



# Farmlands Guyana Inc.

## Crop Farm

*Environmental Assessment and  
Management Plan*



March 2025

# Farmlands Guyana Inc

## **Environmental Assessment & Management Plan**

**March 2025**

## List of Acronyms

| <b>Acronyms</b> | <b>Meaning</b>  |
|-----------------|---|
| ADI             | Area of Direct Influence                                |
| All             | Area of Indirect Influence                              |
| Aligned NAP     | Aligned National Action Plan                            |
| AOI             | Area of Influence                                       |
| AQGs            | Air Quality Guidelines                                  |
| BOD             | Biological Oxygen Demand                                |
| CARICOM         | Caricom Community                                       |
| CCME            | Canadian Council of Ministers for the Environment       |
| CFU             | Colony Forming units                                    |
| CITES           | Convention on International Trade in Endangered Species |
| CO              | Carbon Monoxide   |
| COD             | Chemical Oxygen Demand                                  |
| COPD            | Chronic Obstructive Pulmonary Disease                   |
| DBH             | Diameter Breast Height                                  |
| DO              | Dissolved Oxygen  |
| DPSIR           | Driver-Pressure-State-Impact-Response                   |
| EAMP            | Environmental Assessment and Management Plan            |
| E.Coli          | Escherica Coli  |
| EECS            | Environmental Education and Communication Services      |
| EIA             | Environmental Impact Assessment                         |
| EPA             | Environmental Protection Agency                         |
| FGI             | Farmlands Guyana Inc                                    |
| GDF             | Guyana Defence Force                                    |
| GDP             | Gross Domestic Product                                  |
| GEF             | Global Environment Facility                             |
| GLDA            | Guyana Livestock Development Authority                  |

|                  |  |
|------------------|--|
| GLSC             | Guyana Lands and Survey Commission                     |
| GNBS             | Guyana National Bureau of Standards                    |
| GoG              | Government of Guyana                                   |
| GWI              | Guyana Water Incorporated                              |
| GWCMC            | Guyana Wildlife Conservation and Management Commission |
| HPD              | Hearing Protection Devices                             |
| HQ               | Hazard Quotient  |
| HSE              | Health, Safety and Environment                         |
| ILO              | International Labour Organisation                      |
| IUCN             | International Union for the Conservation of Nature     |
| LCDS             | Low Carbon Development Strategy                        |
| MoA              | Ministry of Agriculture                                |
| MoPW             | Ministry of Public Works                               |
| N <sub>2</sub> O | Nitrous Oxide  |
| NAREI            | National Agriculture Research and Extension Institute  |
| NDC              | Neighbourhood Democratic Council                       |
| NDS              | National Development Strategy                          |
| NEAP             | National Environmental Action Plan                     |
| NIHL             | Noise Induced Hearing Loss                             |
| NIOSH            | National Institute for Occupational Safety and Health  |
| NLUP             | National Land Use Plan                                 |
| NO <sub>2</sub>  | Nitrogen Dioxide                                       |
| NO <sub>x</sub>  | Nitrogen Oxides  |
| O <sub>3</sub>   | Ozone  |
| OCC              | Office of Climate Change                               |
| PM               | Particulate Matter                                     |
| POPC             | Pollutants of Potential Concern                        |
| PPE              | Personal Protective Equipment                          |



|                 |   |
|-----------------|---|
| PTCCB           | Pesticides and Toxic Chemicals Control Board          |
| QHSE            | Quality Assurance, Health, Safety, and Environmental  |
| RDCs            | Regional Democratic Councils                          |
| SDGs            | Sustainable Development Goals                         |
| SDS             | Safety Data Sheet                                     |
| SEP             | Stakeholder Engagement Plan                           |
| SO <sub>2</sub> | Sulphur Dioxide                                       |
| TDS             | Total Dissolved Solids                                |
| TNTC            | Too Numerous to Count                                 |
| TSS             | Total Suspended Solids                                |
| UFP             | Ultra Fine Particles                                  |
| UNCCD           | United Nations Convention to Combat Desertification   |
| UNDP            | United Nations Development Programme                  |
| UNFCCC          | United Nations Framework Convention on Climate Change |
| USEPA           | United States Environmental Protection Agency         |
| VOCs            | Volatile Organic Compounds                            |
| WHO             | World Health Organization                             |

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# 1. Introduction

The agricultural sector in Guyana continues to be one of the most important, despite challenges to productivity over the years. This sector continues to be a major contributor to non-oil GDP, contributing 11% of the country's GDP in 2024, largely due to increased production in subsectors such as rice, fisheries, aquaculture, and new and emerging crops such as corn and soyabean (Guyana Chronicle, 2025). The Government of Guyana (GoG) continues to emphasise the importance of agriculture in diversifying Guyana's economy away from oil and gas, and has made significant investments to boost rice, corn and soyabean production (International Trade Administration, 2023).

The 2013-2020 National Development Strategy for Agriculture in Guyana, emphasised the importance of agricultural diversification, and made key references to the need for local production of soyabean and corn to support the demand for feed locally, while minimising the dependence on imports from overseas markets. Particularly, the strategy identified the following needs in relation to corn and soyabean production:

- ✚ Increased production identified as a priority
- ✚ Development of mega farms which cater to their production
- ✚ Establishment of a crop development unit at NAREI to focus on the development of corn and soyabean for livestock feed
- ✚ Reduction in imports of foods including corn and soyabean is a major goal of the policy
- ✚ Introduction of commercial-sized corn and soyabean production in Guyana to expand and sustain the country's agro-diversity policy and programmes (priority area 1).
- ✚ Promotion of the production of local feed inputs such as corn and soyabean and reducing their import (priority 7), as part of the bid to increase livestock production (Ministry of Agriculture, A National Strategy for Agriculture in Guyana, 2013-2020).

Although the validity period of this strategy ended 5 years ago, the national goals for the agricultural sector are still very active. As recently as of 2024, the Bank of Guyana, in its mid-year report highlighted a decline in stockfeed production by 9.7%,

underscoring the need for more efforts to be directed towards its production Bank of Guyana, 2024).

Farmlands Guyana Inc (FGI) has responded to the national call for investors in this sector through the acquisition of 10,100 hectares of land, in the Ebini area, for the cultivation soyabean and corn, and more recently millet, beans and upland rice. The GoG has also taken steps to prepare for this investment by prioritising the construction of access roads and storage and drying facilities in support of this initiative (Ministry of Agriculture 2023; NewsRoom, 2023 a; Guyana Times, 2023). In 2023, the GoG allocated GY \$150 M for the construction of a wharf at the Tacama Landing, which has already commenced (figure 1). In 2024, GY \$967.8 M was budgeted to improve the capacity of the Tacama Facility, which included the installation of a conveyor system (Ministry of Finance, 2024).



Figure 1: Wharf under construction at Tacama

## 1.1 Background

Farmlands Guyana Inc. (FGI) is a locally owned company, led by a team with more than three decades of experience of doing business in Guyana. The company was established in 2022 and is on a mission to support global food security and nutrition, in keeping with United Nations Sustainable Development Goals, 1, 2 and 3, which aims to realise the

goals of “no poverty”, “zero hunger” and “good health and wellbeing”, respectively. As such, in support of Guyana’s role in achieving the Region’s food security goal, FGI has embarked on a project in which efforts are focused on the origin of the food value chain, where corn and soya production will be undertaken and serve as feed inputs for the growing domestic and regional and poultry industry.

In keeping with the policy of the Environmental Protection Agency (EPA), FGI was required to seek approval from the Agency since the farm’s size exceeds 1000 acres. As such, FGI submitted an Application for Environmental Authorisation to the EPA on October 11, 2023, and an Environmental Permit was granted in July 2024. Condition 1.4 of permit reference no. 20231011-FLGCS stipulates that an environmental assessment and management plan (EAMP) be submitted to the EPA. Subsequently, on October 04, 2024, FGI submitted an Application to EPA, to vary their existing permit to include upland rice, red beans and black eye beans to the current range of cultivated crops.

This EAMP was prepared in compliance with the permit requirements and addresses key areas of environmental management practices which will be implemented during the farm’s operation.

## 1.2 Objectives and Scope

The EAMP targets mainly activities involved in crop production and farm operation but does not address impacts associated with construction activities since major construction has been completed. There are no construction activities planned in the near future, which may likely result in significant environmental impacts. Additionally, there are no external stakeholders immediately surrounding the farm who may be impacted negatively by construction activities. However, during the execution of minor construction activities, appropriate mechanisms will be implemented to ensure the safety of farm employees.

The primary objectives of this EAMP are to identify and assess, as far as reasonably practicable, the positive, negative, direct and indirect impacts resulting from the project’s components and activities; and to clearly describe the mitigation measures in place or proposed, to minimise unavoidable negative impacts, protect environmental resources

and enhance the value of environmental components where possible. Further, the EAMP includes a monitoring and implementation framework for the mitigation measures proposed and details the procedures to be followed in the event of specific, foreseeable emergencies.

The EAMP was prepared in accordance with the guidelines stipulated by the EPA's *Guidelines for preparation of EAMPs*; and supported by international best practice documents prepared by the World Bank, USEPA and WHO among others.

The specific objectives of this EAMP are to:

- ✚ Present a description of the project, inclusive of its spatial location, critical components and project activities
- ✚ Report on the project's baseline in relation to air quality, noise emissions, water quality, biological resources and the socioeconomic environment
- ✚ Describe the methodology utilised for the preparation of the EAMP
- ✚ Outline the policy, legislative and institutional framework governing the project, with special focus on those with relevance to this project
- ✚ Identify potential environmental and socioeconomic impacts, informed by a detailed risk assessment and highlight the benefits of the project
- ✚ Outline existing or planned measures to eliminate hazards and mitigate unavoidable impacts
- ✚ Present FGI's management plans including, but not limited to the Emergency Response Plan, Traffic Management Plan and Stakeholder Engagement Plan.

### 1.3 EAMP Methodology

The preparation of this EAMP involved a series of critical stages, which collectively worked in tandem with each other to achieve the overarching objective of the EAMP. These activities were carefully planned and executed to ensure that an accurate understanding of the project, as well as the surrounding environment, risks and potential impacts could be presented. The stages involved in the preparation of the EAMP were as follows:

- ✚ Initial Documents Review
- ✚ Preliminary Meeting with Company Representative
- ✚ Reconnaissance Visit
- ✚ Request for Additional Information & Literature Review
- ✚ Detailed Site Inspection, Environmental Baseline Data Collection and Interviews with Employees
- ✚ External Stakeholder Engagement
- ✚ Impact Assessment
- ✚ Mitigation and Management Planning

### 1.3.1 Initial Documents Review

At the commencement of this project, documents providing a general overview of the project, particularly those submitted to the EPA were reviewed for context. This included the Application for Environmental Authorisation and the project summary. This was used to prepare for the next phase, where specific information and clarification regarding the project was sought.

### 1.3.2 Preliminary Meeting with Company Representative

An initial meeting was held with FGI's representative to gather information pertinent to the project. At this meeting, the Company's representative was asked to provide information such as the project's objectives, crops to be cultivated, utility usage at the site, stakeholder engagement history and projected timelines. This meeting provided an opportunity to ask follow-up questions and clarify uncertainties. During this meeting, FGI's representative was briefed on the expectations of the Consultancy team, and a timeline for the reconnaissance visit to the site was agreed on.

### 1.3.3 Reconnaissance Site Visit

On July 12, 2024, a reconnaissance visit to the project site was conducted to familiarise the team with the project environment, and to provide a means of ground truthing the information gathered during the previous stages. The reconnaissance visit provided a basic understanding of the project layout and components and provided a cursory but essential overview of the farm's operation, allowing for the early identification of potential

environmental and social impacts. This visit was very critical to the preparation of the EAMP and also allowed for the identification of sampling and assessment locations to support baseline data collection, and to plan for stakeholder engagement.

#### 1.3.4 Request for Additional Information & Literature Review

A list of documents and additional information required to support the preparation of the EAMP were requested and reviewed. This included the Company's HSE policy statement, soil analysis reports, weather data, drone images of the site, existing maps and shapefiles. Additionally, literature specific to the preparation of an EAMP, such as the EPA's Guidelines for the preparation of Environmental Assessment and Management Plans (EAMPs), and literature on specific crops to be planted at the farm were reviewed. This allowed for the development of the framework for the EAMP, and the population of specific chapters in the document.

#### 1.3.5 Detailed Site Inspection, Baseline Data Collection and Employee Interviews

Another site visit was planned and executed during the period October 15, 2024-November 12, 2024. During this visit, a more detailed inspection of the facility and its operations were conducted, and included a walk-through of the farm during which GPS co-ordinates for specific project components were recorded.

Baseline data collection was required to provide empirical data needed to conduct the impact assessment. As such, during the period October 15-17, 2024, noise and air quality assessments were conducted. Noise assessments were conducted for periods ranging from 8 to 16 hours, while air quality assessments were conducted from periods ranging from 10 minutes to 24 hours, depending on the parameter being monitored.

Further, during the period October 21-23, other members of the consultancy team visited the farm, specifically for the purpose of conducting the biodiversity assessment. This aspect of the assessment also involved interviews with community representatives in



Ebini with knowledge about local biodiversity, and the employment of a tree spotter from the village to identify forest species surrounding the project.

Finally, water quality assessments were conducted on November 12, 2024, and involved in-situ analysis for pH and temperature, while other parameters were assessed by the Guyana Water Incorporated (GWI) and the Pesticides and Toxic Chemicals Control Board (PTCCB) laboratories. The results of the water quality analyses are included in Annex 3.

All site visits were facilitated by the Company's Farm Manager, who, along with other employees, answered further questions and provided supporting documents where available.

