource Efficiency and Pollution Prevention and Management	ESS3 is relevant due to risks associated with pollution of land, air, and water and the improper management and disposal of construction and/or hazardous waste during the project's operation.
ESS4 Community Health and Safety	While the risk and impacts on project communities are not anticipated to be significant, it is imperative that the necessary actions are taken to prevent and reduce adverse impacts on the health and safety of surrounding communities, MBIA staff, and visitors during the construction and operation of the solar project.
ESS5 Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	ESS5 is relevant. "*GRENLEC would be using the same route that the existing 11kV lines follow so there would be no displacement (neither economic or physical)of residents of the area*". However ESS5 is considered relevant as a precautionary measure, just in case additional land is needed to be acquired, along the transmission line route.
ESS6 Biodiversity Conservation and Sustainable Management of Living Natural Resources	Fostering biodiversity conservation and wise management of natural resources within the proposed project site and study area is of paramount importance.
ESS7 Indigenous Peoples.	ESS7 is not relevant within the context of the proposed project.
ESS8 Cultural Heritage	ESS8 is relevant due to evidence of reported archeological finds in close proximity to one of the proposed sites for installing the solar PV infrastructure. Congruence with appropriate mitigation measures is pivotal, especially during construction.

ESS10 Stakeholder Engagement and Information Disclosure	ESS10 is relevant for all projects given the need to engage with beneficiaries, affected and interested stakeholders on development activities that affect their lives.

In addition to the ESF and ESSs, the Bank's General Environmental Health and Safety (EHS) Guidelines will be applied as appropriate. The General EHS requires that attention be given to (a) the Environment, (b) Occupational Health and Safety (OHS), and (c) Community Health and Safety, as described below:

1. Environmental

- Air Emissions and Ambient Air Quality
- Energy Conservation
- Hazardous Materials Management
- Waste Management
- Noise and vibrations from trenching
- Contaminated Land

2. Occupational Health and safety

- Physical Hazards associated with construction
- Personal Protective Equipment (PPE)
- Special Hazard Environments
- Monitoring

3. Community Health and Safety

- Surface water runoff affecting coastal water quality
- Structural Safety of Project Infrastructure
- Life and Fire Safety (LFS)
- Traffic Safety
- Disease Prevention
- Emergency Preparedness and Response

2.5.2 Multilateral Environmental and Other Agreements

Grenada is a party to various multilateral agreements on environmental management, social development, and occupational health and safety as presented below. This project will comply with the principles and relevant aspects of these instruments.

The United Nations Framework Convention on Climate Change (UNFCCC): Acknowledging the global nature of climate change, the UNFCCC calls for the widest possible cooperation by all countries and their participation in an effective and appropriate international response, based on their common but different responsibilities, capabilities and their socioeconomic conditions. Driven by extreme vulnerability, the Small Island Developing States (SIDS) including Grenada continue to be at the forefront of the response to climate change. Although their contribution to global GHG is negligible, SIDS continue to make appropriate international response in accordance with their capabilities, and social and economic conditions. The project under consideration reflects Grenada's response to cut GHG emissions by 2030 and the support of international partners to achieve this target.

The United Nations Convention on Biological Diversity (UNCBD): This convention seeks to protect the diversity of life and their supporting habitats. Grenada ratified this convention and is therefore obligated to protect its biological resources including aquatic and marine life forms. In its revised National Biodiversity Strategy and Action Plan 2016-2020, Grenada made the commitment to protect and restore its national terrestrial and marine ecosystems and sustainably managed priority ecosystems including forest, agricultural lands, fresh water and coastal and marine areas in keeping with Aichi Targets 6, 7, 8, 9, 10, 11, and 14.

The United Nations Convention to Combat Desertification (UNCCD): The UNCCD is committed to a bottom-up approach that encourages the participation of local people in combating desertification and land degradation. The UNCCD secretariat facilitates cooperation between developed and developing countries, particularly around knowledge and technology transfer for Sustainable Land Management (SLM). Grenada is currently pursuing efforts to implement actions to achieve the Land Degradation Neutrality in accordance with its specific national circumstance and development priorities.

The Cartagena Protocol on Land Based Source (LBS) of Marine Pollution: While Grenada has not yet ratified the LBS protocol, it participates in organized regional efforts. Given the significance of the marine environment to Grenada, and the proximity of the Grand Anse MPA to the proposed project site, applicable elements of the protocol would be considered. In this regard, the project's waste management strategy will ensure that no waste from construction reaches the marine environment.

3.6.3 Other Multilateral Agreements

- 2030 Agenda for Sustainable Development
- The Sendai Framework for Disaster Risk Reduction.

- ILO[5] Convention 155 – Occupational Safety and Health Convention (Ratified in 2012).
- The Beijing Declaration and Platform for Action (1995); and the Commonwealth Plan of Action for Gender Equality (2005-2015).
- International Covenant on Economic, Social and Cultural Rights (ratified 1991).
- Inter-American Convention on the Prevention, Punishment and Eradication of Violence Against Women (ratified 2000).

[5] International Labour Organization (ILO).

3.0 PROJECT DESCRIPTION

GRENLEC's ground mount utility-scale Solar PV and Battery Storage Project would be located in the parish of St. Georges on lands owned by the MBIA. For the purpose of this ESIA, the project is considered as having six (6) components, namely, three solar plants located at sites labelled site one (S1), site two (S2) and site three (S3), a substation and a battery energy storage system (BESS) north of S1 (Figure 3a) with connective pathways to the solar plants, two road segments allowing external access to sites S2 and S3 and installation of new transmission lines and poles between MBIA substation and Grand Anse substation.

Collectively the project is expected to generate 15.1 MW of electricity, enough to exceed Grenada's 2020 renewable energy (RE) target. Based on the results of the research undertaken by GRENLEC, this PV solar installation will include a 12MWh Li-ion BESS to enhance grid stability and improve the integration of supplementary renewable energy sources.

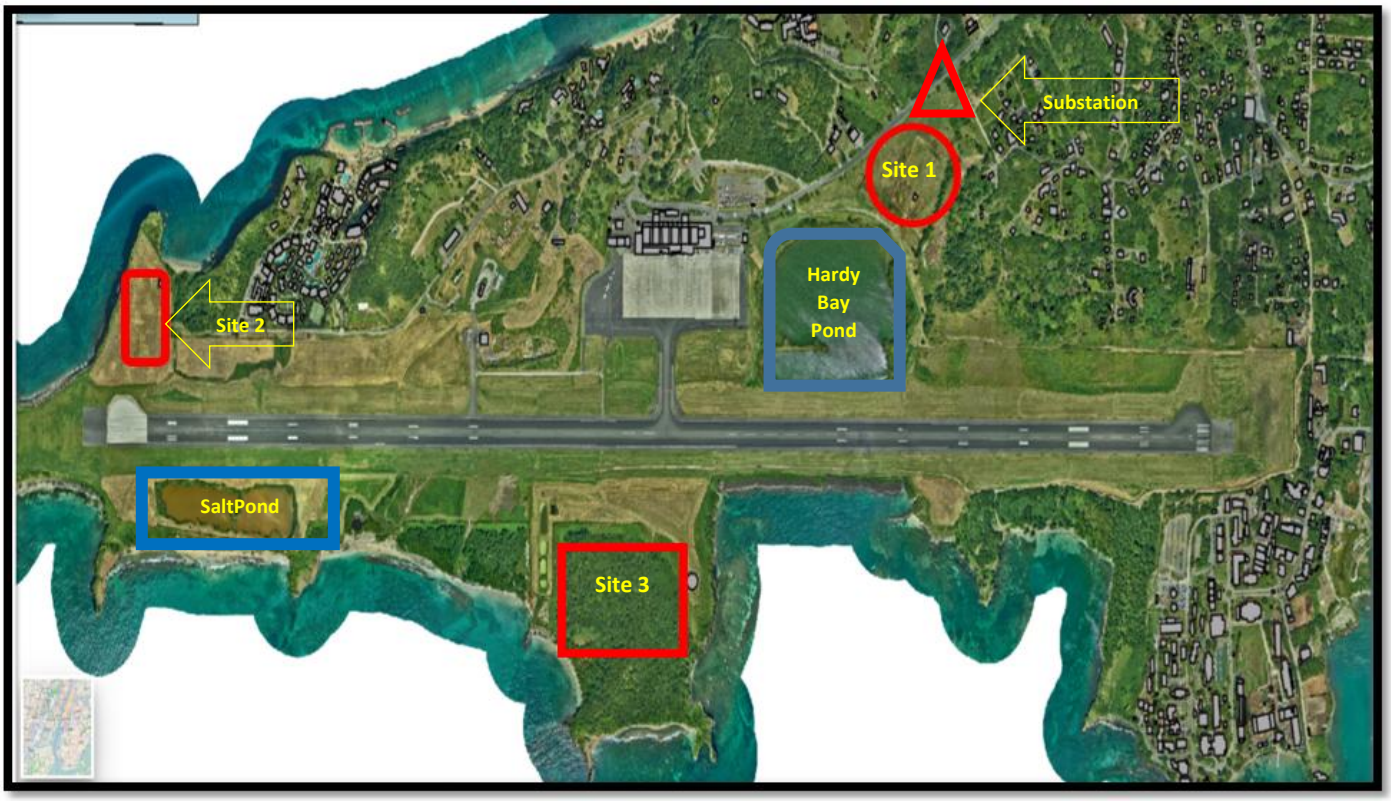


Figure 3a Location of proposed sites

Sites 2 and 3 are located within the airport enclosure. In order to maintain the high level of security required by the airport, it would be necessary to access sites 2 and 3 without crossing active airport space. For this reason, two access roads will be developed giving external access to sites 2 and 3. The precise alignment of these road segments are not yet available.

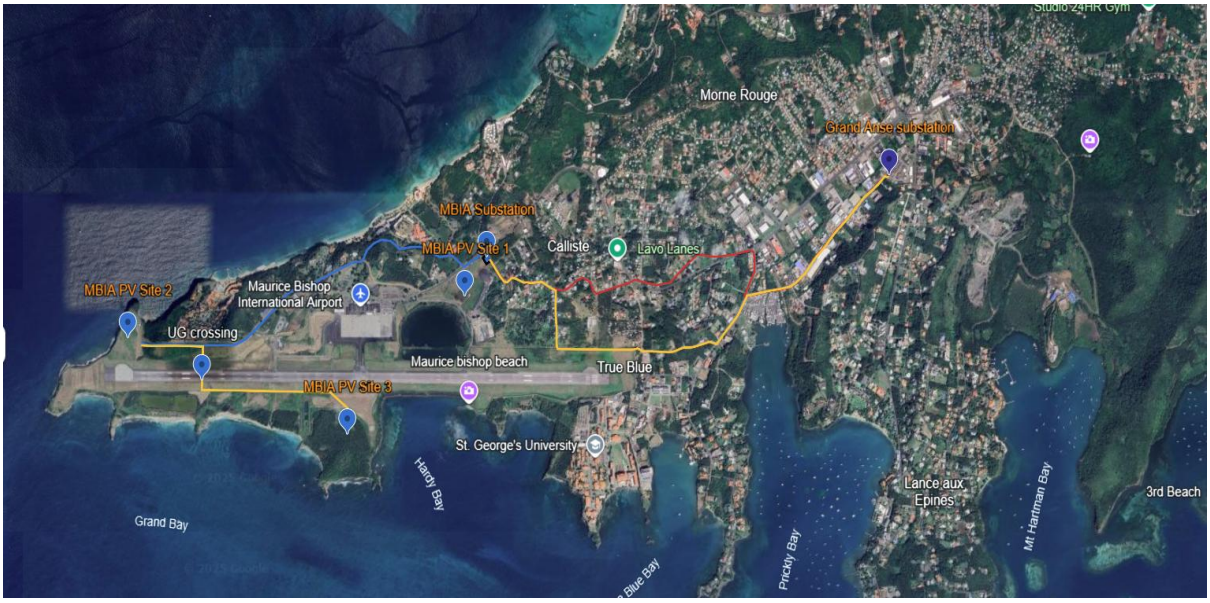


Figure 3 A. Yellow line underground, red is the overhead line, blue line is to be determine and can either be overhead or underground.

3.1 Design Considerations

PV Plants

A micro-grid at the airport consisting of 15.1MW of solar PV and 12MWh of battery storage would be able to support the load of the airport continuously with a very low likelihood of disruption of supply. Three sites have been selected for placement of solar panels. The preferred designs and parameters for each of the three sites are listed as follows:

- Fixed tilt racking
- Top edge panel height of 10 feet above ground level
- Tilt angle of 15° • azimuth angle of 180°
- Panels with anti-reflective coating

In addition, Barrette Energy Research Group (BERG) has modeled alternative designs including:

- Fixed tilt arrays with tilt angles ranging from 5° to 30°
- Fixed tilt arrays with azimuth angles ranging from 135° to 225°
- Single axis tracking designs with a maximum angle of 60° and a resting angle of 0°

Additional features like high quality stainless steel to withstand harsh coastal, tropical conditions; twenty (20) year lifespan with manufacturers 'take back' warrantee (Noting the experience of St.

Kitts where the solar plant at the airport became non-functional in less than ten (10) years; both panels and converters failed).

Substation, BESS and Transmission Lines

- A 33kV substation at the MBIA site to house switchgear, protection panels, BESS and supporting infrastructure.
- A 33kV dual transmission line linking the MBIA substation to GRENLEC's Grand Anse substation. Approximately 27000 feet of 175mm aluminum conductor will be replaced and some underground cable connecting the substation to the Grand Anse station along with 50 wooden poles each 45 feet tall replaced by poles 55 and 60 feet tall.
- A Battery Energy Storage System (BESS) to provide grid stability and spinning reserve capacity for the PV plant. This is likely going to be a commercial container package system.

Road Segments

Sites accessibility for maintenance and effective cleanup and restoration after tropical storms or other catastrophic events is a major consideration. For this reason, two road segments are considered:

1. A road segment to access Site 2. This road segment would one hundred and eighty meters long (180m) long by five meters (5m) wide with rock gravel base material and concrete or asphalt finish. The road will be supported by side drains >2 feet wide X 2 feet deep box drain with appropriate covers.

2. A road segment to access Site 3. This road segment would be twelve hundred meters long (1,200 m) long by five meters (5m) wide with rock gravel base material and concrete or asphalt finish. The road will be supported by side drains >2 feet wide X 2 feet deep box drain with appropriate covers.

3.1.1 Layout Considerations for PV Plants

There is no formal guidance with regard to the maximum distance at which glint and glare should be assessed. From a purely technical perspective, there is no maximum distance for potential reflections. However, the significance of a solar reflection decreases with distance. This is because the proportion of an observer's field of vision that is taken up by the reflecting area diminishes as the separation distance increases. With regard to ground-based receptors, terrain and shielding by vegetation are also more likely to obstruct an observer's view at longer distances.

Air Traffic Control (ATC) Receptors: It is standard practice to determine whether a solar reflection can be experienced by personnel within the Air Traffic Control (ATC) Tower. In the assessment model for this project, the air traffic control tower has been located in the model via its Google Earth interface, and the eye-level height of the controller has been designated as 33 feet above ground level. The two-mile final approach descent has also been input into the model with the glideslope set at 3 degrees. Using this foundational data, the model has calculated various sun angles at 1-minute intervals throughout the year to predict if glare could be observed by the sensitive receptors, specifically air traffic controllers and pilots on approach for landing. The findings were instructive for the preferred designs previously mentioned.

Dwelling Receptors: Dwellings have been identified within approximately 1km of the proposed solar development that are most likely to have visual line of sight to the solar panels (based on high-level review from local topographic survey).

Road Receptors: Most of the roads surrounding the proposed development leads to the airport hence the traffic density is a reflection of the airport activity and air traffic; the traffic density is rated as moderate to high. Local roads have not been considered for geometric modelling given their elevation relative to the proposed panels height, any solar reflections from the proposed development that are experienced by a road user would be considered low impact in accordance with the risk rating provided. The analysis considered major roads that are within one half kilometer assessment area from which the panels may possibly be viewed.

3.1.2 Connectivity (Transmission Lines and Poles)

Electrical power generated by the three solar plants at MBIA will be transmitted to the substations at S1 and Grand Anse using a combination of underground and overhead cables (Figure 3.1). There are existing tunnels beneath the airport runway and associated ground space to accommodate the passage of the requisite power cables. GRENLEC has obtained approval from the Grenada Airport Authority (GAA) for use of these tunnels for the passage of power cables. From the substation, the electricity would be fed into the national grid using existing pathways. To accommodate this integration, GRENLEC will make upgrades to its existing transmission lines and poles between the MBIA and the Grand Anse substations. The 45ft poles back to the Grand Anse substation will be replaced with 55ft poles. The 33kV transmission will be built on top and will most likely be constructed of 175mm^2 AAAC aluminum conductors (ampacity of 532 A). The existing Point Salines feeder will be constructed under the 33kV lines on the same pole. GRENLEC will maintain its construction technique used for existing transmission lines. The technique allows for transmission lines to use differential and distance protection as the primary and back up protection respectively. Once a fault is detected, the lines will trip and will remain de-energized until GRENLEC's personnel can repair the cause of the fault.

No additional lands will be required for the upgrade, and use of the existing lands is covered under Grenada's Electricity Supply Act # 19; (see section 2.3.6).

2.3.6 Grenada's Electricity Supply Act # 19

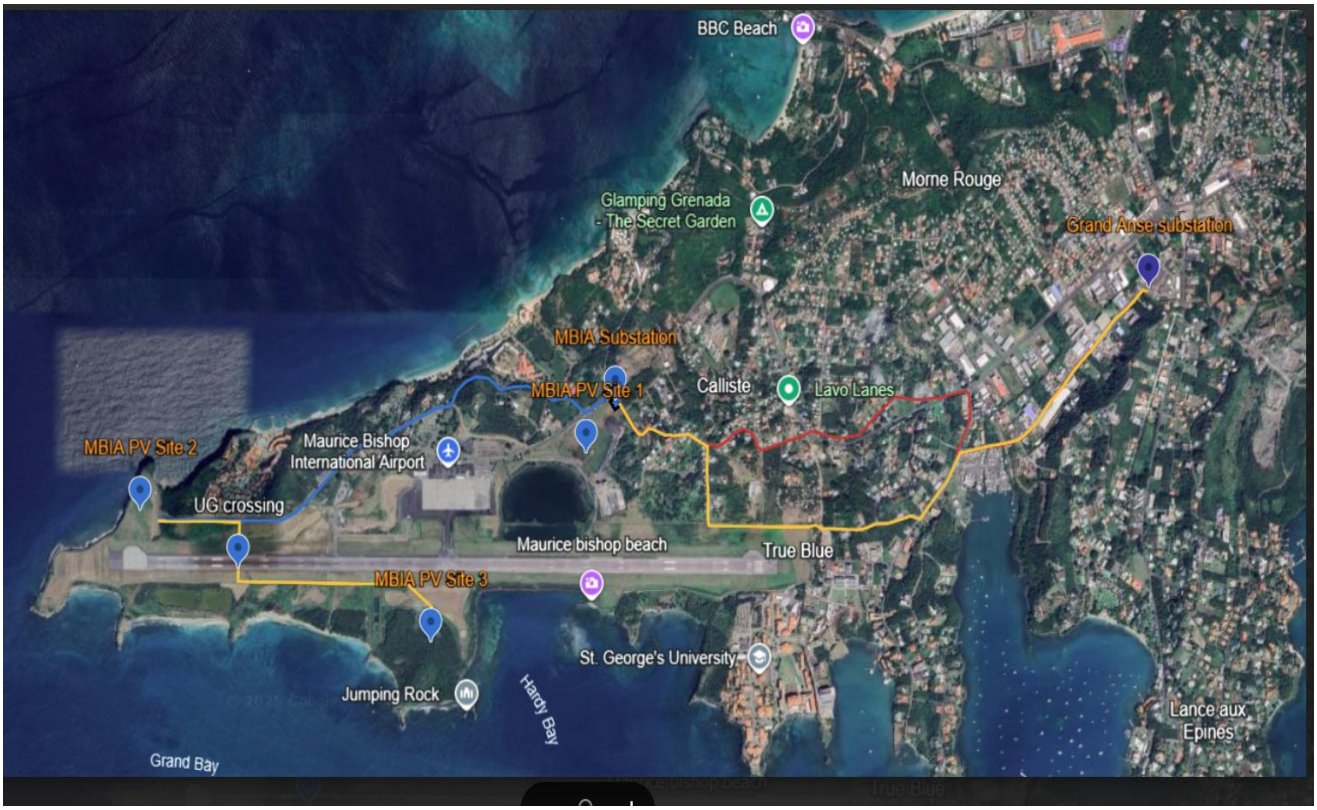


Figure 3.1 Showing connectivity pathway among the three sites. Yellow line underground, red is the overhead line, blue line is to be determine and can either be overhead or underground

3.2 Alternatives

1. Energy Source and Site Location

GRENLEC fuels its generators with diesel to generate electricity for Grenada. This project looks at an alternative to fossil fuel namely solar energy**.**

GRENLEC engaged with Rocky Mountain Institute (RMI) in its effort to achieve the national renewable energy targets of 100% RE by 2030. The GRENLEC-RMI partnership evaluated five (5) sites (Table 3a) under ten (10) different scenarios (individual sites as well as combinations of sites) (Table 3b) in order to determine the most technically and economically advantageous options to be pursued by GRENLEC.

Table 3a. Sites Evaluated by GRENLEC-RMI team

Site Location	Land Title/Ownership	Land Area
Maurice Bishop International Airport – West end of runway	Grenada Airport Authority	6.75 Acres

Maurice Bishop International Airport –North of pond	Grenada Airport Authority	12.66 Acres
Maurice Bishop International Airport- Outside south fence	Grenada Airport Authority	15.76 acres
Pearls	Leased by GRENLEC	39.48 Acres
Grenada Football Association (GFA) Land	Grenada football Association	10 Acres

Table 3b. Scenarios Assessed in Study

Site #	Scenario	Description
0	BESS for Spinning Reserve Only (no solar)	Installation of batteries to carry out spinning reserve functions, allowing for more efficient genset operation
1	Two airport sites	Installations of 8MW of solar PV at two of the three sites at MBIA. This scenario also involved comparative analysis of two cases of T&D upgrades: i. 33 kV transmission lines from Grand Anse power station all the way to the second site at the west end of the runway ii. 33kV lines from Grand Anse station stepped down to 11 kV at a substation located at the first site and continuing to the second site.
2	Pearls (11 KV upgrade only)	Installation of solar PV at the Pearls site with 11 kV T&D upgrades to the Grenville and Industrial feeders as recommended by an RE integration study carried out by DNV-GL
3	Pearls (Max. Capacity)	Installation of solar PV at the Pearls site with 33kV T&D upgrades that allow for the provision of the maximum solar power output that the site can provide.
4	Pearls Max. and GFA	Installation of the maximum solar PV capacity at the Pearls site as well as 4.2 MW at the GFA site.
5	Two airport sites. Pearls (Max.) and GFA	Installation of 8MW of solar PV at two of the three airport sites, with the Pearls site at its maximum solar PV capacity and the GFA site at 4.2MW.
6	Two airport sites and Pearls (11 KV upgrade only)	Installation of 8MW of solar PV at the two of the three sites at MBIA and at Pearls with the recommended 11kV T&D upgrades.
7	Both Solar and Bess optimized	Optimization of both solar PV and BESS capacities based on Grenlec's load profile. This scenario provides the most economic and technically optimized scenario based upon Grenlec's operational, generation and load/demand profile.

