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GUYANA

**ENHANCING THE NATIONAL QUALITY INFRASTRUCTURE FOR ECONOMIC DIVERSIFICATION
AND TRADE PROMOTION (GY-L1059)**

CONSTRUCTION OF A NEW COMPLEX TO HOUSE THE GUYANA NATIONAL BUREAU OF STANDARDS



**Draft Environmental and Social Analysis (ESA) and Environmental
And Social Management Plan (ESMP)**

Updated April 2022

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ACRONYMS

ADI	Area of Direct Influence
AII	Area of Indirect Influence
BC	Before Construction
CARICOM	Caribbean Community
CPF of GMC	Central Packaging Facility of the Guyana Marketing Cooperation
CBD	Convention on Biodiversity
CDO	Community Development Officer
CCAC	Competition and Consumer Affairs Commission
CEMP	Construction and Environmental Management Plan
CH&PA	Central Housing and Planning Authority
CITES	Convention on the International Trade of Endangered Species
CLO	Community Liaison Officer
CO	Carbon Monoxide
CoP	Conference of Parties
CROSOQ	CARICOM Regional Organization for Standards and Quality
CSO	Community Support Officer
DO	Dissolved Oxygen
DC	During Construction
ECM	Environmental Compliance Monitoring
EDMI	Enumeration District Marginality Index
EDWC	East Demerara Water Conservancy
EDWCRP	East Demerara Water Conservancy Rehabilitation Programme
EHS	Environmental Health and Safety
EIA	Environmental Impact Assessment
EMS	Environmental Management System
ENSO	El Nino Southern Oscillation
EPA	Environmental Protection Agency
EPM	Environmental Performance Monitoring
ESA	Environmental and Social Analysis
ESMP	Environmental and Social Management Plan
ETZ	Equatorial Trough Zone
FAO	Food and Agricultural Organization
GA-FDD	Government Analyst Food and Drug Department
GBTI	Guyana Bank for Trade and Industry
GCMs	Global Climate Models
GFC	Guyana Forestry Commission
GFS	Guyana Fire Service
GGMC	Guyana Geology and Mines Commission
GHG	Greenhouse Gas
GLASP	Guyana Land Administration Support Programme
GLDA	Guyana Livestock Development Authority
GLSC	Guyana Lands and Surveys Commission
GNBS	Guyana National Bureau of Standards
GoG	Government of Guyana
GO-INVEST	Guyana Office for Investment
GPF	Guyana Police Force
GRA	Guyana Revenue Authority
GS&WC	Guyana Sewerage and Water Commission
GTA	Guyana Tourism Authority
GUYWA	Guyana Water Authority

GWI	Guyana Water Incorporated
HD	Hydrometeorological Department
HSD	Hinterland Scholarship Dormitory
HSP	Hinterland Scholarship Programme
IADB	Inter-American Development Bank
IAST	Institute of Applied Science and Technology
IICA	Inter-American Institute on Agriculture
IMR	Infant Mortality Rate
IPCC	Inter-Governmental Panel on Climate Change
ISO	International Standards Organization
ITCZ	Inter-Tropical Convergence Zone
ITTO	International Timber Trade Organization
LCDS	Low Carbon Development Strategy
LCI	Living Condition Index
M& CC	Mayor and City Council
MDGs	Millennium Development Goals
MGI	Matching Grant Initiative
MIPA	Ministry of Indigenous Peoples Affairs
MoA	Ministry of Agriculture
MOAA	Ministry of Amerindian Affairs
MoC	Ministry of Communities
MoE	Ministry of Education
MOH	Ministry of Health
MOIPA	Ministry of Indigenous Peoples Affairs
MoSP	Ministry of Social Protection
MOU	Memorandum of Understanding
MPWC	Ministry of Public Works and Communications
NAAQS	National Ambient Air Quality Standards
NCSU	National Competitive Strategy Unit
NDC	Neighbourhood Democratic Council
NDIA	National Drainage and Irrigation Authority
NDS	National Development Strategy
NEAP	National Environmental Action Plan
NO	Nitrogen Oxide
NTFP	Non-Timber Forest Product
OHS	Occupational Health and Safety
OPM	Office of the Prime Minister
OS&HA	Occupational Safety and Health Administration
PC	Post Construction
PMU	Programme Management Unit
PTCCB	Pesticide and Toxic Chemical Control Board
QMS	Quality Management Standard
RDC	Regional Democratic Council
REO	Regional Executive Officer
RM&ERP	Risk Management and Emergency Response Plan
SME	Small and Medium Enterprises
SCC	Sophia Care Centre
SJHC	Sophia Juvenile Holding Centre
SSS	Sophia Special School
STC	Sophia Training Centre
SO ₂	Sulphur Dioxide
SPAW	Specially Protected Areas and Wildlife
TSS	Total Suspended Solids

UAEP	Unserved Areas Electrification Programme
UG	University of Guyana
UN	United Nations
UNCCD	United Nations Convention to Combat Desertification and Deforestation
UNCED	United Nations Conference on Environment and Development
UNEP	United Nations Environmental Programme
USAID	United States Agency for International Development
USEPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds
WHO	World Health Organization
WTO	World Trade Organization
WWF	World Wildlife Fund

EXECUTIVE SUMMARY

1. Introduction

The Government of Guyana (GoG) is seeking to improve the National Quality Infrastructure in Guyana. In this regard, it is seeking a loan from the Inter-American Development Bank (IDB) to build a new complex to house the Guyana National Bureau of Standards (GNBS) secretariat. The then Ministry of Business (MoB)¹, therefore, in seeking to move forward with this project, contracted the services of Dr. Mark Bynoe to conduct an Environmental and Social Assessment (ESA) and Environmental and Social Management Plan (ESMP). What follows is a description of the project, identification of the investment option, description of the physical, social and economic environments, the impacts that are likely to emerge and recommendations to mitigate the impacts while identifying ways of enhancing the positive virtues of the project.

2. Project Description

The current laboratories infrastructure and equipment is not adequate for supporting exports, protect consumers and the environment. There are 20 existing main national laboratories offering services in metrology, chemical and microbiological and physical testing of products and materials used. These laboratories have limitations and gaps in terms of: (i) unsuitable laboratory facilities, lacking the proper physical conditions to assure reliability; (ii) absence of laboratory facility to perform tests for consumer protection and for dynamic sectors; (iii) limited calibration capacity in terms of capacity in temperature, moisture, pressure, force, volume, electricity; (iv) lack of adequate equipment and consumables; (v) outdated test methods that no longer meets the needs for the industry requirements; (vi) lack of accreditation and participation in proficiency testing programmes; and (vii) insufficient trained staff for performing tests and calibrations as well as competence in use and maintenance of instrumentation. In this regard, the Government of Guyana (GoG) carried out in 2014, with the support of the Inter-American Development Bank (IDB) a needs assessment of a State-of-the-Art Laboratory and is contemplating its implementation through an IDB loan. However, the demand for services needs to be updated to reflect the recent economic changes, as well as the dimensioning of cost of the current facility.

3. Methodology

The ESA was conducted using different recognised standards, methods and approaches, and international best practices, inclusive of the IDB's guidelines for conducting Environmental Impact Assessment of Investment Projects (2002). These methods and approaches are detailed within the relevant section of the report.

Field studies were carried out to determine and evaluate impacts of the project based on direct observations and professional judgment. A comprehensive content review of pertinent literature and some desktop techniques were used to complement or supplement field data where it was not available. In addition, extensive public consultations were carried out to capture public views and concerns about the proposed projects.

¹ The name of the Ministry has been changed to the Ministry of Tourism, Industry and Commerce with the change of government in 2020.

4. Environmental, Regulatory and Administrative Framework

The purpose of this ESA was to identify potential impacts and propose measures to devise mitigation measures for negative impacts, ensure compliance to national and international laws and regulations and that all interested and affected parties are given an opportunity to express their views and concerns about the project while being kept informed of the crucial project decisions regarding their bio-physical and social environments. In this regard, it was found that the Project will need to make applications to the following entities:

Environmental Protection Agency	-	Environmental Authorization/Permit and to determine if an EMP is required
Mayor and City Council	-	Approval of designs and building permit
Central Housing and Planning Authority-		Land use and fire permit

Furthermore, an ESA and ESMP of the project are necessary prior to the project's commencement. This would ensure that the adverse impacts are identified and addressed. Such an initial assessment will satisfy the requirement of fulfilling the legislative requirement of the Environmental Protection Act of 1996 and that of the IDB.

5. Environmental Setting

Topography: The proposed project lies in a flat land, flood plain area with elevation of between 0.5 – 1 metre below sea level

Geology: The geology of the area mainly comprises basement complex rocks.

Soils: Mostly comprise clayey soils, with a soil suitability classification of II.

Hydrology: The project site is bordered on the eastern and western side by drains which are in need of rehabilitation.

Climate: The project site has a tropical climate (mean annual temperatures 25 to 28 degrees celcius).

Flora: Vegetation within 10m of the road side is dominated by Congo Pump (*Cecropia sciadophylla* and *C. obusa*), Fire rope (*Pinzonia coriacea*) with strong patch dominance by cowtail - *Andropogon bicornis*, razor grass – *Scleria* spp. and savanna grasses (*Panicum pilosum*).

Fauna: The area is largely denuded of faunal species, with few local species of fishes found in the surrounding canals.

Land Use: The main land uses within the identified area is services

Land Tenure and Rights: The proposed site is found on state land.

6. Main Findings

Potential Positive Impacts and enhancement measures

Positive Impacts

Among other benefits, the improved GNBS complex is expected to provide some short term employment during construction, enhanced property values after completion, improve upon current waste disposal methods applied at the GNBS, improve Guyana's competitive position internationally as well as its exports and reduce the country's trade balance.

Enhancement Measures

In order to secure project benefits, the contractor will maintain open dialogue with stakeholders during the entire project implementation period as a way of ensuring that all concerns and suggestions are specifically dealt with or resolved. This way, stakeholders will be able to perceive benefits and take advantage of this opportunity to request the contractor to fully address their concerns or demands. The other way to sustain the project benefits is for the Government to ensure that a comprehensive plan towards road improvement is pursued.

Potential Negative Impacts and Mitigation Measures

The construction phase is likely to have the largest number of activities that can be potentially damaging to the environment. Major potential negative impacts during this phase include the following:

(i) Atmospheric Impacts: To reduce atmospheric pollution the contract documents should specify that the contractor shall utilize such practicable methods and devices as are reasonably available to control, prevent, and otherwise minimize atmospheric emissions and discharges of air contaminants.

Potential Mitigation: Accordingly, the contractor would be expected to ensure that mechanical equipment, utilized during the construction phase, work at their optimal levels, thereby reducing atmospheric emissions to the manufacturer specified levels. Vehicles and equipment showing excessive emissions of exhaust gases due to poor engine adjustments or other inefficient operations will not be allowed to operate until corrective repairs or adjustments are made.

Airborne particulates from the borrow pits can be mitigated by application of water to the ground surface, if required. However, it is very unlikely that much can be done to reduce this impact significantly. Airborne particulates from the vehicles transporting materials during the rehabilitation phase can be mitigated by ensuring that the vehicles have proper covering and the road is consistently wet to reduce the impact of this pollutant. Application of the mitigation measures will aid with managing the impacts associated with atmospheric emissions.

To reduce water pollution, proper storage and transporting of bituminous material, fuel and waste will be a vital prerequisite at all times. Additionally, work should occur mainly during the hours of 09:30 – 15:30 hrs. a period of high ambient noise level. Furthermore, all workers will be expected to work with protective gear and air protectors.

(ii) Geology, Soils, and Topography: A major source of soil contamination is expected to be the disposal of waste, i.e., chemical, liquid and oils (during operations) and liquid and oil mainly during construction from equipment and heavy vehicles working on the project site.

Potential Mitigation: It is recommended that this oil be collected, stored and resold to the service stations. The chemical waste should be collected, stored and exported following established international protocols. Liquid waste should be collected in a separate holding tank, recycled, with the improved quality of water then released into the environment or applied on grey spaces. All other wastes will be disposed in impervious lined pits or at the Eccles Landfill site approximately 6 km away from the proposed project site. Further, to mitigate any possible soil erosion it will be important to avoid construction in areas of relatively steep gradients, balancing fill and cut and by ensuring that slopes are less than the natural angle of repose for the soils. The mitigation measures will result in minor residual impacts which are of medium severity and which will have a low likelihood of occurrence.

(iii) Water Resources: If culverts are constructed to allow water to flow from the tertiary ditches bordering the site into secondary drains they can potentially result in erosion, and increased sediment discharge to drains along the road. Further, surface water quality may potentially be impacted by discharges to surface water of spilled and leaked chemicals and oils from vehicle maintenance. At the same time, the failure to connect the current project site to the secondary canals confounds the site to being constantly flooded and water logged from rainfall.

Potential Mitigation: These impacts will be mitigated by minimizing the number of culverts to allow for connectivity, but still ensuring that there are sufficient for the effective drainage of the site and surrounding areas. Moreover, the canals will need to be rehabilitated to reduce the risk of flooding. Detention basins can also be strategically located to trap sediments in surface water runoff before discharge to drains. This will result in minor residual impacts of low severity with a low likelihood of occurrence. Additionally, to minimise the possibility of ground and surface water contamination the project will utilize simple preventative techniques consisting of segregated and contained areas with sumps and oil traps. Chemicals and oils collected from sumps and segregated areas should be stored in drums and be resold to some service stations.²

(iv) Biological Resources: Minor erosion from the built complex and borrow source(s) can potentially increase sediment discharge to streams and drains located downstream of these facilities. Increased sediment discharge may potentially ruin spawning beds for fishes.

Potential Mitigation: The impacts on aquatic ecosystems will be mitigated by minimizing re-channelling of streams and/or implementing silt barriers where possible.

(v) Socio-Economic Issues

Traffic congestion: It is anticipated that during construction there will be some level of congestion particularly if trucks taking material use the main access via Duncan Street or Dennis Street during peak hours.

² Small quantities are often bought by those in the agricultural sector and used as lubricants, while larger volumes are often collected by service stations and shipped to designated facilities to be burnt or disposed of in an environmentally sensitive manner.

Potential Mitigation: This impact can be mitigated through having an effective traffic management plan in place, with police presence as much as is practically possible. This plan will be developed with the Guyana Police Force (GPF) as outlined in the ESMP.

Increase in traffic along secondary roads: Guyanese drivers are on the average undisciplined, impatient and aggressive. This is likely to result in many seeking to use side streets to avoid any congestion during the construction phase of the project. This will result in some of these streets having greater flows of traffic than is normally the case.

Potential Mitigation: This impact can be mitigated by careful planning before the project is executed and continued public consultation. Further, the design engineers may wish to consider the possibility of designating some streets as one-way streets with sleeping policemen installed to reduce potential road accidents.

Security Concerns: The main security concerns are with regards to vandalism and theft of equipment during construction and operation.

Potential Mitigation: This impact can be mitigated by fencing the construction site, erecting signs, establishing no go zones, and hiring vigilant security personnel.

I. INTRODUCTION AND BACKGROUND

A. Introduction

- 1.1 The Ministry of Business (MoB) is developing a strategy to support small and medium enterprises (SMEs) productivity, value added and export readiness, considering the modernization of traditional sectors: sugar, rice, forestry, and mining, and supporting new growth and diversification in new sectors: non-traditional agriculture, aquaculture, business process outsourcing/information technology, and tourism, under a social and environmentally sustainable framework³. However, there is a need to modernize the current National Quality Infrastructure in order to facilitate the growth of businesses in the local and external markets, protect the people and the environment and provide recognition for the Guyanese brand in the international market⁴. This modernization should be accompanied by a trade strategy to boost the participation of domestic firms in international markets.
- 1.2 Due to the need to implement best practices in the National Quality Infrastructure, the production and trading of goods and services in the principal sectors face a number of non-compliance risks in both the local and export markets with significant impact on competitiveness inclusive of: (i) rejection of products at border inspection point; (ii) increased costs due to delays while inspections/test are being done in overseas laboratories; (iii) disruptions in trade, loss or inability to expand into new market; (iv) loss of revenue where inaccurate measurements and test results are used and (v) inability to command premium price where quality and safety products are not defined.⁵ In this regard to export markets in both traditional and non-traditional exports require compliance with technical requirements that are standards based⁶. In addition, local consumers and environmental protection conditions need to be enhanced.
- 1.3 The Guyana National Bureau of Standards (GNBS) holds primary responsibility for standardization, through a process of formulation and application of standards, technical regulations, conformity assessment procedures and metrology⁷. However, all standardizing bodies need to modernize the legal and implementation framework of the National Quality Infrastructure⁸, as Guyana has still has to implement national quality infrastructure practices.
- 1.4 The current laboratories infrastructure and equipment are not adequate for supporting exports, protect consumers and the environment. There are 20 existing main national laboratories offering services in metrology, chemical and microbiological and physical testing of products and materials used⁹. These laboratories have limitations and gaps in terms of: (i) unsuitable laboratory facilities, lacking the proper physical conditions to assure reliability; (ii) absence of laboratory facility to perform tests for consumer protection and for dynamic sectors; (iii) limited calibration capacity in

³ The economy is highly dependent on raw materials and unprocessed foods, as the main contributors to the economy are agriculture, forestry and fishing (19% of GDP), mining and quarrying (10%), agroindustry (7%) and services (66%). Source: Bureau of Statistics.

⁴ Needs Assessment for the State-of-the-Art Testing and Metrology Facilities. 2014. Between 2006 and 2010, there were a total of 59 rejections of foods exported to the US from Guyana at an annual average of 12 rejections. The Unit Rate of Rejection for the US market from 2002 to 2010 ranged from 0.9 in 2003 to just about 0.2 in 2010, higher than the average of countries such as Trinidad and Tobago and Jamaica

⁵ Needs Assessment for State-of-the-Art Testing and Metrology Facilities. Executive Summary. 2014..

⁶ Food Safety, Good Agricultural Practices, Quality Standards, Animal Health, Plant Health, Environmental, Social, Safety, Information Security, Efficiency and Certification, each with its own specific requirements.

⁷ GNBS Strategy. 2011

⁸ The GNBS Standards Catalogue 2012 lists twenty (20) standards as having mandatory status. The WTO Report by Measures 2009, states that Guyana makes minimal use of technical regulations⁹

⁹ Needs Assessment for the State-of-the-Art Testing and Metrology Facilities. 2014

terms of capacity in temperature, moisture, pressure, force, volume, electricity¹⁰; (iv) lack of adequate equipment and consumables; (v) outdated test methods that no longer meets the needs for the industry requirements; (vi) lack of accreditation and participation in proficiency testing programmes; and (vii) insufficient trained staff for performing tests and calibrations as well as competence in use and maintenance of instrumentation¹¹. In this regard, the Government of Guyana (GoG) carried out in 2014, with the support of the Inter-American Development Bank (IDB), a needs assessment of a State of the Art Laboratory and is pursuing its implementation through an IDB loan. However, the demand for services needs to be updated to reflect the recent economic changes, as well as the dimensioning of cost of the current facility.

- 1.5 Regarding the scope of the intervention, as a result of legal and technical analysis, in line with the forthcoming guidelines to be issued by the Caribbean Community (CARICOM) Regional Organization for Standards and Quality (CROSQ), the scope of the program will concentrate on four fronts: (i) strengthening the GNBS and its labs in its central role in legal and industrial metrology, standardization, accreditation and certification, including the strengthening of the industrial metrology laboratories in the areas of mass, temperature, force and pressure, length, hardness, volume, electrical quantities, time and frequency and chemical metrology.
- 1.6 It is within this context that this Environmental and Social Analysis (ESA) and Environmental and Social Management Plan (ESMP) report has been prepared for the Ministry of Business under the Enhancing the National Quality Infrastructure for Economic Diversification and Trade Promotion (GY-L1059) Loan signed between the MoB and the Consultant Mark Bynoe. The ESA and ESMP are essential to ensure that the socio-economic sustainability component of the physical infrastructure and its operations to be financed under the program satisfies the national legislation and environmental and social safeguard policy (OP-703) of the Bank. It builds and updates a previous report that was completed in 2016 for said facility in a different location in Guyana, but for which the securing of the land for constructing the facility was not obtained.
- 1.7 This ESA and ESMP have been prepared in compliance with the policies and regulations of the Environmental Protection Agency (EPA) of Guyana and the environmental policies and safeguards of the IDB, in particular the Bank's Environmental and Social Guidance note of February 2009. In 2022, the Government of Guyana and the Ministry of Tourism, Industry and Commerce sought additional financing of the loan. Due to the additional financing the ESA and the ESMP was updated to reflect the IDB's new Environmental and Social Policy Framework. In accordance with those guidelines this ESA and ESMP comprises the Social and Environmental Setting for the project, institutional and governance arrangements, projected impacts during various phases of the project and the mitigation measures to be followed.

¹⁰ Unsuitable type of construction materials to ensure a sterile environment, layouts that may conduce to cross contamination, locations subject to flooding, poor ventilation, humidity and direct sunlight. Needs Assessment Report, 2014.

¹¹ Ibid.

II. OBJECTIVES, METHODOLOGY AND CONSULTATIONS

A. Objectives

- 2.1 The overall objective of this consultancy is to update the previous Environmental and Social Analysis (ESA), including an Environmental and Social Management Plan (ESMP) for the construction of a new laboratory facility for the GNBS (see [Terms of Reference in Annex 1](#)). The ESMP is a management tool to ensure the socio-environmental sustainability component of physical infrastructure and its operations to be financed under the National Quality Infrastructure (NQI) project meet both national environmental legislation and the Environmental and Social Safeguards Policy (OP-703) of the IDB.

B. Methodology

- 2.2 The updated ESA study was conducted using a plurality of recognised standards, methods and approaches, and international best practices, inclusive of the IDB's guidelines for conducting Environmental Impact Assessment of Investment Projects (2002). These methods and approaches are detailed within the relevant sections of this report. The methodological approach therefore used for the collection of data for this study was essentially of four (4) types: (i) visual observation and reconnaissance of the proposed site, (ii) review of pertinent literature, (iii) stakeholder consultations, and (iv) application of expert knowledge.

Visual Observation and Reconnaissance Visits

- 2.3 Given the location of the proposed structure, the consultant felt it was necessary to visit the site to better appreciate the surrounding environment, potential socio-economic impacts and to begin to identify some persons and/or agencies was important and strategic to speak with. Reconnaissance visits were made to the proposed project site over the period May 21 and July 20, 2018 (see [Table 1](#)). These visits were done on both wet and dry days, and on a weekend to ensure that a range of issues could be identified. As such, this updated ESA is informed by both theoretical and practical exercises and considerations.

Table 1: Site Reconnaissance Visits

Date	Purpose of visit	Support Provided
May 21, 2018	<ul style="list-style-type: none">To identify area designated as the construction site	Visit was facilitated by Mr. Shailendra Rai, Head, Legal Metrology & Standards Compliance Department
May 25, 2018	<ul style="list-style-type: none">To examine internal drainage network and identify stakeholders within the Exhibition Complex.	
June 15, 2018	<ul style="list-style-type: none">To reexamine proposed construction site, internal road network (inclusive of proposed access to the construction site) and drainage system	
July 6, 2018	<ul style="list-style-type: none">Visit to compound located immediately north of exhibition site to identify stakeholders in close proximity to the Construction site.	Assistance was provided by Ms. Yvette Sancho, Administrator of the Sophia Juvenile Holding Centre
July 9, 2018	<ul style="list-style-type: none">Visit to compound located immediately north of exhibition site to do a detailed reconnaissance of the Sophia Training Centre (STC) facility located within the compound.	Assistance was provided by Mr. Brian King, Senior Training Officer (Administrator Ag.) of the STC.

Date	Purpose of visit	Support Provided
July 11, 2018	<ul style="list-style-type: none"> Visit to compound located immediately north of exhibition site to do a detailed reconnaissance of the Sophia Care Centre (SCC) and Sophia Special School (SSS) facilities located within the compound. 	Assistance was provided by Ms. Claire Victerino, Assistant House Supervisor of the SCC and Mr. Eusi Harlequin, Senior Master of the SSS.
July 12, 2018	<ul style="list-style-type: none"> To conduct a detailed examination of the access routes to the exhibition site. 	Assistance was provided by Ms. Celestine Butters, Manager of the New Guyana Marketing Cooperation (NGMC)
July 20, 2018	<ul style="list-style-type: none"> Detailed examination of the external drainage networks that supports the complex. General walk through of project site and adjoining compounds to verify issues arising from the Consultation Process 	

Source: Consultant's Report (2018)

Literature Review

2.4 Literature was collected primarily from two sources: (i) The Implementing Agency for the Project which is the GNBS and (ii) The Inter-American Development Bank (IDB, Project Team/Project Consultants) the funder. Some of these documents include:

- The Green State Development Strategy (GSDS) Framework and Financing Mechanism (2017),
- The Greater Georgetown Development Plan, 2001 – 2010,
- The Environmental Protection Act of 1996 and amendments that have occurred since,
- The third revision of the Government of Guyana's Low Carbon Development Strategy (2010)
- The Town and Country Planning Act (1948)
- Land Development Act (1970)
- State Land Act (1953)
- The Municipal District Council Act (1970)
- Needs Assessment for the State of the Art Testing and Metrology Facilities (2014).

These documents provided the consultant with a better understanding of the context within which the proposed project is to be carried out. Their relevance to the project and important issues to be considered are noted in various parts of this report, but particularly within the legal and institutional framework section. This approach was adopted to reduce repetition and enhance brevity (*for a list of the material consulted, kindly see the bibliography*).

Stakeholders Consultations

- 2.5 The Consultant met with the Client on at least 3 occasions in person during the updating of the ESA to discuss the assignment, their expectations, outline and define respective responsibilities and logistical support they might be able to provide to the consultant, such as, the provision of letters of introduction and public notices about a possible public consultation.
- 2.6 Wider consultations were done with stakeholders within the "Zone of Direct Influence" and with institutions whose operations will be impacted by the establishment of the new facility.
- 2.7 It is important to note that within the context of the project there was no deliberate effort to exclude communities from the consultation process. However, the following influenced the selection of stakeholders:
- The proposed construction site is vacant plot of land (located in a built-up environment that is situated within the compound of the Sophia Exhibition Complex. While it would appear that only

governmental institutions were interviewed it should be noted that these stakeholders consist of individuals who were employed, enrolled in educational institutions, resided in a care facility or were being held in a juvenile detention centre. As such the consultations were not done with the aforementioned stakeholders because of their institutional relevance to the project but was due to the fact that they resided, received schooling or worked within close proximity to the construction site.

- Additionally, initial consultations held with the client suggested that the proposed building design and operations will not have any significant impact on the nearby communities. The proposed structure will not be of a magnitude which requires major disruptions of existing activities outside of the boundaries of the Sophia Exhibition Complex and as such the potential impacts to the surrounding community will be both remote and miniscule.
- Further, evaluation of potential risk was curtailed by the fact that GNBS could not provide a list of chemicals which will be utilized for testing on site. However, during consultations it was noted that no large volumes of toxic chemicals will be utilized at the facility and that there exists no significant risk for potential chemical contamination/pollution of the environs.

2.9 The stakeholders consulted between May 21 and July 10, 2018, are shown below in [Table 2](#).

Table 2: Stakeholders Consulted

Date	Topics Discussed	Agency	Representative
May 21, 25 and July 10, 2018	<ul style="list-style-type: none"> • Updates to the design and layout of the new facility • Potential concerns about the project • Benefits the projects are likely to bring to the standards infrastructure • The potential use of chemicals and hazardous materials • Safety/mitigation measures which will be featured in the design of the new facility • Any other issues 	Guyana National Bureau of Standards (GNBS) - Located within the "Zone of Direct Influence"/Institutional Stakeholder	Candelle Walcott-Bostwick, Executive Director Mr. Shailendra Rai, Head, Legal Metrology & Standards Compliance Department Edward Melville, Laboratory Technician III Donna Canterbury, Head, Laboratory Services
June 26, 2018	<ul style="list-style-type: none"> • Is fire a main hazard in the project site • How to mitigate fire risks both at the complex and around the project site • Response capabilities in the event of a fire 	Guyana Fire Service (GFS) - Institutional Stakeholder	Mr. Gregory Wickham, Divisional Officer Operations
June 26, 2018	<ul style="list-style-type: none"> • The permitting process for new applicants seeking to construct buildings • Drainage network that supports the complex and its immediate environs 	Georgetown Mayor and City Council (M&CC) - Institutional Stakeholder	Mr. Kenson Boston, Deputy City Engineer
June 29, 2018	<ul style="list-style-type: none"> • What is the permitting process for a new applicant? 	Central Housing and Planning Authority (CH&PA) - Institutional Stakeholder	Mr. Orsen Simon, Development Facilitation Officer 3

Date	Topics Discussed	Agency	Representative
	<ul style="list-style-type: none"> How does one go about applying for a permit from the CH&PA? 		
July 9, 2018	<ul style="list-style-type: none"> Awareness about the proposed project Potential risk or concerns associated with the project Recommendations/mitigation measure that can implemented to reduce risk 	Sophia Juvenile Holding Centre, Ministry of Public Security - Located within the "Zone of Direct Influence"	Ms. Yvette Sancho, Administrator
July 9, 2018	<ul style="list-style-type: none"> Demographic profile of detainees/students and staff. 	Sophia Training Centre, Department of Social Cohesion, Ministry of the Presidency - Located within the "Zone of Direct Influence"	Mr. Brian King, Senior Training Officer (Administrator Ag.)
July 9, 2018	<ul style="list-style-type: none"> Awareness about the proposed project Potential risk or concerns associated with the project Recommendations/mitigation measure that can implemented to reduce risk Demographic profile of staff 	Exhibition Complex Secretariat - Located within the "Zone of Direct Influence"/Institutional Stakeholder	Ms. Tameca Sukhdeo-Singh, Administrator
July 11, 2018	<ul style="list-style-type: none"> Awareness about the proposed project Potential risk or concerns associated with the project 	Sophia Care Centre, Ministry of Social Protection - Located within the "Zone of Direct Influence"	Ms. Claire Victorino, Assistant House Supervisor, Mr. Eusi Harlequin, Senior Master
July 11, 2018	<ul style="list-style-type: none"> Recommendations/mitigation measure that can implemented to reduce risk Demographic profile of residents/students and staff 	Sophia Special School, Ministry of Education - Located within the "Zone of Direct Influence"	Mr. Eusi Harlequin, Senior Master
July 12, 2018	<ul style="list-style-type: none"> Awareness about the proposed project Potential risk or concerns associated with the project Recommendations/mitigation measure that can implemented to reduce risk 	Guyana Competition and Consumer Affairs Commission (CCAC) - Located within the "Zone of Direct Influence"	Mrs. Dawn Holder-Cush, Director Ms. Allison Parker, Communication Officer, Registrar, Secretary to the Board Mr. Anil Sukhdeo, Economist
July 12, 2018	<ul style="list-style-type: none"> Demographic profile of residents/students and staff 	Guyana Tourism Authority - Located within the "Zone of Direct Influence"	Mr. Kamrul Baksh, Senior Product Development Officer
July 12, 2018		Central Packaging Facility, Guyana Marketing Cooperation (GMC) - Located within the "Zone of Direct Influence"	Ms. Celestine Butters, Manager
July 26, 2018	<ul style="list-style-type: none"> Functions and operations of the GA-FDD Potential concerns about the project 	Government Analyst Food and Drugs Department (GA-FDDA, Ministry of Public Health) - Institutional Stakeholder	Mr. Marlon Cole, Director

Date	Topics Discussed	Agency	Representative
	<ul style="list-style-type: none"> • Benefits the projects are likely to bring to the standards infrastructure • Any other issues 		
July 26, 2018	<ul style="list-style-type: none"> • Functions and operations of the PTCCB • Potential concerns about the project • Benefits the projects are likely to bring to the standards infrastructure • Any other issues 	Pesticides and Toxic Chemicals Control Board (PTCCB) - Institutional Stakeholder	Mr. Suresh Amichand, Deputy Registrar
July 26, 2018	<ul style="list-style-type: none"> • Functions and operations of the GLDA • Potential concerns about the project • Benefits the projects are likely to bring to the standards infrastructure • Any other issues 	Guyana Livestock Development Authority (GLDA) - Institutional Stakeholder	Mr. Richard Cumberbatch, Chief Executive Officer
Taken from the 2016 Report	<ul style="list-style-type: none"> • EPAs permitting and authorization process • EPA current regulatory framework • What standards are in place to govern the type of operation under this project • Who should submit an application, documents accompanying such application and the time it takes to provide an Environmental Authorization 	Environmental Protection Agency (EPA) - Institutional Stakeholder	Dr. Indarjit Ramdass, Executive Director Mr. Kemraj Parsram, Head, Environmental Management Division Mr. Collis Primo, Senior Environmental Officer Ms. Teshanna Redmond, Senior Research and Enforcement Officer Ms. Harsranie Rambaran, Director, Permitting Division
Taken from the 2016 report	<ul style="list-style-type: none"> • The Quality Standards Infrastructure in Guyana • Challenges and opportunities for improving the QSI • The collaborative framework • Resource constraints and the need for capacity building 	Ministry of Agriculture (MoA) - Institutional Stakeholder	Mr. George Jervis, Permanent Secretary Dr. Mark Pierre, Agricultural, Health and Food Safety Specialist Ms. Melisa October, Head, Monitoring and Evaluation Unit
	<ul style="list-style-type: none"> • The drainage infrastructure in and around the proposed project site • Measures to mitigate flooding in and around the project site 	National Drainage and Irrigation Authority (NDIA) - Institutional Stakeholder	Mr. Frederick Flatts, Chief Executive Officer

Application of Expert Knowledge

- 2.10 Based on the experience of the consultant, analysis of the various observations and issues was documented and discussed further in this report.
- 2.11 The remainder of the report is therefore structured in the following order:
- The Socio-Physical Environment,
 - Legal, Environmental and Institutional Framework,
 - Socio-Cultural and Environmental Impact Prediction and Relative Importance,
 - Environmental Impacts
 - Risk Assessment,
 - Mitigation Measures, and
 - Environmental and Social Management Plan.

C. Limitations

- 2.12 The main limitation was the time constraint and busy schedules of many of the stakeholders. This meant that multiple trips had to be made before appointments could have been secured and discussions held. It also meant that it was not always possible to meet with stakeholders at prearranged times, but rather, when the stakeholders were able to accommodate the consultant. Despite these issues the consultant was able to hold discussions within excess of 20 key stakeholders.¹² These persons/organisations raised a number of issues which are reflected in Section 6 that would be important to consider aiding with a more informed project design.

¹² In some instances, the consultant had discussions with stakeholders virtually and sought to ascertain if there were any changes since the last report. Where this was not possible, due to time constraint and the consultant's knowledge of local conditions, laws and regulations, the issues raised in the last report are reflected here.

III. PROJECT DESCRIPTION

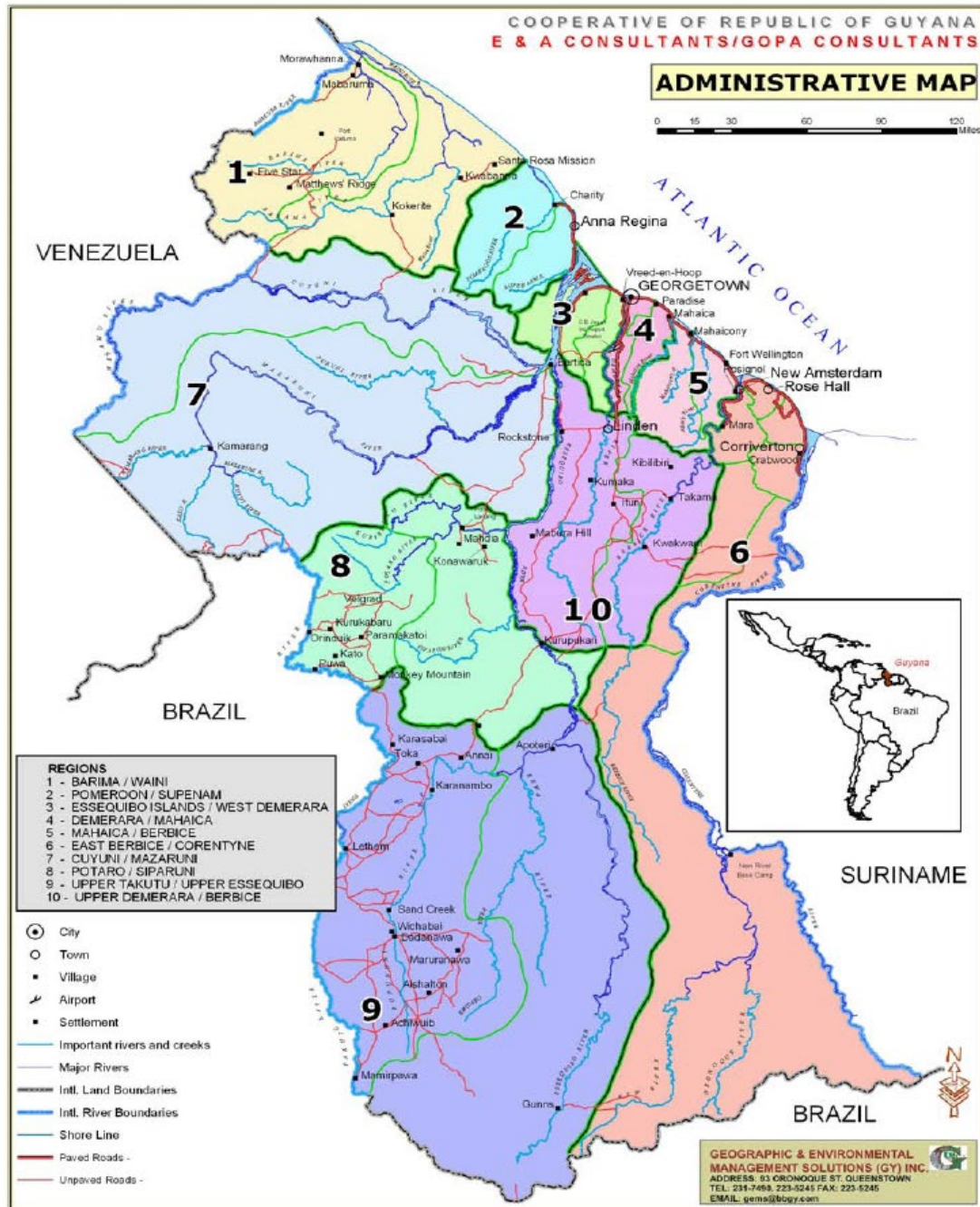
A. Location

- 3.1 The MoB is working to construct a new laboratory facility for the GNBS. This facility will be situated in Sophia Exhibition Complex (SEC), Greater Georgetown in Administrative Region Four, i.e., Demerara-Mahaica ([see Map 1](#)). The new building is expected to be situated on a 2.156 acres plot of vacant ([see Picture 1](#)) state-owned land in a commercial zone that has mainly office buildings or land earmarked for commercial development ([see Map 2](#)). The new facility is expected to have three (3) one flat structure and one two-flat structure to house the Administration Block. Additionally, chemicals (such as sulphuric, nitric and hydrochloric acids) will be stored in the Industrial Metrology Building and various fuels (such as diesel and gasoline) will be stored for short durations in a section to be designated in the Legal Metrology Building. The exact location in which these substances are to be stored is still to be identified as at the time of writing this report the floor plan for the new facility was not available. However, we do posit some recommendations to treat with any potential impacts that may emerge from storing these substances in the various buildings.



Picture 1: Proposed construct site located within the Sophia Exhibition Complex

Map 1: Administrative Regions of Guyana



Source: Geographic and Environmental Management Solutions Inc (GEMS), 2006

Area of Key Spaces

Area of Key Spaces	Area (sq m)
Admin. Block	1,256
Legal Metrology	657
Industrial Metrology	864
Circulation	278

FOOTPRINT

FOOTPRINT	Area (sq m)
Parking [594 sq m]	3,055
Site area	32 days [incl. 2nr. SN]
Site Utilization factor	8,725 sq m
Minimum Green space	35%
	15%

TRUE NORTH (OBSERVED) 16° 30' WEST
MAG. VAR.

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TRUE NORTH (OBSERVED) 16° 30' WEST
MAG. VAR.

22

- 3.2 The facility to be built is bordered on the north by the Sophia Juvenile Holding Centre, Sophia Training Centre (*see Pictures 2 & 3*), the Sophia Special School (SSS) for children with learning challenges, and the Sophia Care Centre for homeless children; on the East by a secondary drain, the A-Field Sophia Dam (*see Picture 4*), and the primary drainage facility in the Downer Canal; on the South by State-owned lands that are currently unoccupied, and on the West by the Eastern Highway is being proposed as the main access to the SEC (*see Picture 5*). This road is in very good condition and is a public thoroughfare. These borders form the area of direct influence (ADI) within this project as demonstrated in *Map 3* below. Within the ADI are, *inter alia*, the current GNBS complex, land designated for the National Toshaos Council Headquarters¹³, the Competition Commission Secretariat, and SEC Administration Building, the NQI Project Office and an “Amerindian Village” which is a facility used to showcase the work and life of the indigenous Guyanese peoples largely during the Exhibition Season.