### 1.3.6 External Stakeholder Engagement

Public consultation is an essential part of project development and therefore, although generally compulsory for the Environmental Impact Assessment (EIA) process, the consultancy team ensured that stakeholders external to the project were consulted. As a result, three main categories of stakeholders were consulted during the period October 16-17, 2024, as follows:

- ✚ Key Stakeholders (e.g. NAREI, GLDA, MoA, Ebini Farmers' Group, FGI Employees)
- ✚ Primary Stakeholders (e.g. Residents of Wikki Creek, Rising Sun Farm, New Frontier Agriculture)
- ✚ Secondary Stakeholders (e.g. Ebini and Wikki Creek Health Centre Staff, Headteachers of the Nursery and Primary Schools, Hydromet, GLSC and GDF)

A copy of the stakeholder consultation report is included in Annex 4.

### 1.3.7 Risk and Impact Assessment

This environmental impact assessment was guided by the traditional risk assessment format through the lens of the Driver-Pressure-State-Impact-Response (DPSIR) framework of defining the problem and identifying the hazards (pressures), examining exposure routes, characterising the resulting hazard and exposure (the state), to


determine the probability/potential of a given risk, i.e. the impact the farm may have within the environment, landscape/zone of influence where it is located. This allowed for those high-risk impacts, requiring mitigation measures to be easily identified and distinguished from those which were categorised as low impact and therefore did not require mitigation.

#### 1.3.8 Mitigation and Management Planning

The mitigation measures and management plans developed were specific to the impacts identified. While the mitigation measures outlined in this EAMP were guided by international best practices, they were carefully examined to ensure their feasibility in the context of the local environment.

### 1.4 EAMP Preparation Team

The EAMP was prepared through the collaboration of three female-owned companies, and individual consultants with various technical capabilities in environmental management, waste management, safety, quality, stakeholder engagement., GIS and mapping, risk and biodiversity assessments and environmental engineering. The portfolios of the companies involved are outlined below:

 **Franklin-Lynch Environmental and Engineering Services**, the lead company on the project, was established in October 2021, and registered under the Business Names (Registration Act, Chapter 90:05). FLEE Services is a 100% privately owned Consultancy which provides environmental regulatory compliance support to clients, through overseeing the development of compliance solutions which are practical and innovative. With over 15 years' experience in the sector, the company specialises in environmental management, specifically targeting waste, air quality and noise management, and prepares Applications for Environmental Authorisation, Project Summaries, Annual Reports and Environmental Assessment and Management Plans. FLEE Services is Local Content certified.

✚ **BrinsJen System Development Specialists-** a Guyanese-owned, women-led Quality Assurance, Health, Safety, and Environmental (QHSE) Management Consultancy. Commencing operations in 2021, services originated with the intent to introduce more local companies to QHSE Management Systems. The founders of BrinsJen SDS have worked extensively, for over a decade, with QHSE Management Systems in multiple fields allowing the Company's portfolio to extend to technical support services such as Environmental Testing (of air, noise and water), Project Support, and QHSE Document Preparation. BrinsJen SDS is also Local Content certified.

✚ **Environmental Education and Communication Services (EECS)-** Established in February 2023, EECS is dedicated to empowering communities and organisations in Guyana and beyond through innovative environmental education and communication solutions. Led by a Specialist with over 18 years of experience in environmental education, communication, environmental management, and stakeholder engagement, EECS is committed to creating lasting impact. EECS offers a range of professional services including the development of communication strategies, designing citizen and stakeholder engagement plans, grievance redress mechanisms and socio-economic assessments and the development of social management plans.

## 1.5 Layout and Organisation of the EAMP

The EAMP is organised by chapters, based on common thematic areas as outlined below:

- ✚ **Chapter One:** Introduction to the EAMP, inclusive of background, objectives and scope, and the EAMP methodology
- ✚ **Chapter Two:** Project Description which presents an overview of FGI's project components and activities, project location and area of influence

- ✚ **Chapter Three:** Presents the administrative framework relevant to the project, such as the national policy, legislative and institutional arrangements
- ✚ **Chapter Four:** Focuses on providing an environmental and social baseline of the project environment where available, and includes results of environmental baseline assessments and stakeholder consultation
- ✚ **Chapter Five:** Presents the approach to stakeholder consultation and the findings of the stakeholder consultation process
- ✚ **Chapter Six:** Assesses the potential impacts of the project on the physical, biological and socio-economic environments, using a risk assessment approach
- ✚ **Chapter Seven:** Environmental Assessment and Management Plans, including mitigation measures for the identified environmental and social impacts resulting from the project; emergency response and traffic management plans, training and environmental awareness
- ✚ **References:** Provides the sources of key literature utilised in the preparation of the EAMP
- ✚ **Annexes:** Includes all company procedures, documents and relevant information which were not included in its entirety in the body of the EAMP.

## 2. Project Description

### 2.1 Project Overview

FGI is a private venture which has acquired 10,100 hectares (24,975 acres) of land in the Ebini area, Upper Berbice River, Region 10, Guyana, to undertake a large-scale agricultural operation. This planned developmental activity is in response to the GoG's goal to increase food security of the CARICOM region and to reduce the food import bill by 25 percent by the year 2025. Guyana is committed to meeting the growing demand for poultry meat and increasing the supply of the product in the country. In order to achieve this target, it is necessary to produce large quantities of poultry feed to supply local markets. FGI plans to support this initiative by investing in the cultivation of grains essential for the production of feed for the livestock industry.

FGI intends to develop 9,797 hectares (24,209 acres) of farmland in the Ebini area to cultivate mainly soyabean and millet over a five-year period. The Company plans to conserve 3 percent of the land as forest. Planning for this project involved conducting several topographic surveys and soil tests to determine the site's suitability. Additionally, site visits were conducted to obtain an understanding of the existing infrastructure, facilities, water sources and logistics for transporting materials and equipment. In November 2023, land preparation and site development commenced. This included the construction of the main office, living quarters, equipment shed, water well and storage facilities, in addition to the development of 600 hectares of farmland for the first year of crop production.

The Company has acquired a fleet of equipment such as tractors, planters and other farming implements to support the operation. FGI uses precision agriculture technology to plant and monitor crops to ensure optimal output.

## 2.2 Project Location

FGI's project site is located on a portion of State Lands which falls within the intermediate savannah area of Ebini, Region 10, Guyana (Figure 2).

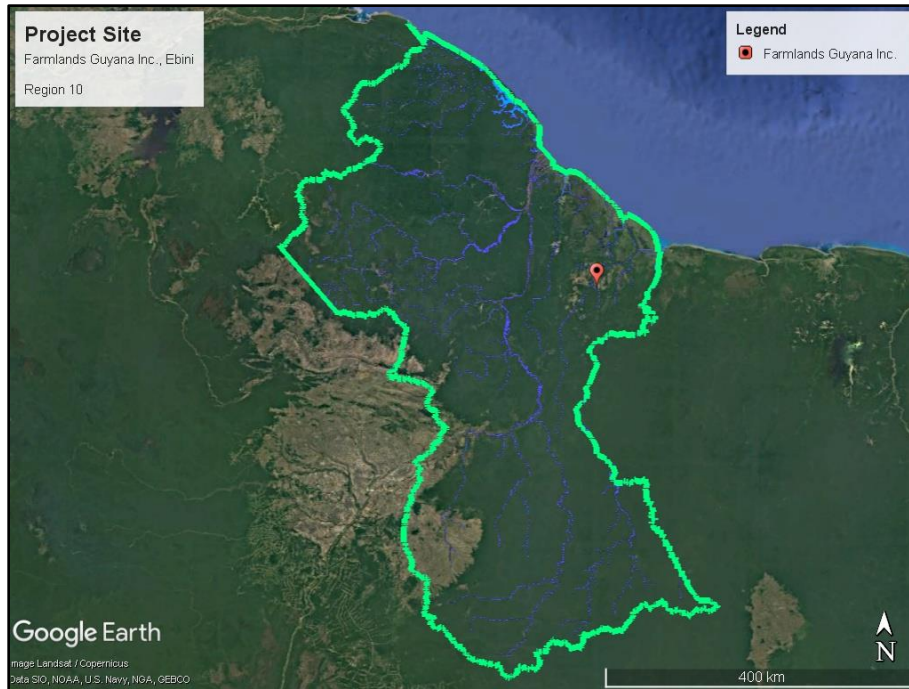


Figure 2: Map of Guyana showing the project location

According to the Guyana Lands and Survey Commission's (GLSC's) Cadastral Plan # 59866, Tract 'BWPI' is situated on the right bank of Wiruni River, right bank of Berbice River and in the county of Berbice, Guyana (figure 3). The area's size is approximately 10,117 hectares/ 24,975 acres.

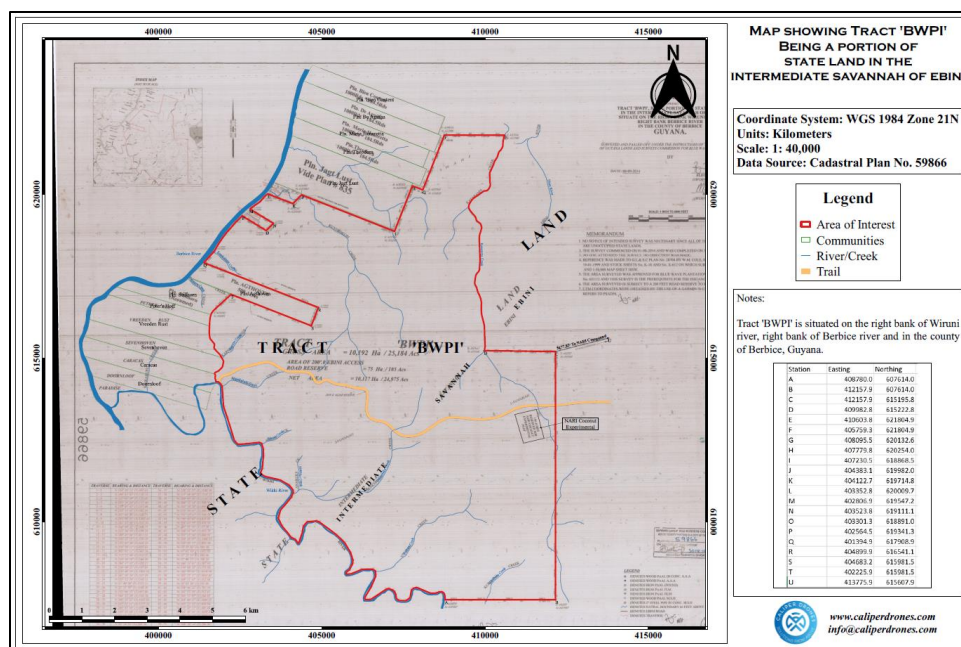


Figure 3: Map showing Cadastral Plan of Farmlands Guyana Inc. Tract 'BWPI'  
(Source: Caliper Drones)

## 2.3 Project Area of Influence (AOI)

The Project's area of influence was determined based on desk reviews of studies and reports of large-scale agricultural projects, with specific emphasis on farming areas. It was noted that the quantification of agro-environmental impacts is usually estimated based on the size and type of project, as well as several other factors including temperature, rainfall, existing farming and land management practices (Van der Werf & Petit, 2002; Rohila, et al, 2017). There are variations in other countries and regions due to different developmental stages and the scale of intensive operations. Additionally, there is much debate on the spatial extent and magnitude of biophysical effects and economic consequences of agricultural impacts on the environment. Land degradation and water pollution are some of the major concerns as it relates to crop production and biodiversity loss as a result of agricultural expansion (FAO, 2003; Chen et al, 2023).

Since agriculture is regarded as a complex and multi-faceted activity, determining the effects of agricultural projects on an area requires various assessments, surveys and



analyses to ascertain relationships, interactions and environmental impacts specific to the project area or region (Payraudeau & Van der Werf, 2005). As the FGI project site is surrounded by various land uses, waterways and communities, there will inevitably be some effects from farming activities. Environmental effects are likely to increase based on the intensity of farming practices and the scale of inputs such as chemicals and machinery (Rohila, et al, 2017). For the purpose of this assessment, an area of 5km from the centre of the project site was used as the Area of Direct Influence (ADI) and 10km from the centre of the project site was used as the Area of Indirect Influence (AI), as depicted in figure 4. The area considered includes the neighbouring communities along the Berbice River, north of Wikki reservation and bordering private farms.

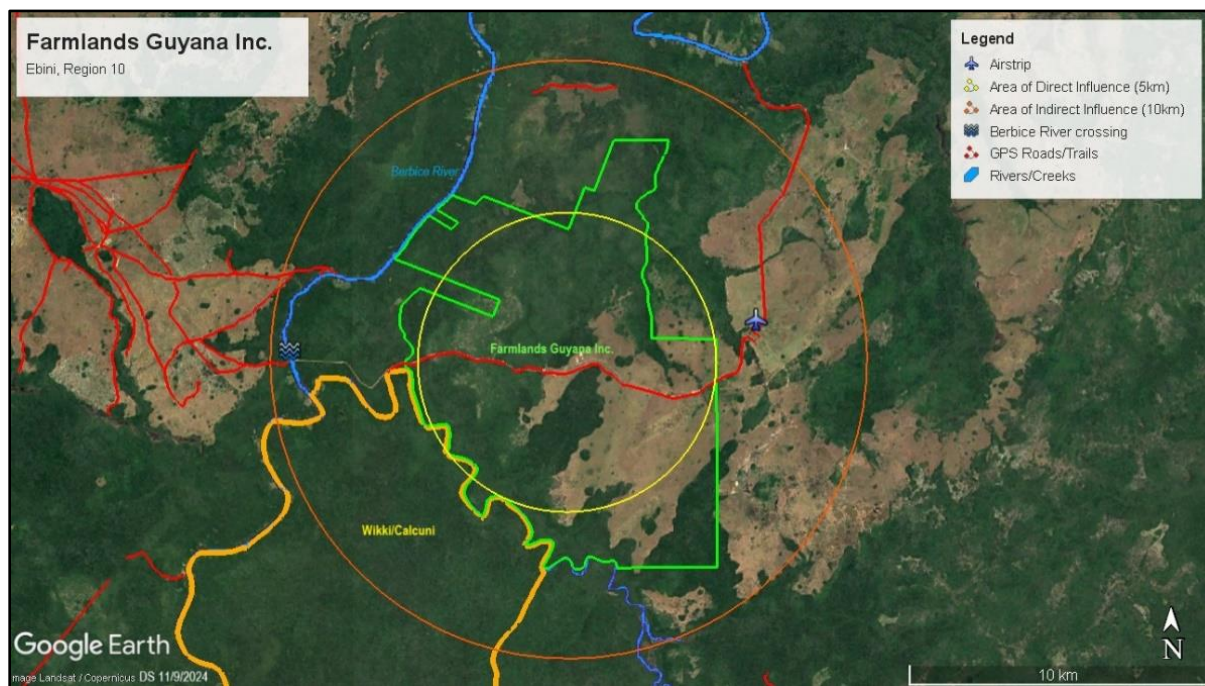


Figure 4: Google Earth Image showing Project's AOI



## 2.4 Project Components & Activities

The core aspect of FGI's operation is the cultivation of crops such as soyabean, rice and beans; however, several activities occur at the farm to support farming.