8	Three airport sites	Installation of solar PV at the three sites at MBIA including required T&D upgrades. Analysis was also done to determine the optimal battery storage capacity required to make these sites a micro-grid if needed.
9	Three Airport Sites and Pearls (11 kV upgrades only)	Installation of solar PV at the three sites at MBIA and at the Pearls site with the recommended 11 kV T&D upgrades

All of the scenarios were similarly treated. Analysis of the airport micro-grid scenario was performed in HOMER Grid. This program, like HOMER Pro, looks for the least-cost combination of system components for a given scenario in addition to considers outages. The aim of this analysis was to determine the optimal battery size required to support a micro-grid at the Maurice Bishop International Airport which could be powered by the 15.1MW of solar PV at the three airport sites in the event of a grid disruption. The airport load for one year was simulated, with a grid outage of 14 days duration modelled to occur in the month of September, during which time there is a higher probability of hurricane impact to Grenada. The load was set to be powered by the main grid and capacity shortage constraints were set to zero, so that no shortage was allowed. The 27 results showed that 4.2MWh of Li-ion battery storage along with the available solar PV would be sufficient to power the airport. Given that techno-economic modelling showed that approximately 12MWh of battery storage would be required to support the solar PV installations at the 3 airport sites, the micro-grid and outage were also modelled with this capacity of storage included. The resulting autonomy of the 12MWh of batteries in a micro-grid scenario was 33.3 hours. This indicates that a micro-grid at the airport consisting of 15.1MW of solar PV and 12MWh of battery storage would be able to support the load of the airport continuously with a very low likelihood of disruption of supply.[6]

All site options have been deemed to have potential but Option 8, the three sites at the MBIA, was the best choice economically and location wise.

2: Other Sources of Solar Energy

An alternative to GRENLEC's solar plants is the production of electricity by Independent Power Producers (IPPs).

The Public Utility Regulatory Commission (PURC) is a statutory body charged with regulating the power industry in Grenada. The power industry consists of Independent Power Producers (IPPs) and a network operator/distributor namely GRENLEC. GRENLEC is both an IPP and the network operator.

[6] GRENLEC solar PV Project Inception Report.

Apart from GRENLEC there are only small IPPs in Grenada with system sizes up to 100kW. These small IPPs depend on GRENLEC to store and distribute what energy they produce. For these small IPPs to generate 15MW of electricity and get it unto the grid requires significant island wide system upgrade. This is a big cost for GRENLEC and for the IPPs. A few IPPs have obtained license and some have equipment including panels. To accommodate the IPPs GRENLEC is currently looking into larger storage systems.

The alternative of IPPs generating the 15MW instead of GRENLEC solar project is feasible but fraught with challenges including logistics, infrastructure, spatial orientation, legal issues and finance.

3. Other RE Sources

GRENLEC's exploratory works on wind energy a decade ago produced some data sets but no physical infrastructure was tested and although the concept of Ocean Thermal Energy and hydroelectricity has been mentioned in Grenada, these never gained traction. This option therefore has little merit in this discourse.

4. Alternatives Access to Sites 2 and 3

Both site one and site two are accessible from within the airport compound. The two road segments discussed in this assessment would be outside the airport fence. The road segment at S2 already exist as an unsurfaced road that is not properly maintained and the segment at S3 will use lands owned by MBIA.

Both road segments will require some vegetation removal, excavation and construction of drains and carriageway. Road surfacing in Grenada uses mainly asphalt. The use of concrete for road surfacing is less prevalent. Both products allow for easy shaping/aligning of roads.

Surfacing with asphalt: Asphalt surface does not work well in wet or cold conditions and has no direct requirement for water during application. In its applied form, it will release oily residue in water. Even after setting, it can release oily residue which can negatively impact coastal ecosystems in the general work area. Additionally it adheres to the skin and releases hydrocarbon fumes that are toxic requiring that workers wear appropriate PPE.

Surfacing with Concrete: Cement works can release copious amounts of dust into the atmosphere if mitigation measures are not followed. Additionally, large volumes of fresh water is needed for mixing of concrete and also for mitigation measures (wetting work area to control dust) and cleaning of tools. Concrete is the preferred option for drains, encasement and embankments where necessary without added negative environmental impact. Once dry, concrete hardens and offers no other negative impact.

Given that concrete will be used in the construction of the substation and drains, there will be in place equipment and protocols for the use of cement. Considering the shorter impact time of cement as opposed to asphalt, and given that all development activities associate with this project will be in proximity to the sea, concrete/cement is recommended as the preferred option for surfacing of these two road segments.

5. Alternative Environmental and Social Considerations

All options presented in this review come with environmental and social impacts. Examination of these impacts revealed similarity in nature but differences in the degree of impact. The main impacts considered include potential land acquisition, transmission lines impacts, waste disposal, storm water runoff, glint and glare from solar panels and general aesthetics.

Pearls is an area of high social and cultural activities. The site has the only playing field and cultural center for residents of Pearls, Conference, Moyah and Paradise, consequently, construction at Pearls will have high social cost including displacement of social and cultural activities, livelihood and economic activities. Here, transmission lines are more likely to cross private spaces including homes and the entertainment center. The airport here is inactive so that there are no air traffic and flight part to be impacted by glint and glare.

The space at GFA was set aside for the development of sports and although there are no immediate plans for development, the growing youthful population must be considered before land use change becomes a reality.

The spaces at MBIA present greater glint and glare challenges than the other sites but less social impact by way of displacement or disruption to social and cultural life. MBIA is on the southern tip of the island partially surrounded by the sea which in this area is part of the GAMPA an area of rich marine biodiversity. Storm water runoff from this project could negatively impact the GAMPA. Such potential impact is absent at Pearls.

6: The DO Nothing Option

Options presented so far involve infrastructural development that comes with some negative impact on the environment and human life. The **do-nothing option**, however, comes at no additional environmental cost but also offers no benefits to Grenadians whose developmental agenda yearns for more and cheaper electrical energy. Without additional electrical energy, Grenada's economy and way of life could become stagnant. The do-nothing option puts Grenada at a disadvantage and is therefore not a chosen option.

4.0 BASELINE ENVIRONMENTAL AND SOCIAL CONDITIONS

4.1 Geology and Topography:

Grenada and its territories is 433 square kilometers of volcanic deposits. Rocks dating back to the middle Eocene period consisting of basalts overlain by turbidite deposits. Alkaline, magnesium-rich basaltic rocks are prevalent from the Pliocene through the Quaternary. These rocks also form part of the active submarine volcano Kick'em Jenny which lies north of the island. Grenada's landmass rises from a narrow, coastal plain in a generally north–south trending axis of ridges and narrow valleys[7]. Several small rivers provide drainage from the volcanic peaks. Mount St. Catherine is the highest peak at 840 meters.

4.2 Climate

The humid tropical marine climate experienced by Grenada, Carriacou and Petite Martinique is strongly shaped by their location and topography. The climate is influenced by Tropical Atlantic Hurricane activity, the North Atlantic Sub-Tropical High, the North East Trade Winds, and also by weather resulting from the convergence of the North and South East trade winds forming the migrating Inter-Tropical Convergence Zone (ITCZ).

In Grenada and its dependencies, observed average annual **temperatures** do not vary significantly, with a minimum average of 28.3°C and a maximum average of 33.3°C.[8]

Grenada experiences most of its **rainfall** during the North Atlantic Hurricane season which runs from June-December (Government of Grenada. Monthly rainfall observations at the Maurice Bishop International Airport indicate that the island of Grenada receives a total of 116 cm of rainfall per year (CCCCC, 2015). Decadal rainfall observations from the Maurice Bishop International Airport were analysed and based on this report, it was noted that while overall, the rainfall pattern of early season months and late wet season months have remained the same, and there has been an increase in the amount of rainfall observed throughout the year, especially during the late wet season (CCCCC, 2015). Despite the observed increase, there has been no flooding recorded around the airport primarily because of the very effective drainage system.

4.3 Location and Socio Economic Statistics for the Project Area

The proposed location of the project is in Point Salines in the parish of St. George, the south eastern tip of the island of Grenada. Except for airport purposes, this section of the island is closed to the general public.

The parish of St. George with a population of 34,262 (16,883 males and 17,379 females) is home to 29.2% of Grenada's population. This parish also has the second highest number of poor 27.2%

[7] .https://en.wikipedia.org/wiki/Geography_of_Grenada

[8] Grenada's Second National Communication

on the island. Table 4.3.1 provides some basic statistics on the communities surrounding the project area.

Table 4.3.1 Some Statistics for Communities in the Project Area: Source Grenada Population and Housing Census 2011

Name of Community	Number of Males	Number of Females	Total Population	Income Level
Calliste	238	261	499	Lower to middle
The Lime	179	222	401	Lower to middle
True Blue	107	101	208	Middle and upper
Point Salines	19	10	29	Middle and upper

The majority of Grenadians own their home (83.2% with or without mortgage). More than 61 % of these homes are made of concrete and wood. More than 90% of the homes are connected to the grid. More than 66% of households have pipe borne water.

The primary health care system has universal reach. Contagious diseases which were prevalent during the middle of the 20th century have been largely eliminated. New challenges have emerged with the prevalence of lifestyle diseases (diabetes, hypertension, cancers and obesity). There is a marked difference in the socio-economic status of persons presenting with these conditions; 33.2% from persons in the higher quintile and 15.6% of persons from the lower quintile. The Percentage of males (12.2%) reported suffering from chronic lifestyle disease is lower than the number of females (19.6%)[9].

While more men were estimated to be poorer than women, segmentation in the labour market confers power in gender relations.

Education is viewed as a critical social protection measure and a means of escaping poverty. School enrolment is high with 93.8 % of school age persons attending some educational institution.

4.5 SITE 1 North of Hardy Bay

Physical Environment

This is a flat coastal area that borders Hardy Bay. The bay was partially filled in to facilitate the extension of the MBIA runway. The landward portion of the bay was left as a pond erroneously known as the salt pond. The water in this pond is sea water connected to the bay by a tunnel (Figure 4.5 A) that goes under the northern end of the MBIA runway.

[9] World Bank Living Conditions in Grenada, Poverty and Equity Update

About one mile north of the project site is Clemont well, a small fresh water well. Constructed in 1912, the well is a significant source of water for animals. Some persons believe that the value of the well can be increased by the installation of an electric pump.

Figure 4.5A Tunnel under the runway

Figure 4.5B Site 1. Asphalt plant top of Photo.

Figure 4.5C Part of the Asphalt Road between the Pond and Site 1.

North of Site 1 is an asphalt plant (Figure 4.5B), to the south is the pond (remnant of Hardy Bay) enclosed by the airport fence See Figure 4.5C). Between the fence and Site one is an asphalt surface road.

Biotic Environment

The ground is covered by two varieties of salt tolerant grasses common in Grenada namely the purple wiregrass and the lawn grass. Apart from the three old flamboyant trees close to the main road, there are no trees or shrubs on this project site.

During the five days of observation, no birds were spotted on this site, but one avid bird watcher reported that white *cattle egrets* have been spotted in the area. Reports from the MBIA Wildlife Management Hazard reported only one (1) sighting of the white egret since 2021. The egrets are known to roost in the vicinity Royalton Resort about 800m (one half mile) away.

Social Environment

Site 1 abuts the main access road leading to the Maurice Bishop International Airport and the Sandals Resort. There are several commercial enterprises along this road making it a rather busy road.

The population in the immediate environs of Site 1 is highly transient comprising mainly of airport and hotel workers and guests, arriving passengers and taxi drivers, the workers at the asphalt plant and persons transacting business in the area. There could be an increase in traffic as a result of this project but such increase is not expected to have a significant impact on the flow of traffic or the way of life of the people in the immediate environs. A more permanent population exists at the St. Georges University (SGU) to the northeast which has a student population of over 4,500.

The fisher men from Calliste stage their operations from the bay in the vicinity of SGU. Their lockers at Calliste Bay were vandalized and their gears stolen. They would like to see the lockers restored and some security stationed at the bay. In the meantime, the sea moss farmers at the bay are also experiencing praedial larceny but continue their livelihood activity farming sea moss.

The Calliste community is a mixed, middle-income community with some commercial activities interspersed among the homes. Financial centers and health service are provided in Grand Anse.

4.6 SITE 2 West of the Airport

Physical Environment

This site is at the western edge of the airport property where the land rises to approximately seventy (70) meters above sea level (Figure 4.6A). There is no sandy beach here, the land drops vertically to the sea. The airport fence is about four (4) meters from the edge of the cliff. From the fence heading to the runway, the land descends at an angle about twelve (12) degrees.

Biotic Environment

Despite the harsh conditions outside the airport fence in the vicinity of Site 2, (shallow top soil, no water source and steady salt spray), there is a relatively dense vegetation cover consisting of cacti, Luceana and Guinea grass. Luceana is a fast-growing colonizer of cleared areas, of minimal environmental sensitivity or importance. These plants are frequently cut by the airport ground

staff as part of airport security. Inside the airport fence the grass is kept very low and at this time of year, the dry season, the concept of a brown field gets real meaning.

No animals were spotted in this area. This is not surprising given the airport's Wildlife Hazard Management program that actively discourages wild animals from inhabiting these areas.

About fifty meters (50 m) North West of the project site between the proposed road and the existing road next to Sandals Resort is a small forested area with acacia, almond and sea grapes. This area will be unaffected by the project.

The surrounding marine area from Grand Anse to Point Salinas is a marine protected area. Fisheries resources in the area include Snappers, Groupers, Queen Conch and Lobsters. Currently, there is no date on fish population in the area but there is an evolving project entitled Coastal Fisheries Management in the Caribbean funded by Japan International Cooperation Agency (JICA) that is seeking to correct this deficiency.

Social Environment

Except for the airport workers accessing the equipment building, there is no human activity at Site 2. Locals mainly from Calliste use the foot part outside the airport fence to access the small bay (Pink Gin Beach) to the north.

Figure 4.6A Site 2. Location

4.7 SITE 3

Physical Environment

Point Salines at the south western tip of Grenada is known for its salt pond. In 1978 during the construction of the MBIA, rubble cleared from the development site was pushed to the southern corner of the airport property in the general area of the famous salt pond. Over the years, natural vegetation succession occurred, resulting in what is now a forested area designated as Site 3 for this solar project. Around 2006, the northern portion of this site was cleared for a proposed hotel development[10]. Decaying logs on the site and the absence of large trees confirm the report.

The general topography is a rugged stony surface sloping towards the north. The top soil is a mixture of construction waste and organic matter held together by the roots of plants. There is no distinctive geological or topographic feature; no surface water or ponds.

Approximately nine hundred and twenty meters (920 m) west of this site is the real Salt Pond. At this time of the year the pond has salt crystals that would normally be harvested but access to the pond is either via the airport where public access is prohibited or via the sea which requires climbing the steep jagged rocks.

Biotic Environment

Based on dominant vegetation cover, the thirteen (13) acre lot can be divided into three segments along east to west lines:

1) The northern portion (approximately 5 acres) consisting primarily of Guinea grass (*Megathyrsus maximus)* two to four feet tall and very dense. A few small Leucaceae plants are scattered among the grass near to the airport fence (*Photo.1*). This is the dry season so the grass is very dry and the risk of fires looms.

   No animal life was observed in this area.

2) The middle section (approximately 7 acres) consisting of mixed vegetation mainly Acacia (*Acacia*), Cactus (*Cactaceae*), Neem (*Azadirachta indica*), Bursera (common name Naked Indian) and Leucaceae (*Leuceinia leucocephala)*. Here the vegetation canopy is relatively dense and the understory very sparse. Some Bursera trees are as tall as ten feet. The cactus and acacia have two to four individual plants in a single root cluster but the Bursera and Neem grow as single plant. The tree density is low averaging nine individual plants or root clusters per ten square meter (10 m^2).

[10] Information obtained from airport staff Mr. Forsite and Mr. Frank during meeting with airport personnel.

The trees to the northern of this section are small and young. On the ground between the trees large dry logs tell the story of land clearing in the not too distant pass (*Photo. 2*)

A small family of *yellow breasted bananaquits* inhabit this area. The population is estimated at between twenty and thirty. Three nests were spotted, one active (*Photo. 3)* and two used. A single humming bird was spotted. Termite mounds are plentiful around the roots of the larger plants or in the low branches of trees (*Photo. 4*).

Photo. 1 Small Leucaceae plants in grass near fence

Photo 2. Logs from previous land clearing

Photo 3. Active bird nest

Photo. 4. Small Mangrove trees with little understory

Photo 5. Termite mound between low branches

Photo 6.Crab hole in mangrove. Note the spacing between trees

3) The southern portion (approximately one half acre) consisting mainly of red mangrove (*Rhizophora mangle*) and white mangrove (*Loguncularia racemosa*) with no understory (*Photo 5*). These plants appear very health but young (small trunks, short breathing roots, and only about eight feet tall). These trees are mostly on the western edge of the site. As you progress east, the gradient changes, the soil moisture changes and so too the vegetation type, mangrove give way to Bursera, Neem and Acacia. These are the largest trees in the entire forested area. Two Bursera had trunks with circumferences of 1.8 m and height over 12m. A few runners/vines crisscross the trees towards the canopy.

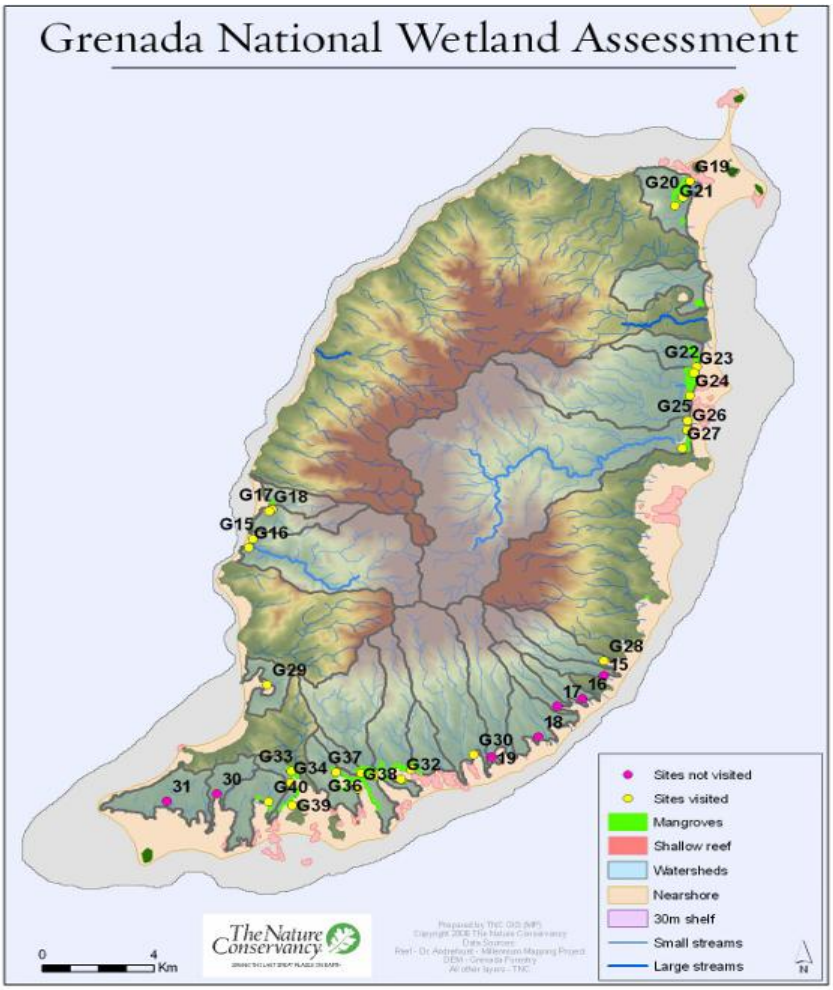
   This entire stance of mangrove (marked by the green line in Figure 4.7) should be protected. This assessment recommends that an area approximately three acres (the mangrove and some buffer marked by the blue line) be protected.

Figure 4.7 Site 3. Mangrove seaward of the green line. Blue line recommended buffer,

Here the black sandy soil is moist and crabs are plentiful, they dig deep into the soil building little mounds at the entrance to their holes (*Photo. 6*). Dragon flies hover above the crab holes that contain water. Two *flycatcher* birds were seen. These seem to be newcomers, they called and answered each other, no other of their families appeared.

Mangrove: Grenada is estimated to have about 500 acres of mangrove wetlands, most concentrated around the southeastern side of the island. These mangrove systems support a variety of wildlife including the many species of birds (resident and migratory). Coastal wetlands including mangrove forests are some of the most productive ecosystems in the world. Their high primary productivity and nutrient profusion make them essential to the breeding, foraging, and roosting of many species, including aquatic plants, fish, shellfish, insects, amphibians, birds, and mammals.

A Nature Conservancy wetlands survey was conducted in Grenada in September 2006 to evaluate the wetland systems in Grenada and the Grenadines for their condition and how well they were functioning as either fish nursery areas or foraging areas. The site in question was not assessed primarily because of airport security policy and the very small size of the mangrove.



Map of Grenada. Sites that were visited during this assessment are indicated by yellow points labled with G code numbers (G15-G40). Other mangrove occurrences not visited during this assessment are indicated by pink points labeled with numbers (17,18,…30). Shaded areas on the island represent watersheds associated with mangrove estuaries.

Figure 4.7A Wetlands (Mangrove) of Grenada. Site 31 the mangrove at Site 3. Source.TNC

No endemic or endangered animals or plants were observed. This was not surprising given the history of the site (cleared for airport development, used for rubble disposal and frequent cutting in line with airport safety policy). There was clear evidence of recent cutting on the western portion of the forest. This was confirmed by the grounds maintenance team at the airport who claimed to have done significant cutting three years ago.

The objectives of this wetlands survey were 1) To determine the general health of mangrove in Grenada and 2) To access the contribution of mangrove in Grenada to the health and sustainability of coastal biodiversity. Preliminary results indicate that most of the mangrove are in satisfactory condition but that threats to their functionality are increasing.

Social Environment

Site three is physically excluded from the rest of Grenada by the MBIA and its fencing. Consequently, there is no ongoing social activity in the area. Periodically MBIA ground staff cross the runaway to cut the vegetation for airport security purposes. Many years ago, the entire northern portion was cleared for hotel development but this did not materialize. Since then, the area has been virtually abandoned.

4.8 Substation and Transmission Lines

Physical Environment

The substation will be located on the elevated portion of land approximately 40m north of Site 1 in proximity to an existing asphalt plant where bitumen is added to gravel to be used for road surfacing. To the south is the pond (remnant of Hardy Bay) enclosed by the airport fence. Between the fence and Site one is an asphalt surface road.

High voltage transmission lines will pass overhead attached to poles planted mainly along the highway. Most buildings along the road highway are commercial including guest houses but there are some family homes along the road also. In addition to the overhead transmission lines, underground transmission lines are also being considered for connecting the sub-station to the Grand Anse station.

Biotic Environment

At the proposed site of the substation there is the odd ornamental plant or clump of shrub but there is no recognized ecosystem (plant or animal habitat) of economic significance. Along the path of the transmission line there are isolated fruit trees on private property that will not be physically impacted by the project.

Social Environment

The asphalt plant is an active operation that attracts both vehicular and pedestrian traffic. The average site population on any given day is approximately twenty five (25) persons.