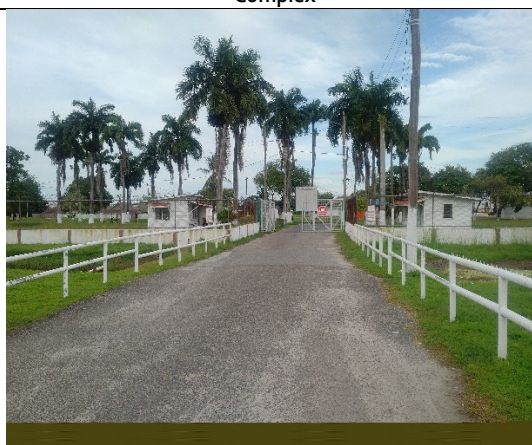
Picture 2: Sections of the Sophia Training Centre located in the compound located immediately north of the Sophia Exhibition Complex



Picture 3: Sophia Juvenile Holding Centre located in the compound immediately north of the Sophia Exhibition Complex



Picture 4: Image of earthen dam located east of the eastern fence separated from the compound by a trench which is overgrown with brush and weeds



Picture 5: Eastern Highway entrance to the Sophia Exhibition complex

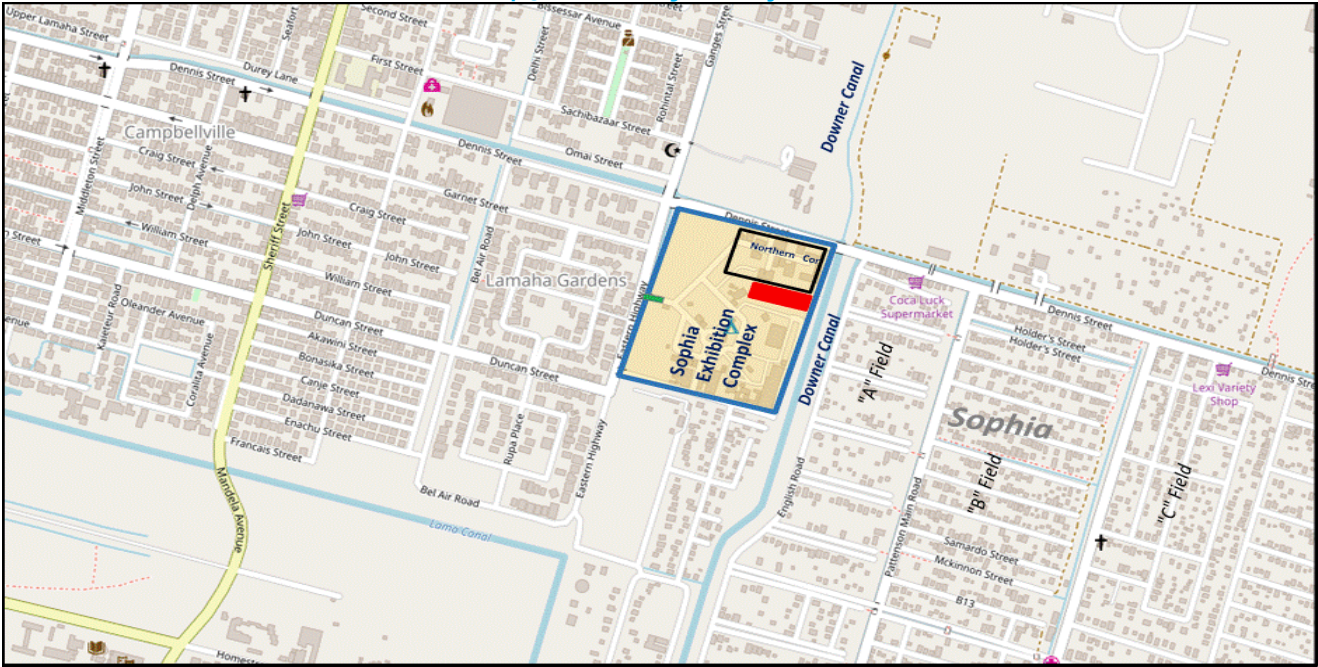
Source: Consultant's Pictures (2018)

- 3.3 Outside the ADI are a number of communities that fall within the area of indirect influence (AIDI). For example, immediately west and northwest of the Eastern Demerara highway are two middle income housing communities, namely, Lamaha Gardens and Prashad Nagar (*Map 2 and Picture 6*).

¹³ This is a HQ for the indigenous peoples' chiefs/captains known in their traditional language as Toshaos.

At the same time, East of the proposed site is the Sophia community, one of the largest housing communities in Guyana that started as a squatter settlement, but which has since been regularised (see [Picture 7](#)). These communities are only expected to be tangentially impacted, mainly due to increased traffic that may be associated with construction and operation activities of the proposed project.

Map 3: Location of the Project Site



Key	
<div></div>	Proposed Construction Site
<div></div>	Zone of Direct Influence
<div></div>	Main Access Point to Complex



Picture 6: The Lamaha Gardens Community on the Western Section of the Proposed Site



Picture 7: The Sophia Community on the Eastern and North Eastern Section of the Proposed Site.

Source: Consultant’s Photographs (2018)

B. Structure

3.6 The new state of the art laboratory facilities is expected to utilise an area of 3,172 square meters of state-owned land. The compound is expected to comprise the following buildings: **Main Building:** Ground Floor - 28,082 s.f.; First Floor - 8,325 s.f.; Mezz. Floor - 579 s.f.

Truck Building: 3,336 s.f.

Services Building: 3,028 s.f.

The total site area to be occupied by building would be 34,446 Square Feet.

The preliminary blueprints of the laboratory facility are expected to be derived from the Gaps and Needs Assessment carried out in 2014. One possibility is also for the structures to be green, pursuing renewable energy potentials and energy efficiency ethos as far as practicable. This will also complement Guyana's Low Carbon Development Strategy.

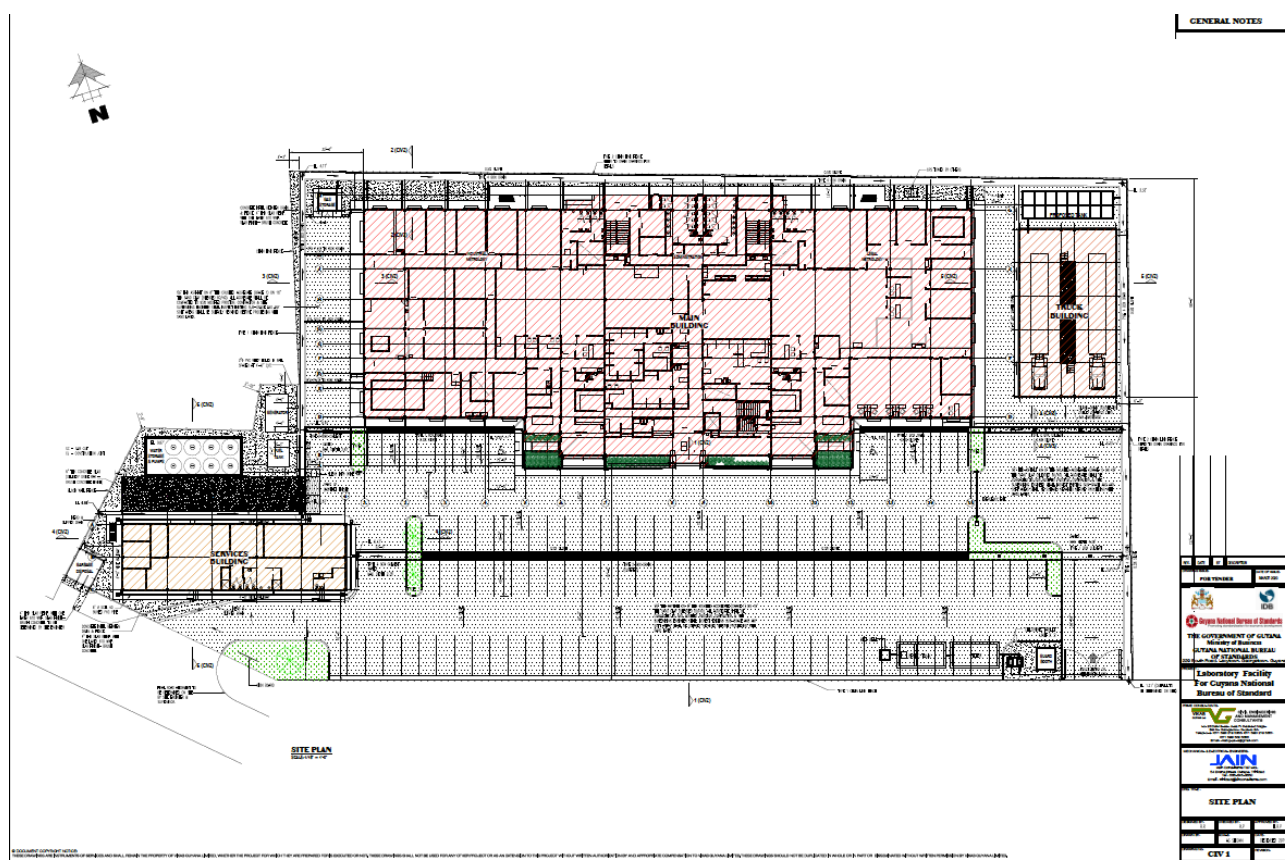


Figure: Design of Buildings (Vikab 2020)

C. Access and Drainage

3.7 Access to the proposed project site can be via many sources, inclusive of the East Demerara Highway, Dennis Street, Duncan Street, Garnett Street, and A-Field Sophia. However, the last of these options would require significant investment in building at least two bridges, building an access road from Dennis Street, and possibly having to relocate some squatters (*Pictures 8 & 9*). All of these are likely to increase the cost of the project and delay its implementation. As such, the most

feasible options would seem to be to use the current entry points into the site or rehabilitate those that have become defunct. These are in the main, via the East Demerara Highway, using the entrance to the far south of the SEC using the Duncan Street entrance (*see Picture 10*), the main entrance (*see Picture 11*), the entrance closest to Garnett Street (*see Picture 12*) that is in some semblance of disrepair, or using the Dennis Street entrance (*see Picture 13*).



Picture 8: Access via A Field Sophia which will be very costly



Picture 9: Squatter Settlement on the earthen dam East of the SEC

Source: Consultant's Photographs (2018)



Picture 10: Duncan Street Entrance



Picture 11: The main entrance from the East Demerara Highway



Picture 12: Garnett Street Entrance



Picture 13: Dennis Street Entrance

Source: Consultant's Pictures (2018)

- 3.8 However, to enter the plot from any of these access points will require some upgrading in the internal roads to facilitate the movement of construction materials, and to facilitate operational activities. Any of the entry points selected should be accessed via the construction of an all-weather road as it will aid with both mitigating dust pollution and make the site more accessible during the rainy season. The GNBS has indicated a preference for the upgrading of the road to the far south of the SEC. In 2019 the road to the far South of the SEC via the Eastern highway was upgraded by a contractor hired by the project. The Final Design and improvements were done using counterpart resources. The road was treated as an Associated Facility and built in keeping with the ESPS of the bank and the environmental requirements of the Guyana Environmental Protection Agency (EPA). The road through its design minimizes the potential for runoff and sedimentation. It also considered the disruptions and limitations to access of other users of the buildings of the complex. The chosen road and improvements will not adversely affect the squatters.
- 3.9 Much of the surface water in Guyana runs from the highlands in the south to the lowlands in the north and then into the Atlantic Ocean via various rivers, streams and outfalls using gravity. With regards to drainage at the proposed site, the SEC is bordered on both the east and the west by access drains. While the drain to the west is in fairly good condition and well maintained, the one to the east is over-grown by brush and in need of dredging (*see Picture 14*). These drains empty into the main access drain that runs parallel and south of Dennis Street and then empties into the Downer Canal that empties into the Atlantic Ocean via the Liliendaal Pumps (*see Picture 15*).



Picture 14: The drain to the east of the SEC overgrown by brush



Picture 15: The Liliendaal Pump Station through which the Downer Canal empties its contents

Source: Consultant's Pictures (2018)

- 3.10 The entire SEC is serviced by internal drains that appear to be well maintained ([see Picture 16](#)), if somewhat shallow, particularly when it is recognized that the site may become susceptible to flooding in the face of climatological changes. Furthermore, as more impermeable structures are erected at the SEC, there will be greater run-off, thus testing the carrying capacity of these internal drains. Given that the project site is on a flood plain it is imperative that going forward, some thought be given to ensuring all buildings are constructed within the building code of Georgetown, i.e., at least 4 feet above ground level, and the drains be deepened to cater for the greater overland flow. This drainage issue needs to be treated with the utmost urgency to mitigate possible flooding and water contamination from any chemicals stored in the Industrial Metrology building.



Picture 16: Internal Drains at the Project Site

Source: Consultant's Photographs (2018)

D. Waste Disposal

- 3.11 It is the expectation that with regards to solid waste the facility will have bins where waste separation and collection will occur. The area is serviced by private contractors using compactors under private arrangements. Currently, the private contractor that services the proposed project site collects waste from the GNBS under a private contract at a cost of G\$4,000 (US\$19.50) per month. This contract is expected to remain in place when the new facility is built. The collection of waste is driven by demand, with the private collector collecting waste twice weekly at the moment. The frequency will also impact the price for collecting waste. The GNBS generates on average approximately three (3) 170-kilogram barrels of waste per week. This waste is disposed of at the Haag Bosch Landfill Site at Eccles on the East Bank of Demerara which is approximately 5.5 kilometres from the proposed project site.
- 3.12 Given that this area falls within the one classified as Greater Georgetown, there is no central sewerage system. Each business or office building is expected to install its own sewerage facility during construction. These septic tanks tend to be located in the ground, built out of concrete material and are built with the possibility of flooding in mind. Once filled, private contractors are contracted to drain and clean these tanks. It would be important that effluent from this system does not get into the nearby drains, resulting in foul odour or pollution of the freshwater system, particularly, given the proximity of the proposed facility to residential communities.
- 3.13 The new facility will focus heavily on testing, metrology and certification. In its testing, it will continue to utilise sulphuric, nitric, and acetic acids. The facility will continue to test textiles, gold and concrete blocks. However, currently, the primary environmental issue that affects the operations of the GNBS is its inability to effectively dispose of chemical/hazardous waste. It was explained that currently they are no existing standards for the storage of hazardous chemicals and disposal after use. This situation has resulted in chemical waste being stockpiled at the facility. Dilution has also been utilized for the disposal of nitric acid. The diluted solution is poured in drains at the current GNBS facility. However, the Bureau reported that the amount of chemical waste stored is not of a large volume. Proposed mitigating measures to arrest this practice are outlined in the ESMP and will need to be implemented given the increase in volume of activities the facility will be expected to process, with the projected increase in economic activities associated with the emerging oil and gas sector. This last point becomes even more critical should Guyana decide to refine some of its petroleum within the country.
- 3.14 Additionally, it was reported that liquid waste and the disposal of petroleum is also an issue of concern. In some instances when oil tankers are presented for examination small volumes of oil remain in the tanks which are washed out into the drainage network, as are the other liquid wastes. This does have the potential to pollute and clog the aquatic ecosystems in the location, while simultaneously impacting human health. These matters are taken up further in this ESA and the ESMP. Old scales and other tested products are disposed of at the municipal landfill site at Eccles. Clearly, the GNBS will need more environmentally friendly ways of disposing of these hazardous wastes, the volume of which is expected to increase with the operation of the new facility.

E. Utilities

- 3.15 The area of the proposed project is well served with the basic infrastructure, inclusive of water, telecommunication and electricity. The facility will access metered water from the Guyana Water

Incorporated (GWI). The proposed site is serviced by the East Demerara Water Conservancy (EDWC) at the Shelterbelt location on Vlissengen Road. This Shelterbelt distribution system was established in the 1920s and is currently undergoing major rehabilitative works. Water from the Shelterbelt Plant is available to the site on a 24-hour basis, but the Plant does suffer on occasions from periodic maintenance, causing disruption to its service, or from power outages that also negative impacts the quality of the service provided. Both the water pressure and quality are said to be good. The cost per water in Guyana is G\$180/m³ (approximately US\$0.88/m³)¹⁴.

- 3.16 However, with the Global Climate Models (GCMs) downscaled to adequate regional resolution predicting longer and drier summers and less annual rainfall¹⁵, it would be prudent for the facility to also consider putting in place rainwater harvesting facilities, and some greywater recycling to reduce water wastage and increase efficiency. This will also be a resilience building measure to ensure that the new facility's operations are not interrupted by (un)scheduled maintenance or power outages at the Shelterbelt Plant. The actual dimensions of the system would be based on projected demand and will have to be worked out with the contractor.
- 3.17 The area is also well served with telecommunication services, with landlines and cellular services being available from the Guyana Telephone and Telegraph (GTT) Company, and cellular service via the Digicel Group (Caribbean). There are already telecommunication lines in the area and entities within the SEC are already connected. As such, it should not be difficult to connect the new facility to said lines to allow for various data packages to be obtained.
- 3.18 Lastly, the area, like most of Guyana is serviced by the Guyana Power and Light (GPL). This company has a monopoly and is the only authorised distributor of electricity. While the new structure will be connected to the national grid, the project will also have a stand-alone stand-by generator. This will ensure that the facility has uninterrupted power. At the same time, the project may wish to explore the installation of renewable energy, specifically, photovoltaic which equipment can be imported duty free into Guyana. This will be consistent as well with Guyana's GSDS. At the same time, the pursuance of energy efficiency measures should be pursued in terms of the integrity and design of the structures, lighting, implements and equipment purchased for the facility and its ancillary laboratories.

F. Other Issues

- 3.19 The GNBS currently employs 64 persons on a full-time basis, but the entity is heavily depleted with regards to technical and professional staff. In fact, the Gap and Needs Assessment Report (2014) indicates that the "*the laboratory head position is vacant, and the current senior staff does not have the requisite qualifications viz at least a degree in physical science.*" There will therefore need to be a training and incentive plan to build the capacity and retain the requisite skills if the entity is to play its role. It is projected, that once completed, the entity will employ 120 persons, all of whom will be permanent staff. At the same time, there is projected to be up to 100 short-term jobs created during the construction and setting up of the facility.
- 3.20 The GNBS is the only laboratory that provides services for calibration of weighing and measuring devices. This is covered under the Weights and Measures Act and Standards Act. Calibration and

¹⁴ This is using an exchange rate of US\$1 = G\$205.

¹⁵ Caribbean Community Climate Change Centre (2012) Achieving Development Resilient to Climate Change – Implementation Plan 2011 – 2021, CCCCC, Belmopan.

traceability are provided to the laboratories by the GNBS in the areas of calibration of balances, weights, thermometers, micrometers, volume flasks, pressure gauges, ovens and incubators. New areas for which calibration and traceability will be covered with this new facility will be calibration of micropipettes, low temperature calibration (below – 40°C), height gauges, deadweight testers, compression and tensile testers, infra-red thermometers and torque testers. Further the GNBS will continue to perform temperature, pressure dimensional metrology, and testing of concrete block and PVC pipes. In the area of physical and chemical metrology the laboratories need calibration and traceability support in pH meters, density meters, polarimetry, refractive index, thermometry, spectrophotometry (UV/Vis) and purchase, storage and distribution of traceable standards from NIST and ASTM.

G. Labour Management Risks

The project during the construction and the operational phase will employ several persons through direct workers as well as contracted workers. There are several risks associated with labour requirements of the project especially during the construction phase, including the risks of gender bias in hiring, the hiring of underage workers and the exploitation of workers through unsafe working conditions and lack of fair wages. Occupational Health and Safety hazard related to project activities include but are not limited to working at heights and risk of falls, improper and non-use of Personal Protective Equipment (PPE), exposure to hazardous materials, exposure to dust and electric shock. There are also potential risks related to the project workers especially construction workers and the present users of the existing buildings in the compound. To address the labour and working conditions risks the ESMP of the project contains a Labour Management Procedures (LMP) to address the requirements of the Environmental and Social Performance Standard 2 Labour and Working Conditions of the IDB's ESMF and the national labour laws of Guyana. The LMP ensures that the health and safety conditions of workers throughout the project phases but especially during the physical works construction activities. The LMP includes a grievance mechanism for project workers and address other issues such child labour, sexual exploitation and Gender Based Violence (GBV) and mainstreams non-discrimination, transparency in conditions of employment and equal opportunity. The LMP also includes a code of conduct for project workers.

IV. INSTITUTIONAL, LEGAL AND REGULATORY FRAMEWORK

A. Institutional Context

- 4.1 The Enhancing the National Quality Infrastructure Project is inserted in the framework established by the Guyana's Environmental Protection Act of 1996 (revised in 2006) and the policies and procedures of the IDB, the funding agency for the project. The regulatory and institutional framework applicable to this project involves the institutions presented on [Table 3](#) below. However, in the interest of brevity, their roles and responsibilities are incorporated within the discussions on the regulatory framework.

Table 3: Institutions Involved in the Institutional Framework

A. Directly
1) Environmental Protection Agency (EPA)
2) Central Housing and Planning Authority (CH&PA)
3) Ministry of Tourism, Industry and Commerce
4) Mayor and City Council (M&CC)
5) Ministry of Amerindian Affairs (MOA)
6) Ministry of Local Government – Guyana Water Incorporated (MoLG – GWI)
7) Ministry of Agriculture (MoA)
8) Ministry of Health, Government Analyst Food and Drugs Department
9) Ministry of Human Social Services (MHSS)
10) Ministry of Education
11) Ministry of Labour
B. Indirectly
1) Guyana Lands and Surveys Commission (GL&SC)
2) Guyana Fire Service (GFS)

- 4.2 Several government departments and agencies have a role to play in environmental and standards management in Guyana. This large number can itself be a recipe for fragmentation and insufficient coordination. Within this section only the main entities are discussed and their relevance to environmental and standards management highlighted.
- 4.3 This Environmental and Social Analysis (ESA) identifies the key environmental guidance; regulations and legislation that must be considered during the life of this project and which contractors and other stakeholders will need to comply with to undertake the implementation of the construction and operational aspects of this project. The management of the project will be required to demonstrate compliance with these and the identified activities through the reporting procedures within the ESMP. The ESMP followed the International Finance Corporation's (IFC) guidelines for new constructions.¹⁶

¹⁶ See

http://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/ifc+sustainability/our+approach/risk+management/ehsguidelines

- 4.4 The legislative and regulatory framework for the project is a combination of International and national, policies, regulations, legislations and guidelines to which Guyana is a signatory. The environmental and social analysis process for development and operation of the project will be undertaken in accordance with the legislative and regulatory framework outlined below. This section of the report focuses on the essential elements within these legislations and examines the regulatory environment that may impact their performance.

B. International Policies

Agenda 21

- 4.5 In 1992, the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro adopted a Program of Action for the 21st Century. Twenty-seven (27) environmental principles were outlined at the UNCED conference as an attempt to enshrine a charter for the protection of the Earth. The environmental management plan for this project falls directly under Chapters 19 and 20: Environmentally Sound Management of Toxic Chemicals, including Prevention of Illegal International Traffic in Toxic and Dangerous Products and Environmentally Sound Management of Hazardous Wastes, Including Prevention of Illegal International Traffic in Hazardous Wastes respectfully.
- 4.6 Chapter 19 indicates that substantial use of chemicals is essential to meet the social and economic goals of the world community and recognizes that best practice demonstrates that chemicals can be used widely in a cost-effective manner and with a high degree of safety. However, a great deal remains to be done to ensure the environmentally sound management of toxic chemicals, within the principles of sustainable development and improved quality of life for humankind. Two of the major problems, particularly in developing countries, are recognized as a lack of sufficient scientific information for the assessment of risks entailed by the use of a great number of chemicals, and the lack of resources for assessment of chemicals for which data are at hand. This section further recognizes that gross chemical contamination, with grave damage to human health, genetic structures and reproductive outcomes, and the environment, has in recent times been continuing within some of the world's most important industrial areas. Enhancing the National Quality Infrastructure Project is expected to result in some materials being processed and transported by mechanical equipment utilizing some of the aforementioned chemicals.
- 4.7 Chapter 20 recognizes that effective control of the generation, storage, treatment, recycling and reuse, transport, recovery and disposal of hazardous wastes is of paramount importance for proper health, environmental protection and natural resource management, and sustainable development. This project will entail management, and facilitate the movement, of dangerous/toxic chemicals, and the disposal of hazardous wastes generated mainly during the operational phase of this project. The ESMP will identify measures for the management of hazardous wastes generated.

Convention on Biological Diversity (CBD)

- 4.8 Guyana ratified the Convention on August 12, 1992, after which it entered into force on November 12, 1997. The National Focal Point is the Ministry of the Presidency (MotP), and the Implementing Agency is the Environmental Protection Agency (EPA). The objectives of the Convention include: the conservation of biological diversity (defined as the variability among living organisms from all sources including *inter alia* terrestrial, marine and other aquatic ecosystems and the ecological

complexities of which they are part, including diversity within species, between species and of ecosystems), the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources.

- 4.9 The provisions of the Convention apply to areas within the limits of national jurisdiction of contracting parties and as regards the effects of processes and activities, both within and beyond the limits of national jurisdiction. Contracting parties are required under Article 7 of the Convention, to identify processes and activities which have or are likely to have significant adverse impact on the conservation and sustainable use of biological diversity and to monitor their effects through sampling and other techniques. Parties are also as far as is possible and as appropriate, required to establish protected areas or areas where special measures need to be taken to conserve biological diversity. In areas adjacent to these protected areas environmentally sound and sustainable development should also be promoted. Article 8 requires that degraded ecosystems be rehabilitated and restored, and the recovery of threatened species be done through the development and implementation of plans or management strategies. Contracting parties are also required to regulate or manage relevant processes or activities where a significant adverse effect on biological diversity has been determined.
- 4.10 Article 10 of the Convention supports the integration of conservation and sustainable use of biological resources in national decision-making, and the support of local populations to develop and implement remedial action in degraded areas where biological diversity has been reduced. In observance of the Convention, Guyana established the EPA in 1996, to coordinate and implement a program for the conservation of biological diversity. A National Biodiversity Action Plan was also developed with stakeholders. These initiatives form part of the foundation within which Guyana seeks to protect its biological resources and what will be essential for this project to consider going forward.

Protocol concerning Specially Protected Areas and Wildlife (SPA W)

- 4.11 The SPA W Protocol utilises an ecosystem approach to conservation by protecting rare and fragile ecosystems and the endangered species it houses. Through its Caribbean Regional Coordinating Unit, assistance is given for the establishment of protected areas. One of the objectives of the SPA W Programme is to significantly increase the number and improve the management of national protected areas and species.
- 4.12 The Protocol urges when necessary, the establishment of protected areas in instances where it is necessary to protect:
- habitats and their associated ecosystems critical to the survival and recovery of endangered, threatened or endemic species of flora or fauna,
 - the productivity of ecosystems and natural resources that provide economic or social benefits and upon which the welfare of local inhabitants is dependent, and
 - areas of special biological, ecological, educational, scientific, historic, cultural, recreational, archaeological, aesthetic, or economic value, including in particular, areas whose ecological and biological processes are essential to the functioning of the Wider Caribbean ecosystems.
- 4.13 In the application of protection measures, each party is urged to progressively take such measures in accordance with its national laws and international law as are appropriate for:

- the regulation or prohibition of the dumping or discharge of wastes and other substances that may endanger protected areas;
- the regulation or prohibition of fishing, hunting, taking or harvesting of endangered or threatened species of fauna and flora and their parts or products;
- the prohibition of activities that result in the destruction of endangered or threatened species of fauna or flora and their parts and products, and the regulation of any other activity likely to harm or disturb such species, their habitats or associated ecosystems;
- the regulation or prohibition of any activity involving a modification of the profile of the soil that could affect watersheds, denudation and other forms of degradation of watersheds;
- any other measure aimed at conserving, protecting or restoring natural processes, ecosystems or populations for which the protected areas were established.

4.13 Even though the project is not likely to impact endangered flora and fauna, depending on how its waste is disposed of during its operations, it can affect soil profiles. As such, the ESMP will incorporate the measures identified by this protocol.

International Labour Organization (ILO) Conventions

Guyana is a signatory and ratified 47 ILO conventions and 1 Protocol. The main conventions applicable to the labour management requirements of the project are:

C029 - Forced Labour Convention, 1930 (No. 29)

C098 - Right to Organise and Collective Bargaining Convention, 1949 (No. 98)

C100 - Equal Remuneration Convention, 1951 (No. 100)

C105 - Abolition of Forced Labour Convention, 1957 (No. 105)

C111 - Discrimination (Employment and Occupation) Convention, 1958 (No. 111)

C138 - Minimum Age Convention, 1973 (No. 138) Minimum age specified: 15 years

C182 - Worst Forms of Child Labour Convention, 1999 (No. 182)

C. National Policies

4.15 The importance of the environmental and social issues in Guyana is well documented and adumbrated in key documents of the country:

The Constitution of Guyana

4.16 Article 2:25 of Guyana's Constitution indicates that *"Every citizen has a duty to participate in activities to improve the environment and protect the health of the nation."* Furthermore, Article 2:36 indicates that *"In the interest of the present and future generations, the State will protect and make rational use of its land, mineral and water resources, as well as its fauna and flora, and will take all appropriate measures to conserve and improve the environment."*

4.17 It appears that the GoG endorsed the principles of sustained economic growth and the promotion of environmental protection when it published the details of its policy and actions on the environment in its National Environmental Action Plan (NEAP) 2001 - 2005. This document unequivocally commits the country to the principals of sustainable development in its widest

context. This document, which followed the Environmental Protection Act of 1996 states that the government of Guyana will endeavour to, *inter alia*:

- Assure all people living in the country the fundamental right to an environment, adequate for their health and well-being;
- Achieve a balance between the use and conservation of the nation's resources to meet the needs of economic development and improve standards of living;
- Conserve and use the environment and natural resources of Guyana for the benefit of both the present and future generations; and
- Ensure prior environmental assessment of proposed activities, which may significantly affect the environment; ensure that conservation is treated as an integral part in the planning and implementation of development activities.

4.18 From the above it is clear that the intention is to integrate economic, environmental and social values during the planning phase of the project cycle, and to distribute benefits equitably across socio-economic cohorts and gender during project implementation. This position is endorsed and reinforced by the National Development Strategy (NDS), which indicates the need for environmental protection to be treated as a cross-sectoral issue in all aspects of the development process.¹⁷

4.19 The vulnerability of Guyana underscores the importance of proper stewardship of the environmental resource base on which the country is dependent for its survival and the role environmental assessment can play in that process. As such, several different pieces of legislation are important for this Project, inclusive of those with regard to the environment, energy, water and biodiversity.

4.20 The Environmental Protection Agency (EPA) advocates the preparation of Environmental and Social Analysis¹⁸ to mitigate environmental impacts of a program. Further the ESA along with the Environmental and Social Management Plan (ESMP) must ensure that proposed procedures, actions and measures identified are not just a statement of goodwill by the company/developer but that they will be effectively implemented. The ESMP is mandated to identify feasible and cost-effective measures to reduce potential significant adverse environmental impacts. It should also include operational procedures to avoid environmental risks during operations, as well as emergency and contingency plans to ensure appropriate response in the event of accidents.

Environmental Protection Agency

4.21 The Act (No 11 of 1996) was first issued in June 1996, reprinted in 1998 and updated in 2006. It provides for the management, conservation, protection and improvement of the environment, the prevention or control of pollution, the assessment of the impact of economic development on the environment, the sustainable use of resources and for matters incidental thereto or connected therewith.

¹⁷ The NDS is for the period 2001 – 2010. It is yet unclear whether the provisions contained in the NDS will be rolled over for a further 5 or ten years.

¹⁸ The Environmental Protection Act of 1996 does not speak explicitly to the social impacts of the impact report or in the management plan (though they are implied), thus the reference to the Environmental Impact Assessment and the Environmental Management Plan. However, the IDB requires that particular attention be paid to social dimension of the project

- 4.22 The EPA was established under the Environmental Protection Act in 1996 as the institution with responsibility for environmental protection. The EPA has broad responsibilities and is organized into four divisions: administrative, natural resources, environmental management, and education information and training. The EPA functions are: (i) to coordinate the prevention and control of pollution; (ii) to coordinate conservation and sustainable use of natural resources; (iii) to promote environmental management, and (iv) to give development consent which entitles the developer to proceed with the project.
- 4.23 Under the Environmental Protection Act, the EPA is mandated to ensure that any project that may have a significant impact on the environment acquires an Environmental Permit. Projects are considered to have an environmental impact when they threaten the health, safety and natural life supporting system of humans and other living things. **This project will be required to apply for an environmental authorization from the EPA.** The environmental permitting process is characterized by the following steps:
1. The developer is expected to complete an application form for an environmental authorization and submits a project summary to the EPA or to the relevant sector Agency.
 2. EPA reviews the project summary, and the developer is notified whether or not an EIA or EMP is required.
 3. If an EMP is required the EPA notifies the client and indicates what should be covered in the EMP.
 4. If an EIA is needed the developer submits his choice of consultants to the EPA.
 5. The EPA approves the consultants and together with the consultant (s) sets the scope of work for the EIA.
 6. The EIA or EMP report is submitted to the EPA for review. The EPA reviews the report then forwards it to the Environmental Assessment Board that makes recommendations as to whether or not a permit should be granted.
 7. The EPA makes a final decision as to whether a permit is granted. This approval process takes approximately three (3) months after the final report is submitted to the Agency, barring no public challenge to the project.
- 4.24 The EPA since its formulation has created various mechanisms for actions geared towards environmental protection. These include:
- the establishment of draft environmental quality standards, with the water quality standards currently being updated,
 - mandating that all projects likely to have significant impacts on the environment carry out an environmental impact assessment (EIA),
 - regulating and licensing activities with the potential for pollution,
 - instituting penalties and fines for environmental degradation,
 - monitoring impacts on the environment emanating from industrial and other activities, and
 - developing a programme geared towards public awareness and environmental education of the national populace.
- 4.25 Recognising that environmental protection is a multidisciplinary task the EPA has established links with sectoral natural resource agencies and has sought to involve other stakeholders and interest groups. Accordingly, the Agency has signed Memoranda of Understanding (MOU) with the Guyana

Geology and Mines Commission (GGMC), the Guyana Forestry Commission (GFC), the Ministry of Agriculture (MoA) and the Ministry of Health (MoH). Through these MOUs the Agency has placed the onus for environmental monitoring on the sector agencies. Additionally, it has drafted some environmental regulations that will be important for the project to operate within. However, these regulations, though drafted in 2000 are yet to be made law and in the interim, the US Environmental Protection Agency's regulations, or other internationally recognized standards are applied within the context of Guyana's development.

4.26 This ESA is intended to satisfy the policy objectives of the NEAP and the stipulations of the Environmental Protection Act. It is intended to ensure prior environmental assessment of the proposed activity and to raise the consciousness of the population on the environmental implications of the economic and social activities related to the project implementation.

4.27 There are five (5) pieces of legislations governing environmental protection which were enacted in 2000 as a consequence of the Environmental Protection Act. These regulations are supplemented by interim standards which the EPA has been working with. Some of these standards, i.e., water quality and noise levels, were developed in collaboration with the GNBS. The regulation is:

- The Environmental Protection Air Quality Regulations
- The Environmental Protection Water Quality Regulations
- The Environmental Protection Noise Management Regulations
- The Environmental Protection Hazardous Wastes Management Regulations
- The Environmental Protection Authorization Regulations.

4.28 The Act is therefore relevant to this Project due to its potential to impact the environment negatively, if not management appropriately.

The Environmental Protection (Authorization) Regulations 2000

4.29 The project will utilize fuel oils and grease in its operations for cutting of logs. Improper discharge of these substances can impact water quality and wildlife. In addition, equipment used for excavation and construction will have emissions to air that can potentially impact air quality. Noise during construction may also impair communication.

4.30 Regulations on Hazardous Waste Management, Water Quality, Air Quality and Noise Management were established in 2000 under the Environmental Protection Act. These pollution management regulations, which would be applicable to this project and are referenced in the monitoring plan, were developed to regulate and control activities of development projects during their construction and operational phases.

Environmental Protection Air Quality Regulations, 2000

4.31 In accordance with these regulations, anyone who emits any air contaminant in the construction, installation, operation, modification or extension of any facility related to industry, commerce, agriculture or any institution shall apply to the EPA for an environmental authorization and shall submit an application to the EPA at least one hundred and eighty (180) days before the date on which the emission is to commence. In accordance with the regulations, the EPA shall establish parameter limits with respect to emission of smoke, solid particles, sulphuric acid mist or sulphuric trioxide, fluoride compounds, hydrogen chloride, chlorine, hydrogen sulphide, nitric acid or oxides of nitrogen and carbon monoxide. No parameter limits have been mandated to date. Where Guyana

has not developed its own regulations, international standards are used instead. All of the applicable standards are described below in [Table 3](#) as identified within the ESMP for this project, and this shows the levels that would be acceptable during construction and operational activities. However, since the Project is not venturing into a pristine area, the majority of potential impacts are associated more with the operational phase of the new facility.

Table 4: Air Quality Regulations and Standard Levels

Regulations (Air Quality Regulations, 2000) and Parameter	Background	Relevant Body	Levels and limits as appropriate
Smoke	Air quality regulations require the registration and environmental authorisation of persons with facilities that emit air pollution from any process into the atmosphere as outlined in the regulations.	World Bank Air Quality Standards	N. A
Particulate matter less than 2.5 microns in diameter ^a			150 mg/m ³
Sulphur dioxide			0.03 ppm or 125 mg/m ³
Nitric acid and oxides of nitrogen			0.053 ppm
Carbon monoxide	Elements related to parameter limits on air contaminants and emission sampling is also stated in the regulations. Schedule I outlines' provisions for air pollution-monitoring index		9 ppm (10 mg/m ³)
Lead			1.5 µg/m ³
Ozone ^b			0.075 ppm
Notes: µg/m ³ – micrograms per cubic meter ppm – parts per million N. A. – Not applicable (no standard exists) ^a Due to a lack of evidence linking health problems to long-term exposure to coarse particle pollution, on July 18, 1997, USEPA promulgated revised AAQS for particulate matter and ozone. For particulate matter, PM _{2.5} standards were introduced (and modified on December 17, 2006) with a 24-hour average standard of 35 µg/m (based on the three-year averages of the 98 th percentile values) and an annual standard of 15 µg/m (three-year average at community monitors). ^b The O ₃ standard was modified to be 0.075 ppm (160 µg/m ³) on an eight-hour average basis; achieved when the three-year average of 99 th percentile values is 0.075 ppm or less.			

Source: EPA, 2018

- 4.32 With the implementation of this project air quality may be affected temporarily during the construction phase due to the production of dust during excavation to lay the foundation for the buildings. However, during the operational stage and testing operations there is the possibility of more sustained impacts. If these standards are projected to be exceeded mitigation measures will be identified to minimize their impacts.

Hazardous Waste Management Regulations, 2000

- 4.33 These regulations outline the rules and procedures for transport, storage, treatment and disposal of hazardous substances. These regulations are intended to ensure, through the environmental authorization process, that all operations that generate, transport, treat, store and dispose of hazardous wastes are managed in a manner that protects human health and the environment. The regulations allow for the provision of information on the types of facilities and quantity of hazardous waste generated, treatment standards and efforts to reduce the waste generated. An emergency preparedness plan is required for anyone who operates a hazardous waste facility. For the purpose of that regulation, hazardous material/waste is regarded as the following:

- Explosives
- Flammable liquids
- Flammable solids or waste solids other than explosives which may be readily combustible

- Oxidising substances
- Organic peroxides
- Poisonous substances
- Infectious substances
- Corrosives
- Toxic gases
- Toxic substances which if inhaled or ingested may cause delayed or chronic effects
- Toxic substances which, if released, may present immediate or delayed adverse impacts to the environment by means of bioaccumulation and/or toxic effects upon systems
- Material capable, after disposal, of yielding another material which possesses any of the characteristics specified above.

4.34 A significant proportion of the hazardous material identified above will not be utilised for the implementation of this project. However, based on discussions with the GNBS it was indicated that they will be using corrosives, inclusive of hydrochloric and nitric acids. Currently, the hazardous wastes from the operations of the Bureau are diluted and released into water streams. Measures for disposing of hazardous waste and mitigating their impacts on the environment are addressed in the ESMP. There will also be fuel used to power a stand-by generator. Fuels and acids may be classified as hazardous, and the requisite regulations will therefore apply at the project site.

Environmental Protection Water Quality Regulation, 2000

4.35 These regulations require registration and environmental authorization by the entity whose construction, installation, operation, modification or extension of any facility cause the discharge of effluents. These regulations cover parameter limits of effluent discharges, new sources of effluent discharges, fees for registration and environmental authorization, sampling points, records and reports and general provisions for the registration of water effluent, biological integrity, spills or accidental discharges and standard methods of analysis. Guidelines on the discharge of effluents and disposal of sludge are detailed in these regulations.

4.36 In accordance with these regulations the EPA was mandated to establish parameter limits for concentration of constituent of effluent which can be discharged into any inland or coastal waters or lands of Guyana as shown in [Table 5](#). Standards were also established for any substance that either by itself or in combination with other waste or refuse may give rise to any gas, fume or odour or substance which causes or is likely to cause pollution.