### 2.4.1 Land Preparation

One of the most critical aspects of farming is the careful preparation of the land. This ensures that factors which can negatively impact plant growth are reduced. Land preparation at FGI involves the following:

1. Excavator and bulldozer are used to break and flatten soil. Land needs to be cleared to avoid damaging planting equipment
2. Soil is leveled to accommodate the next steps
3. Tractor with harrow attached ploughs over the leveled ground. This is done twice to ensure tillage is adequate
4. Limestone is applied to the ploughed area
5. Soil is then ploughed again with tractor and harrow so that the limestone can be properly distributed
6. Levelling is done again to ensure the planting ground is even
7. Seeds are planted at even intervals using a Planter

### 2.4.2 Crop Production

Soyabean is presently the only crop cultivated. The three varieties are planted on a staggered basis to ensure that the entire crop is harvested at the same time. As such, planting commences with the 120 days variety, then 10 days later the 110 days variety is planted and finally the 105 days variety is planted. The crop is harvested at the scheduled time at the end of the growing period.

After harvesting, the produce is loaded in trucks and transported immediately to the Ministry of Agriculture's silo. This facility is located at the Berbice River Crossing, approximately 4.5km from the project's boundary. At the silo, the produce is weighed to determine the total yield. The produce is also sorted to separate the good quality from the damaged produce. It is then weighed again to calculate actual yield. A moisture content test is done to ensure optimal quality and viability. If the result is high (18-19%), the produce is oven dried to achieve ideal moisture content of about 12%. It should be noted that the moisture content is based on seasonality, as the harvest tends to have a higher moisture content during the wet season.

The produce is stored at the silo until it is picked up by local buyers and transported by road to the consumer. Presently, there is a local market for the produce and FGI anticipates Regional markets in the future. The company does not contemplate processing the output at this stage.

### 2.4.3 Crop types

Presently 600 hectares of farmland is cultivated with soyabean (*Glycine max*). Studies have shown that soyabeans require large capital investments in machinery, equipment, land preparation and agricultural inputs (Fearnside, 2000). FGI uses three varieties for planting. These are: TMG 2383 IPRO, FT 3191 IPRO and TMG 2285 IPRO. The growing period for each variety is 105 days, 110 days and 120 days respectively.

The Company will soon cultivate millet (*Sorghum bicolor*) on another 600 hectares of land, to be used as a cover crop. Additionally, FGI plans to plant 10 hectares with red beans (*Phaseolus vulgaris*), black eye beans (*Vigna unguiculata*) and upland rice (*Oryza sativa* L.) on a trial basis. *Brachiaria brizantha* grass would also be grown alongside these crops as a means of replenishing soil nutrients, as with millet.

#### 2.4.4 Fuel Storage

In an effort to ensure adequate fuel is available to power the generator, vehicles and equipment, FGI currently stores fuel on site. Presently, a maximum of 20,000 liters of diesel is stored in a fuel tanker, in a wooden bunded area. Polyethene material is used as a base for the fuel storage area. FGI recognises that additional safeguards for fuel storage need to be implemented, and as such the Company will upgrade this system over time.



Figure 5: Temporary Fuel Storage Area

### 2.4.5 Chemicals Storage

Pesticides, fertilizers, and cleaning chemicals are stored in the storage bond. Most of these chemicals are in a solid state and are stored in the appropriate containers/packaging. Additionally, the SDS for each chemical will also be stored in a readily accessible area.

### 2.4.6 Vehicle and Equipment Maintenance

Currently, all farming vehicles and equipment are stored in the maintenance shed. At this location, all required repairs and maintenance are conducted. Employees of the farm undertake minor repairs and servicing of the vehicles and equipment, while more complex repairs and maintenance activities are conducted by third-party contractors, who visit the site.

### 2.4.7 Waste Management

Domestic waste from the living quarters and other non-hazardous waste is taken to a landfill site established by FGI situated approximately 500m away at GPS location: 5°32'34.80"N 57°48'8.70"W. Empty plastic containers are triple-rinsed and discarded at the landfill and are later buried. Other domestic waste, which is not suitable or used for composting, is also disposed of at the landfill site.

When vehicles and heavy equipment are serviced, waste oil is collected in barrels and is stored in the maintenance shed. FGI has an arrangement with local loggers who collect and utilise the waste oil for their operations.

### 2.4.8 Daily schedule

The FGI staff works Monday through Saturday from 07:00h to 16:00h, with an hour's lunch break from 11:00h to 12:00h. Clean up activities around the living area is done daily, prior to the official working time. Field activities and any mechanical repairs are done

throughout the day. In some instances, work occurs in 12-hour shifts, depending on the activity being undertaken.

## 2.5 Project Alternatives




Based on accessibility and topographic layout of the project area, the most suitable locations for establishing the living quarters and farming areas were selected. Other types of crops can be considered for cultivation in the area as various agricultural produce such as coconuts and peanuts are being grown in nearby farms. The natural landcover and soil type is an important consideration when determining the species to be cultivated. At this time, there are no project alternatives regarding planting areas, crop type or crop size, as FGI's site is considered most suitable.

## 2.6 EHS Policy Statement

FGI is committed to environmental protection, promoting stewardship, and ensuring the health and safety of our employees. Our focus is also on delivering quality products to our clients. Our policy is designed to help the company achieve the highest standards in all its activities while safeguarding the environment and our workforce.

We recognize that conducting commercial activities sustainably is essential to protect the environment. Therefore, all managers, employees, and contractors have specific duties and responsibilities outlined in this policy, ensuring we fulfil our commitments.

Our company aims to achieve these commitments through the following promises:

-  Provide visible leadership in implementing and adhering to this policy within the organization.
-  Ensure all employees are aware of and understand this policy.
-  Maintain the natural ecosystem on parts of the farm by creating land islands.

- ✚ Implement a pollution prevention program, including proper storage of chemicals and fuel within our facility.
- ✚ Develop clear and attainable Health, Safety, and Environmental (HSE) objectives, revising them regularly.
- ✚ Establish a comprehensive Environmental Management System that complies with all local environmental legislation, codes of practice, company objectives, and any other applicable standards.
- ✚ Regularly monitor environmental conditions to ensure all activities meet established environmental standards.
- ✚ Implement a training and communication program that provides employees and contractors with the necessary knowledge and tools to perform their tasks safely.

We acknowledge that our activities can impact the environment, particularly in areas such as energy use, waste management, water usage, and soil management. To effectively manage these impacts, we are committed to:

- ✚ Regularly assessing our activities and exploring innovative ways to improve them.
- ✚ Keeping our farm cultivated and vegetated to minimize soil erosion.
- ✚ Applying the Best Available Technology whenever possible.
- ✚ Utilizing eco-safe products in our operations when feasible.
- ✚ Monitoring our energy consumption and incorporating alternative energy sources into our operations.
- ✚ Tracking our water usage and identifying opportunities to reduce consumption as necessary.

A signed copy of the EHS policy statement is included in Annex 1.

### 3. Administrative Framework

Along with the established by-laws implemented by FGI., this crop farming project will be required to fully comply with Guyana's national environmental and developmental policies, strategies, plans, legislation and institutional framework. Strict compliance with applicable laws, institutional procedures, and guidelines will foster sustainability of the farm's operation. This is a critical area for Farmlands Guyana Inc. Ebini Project and will positively impact the Farms's environmental and socioeconomic value.

#### 3.1 National Policies and Strategies

To ensure an efficient and viable system of operation, it is critical to implement a strict approach towards adherence to national and internationally established policies, strategies and plans within any country. In 2022, at the First National Agri-Investment Forum and Expo was held in Guyana, with the theme "Investing in Vision 25 by 2025" (United Nations Guyana, 2022). It was here that the Government of Guyana's initiative, in collaboration with members of the Caribbean Community (CARICOM), was put forward to "achieve the 25% by 2025 vision of reducing regional food imports by fostering accelerated and targeted investment in agriculture and food production and its business ecosystem within CARICOM member states" (United Nations Guyana, 2022). It is in response to this initiative, that Farmlands Guyana Inc. intends to establish its crop cultivation Project in the Ebini Area, to contribute to the regional food security initiative and reduce food import. The establishment of this Project will encourage the incorporation of several Policies, Strategies and Plans.

##### 3.1.1 National Development Strategy (2001-2010)

The National Development Strategy (NDS) was launched in 1997 and outlined objectives and fundamental policy conditions for Guyana's economic development. Some main

objectives of the establishment of the NDS are to support the promotion of sustainable development and environmental protection, the development of agricultural research as well as the promotion of rural employment, among others. The NDS portrays a detailed classification of the industrial structure of Guyana's economy where the Agriculture Sector is highlighted under the Primary sector, with three established sectors defined (primary, secondary and tertiary). The NDS promotes the diversification of the agriculture sector and illustrates the goals to promote the export of local agriculture products. The Farmlands Guyana Inc. project supports the achievement of the goals for agricultural development in Guyana and will benefit from the policies and initiatives undertaken under the auspices of the NDS.

### 3.1.2 National Land Use Plan

In 2005 the Guyana Lands and Surveys Commission drafted The National Land Use Plan (NLUP). In 2013, it was approved and implemented. The NLUP does not zone areas of the country for particular land uses but aims to bridge development gaps to encourage improved land use planning. This is done by highlighting the availability of lands with various potential for development, using tools such as maps, which further feed into the decision-making process for land use planning. In this way, investments in various developments can be made as guided.

The NLUP prioritizes sustainable developments within various areas in the country. Some of these include agriculture (crop cultivation, livestock and aquaculture), housing, developing renewable energy potential from solar and wind, and fostering connectivity. It is with this in mind, that the Farmlands Guyana Inc. Project will remain committed to follow all guidance set out under the NLUP.

### 3.1.3 National Environmental Action Plan

The Government of Guyana (GoG) outlined its environmental policy objectives for the sound management of the environment and natural resources in the National



Environmental Action Plan (NEAP), developed in 1994 and updated in 2000. The NEAP outlined sound principles of environmental management and guides towards the promotion of sustainable development. Further, the NEAP sets out strategies to govern development in an integrated manner, prioritizing environmental concerns. Here, the Action Plan outlined a thematic approach to environmental management where baseline data collection systems, monitoring and regulation, the development of institutional and legislative capacity, and improving public awareness and participation were promoted.

The Farmlands Guyana Inc. project will remain committed to complying with the environmental management approach outlined in the NEAP, by virtue of the establishment and implementation of mitigation measures for all potential environmental impacts and the required monitoring measures to be implemented during its operation.

#### 3.1.4 Low Carbon Development Strategy

In June 2009, the GoG instituted the Low Carbon Development Strategy (LCDS) intending to transform Guyana's economy into a low-carbon, sustainable one, while tackling climate change. The broad goals of the Strategy were to transform the economy to deliver greater economic and social development by following a low-carbon development path. The LCDS was updated in 2010 and 2013 and in October 2021, the Government released a draft version of an expanded LCDS for public consultations. While the three objectives of the first iterations of the Strategy remained unchanged, a fourth objective was added to align Guyana with global climate goals. This objective recognized that the emergent oil and gas sector had transformed Guyana's development prospects. In the context of this project, there is potential for the release of greenhouse gases from the use of pesticides and fertilizers. With the known facts of the impact of greenhouse gases on the Earth, the company intends to incorporate all mechanisms to minimise its emission.

### 3.1.5 Guyana's Action Plan to Combat Desertification

In December 2015 the United Nations Development Programme (UNDP) in collaboration with the Guyana Lands and Surveys Commission and Global Environment Facility (GEF), completed the Aligned National Action Plan to Combat Land Degradation (Aligned NAP). This Plan satisfied a critical goal for the Government of Guyana, having signed on to the United Nations Convention to Combat Desertification (UNCCD). The established Plan aimed to ensure that all development sectors inclusive of the agricultural sector and its resources are sustainably managed with emphasis on the ecosystem services they provide. This Action Plan was established to incorporate existing policies and strategies which promote sustainable land use and economic development. With crop farming as the main activity of this project, the company remains committed to ensuring all aspects of development pose little impact to the surrounding environment, hence minimising cumulative impacts on eco-systems and services.

### 3.1.6 The Paris Agreement

The Paris Agreement is an international treaty on Climate Change that provides aid to countries in formulating suitable strategies to combat climate change. Ninety-six (96) countries adopted the Paris Agreement in 2015, and in 2016 this Agreement came into force. Guyana being one of the signatories agreed to achieve the goal of safeguarding food security and ending hunger. Signatories to the Paris Agreement are obligated to establish policies that govern development to foster sustainable productivity, taking into account waste management from livestock farming, while exploring and implementing more sustainable methods for cropping. With the knowledge of the impact of agriculture on climate change, Farmlands Guyana Inc. makes it a priority to ensure minimum resulting impact on the environment with the implementation of this Project.