The highway to the airport is a very active one with connections to SGU (a population of over 5000) Calliste, Point Salines, Sandals Hotel and the Airport. There are several indoor commercial/business operations along this road. None of these businesses is expected to be negatively impacted by the project activities.

4.9 Road Segments

Physical Environment

The 180 m long Road Segment at Site 2 will connect the site to the existing road that joins the main airport road. On its approach to Site 2 the road drops at an angle of approximately 20° before levelling off along the airport fence (Figure 4.9 a).

Figure 4.9 a Red line show alignment of road segment at site 2.

The 1,200 m long road segment at Site 3 will follow the coastal contour to connect to the existing road segment that leads to SGU (Figure 4.9b). The coastal area is rocky and drops sharply into the sea. The tunnel that connects the pond at Site 1 to the sea opens along this road segment. This road segment will therefore need to span that body of water.

Figure 4.9 b. Approximate alignment of road segment connected to site 3

Biotic Environment

Both road segments would be located outside the existing MBIA fence. These areas are maintained by the airport for security purposes therefore the vegetation is frequently cleared so there is no thriving habitat at these sites and human activity is only the occasional innocent passage of persons accessing the sea.

Social Environment

Apart from persons crossing these areas to access the sea, there is no social activity at the sites. There is, however, much activity on the adjacent properties. The road segment leading to Site 2 currently exist as a dirt road running along the Sandals Hotel and a few private properties. The road segment that will connect Site 3 will connect to the road leading to SGU. Both Sandals and SGU are high traffic spaces with a plethora of social activities.

5. 0 Environmental and Social Risk, Impact and Mitigation Measures

5.1 Scope

This section of the ESIA identifies E&S risks and potential impacts likely to result from the construction of a substation, changing transmission lines and poles including the use of underground transmission lines, installation and operation of the solar plants and the construction of two road segments. It also proposes mitigation measures to address potentially harmful environmental and/or social consequences *inter alia*, land, air and water pollution, social disruption, and negative cultural impacts. The Environmental and Social Management Plan (ESMP) provided as a separate document is derived from the ESIA analysis and includes specific measures to address, *inter alia,* waste disposal; management of construction materials, mitigation of dust and noise nuisance; connectivity related issues; community relations; job opportunities and ensuring that the solar plants and their preparatory works do not exacerbate the vulnerability of the existing environment or its socio-economic conditions.

The major negative impacts identified include (1) flooding and storm water runoff which can transport land base sources (LBS) of marine pollution negatively impacting the GAMPA the breeding/spawning ground for a variety of fish species that support the livelihood activities for surrounding communities; (2) Occupational Health and Safety of workers and the surrounding communities is a great concern. Persons working with electricity especially those on heights are especially vulnerable to electric shocks and even electrocution. Community members interacting

with workers from outside their community must be protected against diseases and deviant behaviour. The risk of accidents from falling poles or transmission lines looms high for motorist, pedestrians and community members in proximity; (3) Traffic delays and accidents. Road closure to protect the travelling public comes with other challenges; delays, detours and the use of unsafe bypasses roads.

This report does not consider the environmental and social impacts associated with the production of the solar panels or storage batteries, the stage of greatest negative impact, since these impacts would have been considered at the place of manufacture. Decommissioning or disposal of batteries and panels are not detailed either. At this point, the intent is that all damaged or expired batteries and panels will be sent back to their place of origin for recycling. The long term vision is for Grenada to develop the capacity over time to eventually manage these on island. However, until such time, the repatriation of damaged or expired products will be the end of life management strategy.

Methodology

The primary purpose of this ESIA is to predict the impacts likely to result from the proposed project. The assessment of these impacts proceeds through an iterative process as illustrated in Figure 5.1.

Figure 5.1 Impact Assessment Process

This ESIA uses empirical scientific data, traditional knowledge, professional judgment and anecdotal evidence to predict and quantify potential project impacts to the extent possible. In addition to quantifying the magnitude of impact, the sensitivity/vulnerability/importance of the impacted resource/receptor is characterized.

This ESIA evaluates the significance of a potential project impact by considering, in combination, the magnitude of the impact and the sensitivity/vulnerability/importance of the impacted resource or receptor. The identified impact or risk was further evaluated on the basis of its degree of significance using a screening criteria based on WB ESF as presented in Table 5.1.

The assigning of a significance rating facilitates decision-making by enabling stakeholders to weigh their concerns and determine the appropriate response.

Mitigation measures are intended to reduce the magnitude of a predicted impact, thereby reducing its overall significance. Even after mitigation, it is possible to have residual impacts.

Table: 5.1 WB Risk category and Screening criteria for determining impact

Risk Category	Screening Criteria
High	The resource/receptor would likely experience a large magnitude impact that would persist for a long time, extend over a large area, exceed national/international standards, endangers public health and safety, threatens a species or habitat of national or international significance, and/or exceeds a community's resilience and ability to adapt to change. The Project may have difficulty in complying with the applicable ESF requirement, and significant mitigation would likely be required.
Substantial	The resource/receptor would experience a clearly evident change from baseline conditions and would approach but not exceed applicable standards. The Project would comply with the applicable ESF requirement, but mitigation would be required.
Moderate	The resource/receptor would experience a noticeable effect, but the magnitude of the impact is sufficiently small (with or without mitigation) that the overall effect would remain well within applicable standards. The Project would comply with the applicable ESF requirement, but mitigation may be required.
Low	The resource/receptor will either not be affected or the likely effect would be imperceptible or indistinguishable from natural background variation. The Project would comply with the applicable ESF requirement and mitigation would typically not be required.

5.2 Risk Rating for SITE 1

5.2.1 Analysis

Section 5.2.1 provides risk ratings with rationale for worst case scenarios for potential risks relevant to Site 1 (Table 5.2.), Impact and mitigation measures in sub-section 5.2.2.

Table 5.2 Risk rating and rationale For Site 1

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
ESS1: Assessment and Management of E&S Risks and Impacts						
Glint and glare from solar panels affecting motorist on the road to the airport, the adjacent community and control tower and pilots	Moderate	Moderate	Metallic surfaces are good reflectors of sunlight and head light from vehicles. The project will therefore use panels with antiglare surfaces. This project will abide by the ocular hazard standard which establishes the glare intensity depicted by the color-coded system that is deemed significant and thereby determined to produce a potential hazard to air navigation.	Low	Low	With appropriate choice of surface tint for the solar panels and adherence to the ocular hazard standard, there should be little or no residual impact.
Transmission lines from substation	Moderate	Moderate	The substation will be located north of Site 1. Transmission lines will run from the substation to poles outside of the project location. Increased	Low	Low	Upgrade works will be confined to the existing pathway of the electricity

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
crossing sensitive community areas			power generation will require to improve the transmission system. GRENLEC will make the necessary upgrades within the limits of the Electricity Supply Act #19, including the installation of some underground cable (extent still to be determined)			transmission lines. Any underground cables to be installed will use existing conduits or install new ones following the road contour and alignment. Residual impact will therefore be low, however a Resettlement Framework (RF) will be prepared as a precautionary measure in case land acquisition and/or involuntary physical/economic displacement is required
Flooding	Substantial	Substantial	In the absence of vegetation cover and with a relatively large area covered by hard surfaces (panels), runoff is expected to be more than normal. Storm water should	Low	Low	Even with mitigation measures, the risk of flooding remains given the increase in extreme weather

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
			therefore be contained in a settling pond before draining into the pond. This pond is connected to the sea so it will drain readily.			events due to climate change, it is difficult to completely reduce future flood risks.
ESS 2: Labour and Working Conditions						
Working conditions	Moderate	Moderate	Inadequate enforcement of labor laws could result in workers being denied privileges and benefits. Ensure that Contractors comply with the country's labor and human rights laws, as outlined in the Labour Management Procedures (LMP) document. The Contractor will ensure adequate sanitary provisions as well as access to safe drinking water for all workers.	Low	Low	Monitoring the application of the LMP by the relevant agency should lower the risk
Child Labour	Low	Low	There is no history of child labour in Grenada but contractors will include in their policy a clause precluding child labour.	Low	Low	The risk, already low, will be made even lower by the contractors conforming to Grenada's labour laws.

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
Sexual harassment	Moderate	Moderate	Grenada Women's Health and Life Experiences Study (2018) reported a higher than expected level of sexual harassment in the work place.			Mitigation measures (Establish clear anti-sexual harassment policy and training for staff and contractors; enforce code of conduct regarding sexual harassment and abuse) are expected to significantly reduce the incidences of SH on this project.
Occupational Health and Safety	Substantial	Substantial	The occupational health and safety issues include exposure to physical hazards from the use of heavy equipment, cranes as well as hazardous materials, trip and fall accidents, increasing levels of dust and noise, falling objects, and electrical hazards. All anticipated hazards should be diligently controlled.	Moderate	Moderate	Even with an OHS plan and multifaceted efforts in place, accidents can occur; special attention should therefore be paid to OHS issues.

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
ESS 3: Resource Efficiency and Pollution Prevention Management						
Dust generation, vibration, noise.	Moderate	Low	Local air quality will be affected by the emissions generated by equipment and vehicles. During excavation and transport of the excavated materials and construction materials, dust is expected to be generated. The increase in noise and dust will mostly occur during the construction phase with contribution from vehicular movements, construction machinery and hand tools. A construction management plan will determine the dust, noise, and odour-generating areas and activities and detail mitigating measures for any such activities.	Low	Low	Even with mitigation measures, it is difficult to completely eliminate all vibrations and noise. Strong winds can cause mounted panels to vibrate.

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
Generation and disposal of waste	Moderate	Low	Excavation and construction works along with human activities will generate waste.	Low	Low	Implementing an effective waste management plan will significantly lower the risk.
ESS4: Community Health and Safety						
Traffic and road safety issues	Moderate	Low	Traffic delays and accidents could result from increased traffic resulting from heavy equipment and construction related vehicles on the airport road. Mitigation measures, in a traffic management plan would address negative impacts resulting from poor road safety culture as well as ensuring pedestrian safety in the project area, including the use of traffic wardens, road signage and speed restrictions. Only trained drivers would be employed by contractors.	Low	Low	The recommended mitigation measures when employed will significantly reduce risk.

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
Potential spread or outbreak of infectious disease	Moderate	Moderate	Aware of the potential for disease outbreaks like COVID 19 and flu pandemics, protection should be provided for workers against such outbreaks. Current national public health protocols, including providing workers with appropriate forms of personal protective equipment (PPE) when needed, should be observed.	Low	Low	This is precautionary therefore when mitigation measures are enforced, residuals should be near zero.
Sexual exploitation and abuse	Moderate	Moderate	Gender Based Violence Country Profile: Grenada, a WB funded 2020 study reported unemployment higher among women than men and that occupational sex segregation exists	Low	Low	Recommendation of mandatory employment of women and a code of conduct should reduce the risk of SEA
ESS 5. Land Acquisition- Relevant, but unlikely to be applied. All lands within the project footprint are owned by Grenada Airport Authority (GAA). No physical or economic displacement is anticipated, however, a Resettlement Framework (RF) will be prepared as a precautionary measure in case land acquisition and/or involuntary physical/economic displacement is required.						
ESS6*: Biodiversity Conservation and Sustainable Management of Living Natural Resources*.						
Damage to marine habitat and death to marine life	Moderate	Moderate	Storm water runoff can carry construction waste and other pollutants into the adjacent pond affecting marine life.	Moderate	Moderate	Mitigation measures would reduce the risk of negative impacts.

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
			Mitigation measures should include a waste management plan for construction waste and the creation of a sedimentation pond for runoff before entering the marine environment (adjacent pond).			
Damage to terrestrial habitats and damage to organisms	Low	Low	The MBIA Wildlife Management program actively seeks to prevent meaningful habitat development. The area is covered with lawn grass that is regularly cut so there is no significant terrestrial habitat at this site.	Moderate	Moderate	The risk of damage to terrestrial habitats is low since the area does not support terrestrial habitats. Residual impact is almost zero.
ESS8 Cultural Heritage						
Chance Find	Low	Low	There is a report of archaeological finds in the general. No recent finds have been reported.	Low	Low	Precautionary mitigation measures are included.
ESS10: *Stakeholder Engagement and information* disclosure						
Continuous engagement of stakeholders	Moderate	Moderate	The identified stakeholders each have different stakes associated with various levels of involvement in	Low	Low	The recommended mitigation measure will reduce the risk level to low.

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
during implementation			power generation and use in Grenada. As outlined in the Stakeholder Engagement Plan (SEP), public consultations and participation of stakeholders would ensure concerns about the impacts of the project are addressed early during implementation.			

5.2.2 Environmental and Social Impacts and Mitigation Measures

This section of the report looks at potential environmental and social impacts associated with Site 1, the area north of the pond in the area of Hardy Bay. For each identified impact, a description is given along with an identification of the source of the impact and sensitive receptors in proximity to the project site. An assessment of each potential impact is then provided, and mitigation measures identified.

5.2.2.1 Air Quality

This is a construction project involving soil excavation, masonry for the construction of an electrical substation and possible mounts for the solar panels, installation of transmission lines and the total enclosure of the project site. The general area is highly commercial with little vegetation cover and much traffic. Evaluation of air quality will focus on particulate matter in the air and dust deposition. Currently, the air quality is being impacted by emissions from vehicles on the airport road, the asphalt plant to the north east and aeroplanes landing and taking off at MBIA.

Source of Impact: Dust from excavation, concrete mixing, vehicular traffic on the roadway, point source air pollution from combustion of fossil fuels used by trucks and excavators resulting in the production nitrogen oxides (NOx), sulphur dioxide (SO2), carbon monoxide (CO) will all negatively impact air quality. These will add to the existing pollutants present in the air around the airport resulting from renovation works on the airport buildings and dust from airplanes movement.

Sensitive Receptors: Air pollutants in sufficient concentration can have significant impact on humans especially those with compromised health, the elderly and the very young. Other receptors like offices and their contents, buildings and cars are impacted by air pollutants.

Assessment: Air quality measurement were taken at Site 1 on 20th March 2024 starting at 11:30 am. Three readings were taken at fifteen (15) minute intervals and the average recorded in table 5.1. The measurements were recorded using a Temptop M2000C meter.

Table 5. 1 Air Quality as Site 1

Parameter Measured	Site 1 Average Measurements	WHO Standard
PM 10	12.8 µg /m^3	50 µg /m^3
PM 2.5	8.5 µg /m^3	25 µg /m^3
Carbon Dioxide CO_2	593 ppm	<600. OHSA standard 1000ppm

Project activities at Site 1 would be small compared to the quantum of work currently occurring in the general area (renovations and upgrade at MBIA, the operations of the asphalt plant, other construction work in the Calliste community). The project duration would be medium term (six

to eight months). The potential project impact on the air quality would be negative, reversible, and medium term. The impact is rated as **Moderate**.

Mitigation: All vehicle and equipment working on the site should be checked including having their exhaust examined before entering the site for the first time. Thereafter, they should be checked every three months. Vehicle or equipment not in use should be turned off. There should be no burning of waste on site.

Potential dust source such as cement, sand and aggregate should be kept covered, waste marked for disposal should be covered or kept moist. The access road to the project site should be kept wet and free of soil at all times. Trucks carrying any fine material should have enclosed sides and the contents covered during transportation.

5.2.2.2 Noise:

There are no national noise standards for Grenada therefore, the IFC limits for ambient/airborne noise levels (IFC 2007) were used in this assessment as the basis of "significance thresholds".

Source of Impact: Heavy equipment associated with the project (i.e., bulldozer, dump trucks, and loaders) would generate some noise. However, noise from these sources would be intermittent, temporary, and likely occur only during daytime hours. Moreover, these noises would periodically be drowned out by aircrafts landing or taking off.

Noise from photo voltaic systems (solar plants) can either be electromagnetic or real noise such as a hum, vibration, or buzz. Solar panels produce direct current (DC) electrical power, however, in order to transfer this electrical power to the local grid, the DC power must be converted to alternating-current (AC) power. This conversion process is done by an "Inverter". The process of converting DC into AC power requires very fast switches which change the polarity (or direction of electrical flow). Since AC power cycles 60 times per second (or 60 hertz), the switches must activate twice per electrical cycle. This process produces tonal sound at twice electrical line frequency (120 hertz) and its harmonics (240, 360, 480 hertz and higher)[11]. Other noise source and mitigation measures are provided in Table 5.2.

Sensitive Receptors: There is no exposed noise sensitive receptor within the project area of influence. Business offices in proximity to Site 1 (eg. airport offices and Digicel airport branch) have office buildings or rooms with acoustics designed to shut out airport noises which are much louder than any noise this project will generate.

Assessment: The noise from heavy equipment will exceed normal/ambient noise levels and will continue throughout the construction phase with varying intensity at different days and times.

[11]Noise Measurement Procedure Manual, Second Edition; Department of Environment, Hobart, Tasmania, 2008

Noise from heavy equipment is not expected to exceed 70 dBA at a distance of 20m from point of origin.

Generally, only the solar inverter will have a dB rating, and it will not be more than 45dB. Considering the 45dB rating as the maximum rating of PV systems, we can conclude that noise from solar panels is insignificant and generally safe[12]

Noise from this project will be drowned out by the noise from planes landing and taking off. Noise impact will be negative, direct and reversible. Given the project's location and the paucity of sensitive receptors, the impact of this project is rated as **Low** to **Moderate**.

Mitigation: This assessment recommends 90 dBA as the upper sound power level therefore the project must select equipment with lower sound power levels than the upper level (90 dBA) recommended in this assessment. All vehicles working on the project site must be inspected and licensed by the relevant authorities in Grenada. Vehicles should have their entire muffler system intact including muffle barrels and silencers. No vehicle should be allowed to stand idle on the project site with their engine running.

Table 5.2: Sources of Noise from Solar farm; Mitigation measures added

Type of noise	Cause	Mitigation
Banging and popping noise	Contracting and expansion	If the solar panels are installed in a close array, break them apart to allow for thermal changes.
Creaking noise	Wind grabbing loose panels	Ensure solar panels are properly fixed
Rattling noise	Poorly screwed racking	Have everything properly screwed
Shaking and blowing noise	Intense wind	If the solar panels are installed in a close array, break them apart to allow for thermal changes
Hitting noise	Loose cabling	Have all the cables properly fixed without leaving any hanging sections

5.2.2.3 Water Resource

The only fresh or brackish water resource in this area is Clemont Well a mile away to the north. The pond to the south (remnant of the filled in bay) is a salt water pond connected to the sea/ocean by a tunnel under the airport runway.

Source of Impact: Site preparation including excavation works would generate waste that can pollute the pond if not properly managed. Additionally, when the solar panels are in place, they will reduce soil percolation by covering the ground thus accelerating runoff which can carry waste in to the sea resulting in land based source (LBS) of marine pollution.

[12] Do Solar Panels Make Noise? The Truth Revealed! | Solartechadvisor

Sensitive Receptor: Marine life in the pond is under stress. This assessment did not attempt to identify the stress factor(s) but one community fisher showed his empty net as proof of the decline in fish population, size and variety. This pond is connected to the Grand Anse Marine Protected Area (MPA) so that any impact on the pond will eventually affect the larger MPA.

Assessment: Excavation works on this site will be limited to preparation for foundation walls. No hazardous chemical will be used on the project site and no assembling of panels will take place on site. Any impact on the pond would be short term, direct and negative. Such impact is rated as **Low to Moderate.**

Mitigation: The project will implement a waste management plan that will collect and dispose of all waste in accordance with Public Health and national waste management policies. The project will construct a settlement pond to capture all runoff before reaching the pond.

5.2.2.4 Waste Management

Human activities produce a variety of waste; such waste falls into two broad categories i.e., liquid and solid waste. These waste products appear in the environment as litter, dust, sewage, or compostproducing foul odor and breeding ground for disease vectors.

Source of Impact: Construction works produce solid waste commensurate with the nature of the work, inthis case vegetation matter from clearing and pruning, packing materials, debris, unused materials, as well as more commonplace solid waste such as food and beverage containers. Liquid waste including sewerage and wastewater from washing hands and tools.

Sensitive Receptors: Consequences of improper waste disposal include foul odor and breeding of disease vectors. These directly impact all humans within proximity (including workers).

Assessment: All solid waste generated by the project will be taken to national Land Fill for disposal. Wastewater will drain away into a seepage pit constructed for this purpose. The contractors will use portable toilets which will be emptied every two days. The contents will be disposed of in accordance with Public Health standards and policy. The impact from waste will be negative, short term and reversible. Given the foregoing discourse, the impact from waste is rated as **Moderate**.

Mitigation: The contractor will develop and implement a waste management plan that includes the requirement for all waste material to be collected in receptacles provided and taken to the landfill.

5.2.2.5 Impact on Biodiversity and Coastal Resources

This site is separated from coastal resources and habitats by the airport runway leaving only the little pond south of the site. Potential impact of the project on the pond is discussed in

section 5.2. 2.3.

Source of Impact: Excavated soil and improper waste disposal can impact the pond.

Sensitive Receptors will include all life forms and habitats within the pond.

Assessment: There are no threatened, endemic or endangered organisms in the project area; biodiversity importance is therefore classified as low. The magnitude of potential impact from this project will also be low, therefore when the receptors' importance and the magnitude of potential impacts are examined together the impact was rated as **Low**.

Mitigation Measures: No waste or runoff will be allowed to enter the pond. All runoff will be channeled into a sedimentation pond where solids will settle out before the water enters the pond. Workers will not fish in the pond.

5.2.2.6 Occupational Health and Safety

The objectives of the World Bank ESS2 include *inter alia*:

- Promote safety and health at work;
- Promote the fair treatment, non-discrimination and equal opportunity of project workers;
- Protect project workers, including vulnerable workers such as women, persons with disabilities, children (of working age, in accordance with this ESS) and migrant workers, contracted workers, community workers and primary supply workers, as appropriate;

Source of Impact: Construction work using heavy equipment, moving objects and sharp tools expose workers to injury. Additionally, infectious diseases like flu pandemics spreads easily among persons working in close quarter or poorly ventilated areas.

Loud and high-pitched noises from planes impacting workers. This is not a direct impact of the project but a consequence of the environment in which the project will be located.

Sensitive Receptors: Workers on site, operators of machinery, truck drivers and other project staff will all be exposed to health and safety risks including airport noises and are therefore classified as receptors.

Assessment: Heavy equipment, sharp tools and vehicle will all be used on this project. Workers will be exposed to moving objects and equipment. There is also the potential for trip and fall where construction material and tools are not properly stored. Accidents on project site can have long term debilitating effect, the impact is rated as **Moderate**.

Mitigation Measures: All workers will be provided with PPE as appropriate for each task. OHS requirements of the Standard WB SPD for Works will be adopted and relevant specifications will

be added to the Employers Requirements to ensure that particular risks of: construction machinery, working on active platforms, working near water, working on unstable land, and working with excavations are included.

All employees will be required to sign the workers code of conduct. A grievance mechanism will be established (included in ESMP) for workers' complaints, trainings on their terms of employment.

Appropriate signage will be strategically placed indicating muster point, moving objects, active drive way, location of first aid supplies etc. Only licensed drivers and operators will be allowed to use vehicle and heavy equipment on the project site. The contractor will engage his/her workers in daily toolbox talk as a training tool. Topics to be covered include code of conduct, safety on the job, gender base violence, sexual harassment, grievance redress, and environmental awareness (the ESMP)

5.2.2.7 Community Health and Safety

Source of Impact: Construction projects can impact community health and safety directly through physical injury resulting from traffic accidents, exposure to hazardous materials, or respiratory effects from air emissions, as well as indirectly via the spread of communicable diseases from population influx. There is also the risk of fire at the proposed sub-station and BESS,

Sensitive Receptors: All human living or working within proximity to the project could be directly or indirectly impacted by the project. Heavy equipment passing through communities with narrow streets and no footpath pose health and safety risk to pedestrians.