4.37 The effluent discharge from the site during all operational phases will be required to adhere to the most stringent of water quality standards detailed in [Table 5](#) below.

Table 5: Water Quality Regulations and Standard Levels

Regulations (<i>Water Quality Regulations, 2000</i>)	Background	Relevant Body	Levels and limits as appropriate
Physical test - pH	Guidelines on the discharge of effluents and disposal of liquid wastes are detailed in the water quality regulations however no standards for water	World Health Organisation (WHO) Standards	6.5 – 8.5
Conductivity			N.A.
Total suspended solids (TSS)			Should not exceed the depth of the compensation point for photosynthetic activity by more than 10% from the seasonally established norm for aquatic life.
Total dissolved solids (TDS)			250 mg/l

Regulations (Water Quality Regulations, 2000)	Background	Relevant Body	Levels and limits as appropriate
Dissolved oxygen	quality for construction operations have been developed as of September 2010		More than 4 mg/l
Turbidity			Max day less than 150 NTU
Temperature			N.A.
Anions			N.A.
Iron			1 mg/l
Alkalinity			Nil
Sulphate			250 mg/l
Calcium			145 – 250 mg/l
Copper			Nil
Iron			0.3 mg/l
Lead			Nil
Mercury			Nil
Zinc			Nil
Sodium			70 mg/l
Chlorine			1,600 µg/l
Colour			Should not exceed 75 colour units on the platinum-cobalt scale for domestic use or increase colour (in combination with turbidity). Further, it should not reduce the depth of the compensation point for photosynthetic activity by more than 10% from the seasonally established norm for aquatic life.
Biological oxygen demand			30 mg/l
Chemical oxygen demand	150 mg/l		
Oils and grease	<ul style="list-style-type: none">0.01 mg/l of the lowest continuous flow 96-hour LC50 to several important freshwater species having demonstrated high susceptibility to oils and petrochemicalsLevels of oils or petrochemicals in the sediment which cause deleterious effects to the biota should not be allowedSurface water shall virtually be free from floating non-petroleum oils of vegetable or animal origin, as well as petroleum-derived oils.		
Notes: µg/l – micrograms per litre mg/l – milligram per litre N. A. – Not applicable (no standard exists)			

Source: EPA, 2018

Environmental Protection Noise Management Regulations, 2000

- 4.38 Under these regulations operations that emit noise in the execution of various activities such as construction, transportation, industry, commerce and any institution are required to apply to the EPA for an environmental authorization. The EPA is responsible for the establishment of standards for permissible noise levels in industry, construction and other areas. The categories for which permissible noise levels are fixed by the EPA were identified as the following: Residential, Institutional, Educational, Industrial, Commercial, Construction, Transportation and Recreational.

The Guyana National Bureau of Standards (GNBS) and the EPA together with other relevant agencies developed interim Guidelines for Noise Emission into the Environment. Under these guidelines, noise emissions for industrial and commercial sources for both day (06:00 hrs – 18:00 hrs) and night (18:00 hrs – 06:00 hrs) would be 75 and 70 decibels (Industrial) and 65 and 55 decibels (commercial) respectively at the party's boundary or 15 meters from the source (*see Table 6*).

Table 6: Noise Quality Regulations and Standard Levels (2000)

	Category	Daytime (06:00 – 18:00 hrs) Limits (Decibels)	Night time limits (Decibels)
1	Residential	55	45
2	Institutional	50	40
3	Education	50	40
4	Industrial	75	70
5	Commercial	65	55
6	Construction	86	75
7	Transportation	110	70
8	Recreational	110	95

Source: EPA, 2016

- 4.39 The main noises are expected to arise during construction of the building, and during operations due mainly to the movement of traffic. Very limited noise is expected from operations taking place in the built structure as the building will be built to specifications to reduce noise and will operate during the day-time mainly.

Mayor and City Council (M&CC)

- 4.40 The Municipal District and Councils Act, Chapter 28:01, governs the work of the Mayor and City Council. The Act provides for the M&CC to make better provision for local government in Georgetown and New Amsterdam. Furthermore, the Local Democratic Organs Act, 1980, gives power to local government bodies to manage communities. Therefore, among the duties of the M&CC is protecting and improving the physical environment and improving living and working conditions. Both procedural and substantive functional matters are covered in principle by Municipal District Councils Act.
- 4.41 The M&CC has some amount of autonomy though they come under the Ministry of Communities. Under the Local Democratic Organs Act, they receive support from the Central Government. **Since the project site falls within the confines of the M&CC, authorization is also needed from this entity to ensure that the activity is in keeping with land-use in that area.** The process is of such that the applicant is expected to provide the following with their application form:
- Certified copies of Ownership (Transport, Title, Lease etc.) and /or Document of Authority
 - Three (3) copies of Building Plans.
 - Geotechnical and Design Report along with three (3) copies of foundation details.
 - Processing and Inspection Fees.
 - Rates and taxes receipt verifying payment for current year.
 - Copy of Survey Plan of Lot.

Central Housing and Planning Authority (CH&PA)

4.42 The Town and Country Planning Act of 1946 provides for the orderly and progressive development of land, cities, towns and other areas, being urban or rural in order to preserve their amenities. However, this Act is merely mentioned in passing and is rarely applied, leading to the haphazard development noticed throughout the country, with little or no attention paid to land suitability, zoning and land capability issues. **In seeking to construct any property approval should first be sought from the CH&PA.** The process is of such that:

- The applications are sent to the CH&PA from the M&CC for approval.
- When the application is sent to CH&PA, depending on the type of building proposed and the corresponding activity:
 - The design drawings are sent to the Guyana **Fire Service (GFS)** for their input (determination of muster points, locations for fire extinguishers, emergency exits, etc.)

4.43 The Act is enforced through the CH&PA, within the Ministry of Communities, who may also, with the approval of the Minister, assign to a Local Authority, duties and functions of enforcement of the requisite laws. With specific reference to the proposed project, this falls under the purview of the Ministry of Business. However, the CH&PA, with the Mayor and City Council (M&CC), is responsible for land use planning in the city. It is therefore necessary for the CH&PA, the M&CC and the MoB to collaborate closely on this project. The manner of their collaboration is detailed in the Greater Georgetown Development Plan (GGDP) 2001 – 2010¹⁹ and can be a main vehicle via which the work is executed to reduce conflicts and enhance coordination.

4.44 Under the Town and Country Planning Act, Ch 20:01, the CH&PA has been identified as the entity responsible for the orderly development in urban and rural areas of Guyana. This entity has the authority to authorise, remove or deny developments in certain areas. According to the Act, the CH&PA will “*allocate sites for use in relation to transport and providing for reservation of land for that purpose.*”²⁰

4.45 Furthermore, the CH&PA is responsible, according to Part IV (i), for the zoning of land in towns, and country areas (whether public or private and whether built or unbuilt) reserving it for specific purposes. But while the CH&PA Act provides powers for the removal of encumbrances from a particular area that may not be in conformity with the stipulated land use, this has not always been enforced. It is this lack of enforcement that has been partly responsible for many areas around Georgetown seeing a rapid change in land-use. This has often led to congestion and areas prone accidents that operate well above the permitted noise level in residential communities.

Ministry of Tourism Industry and Commerce (MOTIC)

4.46 The MoB provides services to many entities, inclusive of:

¹⁹ This document was for the period 2001 – 2010. Thus far, it is unclear whether it will be revised or whether a new policy document will be developed. The GGDP is the starting point for all planning advice and decisions made by the CH&PA and the M&CC. It sets out what type of development will be allowed and where and the policies that the CH&PA and the M&CC will use to assess development proposals. Among its objectives are: (i) to ensure rational and consistent decisions, and (ii) to secure public involvement in shaping local planning policies.

²⁰ Town and Country Planning Act, 20:01, pp41

- The issuance of Export license for specific products. The MOTIC issues export license for the export of Gold, Diamond and Sugar. The regulatory institutions of other sector provide this function for other products.
- Serve as the focal point for the Competition Commission within the (Commission was established with the passing of the 2006 Competition and Fair Trading Act). The Act seeks to:
 - a) promote, maintain and encourage competition and enhance economic efficiency in production, trade and commerce;
 - b) prohibit anti-competitive business conduct which prevents, restricts or distorts competition or constitutes the abuse of a dominant position in the market; and
 - c) promote the welfare and interest of consumers.

4.47 The MoB, through the National Competitive Strategy Unit (NCSU), foster a Matching Grants Initiative (MGI) aimed at raising the competitiveness of private Guyanese firms, in particular small and medium enterprises, by enhancing their export capacity.

The Ministry of Amerindian Affairs – The Amerindian Act

4.48 The Amerindian Act of 2006 was assented to by the President of the Cooperative Republic of Guyana on March 14th, 2006, and came into operation in April 2006. The Act provides for the recognition and protection of the collective rights of Amerindian Villages and Communities, mechanisms for good governance within Amerindian Villages and Communities and the granting of land to these Villages and Communities.

4.49 Under the 2006 Act, Amerindian lands titles are issued in different forms - Amerindian Villages, Amerindian Areas, and Amerindian Districts. The law also allows Amerindians Village Councils to lease community lands up to 10 percent of the titled area owned. It enshrines the ownership of land grants by Absolute land title and makes provision for matters of land management, allocation, leasing, titling, demarcation and extension. The new Act provides the Village Council with the functional authority "to hold for the benefit and use of the village all rights, titles and interest in or over village lands and to manage and regulate the use of and occupation of village lands". Further at Part V1 of the Act –the section entitled *Grant of Communal Lands to Amerindian Villages and Amerindian Communities* lays out the process for application for extension of village lands and grant of land to untitled Amerindian communities.

4.50 Under the Act, *non-Amerindians* must obtain permission before they can enter or remain in an Amerindian District, Area or Village, settlement or encampment. The Amerindian Act also addresses the protection of property and legal proceedings on behalf of Amerindians, employment of Amerindians, and prohibiting the supply of intoxicating liquor to Amerindians. Provision is also made for entering into written contracts with Amerindians.

4.51 Each Village Council is also required to set its own Village rules and Regulations and to produce a 5 year Village Development Plan. The functions and responsibilities of the elected Toshao (Captains) and Councils are also outlined in the Act, with the proviso that any decision pertaining to the collectively owned lands and natural resources must be made at a public meeting of the village residents and carried by a two-thirds majority. Village Council Elections are held every 3 years.

4.52 The Act further assigns to every Toshao the status of *ex officio* Justice of Peace for the district, area and/or village. This also allows the Toshao to serve as a rural constable. However, the

enforcement of the provisions within this Act remains weak and the projected increase in human and vehicular traffic in close proximity to Amerindian areas will test the provisions contained within this Act.

- 4.53 The Amerindian Act 2006 gives Amerindian communities legal powers to manage and conserve their lands. Communities can use the powers in the Amerindian Act 2006 to create and enforce protected areas over their lands. A community can *inter alia* prohibit or control entry and access to its territory and traditional knowledge, prohibit or control mining, zone its lands, protect sacred sites, regulate hunting, fishing, tourism, research etc. All Amerindian lands are owned collectively by the whole community (technically called a “Village”) and administered through a Village Council. The Village Council is elected by the community and is a recognised legal entity. This Village Council also has the power to make law i.e., rules which are legally binding on everyone within the Village lands whether or not they are members of the Amerindian community. Some communities have informal or traditional arrangements by which they regulate or restrict hunting, fishing, burning, poisoning etc.
- 4.54 While this project does not fall within an Amerindian area or on Amerindian lands, it is in close proximity to the Amerindian Village Exhibition site ([Picture 17](#)) and site designated for the headquarters for the National Tosaos’ Council ([refer to Map 2 above](#)). The Amerindian Village Exhibition site is approximately 200 yards South-west of the proposed project site. The Village has the capacity to house one hundred individuals at any one time comfortably. It would be important that the new facility does not compromise the quality of life of services provided by these two indigenous service facilities with regards to air and water quality, and security. The ESMP outlines possible mitigation measures to alleviate any negative impact.



[Picture 17](#): Location of the Amerindian Village Exhibition Site

Source: Consultant's Photograph (2018)

The Ministry of Local Government- The Guyana Water Incorporated

- 4.55 The Water and Sewerage Act of 2002 is an Act to provide for the ownership, management, control, protection and conservation of water resources, the provision of safe water, sewerage services and advisory services, the regulation thereof and for matters incidental thereto or connected therewith.
- 4.56 Under the Water and Sewerage Act 2002 the Guyana Water Incorporated (GWI) was established on May 30, 2002, resulting from the merger of the Guyana Sewerage and Water Commission (GS&WC) and the Guyana Water Authority (GUYWA).
- 4.57 The current project is expected to receive water from the GWI that falls under the Ministry of Communities. To be connected, an application will have to be made to the GWI with the requisite connection fee paid, i.e., G\$1,000 (US\$4.88). Additionally, the new structure will be expected to adhere to the following GWI Guidelines:
- GWI Corporate Environmental Guidelines of January 2005, and
 - Environmental Guidelines for Construction Projects and Environmental Assessment written in Conjunction with the World Bank in February 2005.

Ministry of Agriculture

Guyana Livestock Development Authority (GLDA)

- 4.58 The Guyana Livestock Development Authority (GLDA) is the primary entity involve in surveillance of zoonotic diseases and animal husbandry. Its laboratory facility was commissioned in August 2014. The laboratory is presently working towards certification and has established linkages with the Inter-American Institute for Cooperation on Agriculture (IICA) and World Animal Health Organisation (WAHO) Laboratories. These linkages have allowed for the IICA and WAHO laboratories to be used to double test results and the use of these facilities as reference laboratories has helped to improve transparency and trust amongst trading partners. It may be useful under this project for the GNBS to improve its support services to laboratories, particularly, in the areas of certification, metrology and training in improved testing techniques.

Pesticides and Toxic Chemicals Control Board (PTCCB)

- 4.59 The PTCCB has responsibility for regulating importation and use of pesticides and toxic chemicals. The Board plays a pivotal role in ensure that chemical imports are registered and verified. Additionally, through its operations in the agricultural sector the PTCCB utilizes it laboratory facilities to track the use of illegal pesticides and residue concentrations in market products and exports. Some exporters require a certificate of clearance (residue concentrations) from the regulatory body to export. ISO 17000 and 17025 certifications for its laboratory is currently being pursued with assistance from the GNBS.
- 4.60 As the PTCCB seeks to expand its testing capacity (range of analysis testing) and as a consequence expand its laboratory infrastructure the current project is of significant importance. It is hoped that the GNBS will increase its ability to support laboratories moving towards certification and seeking to improve metrology and testing techniques. Additionally, it was noted that coordination of technical capacities among laboratory staff is lacking. Often it has been the experience that expertise and capabilities are not shared even among national laboratory staff and as such efforts towards improving networking capabilities is required and should be given due consideration under

this project. Further, it was revealed that at a recent forum the agency was told that for some areas where it was hoping to expand its testing capacity it had no jurisdiction. As such improved networking particularly between the regulatory agencies can result in a more efficient utilization of resources.

Ministry of Labour (MoL)

- 4.61 The Labour Act sets out the conditions that an employer must observe in the contracting of employees. For example, Part V specifies that the entire wages of the employee must be paid as money and not otherwise. However, in occupations where it is customary to make partial payment of allowances in the form of, *inter alia*, food, toiletries, and housing these are acceptable and not considered illegal, if both the employer and employee are agreed on such terms. Wages should be payable either weekly, fortnightly or monthly, except otherwise agreed. Further, the Act covers equal rights, prevention of discrimination, the employment of young persons and children and trade unions.

Occupational Safety and Health Act, 2006

- 4.62 The *Occupational Safety and Health Act 2006* (Chapter 99:10) is administered by the Ministry of Labour ²¹. The Act confers a duty of care on both employers and employees, but as yet has no implementing regulations. *Inter alia*, the Act applies to construction sites. Among other laws which will have to be taken into account by construction contractors are: (i) *The Trade Unions Act 1997* (Chapter 98:03); (ii) *Labour Act 1942* (Chapter 98:01); (iii) *Trade Union Recognition Act 1997* (Chapter 98:07); (iv) *Termination of Employment and Severance Pay Act 1997* (amended 1999) (Chapter 99:08); (v) *Prevention of Discrimination Act 1997* (Chapter 99:09); and (vi) *National Insurance and Social Security Act 1969* (Chapter 36:01).
- 4.63 The Act outlines the procedures for establishing a factory site, regulating it and mandates that health and safety facilities are provided, maintained and the industrial establishment complies with the regulations under the Act. The Act regulates the registration and regulation of industrial establishments, for occupational safety and health of persons while at work and for related purposes. An industrial establishment is defined as a 'factory, shop, office or workplace and any building or other structure or premises. Regulations may be made under the Act which prescribes specifically for matters related to the health and safety of persons employed or engaged in a particular industrial establishment. The Act imposes a variety of specific duties and obligations relating to the health and safety of workers, pertinent for this program, and other persons on different actors who are or maybe in some way be connected or related to an industrial establishment.
- 4.64 The owner or employer of an industrial establishment is obligated to apply to the Occupational Safety and Health Authority (The Authority) for the registration of an industrial establishment. All industrial establishments are subject to inspection by the Authority.
- 4.65 The identification of the health and safety hazards during the construction and operation of the proposed development must be seen as a key element for assessment. The Occupational Safety and Health Act 1997, Section 6 states that "*..any person who intends to erect or cause to be erected a new*

²¹ Formerly known as the Ministry of Labour, Human Services and Social Security.

industrial establishment or any new building appurtenant to any existing industrial establishment shall, before the erection of such industrial establishment or building is commenced, give notice in writing to the Authority of his intention as aforesaid, and shall furnish the Authority with such, drawings, plans or specifications that are required by the Authority.”²² In addition in Section 52 the owner of an industrial establishment that is not a construction site must ensure the following:

- Health and safety facilities as are prescribed, are provided;
- Any such facilities prescribed to be provided are maintained as prescribed; and
- The industrial establishment complies with the regulations.

4.66 In keeping with the laws and regulations a description of the established management procedures to monitor and manage occupational health and safety hazards is critical for this project.

4.67 In 2018 the country developed a National Policy on Occupational Safety and Health (2018). This policy aims to “To promote and improve the quality of life of workers by preventing social and economic losses, work-related accidents and injury to health by eliminating hazards, reducing the number of accidents, and injuries, and militating against stresses and incidence of occupational diseases.

The policy seeks to create safer and healthier working environments through the development of a positive national culture of prevention of occupational accidents, diseases and dangerous occurrences. Additionally, it provides policy orientations for the Ministry of Social Protection to modernize its policies and procedures.”²³

Ministry of Health – Government Analyst Food and Drug Department (GA-FDD)

4.67 The Ministry of Health has authority over environmental health and pollution control, which it exercises through its Environmental Health Unit and the Regional Health Services. The Environmental Health Unit of the Ministry of Health has statutory responsibility for food inspection as well as aspects of occupational health, drinking water quality and solid waste management. It should therefore be considered a stakeholder in relation to any Enhanced Standards Infrastructure Project.

4.68 The Government Analyst Food and Drugs Department (GA-FDD) is responsible for monitoring the quality of food, cosmetics, and medicinal substances/drugs. Their jurisdiction covers imports, exports and items produced for the domestic market. The regulatory department is responsible for issuance of a “Free Sale Certificate/Export Certificate” for exports and for checking and verifying certification (issued in country of origin) from country of origin. Importers of food, cosmetics, and medicinal substances/drugs are also required by law to be registered with the GA-FDD and to be issued with import permit. The GAFDD also routinely checks the authenticity and quality of food products manufactured locally or imported.

4.69 Given its wide range of responsibilities it is very important that there be a closer relationship between the GA-FDD and the GNBS. Further, the Director of the GA-FDD suggested that his department was grossly understaffed with four (4) food inspectors and two (2) drug inspectors. Further, it was believed that given its mandate this department within the Ministry of Health (MoH)

²² Guyana Occupational Safety and Health Act (1997), Section 6, page 17.

²³ Government of Guyana (2018) National Policy on Occupational Safety and Health

should move towards being a semi-autonomous agency. Funding was also mentioned as a major impediment which can be more effectively addressed with a semi-autonomous status.

Guyana Lands and Surveys Commission (GLSC)

- 4.70 The Guyana Lands and Surveys Commission (GLSC) that came into being in 1994 based on Act 59.05 and an amendment to the Land's Act has responsibility for land management in Guyana that include land regularization, the issuing of land deeds, to compile and maintain an inventory of all land resources, to conduct hydrographic surveys, aerial photography and photo mosaics of the coastline and to prepare land use plans for Guyana or any part of the country with the exception of the municipalities. This entity is also Guyana's focal point for the implementation of the United Nations Convention to Combat Desertification and Deforestation (UNCCD).
- 4.71 The procedure for someone to acquire State lands is for the applicant or a representative to approach the Commission with a request for land giving indication of the size of land desired and the soil type which is most preferable (given the type of investment proposed). When this is done GLSC provides a mapping of which areas are available which allows the applicant to make a selection of the most suitable location for the proposed land use activity.
- 4.72 Additionally, a detailed project proposal/business plan (if a business or if concessions are being sought) is required and this is sent to the Guyana Office for Investment (Go-Invest) for review and approval. In its approval process Go-Invest also consults with sector agencies under whose mandate the proposed development will occur.
- 4.73 Lastly, the approval from Go-Invest the proposal/plan is sent to Ministry of the Presidency for final review and approval. Some reasons for non-approval or delays in granting approvals include; the absence of sufficient documentation and conflicts among stakeholder agencies under whose mandate the project if approved will be executed.

The Guyana Fire Service (GFS)

- 4.74 For large buildings such as the laboratory facility under consideration, the CH&PA will request the review and input of the GFS prior to granting their approval or no objection. Generally, upon receipt of the design plans the GFS will inspect the proposed drawing to ensure that safety features are existent. These include but are not limited to:
- Adequate entrance and exits for each floor of the building. There must be at least one entrance and exit for each floor of the building.
 - a. After the second-floor internal steps are not considered as entrance and exit points and an external stairway must be constructed.
 - If flammable items will be utilized within the facility a hose-reel connected to an independent water line is required. Since in Guyana the GWI water pressure tends to diminish after 10 o'clock it is expected that the hose lines will be connected to a secondary water source such as a well or overhead tank system.
 - Muster point(s) must be identified for assembly in the occurrence of an emergency. These are required to be upwind (when consideration is made for a fire) and a fair distance from the building or flammable substances stored on site.

The Low Carbon Development Strategy (LCDS)

- 4.75 The Low Carbon Development Strategy (LCDS) seeks to position Guyana to make a major contribution to global interests in climate change generally and sustainable forest management in particular. The LCDS also emphasizes the value of forest-based services such as the generation of freshwater resources and biodiversity. In essence, the LCDS promotes a low carbon economy that promotes development without significant loss of forest cover. The LCDS also pronounces on value added enterprises in the forestry sector. To the extent possible, and in keeping with the current Administration's thrust to pursue a Green Economy development paradigm, it may be useful for this project to explore avenues for the pursuance of renewable energy where possible and energy efficiency.

D. Applicable IDB Environmental and Social Safeguard Policies and Directives

- 4.76 From an environmental standpoint, the Bank has a threefold strategy for addressing environmental concerns: These are:
- To enhance long-term development benefits to its member countries by integrating environmental sustainability outcomes in all Bank operations and activities and strengthening environmental management capacities in its borrowing member countries;
 - To ensure that all Bank operations and activities are environmentally sustainable as defined in its Policy, and
 - To foster corporate environmental responsibility within the Bank.
- 4.77 The Bank seeks to act to achieve these specific objectives by adopting measures to mainstream the environment into overall economic and social development, and to safeguard the environment in all Bank activities. Additionally, the Bank's Environmental and Safeguards Compliance Policy (OP-703 GN-2208) on Page 5 states that *"the Bank will proactively support borrowing countries and clients in identifying and financing operations designed specifically to: (i) enhance environmental governance, policy development and institutional capacity building; (ii) reverse environmental deterioration; and (iii) promote the conservation and sustainable use of natural resources and ecological services."*
- 4.78 In order to fulfil this mandate, the Bank has identified 3 categories of projects. These are: (i) Category A – Operations that are likely to cause significant negative environmental and associated social impacts, or have profound implications affecting natural resources, (ii) Category B – Operations that are likely to cause mostly local and short-term negative environmental and associated social impacts and for which effective mitigation measures are readily available, and (iii) Category C – Operations that are likely to cause minimal or no negative environmental and associated social impacts.
- 4.79 According to the IDB's Policy OP-703, this operation is a Category "B" with largely moderate environmental and social impacts. The *Enhancing the National Quality Infrastructure for Economic Diversification and Trade Promotion Project*, i.e., constructing a new building to house the GNBS operations is projected to be situated on a piece of State-owned land in the SEC, Greater Georgetown. Construction is likely to cause mainly localized and short-term environmental and social impacts for which effective, standard, and easily implementable mitigation measures exist. During the operation phase, the facility will generate mainly hazardous waste from its testing facilities and small amounts of solid wastes and liquid discharges (excreta disposal and grey water), which are the most sensitive environmental issues of concern for this Project.

- 4.80 The Project triggers several of the IDB's Environment and Social Safeguards policies and directives: Operational Policy on Indigenous People (OP-765), Compliance Policy (OP-703), Access to Information Policy (OP-702), Disaster Risk Management Policy (OP-704), and Gender Equality Policy (OP-270); and Directives: B.2 (Country Laws and Regulations), B.3 (Screening and Classification), B.5 (Environmental Assessment Requirements), B.6 (Consultations), B.7 (Supervision and Compliance), B.11 (Pollution Prevention and Abatement); and B.17 (Procurement).
- 4.81 Based on the location of this project and its direct beneficiaries, the project does not directly involve Guyana's indigenous peoples, and no involuntary physical or economic displacement of beneficiaries is foreseen or planned as part of this project. Hence, the IDB's Indigenous People's Operational Policy is not triggered nor the Involuntary Resettlement Policy.
- 4.82 Thus, based on the methodologies and protocols that are successfully being used to promote social participation in project design and implementation, and in order to comply with Directive B.06, this will develop and implement a mechanism for responding to complaints and claims from beneficiaries and stakeholders directly and/or indirectly impacted by the works and services throughout the project, ensuring compliance with local culture. This mechanism will be incorporated into the ESMP to be prepared.
- 4.83 In order to comply with the IDB's Directive B.05, the Project will develop an Environmental and Social Analysis (ESA) and an Environmental and Social Management Plan (ESMP), through which risks, impacts and mitigation measures will be identified. The ESA and ESMP to be prepared will be based on, inter alia, IDB policies and local legal requirements.

V. ENVIRONMENTAL AND SOCIO-ECONOMIC SETTING

A. Environmental Setting

- 5.1 This section of the ESA discusses the existing physical, natural, and cultural environments of the project site of direct influence (ADI), i.e., bordered by at least 100 meters on all sides and area of indirect influence (AII), i.e., area outside the 100 radius but impacted by the project, nonetheless. The following descriptions of the existing environment are based in part on information and data gathered by the consultant and provided by government agencies and the Bank. This information was supplemented by site reconnaissance, and stakeholders' consultations. However due to the Client's request, no public consultation was undertaken in an effort to advance this study.²⁴ Nonetheless, the information collected provided some valuable insights that will be critical for the Client in going forward.

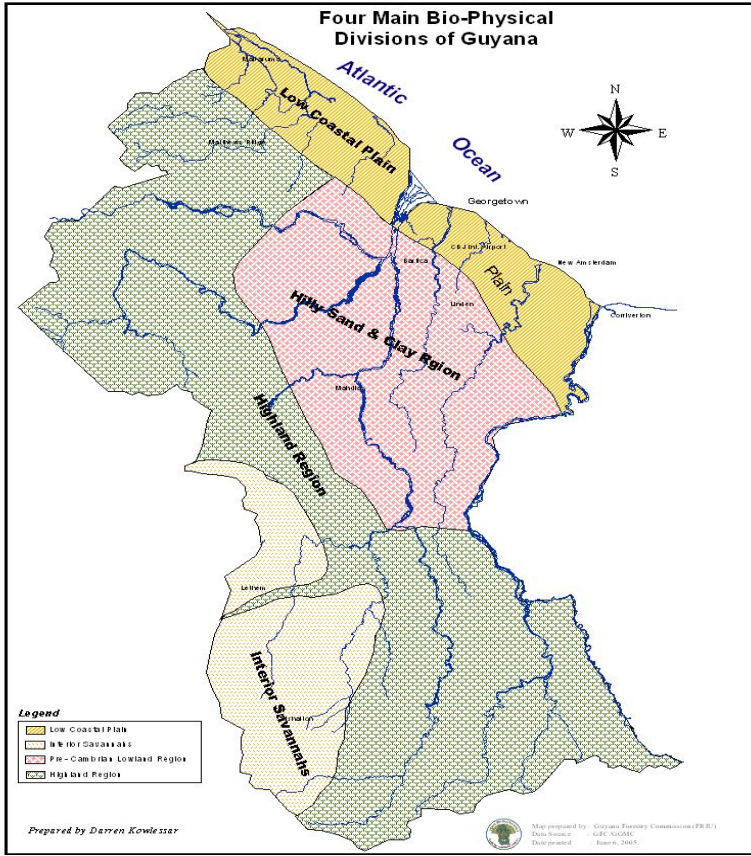
Geography and Physical Resources

Location

- 5.2 The proposed project is situated on the **low coastal plain** natural region of Guyana ([Map 3](#)). The coastal plain is a low-lying narrow piece of land along the Atlantic coast, which is approximately 430 km in length and about 2.4 metres below the high tide sea level mark that occupies about 10 percent of the country. This zone is made habitable due to a series of drainage canals, sluice gates and dykes. The coastal plain is also the most populous area in Guyana, accounting for approximately 90 percent of the population. This zone is also where the bulk of agriculture and food production is undertaken, as well as commercial and service activities. About 10 percent of this area is cultivated, but it is here that the bulk of agriculture and food production is undertaken. A wide variety of cash and permanent crops like cacao and fruit trees are cultivated. As such, a modern and better equipped laboratory to aid with certification and conformity assessment is likely to aid these producers and the export market in Guyana.
- 5.3 The project is located in Administrative Region 4 in Plantation Sophia. As shown above in [Map 2](#) immediately to the west and south west of the proposed project site is the Amerindian Exhibition Village and the site designated for the National Toshao Council building. Within the ADI and to the north of the proposed project the site is bordered by the Sophia Juvenile Holding Centre, Sophia Training Centre, the Sophia Special School (SSS) for children with learning challenges, and the Sophia Care Centre for homeless children. To the south is the Competition Commission Secretariat, the Exhibition Centre, the current GNBS Secretariat and the NQI Office. Lastly, the site is bordered on the east by a secondary drain, the A-Field Sophia Dam, and the primary drainage facility in the Downer Canal. It is, therefore, evident that the proposed project is in an area that is environmentally denuded but may have social implications for those areas in close proximity to the site.

²⁴ It is the expectation that once the ESA and ESMP are approved by the Client, the Public Consultation session will be undertaken, as mandated by the EPA Act (1996).

Map 4: The Natural/Bio-Physical Regions of Guyana

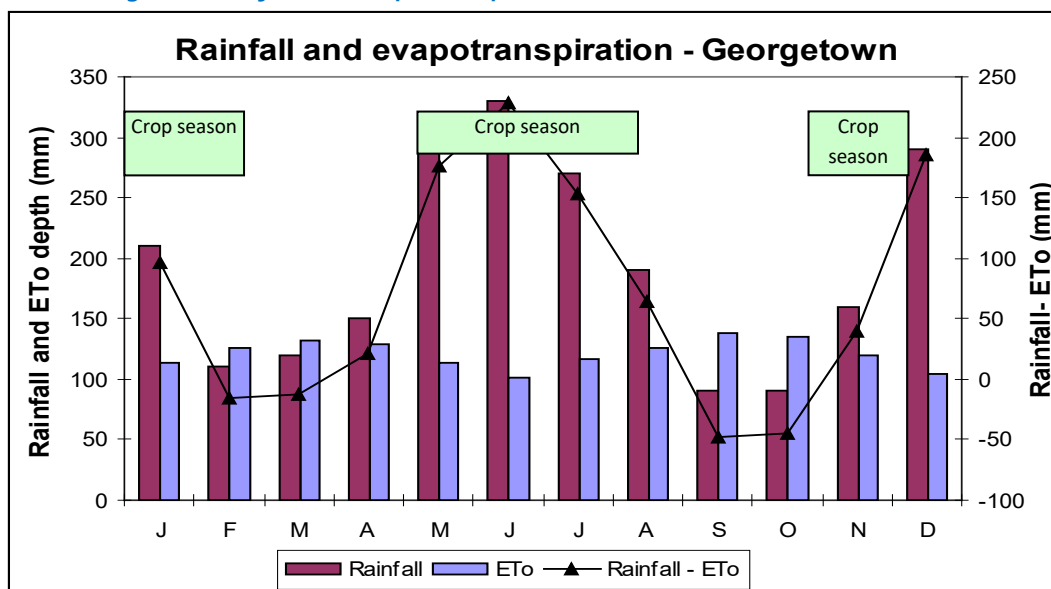
Climate

- 5.4 Guyana is located in the Equatorial Trough Zone (ETZ) and its weather and climate are influenced primarily by the seasonal shifts of the ETZ and its associated rain-bands called the Inter Tropical Convergence Zone (ITCZ). Secondary influences on the climate are of Pacific origin. Formation of El Niño Southern Oscillation (ENSO) and La Niña can disturb the regular location of ITCZ and thus results in higher or lower than normal rainfall at specific locations, such as the proposed project site. These events are predicted to become even more intense in the Caribbean region due to climate variability (IPCC, 2007)²⁵. The El Niño/La Niña weather events are primarily responsible for inter-annual variation in rainfall. This has implications for possible flash and coastal flooding in proximity to the project site as experienced in 2005, and would therefore necessitate effective drains, with appropriate capacity, to mitigate this possibility. Drains to the east of the SEC is in need of recurrent maintenance as they are secondary drains that empty into the Downer Canal, and then into the Atlantic Ocean via the Liliendaal Pump Station. Drainage within the ADI falls mainly to the Mayor and City Council (M&CC) of Georgetown, with assistance provided by the National Drainage and Irrigation Authority (NDIA) for the primary canals.

²⁵ The last ENSO event was in 2015/2016. This severely impacted the agricultural sector, the quality of freshwater supplies and the livelihoods, mainly of rural and hinterland small scale farmers (Ministry of Agriculture, 2016). In fact, Region 9 was declared a disaster Region.

- 5.5 But flooding is not the only threat to the proposed site. During the El Nino period the area becomes dry and persons seeking to clear land often use the most cost-effective means, which is burning of the scrub-like vegetation. This is an anthropogenic threat, but one which the project will need to be cognizant of, particularly along the A-Field Dam in close proximity to the proposed project site.

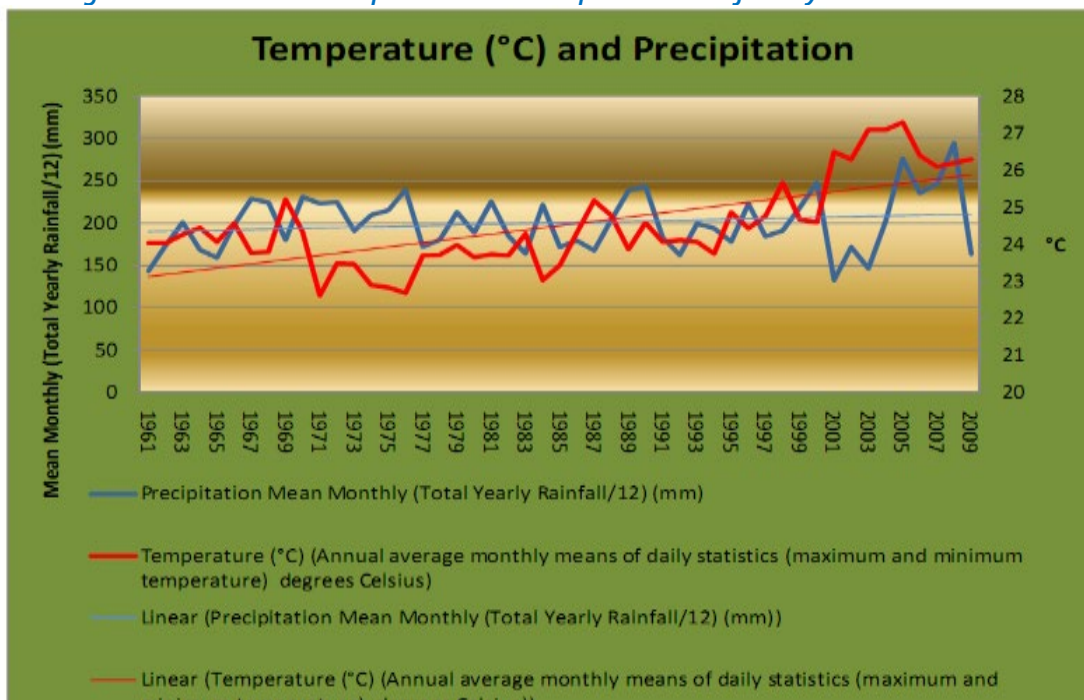
Figure 1: Rainfall and Evapo-transpiration Patterns in the Coastal Zone



Source: Hydrometeorological Division, Ministry of Agriculture (2015) (Botanical Garden Station)

- 5.6 Guyana as a whole has a tropical climate. The project falls within a zone that is characterised by two wet (April-July and November-January) and two dry (August-October and February-March) seasons. Information on rainfall was obtained from the Botanical Gardens that falls just outside the ADI. Annual rainfall within the project area is generally in excess of 2,000mm (see [Figure 1](#)). The weather pattern is largely determined by the Inter-Tropical Convergence Zone (ITCZ). The maximum and minimum instantaneous temperatures are 32°C and 25°C respectively. Along the project zone, the temperatures are moderated by north-east trade winds. Relative humidity ranges from around 95% during mid-morning and drops between 50-75% by mid-afternoon (Hydrometeorological Department, 2015).
- 5.7 The Hydrometeorological Division (HD) within the Ministry of Agriculture (MoA) has limited climatological data for locations away from the coast, with the data for places like Annai and Kurupukari being incomplete. As such, the climatological data available to the consultant came mainly from secondary sources. This data is also more current than data obtained from the HD. Mean precipitation and temperature data for Guyana's coastal plain are shown in [Figure 2](#) below. All the available rainfall data confirm the occurrence of the bimodal annual precipitation along the project site.

Figure 2: Annual Mean Temperature and Precipitation Data for Guyana's Coastal Plain



Source: Kirton et al (2010)

Air Quality

- 5.8 Currently, there are no ambient air quality monitoring stations in Guyana which would help establish baseline air quality for air pollutants. The most significant emissions to the atmosphere in this project will likely result from dust during the construction phase, and emissions associated with the movement of motor vehicles to access the project site.
- 5.9 Emissions from the vehicles are sulfur dioxide (SO₂), nitrogen oxides (NO), carbon monoxide (CO), particulates, and volatile organic compounds (VOCs). Small quantities of greenhouse gases (GHG), (particularly carbon dioxide) as well as small quantities of hazardous air pollutants and metals are also released primarily as a by-product of oil combustion. There are no nationally developed regulatory air quality standards in Guyana to which the impacts from the project can be compared.
- 5.10 The World Bank (WB) and the National Ambient Air Quality Standards (NAAQS) promulgated by the United States Environmental Protection Agency (USEPA) were developed to be protective of human health (primary standards) and the environment (secondary standards). The WB standards provide levels that are well established in law and should be used for evaluating air quality for the project.²⁶

Topography

- 5.11 Generally there is little variance in the topography throughout the proposed project site, with the site being flat in the main. According to the topographic maps of Guyana both the ADI and the All

²⁶ While reference is often made to the World Health Organisation's (WHO) standards, these are mere guidelines and as such the US EPA's NAAQS and World Bank's standards are felt a better baseline for the project.

(Georgetown) vary between 1 - 2 feet (0.3m – 0.65m) in elevation, making the area particularly susceptible to flooding during periods of heavy rainfall. However, the areas from which the construction materials, such as sand and stones, are projected to be transported are well above sea level).

Geology and Soils

- 5.12 According to the geology of the country and the resource map of Guyana (1992) the proposed road traverses an area underlain by the Demerara Clay and the Coropina Formation²⁷. The Coropina Formation was developed during the late Pleistocene. During this time, the ocean receded, and the soft tidal flats and sandbars were subjected to strong erosion and weathering. As a result, the Coastal Plain was crossed by old shorelines and ridges, oriented parallel with the current shoreline. The erosion and weathering caused clays exposed by the receding ocean to become oxidized and firmer in consistency by loss of water. The result of erosion, weathering, and shifting shoreline was the development of the Coropina Formation. In post-glacial times, the sea rose to its former level inundating the Coropina Formation and resulting in the laying down of the soft clays of the Demerara Formation, which surrounded the Coropina "islands" and filled river valleys.
- 5.13 The younger parts of the Demerara Clay formation are recent in age; clay indistinguishable from the Demerara Clay is being added at the present time to parts of the coast. The upper clays, upper sands, intermediate clays and lower or "A" sands units compose the Demerara Clay and Coropina Formation. The upper, exposed soil is a layer of soft to firm clays underlain by an oxidized mottled zone and soft to firm silty clays called the upper clays layer. The upper clay layer has an average thickness of 150 feet (50 meters). Underlying the upper clay layer is the upper sands layer, which is composed of unconsolidated sands. The next underlying layer is an intermediate clay layer composed of clays and shales that contain lenses of white kaolin clay and unconsolidated quartz sands. The lower or "A" sands are relatively thin angular to sub-angular quartz sand beds. The average thickness is approximately 150 feet (50 meters).
- 5.14 The soils along the project site are classified as Category II. The Category II soils are generally suitable for agriculture with some degree of fertilization to cultivate crops. These soils are of variable depth, drainage, colour and texture which have developed mainly in transported materials and areas of natural fertility.