### 3.1.7 The United Nations Sustainable Development Goals

All member states of the United Nations adopted the 2030 Agenda for Sustainable Development. This strategy aims to promote action plans for peace and prosperity for

people and the planet we inhabit. As such, seventeen goals known as the 17 Sustainable Development Goals (SDGs) were established. These goals promote mechanisms to aid the ending of poverty, improve health and education, reduce inequality, preservation of the oceans and forests while tackling climate change and fostering economic growth. SDGs that align with developments such as agriculture include SDG 2 on ending hunger, improving food security and nutrition, and promoting sustainable agriculture; SDG 13 on mitigating and adapting to climate change; SDG 15 on ecosystems, biodiversity, forests and land, which provide the foundation of all food and agriculture systems. Further, as in every development, fostering gender equality and female empowerment must be implemented, which is captured under SDG 5. Farmlands Guyana Inc. is cognizant of the role it plays in implementing SDGs and will ensure that the activities conducted during its operation do not contradict the objectives of the SDGs.

### 3.1.8 National Climate Change Policy and Action Plan (2020-2030) (Draft 2.0 2019)

This Policy and Action Plan was developed by the Office of Climate Change (OCC) in Guyana, as commitments made under international agreements, treaties and regional strategies. It reflected a cross-sectoral approach towards tackling climate change. The overall objective of this policy is to ensure climate change adaptation and mitigation following the United Nations Framework Convention on Climate Change (UNFCCC). This action plan proposed clear steps to establish partnerships and facilitate access to technical and financial support for low-carbon initiatives, climate change mitigation and adaptation, and an integrated approach towards development. As part of this action plan, one of the main steps incorporated was to attain associated SDGs. The main SGD under this action plan is Goal 13, to take urgent action to combat climate change and its impacts. While there is a global need to ensure that the world's growing population is fed, there are also impacts that do not go unnoticed, those emanating from both animal farms as well as crop farms. Therefore, this project must integrate guidelines highlighted within such policies as the National Climate Change Policy and Action Plan, which the company remains committed to ensuring.

## 3.2 Legislative and Regulatory Framework

Many laws within Guyana's legal framework have been enacted to ensure that developmental projects consider environmental and social concerns. Foremost amongst these laws are the Constitution of Guyana with amendments, the Environmental Protection Act and the Environmental Protection Regulations. Other legislation that play important roles in the establishment and operation of this project include the Occupational Safety and Health Act and the Plant Protection Act.

### 3.2.1 The Constitution of the Cooperative Republic of Guyana (1980 and 2003 Reforms)

The Constitution of Guyana is the highest governing legal document and supreme law for the country. The importance of protection and management of the environment is recognized and given particular attention to environmental-related principles by the Constitution. This is as follows:

- Article 25: "Every citizen has to participate in activities to improve the environment and protect the health of the nation."
- Article 36: "The well-being of the nation depends upon preserving clean air, fertile soils, pure water and the rich diversity of plants and animals."
- Article 149J: (1) "Everyone has the right to an environment that is not harmful to his or her health or wellbeing."
- Article 149(J): (2) "The State shall protect the environment, for the benefit of present and future generations, through reasonable legislative and other measures designed to prevent pollution and ecological degradation; Promote conservation; Secure sustainable development and use of natural resources while promoting justifiable economic and social development."

FGI recognises the importance of complying with all aspects of this constitution and endeavors to ensure this is achieved.

### 3.2.2 The Environmental Protection Act (1996 and 2005 Amendments)

The Environmental Protection Act establishes the basic institutional and regulatory framework within which all activities that may significantly impact the environment and public health are effectively governed. The Act provides for the effective management, conservation, protection and improvement of the natural environment, the prevention or control of pollution, the assessment of the impact of economic development on the environment and the sustainable use of natural resources. The Act also provides that the Environmental Protection Agency is the central coordinating agency for environmental management in Guyana.

Given that this project has the potential to impact the surrounding environment, abiding by the principles outlined in the EP Act, will be highly prioritized by the company.

### 3.2.3 Environmental Protection Regulations

There are several subsidiary Environmental Protection Regulations to the Environmental Protection Act. These Regulations were developed to regulate and control the activities of development projects during construction and operation. The EPA has the responsibility to ensure the compliance of both new and existing activities to these Regulations by issuing the required authorizations and conducting continuous monitoring of these operations. Mentioned below are the Environmental Protection Regulations to which FGI will be required to adhere.

#### 3.2.3.1 Environmental Protection (Authorisations) Regulations, 2000

The Environmental Protection Authorisations Regulations outline the requirements of applications for environmental authorisation and the rules governing the issuance of such authorisation. Environmental authorisations typically have specified conditions that Permit Holders must comply with to avoid, minimise, and mitigate environmental impacts. As part of their development activities, FGI has applied for an Environmental Authorisation and the decision to request an EAMP was part of this process.

#### 3.2.3.2 Environmental Protection (Air Quality) Regulations, 2000

These Regulations provide rules for the reduction and prevention of air pollution in Guyana. Any person that conducts activities that emit air contaminants shall register with the Environmental Protection Agency and a person who emits any air contaminant in the construction, installation, operation, modification or extension of any facility relating to (a) industry; (b) commerce; (c) agriculture; or (d) any institution, shall apply to the Agency for an environmental authorization. The Regulation states that no new stationary source or facility shall emit any contaminant in concentrations greater than those established as parameter limits (by the Agency). The Regulations also place restrictions on new and altered sources of air emissions and provide for control of pollution by mobile sources. Currently, there are no nationally determined or established Air Quality standards. However, the Agency is guided by and utilizes the World Health Organization (WHO) and the United States Environmental Protection Agency (USEPA) allowable limits, which are applicable to specific projects when permitted.

#### 3.2.3.3 Environmental Protection (Water Quality) Regulations, 2000

In its efforts to protect the water resources in Guyana, the Environmental Protection Agency (EPA) developed the Environmental Protection Regulations in 2000. As a part of these Regulations, specific emphasis was placed on water through the Environmental Protection (Water Quality) Regulations, which are meant to protect Guyana's waters by controlling the discharge of any effluent (liquid waste matter) into any of the coastal and inland waterways. The Regulations encourage proper disposal of effluent, which in turn minimises contamination of existing or potential sources of water discharges into the environment. The Regulation's main aim is to reduce threats to public health, as well as reduce or eliminate the possibility of actual or potential contamination of our water bodies, by illustrating stringent protocols and guides which are to be followed by developments with potential to impact waters directly or indirectly. The EPA also adopts the WHO and USEPA standards for surface and potable water quality, when required. The Water Quality Regulations require all operations that will discharge effluent during construction, installation, operation, modification or extensions to obtain environmental authorisation.

The Regulations also outline the requirements and guidelines on the discharge of effluents and disposal of sludge. Moreover, the Guyana National Bureau of Standards (GNBS), in collaboration with the EPA and other relevant stakeholders, have developed Interim Guidelines for Industrial Effluent Discharges into the Environment. Currently, these Guidelines provide maximum allowable limits for 16 parameters and are used by the EPA to inform permissible limits for effluents discharged into the environment. As such, effluent discharges resulting from the project's operational phases will be guided by the limits prescribed in the permit.

#### 3.2.3.4 Environmental Protection Noise Management Regulations (2000)

These Regulations provide rules for the emission of noise. Emission of any noise in the construction, installation, operation, modification or extension of any facility relating to (a) industry; (b) commerce; (c) transport; (d) construction; or (e) any institution, that requires environmental authorisation from the Environmental Protection Agency. Under the Noise Management Regulations, operations that emit noise from various activities such as construction, transport, industry, commerce and any institution are required to apply to the Agency for environmental authorisation. The GNBS, in collaboration with the EPA and other relevant institutions, developed a standard that provides Guidelines for Noise Emissions into the environment. Although the GNBS guidelines do not provide limits for agricultural activities, the EPA will determine which limit best applies to this project and its operation, and which compliance with noise emission limits will be measured against.

#### 3.2.3.5 Environmental Protection (Hazardous Waste Management) Regulations, 2000

These Regulations provide rules for the generation, treatment, storage, disposal and transportation of hazardous waste and the use of imported chemicals. If a person or company provides services involving any such activities, they are required to obtain environmental authorisation from the Environmental Protection Agency (EPA). Once permitted, permit holders have certain obligations regarding data collection and reporting. Additionally, these Regulations also provide for permit holders to submit an emergency

preparedness plan to the EPA for approval. Moreover, every person who knowingly uses a chemical substance or mixture which is imported, manufactured, processed or distributed in contravention of these Regulations shall be guilty of an offence and liable on summary conviction to a fine.

Since this project will be handling such materials as waste oil, and such chemicals as pesticides and fertilizers, measures will be implemented to prevent potential impacts that will arise from this.

#### 3.2.3.6 Environmental Protection (Litter Enforcement) Regulations (2013)

These Regulations provide for the enforcement against litter offences. It is an offence under these regulations to place litter in a public place, permit or cause another person to litter a public place or have litter on private premises that poses a health risk. The fine for an individual found littering in a public place is GYD 50,000, while for a body corporate it is GYD 100,000. A fixed penalty of fifteen thousand dollars (GYD 15,000) is offered to offenders who accept liability for the offence committed. Under the Litter Prevention Regulations, the NDCs and Regional Democratic Councils (RDCs) are to provide receptacles in public places. The enforcement of this regulation in the context of the project will be the sole responsibility of FGI.

#### 3.2.4 Public Health Ordinance (1934)

The Public Health Ordinance makes provisions for promoting public health concerns in Guyana. The Ordinance is dated and was enacted during Guyana's colonial past. The Ordinance makes provisions for central and decentralised local health administration including the prevention of infectious, epidemic, endemic and venereal diseases, as well as management of public health facilities and services. The Ordinance also makes provisions for regulating 'offensive trades', that is, trade that can be damaging to the health of the people engaged in the trade. The Ministry of Health has convened a committee for the management of offensive trades and this Committee is chaired by the Chief Medical Officer and is aimed at regulating activities that can damage the health of



employees during their routine duties. A draft Public Health Bill has been prepared to supersede the Ordinance. FGI will remain dedicated to ensuring all guidelines are followed to prevent any potential harm that can result from the implementation of this project.

### 3.2.5 Occupational Safety and Health Act (1997)

The Occupational Safety and Health Act 1997 defines the responsibilities of management and workers concerning safety and health and applies to every workplace in Guyana. The Act makes provisions for the registration of industrial establishments, the establishment of an Occupational Safety and Health Authority, the establishment of a National Advisory Council on Occupational Safety and Health, the duties of employers, workers and other persons, treatments of accidents and occupational diseases, and occupational safety and health regulations. The Act authorises Occupational Health and Safety Inspectors to enter and inspect workplaces. Under this Act, a joint workplace safety and health committee must be established at operations where more than 20 persons are regularly employed. For workplaces with fewer than 50 persons, the committee should consist of at least four persons of which at least half the number should be workers who do not exercise managerial functions and should be selected by the workers themselves. Employers also have duties of providing protective devices for workers, providing instructions and supervision to ensure the safety of workers, maintaining a medicine chest and establishing an occupational health service for workers. The Act requires all industrial establishments to keep a General Register containing the particulars of workers younger than the age of eighteen; particulars as to the washing, whitewashing or odour washing; painting or varnishing of the workplace; and particulars on every accident and industrial disease. Specifically, concerning the Accident Register, notice should be submitted using the form in the First Schedule of the Act within four days of the accident. If the accident results in death, a notice of death should be sent to the Authority, the joint workplace safety and health committee and trade unions if applicable, as soon as the employer becomes knowledgeable of the death. Adhering to guidelines stipulated within the

Occupational Safety and Health Act (1997) is a key priority of FGI. As such, mechanisms will be put in place to guarantee a safe working environment for all employees.

### 3.2.6 Food and Drugs Act

The Food and Drugs Act was passed in Parliament in 1971. The main aim of this Act was to ensure the safety of the Food, Drugs and Cosmetic industry. This Project will produce food products for retail; therefore, this Act will ensure the guidance as necessary. Following this Act, any person who sells an article of food that was manufactured, prepared, preserved, packaged or stored under unsanitary conditions is guilty of an offence.

### 3.2.7 The Pesticides and Toxic Chemicals Control Act, 2000

The Pesticides and Toxic Chemicals Control Act was passed in August 2000 with the aim of regulating the manufacture, importation, transportation, storage, sale, use and disposal of pesticides and toxic chemicals. This Act also provided for the establishment of the Pesticides and Toxic Chemicals Board (PTCCB), which is the institutional authority that manages pesticides and toxic chemicals in Guyana. Given that crop farming is the main component of FGI's project, the use of pesticides, fertilizers and other toxic chemicals will be regulated.

### 3.2.8 Pesticides and Toxic Chemicals Transport Regulations

This Regulation came into force in January 2025. As required under the Pesticides and Toxic Chemicals Control Act, transport of pesticides and toxic chemicals by air, land and water must be regulated to ensure safety. As such, this regulation requires that all individuals involved in the transport of these hazardous materials must complete training and certification to ensure compliance with safety guidelines. Due to the use of chemicals such as fertilizers and pesticides for this project, FGI will ensure that all transporters of pesticides and toxic chemicals are certified in accordance with this regulation.

### 3.2.9 Food Safety Act 2019

This Act was established to promote the health and well-being of consumers. Further, the Food Safety Act details guidance for effective management of food safety along the food chain, prioritizing an integrated approach to achieve this objective. The establishment of the Food Safety Authority, the implementation and enforcement organ aligned with this Act, was also stipulated therein. With consumers involved, as a critical part of this project, this legislation will be essential in building the foundation for the effective functioning and compliance with the food safety requirements outlined in the Act.

### 3.2.10 Plant Protection Act

With the establishment of the Plant Protection Act, the management and protection of Guyana's plant resources was prioritized. In this manner, the Act provides that there should be prohibition, control or restriction of transportation of any diseased plant or any plant appearing to be affected by any pest or disease. There was clear stipulation also for the prohibition, control or restriction of the cultivation and harvesting within Guyana, of any such plant as specified, or as further directed by the Minister. Since FGI intends to cultivate and harvest crops that are not local to Guyana, such as upland rice, soybeans and Sorghum, the Plant Protection Act will guide this development where necessary. It is of high priority that FGI works in conjunction with all conditions as applicable within the Plant Protection Act.