Assessment: Although rare, electricity generation (sub-station) and transmission have been associated with fires that cause significant disruption to communities and businesses.

This project and its associated services will attract workers from other communities causing increased traffic in the general area with the potential for accidents. These workers will require social services such as food and health care.

Health risks to communities in relation to the spread of communicable diseases (HIV/AIDS) and flu pandemics (COVID 19) can be expected.
The overall rating for community health and safety impact is **Moderate**.

Mitigation Measures: Mitigation measures would include the following:

- Establish a worker's code of conduct that requires respect for local communities, appropriate behaviour during and outside working hours.
- Put in place zero-drug and alcohol tolerance policies.
- Include in the daily toolbox talk issues like sexual harassment and gender equality.

- Ensure that there are fire extinguishers at substation and BESS location; also visible guidelines for responding to fires.
- Contractor to provide procedures to identify and report gender based violence perpetuated by workers and mechanisms to deal with perpetuators and survivors as part of a GBV action plan.
- On completion of the works, all temporary installations will be dismantled, all plant and equipment de-mobilized, waste and left over materials and debris removed by the contractor, and the site left clean and tidy
- Visibly display signs around the project site (if applicable) that signal to workers and the community that the project site is an area where VAWG is prohibited.
- A Traffic Management Plan will be prepared and implemented.
- Stakeholder engagement activities such as town hall meetings or information dissemination.

5.2.2.8 Visual Impact

Source of Impact: Visual impact is both the change to the visual qualities of the landscape resulting from the introduction of visual contrasts—in this case from open area to solar plant — and the human response to that change.

Sensitive Receptors: Humans – nature lovers and side seers, property owners with eyes on the market.

Assessment: The introduction of the solar facility to the landscape may affect the perception of the landscape as a natural-appearing setting. Instead, it may be perceived as a landscape strongly influenced by human activities and industrial in character. These are changes to the visual qualities of the landscape as perceived by humans.

Mitigation Measures: Minimize luminous/reflective surfaces to the extent possible and place panels close to ground level. Use vegetation buffers where practical.

5.2.2.9 Public Awareness and Employment

Public awareness is detailed in the Stakeholder Engagement Plan (SEP) and the ESMP; it identifies the stakeholders, provides a communication plan and a grievance redress mechanism. It also makes provision for a community liaison officer who will serve as the interface between the community and the various project components.

The project will have an information board with the name of the project, the contractor(s), the funding source, duration and a directory of key project personnel, how to contact them, and mechanism for addressing grievances. Additionally, project information for public consumption will be posted on social media and circulated on public media services.

5.3 Risk Rating for SITE 2

5.3.1 Analysis

Section 5.3.1 provides risk ratings with rationale for worst case scenarios for potential risks relevant to Site 2 (Table 5.3.), Impact and mitigation measures in sub-section 5.3.2

Table 5.3 Risk rating and rationale For Site 2

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
ESS1: Assessment and Management of E&S Risks and Impacts						
Glint and glare from solar panels affecting motorist on the road to the airport, pilots on planes landing or taking off, control tower and the adjacent community	Substantial	Substantial	Metallic surfaces are good reflectors of sunlight and head light from vehicles. The project will therefore use panels with antiglare surfaces. This project will abide by the ocular hazard standard which establishes the glare intensity depicted by the color-coded system that is deemed significant and thereby determined to produce a potential hazard to air navigation.	Low	Low	With appropriate choice of surface tint for the solar panels and adherence to the ocular hazard standard there should be little or no residual impact.
Transmission lines or underground cables from Site 2 to substation in the vicinity of	Substantial	Substantial	Power generated at Site 2 will be transmitted to the substation located north of Site 1. Transmission lines will run from Site 2 to Site 1 using existing line route without additional impact on the adjacent community. GRENLEC	Low	Low	Upgrade works will be confined to the existing pathway of the electricity transmission lines.

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
Site 1 crossing sensitive community areas			will make the necessary upgrades within the limits of the Electricity Supply Act #19. Some transmission lines may run underground (TBD) in which case they will use existing underground conduits. Any new underground conduit will follow the road alignment and contour.			Residual impact will therefore be very low. however a Resettlement Framework (RF) will be prepared as a precautionary measure in case land acquisition and/or involuntary physical/economic displacement is required
Flooding	Substantial	Substantial	In the absence of vegetation cover and with a relatively large area covered by hard surfaces (panels), runoff is expected to be more than normal. Storm water should therefore be contained in a settling pond before draining into existing airport drains that empty into the sea.	Low	Low	Even with mitigation measures, the risk of flooding remains given the gradient of the land and the increase in extreme weather events due to climate change, it is difficult to completely reduce future flood risks.

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
ESS 2: Labour and Working Conditions						
Working conditions	Moderate	Moderate	Inadequate enforcement of labor laws could result in workers being denied privileges and benefits Ensure that Contractors comply with the country's labor and human rights laws as outlined in the Labour Management Procedures (LMP) document. The Contractor will ensure adequate sanitary provisions as well as access to safe drinking water for all workers.	Low	Low	Monitoring the application of the LMP by the relevant agency should lower the risk
Child Labour	Low	Low	There is not a history of child labour in Grenada but contractors will include in their policy a clause precluding child labour. Employees will be required to show proof of age.			The risk, already low, will be made even lower by the contractors confirming to Grenada's labour laws.
Sexual harassment	Moderate	Moderate	Grenada Women's Health and Life Experiences Study (2018) reported a			Mitigation measures are expected to

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
			higher than expected level of sexual harassment in the work place.			significantly reduce the incidences of SH on this project.
Occupational Health and Safety	Substantial	Substantial	The occupational health and safety issues include exposure to physical hazards from the use of heavy equipment as well as hazardous materials, trip and fall accidents, increasing levels of dust and noise, falling objects, and electrical hazards. All anticipated hazards should be diligently controlled.	Moderate	Moderate	Even with an OHS plan and multifaceted efforts in place, accidents can occur; special attention should therefore be paid to OHS issues.
ESS 3: Resource Efficiency and Pollution Prevention Management						
Dust generation, vibration, noise.	Substantial	Low	Local air quality will be affected by the emissions generated by equipment and vehicles. During excavation and transport of the excavated materials and construction materials, dust is expected to be generated. The increase in noise and dust will mostly occur during the construction phase with contribution	Low	Low	Even with mitigation measures, it is difficult to completely eliminate all vibrations and noise. Strong winds can cause mounted panels to vibrate.

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
			from vehicular movements, construction machinery and hand tools. Preparation of a construction management plan that identifies the dust, noise, and odor-generating areas and activities and detailing mitigating measures for any such activities.			
Generation and disposal of waste	Moderate	Low	Soil excavation and construction works along with human activities will generate waste. A waste management plan will be implemented to make sure that all waste is placed in bins provided to be removed by licensed waste management collectors.	Low	Low	Implementing an effective waste management plan will significantly lower the risk.
ESS4: Community Health and Safety						
Traffic and road safety issues	Moderate	Low	The road that leads to site 2 passes by Sandals Resort and ends at a dead end outside the airport fence. Traffic along this road is light but the end of the	Low	Low	The recommended mitigation measures when employed will

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
			road is unsurfaced. Road improvement works would be necessary to facilitate access to Site 2. During such construction delays and accidents could result from increased activity on the road. Mitigation measures, in a traffic management plan would address negative impacts resulting from poor road safety and ensuring pedestrian safety in the project area, including the use of traffic wardens, road signage and speed restrictions. Only trained drivers would be employed by contractors.			significantly reduce risk.
Potential spread or outbreak of infectious disease	Moderate	Moderate	Aware of the potential for disease outbreaks like COVID 19 and flu pandemics, protection should be provided for workers against such outbreaks. Current national ~~P~~ublic ~~H~~ealth protocols, including providing workers with appropriate forms of personal	Low	Low	This is precautionary therefore when mitigation measures are enforced, residuals should be near zero.

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
			protective equipment (PPE) when needed, should be observed.			
Sexual exploitation and abuse	Moderate	Moderate	Gender Based Violence Country Profile: Grenada, a WB funded 2020 study reported unemployment higher among women than men and that occupational sex segregation exists	Low	Low	Recommendation of mandatory employment of women and a code of conduct should reduce the risk of SEA
ESS 5. Land Acquisition- Relevant but unlikely to be applied. All lands within the project foot print are owned by Grenada Airport Authority (GAA). However, a Resettlement Framework (RF) will be prepared as a precautionary measure in case land acquisition and/or involuntary physical/economic displacement is required.						
ESS6*: Biodiversity Conservation and Sustainable Management of Living Natural Resources*.						
Damage to marine habitat in the adjacent bay.	Low	Low	Storm water runoff can carry construction waste and other pollutants into the sea affecting marine life. Mitigation measures should include a waste management plan for construction waste and the creation of a sedimentation pond for runoff	Low	Low	Mitigation measures would further reduce the risk of negative impacts on the marine environment.

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
			before entering the marine environment.			
Damage to terrestrial habitats and damage to organisms	Low	Low	The MBIA Wildlife Management program actively seeks to prevent meaningful habitat development. The fringe vegetation between the airport fence and the sea would not be affected by the project but will be cut as per usual airport safety requirement. There is no significant terrestrial habitat at this site.	Low	Low	The risk of damage to terrestrial habitats is low since the area does not support terrestrial habitats. Residual impact is almost zero.
ESS 8 Cultural Heritage						
Chance Find	Low	Low	There is a report of archaeological finds in the general. No recent finds have been reported.	Low	Low	Precautionary mitigation measures are included.
ESS10: *Stakeholder Engagement and information* disclosure						
Continuous engagement of stakeholders during implementation	Moderate	Moderate	The identified stakeholders each have different stakes associated with various levels of involvement in power generation and use in Grenada.	Low	Low	The recommended mitigation measure will reduce the risk level to low.

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
			As outlined in the Stakeholder Engagement Plan (SEP), Public consultations and stakeholder participation would ensure concerns about the project's impacts are addressed early during implementation.			

5.3.2 Environmental and Social Impacts and Mitigation Measures

This section of the report looks at potential environmental and social impacts associated with Site 2, the area west of the airport runway. For each identified impact, a description is given along with an identification of the source of the impact and sensitive receptors in proximity to the project site. An assessment of each potential impact is then provided, and mitigation measures identified

5.3.2.1 Air Quality

This is a construction project involving soil excavation, masonry for the construction of mounts on which panels will be anchored, installation of panels and transmission lines. The site is fenced in and the nearest community building is approximately 100m away. Evaluation of air quality will focus on particulate matter in the air and dust deposition.

Source of Impact: Dust from excavation, concrete mixing, vehicular traffic on the unsurfaced road, point source air pollution from combustion of fossil fuels used by trucks and excavators. Combustion of fossil fuel will release nitrogen oxides (NOx), sulphur dioxide (SO2), carbon monoxide (CO) negatively impacting air quality. These will add to the existing pollutants present in the air around the airport.

Sensitive Receptors: Air pollutants in sufficient concentration can have significant impact on humans especially those with compromised health, the elderly and the very young. Other receptors include offices and their contents, buildings and cars.

Assessment: Air quality measurements were taken at Site 2 on 20th March 2024 starting at 1:30 pm. Three readings were taken at fifteen (15) minute intervals and the average recorded in table 5.3. The measurements were recorded using a Temptop M2000C meter.

Table 5. 3 Air Quality as Site 2

Parameter Measured	Site 1 Measurements	WHO Standard
PM 10	11.0 µg /m^3	50 µg /m^3
PM 2.5	7.6 µg /m^3	25 µg /m^3
Carbon Dioxide CO_2	480 ppm	<600. OHSA standard 1000ppm

Project activities at Site 2 would be small compared to the quantum of work currently occurring in the general area (renovations and upgrade at MBIA, construction work around the hotel). The project duration would be medium term (six to eight months). The potential project impact on the air quality would be negative, reversible, and medium term. The impact is rated as **Moderate**.

Mitigation: All vehicle and equipment working on the site should be inspected including having their exhaust examined before entering the site for the first time. Thereafter, they should be

checked every three months. Vehicle or equipment not in use should be turned off. There should be no burning of waste on site.

Any construction material or waste marked for disposal should be covered or kept moist. The access road to the project site should be kept moist at all times to reduce dust on the road. Trucks carrying any fine material should have enclosed sides and the contents covered during transportation.

5.3.2.2 Noise:

There are no national noise standards for Grenada, therefore, the IFC limits for ambient/airborne noise levels (IFC 2007) were used in this assessment as the basis of "significance thresholds".

Noise from photo voltaic systems (solar plants) can either be electromagnetic or real noise such as a hum, vibration, or buzz. Solar panels produce direct current (DC) electrical power, however, in order to transfer this electrical power to the local grid, the DC power must be converted to alternating-current (AC) power. This conversion process is done by an "Inverter". The process of converting DC into AC power requires very fast switches which change the polarity (or direction of electrical flow). Since AC power cycles 60 times per second (or 60 hertz), the switches must activate twice per electrical cycle. This process produces tonal sound at twice electrical line frequency (120 hertz) and its harmonics (240, 360, 480 hertz and higher)[13]. Other noise source and mitigation measures are provided in Table 5.3.

Source of Impact: Heavy equipment associated with the project (i.e., bulldozer, dump trucks, and loaders) would generate some noise. Operational noise could include contracting and expansion of metal structures, wind grabbing at the panels or shaking noise from intense wind blowing against loose panels.

Sensitive Receptors: Noise sensitive receptor in the project area of influence include ancillary airport buildings, the Sandals Resort and a few private homes. All of these facilities sit more than 100m from the project site.

Assessment: The noise from heavy equipment will exceed normal/ambient noise levels and will continue throughout the construction phase with varying intensity at different days and times. Noise from heavy equipment is not expected to exceed 70 dBA at a distance of 20m from point of origin. Such noise would be intermittent, temporary, and likely occur only during daytime hours.

[13]Noise Measurement Procedure Manual, Second Edition; Department of Environment, Hobart, Tasmania, 2008

Generally, only the solar inverter will have a dB rating, and it will not be more than 45dB. Considering the 45dB rating as the maximum rating of PV systems, we can conclude that noise from solar panels is insignificant and generally safe[14]

It is possible that noise from this project will be drowned out by the noise from planes landing and taking off. Noise impact from this project will be negative, direct and reversible. Given the project's location and the paucity of sensitive receptors, the impact of this project is rated as **Low** to **Moderate**.

Mitigation: This assessment recommends 90 dBA as the upper sound power level therefore the project must select equipment with lower sound power levels than the upper level (90 dBA) recommended in this assessment. All vehicles working on the project site must be inspected and licensed by the relevant authorities in Grenada. Vehicles should have their entire muffler system in tact including muffle barrels and silencers. No vehicle should be allowed to stand idle on the project site with their engine running.

Table 5.3: Sources of Noise from Solar plant; Mitigation measures added

Type of noise	Cause	Mitigation
Banging and popping noise	Contracting and expansion	If the solar panels are installed in a close array, break them apart to allow for thermal changes.
Creaking noise	Wind grabbing loose panels	Ensure solar panels are properly fixed
Rattling noise	Poorly screwed racking	Have everything properly screwed
Shaking and blowing noise	Intense wind	If the solar panels are installed in a close array, break them apart to allow for thermal changes
Hitting noise	Loose cabling	Have all the cables properly fixed without leaving any hanging sections

5.3.2.3 Water Resource

There is no fresh water resource in proximity to this project site. The closest point to the sea is approximately 150m north of the project site. Here the land slopes to the south at approximately 20^0.

Source of Impact: Site preparation including excavation works would generate waste that could pollute coastal waters if not properly managed. When the solar panels are in place, they will

[14] Do Solar Panels Make Noise? The Truth Revealed! | Solartechadvisor

reduce percolation into the soil thus increasing runoff and the risk of land based source (LBS) of marine pollution.

Sensitive Receptor: The coastal waters around MBIA are included in the Grand Anse MPA. Fish, lobsters and conch are plentiful in this area but there is no data to confirm this[15]. Marine resources are sensitive to a wide variety of pollutants.

Assessment: Excavation works on this site will be limited to preparation for foundation walls. No hazardous chemical will be used on the project site and no assembling of panels will take place on site. Impact on the marine environment would be short to medium term, direct and negative. Such impact is rated as **Low to Moderate.**

Mitigation: The project will implement a waste management plan that will collect and dispose of all waste in accordance with the Public Health Act and national waste management policies. The project will construct a settlement pond to capture all runoff before reaching the sea.

5.3.2.4 Waste Management

Human activities produce a variety of waste; such waste falls into two broad categories i.e., liquid and solid waste. These waste products appear in the environment as litter, dust, sewage, or compost causing foul odor and acting as breeding ground for disease vectors.

Source of Impact: Construction works produce solid waste commensurate with the nature of the work; in this case organic matter from clearing, packing materials, debris, unused materials, as wellas more commonplace solid waste such as food and beverage containers. Liquid waste including sewerage and wastewater from washing hands and tools.

Sensitive Receptors: Consequences of improper waste disposal include foul odor and breeding of disease vectors. These directly impact all humans within proximity including workers.

Assessment: All solid waste generated by the project will be taken to national Land Fill for disposal. Wastewater will drain away into a seepage pit constructed for this purpose. The contractors will use portable toilets which will be emptied every two days. The contents will be disposed of in accordance with Public Health standards and policy. The impact from waste will be negative, short term and reversible. Given the foregoing discourse, the impact from waste is rated as **Moderate**.

Mitigation: The contractor will develop and implement a waste management plan that includes the requirement for all waste material to be collected in receptacles provided and taken to the landfill.

[15] Personal discussion with Mr. Justin Rennie, Director of Fisheries.20/04/2024

5.3.2.5 Impact on Biodiversity and Coastal Resources

Biodiversity in the general area will include the narrow strip of vegetation outside the airport fence and the marine environment.

Source of Impact: Excavated soil and improper waste disposal could impact the marine environment.

Sensitive Receptors will include all life forms and habitats in the coastal waters.

Assessment: Except for the lawn grass, there is no significant biological diversity at the project site. The marine species in the coastal waters have high economic value, are in great demands and some like the queen conch are being overfished. Coastal biodiversity importance is very high but impact from this project is expected to be very low to zero. Biodiversity resource on the project site is very low. Overall potential impact on biodiversity is rated as **Low**.

Mitigation Measures: No waste or runoff will be allowed to enter coastal waters. All runoff will be channeled into a sedimentation pond where solids will settle out before the water enters the airport drainage system than empties into the sea.

5.3.2.6 Occupational Health and Safety

The objectives of the World Bank ESS2 include *inter alia*:

- Promote safety and health at work;
- Promote the fair treatment, non-discrimination and equal opportunity of project workers;
- Protect project workers, including vulnerable workers such as women, persons with disabilities, children (of working age, in accordance with this ESS) and migrant workers, contracted workers, community workers and primary supply workers, as appropriate;

Source of Impact: Construction work using heavy equipment, moving objects and sharp tools expose workers to injury. Additionally, infectious diseases like flu pandemics spread easily among persons working in close quarters or poorly ventilated areas.

Sensitive Receptors: Workers on site, operators of machinery, truck drivers and other project staff will all be exposed to health and safety risks and are therefore classified as receptors.

Assessment: Heavy equipment, sharp tools and vehicles will all be used on this project. Workers will be exposed to moving objects and equipment. There is also the potential for trip and fall where construction material and tools are not properly stored. Accidents on project site can have long term debilitating effect, the impact is rated as **Moderate**.

Mitigation Measures: All workers will be provided with PPE as appropriate for each task. OHS

requirements of the Standard WB SPD for Works will be adopted and relevant specifications will be added to the Employers Requirements to ensure that particular risks of: construction machinery, working on active platforms, working near water, working on unstable land, and working with excavations are included.
Appropriate signage will be strategically placed indicating muster point, moving objects, active drive way, location of first aid supplies etc. Only licensed drivers and operators will be allowed to use vehicle and heavy equipment on the project site. The contractor will engage his/her workers in daily toolbox talk as a training tool.

5.3.2.7 Community Health and Safety

Source of Impact: Construction projects can impact community health and safety directly through physical injury resulting from traffic accidents, exposure to hazardous materials, or respiratory effects from air emissions, as well as indirectly via the spread of communicable diseases from population influx.

Sensitive Receptors: All human operations within proximity to the project could be directly or indirectly impacted by project activities. Heavy equipment passing through communities with narrow streets and no footpath pose health and safety risk to pedestrians.

Assessment: This project and its associated services will attract workers from other communities causing increased traffic in the general area with the potential for accidents. These workers will require social services such as food and health care.

Health risks to communities in relation to the spread of communicable diseases (HIV/AIDS) and flu pandemics (COVID 19) can be expected. The overall rating for community health and safety impact is **Moderate**.

Mitigation Measures: Mitigation measures would include the following:

- Establish a worker's code of conduct that requires respect for local communities, appropriate behaviour during and outside working hours.
- Put in place zero-drug and alcohol tolerance policies.
- Include in the daily toolbox talk issues like sexual harassment and gender equality.
- Stakeholder engagement activities such as town hall meetings or information dissemination.

5.3.2.8 Visual Impact

Source of Impact: Visual impact is both the change to the visual qualities of the landscape resulting from the introduction of visual contrasts—in this case from open area to solar plant — and the human response to that change.

Sensitive Receptors: Humans – nature lovers and side seers, property owners with eyes on the market.

Assessment: The introduction of the solar facility to the landscape may affect the perception of the landscape as a natural-appearing setting. Instead, it may be perceived as a landscape strongly influenced by human activities and industrial in character. These are changes to the visual qualities of the landscape as perceived by humans.

Mitigation Measures: Minimize luminous/reflective surfaces to the extent possible and place panels close to ground level. Use vegetation buffers where practical.

5.3.2.9 Public Awareness and Employment

Public awareness is detailed in the Stakeholder Engagement Plan (SEP) and the ESMP; it identifies the stakeholder, provides a communication plan and a grievance redress mechanism. It also makes provision for a community liaison officer who will serve as the interface between the community and the various project components.

The project will have an information board with the name of the project, the contractor(s), the funding source, duration and a directory of key project personnel, how to contact them, and mechanism for addressing grievance. Additionally, project information for public consumption will be posted on social media and circulated on public media service.

5.4 Risk Rating for Site 3

5.4.1 Analysis

Section 5.4.1 provides risk ratings with rationale for worst case scenarios for potential risks relevant to Site 3 (Table 5.3.), Impact and mitigation measures in sub-section 5.4.2

Table 5.4. Risk rating and rationale For Site 3.