Hydrogeology

- 5.15 The coastal artesian basin consists of a recharge or catchment area, which coincides roughly with the exposed area of the White Sand Series, and an area of confinement, which is overlain by the Coropina Formation and Demerara clay and accordingly has the same extent as the coastal plain. Confinement in the "A" sand unit is caused by relatively impermeable fine-grained sediments in the overlying intermediate clay unit, the southern extent of which is not known. Similarly, no surface geological data are available concerning the catchment's area or the "A" sand. The base of the groundwater basin is at the base of the White Sand Series, except where the sediments in the deeper part of the basin contain saline water, which forms the lower limit of the usable supply.

²⁷ Unfortunately, the Guyana Lands and Surveys Commission (GLSC) does not have soil capability and resource maps for Region 4 in which the project falls. Rather, there are maps for Guyana as a whole.

- 5.16 Recharge from rain and seepage loss from streams in the catchment area replenishes the groundwater reservoir. Although there are essentially no well data in the catchment area it is logical to assume that groundwater moves generally northward, a part entering the permeable sections of the White Sand Series and a part probably being rejected, at least in the extremely wet seasons of the year as discharge to creeks and streams along the inland edge of the Coropina Formation. The part moving northward in the confined aquifers is discharged through the artesian wells, or seeps through the confining beds, being discharged by flow into streams or by evaporation and transpiration, or by submarine discharge some distance offshore.
- 5.17 All wells that have been completed at a depth greater than the base of the Demerara Clay are flowing artesian wells. In general, the head in the upper sand unit has ranged from 1.0 to 1.5 m above ground level. All the stakeholders within the ADI of the proposed project site are provided with drinking water via the Shelterbelt Water Plant i.e., about 2.0 kilometres from the proposed project site. It is very unlikely that construction and operational works will compromise the quality from this plant or add effluent to this important water body.
- 5.18 Recharge from rain and seepage loss from streams in the catchment area replenishes the groundwater reservoirs. Although there are essentially no well data in the catchment area it is logical to assume that groundwater moves generally northward, a part entering the permeable sections of the White Sand Series and a part probably being rejected, at least in the extremely wet seasons of the year as discharge to creeks and streams along the inland edge of the Coropina Formation. The part moving northward in the confined aquifers is discharged through the artesian wells, or seeps through the confining beds, being discharged by flow into streams or by evaporation and transpiration, or by submarine discharge some distance offshore. All wells that have been completed at a depth greater than the base of the Demerara Clay are flowing artesian wells. In general, the head in the upper sand unit has ranged from 1.0 to 1.5 m above ground level.

Surface Water

- 5.19 Guyana has an extensive network of rivers and streams that have many rapids and waterfalls with an absence of naturally occurring lakes. About 10 percent of the country's drinking water comes from surface water. Many meandering creeks drain into these rivers across the low relief paleorift valley. Along the eastern and western sections of the project site there are open drains that connect and empty into the secondary canals that then empty into the Downer Canal. These drains are largely in need of routine maintenance ([Picture 18 & 19](#)). The responsibility for the maintenance of the secondary canals is the responsibility of the M&CC and the primary drains the responsibility of the NDIA.²⁸
- 5.20 There is a shortage of water quality data for the project site and its immediate surroundings. Nonetheless, surface water samples were collected at strategic locations in January to March 2011 for a project that is in close proximity to the project site. The sample points were chosen based on areas that are considered to be high risk, such as, the Downer Canal or where there is potential contaminated effluent discharge, such as at the point where the railway embankment intersects with the northern canal. The samples were analysed by the Guyana Analyst Food and Drug Department (GA-FDD) and the Institute of Applied Sciences and Technology (IAST) to determine the presence and concentration of specific constituents.

²⁸ Once the drainage system map is collected from the M&CC these possible areas will be reflected in the ADEI.

Picture 18: The Downer Canal looking inland from the Liliendaal Pump Station



Picture 19: Sections of the overgrown Downer Canal



Source: Consultant's Photographs (2018)

- 5.21 The results of the analyses are presented in [Table 7](#) below. The results at the 2 locations indicate levels of total suspended solids that were above the US EPA limit. The total suspended solid (TSS) is a qualitative characteristic which is impacted by solids obstructing the transmittance of light through a water sample. Turbidity is an important water quality indicator and confirms the presence of disperse, suspended solids, slits, clay, algae and other micro-organisms, organic matter and other minute particles. Samples taken from the 2 points revealed that point number 2 was very turbid since the level recorded for this point was above 50 NTU. Oil and grease analysis reveals the total concentration of a family of organic compounds including non-volatile hydrocarbons, vegetable oils, animal fats, waxes, soaps, greases, and related matter. It has been confirmed that even at low concentrations and with release from nonpoint source inputs, oils and grease is toxic to aquatic life, reduces levels of Dissolve Oxygen (DO), alter the usability and aesthetic of water bodies (USEPA, 1999). In our analysis very high levels of oil and grease were detected at the Northern and Railway Embankment Canal juncture.

Table 7: Water Quality Test at Two Points Related to the Project Site

Parameter	Unit	MRL	Liliendaal Canal (1)	Northern and Railway Embankment Canal (2)
Nitrates	mg/l	10.0	4.20	7.80
Total Suspended Solids	mg/l	25.0	24.00	122.00
Total Dissolved Solids	mg/l	250.0	232	372
Iron	mg/l	10.0	1.97	4.46
Ph	mg/l	9.0	7.10	7.01
Oil and Grease	mg/l	1.0	Not detected (ND)	13.50
Phosphate	mg/l	6.0	1.49	1.38
Biological Oxygen Demand	mg/l	30.0	0.198	0.004
Turbidity	NTU	25 – 50	13.00	127.50
Dissolved Oxygen	mg/l	0.5	7.20	7.05
Escherichia Coli (E. Coli)	MPN/100ml	400	TNTC	TNTC

Source: Sheriff Street – Mandela Avenue Road Rehabilitation Project (2011)

- 5.22 Dissolve oxygen (DO) is the actual amount of oxygen available in dissolved form in a body of water. When levels of DO drop below the required range, life form in surrounding water is unable to continue at a normal rate. The decrease in oxygen supply then has a negative effect on fishes and other aquatic life. Fish kills and an invasion and growth of certain types of weeds can cause dramatic changes in a stream or other body of water. Levels of DO recorded at the 2 points were all above 0.5 - 6mg/L and this is a clear indication that sufficient amount of DO is available at the sample points tested to support aquatic life.
- 5.23 Lastly, the coliforms results were noted. Coliforms are bacteria which are naturally present in the environment. They are generally not harmful themselves, but are used as an indicator that other, potentially harmful bacteria may be present. The potentially harmful bacteria, faecal coliform bacteria or E. Coli bacteria, may indicate that the surface water has been contaminated with sewage and/or animal wastes (including human). Water samples collected revealed that at the 2 sample points there was heavy contamination with total coliform bacteria. Using the MPN count colonies from samples of 100ml of water it was found that they were all too numerous to count (TNTC). This is a clear indication that all point tested are subjected to contamination from animal or sewerage discharge.

Natural Habitats and Wildlife

Vegetation

- 5.24 To assess the vegetation along the project route two squares were randomly selected along the ADI. Each square was approximately 50m by 50m. The areas selected were the zones north and south of the proposed project site. It was found that the vegetation within the ADI includes patches of vegetation dominated by Muri (*Humiria balsamifera* var. *balsamifera*) scrub and grasses. Vegetation within 10m of the project site is dominated by Congo Pump (*Cecropia sciadophylla* and *C. obusa*), Fire rope (*Pinzonia coriacea*) with strong patch dominance by cowtail - *Andropogon bicornis*, razor grass – *Scleria* spp. and savanna grasses (*Panicum pilosum*). In the drains there is a large segment of water lilies and duck weeds. In some locations along the railway embankment, and outside the ADI, residents and proprietors have sought to beautify their areas through planting flowering plants. These plants include Bougainvillea (*Bougainvillea glabra*), Ixora (*Ixora coccinea*), Hibiscus (*Hibiscus rosa-sinensis*), King of flowers (*Lagerstroemia indica*) and Eucalyptus.

Wildlife

- 5.25 A similar methodological approach was applied to the faunal survey as in the case of the vegetation survey. Informal discussion with some residents also helped to inform the fish survey information. Very few animal species were found at the location, which is used by school children and as a site for office space. The drains did show some fish life in the form of some popular species such as the Sunfish (*Crenicichla alta*), Huri (*Hoplias malabaricus*), Patwa (*Cichlosoma binaculatum*), Silver bait (*Astyanax* sp.), and Hassar (*Hipilesternum littorale*). Some of these fish species are harvested by residents along the drains to the west of the proposed project site and those that run parallel to Dennis Street, particularly on weekends. These help to supplement their protein diet requirement, as well as they are caught as a sport. It will be necessary for the ESMP to address this issue by developing a communication plan that will advise residents on how this issue will be managed for the duration of the project, especially as it relates to health and safety considerations.

B. Land tenure and Rights

- 5.26 In Guyana, three types of land tenure obtain. These are: (i) lands owned either publicly by the State/government land,²⁹ (ii) privately owned under freehold tenure³⁰, or (iii) cooperatively as in the case of Amerindian lands. Given these categories of land, the main identifiable tenure system in the project area is State-owned lands. The plot of land for the proposed project is leasehold State land. These are generally lands that have been granted to individuals or organizations/entities by the government on long term leases, often for as much as 99 years. This allows the developer to use these lands as collateral and they pay an annual land rental. **Before such lands are issued, a business and/or development plan is required by the Guyana Office for Investment (Go-Invest) and the GLSC.**
- 5.27 However, there seems to be little threat of resettlement of any of the stakeholders in this area due to the fact that the area is used largely for offices. However, there is a basketball court used mainly by students of the SSS and those attending the Sophia Training School. Apart from potential occupational issues, pilfering is also said to be high amongst these student bodies and will need to be closely monitored. Lastly, since the route via A- Field is not viewed as feasible, there will be no need to engage at this stage with the squatter settlement that has emerged in this location.

Land Use

- 5.28 The land use pattern in the project area is a function of a number of factors: climate, soil type, topography and culture. For example, the climatic conditions along the coast are ideal for cash crop farming, with these being the major sources of income, nutrient, employment generation, and food supply for some of the lower income residents of Industry, Cummings Lodge, and Sophia. At the same time, the area of the proposed project is largely an area that is occupied by government offices, training institutions and exhibition centres.
- 5.29 Land use planning within the project zone or ADI comes under the control of the Central Housing and Planning Authority (CH&PA). This entity devised a Greater Georgetown Development Plan (GGDP) 2001 – 2010. Interestingly, this Plan does not propose any zoning within the City, but rather outlines policies for the orderly development of Georgetown. The absence of such zoning may partly be responsible for the changing land use occurring within Georgetown and Greater Georgetown.

C. Demographic Socio-economic Context

Introduction

- 5.30 The entire population of Georgetown and Greater Georgetown was measured at 191,180 according to the 2012 National Population Census with approximately 12% of these being found in the Turkeyen, Pattensen, Liliendaal, Prashad Nagar, Lamaha Gardens, and Sophia areas. These communities are in the main mixed, with various ethnic groups present. The persons are both self-employed in occupations such as retailers, taxi drivers, tailors and seamstresses, barbers and cosmetologists, while others are employed with the government as public servants (teachers, clerks,

²⁹ This regime includes State Lands (Crown Lands) for agriculture, mining and forestry purposes, and Government lands. In this regime, the land administration functions are exercised by the Guyana Geology and Mines Commission, the Guyana Forestry Commission, and the Guyana Lands and Survey Commission.

³⁰ Freehold refers to land owned by persons who hold title deeds to the properties. Freehold lands are also referred to as "proprietor's land" or "bona fide" land. Freehold is generally located along the sea coast and riverbanks in the first depth and benefit from the best conditions regarding transportation, drainage and irrigation, and soils.

accountants, etc), or private sector bodies (banks, insurance and beverage companies). What follows is a brief description of demographic and socio-economic features bordering the project site, but outside of its area of direct influence.

Demographic information

- 5.31 The project will be carried out in an already developed area of Georgetown. To access that area would require passage through many built up communities south and west of the proposed project site. These include the Industry, Cummings Lodge, Prashad Nagar, Lamaha Gardens, Turkeyen, Pattensen, Liliendaal and Sophia communities. The total population of these communities is shown below in [Table 8](#).³¹ Based on the last population census in 2012 it was calculated that approximately 30, 231 persons were living just outside the project's ADI with a population density of 340/km² (Guyana Population Census, 2012). It is quite possible that this number has increased since that time due mainly to rural-urban migration³². Moreover, with the growth in the population along within Sophia and the regularization of this previous squatter settlement and boom in construction activities generally, there has been increased pressure placed on the Eastern Highway and Dennis Street Road corridors.

Table 8: Population Statistics of Communities that may be Indirectly Impacted by the Proposed Project

Villages	Total
Industry	2222
Cummings Lodge	7246
Turkeyen	6599
Pattensen	5013
Liliendaal	3100
Prashad Nagar	1,108
Lamaha Gardens	1,256
Sophia	3687
Total	30,231

Source: Guyana National Census (2002), Bureau of Statistics, Georgetown

- 5.32 While we were unable to calculate the sex ratio because of the paucity of disaggregated data by villages³³ in cases where the male population is larger than the female population, it may affect the employment situation in the city, forcing some men to seek employment away from the city in sectors such as mining and forestry.
- 5.33 The average household size for communities was estimated at approximately 5 persons. Nearly one-third of all households are said to be headed by women with the trend being more pronounced in Sophia. Approximately one-third of the population is younger than 14 years.

Health

- 5.34 Life expectancy at birth averages 64.8 years for the total population of Guyana. For men, it is 61.5 years and for women, 68.2 years. No data is available on life expectancy for the project area.

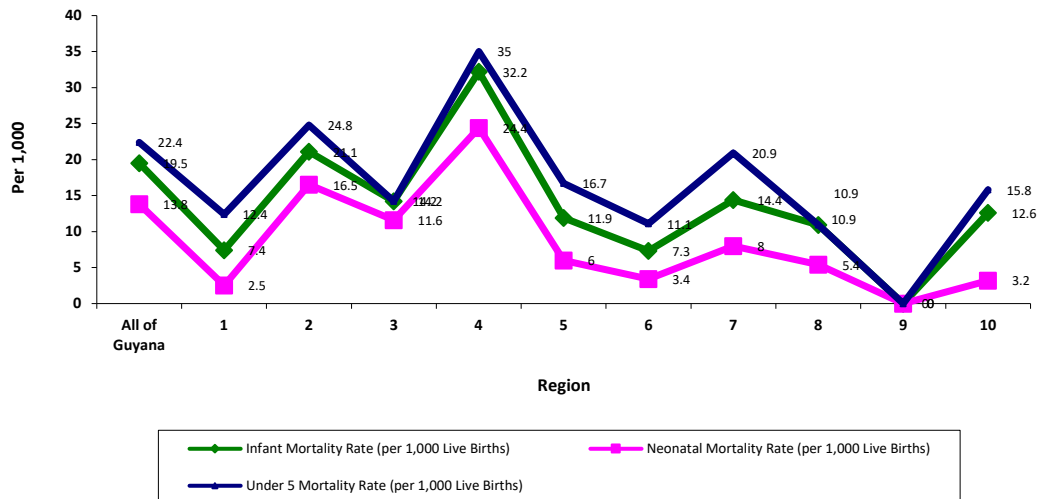
³¹ Please note that the Statistical Bureau of Guyana is yet to release the breakdown of this census data by village and gender.

³² This assumption is based on the fact that most of economic, social and educational facilities are located in Georgetown or close to Georgetown, inclusive of the main University Campus, the Cyril Potter of Education, the Main Banks, all the Ministries and the best public and private schools. This is against the national trend where emigration has resulted in almost no population growth between, but rather a decline since 2002.

³³ The last census data is 14 years ago and that information was considered too dated to be of much use in this report.

Furthermore, the MoH does not keep mortality figures on the project area, rather, information is kept on the entire Region 4. Infant mortality rate (IMR), representative for children less than one year old and a vulnerable group, is approximately 32 for every 1000 live births in Region 4 (Ministry of Health, 2012). This is the highest for all the Administrative Regions in the country ([Figure 3](#)).

Figure 3: Mortality Indicators, 2012



Source: Ministry of Health (2012) Statistical Bulletin, Brickdam

- 5.35 Despite increases in government's outlay on health care in Region 4 and the construction of more diagnostic centres IMR remains high amongst the poor segments of society due to poor prenatal care and more persons having children at a younger age on one end of the spectrum and older women having children on the other end (MoH, 2012). Early childhood mortality is usually utilized as an indicator of poor nutrition and poverty by the World Health Organization (WHO). The Guyana Population and Census Report (2012) indicated that for Region 4 children dying before the age of 5 were 31 per 1000. The reasons for these high child mortality rates were ascribed to children suffering severely from two of the most commonly cited diseases in that region; worm infestations and acute diarrhoea.
- 5.36 In recent years, there have been improvements and expansion in a number of public health facilities in close proximity to the project site and indicators in Guyana generally. Furthermore, major hospital complexes are all no more than 3 km from the project site. All the facilities offer primary care, thus indicating that the project site would be well served with medical facilities and personnel.
- 5.37 The total fertility rate dropped from 6.1 in 1960 to 2.3 in 2012. The number of births attended by trained medical personal rose between 2002 and 2010 from 88% to nearly 97% (Ministry of Health, 2012). In urban areas, nearly 100% of the population has access to both drinking water and sanitation facilities.

Education

- 5.38 The Constitution of Guyana articulates that "every citizen has the right to a free education from nursery to university". Consequent to that constitutional decision, education became overwhelmingly a public service provided through the Ministry of Education (MoE). There is a

nursery school, 3 primary schools, 2 secondary schools, a teacher's training college and the University of Guyana that fall within a 2 miles radius of the project site. However, given the location of the proposed site, it is not anticipated that during construction or operations that vehicular traffic or other activities will in any way impact the activities, directly or indirectly of these institutions since most are present to the northeast of the facility and in built up areas. However, the facilities to the north of the proposed site in the ADI are likely to be impacted, inclusive of the SSS, Sophia Juvenile Training Centre, and Sophia Care Centre. Since most of these deal with children, it will be essential that proper protective measures are taken to keep them out of the site during construction and operation, reducing the possibility of injury or death to any of them. Conversely, through erecting protective barriers and increased security it can reduce the loss of valuables and equipment at the work site.

Utilities

- 5.39 A number of utilities are available within the ADI of the project, inclusive of the Guyana Water Incorporated (GWI), the Guyana Power and Light (GPL) and the Guyana Telephone and Telegraph (GT&T). Within the ADI all of the buildings access drinking water that is piped into their facility (GWI, 2018). The GWI currently provides 100% coverage to the areas within the project zone in terms of drinking water provision. This is piped water from the Shelterbelt Plant. However, major concerns surround the quality and reliability of this water supply. For this reason, and given changing climatic conditions, some consumers supplement their water demand via rainwater harvesting.
- 5.40 Water is viewed as being very affordable at a cost of G\$180/m³ (approximately US\$0.88/m³)³⁴. It was further related that the average household consumed 30m³ of water per quarter at a cost of G\$1,827.00 per month³⁵. This volume of consumption was equated to the consumption of five (5) filled 400 gallons polyurethane tanks. It is worthwhile noting that bottled water and purchasing water from specific sources have become popular in Guyana, with 32% of residents being engaged in these activities in Region 4, using these as their main source of drinking water (UNICEF, 2010). This adds to the household budget and may be a reflection of the quality of water provided by GWI, since unsafe drinking water can be significant carriers of diseases such as trachoma, typhoid and cholera.
- 5.41 The GT&T and the GPL provide telecommunication and electrical supplies to entities within the project zone. All the buildings within the project area are said to have access to both electricity and telephone facilities, if so required. The utilities main pipes (in the case of GWI) and poles (in the case of GT&T and GPL) are currently located within the project site and the services can be easily accessed. In fact, all of these services are accessed by the current GNBS complex in the SEC compound.

Living Conditions and Income

- 5.42 According to the Guyana Census Report (2012) most of the persons employed and living within the All of the project are employed in the areas such as elementary occupations (21%), clerks (20%), sales personnel (18%), technicians (15%), professionals (13%) and legislators and senior managers (10%). These employment avenues are carried out both independently and as paid employees.

³⁴ This is the commercial rate.

³⁵ The domestic rate is approximately G\$60.90/m³.

Furthermore, they are a reflection of the level of education attainment. The project has the potential of providing some short-term employment during construction mainly in the technical and elementary category areas.

- 5.43 Labour force participation has remained low in Guyana, falling from 60% in 1992/93 to 54% by 2008 ([Table 9](#)).³⁶ This may be a reflection of the influence of the growth of the informal economy as less persons are documented as working, even though they may be employed in areas such as mini-bus drivers or conductors, taxi operators, many workers in the construction industry that are undocumented, and those who are self-employed (Faal *et al*, 2002). The rate for men in 2008 being roughly what it was in 1992/93, demonstrating the fluctuating production performance of the Guyanese economy, while that for women increased from 39% to 47.3% over the same period reflective of the expansion in the service industry and the growth of single parent households as more women moved into areas of security services, factory operators and store clerks to assist with the maintenance of their families.

Table 9: Guyana Labour Force Indicators

Labour Force Indicators	1992/93	1999	2002	2008
National Labour Force Participation	60	57	56	54
Female Labour Force Participation Rate	39	39	45	47.3
Male Labour Force Participation Rate	81	76	90	84.1
National Unemployment Rate	12	9	12	9.1
Female Unemployment Rate	18	14	15.1	-
Male Unemployment Rate	8	6	10.1	-
Persons Outside the Labour Force	40	43	44	-

Source: World Bank (1993) *Guyana's Household Income and Expenditure Survey*, Bureau of Statistics (2000), *Guyana's Survey of Living Conditions*, and Bureau of Statistics (2004) *Guyana's National Census – 2002*, United Nations Data (2010).

- 5.44 However, this finding should not gloss over the fact that there are still sharp differences in participation in the labour force in Guyana. Guyana has the lowest female participation rate in the region, and the widest gender participation gap (World Bank, 2009). Even considering other factors that affect the decision to join the labour force (marital status, ethnicity, or area of residence), the participation gender gap remains strong. This suggests the existence of distinct gender roles in Guyanese society that create a disincentive for women to participate fully in the labour market (*ibid*, 2009).
- 5.45 Based on the information provided in the last Census, a Poverty Map was constructed for Guyana.³⁷ The document published in September 2005, considers information related to the access of households to basic services in order to measure poverty. Two indices were composed³⁸: Living Conditions Index (or LCI) and Enumeration District Marginality Index (EDMI). Since no data on household consumption was provided, the EDM I may be considered as a “better” measure of poverty than the LCI, since it considers a wider variety of variables, which are correlated with the level of household consumption.
- 5.46 The poverty indicators are not provided for communities in the All of the project but for Georgetown generally. The EDM I showed that the City of Georgetown and the suburbs had indices of -1.208 and

³⁶ CIA Worldfact Book (2010).

³⁷ Skoufias, E (2005) *Poverty Map for Guyana*, World Bank, Washington, DC.

³⁸ The way these indices are calculated can be further consulted in the mentioned document.

-1.0961 respectively (Enumeration District Marginality Index, 2005) ³⁹. It is known that generalisations would often cloud over area specific issues, but these figures do provide a guide.

D. Cultural and Archaeological Resources

5.47 In addressing the cultural and archaeological resources of the proposed development three aspects were examined:

- archaeology,
- historic resources, and
- general archaeological potential of the area.

Contact was made with the Walter Roth Museum of Anthropology to gather information on important or contentious archaeological resource of the area. A similar enquiry was made of the National Trust (Guyana). The investigation revealed that there are no known cultural or archeological resources within the project site.

E. Common Property

5.48 The existence of common land in the project area was investigated through examination of maps, review of reports from GLSC's Guyana Land Administration Support Programme (GLASP) concerning land tenure regularization, and local consultation during fieldwork. This work confirmed that all land in the project areas is leased to individuals/companies, is held privately (freehold), or owned by the Government. Consequently, the project will not have any effect on land as a common property issue. However, proper demarcation of boundaries and outlines for public thoroughfares, such as ingress and egress, and the boundary lines for the rehabilitation of the drainage canals and the insertions of culverts.

F. Involuntary Resettlement

5.49 The project involves the construction of buildings to house the GNBS operations on a piece of state-owned land not currently occupied or for which is has been determined, there is no other request. As such, no buildings will need to be removed and there will be no need for resettlement based on this project.

³⁹ Explanations on the calculation of the Enumeration District Marginality Index (EDMI) is provided by Emmanuel Skoufias (2005) on the Guyana Poverty Map.

VI. STAKEHOLDERS' CONSULTATION

An Introduction

- 6.1 The assessment of the environmental impacts and development of the ESIA was guided by the deliberations of a series of consultations with stakeholders and their representatives. A range of meetings were held between May 21 and July 26, 2018, as detailed in [Section II](#) above. Present at those meetings was the consultant and his project assistant and representatives from the various stakeholders' organizations. The objective of the meetings was to provide details related to the project to the stakeholders and to receive feedback about issues which can guide the Client in arriving at the most effective and cost efficient solutions in pursuing this project.
- 6.2 The process often commenced with the consultant or the Client sending a formal letter, with a brief background on the project and requesting a meeting. Once the meeting was agreed, the consultant and/or his representative attended and commenced by detailing the project scope. The consultant followed with a presentation of information compiled to date for the project area. The objective of the consultant's presentation was to obtain information from stakeholders on the accuracy of the information available in the public's domain for the project area. Stakeholders were then asked to identify possible impacts the project may have on them and/or their operations. Generally, there is acceptance about the need to build a State of the Art Bureau of Standards. However, there were a number of concerns raised and we sought to capture the more salient ones below. These are grouped under specific headings for ease of reference.

B. Drainage

- 6.3 It was noted by the NDIA Chief Executive Office (acting) that the poor quality of the drainage system in some parts of areas around the project site or within the ADI needs to be addressed to ensure the structural integrity of the buildings is maintained and reduce possibility of flooding. An engineer at the National Drainage and Irrigation Authority (NDIA) highlighted the fact that water is drained from the proposed project area to outlet canals located on both sides of the proposed project site, but these connecting tertiary canals to the secondary canals remain questionable. While the NDIA does not have jurisdiction over the area, they do assist the M&CC in times of need. Both the NDIA and the M&CC agreed that the primary measure being employed to mitigate flooding in the area is the clearing of drains and canals, the maintenance of drainage pumps, kokers/sluices; and the monitoring of the water level in the East Demerara Water Conservancy (EDWC) to ensure that the water level does not surpass 57.75 GD (Georgetown datum)⁴⁰. It was also recommended that the ground floor of the buildings to be constructed be raised to elevations of between 28 to 30 inches above ground level.
- 6.4 The M&CC also indicated that there needs to be connectivity with the tertiary drainage and the secondary and primary systems. According to the M&CC, to develop a viable drainage system would warrant the removal of the squatters that currently occupy the access dam between A – Field Sophia and the project site. The dredging that is warranted cannot be carried out as the dwellings of the squatters then to be in the path of the dredging equipment. However, removal of the squatters has

⁴⁰ If this level is exceeded, water is released through control measures, into relief canals that flow into the Demerara River and the Atlantic Ocean, i.e., the Hope Canal and the Land of Canaan Canal.

political implications, but failure to dredge these canals regularly can compromise the drainage capacity of the SEC.

- 6.5 It should also be noted that this area was previously vacant. The changing land use pattern to build structures is likely to increase run-off, thus increasing the volume of water the internal and external drains are expected to accommodate. This again, during a changing climate regime that predicts more intense rainfall, even though for shorter periods, can expose the site to flash flooding if proper drainage planning is not executed. Given these possibilities it was suggested by both the NDIA and M&CC that routine maintenance be carried out as a matter of priority.

C. Fires

- 6.6 The Guyana Fire Service noted that prior to recent developments in the area (2 to 3 years ago) fires were known to occur in an area east of Dennis Street. It was posited that while there may have been some accidental burning, an estimated 80% of such fires were controlled burns, started by individuals who wanted to clear the area for security and development purposes, but wanted to do so at minimal cost. In recent years there have not been any reported fires at areas surrounding the proposed site. Nevertheless, it was noted that the design drawings for the structure will have to receive the approval of the GFS once that entity is satisfied that the buildings contain adequate fire mitigation features and equipment, and fire resistant materials are used. Additionally, there are a number of natural fire breaks around the site with regards to the presence of the drainage canals, and access to water from the GWI that services the area.

D. Waste Disposal

- 6.7 While it was acknowledged that the project will improve the standards infrastructure in Guyana, leading to improved competitiveness and increased exports, the primary environmental concerns raised by both the GNBS and the PTCCB were the disposal of chemical waste and solvents. It was confirmed that these products were being stockpiled after use without a defined national approach for disposal or removal. It was reported that often other institutions and laboratories will contact the PTCCB for guidance after being referred by the EPA or out of pure frustration of not knowing what to do with said waste. The EPA would often make recommendations to laboratories to dilute or bury their waste but without any specific instructions for the execution of these measures. The entities consulted indicated that there needs to be an effective Waste Management Plan for the Project that will detail procedures for, *inter alia*, storage, labelling, identification of containers for storage, collection and disposal.
- 6.8 However, under the Prevention and Disposal of Obsolete Chemicals (PDOC) project of the Food and Agriculture Organisation (FAO) of the United Nations (UN), the PTCCB's chemical stockpiles are being removed for disposal overseas. Through the PDOC project the FAO is hoping to mobilize about US\$8 million to support this work over the course of the programme which started in 2009 and concluded in 2017 (<http://www.fao.org/agriculture/crops/obsolete-pesticides/news5/en/>). Enquiries (by the PTCCB) into the cost of chemical disposal after the conclusion of the PDOC project in 2017 revealed that the removal of toxic chemical is approximately US\$5,000.00 per ton.
- 6.9 While the project may not have budgeted for a facility at which to dispose hazardous wastes and solvents produced as a result of the Bureau's work, every effort should be taken to explore the further exporting of this waste. Based on feedback from the Bureau, volumes of wastes produced

are relatively small and may not make it cost effective to build their own waste disposal facility at this time. This would need further exploration going forward but will be captured within the Waste Management Plan (WMP). Additionally, the proper transporting and storing of this waste needs to be improved to mitigate any negative externality in the event of an accident. Guiding documents that will aid with the development of the WMP would be the *Laboratory Safety Guidance* manual of the Occupational Safety and Health Administration (OS&HA) and the Environmental Protection Agency of the USA's *Laboratory Environmental Sample Disposal Information Document*.

E. Utilities

- 6.10 It is important to note that one of the improvements envisaged with the implementation of this project, is the improvement in social amenities such as lighting and in security around the site. Moreover, measures to keep out all strangers, such as Juveniles from the Sophia Special School would be important to reduce the possibility of injuries, pilfering and potential conflicts.
- 6.11 The utility companies, i.e., GWI, GTT and GPL have often expressed concerns that knowledge of most projects is brought to them after the service might be disrupted or utility lines or poles proving to be an obstacle to the completion of further works. In cases such as these the developer more often than not expects that these utility companies should be ready to mobilize their resources immediately even when the party who bears the cost is yet to be determined. It was noted that the utility companies usually try to act within the best interest of consumers but compensation for the cost incurred is not always forthcoming. This project should seek to avoid these types of occurrences and involve all parties at a very early state in project design.
- 6.12 Furthermore, while it is expected that the proposed project will result in some short-term disruptions in the supply of these services during the construction and installation phases, it was posited that with forward planning this can be minimized. This can be done in phases/segments. Additionally, the utilities feel that there should be some financial provision made to the entities for the relocation of the project lines. It will be important to conduct a coordinated site visit with the stakeholders and the contractor prior to project commencement. This would allow the utilities to determine what changes to the existing infrastructure is needed and what cost will be attributed to same. Furthermore, the identification of a liaison from the GNBS can help with any follow up necessary between the utilities and the Client.

F. Permitting Process

- 6.13 Entities like the EPA and the M&CC stressed the importance of ensuring that the permitting process for the construction of this facility commences early. They indicated that in the past projects were delayed due because applications for permits were sent late. It is therefore important for the Client to adhere to the permitting guidelines and commence the application process as outlined in other parts of this document.

Table 10: Matrix of Stakeholders' Issues, their Significance and Recommended Mitigation Measures

Potential Impact	Stakeholder (s)	Phase	Significance before mitigation/enhancement	Recommendations to mitigate negative impacts and enhance positive impacts	Stakeholder (s) Responsible for this Action
Drainage					
1. Increased potential for flooding during periods of heavy rainfall	M&CC,	DC & PC	-15	<ul style="list-style-type: none"> Removal of Squatters from M&CC/ Government Reserves at A-Field Sophia to allow for the clearance of canals Rehabilitate all primary, secondary and tertiary drainage canals in the project area Develop a routine and recurrent drainage maintenance programme Ensure there is connectivity within the drainage system in the area Observe the building code for building structures on the coast of Guyana 	CH&PA M&CC CH&PA, M&CC and the Client
2. Increased possibility from flooding due to over-topping of the EDWC dam	NDIA	DC & PC	-13	<ul style="list-style-type: none"> Ensure that the early warning system at the EDWC is working effectively and monitoring is continuous 	NDIA
3. Increased potential for water-logged soils and flooding	NDIA & M&CC	DC & PC	-17	<ul style="list-style-type: none"> Ensure there is connectivity of the drainage network with the main outfall canals in the area 	M&CC
Air Quality and ambiance					
1. Disturbance of residents from night works	SJHC, STC, SCC	DC	-13	<ul style="list-style-type: none"> Monitoring of construction works is required to ensure that disturbances are minimized. Ongoing consultation during the construction phase to ensure that neighbouring facilities have a forum to address any problems which may arise. Scheduling of night works outside of the period when the STC or the Amerindian Village are used as a residence. 	Client, Contractors
2. Generation of dust from the construction site can impact negatively on the respiratory system and asthmatic cases, particularly those at the Sophia Care Centre	SJHC, STC, SCC, CCAC	DC	-12	<ul style="list-style-type: none"> Monitoring of construction works is required to ensure that disturbances are minimized. Employment of dust suppression measure 	Client, Contractors
3. Obstruction of drainage network due to poor waste disposal measures at the construction site.	STC	DC	-10	<ul style="list-style-type: none"> Monitoring of construction works is required to ensure that disturbances are minimized. Employment of waste measurement approaches; provision of receptacles, scheduled site clearing 	Client, Contractors
4. Risk of exposure to toxic chemicals and fumes	SSS, SCC, CCAC	OP	-13	<ul style="list-style-type: none"> Utilization of best practices during to ensure that all hazardous chemicals and toxic fumes are prevented from exiting the facility Information sharing with stakeholders as it relates to hazardous substances which will be used, and the potential risks should exposure occur. 	Client, Contractors
Security and Safety (including traffic)					

Potential Impact	Stakeholder (s)	Phase	Significance before mitigation/enhancement	Recommendations to mitigate negative impacts and enhance positive impacts	Stakeholder (s) Responsible for this Action
1. Vandalism of the construction site and loss of personal effects and equipment	SSC, SSS	DC	-15	<ul style="list-style-type: none">Provision of adequate security personnelFencing of construction area	Contractor
2. Congestion of a limited traffic space	Complex Secretariat, CCAC, CPF of GMC	DC, OP	-14	<ul style="list-style-type: none">The devising of an adequate traffic management planUtilization of the Dennis Street access which is in close proximity to the construction site during the construction and operational phases	Client, contractor
Fires					
1. Increased potential for fires due to anthropogenic factors	GFS	PC	-11	<ul style="list-style-type: none">Outfit the building with fire safety equipmentAvoid the use of flammable material where possibleHave the building plans approved by the GFS	Client, GFS
Waste Disposal					
1. Increased contamination of drainage systems in the area	EPA, GNBS, GLDA, PTCCB, GA-FDD, CCAC, STC, SSS	PC	-17	<ul style="list-style-type: none">Develop and implement an effective solid waste management planEstablish waste separation, storage, collection and removal protocols for chemical wasteConstruct specialised septic tank with filter bed for the collection of liquid waste from laboratory operationsEnsure septic tanks and built to the M&CC specifications and serviced regularly to prevent over-flowing	Client, contractors, M&CC, & EPA NDIA M&CC
2. Destruction of aquatic life	EPA	DC & PC	-14		
3. Potential to contaminate aquifers	EPA &GWI	DC & PC	-11		
Utilities and Infrastructure					
1. Improvement in social infrastructure	HSD	PC	13	<ul style="list-style-type: none">With the construction of the facility there could be improvement in the social infrastructure, inclusive of lighting along the main access road.	GWI, GTT, GPL and Guyana Police Force
2. Disruption of service to some stakeholders	GWI, GPL, GTT	DC	-10	<ul style="list-style-type: none">Inform persons of when the utility companies plan to work in the area	GWI, GTT, GPL
3. Utilization of Green Energy Sources and pursue energy efficiency measures	GNBS	PC	14	<ul style="list-style-type: none">Ensure the integrity of the building supports energy efficiency measuresPursue renewable energy possibilities where presentConduct a detailed energy audit	Client, Contractor
4. Damage to the existing road network	Complex Secretariat, CPF of GMC	DC	-12	<ul style="list-style-type: none">The construction of a new alternative entrance on the dam that runs parallel to the eastern (back) fence	Client, contractor
5. Compromise to the structural integrity of Complex Secretariat buildings	Complex Secretariat	DC	-11	<ul style="list-style-type: none">Utilization of the Dennis Street access which is in close proximity to the construction site during the construction and operational phasesInstallation of sleeping policemen along the raised/elevated and rehabilitated access road to reduce speed of vehicles entering the compound	Client, contractor
Permitting process					
1. Delay in the project due to sloth in submitting application for approval	EPA & M&CC	BC	-12	<ul style="list-style-type: none">Complete application forms for the EPA, M&CC, and CH&PA expeditiously to minimise any delays in project implementation	Client
Quality Standards infrastructure					

Potential Impact	Stakeholder (s)	Phase	Significance before mitigation/enhancement	Recommendations to mitigate negative impacts and enhance positive impacts	Stakeholder (s) Responsible for this Action
1. Improvement in the Quality Standards Infrastructure in the country	GNBS,	PC	15		Client
2. Improved competitiveness and exports	GNBS	PC	15		Client

Note: BC – Before Construction, DC – during construction, PC – post construction

VII. ENVIRONMENTAL AND SOCIAL IMPACTS

A. Impact Assessment Methodology

- 7.1 An impact rating system was employed to ensure the application of analytical rigour to the assessment of impacts. The impact rating system provides comparable ratings of impacts so that mitigation measures can be prioritized and acts as a guide to identify how and where mitigation measures can truly address impacts. The initial step in the impact assessment methodology consisted of the characterization of the project baseline conducted above. The potential impacts and the sources of those impacts were identified based on the baseline data initially compiled, and the alternatives to be followed. Impacts are classified as being direct impacts, indirect impacts or cumulative.
- 7.2 Direct impacts are those caused by the project itself, for example the direct consumption of land and the removal of vegetation for the construction of buildings, and contamination of surface water due to the operations of the GNBS facilities. Indirect (secondary, tertiary, and chain) impacts are those associated with the project which can have consequences on the people, the economy or environment. In some instances, these consequences can be more profound than direct impacts due to their nature. Indirect impacts are both spatial and temporal in the extent of their consequences. A typical example may be slow movement of traffic during construction due to congestion caused by trucks transporting materials.
- 7.3 Cumulative impacts generate additive, multiplicative or synergistic effects. These impacts may result in damage to the function of one or several ecosystems. The project factors which contribute to the additive, multiplicative or synergistic effects on the environmental and which are attributable to the project are detailed in this document. The direct, indirect and cumulative impacts associated with the proposed project are further subdivided into the following:
- ✚ positive and negative impacts;
 - ✚ random and predictable impacts,
 - ✚ local and widespread impacts;
 - ✚ temporary and permanent impacts; and
 - ✚ short- and long-term impacts.
- 7.4 Positive impacts are considered as those which may lead to a consensus their outcomes will benefit the environment. Predictable impacts are considered as having a high probability of occurrence. Local impacts are those which occur in the immediate vicinity of the project. Widespread impacts are those which have a greater geographic scale, and which are identifiable as being caused by project implementation. Temporary impacts lack lasting occurrence and eventually reverse themselves. Permanent impacts are those which cannot be reversed. Permanent for the intent of this ESA is considered as being the duration of a lifetime. Short-term impacts occur during construction. Long-term impacts will extend into the project operational phase and beyond.
- 7.5 The impacts are further categorized according to their seriousness by examining the likelihood and severity of each impact. Each impact was consequently rated as to their severity/level of enhancement and likelihood prior to the implementation of any impact mitigation measures. The impact mitigation measures were then identified, and the residual rating of impacts was then classified as to both severity and likelihood.