### 3.2.11 Labour Act (1942)

The Labour Act specifies the conditions that an employer must observe in the contracting of employees. 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 a partial payment of allowances in the form of food, toiletries, housing etc., these are acceptable and not considered illegal if both the employer and employee agree on such terms. Within the framework of this Act, all employers are required to ensure workers are adequately paid as prescribed by the laws of Guyana and are also required to ensure the workers

are not mistreated. The company will remain committed to ensuring that all guidelines are followed as necessary.

### 3.2.12 Guyana Standard for Occupational Health and Safety Management Systems (2018)

The Guyana National Bureau of Standards (GNBS), in collaboration with relevant stakeholders, released a standard for Occupational Health and Safety Management Systems. This standard specifies the requirements for an Occupational, Health and Safety management system to enable an organization to formulate policies and objectives. This takes into account legislative requirements and information regarding significant hazards and risks that the organization can control and over which it can be expected to influence the project, its employees and others whose health and safety may be affected by the activities of the organization.

## 3.3 Institutional Framework

### 3.3.1 Environmental Protection Agency

The Environmental Protection Agency (EPA) oversees the effective management, conservation, protection and improvement of the environment and takes the necessary measures to ensure the prevention and control of pollution, assess the impact of economic development on the environment and the sustainable use of natural resources. The Agency was established in 1996 by the Environmental Protection Act and is responsible for the enforcement of national environmental legislation and regulations as well as the development and implementation of environmental policies and standards. It also undertakes the inspection and enforcement of matters dealing with the environment, conservation and natural resources and administers the environmental permitting process in Guyana. The Agency is governed by a Board of Directors. Under the Act, the EPA is mandated to “take such steps as are necessary for the effective management of

the natural environment to ensure the conservation, protection and sustainable use of its natural resources” (section 4 (1) (a)). The Act also provides for the EPA to have overall responsibility to ensure management of the natural environment, the conservation, protection and sustainable use of its natural resources; assess any developmental activity, which may harm the natural environment before such activity commences; and coordinate and maintain a programme for the conservation of biological diversity and its sustainable use. The EPA is mandated to ensure that any operation that may have a significant impact on the environment must acquire environmental authorisation from the EPA. Projects are considered to have an environmental impact when they threaten the health, safety and natural life-supporting systems of humans and other living things. The EPA therefore has environmental regulatory oversight for FGI’s project at the national level.

### 3.3.2 Regional Democratic Council (Region 10)

The Regional Democratic Council (RDC) is overseen by the Ministry of Local Government. In a case where developments do not fall under the jurisdiction of a Neighbourhood Democratic Council (NDC), the next Authority that will have the responsibility to approve development activities within such locations would be the RDC. The RDC has a mandate to oversee activities related to development within the Region. In the case of this Project, the Region 10 RDC will have local oversight for projects within the Ebini area.

### 3.3.3 Guyana Lands and Surveys Commission (GLSC)

The Guyana Lands and Surveys Commission (GLSC) was established by the Guyana Lands and Surveys Commission Act No. 15 of 1999. The Commission was mandated by this Act to have charge of and act as guardian over all public lands (State and Government Lands), rivers and creeks of Guyana. Some other functions of the Commission as set out in section 4 of the Guyana Lands and Surveys Commission Act, relating to management and conservation of public include:

- ✚ to carry out various surveys of land and water resources of Guyana,
- ✚ to control and administer land surveys in Guyana,
- ✚ to establish and maintain a national survey control system,
- ✚ to evaluate offers for public land and to issue grants or leases of public lands,
- ✚ to monitor and enforce conditions on which public land is sold or let, to make and maintain records on public land as required by law,
- ✚ to collect sums of money for selling or letting of public land, and
- ✚ to prepare land use plans following the Town and Country Planning Act.

### 3.3.4 Ministry of Agriculture – National Agriculture Research and Extension Institute (NAREI)

The NAREI's main purpose is to provide agricultural services and support across Guyana. As part of this institute, the Chief Plant Protection Officer with its managing body is housed. Their main goal is to implement and enforce the Plant Protection Act. Any concerns about diseased plants should be brought to the attention of this office. For the import and export of plants/seeds/fruits, the authority must approve such activities.

### 3.3.5 Office of Climate Change

The Office of Climate Change (OCC) supports work on climate change adaptation, mitigation and forest conservation and is the UNFCCC focal point for Guyana. While climate change remains a topic of little discussion in Guyana, this office holds a lot of information, strategies and plans to aid in the combat of climate change in various sectors including the agricultural sector.

### 3.3.6 Food Safety Authority

The Food Safety Authority was established to monitor the implementation of the Food Safety Act. This Authority is tasked with the establishment of a risk-based food safety and quality framework to protect, enhance, ensure food safety, and protect consumers from food fraud. This Authority also holds responsibility for certifying food business operators.

### 3.3.7 Ministry of Health – The Government Analyst Food and Drugs Department

The Government Analyst - Food & Drug Department, Ministry of Health aims to protect the health and well-being of consumers and to enhance the competitiveness of industries regulated under the Food and Drug Act 1971, through:

- ✚ Monitoring the implementation of the Food and Drugs Act and enforcing it as necessary.
- ✚ Ensuring the safety and quality of food, beverages, cosmetics, medical devices, drugs and water through the establishment of safety and quality assurance systems.
- ✚ Providing precise and accurate analytical results that are “fit for purpose” and meet customer satisfaction.
- ✚ Aiding International Trade through import and export inspection and certification.

### 3.3.8 Pesticides and Toxic Chemicals Control Board

The Pesticides and Toxic Chemicals Control Board (PTCCB) was established under the mandate of the Pesticides and Toxic Chemicals Control Act 2000, and its associated Regulation which governs the importation, sale, storage, use and distribution, and transportation of pesticides in Guyana. The Board is tasked with responsibility for licensing, registration, training, inspection and enforcement with the aim of ensuring sound chemicals management in Guyana; reduction of risk to human health and environment, and food safety in agriculture production.

### 3.3.9 Ministry of Public Works

The Ministry of Public Works (MoPW) plans, builds and maintains Guyana's road network, and sea and river defense system to protect life and property; support the movement of people, goods and services; reduce the cost of transportation; promote economic growth and quality of life and the environment. The MoPW will play a critical role in supporting the infrastructural developments (e.g. roads and electricity) which are necessary for this project.



## 4. Description of the Project Environment

### 4.1 Physical Environment

The potential environmental impacts that result from FGI's operations may be determined by first establishing the region's and project site's environmental baseline. The baseline data provides a starting point against which future assessments can be compared. In this assessment, the environmental characteristics of the project area were established through extensive literature research, field sampling/measurements, laboratory analyses, stakeholder consultation and data interpretation.

Data from literature research were obtained from several existing sources, while fieldwork required to establish the baseline was conducted during the period October 15-November 12, 2024, by the Consultancy team.

This section provides an overview of the project environment, with specific descriptions of the project area, as well as its immediate physical, biological and socio-economic composition.

#### 4.1.1 Climate

To gain an understanding of the climate experienced by FGI., weather data from the Guyana Hydrometeorological Service Station located at Ebini, Upper Demerara-Berbice was utilised, as well as data from FGI's weather station. Data for the period July 19 to October 17, 2024, was reviewed and analysed.

Guyana normally experiences a tropical humid climate with uniformly high temperatures, rainfall and humidity, moderated by northeast trade winds. Seasonal rainfall variability is generally the dominant characteristic of climate in Guyana, as the country generally experiences two distinct wet and two dry seasons. The normal wet seasons are from mid-April to mid-August and from mid-November through January.

Ebini is located at an elevation of 25.52 meters (83.73 feet) above sea level and has a Tropical rainforest climate (Classification: Af). The district's yearly temperature is 29.75°C (85.55°F) and it is 1.96% higher than Guyana's averages. Annually, Ebini typically

receives about 104.84 millimeters (4.13 inches) of precipitation and has 232.08 rainy days (i.e. 63.58% of the of the year).

During the period July to October 2024, wind direction was East North Easternly (ENE) with an average wind speed of 4.1km/hr, with a high of 25.2km/hr and a low of 0 km/hr. The average temperature was 28.9°C, with the highest recorded temperature of 38.3°C and lowest of 21.8°C. The average humidity was 77.9%, highest humidity, 99% and lowest humidity, 42%. There was an average daily rainfall of 6.9mm.

#### 4.1.2 Air Quality

Air pollution is contamination of the indoor or outdoor environment by any natural or man-made chemical, physical or biological agent that modifies the natural characteristics of the atmosphere (World Health Organization 2012). The air pollutants of major public health concern include volatile organic compounds (VOCs), particulate matter (PM), carbon monoxide (CO), ozone (O<sub>3</sub>), nitrogen oxides (NO<sub>x</sub>), sulphur dioxides (SO<sub>2</sub>) and metals, such as lead (Hedges, 2004; World Health Organization, 2012; National Institute of Environmental Health Sciences, n.d).

Particulate Matter (PM) is the term used to refer to a mixture of solid particles (dust, dirt, soot, and smoke) and liquid droplets suspended in the air. These PM emissions originate from a variety of sources, such as vehicles, factories, industrial sites, construction sites, tilled fields, unpaved roads, stone crushing, and burning of wood (Hedges, 2004). Particulate Matter comprises both coarse and fine particles. The coarse particles (PM<sub>10</sub>) have an aerodynamic diameter between 2.5µm and 10µm. They are formed by mechanical disruption (e.g., crushing, grinding, abrasion of surfaces), evaporation of sprays, and suspension of dust. Fine particles have an aerodynamic diameter less than 2.5µm (PM<sub>2.5</sub>). These particles are formed from gas by chemical reactions; and condensation of high-temperature vapours during combustion (Fierro, 2000).

Carbon monoxide (CO) is a colourless gas that is emitted into the atmosphere largely from the incomplete combustion of carbon-containing fuels and to a smaller extent from natural sources such as electrical storms and volcanoes. This gas is dangerous to

humans due to its strong affinity for haemoglobin in the blood which can cause dizziness, nausea, convulsions and in severe cases death. CO mitigation is therefore paramount in industrial settings for both workers and nearby residents (Manahan, 2000).

Nitrogen oxide (NO<sub>x</sub>) is a generic term used to refer to a group of gases that contain nitrogen and oxygen in varying ratios. Nitrogen dioxide (NO<sub>2</sub>) is a highly reactive, non-flammable, reddish brown gas that has a choking odour. Sources of nitrogen oxides are both natural such as lightning and bacterial activity and man-made such as from the combustion of fossil fuel, fertiliser application in agriculture and forest fires. Depending on the level and duration of exposure to NO<sub>x</sub> the effects will vary. Some of these include coughing, fatigue and vomiting (Manahan, 2000).

Sulphur dioxide (SO<sub>2</sub>) is a colourless, non-flammable gas that possesses an irritating smell. It is a particularly heavy gas that sinks to the ground and dissolves in water to form a strong acid (sulphuric acid). Sources of sulphur dioxide are both natural such as geothermal vents and anthropogenic such as the flue gas from coal combustion. This gas can have a range of negative effects such as irritation of eyes, coughing and paralysis (Manahan, 2000).

The purpose of the ambient air quality standards is to establish maximum limits for air quality parameters (such as those listed above) which are considered desirable for the preservation and enhancement of the quality of air resources and health. The WHO Air Quality Guidelines (AQGs) are intended for worldwide use but have been developed to support actions to achieve air quality that protects public health. Air quality standards are set by each country to protect the public health of their citizens and as such are an important component of national risk management and environmental policies. National standards will vary according to the approach adopted for balancing health risks, technological feasibility, economic considerations and various other political and social factors, which in turn will depend on, among other factors, the level of development and national capability in air quality management (World Health Organization, 2006).

Table 1: WHO Air Quality Guidelines

| <b>Air Pollutant</b> | <b>WHO (2021) Guideline<br/>(<math>\mu\text{g}/\text{m}^3</math>); 24-hour mean</b> | <b>WHO (2021) Guideline<br/>(<math>\mu\text{g}/\text{m}^3</math>)-shorter intervals</b> |
|----------------------|---|---|
| PM <sub>2.5</sub>    | 15  | -   |
| PM <sub>10</sub>     | 45  | -   |
| NO <sub>2</sub>      | 25  | 200 (1hour)   |
| SO <sub>2</sub>      | 40  | 500 (10 minutes)  |
| CO                   | 4000  | 35000 (1 hour)  |

#### 4.1.2.1 Monitoring Procedure

Air quality was analysed at four locations across the project site (see figure 6). This included the maintenance shed, downwind the generator room, upwind of the farm at the intersection of the roadway and the farm's property boundary, and downwind of the farm at the intersection of a roadway and the farm's property boundary. The parameters monitored were carbon monoxide, sulphur dioxide, nitrogen dioxide, PM<sub>2.5</sub> and PM<sub>10</sub>. Measurement of these parameters was done continuously over various time intervals, with particulate matter being measured for 24 hours at the upwind and downwind locations, for 8 hours at the maintenance shed and for 1 hour downwind the generator room. At the "downwind" location at the project site (i.e. downwind the generator room), measurements for PM were taken in two instances i.e., when the generator was off and when the generator was on.