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
ESS1: Assessment and Management of E&S Risks and Impacts						
Glint and glare from solar panels affecting motorist on the road to the airport, pilots on planes landing or taking off, the air traffic controller and the adjacent community	Substantial	Substantial	Metallic surfaces are good reflectors of sunlight and head light from vehicles. The project will therefore use panels with antiglare surfaces. This project will abide by the ocular hazard standard which establishes the glare intensity depicted by the color-coded system that is deemed significant and thereby determined to produce a potential hazard to air navigation.	Low	Low	With appropriate choice of surface tint for the solar panels and adherence to the ocular hazard standard there should be little or no residual impact.
Transmission lines from Site 3 will go	Substantial	Low	Power generated at Site 3 will be transmitted to the substation located north of Site 1. Transmission lines will	Low	Low	The tunnels under the airport are sufficiently large and reinforced

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
underground the airport to the substation in the vicinity of Site 1.			use existing tunnels under the airport without additional impact on the physical structures of the airport. To this end GRENLEC and MBIA have an agreement in principle.			as to require no additional work. Residual impact will therefore be very low.
Flooding	Substantial	Substantial	Currently storm water soaks into the loosely compacted topsoil with the assistance of the vegetation cover. Clearing the area for construction will increase run off leading to sedimentation of the marine environment. The topography of this area (almost U shape) will allow storm water to accumulate close to the sea before overflowing into it. It is recommended that some portion of the southernmost end (about 3 acres) be left under vegetation cover.	Low	Low	Even with mitigation measures, the risk of flooding remains given the gradient of the land and the increase in extreme weather events due to climate change, it is difficult to completely reduce future flood risks.
ESS 2: Labour and Working Conditions						

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
Working conditions	Moderate	Moderate	Inadequate enforcement of labor laws could result in workers being denied privileges and benefits Ensure that Contractors comply with the country's labor and human rights laws, as outlined in the Labour Management Procedures (LMP) document. The Contractor will ensure ~~that~~ adequate sanitary provisions as well as access to safe drinking water for all workers.	Low	Low	Monitoring the application of the LMP by the relevant agency should lower the risk
Child Labour	Low	Low	There is not a history of child labour in Grenada but contractors will include in their policy a clause precluding child labour.	Low	Low	The risk already low will be made even lower by the contractors conforming to Grenada's labour laws.
Sexual harassment	Moderate	Moderate	Grenada Women's Health and Life Experiences Study (2018) reported a			Mitigation measures are expected to

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
			higher than expected level of sexual harassment in the work place.			significantly reduce the incidences of SH on this project.
Occupational Health and Safety	Substantial	Substantial	The occupational health and safety issues include exposure to physical hazards from the use of heavy equipment as well as hazardous materials, trip and fall accidents, increasing levels of dust and noise, falling objects, and electrical hazards. All anticipated hazards should be diligently controlled.	Moderate	Moderate	Even with an OHS plan and multifaceted efforts in place, accidents can occur; special attention should therefore be paid to OHS issues.
ESS 3: Resource Efficiency and Pollution Prevention Management						
Dust generation, vibration, noise.	Substantial	Low	Local air quality will be affected by the emissions generated by equipment and vehicles. During excavation and transport of the excavated materials and construction materials, dust is expected to be generated. The increase in noise and dust will mostly occur during the	Low	Low	Even with mitigation measures, it is difficult to completely eliminate all vibrations and noise. Strong winds can cause mounted panels to vibrate.

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
			construction phase with contribution from vehicular movements, construction machinery and hand tools. This requires a construction management plan that determines the dust, noise, and odour-generating areas and activities and detailing mitigating measures for any such activities.			
Generation and disposal of waste	Substantial	Low	Clearing of vegetation, grading and excavation of soil and construction works along with human activities will generate waste.	Low	Low	Limiting vegetation removal and implementing an effective waste management plan will significantly lower risk.
ESS4: Community Health and Safety						

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
Traffic and road safety issues	Very High	Substantial	Until an access road is developed, vehicular access to site 3 will need to cross the airport runway making it very restrictive. This project will need a road outside the airport fence. The closest access road outside the fence passes by SGU. If this road is developed traffic along this route could experience delays and accidents resulting from increased traffic through a community with ongoing construction work and heavy equipment on the road to SGU. Mitigation measures, in a traffic management plan would address negative impacts resulting from poor road safety culture as well as ensuring pedestrian safety in the project area, including the use of traffic wardens, road signage and speed restrictions. During road construction use traffic wardens, road signage and speed	Low	Low	The recommended mitigation measures if employed will significantly reduce risk.

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
			restrictions. Only trained drivers would be employed by contractors.			
Potential spread or outbreak of infectious disease	Moderate	Moderate	Aware of the potential for disease outbreaks like COVID 19 and flu pandemics, protection should be provided for workers against such outbreaks. Current national public health protocols, including providing workers with appropriate forms of personal protective equipment (PPE) when needed, should be observed.	Low	Low	This is precautionary therefore when mitigation measures are enforced, residuals should be near zero.
Sexual exploitation and abuse	Moderate	Moderate	Gender Based Violence Country Profile: Grenada, a WB funded 2020 study reported unemployment higher among women than men and that occupational sex segregation exists	Low	Low	Recommendation of mandatory employment of women and a code of conduct should reduce the risk of SEA

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
ESS 5. Land Acquisition- Relevant but unlikely to be applied. All lands within the project foot print are owned by Grenada Airport Authority (GAA). However, a Resettlement Framework (RF) will be prepared as a precautionary measure in case land acquisition and/or involuntary physical/economic displacement is required.						
ESS6*: Biodiversity Conservation and Sustainable Management of Living Natural Resources*.						
Damage to marine habitat and death to marine life	Moderate	Moderate	Storm water runoff can carry construction waste and other pollutants into the sea affecting marine life. Mitigation measures should include a waste management plan for construction waste and retaining some portion of the vegetation cover to reduce runoff.	Low	Low	Mitigation measures would reduce the risk of negative impacts.
Damage to terrestrial habitats and damage to organisms	Substantial	Substantial	The MBIA Wildlife Management program actively seeks to prevent meaningful habitat development. There is a small bird population consisting of *yellow breasted banana quit, flycatchers and humming birds. These would be negatively impacted.* Although these birds are not on the	Low	Low	Mitigation measures would reduce the risk of damage to terrestrial habitats. Because the dominant activity here is the airport and its stringent policies are

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
			endangered list, effort should be made to trap and relocate them. The southern portion of the forest should be preserved including fringe mangrove. This section of the forest with the mangrove is the main habitat for the crabs.			in the law residual impact would be low..
ESS 8 Cultural Heritage						
Chance Find	Low	Low	There is a report of archaeological finds in the general. No recent finds have been reported.	Low	Low	Precautionary mitigation measures are included.
ESS10: *Stakeholder Engagement and information* disclosure						
Continuous engagement of stakeholders during implementation	Moderate	Moderate	The identified stakeholders each have different stakes associated with various levels of involvement in power generation and use in Grenada. As outlined in the Stakeholder Engagement Plan (SEP), public consultations and participation of stakeholders would ensure concerns	Low	Low	The recommended mitigation measure will reduce the risk level to low.

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
			about the impacts of the project are addressed early during implementation.			

5.4.2 Environmental and Social Impacts and Mitigation Measures

This section of the report looks at potential environmental and social impacts associated with Site 3, the area outside the airport fence to the east of the airport runway. For each identified impact, a description is given along with an identification of the source of the impact and sensitive receptors in proximity to the project site. An assessment of each potential impact is then provided, and mitigation measures identified

5.4.2.1 Air Quality

This is a construction project involving vegetation removal, soil excavation, masonry for the construction of mounts to which panels will be anchored, installation of panels and transmission lines. The site is at the southern edge of the island outside the airport fence. Although it is not fenced, it is inaccessible by land except by crossing the airport runway and fence. Because of the vegetation cove and the geographic location, there is no activity happening here.

Source of Impact: Dust from excavation, road construction, concrete mixing, vehicular traffic on the unsurfaced access road, point source air pollution from combustion of fossil fuels used by trucks and excavators. Combustion of fossil fuel will release nitrogen oxides (NOx), sulphur dioxide (SO2), carbon monoxide (CO) negatively impacting air quality. These will add to the existing pollutants present in the air around the airport.

Sensitive Receptors: Air pollutants in sufficient concentration can have significant impact on humans especially those with compromised health, the elderly and the very young. Other receptors include the airport instruments and facilities, the Calliste and SGU community.

Assessment: Air quality impact from this project would be small compared to the quantum of work currently occurring in the general area (renovations and upgrade at MBIA, construction work on several houses on the road to SGU). The project duration would be medium term (six to eight months). The potential project impact on the air quality would be negative, reversible, and medium term. The impact is rated as **Moderate**.

Mitigation: All vehicle and equipment working on the site should be inspected including having their exhaust examined before entering the site for the first time. Thereafter, they should be checked every three months. Vehicle or equipment not in use should be turned off. There should be no burning of waste on site.

Any construction material or waste marked for disposal should be covered or kept moist. When the vegetation is cleared, the ground should be kept moist. When the access route is identified it would need construction works. All fines should be kept covered or wet. Trucks carrying any fine material should have enclosed sides and the contents covered during transportation.

5.4.2.2 Noise

There are no national noise standards for Grenada, therefore, the IFC limits for ambient/airborne noise levels (IFC 2007) were used in this assessment as the basis of "significance thresholds". IFC standard recommends day time noise level of 70 dBA for commercial areas and 55 dBA for residential areas. This measurement will be applicable for communities like True Blue and Calliste.

Source of Impact: Heavy equipment associated with the project (i.e., bulldozer, dump trucks, and loaders) would generate some noise. Operational noise could include contracting and expansion of metal structures, wind grabbing at the panels or shaking noise from intense wind blowing against loose panels.

Sensitive Receptors: Noise sensitive receptors in the project area of influence include ancillary airport buildings, True Blue and Calliste communities. These communities are more than 100m from the project site.

Assessment: The noise from heavy equipment will exceed normal/ambient noise levels and will continue throughout the construction phase with varying intensity at different days and times. Noise from heavy equipment is not expected to exceed 70 dBA at a distance of 20m from point of origin. Such noise would be intermittent, temporary, and likely occur only during daytime hours.

It is possible that noise from this project will be drowned out by the noise from planes landing and taking off. Noise impact from this project will be negative, direct and reversible. Given the project's location and the paucity of sensitive receptors, the impact of this project is rated as **Low**.

Mitigation: This assessment recommends 90 dBA as the upper sound power level therefore the project must select equipment with lower sound power levels lower than the upper level (90 dBA) recommended in this assessment. All vehicles working on the project site must be inspected and licensed by the relevant authorities in Grenada. Vehicles should have their entire muffler system in tact including muffle barrels and silencers. No vehicle should be allowed to stand idle on the project site with their engine running.

5.4.2.3 Water Resource

There is no fresh water resource in proximity to this project site. The closest point to the sea is approximately 100m north and east of the project site. The land slopes approximately 15^0 to the west so that storm water will flow westwards.

Source of Impact: Site preparation including excavation works would generate waste that could pollute coastal waters if not properly managed. When the solar panels are in place, they will reduce percolation into the soil thus increasing runoff and the risk of land based source (LBS) of marine pollution.

Sensitive Receptor: The coastal waters around MBIA are included in the Grand Anse MPA. Fisheries resources include lobsters and conch are plentiful in this area. These could be impacted by runoff containing toxic or hazardous substances.

Assessment: Excavation works on this site will be limited to preparation for foundation walls. No hazardous chemical will be used on the project site and no assembling of panels will take place on site. Any impact on the marine environment would be short term, direct and negative. There is no data on the health of the fish stocks[16]or their quantity so the assessment is conservatively rated as **Moderate.**

Mitigation: The project will implement a waste management plan that will collect and dispose of all waste in accordance with the Public Health Act and national waste management policies. The project will construct a settlement pond to capture all runoff before reaching the sea.

5.4.2.4 Waste Management

Human activities produce a variety of waste; such waste falls into two broad categories i.e., liquid and solid waste. These waste products appear in the environment as litter, dust, sewage, or compost producing foul odor and breeding ground for disease vectors.

Source of Impact: Construction works produce solid waste commensurate with the nature of the work, in this case vegetation matter from clearing, packing materials, debris, unused materials, as well as more commonplace solid waste such as food and beverage containers. Liquid waste including sewerage and wastewater from washing hands and tools.

Sensitive Receptors: Improper waste disposal can result in foul odor, breeding ground for disease vectors and water pollution. These directly impact all humans within proximity as well as the marine or aquatic habitat they impact.

Assessment: All solid waste generated by this project will be taken to national Land Fill for disposal. Wastewater will drain away into a seepage pit constructed for this purpose. The contractors will use portable toilets which will be emptied every two days. The contents will be disposed of in accordance with Public Health standards and policy. The impact from waste will be negative, short term and reversible. The impact from waste is rated as **Moderate**.

Mitigation: The contractor will develop and implement a waste management plan that includes the requirement for all waste material to be collected in receptacles provided and taken to the landfill and all liquid waste drained into seepage pit.

5.4.2.5 Impact on Biodiversity and Coastal Resources

[16] Personal discussion with Mr. Justin Rennie, Director of Fisheries.20/04/2024

This project area is covered with vegetation and is home to a small population of birds, lizards and crabs. Most of the vegetation will be removed and the associated habitats destroyed.

Source of Impact: Clearing of vegetation. Soil excavation and improper waste disposal could impact both terrestrial and marine habitat.

Sensitive Receptors will include all life forms and habitats in the forested area and the surrounded coastal waters.

Assessment: The vegetation cover is dominated by seven (7) plant species namely acacia, guinea grass, neem, bursera, leucaceae and two species of mangrove and a few runners. Terrestrial fauna consist of a small number of birds and crabs. No endangered or endemic terrestrial flora or fauna was observed. The coastal waters are reported to have diverse fish species with high economic value. Overall potential impact on biodiversity is rated as **Moderate**.

Mitigation Measures: No waste or runoff will be allowed to enter coastal waters. All runoff will be channeled into a sedimentation pond where solids will settle out before the water enters the sea.

There should be no cutting of the mangrove or the buffer zone as identified in Figure 4.7 in keeping with the national drive to protect coastal mangrove.

5.4.2.6 Occupational Health and Safety

The objectives of the World Bank ESS2 include *inter alia*:

- Promote safety and health at work;
- Promote the fair treatment, non-discrimination and equal opportunity of project workers;
- Protect project workers, including vulnerable workers such as women, persons with disabilities, children (of working age, in accordance with this ESS) and migrant workers, contracted workers, community workers and primary supply workers, as appropriate;

Source of Impact: Construction work using heavy equipment, moving objects and sharp tools expose workers to injury. Additionally, infectious diseases like flu pandemics spreads easily among persons working in close quarter or poorly ventilated areas.

Sensitive Receptors: Workers on site, operators of machinery, truck drivers and other project staff will all be exposed to health and safety risks and are therefore classified as receptors.

Assessment: Heavy equipment, sharp tools and vehicle will all be used on this project. Workers will be exposed to moving objects and equipment. There is also the potential for trip and fall where construction material and tools are not properly stored. Accidents on project site can have long term debilitating effect, the impact is rated as **Moderate**.

Mitigation Measures: All workers will be provided with PPE as appropriate for each task. OHS requirements of the Standard WB SPD for Works will be adopted and relevant specifications will be added to the Employers Requirements to ensure that particular risks of: construction machinery, working on active platforms, working near water, working on unstable land, and working with excavations are included.

Appropriate signage will be strategically placed indicating muster point, moving objects, active drive way, location of first aid supplies etc. Only licensed drivers and operators will be allowed to use vehicle and heavy equipment on the project site. The contractor will engage his/her workers in daily toolbox talk as a training tool.

5.4.2.7 Community Health and Safety

Source of Impact: Construction projects can impact community health and safety directly through physical injury resulting from traffic accidents, exposure to hazardous materials, or respiratory effects from air emissions, as well as indirectly via the spread of communicable diseases from population influx.

Sensitive Receptors: All human operations within proximity to the project could be directly or indirectly impacted by project activities. Heavy equipment passing through communities with narrow streets and no footpath pose health and safety risk to pedestrians.

Assessment: This project and its associated services will attract workers from other communities causing increased traffic in the general area with the potential for accidents. These workers will require social services such as food and health care.

Health risks to communities in relation to the spread of communicable diseases (HIV/AIDS) and flu pandemics (COVID 19) can be expected. The overall rating for community health and safety impact is **Moderate**.

Mitigation Measures: Mitigation measures would include the following:

- Establish a worker's code of conduct that requires respect for local communities, appropriate behavior during and outside working hours.
- Put in place zero-drug and alcohol tolerance policies.
- Include in the daily toolbox talk issues like sexual harassment and gender equality.
- Stakeholder engagement activities such as town hall meetings and information dissemination.

5.4.2.8 Visual Impact

Source of Impact: Visual impact is both the change to the visual qualities of the landscape resulting from the introduction of visual contrasts—in this case from open area to solar plant — and the human response to that change.

Sensitive Receptors: Humans – nature lovers and side seers, property owners with eyes on the market.

Assessment: The introduction of the solar facility to the landscape may affect the perception of the landscape as a natural-appearing setting. Instead, it may be perceived as a landscape strongly influenced by human activities and industrial in character. These are changes to the visual qualities of the landscape as perceived by humans.

Mitigation Measures: Minimize luminous/reflective surfaces to the extent possible and place panels close to ground level. Use vegetation buffers where practical.

5.4.2.9 Public Awareness and Employment

Public awareness is detailed in the Stakeholder Engagement Plan (SEP) and the ESMP; it identifies the stakeholder, provides a communication plan and a grievance redress mechanism. It also makes provision for a community liaison officer who will serve as the interface between the community and the various project components.

The project will have an information board with the name of the project, the contractor(s), the funding source, duration of the project and a directory of key project personnel, how to contact them, and mechanism for addressing grievance. Additionally, project information for public consumption will be posted on social media and circulated on public media services.

5.5 Risk Rating for the Sub-Station

5.5.1 Analysis

Section 5.5.1 provides risk ratings with rationale for worst case scenarios for potential risks relevant to the construction of a sub-station and Battery Energy Storage System (BESS) at Site 1. At this time, the design for the substation is being developed so information provided here is based on experience and work done on other sub-stations. Table 5.5 provides the risk rating for this subproject. Impact and mitigation measures are presented in sub-section 5.5.2

Table 5.5 Risk rating and rationale For Sub-station and BESS

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
ESS1: Assessment and Management of E&S Risks and Impacts						
Sight Clearing: Excavation and trucking of top soil if necessary	Moderate	Low	There is no significant vegetation cover at the site but there is some remnant from a previous development activity. The area will be flattened by excavation and the top soil spread and compacted or removed to an approved site as necessary.	Low	Low	When the construction is complete the hard surface cover will cause increase storm water runoff. There will be no direct residual impact from excavation.
Flooding	Moderate	Moderate	With vegetation cover replaced by hard concrete surface, runoff is	Low	Low	Even with mitigation measures, the risk of

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
			expected to be more than normal. Storm water would be contained in a settling pond before draining into the sea.			flooding remains given the gradient of the land and the increase in extreme weather events due to climate change, it is difficult to completely reduce future flood risks.
ESS 2: Labour and Working Conditions						
Working conditions	Moderate	Moderate	Inadequate enforcement of labor laws could result in workers being denied privileges and benefits Ensure that Contractors comply with the country's labor and human rights laws, as outlined in the Labour Management Procedures (LMP) document. The Contractor will ensure adequate sanitary provisions as well as access to safe drinking water for all workers.	Low	Low	Monitoring the application of the LMP by the relevant agency should lower the risk
Child Labour	Low	Low	There is not a history of child labour in Grenada but contractors will include in			The risk, already low, will be made even

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
			their policy a clause precluding child labour. Employees will be required to show proof of age.			lower by the contractors confirming to Grenada's labour laws.
Sexual harassment	Moderate	Moderate	Grenada Women's Health and Life Experiences Study (2018) reported a higher than expected level of sexual harassment in the work place.	Low	Low	Mitigation measures are expected to significantly reduce the incidences of SH on this project.
Occupational Health and Safety	Substantial	Substantial	The occupational health and safety issues include exposure to physical hazards from the use of heavy equipment as well as hazardous materials, trip and fall accidents, increasing levels of dust and noise and falling objects. All anticipated hazards should be diligently controlled.	Moderate	Moderate	Even with an OHS plan and multifaceted efforts in place, accidents can occur; special attention sho+uld therefore be paid to OHS issues.
ESS 3: Resource Efficiency and Pollution Prevention Management						

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
Dust generation, vibration, noise.	Substantial	Low	Local air quality will be affected by the emissions generated by equipment and vehicles. During excavation and transport of the excavated materials and construction materials, dust is expected to be generated. The increase in noise and dust will mostly occur during the construction phase with contribution from vehicular movements, construction machinery and hand tools. A construction management plan that determines the dust, noise, and odor-generating areas will be developed; it will include activities and detailing mitigating measures for any such activities.	Low	Low	Even with mitigation measures, it is difficult to completely eliminate all vibrations and noise.

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
Generation and disposal of waste	Moderate	Low	Soil excavation and construction works along with human activities will generate waste. A waste management plan will be implemented to make sure that all waste is placed in bins provided to be removed by licensed waste management collectors.	Low	Low	Implementing an effective waste management plan will significantly lower the risk.
ESS4: Community Health and Safety						
Traffic and road safety issues	Moderate	Low	The road that leads to site 1 continues on to the MBIA. Traffic along this road is relatively heavy and will increase by the addition of construction related vehicle. During sub-station construction, delays and accidents could result from increased activity on the road. Mitigation measures, in a traffic management plan would address negative impacts resulting from poor road safety and ensuring pedestrian safety in the project area, including the use of traffic wardens, road	Low	Low	The recommended mitigation measures when employed will significantly reduce risk.

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
			signage and speed restrictions. Only trained drivers would be employed by contractors.			
Potential spread or outbreak of infectious disease	Moderate	Moderate	Aware of the potential for disease outbreaks like COVID 19 and flu pandemics, protection should be provided for workers against such outbreaks. Current national ~~P~~public ~~H~~ealth protocols, including providing workers with appropriate forms of personal protective equipment (PPE) when needed, should be observed.	Low	Low	This is precautionary therefore when mitigation measures are enforced, residuals should be near zero.
Sexual exploitation and abuse	Moderate	Moderate	Gender Based Violence Country Profile: Grenada, a WB funded 2020 study reported unemployment higher among women than men and that occupational sex segregation exists	Low	Low	Recommendation of mandatory employment of women and a code of conduct should reduce the risk of SEA

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
ESS 5. Land Acquisition- Relevant but unlikely to be applied. All lands within the project foot print are owned by Grenada Airport Authority (GAA). However, a Resettlement Framework (RF) will be prepared as a precautionary measure in case land acquisition and/or involuntary physical/economic displacement is required.						
ESS6*: Biodiversity Conservation and Sustainable Management of Living Natural Resources*.						
Damage to marine habitat in the adjacent bay.	Low	Low	Storm water runoff can carry construction waste and other pollutants into the sea affecting marine life. Mitigation measures should include a waste management plan for construction waste and the creation of a sedimentation pond for runoff before entering the marine environment.	Low	Low	Mitigation measures would further reduce the risk of negative impacts on the marine environment.
Damage to terrestrial habitats and damage to organisms	Low	Low	The MBIA Wildlife Management program actively seeks to prevent meaningful habitat development. The fringe vegetation between the airport fence and the project site would not be affected by the project but will be cut as per usual airport safety requirement. There is no	Low	Low	The risk of damage to terrestrial habitats is low since the area does not support terrestrial habitats. Residual impact is almost zero.

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
			significant terrestrial habitat at this site.			
ESS 8 Cultural Heritage						
Chance Find	Low	Low	There is a report of archaeological finds in the general area. No recent finds have been reported.	Low	Low	Precautionary mitigation measures are included.
ESS10: *Stakeholder Engagement and information* disclosure						
Continuous engagement of stakeholders during implementation	Moderate	Moderate	The identified stakeholders each have different stakes associated with various levels of involvement in power generation and use in Grenada. As outlined in the Stakeholder Engagement Plan (SEP), Public consultations and stakeholder participation would ensure concerns about the project's impacts are addressed early during implementation.	Low	Low	The recommended mitigation measure will reduce the risk level to low.