- 7.6 The impact analysis examined the relative importance of the issues raised by stakeholders through the application of an impact matrix, using a formulation used by the Bank. In the first instance impacts were divided into three categories: (i) positive (+), (ii) negative (-), and (iii) neutral (o). Hereafter the characterization of the impacts was done with six (6) categories being identified. These are: (i) the level of disturbance that is likely to take place, (ii) the importance of the impact based on the number of people to be affected, (iii) the probability of the impact occurring, (iv) the extent of the impact, (v) duration of the impact, and (vi) the severity of the impact.
- 7.7 Each impact is then ranked from 3 to 1 with 3 being the most severe of the impacts and 1 being the least severe. The maximum score, therefore, for any impact was 18 and the minimum score was 0. The relative magnitude of the impacts was then calculated using the following formula:

$$\text{Total impact} = C(D + I + O + E + Du + R)$$

Where: C = Character of the impact, D = disturbance, I = Importance, O = Occurrence, E = Extension, Du = duration, R = Reversibility. [Table 11](#) below provides an overview of the methodological framework that was applied to the projected impacts and how these are to be interpreted.

- 7.8 The potential impacts are projected to occur both during the construction of the facility and the life of the project, occurring in both the ADI and the AII. Taking these issues into consideration, where possible, the impacts were looked at jointly to reduce the incidence of repetition. However, where there are clear distinctions, these are identified. What follows, is a discussion of the proposed physical, biological, aquatic and human impacts associated with the project. Additionally, at the end of the section there is a summary of the impacts under the various scenarios and the sensitive receptors identified.

Table 11: Methodological Matrix Utilised in Conducting Impact Analysis

Impact Classification			
Character (C)	Positive (1)	Negative (-1)	Neutral (0)
Disturbance (D)	Important (3)	Regular (2)	Scarce (1)
Importance (I)	High (3)	Medium (2)	Low (1)
Occurrence (O)	Very probable (3)	Probable (2)	Not probable (1)
Extension (E)	Regional (3)	Local (2)	Punctual (1)
Duration (Du)	Permanent (3)	Medium (2)	Short (1)
Reversibility (R)	Irreversible (3)	Partial (2)	Reversible (1)
Total	18	12	6
Impact Appraisal = $C(D + I + O + E + Du + R)$			
Negative (-)			
Severe		$\geq (-) 15$	
Moderate		$(-) 15 \geq (-) 9$	
Compatible		$\leq (-) 9$	
Positive (+)			
High		$\geq (+) 15$	
Medium		$(+) 15 \geq (+) 9$	
Low		$\leq (+) 9$	

Source: Inter-American Development Bank (2006)

B. Mobilization Phase

IMPACTS

Social and Community Impacts

The impacts during the mobilization phase would be mainly social and confined mainly to the users of the facility. The impacts will include the following:

Reduce Access to the Area where the building will be placed because of the stock piling of building materials and other activities. In addition to reduction in the activities, the planned activities of the users will be disrupted. Among the major activities that will be affected are Indigenous Month Celebrations in the month of September and Guyana Exhibition that will be held in December 2022. These community impacts will be addressed through the stakeholder engagement plan.

C. Construction Phase

IMPACTS

Air Quality

- 7.9 A major source of atmospheric disturbance will be from airborne particulates from soil disturbance during construction of the buildings and from vehicular traffic transporting materials along the roads ([see Table 12](#)). The building is expected to be concrete, using sand, stones and cement. The stones and sand are likely to come from the BK or Toolsie Persaud Quarries in Region 7, and the Linden-Soesdyke Highway respectively. These are likely to be main sources of dust pollution falling within the All. These impacts will have a high probability of occurrence and a low level of severity after mitigation.

Noise

- 7.10 Another potential source of atmospheric disturbance will be noise generated largely during the construction of the facility. This is likely to be associated with sawing of wood, mixing of mortar and nailing of materials. However, since this is already in a zone with frequent traffic, the impact on surrounding stakeholders, especially if work is done during the day time, is projected to be minimal. Furthermore, the fact that the construction is expected to take place on the leeward side of the Sophia facilities, the impacts are expected to be less than if the converse was true. Nevertheless, due consideration should be given to reducing the noise, such as piling outside of working and school hours, or at nights. Similarly, minimal use of vehicle horns should be encouraged at all times at the construction site and only in the case of emergencies. Where night work is to be carried out, residents in the Lamaha Gardens and Prashad Nagar areas should be notified at least 48 hrs before such works commence. These impacts will have a high probability of occurrence and a low level of severity after mitigation.

Soils

- 7.11 There may be areas within the project site where soils will have to be disturbed to lay the foundation for the structures. There could be the potential for noticeable environmental disturbance and the potential for increased soil erosion and/or removing top-soil. Similarly, the extraction of timber and other building materials from the All, except done in a selective way, can increase soil erosion. These impacts are minor impacts of low severity and with a moderate likelihood of being realized.
- 7.12 Disturbance during construction of the buildings may potentially impact the balance between vegetation and built structures, the former which tends to reduce soil erosion and running water from the latter which tends to induce erosion. This is an indirect, long term impact and some localized erosion may potentially result in cumulative impacts which can extend beyond the limit of the project area. Run-off may potentially result in water flowing over erosion prone soils and create a greater likelihood of further erosion. These impacts are indirect and long-term. These are localized impacts with a negligible possibility of occurring and a low level of severity. These impacts can be mitigated by avoiding construction in fragile areas, ensuring proper soil compaction and covering open spaces with grasses and trees. The mitigation measures will result in minor residual impacts which are of medium severity, and which will have a low likelihood of occurrence.
- 7.13 Another concern would be the disposal of waste oil from the servicing of mechanical vehicles at the work site during the construction of the complex. It is not uncommon to find waste oil being drained into soils or waterways. These can have profound impacts on the aquatic life unless properly managed. These impacts are projected to be localised, be direct and long-term. Depending on the volume of oils deposited into the waterways and the level of disposal that occurs, this can be of moderate severity. Solid waste is expected to be collected by a private contractor, and all other wastes disposed in impervious lined pits. The residual impacts will consequently be minor with low severity and low likelihood of occurrence.

Biological Resources

- 7.14 The construction operations, operation of power generation equipment and roadway traffic will generate noise levels higher than currently existing background levels. Increased noise levels can potentially impact animals and modify their behaviour as it relates to search for food and nutrient supplies. It may also potentially impact the location of breeding areas and migration routes, and vulnerability to predators. But given the denuded environment of the potential project site these are direct, short term and reversible impacts. These impacts are of low severity and have a low likelihood of being realized in the project site at a particular point in time. Noise impacts can be mitigated by carrying out activities mainly during the day time hours, which is what the expectation level is with regards to this project.
- 7.15 The project will consume land and this may result in the loss of natural habitats. This loss will be restricted to the project site and maybe some of the drains that require rehabilitation. These are direct, long-term irreversible impacts. These are minor impacts with a low severity level and a high likelihood of occurrence.
- 7.16 Erosion from the construction site can potentially increase sediment discharge to streams and drains located downstream of this facility. Evidence indicates that some fish species spawn in some of the drains close to the project site, i.e., the western drainage ditch. Increased sediment discharge may

potentially ruin spawning beds for fish. Further, if culverts or tubes are installed to allow the tertiary drains to be connected to the Railway Embankment secondary drains, the constriction of surface water flows at the culverts/tubes may potentially create currents too fast for some fish species to survive. The construction of the GNBS complex may potentially serve as barriers to movement of some aquatic species, especially where culverts are used. This can potentially restrict the migration of fish, though admittedly, few were found within the ADI and the water samples indicated that these would be presently mostly in the Downer Canal. These are direct, long-term and irreversible impacts.

Ground and Surface Water

- 7.17 Surface water quality may potentially be impacted by discharges to surface water of spilled and leaked chemicals and oils from vehicle maintenance. These are direct, short term and reversible impacts. These are moderate impacts with a medium severity level and a medium likelihood of occurrence. These impacts can be mitigated by utilization of simple preventative techniques consisting of segregated and contained areas with sumps and oil traps.

Social Impacts

- 7.18 Job creation: It is the expectation that most of the labour for the construction phase will be recruited from the communities within a 5-kilometre radius of the project site, i.e., Sophia, Prashad Nagar, Campbellville, Lamaha Gardens, Turkeyen, etc. This will provide, at a minimum, some level of short-term employment for individuals, leading to gainful occupation and the retention of some of the labour power in the surrounding communities. This is also positive for family life and can be a positive, short term reversible impact. These have a high level possibility of occurrence. Most of the positive impacts related to local labour and employment creation are likely to occur during the construction phase with only minimal residual impacts being felt during the operational phase mainly with regards to building a cadre of persons who can act as maintenance personnel for the structures. However, of greater benefit is the enhanced skills which persons from the community are now expected to possess due to their exposure to the project during the construction phase. This is likely to make them more marketable but may also act as a negative to the community as they may now seek employment opportunities outside of the villages, leading to long periods away from their homes and the contingent social implications of such absence. These impacts are therefore projected to be localized, indirect, short-term and have a medium likelihood of occurring.
- 7.19 Waste: Burial of wastes or leachates, generated by both equipment and human presence during the construction phase, can potentially impact groundwater quality. Inert, non-recyclable materials, waste water from the laboratories and cleaning of the vehicles, and waste oils will be collected, but small residues may spill onto the ground. Leaching from these spills can potentially impact groundwater quality. These are local, medium term and reversible impacts. These are moderate impacts with a medium severity level and a moderate likelihood of occurrence. These impacts will be mitigated by constructing holding and collection areas, with specialised septic tanks with filter beds. The waste can then be treated and released into the atmosphere once deemed safe by the EPA. The mitigation measure will result in minor residual impacts of low severity and with a low likelihood of being realized.
- 7.20 Traffic congestion: Given the volume of traffic currently using the Eastern Highway and Dennis Street, even with the best traffic management there is still likely to be localised delays, particularly

if access to the site is via Sheriff Street. This will lead to vehicles having to cutting across on-coming traffic to access the project site, leading to some delays during specific hours. As such, the project during construction is likely to lead to increased congestion. This is a direct and reversible impact with a high probability of occurring. This does not preclude the fact that every effort should be made to have an effective traffic management plan in place, with police presence as much as is practically possible.

- 7.21 Labour and Working Conditions: The project will hire both direct and indirect workers as a result there will be several risks associated with working conditions. The associated risks are expected to be direct, short term and manageable.

D. Operational Phase

Atmospheric Impacts

Air Quality

- 7.22 During the operation of the complex a major source of atmospheric pollution would arise from the combustion of diesel and other fuels from mechanically driven vehicles and the operation of the stand-by generator during periods of power outage. Principal emission compounds will include carbon dioxide (CO₂), carbon monoxide (CO), carbons and nitrogen oxides. Emissions of sulfur dioxides (SO₂) and hydrogen sulfide (H₂S) would be dependent on the sulfur content of the hydrocarbon and diesel fuel used. The impacts of these pollutants are likely to be felt most severely by persons suffering with respiratory ailments and small children. Application of the mitigation measures will aid with managing the impacts associated with atmospheric emissions. These impacts will have a high probability of occurrence and a low level of severity after mitigation.
- 7.23 Greenhouse Gas (GHG) Emissions
Guyana has a signatory to the Paris Agreement is concerned about its project activities contributions to its national emissions. The country has committed itself to a Low Carbon Development Strategy (LCDS). The IDB ESPS₃ Resource Efficiency and Pollution Prevention will also be triggered because of the GHG emissions of the building during the constructional and operational phase. The initial calculations for the GHG of the building are as follows;

Initial Review	MT CO ₂ e	
	Land Use Change	5
	Road Pavement- Construction	51
	Road Pavement- Annual Maintenance	2
	Building Construction	1,274
	Neighborhood Operation: Emissions from Purchased Electricity	98
	Indirect Emissions from Road Operation: Increase in Vehicle Miles Traveled	0
	Subtotal	1,430
Total Emissions (Resulting from Initial Review)		
Construction:	1,329	MT CO ₂ e
Operational:	100	MT CO ₂ e
Avoided Emissions from Energy Efficiency Upgrades:	0	MT CO ₂ e

Soils

- 7.24 A major concern during the operations of the complex is the disposal of hazardous and chemical wastes (inclusive of waste oil), the former from the servicing of vehicles, testing fuel trucks and servicing the stand-by generator, while the latter will emerge largely from the operations of the microbiological and chemical laboratories. It is not uncommon to find waste oil being drained into soils or waterways and the residual oil from oil tankers ending up in water ways during testing. These can have profound impacts on the aquatic life unless properly managed. Furthermore, as discussed elsewhere in this report, in the past the GNBS has been storing hazardous chemical waste in barrels at its premises, but a more acceptable form of disposal will have to be found, i.e., exporting. Moreover, the storage facilities will have to meet best practices given the proposed new location for the facility. Lastly, the entity has been known to dilute its nitric acidic residue and release the diluted solution into the waterways. These impacts are projected to be localised, be direct and long-term. Depending on the volume of oils or hazardous chemical waste that may be deposited into the waterways and the level of disposal that occurs, this can be of moderate severity. A detailed set of management guidelines for the disposal of hazardous waste and waste oil are presented in the ESMP. With the advent of the Oil and Gas sector they are several local, regional and international waste management companies that can be contracted to address the issues of hazardous waste. There are also several initiatives the Basel Convention Center that can be leveraged to address the hazardous waste issue. Suppliers will be evaluated on their prior experience in projects of the same nature and capacity to address the needs of the operational phase. Solid waste will be collected in bins and collected by the M&CC and sewerage will be stored in septic tanks.
- 7.25 At the same time, Liquid wastes from laboratory operations are expected to be washed into a specialized septic tank which has a filter bed and stored and treated. This grey water can then be released for watering the lawns and agricultural purposes. The residual impacts will consequently be minor with low severity and low likelihood of occurrence.
- 7.26 The built structures may lead to the elimination of the productive capacity of soils covered by these buildings. However, the fact that the majority of lands in this area have been converted to buildings this is likely to be minimal. To the extent it occurs, this would be a direct, long-term negative and localised impact. These impacts will be minor with low severity and low likelihood of occurrence. This impact will be mitigated by minimizing the area cleared for the structures, allowing for the

maintenance of green spaces. The residual impacts will be minor with low severity and high likelihood of occurrence.

Biodiversity

- 7.27 A critical concern is the disposal of waste and how this would affect the aquatic life in and around the project area. During use, new oils pick up toxic chemicals, carcinogenic hydrocarbons, and heavy metals which harm the environment and public health when used oil is disposed of improperly. One pint of oil can produce a slick covering approximately one acre of water. Used oil in waterways threatens fish, waterfowl, insects and aquatic life. These impacts would be medium term and reversible and would be localized to the ADI. These are moderate impacts with a moderate severity level and a moderate likelihood of occurrence. With the indication that some residual oils escape during testing of fuel tankers, it will be important to take measures to reduce this practice by having a holding and testing bay at the new facility with the requisite collectors.

Water Quality

- 7.28 Increased built structures will modify the amount of run-off and the natural flow of surface water and concentrate flows at certain points and may increase the speed of surface water flow. These changes may potentially result in localized flooding, soil erosion, and increased sediment discharge to drainage canals around the project site. These impacts will be indirect, irreversible and can be localised in areas along the ADI. These are moderate impacts of high severity and a moderate likelihood of being realized. These impacts will be mitigated by putting in place adequate drainage facilities. This will result in minor residual impacts of low severity with a low likelihood of occurrence.
- 7.29 With the GNBS complex and the use of zinc roof, then we are expanding more impermeable covering which will potentially restrict infiltration and consequently reduce groundwater levels. This can affect aquifer recharge and access to freshwater in some of the surrounding communities that depend on well water. Furthermore, reduction in groundwater levels can potentially alter the vegetation in the site which can potentially result in changes in the habitat of fish in the area. These impacts are indirect, long-term and localized. These potential impacts can be mitigated by encouraging more rainwater collection and channelling into specific low land areas for better aquifer recharge. Further, water will be channelled to areas to ensure continuity of surface water flow. Residual impacts will consequently be minor with low severity and a low likelihood of occurrence.
- 7.30 With improvement in the GNBS Complex it is the expectation that the water amenities will also improve. For example, one feature of improving the Standards Bureau, while simultaneously addressing the water security issue, is the outfitting of the structures to be constructed with water harvesting facilities. This would be a positive impact of this project. The impacts identified expected to be localized, reversible and direct.
- 7.31 Chemicals and oils collected from sumps and segregated areas will be stored in drums and would be disposed at off-site locations. The mitigation measures will effectively remove any potential impacts to surface water quality. The residual impacts will consequently be minor with low severity and a low likelihood of occurrence. Removal of vegetative cover over new alignments in the road may potentially increase surface runoff volumes and alter drainage patterns locally in the vicinity of the rehabilitated road. These impacts will be local, long term and irreversible. These are minor impacts of medium severity and with a low likelihood of being realized.

Socio-Economic

- 7.32 *Economic Activities*: The GNBS complex may potentially induce further land use changes which may lead to economic advancement of surrounding communities. These are positive, direct, long-term, irreversible impacts. These are moderate impacts with a medium level of enhancement and a medium likelihood of occurrence.
- 7.33 *Improved Quality Standards Infrastructure*: The main purpose for the building of the building of the GNBS complex is to improve the national quality standards infrastructure. This has the potential to improve the competitiveness of products coming from Guyana, boosting exports and improving the country's trade balance. These are medium to long term positive impacts, with a high likelihood of occurring.
- 7.34 *Job creation*: During the consultations with the GNBS it was revealed that the facility, once completed, will be hiring approximately 120 persons, which represents an addition of 64 persons above what the Bureau currently employs or a more than 100% increase. Most of these persons will be in specialist areas and are expected to enhance the confidence persons and businesses will have conducting transactions with the entity. This will also aid with providing increased disposal income, quite likely in many cases, to the persons being employed. This can lead to an improvement in their standard of living. These impacts are expected to be short to medium term, localised, significant with a high likelihood of occurring.
- 7.35 *Increase in traffic along secondary roads*: If the project decides to utilise secondary routes to access the site, such as via Dennis Street, or the site via the Duncan Street entrance may result in reduced life of such roads as well as exposing other users of these thoroughfares to the possibility of more accidents. Additionally, since other users, i.e., the NGMC packaging plant utilises the Duncan Street entrance, the constant movement of vehicles transporting construction material may impact the other operations in the SEC. This will need to be carefully monitored with a constant traffic warden at the entrance (should this be the preferred access route) to direct traffic accordingly. These are short term direct and reversible impacts that have a high probability of occurring. Careful planning before the project is executed and continued public consultation can help alleviate some of the negative impacts.
- 7.36 *Improvement in social amenities*: As indicated within the Section 6, one of the projected positive impacts from the project is attributed to improved lighting, better access roads, and improved drainage and security in the area. These are all anticipated to occur as the complex will be a Government entity and for which these supporting infrastructure will be critical. The residual impact is that all those within the ADI will also benefit from these positive externalities, which are expected to be long-term, reversible, significant and with a high probability of occurring.
- 7.37 *Gender equality*: The impact on gender due to this project is expected to be minimal. Guyana is an equal opportunities country and persons are not generally hired based on their gender. This is not expected to change under this project, even though admittedly, most construction workers are still men.
- 7.38 *Community Relations and Participation*: An improved neighbourhood and environment generally tends to enhance community relations. Many of the communities in close proximity to the proposed

project site are cohesive units, with the adage “together we stand divided we fall” never being truer than in these communities. It is the expectation therefore that the project will build upon this social capital that is present within these communities through first seeking to employ the skills present therein, rather than “importing” workers. To the extent that this is pursued, the community will then tend to have a sense of belonging and ownership, which will filter over to the operational phase of the project. The impact here is projected to be mostly positive of a long-term, regional basis, with a medium possibility of occurring.

Table 12: Magnitude of the Various Positive and Negative Impacts Projected during the Construction and Operational Phases of the Proposed Project

Medium	Phase	Sensitive Receptors	Type of Impact (Direct/ Indirect)	Significance before mitigation/enhancement						
				D	I	O	E	Du	R	Total
Construction										
	Negative Impacts									
Atmospheric	1. Increased air pollution (dust)	Persons with respiratory ailments and small children	D	2	2	3	2	1	2	-12
	2. Increased air pollution (toxic fumes from vehicular traffic and construction and vehicular waste)		D	2	2	3	2	1	2	-12
	3. Major noise nuisance along project route	Schools and residents within the All	D	2	2	3	2	1	1	-11
	- during the mining of raw materials and transport	Other stakeholders in the ADI	I	2	2	2	2	1	2	-11
Geology, Soils and Topography	1. Indiscriminate disposal of waste	Other Stakeholders in the ADI	D	2	2	2	2	1	1	-10
	2. Soil erosion due to removal of vegetation associated with foundation laying	Other Stakeholders in the ADI	D	2	1	2	2	2	2	-11
	3. Contamination of soil profile from - indiscriminate disposal of chemical and biological wastes - toxic waste from construction material - fuel and other vehicular waste - lubricants and detergents etc. - chemical storage bond/room - erection of camps for construction workers	Other stakeholders in the ADI and Residents in the All	D	3	3	2	2	1	1	-12
			D	3	3	2	2	1	1	-12
			D	2	2	2	2	1	1	-10
			D	2	2	2	2	2	1	-11
		ADI Stakeholders	D	1	1	2	1	1	1	-7
ADI Stakeholders	D	1	2	2	2	1	1	-9		
Water Resources	1. Increased flooding due to water diversion and increased run off	Physically challenged, the elderly and children	D	2	3	2	2	1	1	-11
	2. Water Pollution - suspended solids and spillage of waste	Children and residents in the ADI	I	2	3	3	2	2	1	-13
Biodiversity	1. Ecological damage resulting from construction works and clearance	-	D	1	1	2	2	3	3	-12
	2. Effect on fish life	-	I	1	2	1	2	2	1	-9

Medium	Phase	Sensitive Receptors	Type of Impact (Direct/ Indirect)	Significance before mitigation/enhancement						
				D	I	O	E	Du	R	Total
Socio-Economic	1. Congestion of the roadway, particularly at peak hours	School children and the elderly	D	1	1	2	1	1	1	-7
	2. Increased traffic through secondary streets	Children	I	3	3	3	2	1	1	-13
	3. Damage/disturbance to streets and possible increased accidents	Residents and road-users	I	2	2	2	2	1	1	-10
	4. Vandalism of construction tools and materials	Contractors	D	3	3	2	2	3	2	-15
	5. Increases in construction accidents	Persons not directly involved in the construction activities	I	2	2	1	2	2	2	-11
	Positive Impacts									
Socio-Economic	1. Short term job creation for residents in neighboring communities		D	2	3	3	2	1	1	12
	2. Increased demand for supply for raw materials from local quarries and mining sector		D	2	1	3	2	1	2	11
	3. Increase in skills of workers from community		I	3	3	3	2	2	2	15
	4. Improved family life and cohesion		D	3	3	3	3	2	2	16
Operational Phase										
	Negative Impacts									
Atmospheric	1. Decline in air quality	Children, the elderly and the physically challenged	D	3	2	3	3	2	1	-14
	2. Increased congestion on Lamaha Street	-	I	3	2	2	2	3	1	-13
	3. Ground water pollution	Residents in the All and Stakeholders in the ADI	D	3	3	2	2	2	1	-13
Geology and Soil	1. Increased pollution due to improper waste disposal	Residents in the All and Stakeholders in the ADI	D	1	3	3	2	2	2	-13
	2. Reduced productive capacity of soils	Stakeholders in the ADI	I	1	1	2	1	1	1	-7

Medium	Phase	Sensitive Receptors	Type of Impact (Direct/Indirect)	Significance before mitigation/enhancement						
				D	I	O	E	Du	R	Total
Biodiversity	1. Impact on aquatic life	Residents in the All and Stakeholders in the ADI	I	1	2	2	2	1	1	-9
	1. Increased run-off	Residents in the All and Stakeholders in the ADI	D	2	2	2	2	1	1	-10
Water quality	2. Reduction in aquifer recharge rates		D	1	2	1	1	1	1	-7
	3. Change in vegetation		I	1	1	1	1	1	1	-6
Socio-Economic	1. Occupational Health & Safety	Workers	D	2	3	2	2	1	1	-11
	2. Unfair treatment or discrimination of project workers	Workers	D	2	3	2	2	1	1	-11
	3. Physical, psychological, or sexual harassment of project workers	Workers	D	2	3	2	2	1	1	-11
	4. Child and Forced Labour	Children	D	2	3	2	2	1	1	-11
	5. Sexual Exploitation and Abuse and Sexual Harassment (SEA/SH)	Workers, children and women from communities	D	2	3	2	2	1	1	-11
	2. Increased traffic congestion	Residents in the All and Stakeholders in the ADI	D	2	2	2	2	1	1	-10
	3. Increased vandalism	New GNBS Complex and stakeholders in the ADI	I	1	2	2	2	1	2	-10
	Positive Impacts									
	1. Improved standards	Populace of Guyana	D	3	3	3	3	2	2	16
	2. Improvement in income for exporters from Guyana	Populace of Guyana	I	3	2	2	3	2	2	14
	3. Increased job creation and better training for staff at the GNBS	Communities near the project site	I	3	3	3	3	2	2	16
	4. Better working conditions at the GNBS	GNBS Staff	D	3	3	3	2	2	2	15
	5. Increased competitiveness of Guyanese exports	Populace of Guyana	I	3	3	2	3	2	2	15
	6. Improvement in property value	Communities near project site	I	3	2	3	3	1	2	14
	7. Better coordination amongst standards agencies	Populace of Guyana	I	3	3	3	3	2	1	15

Medium	Phase	Sensitive Receptors	Type of Impact (Direct/ Indirect)	Significance before mitigation/enhancement						
				D	I	O	E	Du	R	Total
	8. Improvement in social amenities	Stakeholders in and around project site	I	3	3	3	2	2	2	15
	9. Improved waste management system	GNBS	D	2	3	3	2	2	2	14
	10. Better output from workers	GNBS	D	2	3	2	2	2	2	13

VIII. MITIGATION MEASURES

A. Air Quality Management

- 8.1 The noise emissions could be limited by appropriate soundproofing of individual pieces of equipment. Equipment will be fitted with special exhaust systems (mufflers). Additionally, the employees will be required to wear personal noise-protection gear, e.g., ear protectors.
- 8.2 The implementation of these measures will commence during the construction phase of the Project and the Project Management Unit (PMU) will be responsible for implementation. The costs associated with these measures are part of the project costs.
- 8.3 All vehicles transporting materials will be expected to be covered to reduce air pollution. Furthermore, as part of the contract with the Contractor for the buildings, it should be made a condition that only trucks with covered trays should be hired.

B Protection of Soils

- 8.4 To reduce the impact of excavation and earth movements in the construction phase, mitigation measures are required. The exposed surface should be covered with grass and re-vegetated as soon as possible. Erosion measures are to be implemented during construction. Further, the project will be undertaken with long-term erosion and sediment control as primary considerations. Operations conducted during the rainy season will be carried out to the satisfaction of the EPA by ensuring that at no stage of the operations will there be any substantial risk of increased sediment discharge from the project site.
- 8.5 Natural features, including vegetation, terrain, watercourses and similar resources shall be preserved wherever possible. Limits of excavation/extraction shall be clearly defined and marked to prevent damage by excavation/extraction equipment. Permanent vegetation and structures for erosion and sediment control shall be installed as soon as possible. Adequate provision shall be made for long-term maintenance of permanent erosion and sediment control structures and vegetation. No topsoil shall be removed from the area outside the excavation/extraction limits unless approved by the EPA.

C. Biodiversity

- 8.6 Vegetated will be replanted once extracted. Further, construction will occur in a manner slow enough to ensure that animals can move to other locations, even though there are very few faunal species in the location.
- 8.7 Particular attention will be paid to vulnerable or conservation-worthy plants and animal species that may be affected and conservation measures will be enforced in consultation with the EPA Biodiversity Unit and the Wildlife Division. Wildlife will be restricted access to fuel depot areas by erecting fences around the perimeter of these locations. In addition, all discharges from these facilities will be monitored to ascertain those discharges are safe for fish, as well as people.

- 8.8 Lastly, every effort should be made to take advantage of various stakeholders' strengths, while minimising institutional weaknesses. This would entail coordinating to the optimum level possible and across a wide array of stakeholders in carrying out: (a) environmental and social impact monitoring, (c) impact amelioration and mitigation, and (d) information access and public awareness building. These activities can be promoted through various mechanisms including co-management or partnership agreements.

D. Protection of Water Quality

- 8.9 Mitigation measures are required to reduce the impact on water quality. The parameters to be monitored are organic matters, pH, carbon, nitrates and nitrites mostly. Criteria for both surface and ground water to be tested are:

- Color and turbidity;
- The pH;
- Ammonium concentration; and
- The organic matter concentration.

- 8.9 Additionally, site clearing operations will progress in a gradual and phased manner to ensure there are no large increases in sediment discharge. Sediment control structures should be used to prevent the inflow of sediment to surface water. These control practices will include sediment traps and screens to control runoff and sedimentation. Surface runoff from vehicle service areas will be channelled to oil/water separators. All water from the oil/water separators will be skimmed prior to discharge. Drains will be provided for seepage collection and all seepage collected in these drains will be monitored before being discharged into the surrounding water bodies.

- 8.10 The project will undertake all aspects of the design related to the water management facilities. That work will be done before construction activities commence. The costs for the design, construction and maintenance of these facilities are an element of the project cost.

- 8.11 Contamination of water quality is projected to come mainly from improper solid waste disposal and the use of chemicals in the laboratories. To combat these impacts, it will be imperative for the GNBS to educate all employees about the proper and safe use, disposal and clean-up of chemicals. Lastly, it will be contingent upon the EPA, along with the GWI, to conduct regular water quality checks to ensure that the quality of the resource is not being compromised. The parameters to be measured will be those as set out in the water quality standards as followed by the EPA. The responsibility for these measures will fall to the PMU, EPA, and GWI.

E. Waste Management

- 8.12 The complex will be outfitted with solid waste disposal facilities and septic tanks. These must be kept clean at all times and measures must be taken for storage, disposal, collection, transportation and ultimate management of any solid and liquid waste material.
- 8.13 During construction, the contractor will be responsible for providing adequate sanitary facilities, including sanitary toilets, garbage collection, disposal and management for their operations. The

Project shall take all reasonable measure to prevent spillage and leakage of materials likely to pollute surface and ground waters.

F. Workers Health and Occupational Safety

8.14 Pesticides that are non-toxic to humans, fish and livestock will be used for habitat and vector control. The Community Health Workers framework will be utilised to provide health advisory and support health services and to monitor disease vector and disease incidences. During the construction phase of the project, emphasis will be placed on providing a safe and healthy environment for the workers. A health and safety plan will be developed and implemented to ensure compliance with the regulations of the Occupational Health and Safety (OHS) Act 1997. Occupational Safety and Health plans will be implemented in the following areas:

- Occupational Hygiene,
- Illness and Infectious disease prevention and management, and
- Sewage and all types of waste disposal.

8.14 The main environmental occupational hazards to which workers will be exposed during the construction phase are:

- Dust,
- Noise,
- Heat, and
- Fumes.

Dust Exposure

8.15 The following measures will be implemented in order to decrease or eliminate respirable dust inhalation and prevent any adverse effects on workers:

- Provision of dust respirator with filters to employees exposed during the construction material,
- Minimal denudation of vegetation around the site,

8.16 These measures will assist in elimination or reduce further the very low risk of the development of lung impregnated disease by employees exposed to dust.

Noise

8.17 The following measures will be implemented to address worker health and safety related to noise associated with the construction phase:

- Control of noise levels at source via installation of silencers on exhaust system of motor vehicles,
- Provision of hearing protection to workers exposed to high noise levels,
- Warning signs in areas of high noise levels instructing employees to wear earmuffs or earplugs as required

- Measurement of sound levels in instances where it is suspected that deviations from the previous levels are occurring.

Heat

- 8.18 Measures to decrease the effect of increased exposure to heat will include working with adequate protective clothing to reduce the effect of heat stroke and skin cancers.
- 8.19 Implementation of the management program for health and safety of employees will coincide with the commencement of construction activities and will last through work on project closure. The contractors and the PMU will be responsible for its implementation and the costs for implementation are part of the project costs.

G. Workers Education and Awareness

- 8.20 Essential for minimizing risks and occupational issues would be for the Project to undertake an intense workers' education and awareness program at the very commencement of the project. This should detail responsibilities, with clearly demarcated areas of potential hazard, waste disposal sites, etc. This will be the responsibility of the PMU, the Contractors and the Clients.

H. Community Health and Safety

- 8.21 The community health and safety will follow pathways that will restrict the exposure of the communities to the negative impacts associated with the program in its construction phase. These will involve improved signage, development of a public awareness program, working only during the daylight hours to ensure that the noise levels related to construction activities are in consonance with the ambient noise level, and use sprinklers to keep the dust level down. It will also be necessary to ensure that the construction site is fenced to keep out possible unwanted "guests", while simultaneously allowing the students to continue using the nearby basketball court for recreational activities.
- 8.22 Furthermore, the main challenges to the communities' health and safety during the operational phase is likely to come from impure water quality, poor waste disposal, insufficient understanding of how to monitor a solar system, potential for fire outbreaks (particularly during the dry season when the stand-by generator is operating) and general lack of adherence to occupational safety when conducting routine maintenance to the structures. To address these challenges, an occupational health and safety manual should be prepared for the stakeholders under this project. This manual should then be rolled out at the commencement of project operations, with regular training sessions and refresher workshops. This would be the responsibility of the Contractor and the PMU.

I. Community Education and Awareness

- 8.23 As mentioned above, there will be need for the development of a public awareness program. This should ensure that the messages are targeted at the different interest groups and various media are used to communicate these. This will be the responsibility of the PMU.

L. Promotion of Gender Equality

- 8.24 This program is not expected to have any significant impact on gender equality. Nevertheless, it should continue to be monitored to ascertain that the program does not deviate from the a priori expectations. This will be the responsibility for the Ministry of Human Services and Social Security and the PMU.

M. Disaster Risk Management

- 8.25 The main disasters that the project will face are localized flash flooding, droughts and fires set by squatters. The project is not anticipated to exacerbate these but may be impacted by these, nonetheless. As such, it is imperative to treat with these using adequate and pragmatic mitigation measures. As regards localized flash flooding, the project should ensure that the project site is well equipped with functioning and effective drainage systems. Further, the construction of all structures should adhere to the building standards of Guyana, where elevated structures are always recommended along the coastal plain. This would ensure that the project does not have to face the constant scourge of flooding that can weaken the foundation of structures, lead to water contamination if the chemical bonds and gas storage facilities do not adhere to these standards, damage valuables and result in the spread of water-borne diseases.
- 8.26 Concurrently, the project has little control over droughts but given that all the climate models are indicating more extreme El Nino type weather events unless there is a drastic cut in greenhouse gas (GHG) emissions, then it is contingent upon the project to plan accordingly. In this sense, the complex should be outfitted with a redundant freshwater storage facility. This facility should remain full at all times and will be utilized during the dry season. Monitoring this facility will be the job of the GWI, Ministry of Health, and the GNBS.
- 8.27 Lastly, the GFS indicated that approximately 2 to 3 years ago fire was known to occur in the Sophia squatting and adjoining areas. The Fire Prevention Officer posited that approximately 80% of these fires were caused by humans. These fires were started largely to clear the area for security and land development purposes. This approach was often viewed as most cost effective. It will be imperative that the natural fire breaks be observed, public education about fire prevention ramped up, and that the facility have fire mitigation facilities.

IX. RISK ASSESSMENT AND MANAGEMENT

- 9.1 According to the *National Integrated Disaster Risk Management Plan and Implementation Strategy for Guyana (2013)*, the two major hazards threatening the coast of Guyana are floods and droughts. The proposed project site falls within a flood plain. This makes it particularly vulnerable in the wet season or during periods of unseasonal rainfall, to possible flooding. This was evident in the December 2005 floods that rose to almost 2 feet in the project site and took more than 3 weeks to be drained (ECLAC Damage Assessment Report, 2005; Civil Defence Commission, 2013). Flood in this context is defined as the temporary covering by water of land not normally covered by water. This term is a generic term to include floods from rivers, mountain torrents, water courses, and floods from the sea in coastal areas, and may exclude floods from sewerage systems. Floods occur when the natural or man-made channels are unable to carry all the water, leading to rising water flows that flow over the banks and flood the surrounding dry land.
- 9.2 Guyana, meaning land of many waters, is home to many rivers, streams and creeks. Furthermore, it utilises a complex drainage and irrigation system, inclusive of conservancies, to make the Coast habitable. As explained in other parts of this report, the country is also well endowed with ground water and excess water flows from the highlands in the south to the low lands in the north using gravity.
- 9.3 Over the years, changing global weather patterns (IPCC, 2015) and land use within the proposed project site have exacerbated the potential for flooding, unless the requisite mitigation measures are adopted. Floods have been recognised as potentially undermining Guyana's drive towards a green economy and a sustainable development pathway with the adverse effects they have on the economy. At the same time, more frequent drought events said to be associated with the El Nino weather phenomenon (Development Policy and Management Consultant, 2009) threaten the project site. This project aims to manage the risks that floods and droughts pose to human health, the environment, and economic activity.
- 9.4 The identification of areas with potential significant flood, drought and security risks has to be based on available or readily derivable information. No definition for the term 'significant' was provided so the consultant has the flexibility to determine which areas are considered to have a significant flood, drought and security risk potential within a national context. In accordance with the requirements of the terms of reference, the assessment presented in this report has considered 3 main types of flooding, including natural sources, such as that which can occur from rivers, the sea and estuaries and heavy rain and groundwater, and the failure of built infrastructures. Similarly, it considers the main source of drought as being derived from natural sources; while in this case, public insecurity is derived from exposure to construction activities during the erection of the complex.

A. Rainfall Flooding

- 9.5 As discussed earlier, Guyana has a bimodal weather pattern, with two wet and two dry seasons. Rainstorms occurring in the areas of the various catchments of Guyana generate surface water runoff that converges and flows through the various drains, rivers and streams. This is a result of the specific climate and watershed characteristics found in Guyana, and more specifically, within the project site. Rainfall events can range from a couple of minutes to days and given that all watersheds are large, and the project area is close to the sea in a low elevation area, surface runoff is rapid and is often synchronized with the rising and the falling of the tide in the Atlantic Ocean.

- 9.6 During the rainy season, the tertiary and secondary drains are reactivated with runoff water flowing for a couple of hours in some areas following the end of a rainfall event, as drainage is heavily dependent on the falling of the tide in the Atlantic Ocean. It is further noted that the lower parts of some of the larger catchments have become urbanized around the low-lying coastal areas. The original watercourses have become incorporated into the development footprint and some of the catchment areas have been converted into housing schemes and other social infrastructure. Intense rainfall does lead to localise and flash flooding around the proposed project site in communities such as Sophia and Liliendaal. Some urban areas have been made susceptible to accumulation of surface water runoff due to lack of foresight and failure to provide rainwater infrastructure alongside the spread of urban sprawl and other areas that formerly provided areas of percolation.
- 9.7 Although there is incomplete information on past flood events in the proposed project site, the following observations can be made:
- Flooding does not occur during normal periods of rainfall, but the site is susceptible to flooding during periods of intense rainfall, leading as well to ponding of water in specific sections.
 - Flooding occurs due to rainfall and thus tends to be most severe during the November to December and May-June months,
 - Some of the adverse consequences associated with past flood events were the result of a very limited public perception of the flood risk,
 - The lack, and insufficient maintenance of an adequate storm water infrastructure is one of the main problems leading to flooding,
 - The most widespread consequence of past flood events is the disruption of traffic and economic activities as a result of the temporary covering of some surrounding roads and streets, and
 - In most cases a combination of rapid urbanisation and planning, which did not integrate storm water control, led to the modification of the flood plains which are then flooded by street surface runoff with the onset of intense rainfall events.

B. Flooding from the Sea

- 9.8 The project is approximately 1,900 meters from the seawall that helps to protect the coast of Guyana from rising sea levels. This coastline is often exposed to saltwater over topping during above normal high-tide events. Additionally, there is the possibility of saltwater intrusion into the freshwater system during periods of extreme drought. While the site is not immediately in danger of being flooded from the sea, the Rupert Craig Highway that runs parallel to the seawall, has been known to experience localise flooding.

C. Flooding from Infrastructural Failure

- 9.9 Most of the agricultural lands on the coast and the water system that serves this site receive their water from the East Demerara Water Conservancy (EDWC). This is a body of water with catchment area of approximately 200 square miles that is impoldered by a system of earthen dams. The dams serve both the purpose of flood prevention and the retention of irrigated water. The system operates in a manner that often results in water being released into the main drainage canals at (i) Sara Johanna, (ii) Nancy Intake, (iii) Annandale Intake, (iv) Hope canal, (v) Shanks Intake, and Maduni Outlet and into the Atlantic when the expected onset of the rainy season is near. This is to prevent possible over-topping of its banks when the rains come. However, there have also been cases, due

to insufficient early warning systems, where waters were released but the rainy season failed to materialise resulting in significant hardship. Should the banks of the EDWC fail the risk of flooding is significant because of the high volumes of water involved. However, planning for this possibility is on-going with a new drainage canal recently being opened at Estate Hope on the East Coast, approximately 15 miles from the proposed project site.