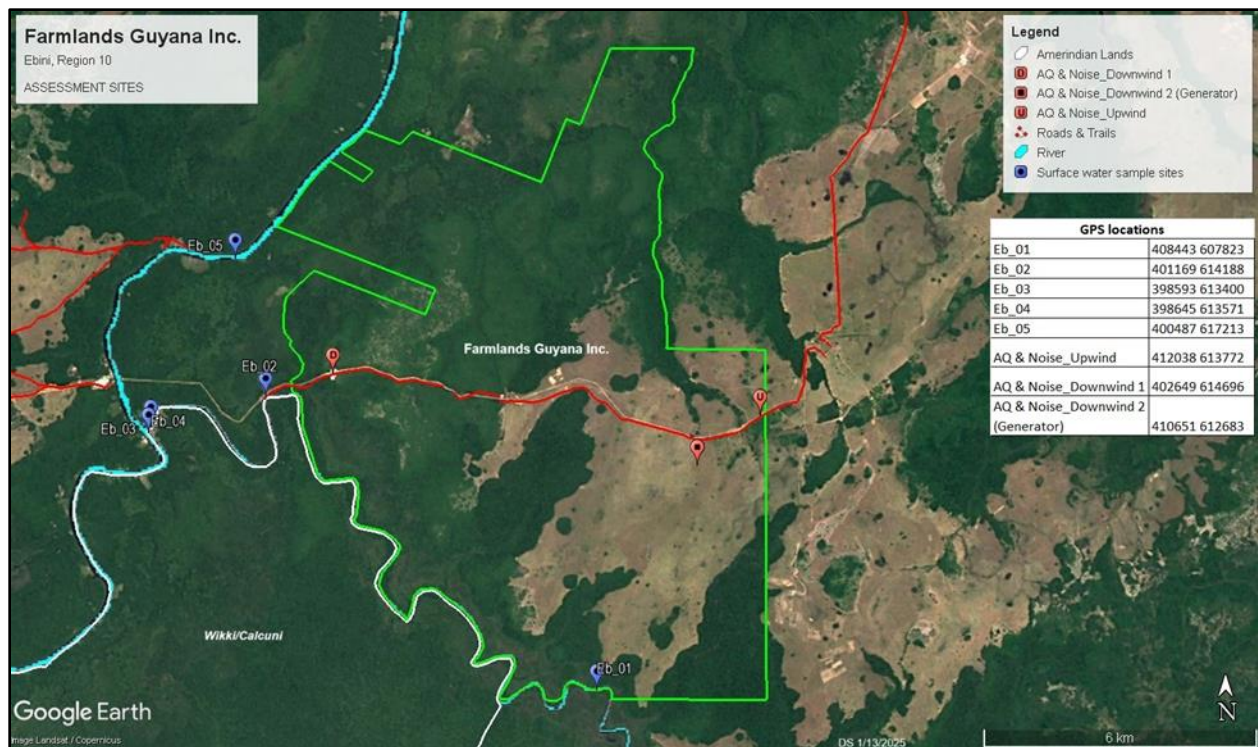


Figure 6: Air, Noise and Water Quality Assessment Sites

4.1.2.2 Data Results

The following table shows the results of air quality assessment conducted during the monitoring period.

Table 2: Results of Air Quality Assessment

| Location                    |    | CO (ppm) |     |         | NO <sub>2</sub> (ppm) |       |         | SO <sub>2</sub> (ppm) |     |         | PM <sub>2.5</sub> (ppm) |       |         | PM <sub>10</sub> (ppm) |       |         |
|-----------------------------|----|----------|-----|---------|-----------------------|-------|---------|-----------------------|-----|---------|-------------------------|-------|---------|------------------------|-------|---------|
|                             |    | Max      | Min | Average | Max                   | Min   | Average | Max                   | Min | Average | Max                     | Min   | Average | Max                    | Min   | Average |
| Maintenance shed            |    | 0.17     | 0   | 0.004   | 0.059                 | 0     | 0.001   | 0.13                  | 0   | 0.079   | --                      | --    | --      | --                     | --    | --      |
| Downwind                    | of | 11.83    | 0   | 1.603   | --                    | --    | --      | --                    | --  | --      | 7.5                     | 4.7   | 5.882   | 21.7                   | 11    | 15.133  |
| Generator room <sup>†</sup> |    |          |     |         |                       |       |         |                       |     |         |                         |       |         |                        |       |         |
| Downwind                    | of | 1.77     | 0   | 0.068   | --                    | --    | --      | --                    | --  | --      | 7.2                     | 4.2   | 5.177   | 29                     | 12.2  | 15.976  |
| Generator room <sup>*</sup> |    |          |     |         |                       |       |         |                       |     |         |                         |       |         |                        |       |         |
| Upwind                      |    | 1.79     | 0   | 0.095   | 0.021                 | 0     | 0.007   | 0                     | 0   | 0       | 0.019                   | 0.003 | 0.006   | 0.243                  | 0.006 | 0.022   |
| Downwind                    |    | 1.96     | 0   | 0.216   | 0.025                 | 0.001 | 0.015   | 0.34                  | 0   | 0.107   | 0.022                   | 0.002 | 0.004   | 0.309                  | 0.005 | 0.018   |

<sup>†</sup> Generator on | <sup>\*</sup> Generator off | -- no data

#### 4.1.2.3 Analysis

The analysis of particulate matter revealed that the maximum values recorded for both PM<sub>2.5</sub> and PM<sub>10</sub> at the downwind and upwind locations were above the WHO standards, measuring 309 µg/m<sup>3</sup> (0.309 ppm) and 243 µg/m<sup>3</sup> (0.243 ppm) respectively. However, both PM<sub>2.5</sub> and PM<sub>10</sub> had average concentrations that were well below the WHO standard of 15 µg/m<sup>3</sup> and 45 µg/m<sup>3</sup> daily mean respectively. Average PM<sub>10</sub> levels measured 18 µg/m<sup>3</sup> (0.018 ppm) and 22 µg/m<sup>3</sup> (0.022 ppm) at the downwind and upwind locations respectively; while PM<sub>2.5</sub> levels measured 4 µg/m<sup>3</sup> (0.004 ppm) and 6 µg/m<sup>3</sup> (0.006 ppm) at the downwind and upwind locations respectively. Notably, the average PM levels, measured over 24 hrs., were higher at the upwind location.

PM was also measured downwind of the generator in two instances i.e., when the generator was on and off; however, there was no remarkable difference in values obtained when the generator was on, as compared to off.

Carbon monoxide, nitrogen dioxide and sulphur dioxide analyses showed that the concentration of these gases was well below the respective hourly guideline values of 35,000 µg/m<sup>3</sup>, and 200 µg/m<sup>3</sup> for carbon monoxide, and nitrogen dioxide respectively and the 10-minutes interval of 500 µg/m<sup>3</sup> for sulphur dioxide. This is attributed to the fact that the project site is located in a non-industrial uninhabited area. Notably, the values recorded for CO emissions were higher when the generator was on at the location downwind of the generator room, which illustrates the contribution of CO in the atmosphere by the generator.

### 4.1.3 Noise

Noise pollution can be generally described as unwanted or excessive sound that can have deleterious effects on human health, wildlife, and environmental quality. Noise pollution is commonly generated inside many industrial facilities and some other workplaces; however, it also comes from highway, railway and aeroplane traffic, as well as outdoor construction activities (Nathanson & Berg, 2024). Industries must therefore be mindful of their noise emissions. Consideration must be given to how their activities can affect the environment, including residents living within earshot.

#### 4.1.3.1 Procedure

Sound measurements were taken at 4 locations continuously over various time intervals with calibrated REED 8080 sound meters bearing serial numbers 220106871; 220605280 and 220605250. At the area downwind of the generator set, measurements were taken in two instances i.e., when the generator was off and when the generator was on, for a duration of 1 hour in each instance. Further, noise at the maintenance shed was measured for 8 hours to consider the occupational exposure value, while noise at the upwind and downwind property boundaries were measured for 16 hours.

In accordance with the permit issued by the EPA, noise levels should not be greater than the established permissible noise levels/limits prescribed by the Guyana National Bureau of Standards (GNBS) in the *Guidelines for Noise Emissions into the Environment*, which have been adopted by the Environmental Protection Agency (EPA).



Table 3: GNBS Guideline Values for Noise in Specific Environment

(Source: GNBS 2010)

| Categories     | Daytime Limits (dB)<br>(06:00 - 18:00h) | Night time Limits (dB)<br>(18:00h - 06:00) |     |
|----------------|---|--|-----|
| Residential    | 75                                      | 60   |     |
| Institutional  | 75                                      | 60   |     |
| Educational    | 75                                      | 60   |     |
| Industrial     | 100                                     | 80   |     |
| Commercial*    | 80                                      | 65   |     |
| Construction   | 90                                      | 75   |     |
| Transportation | 100                                     | 80   |     |
| Recreational   | 100                                     | 18:00 - 01:00h                             | 100 |
|                |   | 01:00 - 08:00h                             | 70  |

\* Applicable standard for Farmlands Guyana Inc. Project site

#### 4.1.3.2 Data Results

The following table shows the results of noise emission data obtained during the monitoring period.

Table 4: Results from noise emission analysis at various locations at the project site

| Location                        | Time     |          | Sound level (dB) |                           |      |      |         |
|---------------------------------|----------|----------|------------------|---------------------------|------|------|---------|
|                                 | Start    | End      | Max              | Min                       | Max  | Min  | Average |
| <b>West of Maintenance shed</b> | 10:30:00 | 18:30:00 | 14:46:00         | 12:13:00                  | 84.8 | 32   | 46.8    |
| <b>Downwind (Generator on)</b>  | 17:00:00 | 18:00:00 | 17:58:00         | 17:03:00                  | 79.5 | 54.5 | 57.8    |
| <b>Downwind (Generator off)</b> | 06:55:00 | 07:59:00 | 07:45:00         | 07:24:00                  | 58.1 | 31.4 | 39.7    |
| <b>Upwind</b>                   | 05:35:00 | 21:43:00 | 12:30:00         | 07:20:00                  | 82.4 | 29.5 | 44.0    |
| <b>Downwind</b>                 | 06:15:00 | 22:16:00 | 17:37:00         | 06:28:00<br>&<br>06:45:00 | 88.4 | 28.9 | 42.7    |

#### 4.1.3.3 Analysis

The data from the noise assessment illustrates that the sound emanating from the operations at the project site ranges from a high of 84.8 dB to a low of 29.5 dB. These readings were obtained west of the maintenance shed and at the upwind location respectively. Most of the on-site activities, including vehicular maintenance, were occurring at the former location and as such it is no surprise that the maximum value, which is higher than the standard, was recorded there. Nevertheless, average noise level ranged from 44 to 58 dB around the entire project site. In some instances, there were periodic high increases in the recorded sound level due to either equipment/vehicle start-up or vehicles traversing the site. As such some of the maximum values (three of the five) were above the daytime standard of 80 dB. However, in interpreting these values, it must also be taken into consideration that they were taken on the property close to the noise source and that the 80 dB daytime limit applies at a distance of 15 m or 50 ft from the *source* or *property boundary*. The results of the noise assessments are presented graphically in Annex 2.

#### 4.1.4 Landscape & Topography

The topography of the project site is mainly flat to undulating with small creeks and tributaries of the Berbice and Wikki Rivers across the landscape. The southern and central areas of the project site are savannah lands and muri scrub. The Guyana Forestry Commission's vegetation map shows a stretch of Dakama forest in the central region of the project site; however, this was not confirmed by the biodiversity survey. The northern and western areas are covered with marsh forest vegetation and open swamp. Along the bank of the Wikki River, there is an open coastal swamp and some white sand forest (Fig. 7).

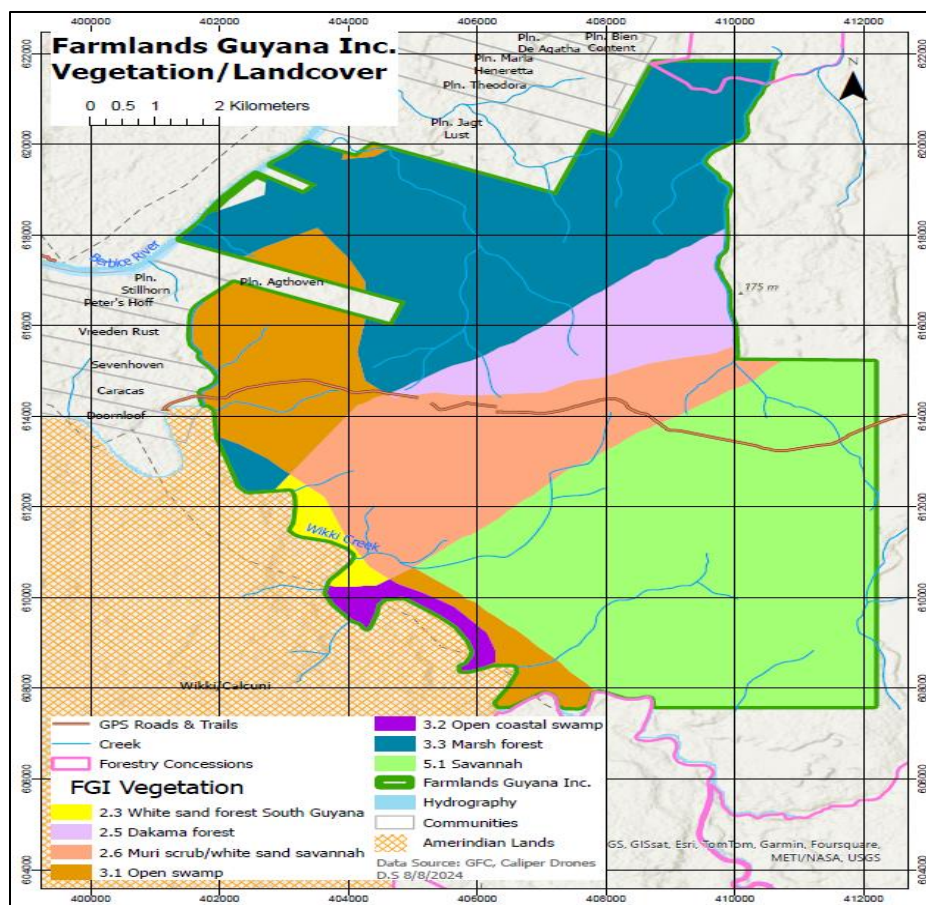


Figure 7: Map of FGI showing Vegetation and Land cover type

(Source GFC, 2001)

Table 5 and figure 8 describe and depict the location of FGI and its surroundings.