5.5.2 Environmental and Social Impacts and Mitigation Measures

This section of the report looks at potential environmental and social impacts associated with construction of the substation. For each identified impact, a description is given along with an identification of the source of the impact and sensitive receptors in proximity to the project site. An assessment of each potential impact is then provided, and mitigation measures identified

5.5.2.1 Air Quality

This is a construction project involving soil excavation and masonry. Evaluation of air quality will focus on particulate matter in the air and dust deposition.

Source of Impact: Dust from excavation, concrete mixing, vehicular traffic on the unsurfaced road, point source air pollution from combustion of fossil fuels used by trucks and excavators. Combustion of fossil fuel will release nitrogen oxides (NOx), sulphur dioxide (SO2), carbon monoxide (CO) negatively impacting air quality. These will add to the existing pollutants present in the air around the airport.

Sensitive Receptors: Air pollutants in sufficient concentration can have significant impact on humans especially those with compromised health, the elderly and the very young. Other receptors include the Caliste community off to the west and the travelling public.

Assessment: Air quality measurements were taken on 20th March 2024 starting at 1:30 pm. Three readings were taken at fifteen (15) minute intervals and the average recorded in table 5.3. The measurements were recorded using a Temptop M2000C meter.

Table 5.6 Air Quality as Site 2

Parameter Measured	Site 1 Measurements	WHO Standard
PM 10	11.0 µg /m^3	50 µg /m^3
PM 2.5	7.6 µg /m^3	25 µg /m^3
Carbon Dioxide CO_2	480 ppm	<600. OHSA standard 1000ppm

Construction activities associated with the placement of the sub-station would be minimal since the intention is to use a containerised building. Masonry will be required for the paving of the grounds and the construction of drains. The project duration would be medium term (five to six months). The potential project impact on the air quality would be negative, reversible, and medium term. The impact is rated as **Moderate**.

Mitigation: All vehicle and equipment working on the site should be inspected including having their exhaust examined before entering the site for the first time. Thereafter, they should be checked every three months. Vehicle or equipment not in use should be turned off. There should be no burning of waste on site.

Any construction material or waste marked for disposal should be covered or kept moist. The access road to the project site should be kept moist at all times to reduce dust on the road. Trucks carrying any fine material should have enclosed sides and the contents covered during transportation.

5.5.2.2 Noise:

There are no national noise standards for Grenada, therefore, the IFC limits for ambient/airborne noise levels (IFC 2007) were used in this assessment as the basis of "significance thresholds".

Source of Impact: Heavy equipment associated with the project (i.e., bulldozer, dump trucks, and loaders) would generate some noise. Operational noise will relate only to maintenance work.

Sensitive Receptors: The community of Caliste approximately 100 m from the project site is the only noise sensitive receptor in proximity to the project area of influence.

Assessment: The noise from heavy equipment will exceed normal/ambient noise levels and will continue throughout the construction phase with varying intensity at different days and times. Noise from heavy equipment is not expected to exceed 70 dBA at a distance of 20m from point of origin. Such noise would be intermittent, temporary, and likely occur only during daytime hours.

It is possible that noise from this project will be drowned out by the noise from planes landing and taking off. Noise impact from this project will be negative, direct and reversible. Given the project's location and the paucity of sensitive receptors, the impact of this project is rated as **Low** to **Moderate**.

Mitigation: This assessment recommends 90 dBA as the upper sound power level therefore the project must select equipment with lower sound power levels than the upper level (90 dBA) recommended in this assessment. All vehicles working on the project site must be inspected and licensed by the relevant authorities in Grenada. Vehicles should have their entire muffler system in tact including muffle barrels and silencers. No vehicle should be allowed to stand idle on the project site with their engine running.

5.5.2.3 Water Resource

There is no fresh water resource in proximity to this project site. The closest point to the sea is approximately 150m north of the project site. Here the land slopes to the south at approximately 20^0.

Source of Impact: Site preparation including excavation works would generate waste that could pollute coastal waters if not properly managed. Concrete surface will reduce percolation into the soil thus increasing runoff and the risk of land based source (LBS) of marine pollution.

Sensitive Receptor: The coastal waters around MBIA are included in the Grand Anse MPA. Fish, lobsters and conch are plentiful in this area but there is no data to confirm this[17]. Marine resources are sensitive to a wide variety of pollutants

Assessment: Excavation works on this site will be limited to preparation of platform to house the containerised sub-station and drains. No hazardous chemical will be used on the project site. Impact on the marine environment would be short to medium term, direct and negative. Such impact is rated as **Low to Moderate.**

Mitigation: The project will implement a waste management plan that will collect and dispose of all waste in accordance with the Public Health Act and national waste management policies. The project will construct a settlement pond to capture all runoff before reaching the sea.

5.5.2.4 Waste Management

Human activities produce a variety of waste; such waste falls into two broad categories i.e., liquid and solid waste. These waste products appear in the environment as litter, dust, sewage, or compost causing foul odor and acting as breeding ground for disease vectors.

Source of Impact: Construction works produce solid waste commensurate with the nature of the work; in this case organic matter from clearing, packing materials, debris, unused materials, as wellas more commonplace solid waste such as food and beverage containers. Liquid waste including sewerage and wastewater from washing hands and tools.

Sensitive Receptors: Consequences of improper waste disposal include foul odor and breeding of disease vectors all of which directly impact all humans within proximity including workers.

Assessment: All solid waste generated by the project will be taken to national Land Fill for disposal. Wastewater will drain away into a seepage pit constructed for this purpose. The contractors will use portable toilets which will be emptied every two days. The contents will be disposed of in accordance with Public Health standards and policy. The impact from waste will be negative, short term and reversible. Given the foregoing discourse, the impact from waste is rated as **Moderate**.

Mitigation: The contractor will develop and implement a waste management plan that includes the requirement for all waste material to be collected in receptacles provided and taken to the landfill.

5.5.2.5 Impact on Biodiversity and Coastal Resources

Biodiversity in the general area will include the narrow strip of vegetation outside the airport fence and the marine environment.

[17] Personal discussion with Mr. Justin Rennie, Director of Fisheries.20/04/2024

Source of Impact: Excavated soil and waste not properly disposed of could impact the marine environment.

Sensitive Receptors will include all life forms in the surrounding coastal zone.

Assessment: There is no significant biological diversity at the project site. The marine species in the coastal waters have high economic value, are in great demands and some like the queen conch are being overfished. Coastal biodiversity importance is very high but impact from this project is expected to be very low to zero. Biodiversity resource on the project site is very low. Overall potential impact on biodiversity is rated as **Low**.

Mitigation Measures: No waste or runoff will be allowed to enter coastal waters. All runoff will be channeled into a sedimentation pond where solids will settle out before the water enters the drainage system than empties into the sea.

5.5.2.6 Occupational Health and Safety

The objectives of the World Bank ESS2 include *inter alia*:

- Promote safety and health at work;
- Promote the fair treatment, non-discrimination and equal opportunity of project workers;
- Protect project workers, including vulnerable workers such as women, persons with disabilities, children (of working age, in accordance with this ESS) and migrant workers, contracted workers, community workers and primary supply workers, as appropriate;

Source of Impact: Construction work using heavy equipment, moving objects and sharp tools expose workers to injury. Additionally, infectious diseases like flu pandemics spread easily among persons working in close quarters or poorly ventilated areas.

Sensitive Receptors: Workers on site, operators of machinery, truck drivers and other project staff will be exposed to health and safety risks and are therefore classified as receptors.

Assessment: Heavy equipment, sharp tools and vehicles will all be used on this project. Workers will be exposed to moving objects and equipment. There is also the potential for trip and fall where construction material and tools are not properly stored. Accidents on project site can have long term debilitating effect, the impact is rated as **Moderate**.

Mitigation Measures: All workers will be provided with PPE as appropriate for each task. OHS requirements of the Standard WB SPD for Works will be adopted and relevant specifications will be added to the Employers Requirements to ensure that particular risks of: construction machinery, working on active platforms, working near water, working on unstable land, and

working with excavations are included.
Appropriate signage will be strategically placed indicating muster point, moving objects, active drive way, location of first aid supplies etc. Only licensed drivers and operators will be allowed to use vehicle and heavy equipment on the project site. The contractor will engage his/her workers in daily toolbox talk as a training tool.

5.5.2.7 Community Health and Safety

Source of Impact: Construction projects can impact community health and safety directly through physical injury resulting from traffic accidents, exposure to hazardous materials, or respiratory effects from air emissions, as well as indirectly via the spread of communicable diseases from population influx.

Sensitive Receptors: All human operations within proximity to the project could be directly or indirectly impacted by project activities. Heavy equipment passing through communities with narrow streets and no footpath pose health and safety risk to pedestrians.

Assessment: This project and its associated services will attract workers from other communities causing increase traffic in the general area with the potential for accidents. These workers will require social services such as food and health care.

Health risks to communities in relation to the spread of communicable diseases (HIV/AIDS) and flu pandemics (COVID 19) should be considered. The overall rating for community health and safety impact is **Moderate**.

Mitigation Measures: Mitigation measures would include the following:

- Establish a worker's code of conduct that requires respect for local communities, appropriate behavior during and outside working hours.
- Put in place zero-drug and alcohol tolerance policies.
- Include in the daily toolbox talk issues like sexual harassment and gender equality.
- Stakeholder engagement activities such as town hall meetings or information dissemination.
- A traffic management plan will be prepared and implemented.

5.5.2.9 Public Awareness and Employment

Public awareness is detailed in the Stakeholder Engagement Plan (SEP) and the ESMP; it identifies the stakeholder, provides a communication plan and a grievance redress mechanism. It also makes provision for a community liaison officer who will serve as the interface between the community and the various project components.

The project will have an information board with the name of the project, the contractor(s), the

funding source, duration and a directory of key project personnel, how to contact them, and mechanism for addressing grievance. Additionally, project information for public consumption will be posted on social media and circulated on public media service.

5.6. Risk Rating for Road Segments

5.6.1 Analysis

Section 5.6.1 provides risk ratings with rationale for worst case scenarios for potential risks relevant to construction of the two road segments (Table 6.2.), Impact and mitigation measures in sub-section 5.6.2.

Table 6.2 Risk rating and rationale For Road Segments

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
ESS1: Assessment and Management of E&S Risks and Impacts						
Soil erosion	Moderate	Moderate	One section of the road at site three will be new; the segment will be opened up by excavation then graded. Base material will be brought to the site from government approved quarry or borrow pit. Appropriate drainage will be aligned and excavated.	Low	Low	Once the carriage way is compacted and adequately surfaced and sealed, and once the drains are built to design soil erosion will be minimal to zero.
Flooding	Substantial	Substantial	In the absence of vegetation cover and with concrete covered carriageway runoff will be significant. Storm water from	Low	Low	Even with mitigation measures, the risk of flooding remains given the increase in

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
			construction areas would be contained in a settling pond before draining into other receiving water bodies.			extreme weather events due to climate change, it is difficult to completely reduce future flood risks.
ESS 2: Labour and Working Conditions						
Working conditions	Moderate	Moderate	Inadequate enforcement of labor laws could result in workers being denied privileges and benefits. Ensure that Contractors comply with the country's labor and human rights laws, as outlined in the Labour Management Procedures (LMP) document. The Contractor will ensure adequate sanitary provisions as well as access to safe drinking water for all workers.	Low	Low	Monitoring the application of the LMP by the relevant agency should lower the risk
Child Labour	Low	Low	There is not a history of child labour in Grenada but contractors will include in their policy a clause precluding child labour.	Low	Low	The risk, already low, will be made even lower by the contractors

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
						conforming to Grenada's labour laws.
Sexual harassment	Moderate	Moderate	Grenada Women's Health and Life Experiences Study (2018) reported a higher than expected level of sexual harassment in the work place.			Mitigation measures are expected to significantly reduce the incidences of SH on this project.
Occupational Health and Safety	Substantial	Substantial	The occupational health and safety issues include exposure to physical hazards from the use of heavy equipment, cranes as well as hazardous materials, trip and fall accidents, increasing levels of dust and noise, falling objects, and electrical hazards. All anticipated hazards should be diligently controlled.	Moderate	Moderate	Even with an OHS plan and multifaceted efforts in place, accidents can occur; special attention should therefore be paid to OHS issues.
ESS 3: Resource Efficiency and Pollution Prevention Management						
Dust generation, vibration, noise.	Moderate	Low	Local air quality will be affected by the emissions generated by equipment and vehicles.	Low	Low	Even with mitigation measures, it is difficult to completely

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
			During excavation and transport of the excavated materials and construction materials, dust is expected to be generated. The increase in noise and dust will mostly occur during the construction phase with contribution from vehicular movements, construction machinery and hand tools. A construction management plan will determine the dust, noise, and odour-generating areas and activities and detail mitigating measures for any such activities.			eliminate all vibrations and noise. Strong winds can cause mounted panels to vibrate.
Generation and disposal of waste	Moderate	Low	Excavation works will produce copious amounts of loose soil. Construction works will generate material waste some of which may be toxic.	Low	Low	Implementing an effective waste management plan will significantly lower the risk.

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
			Human activities will generate organic waste that could produce foul smell.			
ESS4: Community Health and Safety						
Traffic and road safety issues	Moderate	Low	Traffic delays and accidents could result from increased traffic resulting from heavy equipment and construction related vehicles using the main airport road. The roads to be developed will be closed to the public during construction. Mitigation measures, in a traffic management plan would address negative impacts resulting from poor road safety culture as well as ensuring pedestrian safety in the project area, including the use of traffic wardens, road signage and speed restrictions. Only trained drivers would be employed by contractors.	Low	Low	The recommended mitigation measures when employed will significantly reduce risk.

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
Potential spread or outbreak of infectious disease	Moderate	Moderate	Aware of the potential for disease outbreaks like COVID 19 and flu pandemics, protection should be provided for workers against such outbreaks. Current national public health protocols, including providing workers with appropriate forms of personal protective equipment (PPE) when needed, should be observed.	Low	Low	This is precautionary therefore when mitigation measures are enforced, residuals should be near zero.
Sexual exploitation and abuse	Moderate	Moderate	Gender Based Violence Country Profile: Grenada, a WB funded 2020 study reported unemployment higher among women than men and that occupational sex segregation exists	Low	Low	Recommendation of mandatory employment of women and a code of conduct should reduce the risk of SEA
ESS 5. Land Acquisition- Relevant but unlikely to be applied. All lands within the project foot print are owned by Grenada Airport Authority (GAA). However, a Resettlement Framework (RF) will be prepared as a precautionary measure in case land acquisition and/or involuntary physical/economic displacement is required.						
ESS6*: Biodiversity Conservation and Sustainable Management of Living Natural Resources*.						
Damage to marine habitats.	Moderate	Moderate	Storm water runoff can carry construction waste and other	Moderate	Moderate	Mitigation measures would reduce the risk of negative impacts.

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
			pollutants into the adjacent coastal waters damaging marine habitats. Mitigation measures should include a waste management plan for construction waste and the creation of a sedimentation pond for runoff before entering the marine environment (adjacent pond). Ensure that proper drains are constructed.			
Loss of vegetation and damage to terrestrial habitats.	Low	Low	The MBIA Wildlife Management program actively seeks to prevent meaningful habitat development. Scrub vegetation that readily grows at both sites are regularly removed so there is no significant terrestrial habitat at the site.	Moderate	Moderate	The risk of damage to terrestrial habitats is low since current activities in the area does not support terrestrial habitats. Residual impact is almost zero.
ESS8 Cultural Heritage						
Chance Find	Low	Low	There is a report of archaeological finds in the general. No recent finds have been reported.	Low	Low	Precautionary mitigation measures are included.

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
ESS10: *Stakeholder Engagement and information* disclosure						
Continuous engagement of stakeholders during implementation	Moderate	Moderate	The identified stakeholders each have different stakes associated with various levels of involvement in the construction of the roads. As outlined in the Stakeholder Engagement Plan (SEP), public consultations and participation of stakeholders would ensure concerns about the impacts of the project are addressed early during implementation.	Low	Low	The recommended mitigation measure will reduce the risk level to low.

5.6.2 Environmental and Social Impacts and Mitigation Measures

This section of the report looks at potential environmental and social impacts associated with two new road segments one at site two and the other at site three. For each identified impact, a description is given along with an identification of the source of the impact and sensitive receptors in proximity to the project site. An assessment of each potential impact is then provided, and mitigation measures identified.

5.6.2.1 Air Quality

This is a construction project involving soil excavation, construction of carriageway and masonry for the construction of drains and foot path. The road segment adjacent to site two is in a highly commercial area with little vegetation cover and much traffic. The road segment at site three will connect the community of Calliste to the remote vegetation plot west of the airport runway. Evaluation of air quality will focus on particulate matter in the air affecting health and aesthetics - dust deposition on vehicle, houses and external recreational areas. Currently the air quality is being impacted by emissions from vehicles on the airport road and aeroplanes landing and taking off at MBIA.

Source of Impact: Dust from excavation, road construction, concrete mixing, vehicular traffic on the roadway, point source air pollution from combustion of fossil fuels used by trucks and excavators. Pollutants from point sources pollution will include nitrogen oxides (NOx), sulphur dioxide (SO2), and carbon monoxide (CO). These will add to the existing pollutants present in the air around the airport.

Sensitive Receptors: Air pollutants in sufficient concentration can have significant impact on humans especially those with compromised health, the elderly and the very young. Other receptors like the Sandals Hotel offices and their contents, small businesses, buildings and vehicle in the general area.

Assessment: Air quality measurement were taken at Site 2 and 3 on 20th March 2024 between 11:30 a.m and 1:30 p.m. Three readings were taken at fifteen (15) minute intervals and the average recorded in table 5.1. The measurements were recorded using a Temptop M2000C meter.

Table 5. 1 Air Quality as Site 1

Parameter Measured	Site 2 Average Measurements	Site 3 Average Measurements	WHO Standard
PM 10	15.8 µg /m^3	12.6 µg /m^3	50 µg /m^3
PM 2.5	9.5 µg /m^3	9:0 µg /m^3	25 µg /m^3
Carbon Dioxide CO_2	663 ppm	589 ppm	<600. OHSA standard 1000ppm

Construction works on both road segments is estimated to last ten (10) weeks. The potential project impact on the air quality would be negative, reversible, and medium term. The impact is rated as **Moderate**.

Mitigation: All vehicle and equipment working on the site should be checked including having their exhaust examined before entering the site for the first time. Thereafter, they should be checked every three months. Vehicle or equipment not in use should be turned off. There should be no burning of waste on site.

Potential dust source such as cement, sand and aggregate should be kept covered, waste marked for disposal should be covered or kept moist. The access road to the project site should be kept wet and free of soil at all times. Trucks carrying any fine material should have enclosed sides and the contents covered during transportation.

5.6.2.2 Noise:

There are no national noise standards for Grenada therefore, the IFC limits for ambient/airborne noise levels (IFC 2007) were used in this assessment as the basis of "significance thresholds".

Source of Impact: Heavy equipment associated with the project (i.e., bulldozer, dump trucks, and loaders) would generate noise above acceptable levels for residential communities. However, noise from these sources would be intermittent, temporary, and likely occur only during daytime hours.

Sensitive Receptors: Sandals Hotel and Resort and a number of residential houses are in proximity to site two and the Calliste community at the northern end of road segment 3 are the receptors most likely to be impacted by any noise generated from this project.

Assessment: The noise from heavy equipment will exceed normal/ambient noise levels and will continue throughout the construction phase with varying intensity at different days and times. Noise from heavy equipment is not expected to exceed 70 dBA at a distance of 20m from point of origin.

Noise from this project will be drowned out by the noise from planes landing and taking off. Noise impact will be negative, direct and reversible. Given the project's location and the paucity of sensitive receptors, the impact of this project is rated as **Moderate**.

Mitigation: This assessment recommends 90 dBA as the upper sound power level therefore the project must select equipment with lower sound power levels than the upper level (90 dBA) recommended in this assessment. All vehicles working on the project site must be inspected and licensed by the relevant authorities in Grenada. Vehicles should have their entire muffler system

in tact including muffle barrels and silencers. No vehicle should be allowed to stand idle on the project site with their engine running.

5.6.2.3 Water Resource

There is no fresh water resource in proximity to either road segments. Both segments sit about thirty (30) meters from the sea. The coastal waters in this area is part of the Grand Anse Marine Protected Area.

Source of Impact: Site preparation including excavation works would generate waste that can pollute the coastal waters if not managed. Additionally, when the road segments are paved soil percolation would be reduced thus accelerating runoff which can carry waste into the sea resulting in land based source (LBS) of marine pollution.

Sensitive Receptor: The entire Grand Anse Marine Protected Area (MPA) is a sensitive receptor rich in marine life including lobsters, conch and a wide variety of demersal fish. Sea moss farming is also practiced in the waters around Calieste.

Assessment: Excavation works on both sites will be limited to preparation for the carriageway. No hazardous chemical will be used on the project site and no maintenance of vehicle or equipment. Any impact on the marine environment would be short term, direct and negative. Such impact is rated as Low to Moderate.

Mitigation: The project will implement a waste management plan that will collect and dispose of all waste in accordance with Public Health and national waste management policies. The project will construct a settlement pond to capture all runoff including storm water before reaching the sea.

5.6.2.4 Waste Management

Human activities produce a variety of waste; such waste falls into two broad categories i.e., liquid and solid waste. These waste products appear in the environment as litter, dust, sewage, or compost producing foul odor and breeding ground for disease vectors.

Source of Impact: Construction works produce solid waste commensurate with the nature of the work, in this case vegetation matter from clearing and pruning, packing materials, debris, unused materials, as well as more commonplace solid waste such as food and beverage containers. Liquid waste including sewerage and wastewater from washing hands and tools.

Sensitive Receptors: Consequences of improper waste disposal include foul odor and breeding of disease vectors. These directly impact all humans within proximity (including workers).

Assessment: All solid waste generated by the project will be taken to national Land Fill for disposal. Wastewater will drain away into a seepage pit constructed for this purpose. The contractors will use portable toilets which will be emptied every two days. The contents will be disposed of in accordance with Public Health standards and policy. The impact from waste will be negative, short term and reversible. Given the foregoing discourse, the impact from waste is rated as Moderate.

Mitigation: The contractor will develop and implement a waste management plan that includes the requirement for all waste material to be collected in receptacles provided and taken to the landfill.

5.6.2.5 Impact on Biodiversity

Both sites have small amounts of scrub vegetation with little or no animal life. The airport safety policy discourages terrestrial habitats in proximity to the airport property.

Source of Impact: Excavation works will remove any vegetation and expose any tunnels or holes in the ground thus eradicating any semblance of biodiversity on the project site.

Sensitive Receptors: All life forms existing at the project site or uses the project site will constitute receptors.

Assessment: There are no threatened, endemic or endangered organisms in the project area; biodiversity importance is therefore classified as low. The magnitude of potential impact from this project will also be low, therefore when the receptors' importance and the magnitude of potential impacts are examined together the impact was rated as Low.

Mitigation Measures: No waste or runoff will be allowed to enter the marine environment directly. All runoff will be channeled into a sedimentation pond where solids will settle out before the water enters the sea. Workers will not fish in the GAMPA.