D. Future flood risk

- 9.10 A large volume of work has already been carried out to develop hydrological models of the Guyana coastal river basin and catchment areas and to model future flood events. This support is being provided largely by the World Bank and the Government of the Kingdom of the Netherlands⁴¹ (Flatts, *per comm.*, 2016). The first important study in this regard was the EDWC Rehabilitation Project which developed a hydrological model of the present and foreseeable flood events in an effort to identify the key problem areas. The EDWCRP also included a technical feasibility study to abate the flooding by suggesting a number of technical options. Due consideration was given to the effectiveness of existing structures in alleviating problems as well as explore potential benefits of future project options. The EDWCRP adopted a comparison procedure for filtering and ranking the major flood relief projects in order to be able to prioritize the projects and to enable the Guyanese decision maker to choose the order of the projects construction. Preference was given to projects within the following criteria: (i) urban areas rather than those draining agricultural areas, (ii) densely populated areas, (iii) commercial areas, and (iv) flood relief in areas located in the vicinity of public services such as hospitals, first aid stations, police, fire stations and other public serving and essential institutions and premises.
- 9.11 The risk of flooding in the areas was calculated according to a widely accepted definition of flood risk. The flood risk, measured in \$/yr. of damages caused by a certain rainfall storm, is defined as the probability of failure of the hydraulic system, i.e. the storm water system, corresponding to the occurrence of the storm – overcoming probability (pf), by the associated expected damages (E(D)): $R = pf \cdot E(D)$. The probability of failure is a function of the occurrence of a certain rainfall storm (hazard) and of the performance of the storm water system (vulnerability). The calculation of the probability of failure included (i) rainfall analysis, (ii) determination of flow discharges, (iii) flood routing models, and (iv) hydraulic design of only storm water system.
- 9.12 For the practical application of the flood risk assessment, the expected damages were evaluated for flood events of different probabilities. Based on these damage evaluations, a damage-probability curve was constructed. In the risk calculation, all hydraulic processes are not deterministic. Moreover, the expected damages were also associated with uncertainties since little information is available about the relation between damage causing factors and the resulting flood damage. Therefore, for the design rainfall event, there is a residual flood risk that assumes an acceptable value ($R \rightarrow 0$), defined according to International and/or National standards. The purpose of calculating this flood risk is to create an accepted vulnerability level of the system, namely, to provide flood relief to the project area vulnerable to impact from the rainfall storm with a return period of 1 in 5 years, as established statistically by the rainfall data captured by the EDWCRP study, that is on-going.

⁴¹ The draft report from this flood modeling effort is expected to be presented to the Government during the week of September 9, 2016.

- 9.13 The level of accepted vulnerability was derived after considering the specific assets at risk, the type of floods that occur in Guyana, the type of storm water infrastructure required to provide flood relief in along the Guyanese cost and cost-effectiveness considerations. Common return period of similar projects is between 10 to 20 years, but there are a number of arguments that support the value of 5 years as the optimal solution for the EDWCRP. A return period of 10 years would have increased the cost of the project implementation by approximately 40%, making the project economically unviable. Moreover, in terms of risk of occurrence of a storm of a certain return period (5,10, 20 years) within the expected life of the system (50 years) the benefit of adopting 10 instead of 5 years return period is limited.

E. Future Flooding and Climate Change

- 9.14 In projecting for possible future flood events, the consultant sought, apart from reducing the risks to life and property, to also reduce the vulnerability to climate change. This is addressed through proposing the development of infrastructure that is capable of withstanding the uncertainties associated with future flood events and also through the adoption of a holistic catchment based approach to surface runoff management. Moreover, the National Climate Change Adaptation Strategy has put forward a number of recommendations to limit the effect of climate change on the occurrence of flood events such as the enforcement of the fines for not adhering to the building codes of Guyana and Georgetown more specifically.

F. Drought Risks

- 9.15 The current clear and overwhelming consensus is that drought impacts and their causes will worsen over the coming 10 to 20 years (IPCC, 2015). This projection is based on a changing climate regime as a major driver of future risk. Guyana as a country has witnessed at least 3 El Nino weather events in the past 10 years, i.e., 2007/2008, 2012 and 2015. Yet, the country seems ill-prepared for droughts. While many homes and businesses have implemented water saving and rainwater harvesting facilities, these seem more in response to the quality of water being provided by GWI rather than as a drought reduction strategy. It will be important for the project to pursue at least 3 main measures to combat drought: (i) invest in rainwater harvesting facilities, (ii) invest in greywater recycling facilities, and (iii) install water efficient implements at the complex.

G. Security Risks

- 9.16 Security risks come from two main sources. In the first instance, there is a basketball court that is currently situated northwest of the proposed project site. This court is frequented by youths and juveniles, particularly from the Sophia Juvenile Centre, Sophia Training School and SSS. It is possible that during construction, unless properly ring-fenced, some students may end up in the construction zone, thus risking injury to limb and possibly life.
- 9.15.1 The second risk comes from possible vandalism and theft of property by those entering the site that should not be there. This was raised as a strong possibility and therefore would require not just more bodies in place, but also greater vigilance on the part of the security personnel.

H. Labour Management Risks

- 9.15.2 Labour Management risks of the project emanates from the hiring of project workers but direct and contract workers. The labour risks are enhanced during the construction phase of the facility but will also exist, even minimally during the operational phase. The labour risks come mainly from the following areas:
- 9.15.3 OHS consists of risk of exposure to several hazards that could result in illness, injury or death such as due to workplace injuries, improper use of PPE or COVID-19 related illness.
- 9.15.4 Unfair treatment or discrimination on the basis of personal characteristics unrelated to job requirements, such as race, gender, religion and sexual orientation is a risk of the project especially the physical works. These risks apply to all project workers, including those employed by the PMU.
- 9.15.5 Physical, psychological or sexual harassment and abuse are risks that all project workers face. These Risks include both physical forms of harassment and abuse (such as violence and sexual assault) and non-physical forms (such as verbal abuse, bullying and unwanted sexual attention).
- 9.15.6 Inappropriate or criminal behaviour, such as sexual harassment SEA/SH of a person, exploitative sexual relations, and illicit sexual relations with minors from the local community. SEA/SH also includes any exploitative sexual relationships and human trafficking whereby women and girls are forced into sex work.
- 9.15.7 The risks of child labour or forced labour is high in Guyana. However, the project will require skilled labour and technical staff with experience and education above a certain minimum age, in line with ESPS2. Force labour will be prohibited at all levels of the project activities.
- 9.15.8 Children above the age of 16 years of age can only be hired by the Project to provide light work that does not expose said child to hazards and harms their health and interfere with their education, in line with ESPS 2. Persons under 18 years of age cannot work in any construction activities supported under the Project

X. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

A. Environmental Management System to be implemented

- 10.1 This Environmental and Social Management Plan (ESMP) for the construction of the new GNBS Complex has been prepared in compliance with requirements of the Terms of Reference of the Inter-American Development Bank (IDB), IFC Environmental, Health, and Safety (EHS) Guidelines, and the Guyana Environmental Protection Act. For projects of this type, an authorization/"permit" is required from the Guyana Environmental Protection Agency (EPA). A meeting was held with the EPA on August 3, 2016, at which the Project was discussed. Representatives from the EPA stated that the project would require a permit. The application form for this permit has to be completed by the Bank, along with a sketch of the Project and submitted to the EPA.
- 10.2 The Client is committed to enforcement of the stipulations contained within the ESMP dictated by Guyana's EPA regulations and those of other bodies for environmental and social management of built development projects. Further, the GNBS is prepared to adhere to regulations which may be more stringent than those identified, if adequate technical justification is provided for those standards and provided that those standards do not compromise the economic viability of the proposed action. The GNBS will hire an Environmental, Health and Safety (EHS) officer. That officer will have specific responsibility for enforcement and for adherence to and compliance with EHS issues and for implementation of the ESMP.
- 10.3 The ESMP incorporates protection, mitigation and enhancement measures. The avoidance and mitigation measures include:
- Engineering designs and disposal techniques,
 - Pollution control, recycling, and monitoring of scientifically sensitive areas and resources, and
 - Enhancement of the physical environment, where possible, and stakeholders' involvement.
- 10.4 Additionally, the ESMP outlines a separate monitoring framework to assess the effectiveness of the Plan over time. The monitoring framework will determine whether the ESMP requires reorienting, based on changed conditions or factors not necessarily accounted for in the Plan. The ESMP's purposes therefore are:
- to reduce the risks of adverse impacts that may be associated with the project on environmental resources, and
 - to minimize disturbance to local stakeholders and/residents.
- 10.5 The national environmental regulation, the Inter-American Development Bank's (IDB) requirements and socio-physical environment are described above. As such, no further discussion on the project's justification and importance are deemed necessary. However, it is important to elaborate that the application of the EHS Guidelines is to outline the performance levels and measures that are normally acceptable to IFC, and that are generally considered to be achievable in new facilities at reasonable costs by existing technology.
- 10.6 The EPA Guidelines for Environmental Assessment identify that developers should demonstrate within their environmental management plans that they have an objective to meet the ISO14000

standards. It is expected that the contractor would have an Environmental Policy in place that should accompany their site specific environmental management plan.

- 10.7 The ISO14000 series of international standards have been developed for incorporating environmental aspects into operations and product standards. In September 1996, the International Organisation for Standardisation finalised the ISO 14001 standards for environmental management systems. Similar to the Quality Management System (QMS) implemented for ISO 9001, the ISO 14001 requires implementation of an environment management system (EMS) in accordance with defined internationally recognised standards (as set forth in the ISO 14001 specification).
- 10.8 As with ISO9001, the key to a successful ISO14001 EMS is having documented procedures that are implemented and maintained in such a way that successful achievement of environmental goals, commensurate with the nature and scale of activities, is promoted. In addition, the EMS must include appropriate monitoring and review to ensure effective functioning of the EMS and to identify and implement corrective measures in a timely manner. It is only within the context of this certification that compliance with the environmental social management plan for this project can be assured. Many of the procedures outlined in the following sections are inherently part of an environmental management quality control system.
- 10.9 From baseline information collected during the preparation of the ESA potential impacts were identified that will require mitigation, through best practice during construction and operation of the GNBS complex, or through special measures employed as part of the contracted work. Impacts on the environmental components have been categorized into positive and negative impacts and further into direct (noise and dust pollution) and indirect impacts (improvement in amenities due to the construction of the complex). Additionally, it is important to distinguish between short- and long-term impacts occurring during the construction and operational phases of the project.
- 10.10 Activities to be carried out during each stage of development are further divided into:
- Detailed design mitigation;
 - Implementation/installation of mitigation measures;
 - Response to incidents or unforeseen issues arising e.g., spills, emergency situations, chance finds (construction stage only);
 - Routine daily and weekly inspections;
 - Review of ESMP and Construction Environmental Management Plan (CEMP);
 - Performance and compliance monitoring and response to any corrective actions;
 - Reporting – Daily Inspection Logs, weekly reports, monthly reports and quarterly reports in conjunction with Contractor's project management administration procedures.
- 10.11 The ESMP should be applied as a document that provides direction on the management of the environment and social relationships to construction, inspection and management personnel throughout the construction and operational phases of the project. The ESMP sets out the condition that the project is expected to follow to meet legislation, regulations and best practice for sustainable management of the project. The goal of the ESMP, therefore, is to reduce adverse impacts on both the physical environment and affected stakeholders as identified in the ESA. This ESMP is a legally binding document and the actions contained therein are expected to be followed by the Contractor(s), who will need to demonstrate their commitment through the adoption of this

ESMP and the development of a CEMP for the stages of the project, for which they have responsibility.

- 10.12 The Contractor(s) will need to include the compilation, implementation and the administration of the ESMP on the site, including training of the site team on their environmental duties and responsibilities. For ease of reference, a summary of environmental positive impacts and negative impacts which will require mitigation are highlighted below and reflected in [Table 13](#). Furthermore, for ease of reference, the issue is first identified, followed by a discussion of the mitigation measure and who will be responsible for executing the specific mitigation measure(s).

Table 13: Summary of the Potential Impacts during the Construction and Operation of the GNBS Complex

Medium	Impact	Type of Impact (Direct[D]/Indirect[I])	Mitigation/ Enhancement/ Avoidance	Phase	Design Requirement	Procedures for execution	Responsible Entity/ Individual for Mitigation	Budget
	Negative Impacts							
Atmospheric	1. Increased air pollution (dust)	D	Dampening and covering of vehicle trays to be used	Construction	None	Identify best practice methods and ensure machinery and equipment are designed for dust suppression	Contractor & EMS	Contractor staff time
	2. Increased air pollution (toxic fumes from vehicular traffic and construction and vehicular waste)	D	Filters to be used on vehicles or alternative methods	Construction and Operational	None	Identify best practice and ensure vehicles and machinery are operating optimally, thus emitting limited exhaust fumes and potential noxious emissions	Contractor & EMS	Contractor staff time
	3. Major noise nuisance along project route	D	Mufflers or alternative methods to be used	Construction	None	Contract Specification for contractor to have protocol in place for managing any complaints – Use Communication Plan. Agree noise levels and working hours with EPA.	Contractor & Vehicle owners	Included in contract with vehicle owners
	- during the mining of raw materials and transport	I	Mufflers or alternative methods to be used	Construction	None	Contract Specification for contractor to have protocol in place for managing any complaints – Use Communication Plan. Agree noise levels and working hours with EPA.	Mine Operators & Vehicle owners	
	4. Increase in congestion along the Lamaha Street	I	Transport materials during off-peak hours and adhere to traffic laws	Construction and operational	None	Work with the Guyana Police Force to identify best routes to access the site	Contractor and Client	
Geology, Soils and Tannin	5. Ground water pollution	D	Construct sump for collecting of wastewater and treat before releasing into the environment	Operational	Include tank for the collection of wastewater, with filter bed in the design	Work with the EPA to design best model for treating wastewater from the facility	Client	Cost for constructing wastewater recycling facility
	1. Indiscriminate disposal of waste	D	Adequate waste disposal facilities	Construction and operational	None	Waste facilities are clearly designated and disposed using private contractors. Hazardous	Contractor and Client	

Medium	Impact	Type of Impact (Direct[D]/Indirect[I])	Mitigation/ Enhancement/ Avoidance	Phase	Design Requirement	Procedures for execution	Responsible Entity/ Individual for Mitigation	Budget
						chemical waste will be collected and stored to be exported.		
	2. Contamination of soil profile from toxic waste from construction material/fuel/lubricants/detergents etc.	D	Manage the containment of materials, fuel storage, and equipment with efficient prevention measures in place	Construction and operational	None	Identify best practice within site methods and supply adequate covering materials, bonding facilities for long term storage of any fuels, oils, or chemical shelters to avoid any potential combustion of heat/light sensitive materials. Further, work with the M&CC to determine the elevation off the ground for the chemical bond	Contractor, EMS & Client	
	3. Soil erosion from land clearance for storage of raw materials, construction camps and laying foundation	D	Utilize an area already denuded as construction site and clear only spaces needed for construction activities	Construction	None	The site most suitable for the placement of storage and workers camp will be identified	Contractor & SC	
	4. Reduced productive capacity of soils	D	Ensure that as much green spaces are retained as possible	Operational	None	Follow best practices during the operations of facility to maintain its environmental integrity	Client	
	1. Possible increased flooding due to water diversion and increased run off	D	Conduct thorough site survey to determine the number of culverts that will possibly need to be installed and maintain watercourses flow potential through inspection and regular clearance	Construction and Operational	Design specifications to identify the most reasonably practical place to locate any new culverts	Retention basis will be placed strategically along the project site to trap sediments in surface water before discharge	Contractor, SC and EMS	Included in contract bill of quantities

Medium	Impact	Type of Impact (Direct[D]/Indirect[I])	Mitigation/ Enhancement/ Avoidance	Phase	Design Requirement	Procedures for execution	Responsible Entity/ Individual for Mitigation	Budget
Water Resources	3. Increased flooding due to intense rainfall and/or overtopping at the EDWC	D	Adhere to the M&CC and CH&PA building codes	Operational	Design structures to reduce the risk of flooding by adhering to national building codes and standards	Applications and design specifications to be approved by the M&CC and CH&PA. Additionally, the NDIA will install early-warning systems at the EDWC and continue to rehabilitate outfall canals, i.e., Hope, Cunha and Maduni	Contractor, Client, NDIA, M&CC and CH&PA	Included in contract bill of quantities
	3. Water Pollution from suspended solids and spillage	D	Application of best practices, such as lining pits with flexible impervious membrane	Construction	None		Contractor, SC & EMS	
	4. Reduction in aquifer recharge rates	D	Application of best practices through leaving as much green spaces as possible to allow for percolation of water	Construction	None	Design application is cognizant of this requirement	Contractor	Part of contract
	5. Increase in drought conditions that can lead to water scarcity at the facility	D	Construct redundant water facility	Construction	Modify design to include rainwater harvesting and water storage tanks	Design specifications modified based on climate models and information from the Hydrometeorological Department (HD) to assess future demand for water	Contractor and Client	Cost for the construction of the water harvesting and storage facilities
Biodiversity	1. Damage to ecology from construction works	D	Use best practices to reduce the impact on the environment	Construction	None		Contractor	
	2. Effect on aquatic life	I	Mitigate foreign material getting into the waterways	Construction and Operational	None	Have clearly marked waste disposal bins for waste separation and collection	Contractor and Client	
Socio-Economic	1. Congestion of the roadway, particularly at peak hours	D	Road users should be provided advance notice in a clear, timely and culturally appropriate manner via various media (TV, newspaper, radio, roadway signage, etc.).	Construction and operational	None	Advanced notice periods to be agreed	Contractor and GPF	Cost for notices in the local press

Medium	Impact	Type of Impact (Direct[D]/Indirect[I])	Mitigation/ Enhancement/ Avoidance	Phase	Design Requirement	Procedures for execution	Responsible Entity/ Individual for Mitigation	Budget
Labour and Working Conditions	2. Increased traffic through side streets	D	The contractor, in collaboration with the Guyana Police Force will establish an effective Traffic Management Plan (TMP)	Construction and operational	None	Proper signage and notices to be instituted	Contractor, & GPF	Cost for notices in the local press
	3. Road safety concerns	D	The TMP will consider safety along main carriage way as well as through areas of ADI and All. Measures will include proper signage, pedestrian walkways and notices	Construction and operational	None	Advance notice period to be agreed with the Contractor	Contractor, GPF, SC	
	4. Deterioration of side streets	I	Restrict access through some side streets and enforce the TMP	Construction and operational	None	Prior notice to the members of the public in the print, electronic and voice media	Contractor & M&CC	
	5. Security concerns	D	Fence the construction site and install no go zones. Hire vigilant security officers	Construction and operation	Include a fence in the design	Increased signage with regards to the zonation of the site.	Contractor and PMU	To be determined
	6. Impacts on users of the facility including access reduction and restrictions	D	Implement the Stakeholder Engagement Plan and the GM (Annex 3)	Construction	None	Increased signage with regards to the zonation of the site	Contractor and PMU	
	1. Exposure to several hazards that could result in illness, injury or death such as due to workplace injuries, improper use of PPE or COVID-19 related illness.	D	Implement the mitigation and management measures in the LMP (Annex 3)	Construction and operation	Water stations, sanitation facilities on construction site, workers specific entrance and exists	Listed in the LMP	Contractor and the PMU	Included in the ESMP and ESS costs

Medium	Impact	Type of Impact (Direct[D]/Indirect[I])	Mitigation/ Enhancement/ Avoidance	Phase	Design Requirement	Procedures for execution	Responsible Entity/ Individual for Mitigation	Budget
	2. Unfair treatment or discrimination based on personal characteristics unrelated to job requirements, such as race, gender, religion and sexual orientation is a risk of the project especially the physical works. These risks apply to all project workers, including those employed by the PMU.	D	Implement the mitigation and management measures in the LMP especially Code of Conduct and Local Labour Laws and Grievance Mechanism (Annex 3)	Construction and Operational	None	idem	Idem	Idem
	3. SEA/SH ⁴² Impacts including human trafficking and sexual relationships with minors.	D	All project workers' contracts will include a CoC (Annexe 3) with SEA/SH provisions and the PIU will monitor compliance. Project workers will be provided GBV orientation. SEA/SH considerations are included in the GRM for project workers, in the form of maintaining a list of SEA/SH service providers.	Construction and Operational	None	idem	Idem	Idem

⁴² refers to inappropriate or criminal behaviour, such as sexual harassment SEA/SH of a person, exploitative sexual relations, and illicit sexual relations with minors from the local community. SEA/SH also includes any exploitative sexual relationships and human trafficking whereby women and girls are forced into sex work.

Medium	Impact	Type of Impact (Direct[D]/Indirect[I])	Mitigation/ Enhancement/ Avoidance	Phase	Design Requirement	Procedures for execution	Responsible Entity/ Individual for Mitigation	Budget
	4. Physical, psychological or sexual harassment of project workers	D	<p>The project will adopt a zero-harassment policy for all workers, reflected in the CoC and to be broadcast to all workers through various media and formats. The CoC will be integrated into contracts of all. The project GRM will be available to all Project workers.</p> <p>Awareness raising and training will be conducted for all Project Workers reviewing the terms and conditions of these procedures and tools.</p>	Construction and Operational	None	Idem	Idem	Idem
	5. Child and Forced Labour	D	<p>Certification of labourer's age using legally recognized documents.</p> <p>Awareness raising of the CoC, careful monitoring, and strict enforcement of compliance.</p> <p>Where persons under the age of 18 but above the 16 years of age are hired, the project will maintain a register containing the dates of their births and the type of work they provide in line with ESP52, and with the Employment Act (Annexe 3)</p>	Construction and Operational	None	Idem	Idem	Idem

Source: ESA, 2018

B. General Roles and Responsibilities

- 10.13 *Tables 14 and 15* outline the administration roles and responsibilities of the client and its representatives, regulatory agencies, and Contractor in the preparation and detailing of protocols to be followed during the construction and operational phases of the project. Many of these protocols will be done in consultation with other stakeholders, such as the private sector, residents, and the taxi and mini-bus associations. These roles and plans should be agreed by all parties prior to the commencement of any contract activities. This ESMP is a transitional document and aspects may be adjusted based on review and changed conditions in the field.

Table 14: Key Role and Responsibilities for Environmental Management of the Project

Role	Lead Responsibility
PMU Project Manager	<ul style="list-style-type: none"> Overall Management of the Project and main liaison with GoG and IADB. Oversee project and meet regularly with key members of the Supervising Consultant and his team and the Contractor's Project Management team and provide feedback to the Client and the GoG. Attend public consultation meetings as required.
PMU Environmental Engineer	<ul style="list-style-type: none"> Overseeing that the overall implementation of the ESMP. Undertake regular inspections on a discretionary basis of all areas of the works, site offices, compound, storage of materials areas and general provisions for environmental management during pre-construction and construction activities. Conduct reviews to ensure reporting and monitoring systems are in place and being maintained and recorded appropriately. Recording any incidents that require corrective actions which could be recorded as non-compliance. If the action is not corrected within the dedicated timeframe, the EE will write the Contractor on this formally. Be consulted on any departure from the stipulations of the ESMP. Follow up visits to be undertaken to check actions have been carried out appropriately. Attend regular meetings with other environmental representatives from Contractor and Consulting organisations. Attend regular project management meetings.
Supervising Consultant	<ul style="list-style-type: none"> Maintain administrative overview and design, review and monitor inspection reports and identify actions to Contractor. Audit the Principal Contractor's Construction Environmental Management Plan and activities associated with strategic plans and method statements and compliance with the Contract Specification, local regulations and the ESMP. Maintain inspection reports. Provide weekly reports to the Client Hold regular meetings with the Contractor's Environmental Inspector and the GNBS Environmental representative and others as required. Ensure compliance and performance monitoring of the ESMP are conducted as stipulated in the ESMP. Monitor compliance with the engagement of the public in accordance with the Communication Plan.
Construction Contractor Project Manager	<ul style="list-style-type: none"> Contractor responsible for compliance with Quality Environment and Safety, and the full implementation of the ESMP.
Contractor's Environmental Manager	<ul style="list-style-type: none"> Reports to Contractor's Project Manager and the Supervising Consultant Environmental.

Role	Lead Responsibility
	<ul style="list-style-type: none"> • Regular daily site inspections of all work areas and reporting as required for corrective actions. • Training new team members on any environmental aspects and specific tool box talks for site specific activities e.g., occupational health and safety, etc. • Coordinate all environmental quality testing as required by the ESMP. • Provide monthly reports to the Project Manager which will include training and induction records; incident reports and reports /complaints by the public inclusive confirmation of actions taken. • Maintain waste management records – materials and domestic waste management. • Implement with the Contractor's site team adherence to the strategic plans - Traffic Management Plan, Communication Plan, Emergency Response Protocols and general environmental best practice. • Prepare site specific or standard generic methods for the site team to adhere to for working near watercourses. • Implement the ESMP in full. • Agree hours of working to meet accepted noise and vibration limits in consultation with GNBS and EPA. If there is to be a variation in the agreed times, must write the GNBS and the EPA for written consent well in advance so the public can receive at least two (2) weeks notice in advance of the deviation.

Table 15: Responsibility for the Development and Approval of Specific Plans

Mitigation Strategy as per ESIA	Comments		
	Construction	Operational	
Emergency Response Plan (ERP)	Updating and Reviewing the ERP will be the responsibility of the Contractor with approval being sought from the GNBS and/or the EPA	Same as in the case in the construction phase	Consultation with stakeholders is required to ensure this would be a working document with commitments of all relevant parties who will be required to participate in the successful implementation.
Waste Mitigation strategy	Updating and Reviewing the ERP will be the responsibility of the Contractor with approval being sought from the GNBS and/or the EPA	Same as in the case in the construction phase	Consultation with stakeholders is required to ensure this would be a working document with commitments of all relevant parties who will be required to participate in the successful implementation.
Communication Strategy (CS)	Updating and Reviewing the CS will be the responsibility of the Contractor with approval being sought from the GNBS	Same as in the case in the construction phase	Consultation with stakeholders is required to ensure this would be a working document with commitments of all relevant parties who will be required to participate in the successful execution of the actions. Furthermore, it must be linked with the TMP to reduce the negative impact of the project, particularly during construction on businesses and residents.
Training and Induction Plan	Update and review will be the responsibility of the Contractor and the Supervising Consultant's Environmental Management Specialist with approval being sought from the GNBS and/or the EPA	Same as in the case in the construction phase	Training will cover all aspects of the project's activities and must be done prior to a person commencing work. Hence, this document must be prepared prior to construction activities.
Traffic Management Plan (TMP)	Updating and Reviewing the TMP will be the responsibility of the Contractor with approval being sought from the GNBS		Cross reference to CS and maintaining traffic over two carriageways during works and restricting flow through cross-streets and built-up areas.
Environmental Permit	ditto	ditto	

C. Risk Management and Emergency Response Plan

- 10.14 The Contractor(s) shall prepare and submit to the Engineer within the PMU at the GNBS prior to initiation of construction, a Risk Management and Emergency Response Plan (RM&ERP) which outlines procedures for responding to environmental and social emergencies that may occur as a result of unforeseeable circumstances, such as a spill of hazardous materials, significant flooding as

occurred in 2005, or El Nino type events. Since it is the expectation that the Program will be managed based on the work taking place the PMU Environmental Specialist or a Supervising Engineer's Environmental Manager should lead on the coordination of any stakeholders' meetings to collaborate on the RM&ERP implementation. The PMU's Environmental Specialist or the Supervising Engineer's Environmental Manager should also manage the liaison required between the individual phases of the works and management.

- 10.15 At a minimum, the RM&ERP should provide procedures demonstrating how, during emergencies, the Contractors will respond in a timely manner with all reasonable measures to prevent, counteract or minimise detrimental effects to other stakeholders and/or communities and the environment, including:

- N. the health and safety of local residents, and employees;
- O. the quality of soils, surface and groundwater;
- P. the protection of environmentally sensitive areas; and
- Q. in conjunction with the Stakeholders' Communication Plan develop a system for managing movement of construction personnel, public and traffic in an emergency situation.

- 10.16 Any emergency conditions or impacts identified by any person at any time during construction and/or operational phases of this project will be handled according to the reporting procedures outlined in this ESMP and the RM&ERP to be prepared by the Contractors.

Spill Contingency Plan

- 10.17 The ERP to be prepared and submitted to the Consulting Engineer by the Contractor will include a Spill Contingency Plan. A "spill" is considered to be any unscheduled discharge of a contaminant to the natural environment (e.g., soils and/or water) that causes or is likely to cause an adverse impact. A spill may originate from a structure, vehicle or container.

- 10.18 Construction-related spills include:

- fluid spills (oil, fuel, etc.) into water or onto land from construction equipment;
- the release of other construction-related materials into water or onto land from vehicles or other sources;
- silt and/or sediment released into water from the failure of erosion and sediment control measures or unprotected soils.

- 10.19 The Contractors' ERP shall specify that the Contractor is responsible for ensuring that the procedures set out in the Spills Manual (to be prepared by the PMU) are followed and implemented. This should minimise the possibility of a spill and, if a spill should occur, to minimise the associated environmental damage by taking whatever course of action is necessary and/or available in compliance with said specifications. These responsibilities will fall to the Client, i.e., GNBS, after construction is completed, but the possibility of this occurring, given the target group is infinitesimal.

- 10.20 The ERP will also identify the fact that the Contractor is responsible for notifying the Consulting Engineer of any spill of contaminated substances, who in turn shall mobilise the Emergency Response Team as described.

- 10.21 In any emergency situation, the health and the safety of the workers, nearby residents and the travelling public will be given the highest priority and actions to ensure their health and safety will be implemented immediately.

'Stop Work' Orders

- 10.22 The Consulting Engineer and the GNBS may at any time issue an order for the Contractor to stop work in the event of an outstanding non-compliance. Except in unusual instances when the environmental consequences of non-compliance are considered by the Environmental Inspector and the GNBS' Environmental Specialist/Engineer to be significant, requiring immediate work stoppage, two warnings from the Consulting Engineer and/or the GNBS Environmental Specialist/Engineer could constitute sufficient grounds for stopping construction. All incidences of work stoppage will be noted in the Environmental Inspector's inspection report. In the instance of a work stoppage, copies of the inspection report will be submitted by the GNBS to the EPA.
- 10.23 At the discretion of the PMU's Environmental Specialist/Engineer and PMU's Project Manager, the GNBS may withhold payment to the Contractor in the event of repeated non-compliance with environmental procedures.

Environmental Emergency Response Capacity

- 10.24 It is reported that there is very limited capacity in Guyana to respond to environmental emergencies (Ramdass per comm., 2016). There is no legislation that controls such events and no specific agency responsible for responding to, and reporting on environmental emergencies. The GFS Service and EPA staff have no formal notification and reporting procedure for spills or other large scale environmental emergency events. There is a risk that the emergency response personnel are not adequately trained to control/manage environmental emergencies and have not been provided with adequate equipment. There will be a requirement for early liaison between the above organisations and the Project Team to discuss the local limitations and to ensure that adequate provisions are made to enable effective implementation of the Contractors' emergency preparedness plans. At this time, agreed systems should be put in place for communications, making requests for assistance and addressing any incidents in an effective and timely manner.
- 10.25 Below is an overview of the capacity within the Project area and the protocols that have been followed with other projects in Guyana. The Contractors will need to be aware of these constraints and produce an Emergency Response Plan that includes regular training and practice drills as well as methods developed to deal with any incidents appropriately within the capacity of the Contractors and local support network.

Guyana National Bureau of Standards (GNBS)

- 10.26 At the time of drafting this ESMP, the GNBS currently has no trained staff, no equipment, and no clear mandate to provide response to environmental emergencies.

Environmental Protection Agency (EPA)

- 10.27 According to EPA staff, the Environmental Protection Agency is not specifically charged with the administrative responsibility to respond to, or report on environmental emergencies, nor does the

EPA have the resources required to assume such responsibilities. Although the EPA would prefer to remain in a regulatory and advisory role in the event of emergencies, they have been involved in an oversight capacity on at least one environmental emergency event in the past several years involving an uncontrolled spill of contaminants at a mine facility.

Guyana Police and Fire Services

- 10.28 From a procedural and response perspective, an environmental emergency that may occur during the construction of the Program would be treated as any other emergency. First responders would include the Guyana Police Force (GPF) and the Guyana Fire Service (GFS). However, Police officers are not trained to manage spills and in general, the Guyana Fire Service officers have limited capability to manage spills. Other fire officers receive basic fire-fighting training on a regular basis (minimum 80 hours per year).

The Private Sector

- 10.29 Fire-fighting training sessions are offered by the Fire Prevention Section of the Guyana Fire Service to petroleum product companies approximately 3 to 4 times per year. Most drivers of petroleum product transport trucks receive this basic training at least once (commonly with very few repeats). Most petroleum product companies have nominated a Fire Safety Officer who receives training on an annual basis. Occasionally petroleum product companies will offer special training by outside consultants that may include techniques in spills management. A representative of the Guyana Fire Service attends such training sessions.

D. Environmental and Social Management Plan

- 10.30 This ESMP, therefore, presents relevant, appropriate and applicable measures to avoid, mitigate and/or minimize the potential negative impacts associated with various phases of the Project. The ESMP provides a management framework for the implementation and operation of the program in accordance with environmental and social commitments and legal requirements adumbrated within the Environmental and Social Analysis (ESA).
- 10.31 The EPA advocates the preparation of an ESA to mitigate environmental impacts related to programs of this type. Further the ESA, along with the ESMP, must ensure that proposed procedures, actions and measures identified are not just statements of intent by the developer but that they will be effectively implemented. The ESMP is mandated to identify feasible and cost-effective measures to reduce potential significant adverse environmental impacts. It should also include operational procedures to avoid environmental risks during operations, as well as emergency and contingency plans to ensure appropriate response in the event of accidents.

Water Supply and Potabilization

- 10.32 These specifications cover the protection of water supply facilities during the construction and operation of the Project.
- 10.33 These specifications apply to all Personnel and Contractors involved in the project, particularly in proximity to potable water supply, watercourses or drains. These specifications include erosion and

sediment control and should be applied together with the following specifications to provide protection of the water bodies that could be impacted by the program:

10.34 Protection of Watercourses and Waterbodies

- The work shall be controlled to provide effective protection of watercourses and water bodies and associated fish habitats.
- The Contractors shall at their own expense take all necessary precautions to prevent damage due to erosion and siltation during construction. Precautions will include temporary drainage berms. Waste material shall be disposed in a manner so as not to interfere with aquifers, streams, watercourses or any of the drainage works detailed by the Engineer and shall not be planned within 10 m of a watercourse or drain.
- Whenever such protection is found to be ineffective, the Contractor shall implement changes immediately to the procedures and work practices to provide such protection.
- No work shall be carried out in watercourses or water bodies either during construction or operation of the Project.
- Construction vehicles and equipment are prohibited from entering into or crossing a watercourse or water body.
- Debris shall not be stored or disposed of within 10m of a watercourse or drain.
- Construction equipment shall be maintained in good operating order to minimise leakage.
- Vehicle maintenance during construction and operational phases shall be conducted a minimum of 10 m from any watercourse.
- The following procedures should be implemented prior to construction and maintained during construction and operationalization of the Project, where appropriate, based on site conditions:
 - Limit the size of the disturbed area;
 - Limit duration of soil exposure;
 - Retain existing vegetation, where feasible;
 - Limit slope length and gradient of disturbed areas;
 - Break and redirect flows to lower gradients;
 - Install erosion control measures where site-specific characteristics (e.g., erodible slopes) or sensitivities (e.g., proximity to watercourses) indicate a need for such measures;
 - Maintain erosion control measures until erodible areas have been stabilised;
 - Bench slopes, as necessary, to reduce sheet erosion where benching is deemed beneficial.
- Construct barriers or temporary rock flows checks or install equivalent erosion control measures (e.g., sand bags, berms, silt fencing), where required, to prevent the entry of sediment laden runoff into watercourses or drains
- All waste storage piles shall have a toe berm consisting of clean fill.
- Silt fences, if deemed necessary, shall be installed to provide a high level of protection in environmentally sensitive areas and in instances where soils are exposed within 10m of a watercourse.
- Sediment, which has accumulated by erosion control measures, shall be removed in a manner that avoids escape to the downstream side of the control measure and avoids damage to the control measure. Sediment shall be removed to the level of the grade prior to installation of the measure.
- Sediment, which has been removed, shall be managed as excess earth material.
- Seeding, mulching, and/or hydro-seeding where conditions warrant.

- Any damage to adjacent properties resulting from the Contractor's (during construction) or GNBS (during operations) failure to take necessary precautions shall be at the Contractor's or GNBS' expense.

Sanitation

10.35 In this section of the report, we outline the standards to be followed for improved sanitation at the GNBS complex. These include the fact that:

- The complex will be outfitted with sanitary toilets, which will confirm to the Ministry of Health standards;
- The complex must be accompanied by the respective septic tank, with a maintenance schedule worked out with the GNBS for the maintenance of said tank,
- All toilets must be accompanied with the necessary sinks for hand-washing purposes,
- If the area is susceptible to flooding, a relatively elevated area will be identified for the sighting of the septic tank and these will adhere to CH&PA and M&CC building codes,
- The septic tank will be at least 15 feet on the leeward side from the building on the south-western corner of the plot of land,
- All excess materials shall be managed so as to prevent their entry into water bodies and watercourses,
- All stockpiles will be placed so as not to interfere with watercourses or surface drainage and shall not be placed within 10 m of a watercourse or drain,
- The Contractor shall develop a strategy for the reuse, recycling and/or disposal of all waste materials at the outset of construction. The strategy shall identify the types of materials that can be reused or recycled and shall specify the manner in which these materials will be removed from the site. The strategy shall also specify those materials, which are to be disposed and shall identify specific approved facilities where these materials shall be sent, and the manner in which materials will be removed from the site.

Solid and Liquid Waste Management

10.36 The effective management and disposal of solid and liquid waste, hazardous chemical waste, non-hazardous domestic wastes, including waste food, packaging, office wastes, paper, etc., is essential to reduce the volumes of materials to be put into landfill/incinerated or exported. This section identifies strategies for the management and disposal of solid and liquid wastes at the project site. The waste management strategies apply to all personnel and visitors who are involved in the generation, storage, handling, transportation or disposal of waste materials.

- Solid waste reuse, recycling, sorting and disposal procedures shall apply to all personnel and shall be undertaken consistent with the waste management strategy to be developed by the contractor.
- The Contractor shall provide sufficient numbers of waste collection receptacles to prevent littering of the construction site.
- All combustible, non-hazardous wastes including food wastes, packaging and paper products will be collected by the M&CC and private contractors.

- Measures shall be taken to ensure that hazardous wastes are segregated from, and not collected with, the more routine domestic wastes, and handled according to applicable procedures.
- Non-combustible domestic waste shall be properly stored in designated containers and should be periodically removed for disposal at the Eccles landfill site.
- Chemical solid waste shall be collected, stored, and exported by a certified hauler and handler of such waste. Storage will be done in a compatible container and stored at a location approved by the EPA.
- Methods for collecting, handling and storing chemical waste will be detailed in the waste management strategy to be developed by the Contractor.
- The Consulting Engineer Environmental Inspector shall monitor domestic waste handling practices on a regular basis. Operating procedures should be adjusted to further improve waste minimisation and waste handling practices as appropriate.
- Liquid waste will be collected in a separate waste disposal tank. The specifications of this tank will be determined by the EPA.
- Liquid waste will be treated for the removal of dangerous chemicals and go through a recycle process before being released into the environment.

Flood Mitigation

- 10.37 As stated in other parts of this document, the project site exists in an area susceptible to flooding, particularly during the rainy season. It will therefore be imperative that all efforts are made during the construction and operational phases of the Project to ensure that the integrity of the buildings are not compromised. In this regard the following will be essential:
- Conduct a thorough assessment of the drainage facilities in and around the site.
 - Ensure there is an effective and efficient drainage system in place in and around the site, that flows into the main canals and the Atlantic Ocean, i.e., sufficient culverts, tubes, etc.
 - Work with the relevant authorities and communities to ensure that all tertiary, secondary primary drains/canals are routinely maintained.
 - Develop a flood management plan for the project and the site in particular. This would involve how to store and dispose of chemicals, structures for equipment, where and how to store fuels, etc.
 - Ensure the building designs are flood-proof and the various infrastructure to be erected are cognizant of the area in which the project is being situated.
 - Observe and adhere to the building code in Georgetown, i.e., consult with the M&CC on the final building designs and obtain their approval before any building is erected.
 - Set up early warning system in the ADI where persons can be provided with climate services from the Hydrometeorological Department of the Ministry of Agriculture. These messages can be easily transmitted via various media to the stakeholders.
 - Ensure that the complex is insured against flood risks as a means of implementing a risk transfer mechanism.
 - Conduct training for all staff in terms of what should be done in the event of flood.
 - Work with the NDIA to ensure the best flood mitigation measures are put in place at the site.
 - Allow for proper management of garbage so that they do not become a main hindrance to drainage.