Table 5: FGI Surrounding Land Uses

|              |  |
|--------------|--|
| <i>North</i> | Inhabited communities of Ebini and Kimbia. Further north is the Berbice River and active forestry concessions.         |
| <i>South</i> | Wikki River forms the boundary between FGI and Wikki Amerindian Reservation.   |
| <i>East</i>  | Open savannah and other public and private farms including GLDA and New Frontier Agriculture.                          |
| <i>West</i>  | Berbice River forms partial boundary of FGI. Riverain communities lie along the bank of the Berbice River west of FGI. |

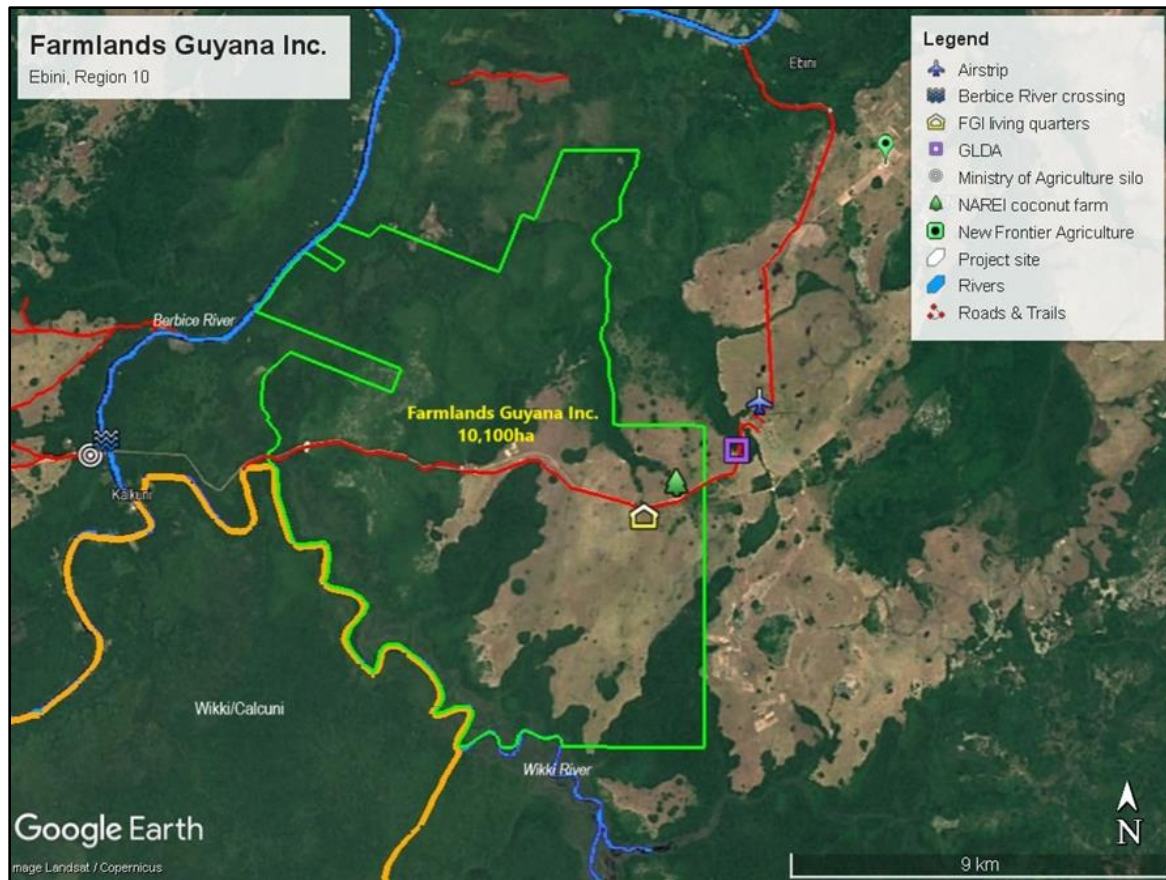


Figure 8: Google Image Showing FGI and Surrounding Land Use

The Berbice River crossing, GLDA grazing area, Ebini Airstrip and other private farms are within 5km of the FGI project boundaries. The main access road is the Tacama trail turn-off from Ituni Road which continues east towards Berbice River. There is a pontoon crossing which links the banks of the Berbice River. The trail then passes through the central FGI area and leads to Ebini Waterfront at another point on the Berbice River. This road is maintained by the GoG, with some input from private farmers. The northwest area of the project site can also be accessed by boat via the Berbice River and the southern area via the Wikki River. Images of some of the aforementioned land uses are depicted in figures 9-14.





Figure 9: Pontoon Crossing at the Berbice River (West of the Project Site)



Figure 10: Cattle Farm East of FGI Boundary



Figure 11: Open Savannah/Private Farm along Tacama Trail on the way to FGI (West of the Project Area)



Figure 12: Crop Farming along the Access Road, East of the FGI Boundary





Figure 13: Berbice River (Ebini Waterfront) North of the Project Site



Figure 14: Wikki Amerindian Reservation, South of FGI

#### 4.1.5 Geology

The project area falls within the 'White Sand Plateau' of the Hilly Sand and Clay region of Guyana. Bauxite deposits are known to occur in the Kwakwani-Ituni area and there is an abundance of silica sand across the Plateau. Further, the geological map of Guyana shows that the mineral migmatite is prevalent in the Takama-Ituni-Ebini area (GLSC, 2013). The soil type of the northern and western boundaries of the FGI area is silt loam and mixed alluvial land. Along the banks of the Berbice and Wikki Rivers lie clayey soil. Further inland, in the central and southeastern regions, there is well-drained sand and sandy loam soil. According to the soil classification map, most of the project area consists of Kasarama loamy sand and Ebini sandy loam which is greyish brown over yellowish red sandy clay (Figure 15). The soils of this area tend to be acidic, have limited fertility and low water holding capacity; however, they can be enriched with appropriate land management techniques such as tillage, soil pH amelioration, fertilizers, large scale cropping and irrigation (Chesney, et al, 2010; GLSC, 2013).



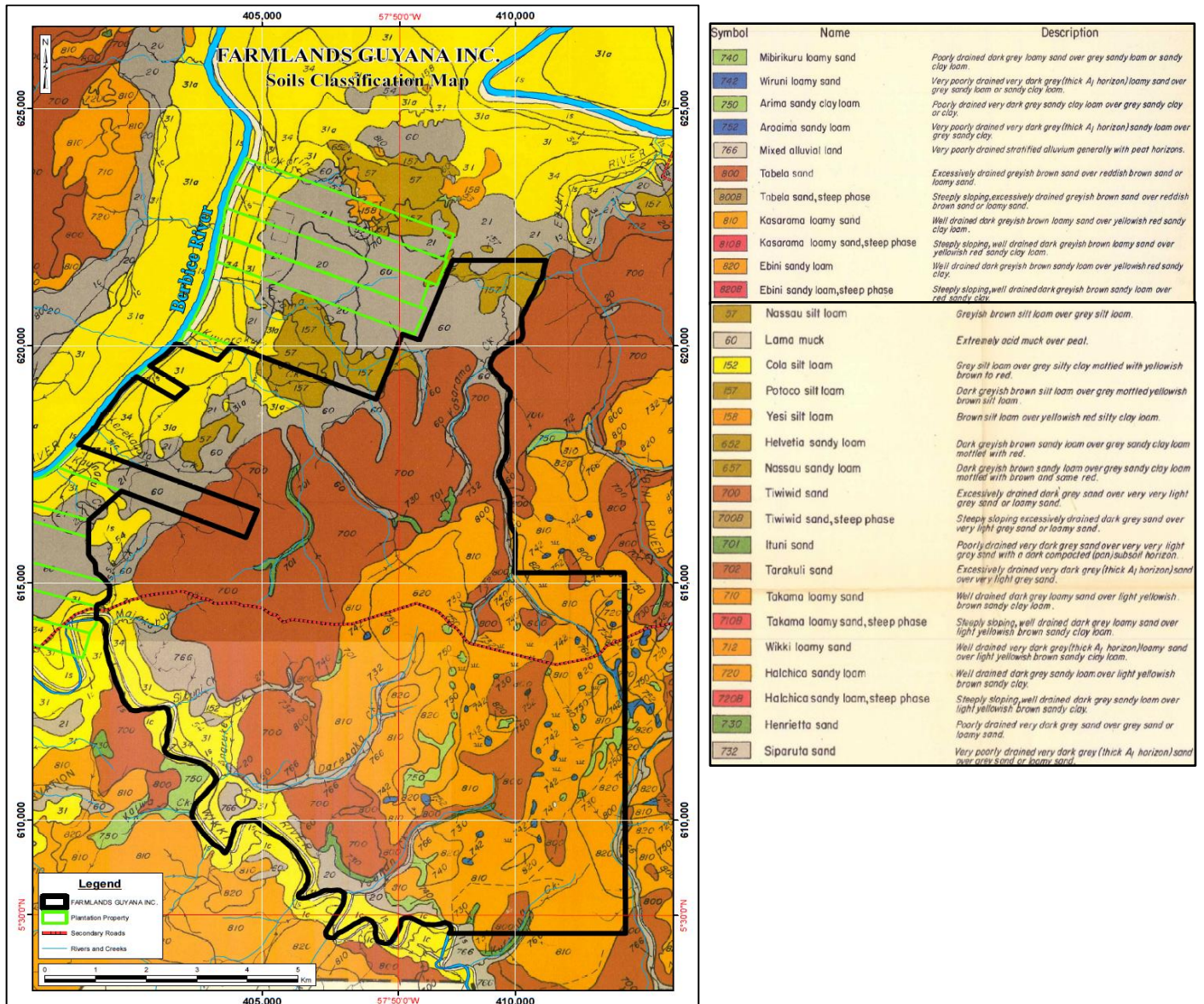


Figure 15: Map of FGI Showing Soil Classification

Source: Caliper Drones/European Soil Data Centre

#### 4.1.6 Ground and Surface Water Quality

The surface water of the area within and around the project site is freshwater, which is seasonally plentiful. During April through August; and November through January, there are large quantities of available freshwater in streams, tributaries and other waterways. During the rest of the year, small to moderate quantities are available in perennial streams. Groundwater is available in moderate to large quantities at depths of 3m to 75m from unconsolidated sand and sandstone (GLSC, 2013).

A well is located on site at the FGI living quarters at GPS location: 5°32'34.1"N 57°48'22.0"W. The depth is approximately 100ft/30m. Water from the well is used for cooking and other domestic purposes including for laundry, bathrooms and the kitchen sink on site but not for drinking.

The quality of water is generally used as an indication of the health of the ecosystem it supports. This is determined by measuring important chemical, physical and biological parameters of the water such as total coliforms, pH, turbidity, dissolved oxygen, total dissolved solids (TDS), total suspended solids (TSS), biological oxygen demand (BOD), chemical oxygen demand (COD) and the concentration of various ions. These parameters can also indicate whether the water is safe for consumption and how effluent from industries or other environmental factors may be affecting the environment itself.

##### 4.1.6.1 Procedure

Water samples were collected from various locations along the Wikki Creek, particularly where there was an intersection between the creek and FGI's boundary. In-situ measurement for temperature and pH were conducted using the ExStik Waterproof pH meter. The analyses of dissolved oxygen, total dissolved solids, sulphate, nitrate, ammonia, E.coli and total coliform were facilitated by the Guyana Water Inc. and Pesticides and Toxic Chemicals Control Board laboratories, both of which are certified by the GNBS. The results of the water quality analyses and the methods of analyses are included in Annex 3.

#### 4.1.6.2 Data Results

The following table show the results of water quality data obtained during the monitoring period.

In the absence of a national standard on water quality, comparison was made with internationally acceptable limits from the WHO Drinking Water Guidelines, 2011, and GNBS effluent discharge standards (although the samples collected, were not discharges from the farm. Water quality reports are included in Annex 3.

Table 6: Results from Water Quality Analysis of Surface Water Samples from Various Locations at the Project Site

| Location         | pH         | Temp.<br>(Day) °C | DO<br>(ppm) | TDS<br>(ppm) | SO <sub>4</sub> <sup>2-</sup><br>(ppm) | NO <sub>3</sub> <sup>-</sup><br>(ppm) | NH <sub>3</sub><br>Nitrogen<br>(ppm) | Total<br>coliform<br>(CFU/100ml) | <i>E. coli</i><br>(CFU/<br>100ml) |
|------------------|------------|-------------------|-------------|--------------|--|---------------------------------------|--------------------------------------|----------------------------------|-----------------------------------|
| <b>Eb-01</b>     | 4.56       | 27.27             | 7.43        | 9.66         | 0                                      | 0.00                                  | 0.016                                | TNTC                             | 18                                |
| <b>Eb-02</b>     | 4.56       | 28.06             | 7.04        | 9.88         | 0                                      | 19.61                                 | 0.010                                | TNTC                             | 25                                |
| <b>Eb-03</b>     | 4.95       | 29.33             | 6.98        | 8.20         | 0                                      | 7.84                                  | 0.016                                | TNTC                             | 22                                |
| <b>Eb-04</b>     | 4.74       | 29.56             | 6.91        | 8.85         | 0                                      | 3.94                                  | 0.000                                | TNTC                             | 20                                |
| <b>Eb-05</b>     | 4.91       | 29.56             | 7.23        | 8.17         | 0                                      | 11.78                                 | 0.013                                | TNTC                             | 12                                |
| <b>WHO Std.</b>  | 6.5<br>8.5 | --                | --          | <40          | <500                                   | <50                                   | --                                   | 0                                | 0                                 |
| <b>GNBS Std.</b> | 5.0<br>9.0 | <40°C             | --          | <50          | --                                     | --                                    | --                                   | --                               | --                                |

TNTC – Too Numerous To Count | CFU – Colony Forming Units | DO – Dissolved Oxygen | TDS – Total Dissolved Solids | SO<sub>4</sub><sup>2-</sup> – Sulphate | NO<sub>3</sub><sup>-</sup> – Nitrate | NH<sub>3</sub> – Ammonia

#### 4.1.6.3 Analysis

Results from the analysis of the surface water revealed that most of the parameters were well within the respective acceptable range except for pH, total coliforms and *E. coli*.