5.6.2.6 Occupational Health and Safety

The objectives of the World Bank ESS2 include inter alia:

- Promote safety and health at work;
- Promote the fair treatment, non-discrimination and equal opportunity of project workers;

- Protect project workers, including vulnerable workers such as women, persons with disabilities, children (of working age, in accordance with this ESS) and migrant workers, contracted workers, community workers and primary supply workers, as appropriate;

Source of Impact: Construction work using heavy equipment, employ moving objects and sharp tools that expose workers to injury. Additionally, infectious diseases like flu pandemics spreads easily among persons working in close quarter or poorly ventilated areas.

Loud and high-pitched noises from planes impacting workers. This is not a direct impact of the project but a consequence of the environment in which the project will be located.

Sensitive Receptors: Workers on site, operators of machinery, truck drivers and other project staff will all be exposed to health and safety risks including airport noises and are therefore classified as receptors.

Assessment: Heavy equipment, sharp tools and vehicle will all be used on this project. Workers will be exposed to moving objects and equipment. There is also the potential for trip and fall where construction material and tools are not properly stored. Accidents on project site can have long term debilitating effect, the impact is rated as Moderate.

Mitigation Measures: All workers will be provided with PPE as appropriate for each task. OHS requirements of the Standard WB SPD for Works will be adopted and relevant specifications will be added to the Employers Requirements to ensure that particular risks of: construction machinery, working on active platforms, working near water, working on unstable land, and working with excavations are included.

All employees will be required to sign the workers code of conduct. A grievance mechanism will be established (included in ESMP) for workers' complaints and trainings on their terms of employment.

Appropriate signage will be strategically placed indicating muster point, moving objects, active drive way, location of first aid supplies etc. Only licensed drivers and operators will be allowed to use vehicle and heavy equipment on the project site. The contractor will engage his/her workers in daily toolbox talk as a training tool. Topics to be covered include code of conduct, safety on the job, gender base violence, sexual harassment, grievance redress, and environmental awareness (the ESMP)

5.6.2.7 Community Health and Safety

Source of Impact: Construction projects can impact community health and safety directly through physical injury resulting from traffic accidents, exposure to hazardous materials, or respiratory effects from air emissions, as well as indirectly via the spread of communicable diseases from population influx. There is also the risk of fire from other components of the project.

Sensitive Receptors: All human living or working within proximity to the project could be directly or indirectly impacted by the project. Heavy equipment passing through communities with narrow streets and no foot path pose health and safety risk to pedestrians.

Assessment: Although rare, vehicular accidents have occurred on road construction projects. Workers have sustained injury due to improper use or lack of PPE.

This project and its associated services will attract workers from other communities causing increased traffic in the general area with the potential for accidents. These workers will require social services such as food and health care.

Health risks to communities in relation to the spread of communicable diseases (HIV/AIDS) and flu pandemics (COVID 19) can be expected. The overall rating for community health and safety impact is Moderate.

Mitigation Measures: Mitigation measures would include the following:

- Establish a worker's code of conduct that requires respect for local communities, appropriate behavior during and outside working hours.
- Put in place zero-drug and alcohol tolerance policies.
- Include in the daily toolbox talk issues like sexual harassment and gender equality.
- Ensure that there are fire extinguishers at substation and BESS location; also visible guidelines for responding to fires.
- Contractor to provide procedures to identify and report gender based violence perpetuated by workers and mechanisms to deal with perpetuators and survivors as part of a GBV action plan.
- On completion of the works, all temporary installations will be dismantled, all plant and equipment de-mobilized, waste and left over materials and debris removed by the contractor, and the site left clean and tidy.

- Visibly display signs around the project site (if applicable) that signal to workers and the community that the project site is an area where VAWG is prohibited.
- A Traffic Management Plan will be prepared and implemented.
- Stakeholder engagement activities such as town hall meetings or information dissemination.

5.6.2.8 Visual Impact

Source of Impact: Visual impact is both the change to the visual qualities of the landscape resulting from the introduction of visual contrasts—in this case from open area to solar plant — and the human response to that change.

0Sensitive Receptors: Humans – nature lovers and side seers, property owners with eyes on the market.

Assessment: The introduction of the solar facility to the landscape may affect the perception of the landscape as a natural-appearing setting. Instead, it may be perceived as a landscape strongly influenced by human activities and industrial in character. These are changes to the visual qualities of the landscape as perceived by humans.

Mitigation Measures: Minimize luminous/reflective surfaces to the extent possible and place panels close to ground level. Use vegetation buffers where practical.

5.6.2.9 Public Awareness and Employment

Public awareness is detailed in the Stakeholder Engagement Plan (SEP) and the ESMP; it identifies the stakeholders, provides a communication plan and a grievance redress mechanism. It also makes provision for a community liaison officer who will serve as the interface between the community and the various project components.

The project will have an information board with the name of the project, the contractor(s), the funding source, duration and a directory of key project personnel, how to contact them, and mechanism for addressing grievances. Additionally, project information for public consumption will be posted on social media and circulated on public media services

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5.7 Rating for Changing of Transmission Lines

5.7.1 Analysis

Section 5.7. 1 Provides risk ratings with rationale for worst case scenarios for potential risks relevant to the changing of transmission lines and associated poles. The assessment of risk, impact and mitigation measures provided in this section are based on knowledge of the site and standard methodology for the maintenance and replacement of transmission lines and poles as provided in GRENLEC's H&S Manual Section 2 entitled Substation, Transmission and Distribution Operations.

Table 5.7. Risk rating and rationale For Changing of Transmission Lines and Poles.

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
ESS1: Assessment and Management of E&S Risks and Impacts						
Transmission lines from the substation will go overhead or underground; this operation has significant potential impact.	Substantial	Low	Installation of overhead and underground transmission lines can cause social disruption such as closure of road segments and temporary disruption of other works that depend on electricity and a number of challenges to residents in the immediate vicinity.	Low	Low	Residual impacts relate lines or poles failing due to hurricanes.
Changing of poles	High	Low	Removing the transmission lines and lowering tall electrical poles to the ground will cause disruption to electricity supply, transportation in the area and the social life residents in the area.	Low	Low	Residual impacts relate to lines or poles failing due hurricanes.

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
ESS 2: Labour and Working Conditions						
Working conditions- Electrical shocks or electrocution	Substantial	Moderate	Working on overhead transmission lines carries an element of risk from falling or electric shocks. Inadequate enforcement of GRENLEC's H&S policy, and labor laws could result in accidents or workers being denied privileges and benefits. Ensure that Contractors comply with the country's labor and human rights laws as outlined in the Labour Management Procedures (LMP) document. The Contractor will ensure adequate sanitary provisions as well as access to safe drinking water for all workers. Provision of PPEs and protocol for working with electricity and on heights	Low	Low	Monitoring the application of the LMP by the relevant agency should lower the risk
Child Labour	Low	Low	There is not a history of child labour in Grenada but contractors will include in their policy a clause precluding child labour.	Low	Low	The risk already low will be made even lower by the contractors conforming to

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
						Grenada's labour laws.
Sexual harassment	Moderate	Moderate	Grenada Women's Health and Life Experiences Study (2018) reported a higher than expected level of sexual harassment in the work place.	Low	Low	Mitigation measures are expected to significantly reduce the incidences of SH on this project.
Occupational Health and Safety	Substantial	Substantial	The occupational health and safety issues include exposure to physical hazards from the use of heavy equipment as well as hazardous materials, trip and fall accidents and accidents resulting from poor maintenance of aerial baskets or climbing of poles and structures, falling objects, and electrical hazards. All anticipated hazards should be diligently monitored and controlled.	Moderate	Moderate	Even with an OHS plan in place, accidents can occur; special attention should therefore be paid to OHS issues.
ESS 3: Resource Efficiency and Pollution Prevention Management						
Dust generation, vibration, noise.	Moderate	Low	Local air quality will be affected by the emissions generated by equipment and vehicles.	Low	Low	Even with mitigation measures, it is difficult to completely

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
			During excavation and transport of the excavated materials and construction materials, dust is expected to be generated. The increase in noise and dust will mostly occur during the construction/pole planting phase with contribution from vehicular movements, construction machinery and hand tools. A construction management plan that identifies the dust, noise, and vibration-generating areas and activities and details appropriate mitigating measures for any such activities.			eliminate all vibrations and noise especially where moving parts are involved.
Generation and disposal of waste	Moderate	Low	Excavation of soil and general construction works along with human activities will generate waste. Pole that are in a good condition will be reused somewhere on the network; If only parts are salvageable, then the good parts are salvage for	Low	Low	Limiting soil disturbance and implementing an effective waste management plan will significantly lower risk.

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
			applications where shorter poles are required and the bad parts will be sent to the land fill.			
ESS4: Community Health and Safety						
Traffic and road safety issues	High	Moderate	Transportation and installation of poles and overhead transmission lines poses risk for the communities adjacent to the line route and the traffic on the roads under the transmission lines. Work area protection and network protection will be applied as provided for in GRENLEC's H&S manual. Mitigation measures in the traffic management plan would address negative impacts resulting from poor road safety culture as well as ensuring pedestrian safety in the project area	Low	Low	The recommended mitigation measures if employed will significantly reduce risk.

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
			using traffic wardens, road signage and speed restrictions.			
Potential spread or outbreak of infectious disease	Moderate	Moderate	Aware of the potential for disease outbreaks like COVID 19 and flu pandemics, protection should be provided for workers against such outbreaks. Current national public health protocols, including providing workers with appropriate forms of personal protective equipment (PPE) when needed, should be observed.	Low	Low	This is precautionary therefore when mitigation measures are enforced, residuals should be near zero.
Sexual exploitation and abuse	Moderate	Moderate	Gender Based Violence Country Profile: Grenada, a WB funded 2020 study reported unemployment higher among women than men and that occupational sex segregation exists	Low	Low	Recommendation of mandatory employment of women and a code of conduct should reduce the risk of SEA
ESS 5. Land Acquisition- Relevant but unlikely to be applied. The road segment at site two already exist as a dirt road that will be upgraded, at site three the land is owned by MBIA so no land acquisition is expected. However, a Resettlement Framework (RF) will be prepared as a precautionary measure in case land acquisition and/or involuntary physical/economic displacement is required.						

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
***ESS6**: Biodiversity Conservation and Sustainable Management of Living Natural Resources*.						
Damage to marine habitat and death to marine life	Moderate	Moderate	Excavated soil and other waste could be carried to the sea by storm water runoff affecting marine life. Mitigation measures should include a waste management plan for excavated soil and construction waste. Ensure proper drains are constructed	Low	Low	Mitigation measures would reduce the risk of negative impacts.
ESS 8 Cultural Heritage						
Chance Find	Low	Low	There is a report of archaeological finds in the general area but no recent finds have been reported.	Low	Low	Precautionary mitigation measures are included.
***ESS10:** Stakeholder Engagement and information* disclosure						
Continuous engagement of stakeholders during implementation	Moderate	Moderate	The identified stakeholders each have different stakes associated with various levels of involvement in power generation and use in Grenada. As outlined in the Stakeholder Engagement Plan (SEP), public consultations and participation of stakeholders would ensure concerns	Low	Low	The recommended mitigation measure will reduce the risk level to low.

ESF Standards, Environmental and Social Risks and Impacts	Initial Risk Rating		Rationale	Risk Rating Post-Mitigation		Residual Impacts
	Construction	Operation		Construction	Operation	
			about the impacts of the project are addressed early during implementation.			

5.7.2 Environmental and Social Impacts and Mitigation Measures

This section of the report looks at potential environmental and social impacts associated with the changing of poles and associated transmission lines.

5.7.2.1 Air Quality

This component of the project involving soil excavation for the planting of poles to support transmission cables. This activities will produce dust which will be exacerbated by traffic on the adjacent airport road thus compromising air quality in the general area.

Source of Impact: Dust from excavation, concrete mixing, vehicular traffic on the adjacent road, point source air pollution from combustion of fossil fuels used by trucks and excavators. Combustion of fossil fuel will release nitrogen oxides (NOx), sulphur dioxide (SO2), carbon monoxide (CO) negatively impacting air quality. These will add to the existing pollutants present in the air around the airport.

Sensitive Receptors: Air pollutants in sufficient concentration can have significant impact on humans especially those with compromised health, the elderly and the very young. Other receptors include the airport instruments and facilities, the Calliste and SGU communities.

Assessment: Air quality impact from this project would be small compared to the quantum of work currently occurring in the general area (construction work at SGU and several houses on the road to SGU). The project duration would be medium term (six to eight months). The potential project impact on the air quality would be negative, reversible, and medium term. The impact is rated as **Moderate**.

Mitigation: All vehicle and equipment working on the site should be inspected including having their exhaust examined before entering the site for the first time. Thereafter, they should be checked every three months. Vehicle or equipment not in use should be turned off. There should be no burning of waste on site. All fines should be kept covered or wet. Trucks carrying any fine material should have enclosed sides and the contents covered during transportation.

5.7.2.2 Noise

There are no national noise standards for Grenada, therefore, the IFC limits for ambient/airborne noise levels (IFC 2007) were used in this assessment as the basis of “significance thresholds”. IFC standard recommends day time noise level of 70 dBA for commercial areas and 55 dBA for residential areas. This measurement will be applicable for communities like True Blue and Calliste.

Source of Impact: Heavy equipment associated with the project (i.e., excavators, dump trucks, and loaders) would generate some noise. Operational noise could include contracting and expansion of metal structures and rotation of engine parts.

Sensitive Receptors: Noise sensitive receptors in the project area of influence include the True Blue and Calliste communities and any area where transmission lines and poles will be changed.

Assessment: The noise from heavy equipment will exceed normal/ambient noise levels and will continue throughout this project phase (approximately 6 months) with varying intensity at different days and times.

Noise impact from this project will be negative, direct and reversible. Given the dispersed nature of this project activity, the impact is rated as **Moderate**.

Mitigation: This assessment recommends 90 dBA as the upper sound power level therefore the project must select equipment with lower sound power levels lower than the upper level (90 dBA) recommended in this assessment. All vehicles working on the project site must be inspected and licensed by the relevant authorities in Grenada. Vehicles should have their entire muffler system in tact including muffle barrels and silencers. No vehicle should be allowed to stand idle on the project site with their engine running.

5.7.2.3 Waste Management

The waste management plan for the MBIA solar project will apply to all components of the project including the subproject that addresses changing of some transmission lines and poles.

Source of Impact: Waste products for this subproject include topsoil, human waste, condemned transmission lines, condemned poles and fragments of material used in this activity.

Sensitive Receptors: If the is not managed, they can block drains, pedestrian foot path or even the main streets/highway. This could prove challenging for pedestrians, commuters and residents in the work area. By extension, airport access and services could be impacted.

Assessment: Transmission lines and poles that will be removed may still be useable for other purposes. If effectively utilized, the impact of waste from this subproject would be **Low**. If the disposal is not well managed the impact could be **Substantia**l.

Mitigation: Transmission lines and poles taken down should not be left to clog drains, the side of the road or the landfill. The developer should explore other uses for these resources. The waste management plan should address reuse and recycle of poles and transmission lines retired from use by GRENLEC.

5.7.2.4 Occupational Health and Safety

The objectives of the World Bank ESS2 include *inter alia*:

- Promote safety and health at work;

- Promote the fair treatment, non-discrimination and equal opportunity of project workers;
- Protect project workers, including vulnerable workers such as women, persons with disabilities, children (of working age, in accordance with this ESS) and migrant workers, contracted workers, community workers and primary supply workers, as appropriate;

Source of Impact: Construction work using heavy equipment, climbing tall poles, working on heights supported by straps or in aerial baskets, working with electricity (transformers, circuit breakers and capacitors) moving objects and sharp tools expose workers to injury. Additionally, infectious diseases like flu pandemics spreads easily among persons working in close quarter or poorly ventilated areas.

Sensitive Receptors: Workers with electricity, climbing electrical poles, operators of machinery, truck drivers and other project staff will all be exposed to health and safety risks and are therefore classified as receptors.

Assessment: Heavy equipment, sharp tools and vehicle will all be used on this project. Workers will be exposed to moving objects and equipment. Workers will be in aerial buckets and on poles up to fifty (50) feet above the ground. Potential for electric shocks or electrocution. Accidents on project site can have long term debilitating effect, the impact is rated as High.

Mitigation Measures: All workers will be provided with PPE as appropriate for each task. OHS requirements of the Standard WB SPD for Works will be adopted and relevant specifications and GRENLEC H&S policies will be addedto the Employers Requirements to ensure that particular risks of: construction machinery, working on active platforms and aerial baskets, working on unstable structures, and working with excavations are included.

Appropriate signage will be strategically placed indicating muster point, moving objects, active drive way, location of first aid supplies etc. Only licensed drivers and operators will be allowed to use vehicle and heavy equipment on the project site. The contractor will engage his/her workers in daily toolbox talk as a training tool.

5.7.2.5 Community Health and Safety

Source of Impact: Construction projects can impact community health and safety directly through physical injury resulting from traffic accidents, exposure to hazardous materials, or respiratory effects from air emissions, as well as indirectly via the spread of communicable diseases from population influx.

Sensitive Receptors: Communities and human activities within proximity to the project could be directly or indirectly impacted by project activities. Heavy equipment passing through communities with narrow streets and no footpath pose health and safety risk to pedestrians. Replacing poles and overhead transmission lines pose risk to operations on the ground beneath

them.

Assessment: This project and its associated services will attract workers from other communities causing increase traffic in the general area with the potential for accidents. These workers will require social services such as food and health care. Replacing transmission lines and poles will create inconvenience and some element of fear for community members.

Health risks to communities in relation to the spread of communicable diseases (HIV/AIDS) and flu pandemics (COVID 19) can be expected. The overall rating for community health and safety impact is **Substantial**.

Mitigation Measures: Mitigation measures would include the following:

- Establish a worker's code of conduct that requires respect for local communities, appropriate behavior during and outside working hours.
- Put in place zero-drug and alcohol tolerance policies.
- Include in the daily toolbox talk issues like sexual harassment and gender equality.
- Stakeholder engagement activities such as town hall meetings and information dissemination.
- Implementation of GRENLEC's H&S policies
- Activate the Traffic Management plan
- Placement of appropriate signage
- Identify safe walk way for pedestrians

5.7.2.6 Public Awareness and Employment

Public awareness is detailed in the Stakeholder Engagement Plan (SEP) and the ESMP; it identifies the stakeholder, provides a communication plan and a grievance redress mechanism. It also makes provision for a community liaison officer who will serve as the interface between the community and the various project components.

The project will have an information board with the name of the project, the contractor(s), the funding source, duration of the project and a directory of key project personnel, how to contact them, and mechanism for addressing grievance. Additionally, project information for public consumption will be posted on social media and circulated on public media services.

6.0 Stakeholder Engagement

6.1 Introduction

Stakeholder engagement is a critical component of the ESIA process as it provides the opportunity for stakeholders to become engaged in the project's development and implementation. It ensures that stakeholder views and concerns are incorporated into project designs and that appropriate measures are applied to mitigate possible negative impacts and enhance benefits for project affected persons (PAP). World Bank ESS10 emphasizes the importance of open and transparent engagement between the client and project stakeholders as an essential element of good international practice. In this regard, the engagement process with local communities and other key stakeholders was initiated at the pre-design phase.

6.2 Stakeholder Identification

In order for the stakeholder engagement to be effective, it is necessary to identify the key stakeholders and understand their needs, expectations, priorities and objectives in relation to the Project. While the main project beneficiaries are likely to be the MBIA and the people of Grenada, the primary affected and interested stakeholders include the following groups:

- Grenada Airport Authority;
- Residents of nearby communities of Calliste, True Blue, Point Salines and surrounding areas and community leaders;
- Resource users/persons who fish in the Bays surrounding the airport;
- The private sector including St. George's University, Independent Power Producers (IPP) Association[18], Sandals Resort and other hotels, restaurants, and businesses in close proximity to the airport;
- Government agencies such as the Ministry with responsibility for Climate Resilience, The Environment and Renewable Energy; Department of Fisheries, Ministry of Agriculture, and the Ministry of Labour.
- Faith based organizations
- Neighbouring schools and local colleges involved in teaching/mentoring students in solar installation
- Non-governmental organizations such as the Interagency Group of Development Organisations (IADGO).

6.3 Engagement Process

The engagement process followed established procedures to ensure full participation by all sectors of society. Table 1 in appendix 2 details meeting dates and times. Through these various meetings 42 stakeholders were engaged during the development of the Draft ESIA and another 20 during the finalization process (Refer to Appendix 2 for a list of participating stakeholders).

[18] Association is being formalized independently. To become an IPP, a license is needed from PURC, compliant to national legislation.

6.4 Summary of Discussions

All meetings began with an introduction of participants followed by a brief overview of the project by the consultant. The overview took the form of a power point presentation so that participants can get a picture of the sites to be used by the project. It was necessary to clarify that there is no salt pond at the site labelled '**Site 2 north of the salt pond'** in the document provided by the client. Site 2 is north of a pond which is the remnant of Hardy Bay that was partially filled in to accommodate the length of the runway during construction of the MBIA. There is or never has been any salt pond in this area.

The following bullets represent the most common responses among all stakeholders. Table 2 in Appendix 2 provides a list of stakeholders and a complete record of their comments and concerns.

- The coastal area from Grand Anse to Point Saline is a marine protected area (MPA)
- Project can play a major role in reducing the carbon footprint of electricity production in Grenada due to a reduced reliance on fossil fuel. In addition, the proposed project is synergistic to the government's vision of transforming the national transport fleet to be powered by renewable forms of electricity.
- Stakeholders were of the viewpoint that the proposed project is congruent with Government's policy to pursue a low carbon economy, structured around more sustainable and renewable forms of energy. Moreover, it was considered a welcome initiative due to its potential to reduce national greenhouse gas (GHG) production, contributing to attainment of the NDC targets by 2040. The proposed project was therefore viewed as highly beneficial for the country including its pursuit of energy security.
- The possible risk of aviation accidents due to increased glare generated by the installation of solar panels close to the airside area at the MBIA. This was voiced as a concern by the majority of stakeholders'.
- The impact of the proposed development on the future expansion and development of the MBIA was raised as key matter for consideration to avoid challenges with inadequate land space. Other stakeholders noted that due to the somewhat portable nature of the panels, this risk is not likely to be a significant concern.
- Solar panels and related infrastructure should be of the highest quality and designed to withstand high salt levels due to the proposed location of the development along the coast.
- GRENLEC should consider constructing an access road outside the airport fence to provide access to site 3 due to the fact that access from the land side is blocked by the airport.

Project designers have taken on board the concerns that can be addresses in the design phase including the following:

- Protection of the Marine environment by instituting settlement tanks reduce coastal sedimentation by the project.
- Specified angle of tilt (using data from research and modelling) and type of material for solar panels to reduce potential effects of glare.
- It was always known that and access road to site three was necessary since crossing the airport runway was unacceptable. However, due to the stakeholder concerns the construction date has been moved forward.