Drought Mitigation

10.38 The other major natural hazard that threatens the success of the project is the advent of droughts. To mitigate this risk the project should pursue the following initiatives:

- Collaborate closely with the HD to ensure an effective early-warning system is in place to warn not only the project, but the country, about impending droughts.
- Construct rainwater harvesting facilities and water storage capacity to meet its projected demands.
- Install grey water (recycled water) facilities. This is the usage of wastewater that has been treated and purified for use.
- Install water saving devices within the complex, such as water taps with sensors, and low flush lavatories.

E. Stakeholder Engagement and Participation

10.39 The ESMP strongly recommends the development of a Stakeholder Engagement Plan (SEP) in keeping with ESPS Standard 10 Stakeholder Engagement and Information Disclosure. The objective of the development of the plan will be to develop the internal project team communication and reporting system as well as to keep stakeholders of the project informed and receive feedback from all stakeholders. In addition, and as part of the grievance mechanism, there will be need to have a direct helpline number and a key individual identified as the first point of contact prior to delegation of responsibility for handling complaints, press notices and liaison with the GNBS and the Supervising Engineer. The associated communication plan of the SEP may also involve the production of positive publicity of the raising of standards.

F. Complaint Procedure and Grievance Resolution Mechanism

10.40 A Social and Environmental Expert (SEE) will be appointed by the PMU. Among this person's responsibilities, will be to accept complaints and seek resolution of these amicably through the involvement of the project team as necessary. The SEE will formally log grievances. A Grievance intake form will be produced by PMU for those wanting to make a complaint or comment. In the first instance, grievances will be directed to the SEE who will classify grievances according to [Table 16](#) below.

Table 16: Grievance Classification Criteria

Grievance Classification	Risk Level	Validity	Response
Low	No or low	Unsubstantiated	CLO will conduct investigation, document findings and provide a response
Medium	Possible risk and likely a one-off event	Possible substantiation	CLO and an appropriate investigation team will conduct investigation. The Project Manager may decide to stop work during the investigation to allow the corrective preventive actions to be determined. The CLO will provide a response.
High	Probable risk and could reoccur	Probable substantiation	CLO will organise a Major Investigation Team including GNBS for prompt investigation and resolution. Work will be stopped in the affected area. The CLO will provide a response.

- 10.41 The SEE will log the receipt of a comment, formally acknowledge it, track progress on its investigation and resolution, and respond in writing with feedback to the aggrieved party. The SEE will also initiate the investigation and ensure its speedy conclusion aiming to provide a response within 10 working days, unless there are exceptional circumstances. If the Project receives a large number of unsubstantiated grievances, the process will be reviewed to define instances when no response is needed.
- 10.42 The Environmental Specialist or the Consulting Engineer's Environmental Inspector will monitor environmental and social indicators during the operational phase and will play an important role in investigating the validity and responsibility for the grievance effect. Project staff, and outside authorities as appropriate, will also contribute to the investigation. The SEE will collaborate to identify an appropriate investigation team with the correct skills to review the issue raised and to decide whether it is Project related or whether it is more appropriately addressed by a relevant authority outside the Project. The investigation will also aim to identify whether the incident leading to the grievance is a singular occurrence or likely to reoccur. Identifying and implementing activities, procedures, equipment and training to address and prevent reoccurrence will be part of the investigation activities. In some cases, it will be appropriate for the SEE to follow up at a later date to see if the person or organization is satisfied with the resolution or remedial actions.
- 10.43 The SEE will summarize grievances to report on project performance bi-annually during operation removing identification information to protect the confidentiality of the complainant and guaranteeing anonymity.
- 10.44 The point of contact for grievances and comments is as yet unspecified. When the contact details of who will fill the role are available, these should be disclosed to the general public, as well as the contents of this grievance mechanism and the location of comments sheets for grievances.

G. Environmental and Social Monitoring and Evaluation Program

- 10.45 An environmental monitoring program will be devised during the pre-construction stage and will be carried out through to the operation stage. Baseline monitoring shall be undertaken by the Contractor to measure any changes in the event of complaints or issues arising in the operational period that could be attributed to the construction or Project generally. The extent of the monitoring shall be discussed with the PMU and the EPA at the pre-construction meeting, where any baseline data collection can be identified and programmed into the scheduled works. Water quality and localised soils testing is required, but the need for any air quality, noise assessment will require confirmation from the PMU and EPA.

Monitoring Activities

- 10.46 Suggested monitoring activities are listed in [Table 16](#) and include:
- Soil quality monitoring (at least one soil sample) at the project site, additional samples could be required by the GNBS Environmental Specialist/Engineer;
 - Groundwater quality monitoring (at least twice yearly at strategic locations to be worked out with the GNBS Environmental Specialist),
 - Vegetation monitoring,
 - Water quality (suspended solids) monitoring for signs of erosion/sedimentation;

- Site monitoring for localised flooding.

Responsibilities

- 10.47 Initial monitoring activities and restoration will be the responsibility of the Contractor. The GNBS Environmental Specialist/Engineer will be responsible for follow-up monitoring, typically on an annual basis.

Table 17: Post Construction Monitoring (recommended)

Post-Construction Monitoring Element	Monitoring Activity	Analyst	Location	Frequency	Follow-up Actions Required
Soil quality	Soil samples (at least one sample per location) at areas with visible signs of contamination (e.g., staining); including laboratory analysis of samples for hydrocarbons by a recognised and accredited laboratory; additional samples could be required by the GNBS Environmental Engineer and/or third-party supervisor	Construction contractor	All fuel storage facilities, waste oil storage facilities and oil changing areas that show visible signs of contamination (i.e., staining)	Within 3 months of construction/demolition completion	Soils testing above 100 ppm gas/diesel or 1000 ppm for heavy oils (lubricants and bitumen) must be removed and replaced with clean soils. A plan for remediation of contaminated soils must be developed for approval by the EPA prior to commencement of works. A third-party supervisor/inspector shall supervise sampling and may request additional samples
Vegetation	Visual monitoring of re-vegetation success at construction sites	Construction contractor	All stakeholders; All waste storage locations	Within 3 months of construction/demolition completion	Seeding/sodding as required to re-establish vegetation
	Visual monitoring of vegetation	GNBS's Environmental Engineer	All sites	Annual	Vegetation restored to allow for enhanced integrity of the natural habitats
Water quality	Groundwater samples (minimum 2 sample holes per location), completed within shallowest aquifer; including laboratory analysis of samples for hydrocarbons by a recognised and accredited laboratory	Construction contractor	Each equipment and materials staging area that shows visible signs of contamination (e.g., staining)	Within 3 months of construction/demolition completion	Groundwater exceeding 1000 ppb for gas/diesel or heavy oils (lubricants, bitumen) must be remediated. A third-party supervisor/inspector shall supervise sampling A plan for remediation of contaminated groundwater must be developed for approval by the GNBS and EPA prior to initiation.
Resident and business interference	Visual monitoring surround areas	Construction contractor	Every community	Throughout construction	Restore area access as necessary, and clear clogged drainage system
	Visual monitoring of road drainage for signs of localised flooding	Construction contractor	Every community	Throughout construction	Repair incidents of localised flooding Restore proper drainage function

H. Schedule and Mitigation and Monitoring Costs

- 10.48 The ESMP outlines the way in which the environmental and social impacts of the Project should be managed and monitored. The ESMP describes environmental and social management and monitoring measures both for the responsible agencies in the GNBS and for other sectoral agencies with responsibility of environmental management in Guyana. The plan also takes into account likely changes to current institutional arrangements and outlines institutional linkages within and outside the relevant agencies.
- 10.49 The ESMP outlines appropriate mitigation measures for both the construction phase and the operational phase of the project. For each activity, the ESMP identifies appropriate institutions for implementation and provides an approximate cost. The cost estimates are derived from an understanding by the consultant of what will be required, and the costs estimates for such services nationally.
- 10.50 While it is understood that the Project will have both positive and negative impacts, the focus of the ESMP is on the preventive and mitigation measures to protect the receiving environment from negative impacts. Positive impacts which are mostly socio-economic, are described in the ESA draft report for the project. The main objective of the plan is to prepare an appropriate institutional, social and legal framework for the implementation of actions to enhance the positive benefits of the proposed project under the Client's preferred option.
- 10.51 Attention must be paid to the implementation of the monitoring package in terms of timing and the correct application of the measures. Each measure will help mitigate a potential problem. However, the full benefits of the package will not be realized if some measures are not implemented. The results could be disappointing and the welfare of Guyanese and other sensitive ecological issues that will arise from this project may be less than expected. It is, therefore, very significant that the recommended mitigation measures be applied and/or pursued in their entirety before and during the construction and operational phases.

Environmental Monitoring

- 10.52 The ESMP outlines two basic monitoring regimes that will be followed. These are: (i) environmental compliance monitoring (ECM), and (ii) environmental effects/performance monitoring. Environmental Compliance Monitoring (ECM) focuses on physical investment that has to be carried out in accordance with relevant clauses in contract documents, and the IDB regulations. Environmental Compliance Monitoring is the process of checking that agreed actions have been carried out effectively, in the right place and at the right time. They are described in project sequences. It should be noted that rather than carrying out site inspections with agency staff, the EPA encourages self-monitoring by project proponents; monitoring reports should be submitted to the EPA for review ([see Table 17](#)).
- 10.53 The second component, Environmental Performance Monitoring (EPM) is the process of checking the impacts of the project on specific social or environmental parameters or features (e.g., "valued ecosystem components" such as wetlands). This is normally done through the measurement of one or more indicators. If the value of the indicator exceeds a certain legal level, or if it is changing too fast in comparison with a pre-project baseline value, then further investigation is carried out to determine an appropriate management response. The following

areas of effects monitoring are considered most relevant to this project: socio-economic, health, soil, surface and sub-surface water quality, and plant and aquatic life along the road corridor and surrounding areas. The primary water and soil quality monitoring program will be implemented under an arrangement between the GNBS, EPA, and the PMU. The objectives of this monitoring program are to provide the project management team with the information required to evaluate the success or failure of the project from an environmental and social standpoint and determine if subsequent interventions would be required. The EMS will be carried out and/or coordinate the monitoring program to be executed.

- 10.54 The ESA for the project has demonstrated the importance of sound planning, high standard of project implementation and on-going management in promoting the successful implementation of this Project.
- 10.55 The following sections set out a menu of measures to mitigate the direct and indirect negative impacts of the project and to help establish a sounder base for future development. These measures have been selected based upon their technical feasibility, economic viability, socio-cultural palatability and environmental sustainability. Furthermore, the institutional capacity necessary to implement these measures is also briefly examined.
- 10.56 The ESMP model is built on the structure that management depends on measurement. Without measurement, management has nothing on which to base its decisions. The ESMP will have two components:
 - Activities within the PMU which will support the monitoring program; and
 - Activities within the PMU, EMS, EPA and other sector bodies that will monitor water quality, soil contamination, and air quality.
- 10.57 The PMU will be responsible for monitoring the performance of all project activities. This will be done through a coordinated program that starts with a baseline survey and then continues through the life of the project.

Institutional Requirement for Environmental Monitoring Programme

- 10.58 In order to establish a proper framework for environmental and social management and monitoring, a well-structured institutional arrangement needs to be identified. The principal stakeholder for environmental management will include the GNBS, EPA, PMU, the EMS, and the Contractor. The IDB will conduct review and supervision missions. Furthermore, some members of the communities and Village Councils will be trained to observe certain parameters, consistent with the EPA's and other regulatory standards with regards to water quality, air pollution, sanitation, waste management, and soil degradation. The division of work and suggested responsibility are presented in [Table 18](#) below.

Table 18: Compliance Monitoring Framework

Organisation	Tasks
1. GNBS	<ul style="list-style-type: none"> As the project proponent, obtains environmental clearance from the EPA. Ensures that the supervision mechanism for the physical works includes resources to ensure enforcement of compliance with the environmental and health and safety provisions of the contracts. Prepares regular monitoring reports and forward these to the EPA and IDB.
2. PMU	<ul style="list-style-type: none"> Working under the direction of the GNBS the PMU will perform the following tasks: <ol style="list-style-type: none"> Support EMS to develop an environmental monitoring operational plan. Coordinate with relevant private and public sector entities and non-governmental organizations (NGOs) to mitigate the key environmental problems that may arise during project implementation. Maintain and manage project reports. Report Environmental Monitoring results into project progress report and submit to the GNBS
3. EMS	<ul style="list-style-type: none"> The National Environmental Monitoring Specialist (EMS) will be contracted by the PMU for the duration of the construction period and will assist with on-site supervision of environmental assessment and biological control measures especially in worker areas, training of GNBS staff members to continue the monitoring work during the operational phase of the project, and taking samplings
4. GNBS/EPA	<ul style="list-style-type: none"> The GNBS, in collaboration with the Environmental Protection Agency (EPA), will set up a programme to periodically monitor key environmental parameters with the PMU. The reports from this collaboration will include: <ol style="list-style-type: none"> An assessment on the changes in water and air quality, changes in water use and changes in soil contamination. This may include baseline survey and subsequent periodic monitoring. Reporting on the extent and severity of the environmental impacts against the predicted impacts in the ESA and ESMP. An assessment on the overall effectiveness of the project in environmental mitigation and monitoring measures.
5. EPA	<ul style="list-style-type: none"> As the regulatory authority, administers the environmental assessment process and issues the project's Environmental Permit. Reviews monitoring reports from the project proponent and ensures compliance with Permit conditions.
6. IDB IADB	<ul style="list-style-type: none"> Ensures compliance of the project design with IDB environmental and social procedures and guidelines. Reviews monitoring reports and carries out supervisory missions to ensure compliance with loan conditionality.
7. Supervising Consultant	<ul style="list-style-type: none"> Supervises the work of the contractor(s) and ensures compliance of the works with the environmental and health, safety and welfare specifications and conditions in the contract documents.
8. Contractor	<ul style="list-style-type: none"> Carry out his/her work in conformity with the Contractor's Guidelines and specifications in his/her contract for design, construction and operation of the project and environmental mitigation.
9. Communities and Village Councils	<ul style="list-style-type: none"> Conducting compliance monitoring alongside regulatory bodies in the first instance and then on their own over the long-term.

Source: Compiled by Consultant (2018)

- 10.59 The monitoring system should be workable and manageable; there is a need for an efficient and Workable Reporting System for the Monitoring to be effective. This must be initiated by the PMU.

- 10.60 The EMS will monitor the implementation of mitigation measures and the impacts of the project during the rehabilitation and operation phases. In the plan, there will be an estimate of capital and operating costs and description of other inputs (such as training and institutional strengthening) that are needed to carry out the Project.

Table 19: Compliance Monitoring

Phase	Activity	Responsible Entity	Task	Budget (US\$)	Source of Funding
Pre-Construction					
	<i>Environmental Management and Monitoring Program. Detailed Monitoring describing Contractors Social & Technical Responsibility</i>	<i>PMU</i>	<i>Collect "baseline data" on a selected number of biological, social and economic indicators reflecting environmental sensitivity and that will be moderately or significantly affected due to the project</i>	<i>\$20,000</i>	<i>IDB and GoG</i>
Construction					
	<i>Construction of work camp(s)</i>	<i>Contractor with supervision from EMS</i>	<i>Monitor and track siting process</i>	<i>-</i>	<i>Contractor's budget</i>
	<i>Operation of camp(s)</i>	<i>Contractor working in compliance with contractual conditions relating to health, food, sanitation, and waste management</i>	<i>Monitor health and labour force, camp site environs</i>	<i>-</i>	<i>Contractor's budget</i>
	<i>Impact on the labour force</i>	<i>Contractor with supervision from the PMU.</i>	<i>Monitor employment and cash flow in local communities; reactions of surrounding areas to the project and work force.</i>	<i>5,000</i>	<i>Project funds</i>
	<i>Labour and Working Conditions</i>	<i>PMU Contractor with supervision from EMS</i>	<i>Monitor compliance with the labour laws and working conditions as per risks identified in LMP and Annexe Checklists</i>	<i>ESS Budget</i>	

Impact	Activity	Responsible Entity	Task	Budget (US\$)	Source of Funding
Construction cont'd					
	Monitor atmospheric, water and biological parameters during site preparation	Contractor, EMS and the Environmental Inspector	Compliance with contractual conditions on atmospheric, water and biological parameters. Audit against the Contractor's contractual obligations	10,000	IDB and GoG
	Monitoring water quality in streams and the level of erosion and sedimentation during construction	EPA, GNBS, EMS	Compliance with technical specifications for earthworks and spoil disposal, especially erosion control and drainage, and for protection of watercourses	5,000	IDB and GoG
Post-Construction					
	Maintain the buildings	GNBS	Compliance with environmental/social conditions governing the maintenance of the structures	Not Known	Households
	Sanitation and solid waste monitoring	GNBS	Monitoring water quality.	Not Known	GoG

Source: Compiled by the Consultant (2018)

Reporting

Monthly Report from the Contractor

- 10.61 The proposed EMS will produce a monthly performance report of environmental monitoring, summarizing the environmental monitoring and management of the project and other related environmental management problems.

Table 20: Effects/Performance Monitoring Plan

Parameters to be Monitored	Periodicity	Number of Samples				Cost for one Year in US\$	Total Cost in US\$ for 2 Years
		Total Number of Samples	Number of Indicators	Sum of Determination	Total/ yr.		
1. Potential Soil Toxicity	Once per year for 2 years	5	3	15	15	15	\$450.00
2. Surface Water measurement	Twice yearly for 2 years	5	5	25	25	25	\$1,250.00
3. Ground Water Quality	Twice annually for 2 years	5	5	25	25	25	\$1,250.00
4. Surface Water Quality	Twice annually for 2 years	5	10	50	50	25	\$2,500.00
5. Reforestation	Onetime Expense		\$200 per Km		\$1,000	-	\$1,000.00
6. Solid Waste Collection & Management, provision of garbage bins	Onetime expense 10 bins						\$1,000.0
7. Environmental Management Specialist	\$1,250.00 Per Month				\$15,000.00 Yearly for 2 years	\$15,000.00	\$30,000.00 for 2 years
1. Environmental Inspector.	\$750.0 per mth for two years				\$9,000.00 for two years	\$9,000.00	\$18,000.00 For 2 years
2. Miscellaneous 10%							\$5,945.00
Grand Total							\$61,395.00

Source: Compiled by Consultant

Semi-Annual PMU Report

- 10.62 Every half year the PMU will compile an environmental assessment working report, summarizing the progress with regards to the ESMP implementation, and monitoring status. This report will be prepared by the EMS and audited by the Project Manager and may be attached to the Project Manager's Semi-Annual report or be integrated into "The Progress Report" and sent to the Client and the IDB for review. The water parameters to be monitored are shown in [Table 21](#) below.

Table 21: Indicators and Parameters for Monitoring Surface and Ground Waters⁴³

Indicators	Parameters	EPA Standards
Physical Properties:	Temperature	N. A.
	Odour	N. A.
	Turbidity	Less than 150 NTU
	TSS	25 mg/l
	TDS	Less than 500
Chemical Properties:	pH	6.5 – 8.5
	Iron	0.3 mg/l
	Nitrate	70 mg/l
	Nitrite	70 mg/l
	Sulphate	250 mg/l
	Organic Matter	N.A.
	Salinity	Less than 3‰
	DO	More than 4 mg/l
	BOD	N.A.
	Other Pollutants	N.A.

Source: Compiled by Consultant (2016)

Environmental Monitoring Details

- 10.63 Monitoring is necessary with respect to (i) soil and water quality and quantity; (ii) monitoring environmental indicators related to design, construction and operation; (iii) socio-economic impacts, wildlife and natural resources management; (iv) maintenance and management, including inspection of work camps, erosion control, liquid and solid waste collection and management, and (v) monitoring of key environmental indicators indicated in [Table 20](#).
- 10.64 No air pollution monitoring/data is required for the program at this stage. The dust that will be generated during construction phase will be mitigated by the “Contractor” as indicated in their contracts. The contractor will regularly spray the dust with water hose and soak dust particles properly. The Project Engineer will mention this dust management clause in contractor’s agreement before construction.
- 10.65 However, EPA will be requested to take air samples from the project area once every six months and report to PMU.

⁴³ Please note that there are currently no ground water standards for Guyana

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Annex 1: Terms of Reference

ENHANCING THE NATIONAL QUALITY INFRASTRUCTURE FOR ECONOMIC DIVERSIFICATION AND TRADE PROMOTION (GY-L1059)

I. Background

- 1.1 Guyana experienced a 4.5% average economic growth during 2009-2014 period, mainly due to the expansion of mining and agricultural exports and the high prices of commodities, in particular gold⁴⁴. However, in 2015, as a response to the decline in international prices of commodities, economic growth declined to 1.6%, highlighting the vulnerability of the economy due to the high concentration of exports, mainly related to mineral and agricultural exports (45% correspond to gold, 18% to rice, raw sugar 6.6% and crustaceans 3.5%⁴⁵). Regarding Guyana's economic structure is based on strong links between the main engines of growth (mining and agriculture) and other domestic sectors, as most goods (tradable and non-tradable) and services are bought on the domestic market⁴⁶. In this regard, there is consensus among public and private stakeholders on the need to diversify the economy and the export base, as well as to improve efficiencies and remove bottlenecks in the sectors that are currently the engine for growth, i.e., mining and agriculture.
- 1.2 The Ministry of Business is developing a strategy to support SMEs productivity, value added and export readiness, considering the modernization of traditional sectors: sugar, rice, forestry, and mining, and supporting new growth and diversification in new sectors: non-traditional agriculture, aquaculture, business process outsourcing/information technology, and tourism, under a social and environmentally sustainable framework⁴⁷. However, there is a need to modernize the current National Quality Infrastructure in order to facilitate the growth of businesses in the local and external markets, protect the people and the environment and provide recognition for the Guyanese brand in the international market⁴⁸. This modernization should be accompanied by a trade strategy to boost the participation of domestic firms in international markets.
- 1.3 Due to the need to implement best practices in the National Quality Infrastructure, the production and trading of goods and services in the principal sectors face a number of non-compliance risks in both the local and export markets with significant impact on competitiveness such as: i) rejection of products at border inspection point; ii) increased costs due to delays while inspections/test are being done in overseas laboratories; iii) disruptions in trade, loss or inability to expand into new market; iv) loss of revenue where inaccurate measurements and test results are used and v) inability to command premium price where quality and safety products are not defined.⁴⁹ In this regard to export markets in both traditional and non-traditional exports require compliance with technical requirements that are standards based⁵⁰. In addition, local consumers and environmental protection conditions need to be enhanced.
- 1.4 The Guyana National Bureau of Standards holds primary responsibility for standardization, through a process of formulation and application of standards, technical regulations, conformity assessment procedures and metrology⁵¹. However, all standardizing bodies need to modernize

⁴⁴ Guyana Private Sector Assessment Report. 2014. Bureau of Statistics Data.

⁴⁵ Observatory of Economic Complexity 2016.

⁴⁶ PSAR. 2015

⁴⁷ The economy is highly dependent on raw materials and unprocessed foods, as the main contributors to the economy are agriculture, forestry and fishing (19% of GDP), mining and quarrying (10%), agroindustry (7%) and services (66%). Source: Bureau of Statistics.

⁴⁸ Needs Assessment for the State-of-the-Art Testing and Metrology Facilities. 2014. Between 2006 and 2010, there were a total of 59 rejections of foods exported to the US from Guyana at an annual average of 12 rejections.. The Unit Rate of Rejection for the US market from 2002 to 2010 ranged from 0.9 in 2003 to just about 0.2 in 2010, higher than the average of countries such as Trinidad and Tobago and Jamaica

⁴⁹ Needs Assessment for State-of-the-Art Testing and Metrology Facilities. Executive Summary. 2014..

⁵⁰ Food Safety, Good Agricultural Practices, Quality Standards, Animal Health, Plant Health, Environmental, Social, Safety, Information Security, Efficiency and Certification, each with its own specific requirements.

⁵¹ GNBS Strategy. 2011

the legal and implementation framework of the National Quality Infrastructure⁵², as Guyana has still had to implement national quality infrastructure practices.

- 1.5 The current laboratories infrastructure and equipment is not adequate for supporting exports, protect consumers and the environment. There are 20 existing main national laboratories offering services in metrology, chemical and microbiological and physical testing of products and materials used. These laboratories have limitations and gaps in terms of: i) unsuitable laboratory facilities, lacking the proper physical conditions to assure reliability; ii) absence of laboratory facility to perform tests for consumer protection and for dynamic sectors; iii) limited calibration capacity in terms of capacity in temperature, moisture, pressure, force, volume, electricity⁵³; iv) lack of adequate equipment and consumables; v) outdated test methods that no longer meets the needs for the industry requirements; vi) lack of accreditation and participation in proficiency testing programmes; and vii) insufficient trained staff for performing tests and calibrations as well as competence in use and maintenance of instrumentation ⁵⁴. In this regard, the Government of Guyana carried out in 2014, with the support of the IDB a needs assessment of a State-of-the-Art Laboratory and is contemplating its implementation through an IDB loan. However, the demand for services needs to be updated to reflect the recent economic changes, as well as the dimensioning of cost of the current facility.
- 1.6 Regarding the scope of the intervention, as a result of legal and technical analysis, in line with the forthcoming guidelines to be issued by the CARICOM Regional Organization for Standards and Quality, the scope of the program will concentrate on four fronts: (i) strengthening the GNBS and its labs in its central role in legal and industrial metrology, standardization, accreditation and certification, including the strengthening of the industrial metrology laboratories in the areas of mass, temperature, force and pressure, length, hardness, volume, electrical quantities, time and frequency and chemical metrology. In this regard, a new laboratory facility for the GNBS will be constructed. The new facility will consist of a new building on government owned land, with an expected area of 1,800 square meters and two stories. Preliminary blueprints of the laboratory facility have been carried out as part of the Gaps and Needs Assessment carried out in 2014.

II. Objective(s) of the Consultancy

The purpose of this consultancy is to develop an Environmental and Social Analysis (EAS), including an Environmental and Social Management Plan for the Program, which is a management tool to ensure the socio-environmental sustainability component of physical infrastructure and its operation to be financed under the program and thus meet both national environmental legislation and the Environmental and Social Safeguards Policy (OP-703) of the IDB.

III. Main Activities

The Consultant will:

Perform an Environmental and Social Analysis (EAS) of the activities of the Program and prepare an Environmental and Social Management Plan (ESMP) in accordance with the ToR as set out below: The consultant will be guided by the inputs of the Program team, and will consult relevant available information, stakeholders and conduct site visits as necessary.

⁵² The GNBS Standards Catalogue 2021 lists twenty (20) standards as having mandatory status. The WTO Report by Measures 2009, states that Guyana makes minimal use of technical regulations”

⁵³ Unsuitable type of construction materials to ensure a sterile environment, layouts that may conduce to cross contamination, locations subject to flooding, poor ventilation, humidity and direct sunlight. Needs Assessment Report, 2014.

⁵⁴ Ibid.

IV. Minimum Contents

Introduction

- Objectives, background and scope of the Program, including a description of the need for the Program in the context of national strategies,
- Expected social and economic impact of the Program.

Program Description

- **Location.** Describe and present schematically, the administrative, political and geographical location of all infrastructure works of the Program, as well as the areas of both direct impact (DIA) and indirect (IIA).⁵⁵
- **Program Description.** Detailed description of all of the infrastructure to be financed by the Bank loan and to be built as part of the Program, including, among other relevant aspects:
 - Proposed Program activities/renovations
 - Total land area of the facilities where construction, expansion and upgrading will be carried out.
 - Building design features, including detailed description of all components, number of floors, total construction areas, green spaces, etc.,
 - Description of the infrastructure associated with the Program such as access roads to have direct access to the edifications, sewer, connection to the electric grid/lighting, connection to drinking water, solid waste recollection systems, among other basic infrastructure.
 - Identify and describe, if applicable, power generators, fuel tanks operation, sanitary landfills in the area of the Program and wastewater treatment plants,
 - Storage and drinking water treatment.
 - Description of the required personnel to be hired temporary and permanently during the stages of construction and operation of the Program and to include, if available, the detailed schedule of the construction and operation activities,
 - Describe how and if "Sustainable Infrastructure" principles have been included in the Program with focus on energy efficiency and use of renewable resources, conservation of resources such as water and energy, internal air quality, and community aspects, such as public transport access.
 - Description of all the activities and process that will be carried out in the laboratories, as well as, explaining and describing chemicals and procedures to be used and implemented.

Legal and Institutional Framework

- Description of legislative and institutional framework regulations, norms, systems and environmental licensing requirements, and other necessary requirement for the implementation of the program's infrastructure works;
- Description of any specific local regulations and requirements regarding laboratories and Program facilities management in relation to solid waste' wastewater, air pollution, labour, and health and safety. In addition, to include a description of the requirements, which are applied for the activities of the Program, of other institutions such as the World Bank / IFC, World Health Organization, and other entities;
- Identify compliance required in accordance with the Environmental and Social Safeguards Policy of the Bank, and where applicable, compliance with policies of Access to Information, Disaster Risk Management, Indigenous Peoples, Gender in Development and Involuntary Resettlement;

⁵⁵ El área de influencia directa (AID) del proyecto, es aquella donde se manifiestan los impactos generados por las actividades de construcción y operación; está relacionada con el sitio del proyecto y su infraestructura asociada. El área de influencia indirecta (AII) es el área donde los impactos trascienden el espacio físico del proyecto y su infraestructura asociada, es decir, la zona externa al área de influencia directa y se extiende hasta donde se manifiestan tales impactos.

- Describe, if applicable, mechanisms of Public/Civic Participation Consultation to include information related to public consultation processes and citizen participation as requirements for the construction and operation of the Program.

Diagnosis and Characterization of the Area of Influence and Program Beneficiaries

- Environmental Characterization. Characterization of the area of influence where the infrastructure will be carried out, describing its current environmental conditions, and detailing the area where it is intended to intervene or implement the program. This characterization must include the appropriate definition of both the Area of Direct Influence (ADI) and the Area of Indirect Influence (All) of the Program. This information, whenever possible, should be based primarily on quantitative data. The factors to be discussed may include:
 - Land characteristics and use (i.e., topography, soil characteristics, terrain stability and susceptibility to erosion or landslip, existing land uses occurring at the proposed site, and existing surface characteristics of the surrounding area). Further, existing land uses occupying the surrounding area should be delineated; particularly for those land uses which would be sensitive to industrial development or other types of uses, and which could contribute to cumulative effects on local and regional resources.
 - Landscape character and existing views (i.e., existing character of the landscape both on the development site and in the surrounding area; and views of the site from adjoining properties and public areas, particularly where these are sensitive, e.g., residential, recreational or tourist areas, etc.).
 - Air quality including: (1) meteorological data, particularly prevailing wind direction and speed, rainfall, and temperature; (2) occurrence of extreme weather such as storms and droughts, and their location and duration; (3) existing ambient air quality, particularly dust loading and existing sources of gaseous air emissions in the local and extended area of the project; and (4) risk related to inversion conditions. Existing air quality cannot be determined with precision without sampling over an extended period. This may not be practicable, and a descriptive approach based on prevailing weather conditions and identification of the main local emission sources affecting air quality (e.g., traffic and heavy industries with multiple stacks) is often a better approach. Most likely these data may be obtained from a nearby airport, a local meteorological institute or governmental department, or a local university.
 - Noise levels are relatively easy to measure, and this may be undertaken at the nearest sensitive receptor locations; e.g., residential areas or schools which are nearby the proposed project, activity, or action. Existing sources of elevated noise levels, which might result in nuisance conditions even if they are located a considerable distance from the source, should be considered..
 - Geology and soils-related information, with particular attention given to the presence of erodible soils and/or contaminated soils.
 - Natural hazards (seismic, faults, sink holes, flooding, hurricanes, tornadoes, etc.)
 - Water, including hydrology, surface runoff, groundwater and water quality. Topics which should be addressed include: (1) existing drainage, including the location and capacity of sensitive receptors such as canals, drains and rivers; identification of areas prone to flash floods; and depth to groundwater; (2) surface water and groundwater movement patterns, including groundwater hydrology, the range of water levels and daily flushing regime in canals, drains and rivers, tidal ranges and wave climate in coastal areas and sediment transport processes; (3) the quality of waters, both surface water and groundwater; and (4) abstraction of waters including abstraction of groundwater, reservoirs and intakes of surface waters, the usage of the waters for irrigation, public water supply or watering of animals, industrial plant water supply, and the quantities abstracted, etc..
 - Habitats – terrestrial and aquatic. As appropriate, two types of habitats may be relevant; namely, natural habitats and critical natural habitats. Information on these types is in Section B.9 of IDB's Environment and Safeguards Compliance Policy (2006), and in the International

Finance Corporation's (IFC's) Performance Standards on Social and Environmental Responsibility (2006). Detailed information on categories of habitats or species is in IFC's 2006 standards.

- Flora (especially tropical rain forests, wetlands, or unique or sensitive habitats).
- Fauna
- Endangered and threatened species (including sensitive species, economically important species, and critical habitats).
- National parks or protected areas.
- Traffic flows and transport infrastructure aspects.
- **Social Characterization.** An overview of the existing social and cultural conditions should be provided in order to place the Program in context. The baseline information considered important to an ESMP should be presented. This may include:
 - Towns/communities surrounding the area, and their population and socioeconomic characterization by age, gender, ethnicity, language, literacy/education, income and occupation;
 - Sources of livelihood (level/availability of employment by gender/occupation and income patterns);
 - Land tenure/titling;
 - Migration and settlement patterns;
 - Health and education levels (including disease patterns and endemic diseases);
 - Archaeological/cultural sites and monuments, including sacred sites such as caves, lakes, quarries, etc.;
 - Services and infrastructure (i.e., existing utility infrastructure including water supply, sewage, wastewater treatment works, power lines and transformer sub-stations; and existing capacity of and load on utilities infrastructure);
 - Access to basic healthcare, education (i.e., existing clinics/hospitals, capacity of healthcare system; existing schools/training centers, and daycare facilities);
 - Social organizations and dynamics;
 - Indigenous populations/territories;
 - Access to infrastructure/roads or network of existing transportation modes to/from the proposed development project, activity, or action; and,
 - Vulnerable populations (elderly, poor, disabled, and young).

Assessment of the Environmental and Social Impacts of the Program

Identification and assessment of environmental and social impacts of the Program, including those impacts related to occupational safety and health in the stages of construction, operation and maintenance should be done. Consideration should be given of all potential direct and indirect negative impacts.

The identification and evaluation of socio-environmental impacts must be based on the characterization of the area of influence. This characterization expresses the general conditions of the area without the effects of the program and constitutes the basis for analyzing how the program will impact the area.

The assessment of the impacts should be done by identifying and describing impacts and overall impact by the program on the environment as a result of the interplay between the different stages and activities. Describe the evaluation method used, indicating the criteria for assessment and pointing out its limitations, according to the environmental characteristics of the area of influence of the program and its activities. Such assessment should have their respective categories so as to facilitate the qualitative and quantitative weighting of impacts.

Disaster Risk Assessment and Disaster Risk Management

This section should be focused on the identification and evaluation of potential natural and manmade project risks that can occur in the context of the project. This Disaster Risk Assessment (DRA) should include a Disaster Risk Management Plan (DRMP) that will cover the management of the disaster risks

identified in the project design, construction and operation. This DRMP will be integrated into the Environmental and Social Management Plan. A detailed guideline for this section is contained in Annex 1.

Environmental and Social Management Plan (ESMP)

This section of the ESA should describe an environmental and social management plan for the project, activity, or action. This plan should include, as a minimum, the following components:

- Detailed description of the proposed environmental and social control and mitigation measures for project, activity, or action construction (e.g., air quality management plan, and landscape management plans) and operation (e.g., hazardous materials and fuel management, transport and packing management, maintenance and site security plans, and emergency evacuation and contingency plans).
- Detailed description of the planned environmental and social monitoring program for both construction and operation and a discussion of how the information will support management practices.
- Description of the planned worker health and safety plan, procedures and controls.
- Regarding hazardous materials, include a management plan covering their transport, handling, storage and disposal, with associated management and reporting practices including preventive and contingency measures, in consultations with potentially workers and communities (if applies). Include an annex of the restricted toxic substances for the activities in this Program and make reference to international treaties such as Basel Convention, Rotterdam Convention, and others.
- Description of planned environmental contingency plan and procedures.
- Description of a proposed environmental, health and safety management system (including personnel, training, documentation, auditing, etc.).
- Description of a plan to manage population influx into the project site or controlled land use area (e.g., contracting requirements to manage potential worker expectations).
- Description of a plan/mechanism to receive and facilitate resolution of affected community concerns and grievances about the project, activity, or action and its negative impacts.
- Descriptions of a plan to protect, reduce, and manage the negative impacts on sacred/archaeological and historic sites/monuments.
- Description of project, activity, or action-specific supervision and evaluation actions to be implemented.
- Public awareness, communication and training programs for operational staff.
- Indicators of compliance with licensing and approval requirements.

For each component listed above, the proposed time schedule (i.e., when initiated, when completed, and frequency), responsibility (i.e., who will implement), and the estimated cost should be provided; as appropriate, this information should also be provided for the individual actions within a component.

More specifically, monitoring/evaluation parameters which may be relevant include:

- Performance indicators in relation to critical operational issues (i.e., water quality -- marine and freshwater, shoreline morphology and sediment budget, soils and sediments, noise and air quality, public health indicators, land surface and hydrology, flora and fauna, etc.).
- Waste management performance indicators in relation to recycling and reuse.
- Documentation of complaints received.
- Also, monitoring procedures should cover:
 - a. The key conditions that will be monitored and their criteria and reason for monitoring such as noise (low frequency, high frequency, and vibrations), dust (particulate matter), air emissions (NO₂, SO₂, CO, CO₂, H₂O %, metals, etc.), wastewater (volume, suspended solids, pH, toxic substances, etc.), waste (solid waste and hazardous waste) and odor;
 - b. The monitoring locations (air emission outlet: particulate matter, CO₂, NO₂, and SO₂; the property boundary: noise, odor, particulate matter, CO₂, NO₂, SO₂ and other relevant

- substances; outdoor storage areas for raw materials (dust fall from the areas), intervals and duration;
- c. Actions to be undertaken if the monitoring indicates a noncompliance condition or abnormality; and
- d. Internal reporting and links to management practices and action plans.
- Reporting to relevant authorities and, if appropriate, to the consent authority or the community on matters such as reports on interruptions of operations, operational journals, list of used raw materials, protocol on stored raw materials, dustfall reports from the storage areas for raw materials, and noise documentation.
- Reports on odor and air pollutant emissions and ambient concentrations, CO₂ equivalent documentation reports for greenhouse gases, energy consumption reports, wastewater reports, etc.

V. Products

- Work plan and timeline.
- Environmental and Social Analysis Draft, including the Environmental and Social Management Plan. The week before the analysis mission –August 15, 2016.
- Environmental and Social Analysis Final Version, including the ESMP – September 4, 2016.

VI. Payments Schedule

Three (3) payments: (i) 30% after contract signature and delivery of the work plan and timeline; (ii) 30% after delivering the Environmental and Social Analysis Draft, including the Environmental and Social Management Plan, and (iii) 40% after delivering of the Environmental and Social Analysis Final Version, including the ESMP.

VII. Qualifications

- Academic Level & Years of Professional Experience: Master's in environmental engineering with experience in civil infrastructure, with a minimum of a 10- year experience or an equivalent combination of education and experience.
- Languages: English
- Areas of Specialization: Civil Engineering, Environment, Water Resources, Risk Management, and Risk Management Environmental Impact and Social Infrastructure Health.
- Skills: Previous experience with the IDB on infrastructure operations related to urban development sector, and robust knowledge in handling the implementation of the Environmental and Social Safeguards Compliance Policy (OP-703) of the IDB, and best practices and standards that apply to this type of operation.

VIII. Consultancy Characteristics

- Type of Consultancy: PEC
- Contract Period: 35 non continuous days, starting after contract signature and ending on October 31, 2016.
- Place of work: Guyana and the city of the consultant
- Division Leader or Coordinator: Coordination and monitoring of the consultancy will be in charge of Claudia Stevenson (IFD/CTI) Team Leader of Project claudiast@iadb.org.

Payment and Conditions of Employment: Remuneration will be determined in accordance with Bank regulations and criteria.

Consanguinity: Individuals with relatives working for the IDB within and including the fourth degree of consanguinity and the second degree of affinity are not eligible for employment as staff or consultants. Candidates must be citizens of a member country of the Inter-American Development Bank.

Diversity: The IDB is committed to diversity and inclusion and to providing equal opportunities in employment. We embrace diversity on the basis of gender, age, education, national origin, ethnic origin, race, disability, sexual orientation, religion, and HIV/AIDs status. We encourage women, Afro-descendants and persons of indigenous origins to apply.

Annex 2 Guidelines for Disaster Risk Assessment and Disaster Risk Management Plan

1. Disaster Risk Assessment

Disaster Risk Assessment (DRA) includes the risk identification and analysis required to identify and evaluate appropriate Disaster Risk Management (DRM) measures into project planning.