APPENDIX 1 SCREENING CHECKLIST

SITE INFORMATION			
Location –Parish	St. George		
Total acreage of the site of the proposed action?	36 acres		
Total acreage to be physically disturbed?	25 acres		
LAND USE AND PLANS			
Check all land uses that occur on, adjoining and near the proposed action.			
Urban			
Rural	**X**		
Industrial	**X**		
Residential			
Commercial	**X**		
Forest	**X**		
Agriculture			
Parkland			
Other Specify:			
	Yes	**No**	**N/A**
Is the proposed action consistent with adjacent uses?	**X**		
Is the proposed action consistent with the predominant character of the existing built or natural landscape?	**X**		
Is the proposed action/project compatible with the National Development Plan and other development plans?	**X**		
Is the site of the proposed action located in or adjoining an environmentally sensitive or valuable area?			
If Yes, specify: **Yes, the project is located in proximity to the sea and the airport**.			
TRAFFIC MANAGEMENT	**Yes**	**No**	**N/A**
Will the proposed action result in a substantial increase in traffic above present levels? (**During construction only**)	**X**		
Are public transportation service(s) available at or near the site of the proposed action?	**X**		

UTILITIES	Yes	No	N/A

Will the proposed action connect to an existing public water supply?	**N/A**		
Will improvements be necessary to allow for connection?			N/A
Will the proposed action/project be able to connect to an existing roadway?	**X**		
Will improvements be necessary?	X		
Will project require the re-location of existing roadways, drainage and other utilities?		**X**	
Will the proposed action/project require connection to the electrical grid after construction?	**X**		
Will the proposed action connect to an existing wastewater or storm water utility?	**X**		
What method is proposed to handle sanitary wastewater? Channel to open drain or septic tank.			
Other please specify. Portable toilets will be provided.			
WATER	**Yes**	**No**	**N/A**
Will the proposed action/project require connection to water mains?		X	
Will the project include any water conservation devices/techniques?		X	
Will the project include any rainwater capturing devices?		X	
AESTHETICS AND PHYSICAL CULTURAL RESOURCES			
Is the project site known to contain any scenic vistas or recreation area that is important to the community?		**X**	
Is the proposed action located in an archaeological sensitive area?		**X**	
ENVIRONMENTALLY SENSITIVE AREAS (Natural habitats)	**Yes**	**No**	**N/A**
Does any portion of the site of the proposed action, or lands adjoining contain wetlands or other water bodies?	X		
Would the proposed action physically alter, or encroach into, any existing wetland or water body?		X	
If Yes, identify the wetland or water body and extent of alterations?			
VEGETATION			
Identify the typical habitat types that occur on, or are likely to be found on the project site. Check all that apply:			
Shoreline/Beach	**X**		
Dry Forest	**X**		

Farmland			
Pasture			
Wetland	X		
Urban			
Rural	X		
SENSITIVE OR THREATENED SPECIES	**Yes**	**No**	**N/A**
Does the site of the proposed action or surrounding sites contain any species of animal or plant that are known to be threatened or endangered?		**Not sure**	
STORM WATER/DRAINAGE	**Yes**	**No**	**N/A**
Will the proposed action create storm water discharge, either from point or non-point sources	**X**		
Will the storm water discharge flow to adjacent properties?		**X**	
Will the storm water discharge flow to offsite drainage?	**X**		
Will storm water flow to onsite conveyance or drainage features/devices?		**X**	
Does the proposed action include construction or other activities that result in the impoundment of water or other liquids (e.g. retention pond, waste lagoon, dams)?		**X**	
Please describe:			
NATURAL HAZARDS	**Yes**	**No**	**N/A**
Is the project site located in an area that is prone to flooding?		**X**	
Is the project site located in an area that is prone to landslides?		**X**	
Is the project located in an area that can be inundated by storm surge?	**X**		
Is the project site located in a coastal area that can be impacted by coastal erosion due to sea level rise and/or strong wave action?	**X**		
Toxic and Hazardous Substance Control			
Will the project generate any hazardous waste		**X**	
Will the project involve the use any lead-based products		**X**	
Will the project involve the use of oils or oil-based products		**X**	
SOCIAL IMPACTS			

Potential Impact	Yes/No/NA	Comments
Does the project respect internationally proclaimed human rights including dignity, cultural property and uniqueness and rights of indigenous people?	N/A	There are no indigenous people in the area.
Are property rights on resources such as land tenure recognized by existing laws?	Yes	
Will the project cause social problems and conflicts related to land tenure and access to resources?	No	
Does the project incorporate measures to allow affected stakeholders' information and consultation?	Yes	Stakeholder consultations, grievance redress and community Liaison are elements of the project.
Will the project cause technology or land use modification that may change present social and economic activities?	Yes	Project will create employment and implement community health and safety features. The project will generate electricity that can stimulate production
Will the project cause dislocation or **involuntary resettlement** of people?	No	
Will the project cause disproportionate impact to women or other **disadvantaged or vulnerable groups?**	No	
Will the project cause impairment of **indigenous people's** livelihoods or belief systems?	N/A	No indigenous people known to exist on the island.
Will the project cause impairment of recreational opportunities?	No	
Does the project include measures to ensure the **health and safety** of workers and the environment?	Yes	
Will the project cause increased local or regional unemployment?	No	The project will create employment
Will the project involve migrant workers (short- and long-term) and possible overloading of social infrastructure?	No	The skill sets required by the project are all resident on the island.
Will the project have differential impacts on men and women?	Yes	More men are likely to benefit from employment during the construction phase.

Conclusions and recommendations:

The screening assessment revealed that even though the sub-project is eligible under the project, concerns relating to environmentally sensitive areas, storm water runoff and social issues necessitate an Environmental and Social Impact Assessment. Further, that vegetation cover with special reference to site three be included.

Appendix 2 Detailed Stakeholder Engagement

Engagement Process

Consultations undertaken as part of the ESIA process followed accepted principles necessary to meet general requirements on accessibility and inclusiveness. Consultation events were held at venues that are easily reachable and accessible to all representatives of the target audience, were time sensitive and conducted in a manner that was culturally appropriate. Moreover, consultations endeavoured to engage all segments of the society as is feasible to include youths, the elderly, minority groups, and other vulnerable individuals. Table 1 below outlines the meeting dates and times. Through these modalities, 42 stakeholders were engaged during development of the ESIA (Table 2) and another 20 during the finalization process.

Table 1: Stakeholder Engagement - Meeting Dates and Venue

Stakeholders	Meeting date	Venue/type
Community leaders	March 18, 2024	Online meeting via Zoom
Mixed private and public sector grouping Sector (Hotels, Restaurants, Trucking company, academic institution)	March 18, 2024	Online meeting via Zoom
Ministry of Climate Resilience, The Environment & Renewable Energy	March 18 & 26, 2024	Online meeting via Zoom
Grenada Solid Waste Management Authority	March 20, 2024	Via the telephone
Government Ministries (Ministry with responsibilities for ICT, Agriculture and Forestry, Labour)	March 21, 2024	Face to face group meeting, Ministry of Labour Conference Room
Grenada Chamber of Industry and Commerce	March 21, 2024	Online meeting via Zoom
St. George's University (SGU)	March 21, 2024	Face to face meeting at SGU Campus

Grenada Airport Authority (GAA)	March 21, 2024	Face to face meeting at Grenada Airport Authority
Calliste Fishermen Cooperative	March 21, 2024	Face to face meeting at roadside shop in Calliste
Climate Action Team/Committee and the Interagency Group of Development Organisations (IADGO)	March 26, 2024	Online group meeting via Zoom
Local community colleges – T.A. Marryshow Community College (TAMCC) and New Life Organization (NEWLO)	April 4, 2024	Online group meeting via Zoom
Independent Power Producers	April 5, 2024	Online group meeting via Zoom

Findings from Stakeholder Discussions

Knowledge of the Site

- The actual salt pond, located west of Hardy Bay was a source of salt for communities such as Calliste in earlier years. Presently, this resource is used only rarely by small groups of people due to reduce connection over time with the younger generation.

- There is a borehole well in the area that was used for watering animals; given the increased demand for water on the island, the well should be protected.

- Marine waters around the project site and wider study area constitute a major fishing area/ground for southern fisher folks such as the Calliste Fishermen Cooperative. Lobster, Queen Conch (*lambi*) and other fishery are targeted resources caught in this area, some of which are exported regionally to countries such as Trinidad and Tobago.

- The coastal area from Grand Anse to Point Saline is a marine protected area (MPA) (to be developed in the baseline section on ecosystems).

Project Benefits

- Generally most stakeholders supported the proposed solar project. Members of the IADGO and the Climate Action Committee and a few other private individuals were in high support

of GRENLEC's decision to invest in solar energy and viewed this form of renewable energy as more sustainable and beneficial to Grenada compared to geothermal energy.[19]

- The proposed project can play a major role in reducing the carbon footprint of electricity production and use in Grenada due to a reduced reliance on fossil fuel. This was reported by most stakeholders including large energy users such as the Grenada Airport Authority (GAA) and St. George's University (SGU). The GAA noted that any savings derived from reduced electricity costs can be invested into maintenance of the airport's infrastructure.

- Stakeholders were of the view that the proposed project is congruent with Government's policy to pursue a low carbon economy, structured around more sustainable and renewable forms of energy. It was also viewed as complementary to the state's trajectory to transform the national transport fleet to be powered by renewable energy. Moreover, the solar project was considered a welcome initiative due to its potential to reduce national greenhouse gas (GHG) emissions, contributing to attainment of the NDC targets by 2040. The proposed project was therefore considered highly beneficial to the nation, including government's pursuit of its energy security and independence goals.

- A few stakeholders envisaged that the proposed project could be associated with a lower unit cost of electricity, which can be of benefit to all GRENLEC's customers. Large private users such as SGU were particularly interested in this possible advantage and supported any intervention that resulted in a stabilization of and/or a reduction in future electricity prices. The SGU also underscored a willingness to assist and/or partner with GRENLEC in this venture if deemed prudent. Smaller entities such as the Calliste Government School and the NEWLO welcomed any such reduction in electricity costs driven by the proposed solar project.

- The GAA identified the proposed site at the MBIA as the best location for the solar project due to the absence of mountains or other elevated landscapes to shade the panels. They underscored that installation of the solar PVs can improve the Authority's capacity for surveillance of the land and marine areas in close proximity to the airport, which are somewhat obscured due to vegetative cover. This can positively impact the Authority's security system, which is a major priority for the GAA.

- Most fisher folks consulted reported that they did not see any direct benefits of the project to them. The need for public education on the value of the proposed project to Grenadians was rated a high priority pending approval for implementation by the Planning and Development Authority.

Concerns

[19] Representatives of the IADGO underscored they do not support geothermal energy due to its high environmental footprint, particularly considering the small land mass of Grenada and the possible limited availability of geothermal resources compared to other regional states such as Dominica.

- The possible risk of aviation accidents and the related negative implications to the tourism industry due to increase glare generated by solar panels close to the airside areas of the airport. This was voiced as a concern by many stakeholders.

- The durability and robustness of the materials used for construction of the solar panels and inverters were flagged as an area of concern, cognizant of the proximity of the proposed development to the coast and the high potential for corrosion of metal elements. This was identified as a concern by most stakeholders including the Grenada Chamber of Industry and Commerce, the Ministry of Climate Resilience and the Independent Power Producers.

- The Ministry of Climate Resilience identified a possible low risk of vandalism and theft of the infrastructure proposed to be sited in the unfenced part of the airport driven possibly by the metal trade between Grenada and Trinidad and Tobago. This issue reportedly occurred with other utility companies. Investment in security controls to prevent and minmize this occurrence was advised.

- The impact of the proposed development on the future expansion and development of the MBIA, including its capability to accommodate larger aircrafts was raised as key matter for consideration. This was deemed necessary to avoid future challenges with land space. Other stakeholders noted that due to the somewhat portable nature of the PV panels, this risk is not likely to be of significant concern, since the panels can be erected at an alternative site if this became a matter of urgency. Representatives of the IPP Association encourage consultation between GRENLEC and the Grenada Tourism Authority and related stakeholders.

- A few stakeholders including TAMCC questioned the possible impact of the solar project on migratory birds entering the southeastern part of the island, including areas such as Calliste and Woburn.

- Representatives of TAMCC identified accidental fires associated with the use of batteries as a possible risk. Integrating measures for prompt emergency access and response to the site to address any unforeseen hazard event was flagged as crucial in the operational phase.

- Potential for increase runoff and coastal pollution due to removal of vegetation along the project site.

- Stakeholders with businesses along Point Salines reported a possibly increased generation of dust during the construction phase which can create a nuisance for business operation.

- Notwithstanding the benefits of the proposed project, a few stakeholders were concerned that installation of the solar panels would be aesthetically unappealing within the landscape. They questioned whether other locations were explored for the proposed project, which limited this risk.

- The Department of Forestry raised concern about the governance mechanisms that would be in place during construction to ensure compliance with the mitigation measures for

environmental conservation as outlined in the ESIA and ESMP, pending approval from the Planning and Development Authority. This they underscored as a major deficiency for development projects carried out on island, which limits the accountability of developers for environmental sustainability.

- The Department of Labour were particularly interested in the provisions that are made to attract and employ local workers on the proposed project. They further questioned whether foreign workers will be needed, requirements for workers permits, and the proportion of local to foreign employees.

- Both the TAMCC and the NEWLO were concerned about the limited utilization of qualified local personnel on major capital projects. They made a special call that the proposed project should maximize utilization of locally skilled professionals in the pre-installation and operational phases due to availability of trained persons within the labour force.[20] This they deemed as prudent in supporting the growth of the national economy.

- Concerns of possible radiation from the PV panels was raised by representatives of the Calliste Fisher folk Oragnization. However, this was dispelled by the lead consultant.

- One member of the IADGO placed on record still requiring answers for the ownership and current mandate of GRENLEC. They also pointed to the need for an Integrated Resource Plan for Grenada considering the national vision for renewable energy.

- The capability of the existing electricity network to accommodate the additional wattage on the system was flagged as a concern. Stakeholder underscored the need to upgrade the electricity infrastructure in parallel with implementation of the proposed project to safely accommodate the additional load, due to the baseline status of the grid.

- The Grenada Chamber of Industry and Commerce raised the following additional concerns:

  - The extent to which the proposed project complies with aviation regulations for safety.

  - The nature of the adverse impacts associated with the planned removal of coastal vegetation, including mangroves at Sites 3.

  - The resilience of the proposed solar infrastructure to hurricane force winds due to its high exposure along the southern coast. Stakeholders were also concerned about the measures that will be implemented to facilitate effective response and recovery during the aftermath of a disaster to limit any undue impacts to the aviation and tourism sectors. Hence, a proper emergency recovery plan was deemed important for the development.

- The following additional concerns were raised by the IPP Association:

[20] Such training are offered at TAMCC and the NEWLO.

- The possible public relations backlash that can arise if GRENLEC is given permission to invest in a major solar project, prior to which other IPPs were prevented or hindered from doing so. Stakeholders questioned whether approval of the proposed solar project by GRENLEC will create an unfair competitive environment for other IPPs in light of Government's renewable energy development goals. This concern was also raised by the GIDC.

- Other stakeholders added that the implementation of this project can create a potential negative public image for GRENLEC due to the numerous delays which IPPs are experiencing to implement similar solar projects.

- Stakeholders were further concerned that GRENLEC can potentially squeeze out smaller IPPs from pursuing planned investments in solar technologies since other private individuals are also investing in solar at the residential or institutional level.

- Members of the IPP Association also raised concern about the ownership of the proposed project and whether the surpluses and revenues generated would remain in the country or exported as foreign exchange. GRENLEC's monopoly position as both generator and distributor in the electricity landscape was seen as a concern, since they can potentially demand their own price and control access to the network. They further queried whether GRENLEC was required to meet the same criteria and standards for electricity generation, and therefore the degree of equality for electricity generation among all IPPs.

- Finally, the extent to which GRENLEC has the capabilities to manage the proposed project due to existing challenges with production, generation, and other operational matters.

Opportunities

- Representation from the Grenada Solid Waste Management Authority (GSWMA) noted the potential increase in waste from electrical and electronic equipment (WEEE) from this and similar projects[21] presents an opportunity to develop a protocol and recycling system for WEEE management. Cognizant that a Compliance Unit is already enshrined in the GSWMA, revision of the existing legislation and development of regulations to accompany the parent Act is a key priority for robust management of the future waste streams.

Recommendations

- The Ministry of Climate Resilience supported the World Banks thrust for a thorough investigation of the environmental conditions within the project site, including the baseline vegetation. Similarly, the Ministry supported plans to maintain the existing mangrove ecosystem along the sites targeted for installation of the solar panels. Representatives also recommended that provision be made for management of surface runoff to limit flooding and soil erosion.

[21] Including components of the hybrid vehicles.

- Mechanisms for preventing and reducing sedimentation of the near shore marine areas were strongly advised cognizant of the sensitivity of this ecosystem.

- Solar panels and related infrastructure should be of the highest quality and designed to withstand high salt levels characteristic of the proposed location of the development.

- Consideration should be given to the installation of an access road to the project site, particularly along Site 3 to provide appropriate infrastructure to facilitate prompt emergency response and recovery to any hazardous event (e.g., an electric fire).

- The GCIC and other stakeholders recommended that that the public should be informed of the estimated financial savings that can be accrued from every unit of energy produced and the associated amount of carbon that can be offset from the intervention.

- A knowledge of the complementary and synergistic projects planned and/or underway were deemed useful by the IADGO to properly position the likely risks and impacts of the proposed project.

- Stakeholders including the IADGO, TAMCC and NEWLO recommended investment in advance training for skilled professionals to support the national thrust for renewable energy technologies. This was deemed a national responsibility.

- While not a direct responsibility of the developer, members of the Calliste Fisher-folk Cooperative reported an interest in having electricity supplied to the neighbouring Calliste Beach which houses their locker facilities. Lighting of the area can enhance security and reduce the risk of petty theft of their supplies and equipment. This can therefore facilitate reoccupation and use of the site by the Cooperative and prevent fisher folk from losing access[22] to that area provided by government.

- Greater need for public education on the value of solar and related renewable energy projects.

- The need for an effective emergency waste management plan to handle any debris around the airside area after a natural disaster such as a hurricane to allow for effective business continuity.

[22] Fisher-folk were allowed to use a site at SGU True Blue Campus due to security concerns at Calliste Beach. They are hoping to return to that area as their base, however, require lighting to as a major prerequisite.

Table 2 Participants List

Name	Gender	Organization/Community Represented	Contact Information
Peron Johnson	Female	Ministry of Climate Resilience, The Environment & Renewable Energy	ps@cre.gov.gd
Chris Joseph	Male	Ministry of Climate Resilience, The Environment & Renewable Energy	Chris.joseph@cre.gov.gd
Leslie Smith	Male	Ministry of Climate Resilience, The Environment & Renewable Energy	Leslie.smith@gov.gd
Ray Roberts	Male	National Paralympics Committee and local resident, Calliste	414-7243
Jude Bernard	Male	Community Leader, True Blue	415-1146
Russ Fielden	Male	Board Member - Grenada Hotel and Tourism Association and GAA	443-8793 russf@truebluebay.com
Abi Sighn	Female	Punjabi Restaurant	restaurant@punj-abi.com 420-0202
Christopher Levy	Male	Sandals Resort	*437-8000*
Deleone Forester	Female	Sandals Resort	*437-8000*
Alifa St. Paul-Munro	Female	Sandals Resort	*437-8000*
Goslyn Blackette	Male	Kenny Forester's Trucking	439-6605
David Marryshow	Male	Calliste Government School	444-4286
Antoinette Lewis	Female	Calliste Government School	444-4286
Lindon Robertson	Male	Grenada Solid Waste Management Authority	Lyndon.Robertson@gswma.com
Maurice George	Male	Ministry of ICT	webmaster@ict.gov.gd
Aleanna Williams	Female	Department of forestry	aleanna.williams@moa.gov.gd
Imotep Mawuto	Male	Department of forestry	imhotep.mawuto@moa.gov.gd
Connie McQuilkin	Female	Ministry of Labour	labour@labour.gov.gd
Gilbert Spooner	Male	Caribbean agro industries, Member of the Board of the GCIC	
Johnathan Steele	Male	Member of the Board GCIC, Steeple auto supplies	jsteele@sasgd.com
Dawne Buckmire	Female	SGU	dbuckmire@sgu.edu
Dr. Greg Hendel	Male	SGU	

Fletcher Frank	Male	Grenada Airport Authority	ffrank@gaa.gd
Glen Forsyth	Male	Grenada Airport Authority	gforsyth@gaa.gd
Martin Simon	Male	Calliste Fishermen Cooperative	
Elton Stephen	Male	Calliste Fishermen Cooperative	
Dwayne Andrews	Male	Calliste Fishermen Cooperative	
Javanson Plenti	Male	Calliste Fishermen Cooperative	
Sandra Ferguson	Female	ART, IADGO, Climate Action Committee	iagdo01@gmail.com
Kriss Davies	Female	Climate Action Committee	beachkriss@gmail.com
Rahim Smith	Male	Climate Action Committee	
Lorna Douglas	Female	Climate Action Committee/NEWLO	Marketmanager@newlo.org
Earl Roberts	Male	T.A. Marryshow Community College	earlr@tamcc.edu.gd
Sr. Margaret Yamoah	Female	NEWLO	smyamoah@newlo.org
Callistus Edwards	Male	NEWLO	442-8442
Paul Phillip	Male	NEWLO	442-8442
E. Connor	Male	IPP Association	
Hershel Whiteman	Male	IPP Association	
John Steele	Male	IPP Association	jsteele@sasgd.com
Tyrone Buckmire	Male	Grenada Fund For Conservation	1 473 231 7622
Justin Rennie	Male	Director of Fisheries	1 473 417 5381

Appendix 3 GAA Polices and Guidelines applicable to the proposed project

Instrument	Summary and relevance
Environmental Management and Protection Policy 2011	This policy targets all employees and stakeholders of the GAA. It is congruent with the national regulatory framework and applicable regulations and standards outlined within the International Civil Aviation Organization (ICAO) Annex 16 and ISO[23] 14001. The priority issues addressed in the policy with implications for the proposed projects are: - Wildlife management - Hazardous material uses and waste storage/disposal - Hazardous spills - Pest control - Flammable and combustible material storage - Potable water quality. Integrating these issues in the ESIA to ensure compliance with the GAA operational frameworks is strongly advised.
Accident, Incident and Near Miss Reporting Policy, 2021	This policy is premised on the notion that all employees should have a safe working environment and that reasonable measures should be adopted to reduce accidents and incidents at work. Moreover, the GAA underscores its commitment to timely reporting and investigation to expedite such matters. The policy therefore outlines the lines of responsibilities for incident/accident reporting, investigation and monitoring. Compliance with these general principles of this policy is expected of the project's contractor and supervision staff.
Contractor's Guidelines	This Guidelines outlines the requirements that should be observed during all construction activities at the MBIA. It is imperative the specifications elaborated in this instrument are captured in the ESIA's mitigation measures and related Environmental and Social Management Plan.
Personal Protective Equipment (PPE) Policy	The PPE Policy complements the Contractor's Guidelines and aims to protect employees of the GAA from exposure to workplace hazards and the risk of injury from using such equipment. The policy states that PPEs shall be used in conjunction with other controls unless no other means of control exist. It speaks to procedures for hazard assessments, selection, training, cleaning, maintenance, and disposal of PPE.
Security Regulations for Restricted Area Access	These regulations outline the requirements for persons or businesses desiring to operate within the restricted access of the airport. Familiarity and compliance with these regulations are expected of all project personnel during the construction and operational phases of the proposed project.
Wildlife Hazard Management Plan (WHMP) 2022	The WHMP addresses the risk associated with wildlife colliding with incoming and outbound aircraft at MBIA. The revised plan prepared as part of the Caribbean Regional Air Transport Connectivity Project (CATCOP) project should be reviewed along with any assessments and mitigation measures to reduce bird and wildlife risk for Grenlec's proposed solar venture.

[23] International Organization for Standardization (ISO).