1.1 Hazard selection

Summarize available information for the project area in order to select the priority hazards, including historical disaster data, risk information (hazard, exposure, and vulnerability), and regional climate change model outputs and studies.

Especially (but not only, and if apply) the following hazards shall be considered:

Rapid-onset hazards:

1. Coastal flooding, storm surge, and sea level rise of 0.5m, 1.0m, and 1.5m;
2. Inland flooding;
3. Hurricanes and tropical storm-strength winds;
4. Seismic activity and its effects (ground shaking, liquefaction, tsunamis, etc.);
5. Volcanic activity;
6. Landslides;
7. Wildfires;

Slow-onset hazards:

8. Heat waves and Cold waves;
9. Coastal erosion (also taking into account sea-level rise)
10. Groundwater salinization
11. Drought.
12. (Further) Effects of changes in minimum or maximum temperatures, precipitation, insolation, and in seasonal climatic patterns (e.g., food and water shortages).

Hazards shall be selected using a multi-criteria analysis for comparing and prioritizing them. Criteria should include, at a minimum, hazard frequency and recurrence and potential impact in the project. The final selection must be approved by the IDB.

1.2 Disaster risk assessment

A risk assessment is an estimate of the expected loss to a system exposed to a given hazardous event. It is a function of the probability of the hazard and the vulnerability of the components that can be affected by the hazard. Carrying out a risk assessment requires an estimate of the probability of experiencing the selected event and an understanding of the effects of such an event on the resources at risk—people, structures, employment and the economy—in the assessment area.

Methodology for the probabilistic disaster risk analysis.

The methodology and tools from CAPRA (<http://ecapra.org>) or a similar platform (e.g., Hazus), with the following general steps, is recommended:

- **Hazard analysis:** Analyze past, current, and future hazard trends (under consideration of climate change if applicable to the hazard) in a probabilistic manner. The consultant should model an appropriate number of stochastic hazard scenarios, each one with a probability associated and with values of intensity for each unit of analysis. The scale of analysis should be at least 1:5,000. The

analytical data and modeling could be complemented with field work (i.e., identification in the field of historical inundation levels). Multi-hazard analysis should be considered (e.g., tropical storms and hurricanes in coastal areas where storm surge, winds and inland flooding should interact).

- **Exposure value calculation:** Develop an inventory of infrastructure and assets which are part of the project. The inventory will define the construction area, value of assets, and exact location of constructions and assets.
- **Description and identification of vulnerability functions:** Define, with the appropriate technical justification, the physical vulnerability function of each type of construction, asset and infrastructure located in the project for the considered hazards. Existing vulnerability functions developed and/or deemed adequate by the IDB (e.g., CAPRA) may be applied. As part of the vulnerability analysis, it should be verified if the existing or designed assets comply with the standards of acceptable risk defined by the Bank (see glossary).
- **Risk estimation:** Based on the information of hazards, exposure values and vulnerability functions, develop a quantitative probabilistic risk analysis in terms of economical and human losses. This calculation includes the probable maximum loss (PML) and average annual loss (AAL) from the prioritized hazards (see glossary). The consultant should include the estimation of direct and indirect losses.
- **Develop maps** that illustrate the results of the probabilistic disaster risk analysis in terms of PML and AAL.

Calibration of risk and estimations

The consultant shall carry out and include in the report a calibration of the risk maps and risk estimations using information on historical losses in order to estimate the accuracy of the results.

2. Disaster Risk Management Plan

DRM is the result of the integration of different processes (risk reduction, disaster management and financial protection) and sub-process (prevention, mitigation, disaster preparedness, respond, recovery, risk retention and risk transfer)⁵⁶.

The DRM⁵⁷ plan should include:

- (i) Identification and prioritization of DRM measures. In order to identify and prioritize DRM measures three different type of analysis should be considered:
 - a. Compliance with Bank and national risk acceptable standard. "Bank-financed public and private sector projects will include the necessary measures to reduce disaster risk to acceptable levels as determined by the Bank on the basis of generally accepted standards and practices". If the vulnerability analysis identifies that the project or the design of the project doesn't comply with national and international acceptable risk standards the DRM will include and analysis of measures to reduce the risk to acceptable levels. If different measures are identifying a Cost Benefit Analysis or Cost/efficiency analysis following Bank standards⁵⁸ and international best practices⁵⁹ should be carried out.
 - b. Human losses. The DRM should analyze a combination of disaster reduction, prevention and disaster preparedness measures which minimize the risk of human losses.
 - c. Impact of disaster losses in the achievement of project development goals. It should be analyzed if the disasters losses may compromise the achievement of the benefits of the project. If this is

⁵⁶ See glossary for definitions.

⁵⁷ Bank Disaster Risk Management Policy. OP-407.

⁵⁸ Guidelines for the Economic Analysis of IDB-Funded Projects. IDB, 2012.

⁵⁹ A reference could be Mechler, 2005. Cost-Benefit Analysis of Natural Disaster Risk Management in Development Countries

the case DRM measures should be considered in order to guarantee the viability of the project under Bank parameters⁶⁰.

Ideally the prioritization of DRM activities should be based on an optimal combination of the different process of DRM to manage the risk represented by the loss exceedance curve.

- (ii) Design of disaster prevention and mitigation measures. The DRM should include the design at pre-feasibility level of the prioritized disaster prevention and mitigation measures.
- (iii) Business continuity and contingency plans to protect human health and economic assets. The DRM should include the business continuity and contingency plan, with protocols, scenarios analysis, etc.
- (iv) Estimated costs. The DRM plan should include estimated cost at pre-feasibility level for the different activities.
- (v) An implementation plan. The implementation plan includes protocols to undertake periodic safety evaluations from project implementation up to project completion and maintenance of project equipment and works.
- (vi) A monitoring program and indicators for progress; and an evaluation plan.

⁶⁰ Ibid.

Annexe 3 Labour Management Procedures

1. Introduction

This Labour Management Procedures (LMP or Procedures) is developed to comply with the Environmental and Social Performance Standard 2 (Labour and Working Conditions) (ESPS2) of the Inter-American Bank. The objective of the LMP is to ensure that measures are in place to manage risks associated with the labour and working conditions of Project Workers, as defined in ESPS 2, under the project and help determine the resources necessary for effective planning and management.

The ESA done for the project design identified risks as it relates to labour and working conditions and occupational health and safety as temporary and manageable through this LMP and diligent monitoring. The Ministry of Tourism Industry and Commerce and Government of Guyana is committed, on a continuous basis throughout the project's life, to evaluate risks and impacts and to having in place adequate measures and procedures to manage adverse impacts, in line with the ESA.

The LMP is a living document and can be updated if the underlying circumstances changes resulting in changes in the risks of the project activities.

2. Overview of Labour Use on the Project

Project workers, as it relates to the applicability of ESPS 2, refers to workers that will be employed or engaged under the project, whether full-time, part-time, temporary, seasonal and migrant workers. The main type of workers anticipated to work under this project is direct⁶¹ and contracted workers⁶². The Project may engage primary supply workers⁶³. The employment of Primary Supply Workers will be screened on an ongoing basis throughout Project implementation and, where needed, risks will be managed in line with ESps2 and this LMP. The Project doesn't intend to engage with community workers⁶⁴.

It is important to note that the timing of labour requirements will be based on the project implementation schedule developed for the project.

3. Assessment of Key Potential Labour Risks

The key labour risks which may be associated with the project are outlined below:

Table 1: Risks and Measures

Key identified Labour risk	Description	Proposed mitigation measures
1. Occupational Health & Safety	OHS consists of risk of exposure to several hazards that could result in illness, injury or death such as due to workplace injuries, improper use of PPE or COVID-19 related illness.	Conduct regular awareness raising sessions reaching project workers and affected communities as well as adequate OHS training.

⁶¹ People employed or engaged directly by the Project (including the project proponent and the project implementing agencies) to work specifically in relation to the project

⁶² People employed or engaged through third parties to perform work related to core functions⁴ of the project, regardless of location. Third parties may include contractors, subcontractors, brokers, agents or intermediaries

⁶³ Primary suppliers are those suppliers who, on an ongoing basis, **provide directly to the project goods or materials essential for the core functions of the project.**

⁶⁴ Where labor is provided by the community as a contribution to the project, or where projects are designed and conducted for the purpose of fostering community-driven development, providing a social safety net or providing targeted assistance in fragile and conflict-affected situations

Key identified Labour risk	Description	Proposed mitigation measures
		<p>Use of adequate protective gear. Development of emergency preparedness and response plans, including at subprojects sites. Implementing OHS measures described in the ESMPs</p> <p>Implementation of the Covid-19 transmission prevention plan in the ESMP.</p>
2. Unfair treatment or discrimination of project workers	Unfair treatment or discrimination on the basis of personal characteristics unrelated to job requirements, such as race, gender, religion and sexual orientation is a risk of the project especially the physical works. These risks apply to all project workers, including those employed by the PMU.	Requirement for fair recruitment policies and enforcement of zero tolerance to discrimination.
3. Physical, psychological or sexual harassment of project workers	Physical, psychological or sexual harassment and abuse are risks that all project workers face. These Risks include both physical forms of harassment and abuse (such as violence and sexual assault) and non-physical forms (such as verbal abuse, bullying and unwanted sexual attention).	<p>The project will adopt a zero-harassment policy for all workers, reflected in the CoC and to be broadcast to all workers through various media and formats. The CoC will be integrated into contracts of all. The project GRM will be available to all Project workers.</p> <p>Awareness raising and training will be conducted for all Project Workers reviewing the terms and conditions of these procedures and tools.</p>
4. Sexual Exploitation and Abuse and Sexual Harassment (SEA/SH)	SEA/SH refers to inappropriate or criminal behaviour, such as sexual harassment of a person, exploitative sexual relations, and illicit sexual relations with minors from the local community. SEA/SH also includes any exploitative sexual relationships and human trafficking whereby women and girls are forced into sex work.	<p>All project workers' contracts will include a CoC with SEA/SH provisions and the PIU will monitor compliance.</p> <p>Project workers will be provided GBV orientation. SEA/SH considerations are included in the GRM for project workers, in the form of maintaining a list of SEA/SH service providers.</p>
4. Child and Forced Labour	The risks of child labour or forced labour is high in Guyana. However, the project will require skilled labour and technical staff with experience and education above a certain minimum age, in line with ESPS2. Force	Certification of labourer's age using legally recognized documents.

Key identified Labour risk	Description	Proposed mitigation measures
	labour will be prohibited at all levels of the project activities. Children above the age of 16 years of age can only be hired by the Project to provide light work that does not expose said child to hazards and harms their health and interfere with their education, in line with ESPS 2. Persons under 18 years of age cannot work in any construction activities supported under the Project.	Awareness raising of the CoC, careful monitoring, and strict enforcement of compliance. Where persons under the age of 18 but above the 16 years of age are hired, the project will maintain a register containing the dates of their births and the type of work they provide in line with ESPS2, and with the Employment Act of participating countries. Persons under 18 years of age cannot perform work that exposes them to hazards and harms their health and interferes with their education, in line with ESPS2. As such, for example, persons under 18 years of age cannot work in any construction activities supported under the Project.

Risks associated with terms and conditions of employment of technical assistance and management types of work may include, working extended hours and getting compensated for that. There is also the possibility of the staff not working in properly ventilated buildings or buildings not equipped with proper cooling facilities. The risks of child labour or forced labour is high and will be monitored diligently. A register of all persons under the age of eighteen years employed by the project and the dates of their births will be kept in keeping with the Employment Act of Guyana. No person under the age of eighteen years shall be employed or allowed to work between the hours of 9.00 p.m. to 6.00 a.m.

The potential for sexual harassment/sexual exploitation and abuse in both the assessments and technical works and the civil works is high, given the high rates in the society. The group at highest risk of harassment, including sexual harassment, intimidation, and exploitation is young females. The project will mitigate these risks by developing and implementing a zero-harassment policy for all its workers and sub-contractors. The zero-harassment policy will be part of the workers' Code of Conduct (Annex 1 of the LMP) developed by the project. There will be an awareness raising of the policy using various mediums to all workers. Workers over the minimum age of 16 and under the age of 18 if hired to perform Project-related light work that is not harmful to their health or development, as set out in ESPS2, will be the subject of an extra layer of supervision and awareness campaigns to ensure they are aware of their rights and the project's policies on harassment, intimidation, and exploitation. The extra layer will include separate training sessions and information and awareness of the Workers' grievance mechanism (GM) and project point person to which complaints can be made; this is part of the functioning of the workers GM and as part of the responsibility of the Social and Environmental Expert of the project.

As a result of the ongoing COVID-19 pandemic, there is the risk of project workers contracting the virus following an outbreak in a Project site. Consequently, proper safety measures in accordance with national laws and regulations, and international good practices will be applied to manage the risks of such COVID19 outbreaks. Consequently, the project will be guided by good international industry practice including:

- ILO Occupational Safety and Health Convention, 1981 (No. 155)
- ILO Occupational Health Services Convention, 1985 (No. 161)

- WHO International Health Regulations, 2005
- WHO Emergency Response Framework, 2017
- WHO Guidance on COVID-19, 2020

The project will also ensure that adherence is made to the Guidance for Infrastructure Projects on COVID-19-IDB Invest.⁶⁵

The project will ensure the following:

- The COVID-19 transmission prevention plan developed is implemented in instances of outbreak
- Project workers will be provided with the adequate Personal Protective Equipment (PPE) to safely carry out their duties
- OHS training will include training for project workers on hygiene and other preventative measures, such as use of masks and social distancing or alternative working hours.
- A communication strategy for regular updates on COVID-19 related issues and status of any workers that may be affected by the illness.

4. Brief Overview of Guyana's Labour Legislation: Terms and Conditions

There are several labour laws in Guyana which will guide the terms and conditions of employment on the project. These includes the following legislations:

Constitution of Guyana Overarching rights document of labour legislation is the constitution of Guyana. It recognizes the right to all citizens of employment through the following articles:

Article 22. This Article of Guyana Constitution speaks to Labour rights which reads that every citizen has a right to work, to choose work in accordance with social requirements and personal qualifications. Men and Women have equal right to equal pay for equal work.

Article 29. This Article addresses gender equality and states that "women and men have equal rights and the same legal status in all spheres of political, economic and social life. All forms of discrimination against women on the basis of their sex is illegal".

Article 140. In accordance with this article, no person shall be held in slavery or servitude, nor be required to perform forced labour.

Article 149A. The Right to work. No person shall be hindered in the enjoyment of his or her right to work the right to free choice of employment.

Article 149C. The Right to participate in co-operatives, trade unions, civic or socio-economic organisations.

Occupational Health and Safety Legislation

The Occupational Health and Safety Act is the primary legislation that governs workplace hazards and applies to every industrial establishment such as factories, shops, and offices. It provides for the registration and regulation of industrial establishments, for occupational health and safety of persons at work. The document addresses several issues such hygiene through Consultation on hygiene.

Section 22 (1) states "at a construction site or workplace where no committee is required and where the number of workers regularly exceeds five, the employer shall cause the workers to select at least one Safety and Health representative from among the workers at the workplace who do not exercise managerial functions." Further

the Act establishes the need for workplaces to **implement joint safety and health committees to do the following:**

1. Identify situations that may be a source of danger or hazard to workers
2. Make recommendations to the employer and the workers for the improvement of the health and welfare of the workers
3. Obtain information with regards to the identification of potential or existing hazards and safety and health experiences and work practices and standards comparable to others

Part IV of the Act addresses the hiring of children which it specifically prohibits. Section 41 states No child shall be employed in any factory, outside the factory or in any business trade or process ancillary to the business of the factory. Section 42 of the Act established the requirements for the sanitary and other conditions at workplaces such as workers access to potable drinking water. It also requires that workplaces be equipped with sufficient means of ventilation and adequate lighting. Section 45 of the Act outlines the minimum conditions of construction site. Among the requirements of construction sites are the provision of safety equipment, clothing and other protective devices to be used as prescribed, carried out in workplaces are free of the discharge of noxious, hazardous or polluting matter into air, water or soil so far as is practicable in keeping with the regulations of any licenses for the purpose granted. All workplaces must ensure the establishment of a medical surveillance program at work and provide for safety related medical examinations and tests for workers as required. Section 46. (1) address the employer shall ensure that the equipment, materials and protective devices and clothing as prescribed be provided and that these are in good condition.

5. Responsible Staff

The project manager with the support of the Social and Environmental Expert will be responsible for the overall management of all project workers. They will give follow-up with contractors to ensure that both contractors and subcontractors develop and implement procedures to establish and maintain a safe working environment, including that workplaces, machinery, equipment, and processes under their control are safe and without risk to health, including by use of appropriate measures relating to chemical, physical and biological substances and agents. Contractors and subcontractors will actively collaborate and consult with project workers in promoting understanding, and methods for, implementation of OHS requirements, as well as in providing information to project workers, training on occupational safety and health, and provision of personal protective equipment without expense to the project workers.

6. Occupational Health and Safety (OHS) Policies and Procedures

The LMP including Occupational Health and Safety (OHS) will be the responsibility of the Project Manager with the support of the Social and Environmental Expert. Contractors will assign a member of staff with responsibility for matters related to health and safety. In large firms, this member of staff may be a specialist in OHS, for smaller firms and sub-contractors a member of staff with training and experience in OHS can suffice. A Code of Conduct for workers is required and will be developed and implemented. The safety representative will ensure that any complaints on health and safety are recorded and reported to the project E&S specialists.

Training of Workers: The Social and Environmental Expert will liaise with the contractor's OHS representative for the necessary capacity building activities of the contractor's management staff and workers. Training of workers in environmental and social standards and OHS will be the responsibility of the project SEE. Training on the Code of Conduct will be conducted by the project SEE.

Worker Grievances: The process for addressing workers' grievances is described in the Worker Grievance Mechanism described in this LMP.

7. Purpose of OHS Procedures

The primary purpose of these OHS measures is the safety and health of all the project workers at work and the protection of the environment and conservation of resources associated with the project. The measures also establish and define the authority of the OHS and associated safety systems. These measures will be enforced on all project activities and contractors and sub-contractors of the project through contractual arrangements as is appropriate.

8. Scope of OHS Procedures

Occupational safety and health (OSH), also commonly referred to as occupational health and safety (OHS), occupational health, or workplace health and safety (WHS), is concerned with the safety, health, and welfare of people at work. Safety is defined as “the well-being of project workers whilst at work or carrying out work duties”. OSH Management System is the standards, policies, guidelines that address project workers’ safety, monitoring and evaluation of safety, worker's health, work and general environment.

OHS Procedures:

The obligations of the project under the OSH policy include the following:

- Prevention of use of faulty equipment or sub-standard equipment.
- Prevention of injury and ill health of all project workers;
- Compliance with pertinent national and international OSH standards, that are applicable to Guyana;
- Compliance with the Environmental and Social Policy Standards of the IDB, including ESPS2 objectives and requirements on Labor and Working Conditions;
- Identification and assessment of hazards; Measures to manage the hazards, including the establishment of safety systems, processes and performance;
- Continuous improvement of Safety Systems;
- Management and mitigation of adverse environmental and social impacts;
- Compliance with COVID-19 protocols
- Training and awareness

The project will commit to safety considerations in all its activities and that of contractors and sub-contractors. The project will provide systems, processes, procedures, the necessary safety equipment and gears, and training for all Project workers to conduct all activities in a safe environment. Project workers will be responsible, subject to their roles, for maintaining a safe environment, including the assessment of risks and actions to mitigate, minimize and manage risks to the safety of the work environment.

9. Guiding Principles of the LMP

The project will also ensure that all Project workers hired:

- Ascribe to the principle of not harming people;
- That sexual harassment and sexual exploitation and abuse (SEA) will not be tolerated;
- That discrimination will not be tolerated in the workplace;
- The employment of project workers will be based on the principle of equal opportunity and fair treatment, and there will be no discrimination with respect to any aspects of the employment

relationship, such as recruitment and hiring, compensation (including wages and benefits), working conditions and terms of employment;

- Given that there are direct workers under PIU, the PIU will adapt and receive training on the Code of Conduct as well as on OHS measures required under ESPS 2;
- That there is always compliance with the laws of GUYANA, unless ESPS₂ or the other ESPSs requirements differ and, therefore, the latter prevail for purposes of the Project;
- Compliance with the Environmental and Social Framework (ESF) of the Bank, including the Environment and Social Performance Standard (ESPS₂) on Labour and Working Conditions;

10. Awareness of Policy

The OSH policy will be disseminated to all project workers. The information will be disseminated in various formats, including an adapted and summarised version.

11. Age of Employment

The project will be guided by the (Guyana Employment Act, 1999), which states that the minimum age of employment in Guyana is fifteen (15) years old, provided that, in line with ESPS₂, Project Workers between 16 and 18 only engage in light work that is not harmful to their health, develop and allows them to attend school. Under no circumstances should persons below 18 years of age be employed in the project for construction activities. In addition to the Employment Act, Guyana is a signatory to the following international conventions related to the minimum age of employment:

- Convention on the Rights of the Child (CRC): "Guyana signed and ratified the Convention on the Rights of the Child in 1991"⁶⁶
- Minimum Age Convention, 1973 (No.138) (International Labour Organization, 2017)⁶⁷
- Forced Labour Convention, 1930 (No. 29) (International Labour Organization, 2017)⁶⁸
- Worst Forms of Child Labour Convention, 1999 (No. 182) (International Labour Organization, 2017)⁶⁹
- UN CRC Optional Protocol on Armed Conflict (U.S. Department of Labor, 2017)⁷⁰
- UN CRC Optional Protocol on the Sale of Children, Child Prostitution and Child Pornography (U.S. Department of Labor, 2017)⁷¹
- Palermo Protocol on Trafficking in Persons (U.S. Department of Labor, 2017)⁷²

Project workers over the minimum age of 16 and under the age of 18 may be employed or engaged in connection with the project only under the following specific conditions:

- (a) the work is not likely to be hazardous and harmful to the child's health or physical, mental, spiritual, moral or social development and will not interfere with the child's education.
- (b) an appropriate risk assessment is conducted before the work commences; and
- (c) the Borrower conducts regular monitoring of health, working conditions, hours of work and the other requirement of ESPS₂: Labour and working conditions.

⁶⁶ <https://www.refworld.org/pdfid/3f8d1aad4.pdf>

⁶⁷ <https://cagi.org.gy/pubs/International%20Labour%20Convention%20Ratified%20by%20Guyana.pdf>

⁶⁸ Idem

⁶⁹ Idem

⁷⁰ https://www.ilo.org/wcmsp5/groups/public/---americas/---ro-lima/---sro-port_of_spain/documents/publication/wcms_573539.pdf

⁷¹ Idem

⁷² Idem

The following process will be followed to verify the age of project workers. This process will be completed by project contractors and verified by the PIU:

- All project workers will be asked to produce identification documents (ID) acceptable in local laws, employment, and human resources practices as “proof of age”. These forms of ID will be birth certificates, national driver’s licenses, passports and national registration cards. In the absence of one of those forms of IDs, the project will apply and document an age verification process.
- All copies of the IDs and documents pertaining to the applicant's age and other supporting materials will be kept in files with the human resources personnel. Audits and controls of the process will be a requirement of the contractors and included in the contracts, in keeping with the Employment Act.
- If underage workers are found working on the project, the following actions will be undertaken:
 - Termination of the contract and services agreement immediately as per the Labor Act;
 - Schedule a meeting with the child and seek to determine the reasons for seeking employment.
 - Refer the child to other support services, including social services and the Ministry of Education;
 - Leverage the services of Non-government and Community Based Organizations to assist the child.

12. Terms and Conditions of Employment

The following terms and conditions apply to project workers in accordance with the Guyana Employment Act of 1999.

Contracts

The project -contractor, subcontractor, and any other assignees of contracts shall pay wages and observe hours and conditions of employment that are no less favourable than those established in the country as part of the Guyana Employment Act (1999).

Contractors and sub-contractors shall be certified according to the Government Requirements for governmental contractors. This includes that contractor are to certify that the wages and conditions of employment of all those employed by the contractor in the trade or industry in which the contractor is seeking to contract with the Government are fair and reasonable.

The principle of collective bargaining will guide the contracts. Where there is no minimum wage or rates established in the country, the guiding principle will be fair wages and reasonable rates commensurate with governmental minimum wage and similar established rates and conditions.

In keeping with the Employment Act, the contractor shall keep proper wage records and timesheets for all those employed in relation to the execution of the contract, and the contractor shall produce the wage records and timesheets for the inspection of any person authorised by the project or the Ministry of Labour.

Contractors are required by law to post conditions of work in conspicuous places, informing workers of their rights and conditions of work. A subcontractor shall be bound to conform to the main contract conditions and the main contractor shall be responsible for the observance of all contract conditions. Contractors and subcontractors shall recognise the right of their workers to be members of trade unions.

Minimum Wage

All project workers shall be paid a wage above or equal to the minimum wage as established by the Government of Guyana. Wages will be paid on a weekly, bi-weekly, or monthly basis. Each employee is entitled to a statement accompanying pay that itemised the following: “(a) the employee’s gross wages due at the end of that pay period; (b) the amount of every deduction from his or her wages during that pay period and the

purpose for which each deduction was made; and (c) the employee's net wages payable at the end of that pay period."

Hours of Work

The maximum number of ordinary hours of work for employees shall be 40 hours per week, with the ordinary working days being Mondays to Saturdays.

Project employees are prohibited from working more than 10 hours per day, including two hours for lunch and rest periods. No person under the age of eighteen years shall be employed or allowed to work between the hours of 9.00 p.m. to 6.00 a.m. The Employment Act will guide other provisions related to hours of work on this matter.

13. Grievance Mechanism

This GM will be operational prior to the engagement of project workers.

The Grievance Mechanism for all Project Workers is as follows:

The Project Management Unit and Contractors will appoint a representative/employee who will be the point of contact for all Grievances. In the case of project management staff, the point of contact will be the project manager. Contact information of the contractor will become available once the contractors are known. Contact information will be available prior to the hiring of workers, and it will be provided to workers upon signing of the contract.

Upon receipt of Grievances (not channelled through the project manager,) the contractor staff / Permanent Secretary or Representative will notify the project manager and Social and Environmental Expert. In the case of issues with project management staff, the Project Manager may be required to exclude her or himself if the complaint directly involves them. These complaints will be lodged directly with the PS.

The contractor and PMU will attempt to address the grievance within the established time frame of 3 weeks or 15 working days upon receipt. In cases of timely or urgent matters, a period of a minimum of 24 hours and a maximum of 15 days will be allotted for addressing and resolving the grievance. Grievances can be made in person, by telephone call or in writing. Grievances can be made anonymously. A dedicated email and telephone number will be provided for all Grievances. For grievances made via telephone or in-person, grievances will be recorded later, and the complainant will be asked to sign the same.

Contact Information:

**The Project Management Unit
National Quality Infrastructure Project
Attn: Project Manager
Telephone: 662 4753
Email: peu.nqi@gmail.com**

The contractor will notify the Project Manager through a report of the successful resolution of any grievance. The complainant will also be informed via writing of the measures taken to address the grievance.

If the grievance cannot be resolved by the contractor, the contractor will inform the Project Manager and the Social and Environmental Expert.

The Social and Environmental Expert and Project Manager will meet with the project contractor and workers and attempt resolution. In the case of project management staff, the Permanent Secretary will meet directly with the staff.

If issues cannot be resolved the issue will be referred to the Ministry of Labour for their action and pronouncement. The Ministry of Labour's ruling would be the final tier of the grievance mechanism.

Grievances may be submitted anonymously without providing the complainant's name or contact details. There is a zero policy on retaliation against any Project Worker or Individual that submits a complaint through the Project GM.

If unresolved, either party may seek redress in the courts of Guyana. Parties involved will be advised that they can directly contact the Project Office.

All received grievances received by the project shall be logged and filed.

Addressing Sexual Exploitation and Abuse and Sexual Harassment complaints in the workplace

The specific nature of sexual exploitation and abuse and sexual harassment (SEA/SH) requires tailored measures for the reporting and safe and ethical handling of such allegations. A survivor-centred approach aims to ensure that anyone who has been the target of SEA/SH is treated with dignity. The person's rights, privacy, needs and wishes are respected and prioritised in any and all interactions.

The GM will specify and train an individual responsible for dealing with any SH/SEA allegations issues, should they arise. A list of SH/SEA service providers included in Annex IV will be updated annually to ensure correct information will be kept available by the SH/SEA trained individual, the Project Manager at the PIU and by either the Project Manager or the Permanent Secretary. The GM should assist SH/SEA survivors by referring them to Services Provider(s) for support immediately after receiving a complaint directly from a survivor.

Survivor-centred Approach

The survivor-centred approach is based on a set of principles and skills designed to guide professionals—regardless of their role—in their engagement with survivors (predominantly women and girls but also men and boys) who have experienced sexual or other forms of violence. The survivor-centred approach aims to create a supportive environment in which the survivor's interests are respected and prioritised, and in which the survivor is treated with dignity and respect. The approach helps to promote the survivor's recovery and ability to identify and express needs and wishes, as well as to reinforce the survivor's capacity to make decisions about possible interventions.

SEA/SH grievances can be received through any of the available channels and will be considered level 3 grievances investigated and addressed by the GRC. A list of SEA/SH service providers will be kept available by the Project. Additionally, if an incident occurs, it will be reported as appropriate, keeping the anonymity and confidentiality of the complainant, and applying the survivor-centred approach⁷³. Any cases of SEA/SH brought through the GRM will be documented but remain closed/sealed to maintain the survivor's confidentiality. The IDB will be notified as soon as the Project Manager and the SEE learn about the complaint. If a SEA/SH related incident occurs, it will be reported through the GM, as appropriate and keeping the survivor information confidential. Specifically, following steps will be taken once an incident occurs:

⁷³ The survivor-centred approach is based on a set of principles and skills designed to guide professionals—regardless of their role—in their engagement with survivors (predominantly women and girls but also men and boys) who have experienced sexual or other forms of violence. The survivor-centred approach aims to create a supportive environment in which the survivor's interests are respected and prioritised, and in which the survivor is treated with dignity and respect. The approach helps to promote the survivor's recovery and ability to identify and express needs and wishes, as well as to reinforce the survivor's capacity to make decisions about possible interventions.

Annex 4 Sample Code of Conduct

CODE OF CONDUCT FOR CONTRACTOR'S PERSONNEL

We are the Contractor, [enter name of Contractor]. We have signed a contract with [enter name of Employer], for [enter description of the Works]. These works will be carried out at [enter the Site and other locations where the Works will be carried out]. Our contract requires us to implement measures to address environmental and social risks related to the Works, including the risks of sexual exploitation, sexual abuse, and sexual harassment.

This Code of Conduct is part of our measures to deal with environmental and social risks related to the Works. It applies to all our staff, labourers and other employees at the Works Sites or other places where the Works are being carried out. It also applies to the personnel of each subcontractor and any other personnel assisting us in the execution of the Works. All such persons are referred to as **"Contractor's Personnel"** and are subject to this Code of Conduct.

This Code of Conduct identifies the behaviour that we require from all Contractor's Personnel.

Our workplace is an environment where unsafe, offensive, abusive or violent behaviour will not be tolerated and where all persons should feel comfortable raising issues or concerns without fear of retaliation.

REQUIRED CONDUCT

Contractor's Personnel shall:

1. carry out his/her duties competently and diligently;
2. comply with this Code of Conduct and all applicable laws, regulations and other requirements, including requirements to protect the health, safety and well-being of other Contractor's Personnel and any other person;
3. maintain a safe working environment including by:
 - a) ensuring that workplaces, machinery, equipment and processes under each person's control are safe and without risk to health;
 - b) wearing required personal protective equipment (PPE);
 - c) using appropriate measures relating to chemical, physical and biological substances and agents; and
 - d) following applicable emergency operating procedures.
4. report work situations that he/she believes are not safe or healthy and remove himself/herself from a work situation which he/she reasonably believes presents an imminent and danger to his/her life or health;
5. treat other people with respect and not discriminate against specific groups such as women, people with disabilities, migrant workers or children;
6. not engage in Sexual Harassment, which means unwelcome sexual advances, requests for sexual favours, and other verbal or physical conduct of a sexual nature with other Contractor's or Employer's Personnel;
7. not engage in Sexual Exploitation, which means any actual or attempted abuse of position of vulnerability, differential power or trust, for sexual purposes, including, but not limited to, profiting monetarily, socially or politically from the sexual exploitation of another. In Bank financed operations/projects, sexual exploitation occurs when access to or benefit from Bank financed Goods, Works, Consulting or Non-consulting services is used to extract sexual gain;
8. not engage in Sexual Abuse, which means the actual or threatened physical intrusion of a sexual nature, whether by force or under unequal coercive conditions;
9. not engage in any form of sexual activity with individuals under the age of 18, except in case of pre-existing marriage;

10. complete relevant training courses that will be provided related to the environmental and social aspects of the Contract, including health and safety matters, Sexual Exploitation and Abuse (SEA), and Sexual Harassment (SH);
11. report violations of this Code of Conduct;
12. not retaliate against any person who reports violations of this Code of Conduct, whether to us or the Employer who makes use of the grievance mechanism for Contractor's Personnel or the project's Grievance Redress Mechanism.

RAISING CONCERNS

If any person observes behavior that he/she believes may represent a violation of this Code of Conduct, or that otherwise concerns him/her, he/she should raise the issue promptly. This can be done in either of the following ways:

1. Contact [*enter name of the Contractor's Social Expert with relevant experience in handling sexual exploitation, sexual abuse and sexual harassment cases, or if such person is not required under the Contract, another individual designated by the Contractor to handle these matters*] in writing at this address [] or by telephone [] or in person at []; or
2. Call [] to reach the Contractor's hotline (*if any*) and leave a message.

The person's identity will be kept confidential unless reporting of allegations is mandated by the country's law. Anonymous complaints or allegations may also be submitted and will be given all due and appropriate consideration. We take seriously all reports of possible misconduct and will investigate and take appropriate action. We will provide warm referrals to service providers that may help support the persons who experience the alleged incident, as appropriate.

There will be no retaliation against any person who raises a concern in good faith about any behaviour prohibited by this Code of Conduct. Such retaliation would be a violation of this Code of Conduct.

CONSEQUENCES OF VIOLATING THE CODE OF CONDUCT

Any violation of this Code of Conduct by Contractor's Personnel may result in serious consequences, up to and including termination and possible referral to legal authorities.

FOR CONTRACTOR'S PERSONNEL:

I have received a copy of this Code of Conduct written in a language that I comprehend. I understand that if I have any questions about this Code of Conduct, I can contact [*enter name of Contractor's contact person(s) with relevant experience (including for sexual exploitation, abuse and harassment cases) in handling those types of cases*] requesting an explanation.

Name of Contractor's Personnel: [*insert name*]

Signature: _____

Date (day/month/year/): _____

Countersignature of authorized representative of the Contractor:

Signature: _____

Date (day/month/year/): _____

Annex 5 Guidance for Reporting Incidents and Accidents

Guidance on Reporting of Incidents/accidents by the PIU of the project.

In case of incidents and accidents, the Project Implementation Unit (PIU) will notify the Bank within 24 hours after learning of the incident or accident. The submission of the subsequent report would be provided in a timeframe acceptable to the Bank and or as requested. The PIU will provide sufficient details about the incident or accident, indicating the immediate measures taken to address it, including information provided by any contractor and supervisory entity, as appropriate. Subsequently, at the Bank's request, the PIU will prepare more detailed report (s) on the incident or accident, where it will propose measures to prevent it from happening again. See appendix A, format for reporting incident and accident.

These subsequent reports, among others, can be:

1. Root Cause Analysis (RCA). The main objective of the RCA is Prevention, and it will be carried out by whoever is managing the site where the incident / accident occurred, for example grant, contractor, subcontractor, etc. The RCA⁷⁴ will address the following:
 - a. Determine what happened by identifying and describing the incident / accident. Include photos.
 - i. What happened? Who was affected?
 - ii. Where and when it happened.
 - iii. What is the source of the information? How did you find out about the incident / accident?
 - iv. Are the basic facts of the incident / accident clear and indisputable, or are there contradictory versions?
 - v. What were the conditions or circumstances under which the incident / accident occurred?
 - vi. Is the incident ongoing or contained?
 - vii. Is it a loss of life / s or serious damage?
 - viii. How serious was the incident?
 - b. Determine the root cause (RCA) of the incident / accident
 - i. Understand and document the root cause (s) of the incident, which may be due to the following factors:
 1. Labour Procedures
 2. Equipment and technology
 3. Organizational / systemic
 4. Human factors.
 - ii. The RCA should be based on existing country processes, where available. It is only in the absence of systems or weak experience that consultants (national or international) need to be recruited to undertake the RCA.
 - iii. The Borrower is responsible for funding the preparation of the RCA from project funds or other own resources.
 - iv. RCA should be completed as soon as possible, ideally within 10 days.
 - v. Findings of RCA will inform measures to be included in Corrective Action Plan (CAP)
 - vi. Provide complete information about the incident to the Bank and facilitate site visit(s)
 - c. Identify immediate corrective measures, as well as additional follow-up actions if any are required, with their associated deadlines. These additional follow-up actions may enter the
2. The CAP and with the aim of preventing similar incidents / accidents in the future. The CAP will have, among other elements, those indicated in Appendix C.

⁷⁴ While an RCA per se is not mandatory, especially in cases where information is clear and readily available., it is nonetheless essential that the Borrower and Bank understand very well the underlying cause(s) of the incident, to agree on measures to prevent recurrences

3. Any subsequent report would be provided within a time acceptable to the Bank.

Appendix A: INCIDENT / ACCIDENT REPORTING SHEET

INCIDENT / ACCIDENT REPORT FORM			
EVENT IDENTIFICATION -INCIDENTS / ACCIDENTS			
Project name and Id:			
Name and Id of subproject:			
Event -Incident / Accident #:			
Date:		Hour:	
Place of occurrence:			
UPI / Contractor:			
Town:			
Communities:			
Incident / accident Information Source:			
INCIDENT / ACCIDENT DESCRIPTION			
Event Severity Level	Weather condition	Scope of the even to	How the event relates to the Project
<input type="checkbox"/> Indicative	<input type="checkbox"/> Sunny	<input type="checkbox"/> Local	<input type="checkbox"/> Linked with the project
<input type="checkbox"/> Serious	<input type="checkbox"/> Cloudy	<input type="checkbox"/> Regional	<input type="checkbox"/> Not linked with the project
<input type="checkbox"/> Severe	<input type="checkbox"/> Rainy	<input type="checkbox"/> National	
	<input type="checkbox"/> Night	<input type="checkbox"/> International	
	<input type="checkbox"/> Other (explain)		
Scope of the Incident / Accident			
<input type="checkbox"/> Environmental <input type="checkbox"/> Social <input type="checkbox"/> Occupational Health and Safety			
Detailed Description of the Incident / Accident Event			
RESPONSE ACTIONS FOR THE INCIDENT / Accident			
Status of resolution		Urgency of Response	
<input type="checkbox"/> Resolved		<input type="checkbox"/> Need for immediate response	
<input type="checkbox"/> In progress		<input type="checkbox"/> No immediate response	
<input type="checkbox"/> Other (explain)			
Description of Response to Event - Incident / Accident			

Recurrence of Similar Events / Incidents / Accidents	
<input type="checkbox"/> No	<input type="checkbox"/> yes Number of times ____
In case of recurrence, indicate the period in which the events were repeated:	
IMPACT ON THE PROJECT	
Does the event affect the execution of the work?	Is there a need for additional specialized resources to investigate, evaluate, or resolve the event?
<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
<input type="checkbox"/> NO	<input type="checkbox"/> No
	<input type="checkbox"/> Other (Explain)
Other Observations	

Appendix B: Incident Classification Guide

Indicative
A relatively minor and small-scale incident or non-compliance that is limited in its immediate effects but may be indicative of wider-scale issues within a project that could lead to serious or severe incidents. It may be escalated to serious or severe under certain circumstances, including recurrence of the incident within a six-month period, severity of impact of the incident, or inability to rectify the condition within the agreed timeframe.
Serious
An incident that is causing or will cause significant harm to the environment, workers, communities, or natural or cultural resources, is complex and/or costly to reverse and may result in some level of lasting damage or injury. This may include repeated non-compliance. Serious incidents for example could involve injuries to workers that require off-site medical attention and result in lost time, improper treatment of vulnerable groups, inadequate consultation, consistent lack of OHS plans in a civil works environment, and medium-scale deforestation. These types of incidents require an urgent response.
Severe
An incident or repeated pattern of non-compliance of sufficient seriousness that it may, in addition to the actual or potential harm caused, pose a corporate risk. A severe incident is complex and expensive to remedy, and likely irreversible. A fatality is automatically classified as severe, as are large-scale deforestation, major contamination, forced or child labor, human rights abuses of community members by security forces or other project workers, including GBV, violent community protests a project, and trafficking in endangered species.

Appendix C: Elements of a Corrective Action Plan

Timeframe: - Immediate to near term actions - Medium term/ongoing actions	Topics for example: Documentation, monitoring and reporting; Contractual agreements /enforcement; Risk assessment, processes, procedures and training plans for managing risks	Actions/Measures	Responsible Parties	Compliance Date	Compliance Status