The detected pH levels ranged from 4.56 to 4.91, which indicates that the water is acidic and below the lower limit of 6.5 recommended by WHO and the 5.0 – 9.0 range recommended by the GNBS Interim Guidelines for Industrial effluent into the environment. The daytime temperature of the water (which ranged from a low of 27.27°C to a high of 29.56°C) was within the GNBS accepted range of below 40°C which is considered healthy for living organisms. It should be noted that the samples collected were not discharges of effluent but were collected from the river in which domestic activities occur.

There was no detection of sulphate at any of the locations. Nitrates were detected at all but one location i.e., “EB - 01”. The recorded levels were all within the acceptable range of below 50 ppm. Ammonia was detected at all but one location i.e., “EB – 04”. While no WHO standard for this parameter exists, all detected values were below the US EPA chronic criterion magnitude of 1.7 ppm of total ammonia nitrogen. Total Dissolved Solids (TDS) were detected at all locations with all values recorded being within the acceptable range of below 40 ppm and ranging between 8 ppm – 10 ppm. Similarly, Dissolved Oxygen (DO) was detected at all locations and like ammonia there is no established guideline value by WHO for this parameter. However, all detected values were well within the US EPA standard range of 6.5 – 12 ppm for support of aquatic life, specifically ranging between 6.5 ppm – 7.5 ppm.

Total coliforms and *E. coli* are considered indicator organisms used to determine the integrity and cleanliness of water (WHO, 2022). The presence of total coliforms indicates poor water treatment, and the presence of *E. coli* indicates faecal contamination of water. The water quality analysis revealed that the water is microbially unsafe for consumption based on the WHO (2006) standard for drinking water for Total coliforms and *E. coli* which is both 0 CFU/100ml. No quantitative result was obtained for Total coliforms in the samples as they were well above the upper limit of the method used for analysis (and








therefore the standard); hence the value being reported as Too Numerous To Count (TNTC). *E. coli*, on the other hand, was quantitatively analysed and had values ranging from a low of 12 CFU/100ml to a high of 25 CFU/100ml which are both above the standard of 0 CFU/100ml.

## 4.2 Biological Environment

The characterisation of the biodiversity baseline is important to understand the status of the biological resources, ideally before project implementation. Baseline data can be used as a reference for future monitoring and illuminate how human activities are affecting the biological environment. The biodiversity baseline in the project environment was determined through rapid biodiversity surveys, interviews and desk reviews. A rapid biodiversity assessment was conducted in October 2024 and lasted for two days.

### 4.2.1 Flora

The forest types documented in the Farmland's Concession are:

-  White sand forest in the South of Guyana
-  Dakama forest
-  Muri Scrub/White Sand Savanna
-  Open Swamp
-  Open Coastal Swamp
-  Marsh Forest
-  Savannah

The dominant vegetation types are savannah, marsh forest, muri scrub/white sand and open swamp. Historical information indicates the NAREI has a small experimental plot that was set up about 20 years ago to cultivate corn, red beans and peanuts. This area is colonised by several non-forest species including Jamoon and palms. During the vegetation survey, it was confirmed that no Dakama forest exists in the concession area



because this forest type has been completely cleared. Instead, the area is colonised by grass (Poaceae). Scattered among the grass are several ant hills (figure 16).



Figure 16: Ant Hills in the Open Area that was Once Dakama forest

The forests and savannah ecosystems in FGI's concession have been impacted by natural and anthropogenic factors such as the construction of roads and occurrence of forest fires. Roads have fragmented these ecosystems and led to the creation of edge habitats. The forests were also logged, and several timber species were harvested for commercial and subsistence purposes by private loggers, prior to FGI taking possession the land. Since the forests in the concessions area are prone to ignition, particularly during dry periods a plot was set up in the burnt area to determine the diversity that remains after this event. Plots were also established along the road edge to document the edge species in the area. The vegetation survey at FGI. was conducted in October 2024. Ten plots were sampled in the concession area. The location of the sample plots and their GPS coordinates are depicted on the map below.

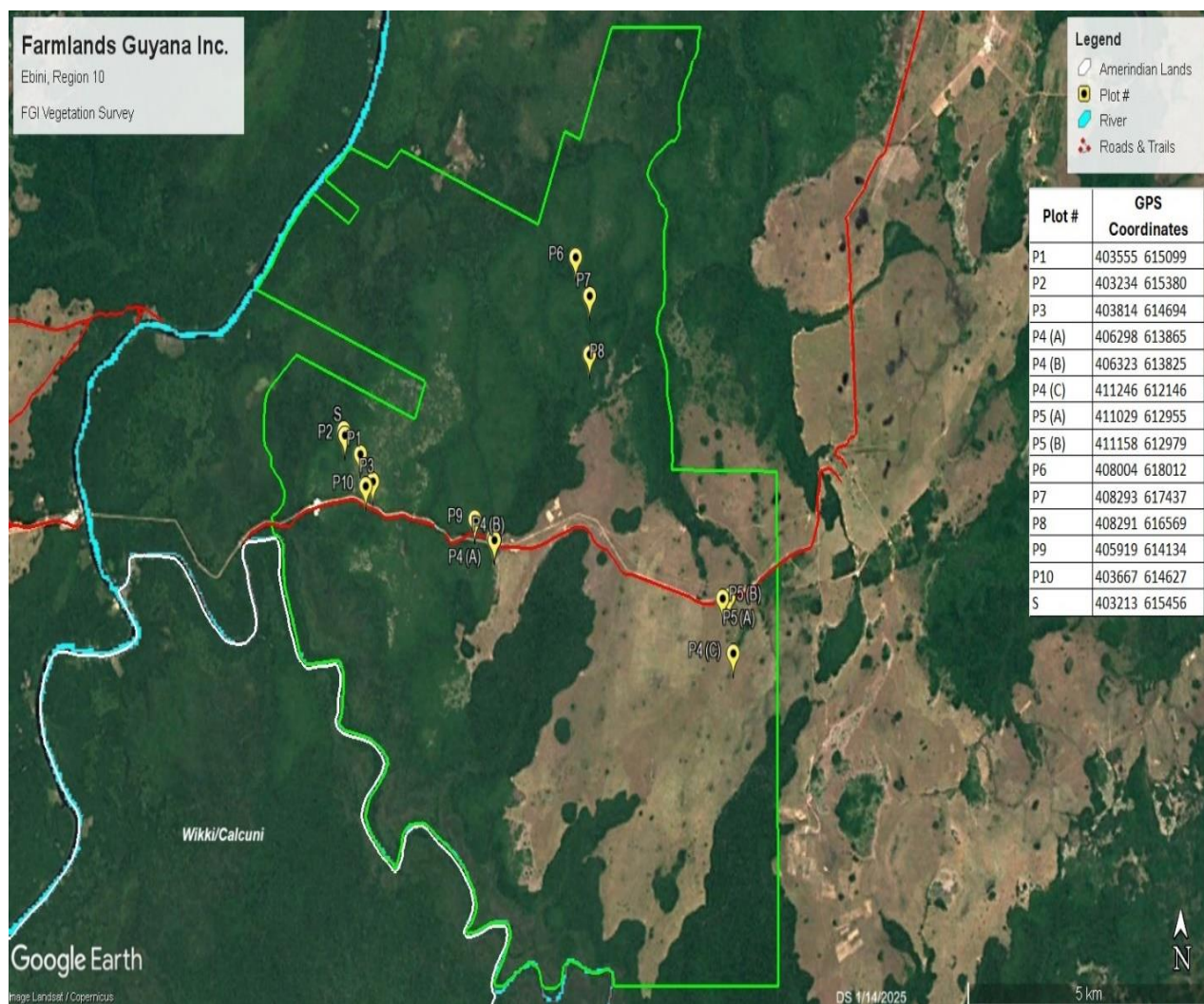


Figure 17: Map showing the vegetation sampling plot in the concession area

#### 4.2.1.1 Floral Survey Methodology

A total of ten plots were established to survey vegetation. The surveys were conducted in circular plots. Sampling occurred in a 25 m radius from the plot centre (see figure 17 below, depicting the layout of the sample plot). All plants larger than 10cm DBH were identified and the abundance was recorded. In each plot information on species name and abundance was noted. To understand the distribution of species diversity among the forest strata (understory, midstory and canopy) the number of species and their abundance were documented. This information was gathered only in the forested area.

More plots were set up in the forested area to capture the variation in habitat types and disturbances (natural and anthropogenic) in the concession.

Plot location was determined by accessibility since this was a rapid assessment. Two experienced tree spotters assisted with the vegetation surveys and identification of the tree species. The figure below shows the plot that was used to survey vegetation.

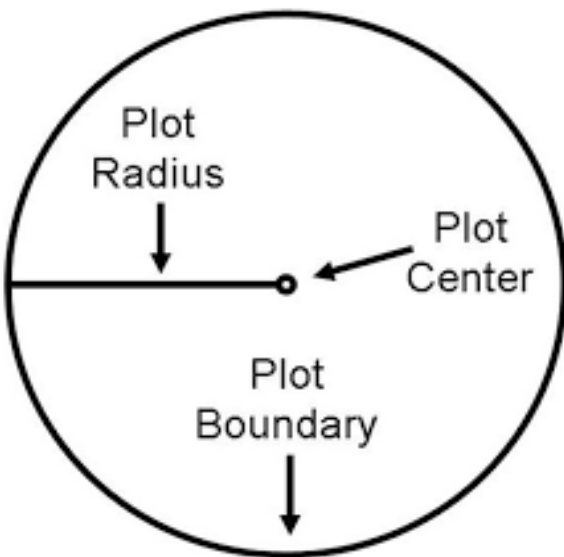


Figure 18: The layout of the plot used to sample vegetation

Prior to the commencement of the surveys, the centre points were selected, and the plots were demarcated 30 m in each cardinal direction (North, South, East and West) from the centre point. All trees measuring 15cm DBH and above were recorded. Line transects were used to document the plant species along the road edges. The edges of forests are known to support different plant species from those found in the forest interior and thus this area was also sampled.



#### 4.2.1.2 Results of the Vegetation Survey

A total of forty plant species were documented in the plots surveyed. This number includes several species with commercial value. These include baromalli, keteti silverballi and soft wallaba. The species documented in the plots established at FGI. are presented below.

**Plot 1** was established in a mixed forest on white sand. Species documented here are burada (*Parinari anamensis*), madaburi (*Clusia memorosa*) barakaro (*Ormosia coccinea*) and sand mora (*Talisia squarrosa*). Burada is known to be an important food source for bats and was fruiting at the time of the survey. Other species in the plot were manobodin (*Emmotum fagifolium*), and maho (*Sterculia pruriens*).



Figure 19: Burada fruits on the ground



Figure 20: Muri Scrub

**Plot 2** was established at the edge of a mixed forest that bordered Muri forests. Ten species were documented in this plot. Species present in this plot were hububalli (*Alexa leiopetala*), dukali (*Tapirira obtuse*), sand mora (*Talisia squarrosa*), kabakalli (*Goupia glabra*), black kulishiri (*Cupania hirsute*), barakaro (*Ormosia coccinea*), duka (*Tapirira marchandii*), soft wallaba (*Eperua falcata*), haiwa (*Protium guianense*) and yarula (*Aspidoperma oblongum*). Duka and dukali were the most common species in this plot.

**Plot 3 (a and b)** were established along the road to document roadside edge species in the concession area. In these plots, the species bordering the road were recorded. Duka (*Tapirira marchandii*) and burada (*Parinari campestris*) were the most common species encountered. The other species colonising the road edge were madaburi (*Clusia memorosa*), black kulishiri (*Cupania hirsute*) and madaburi (*Clusia memorosa*).

**Plots 4a and 4b** were established at the edge of the savannah and in the savannah respectively. The wild banana was dominant in the forest edge plot, some of which were

dried and burnt due to natural fires. Soft wallaba (*Eperua falcata*), sand baromalli (*Catostemma fragrans*), White cedar (*Tabebuia insignis*), Manni (*Symphonia globulifera*), toronario (*Humiria balsamifera*), Turu palm (*Jessebia bataua*), soft wallaba (*Eperua falcata*) and sand mora (*Talisia squarrosa*), were other forest edge species. Savannah grass and the sandpaper tree (*Curatella americana*) dominated the Savannah plot.



Figure 21: Sandpaper tree





Figure 22: Wild Banana at the Savannah edge

**Plot 5 (a and b)** was dominated by planted grass. Personal communication with persons familiar with the area indicated that the grass was first introduced into the area in the 1970s. The skeletal remains of a cow were found in this plot. **Plot 5b** was an area that supported jamoon (*Syzgium cumini*), duka (*Tapirira marchandii*), simurupa (*Siparuna guianensis*), *Lantana camara* (sweet sage), ferns, fox stone, and savannah guava.



Figure 23: Sweet sage



Figure 24: Jamoon Tree with Fruits





Figure 25: Skeletal remains of a cow

**Plot 6** represents Wallaba forest on white sand and was dominated by soft wallaba (*Eperua falcata*), manobodin (*Emmotum fagifolium*), sand mora (*Talisia squarrosa*) and wina kakaralli (*Lecythis corrugata*). The other species in the plot were baromalli (*Catostemma commune*) and hairaballi (*Alexa imperatricis*). Baromalli (*Catostemma commune*) was the dominant species in the sub-canopy while soft wallaba (*Eperua falcata*) dominated the seedling layer.

**Plot 7** included five species namely, toronario (*Humiria balsamifera*), soft wallaba (*Eperua falcata*), sand mora (*Talisia squarrosa*), sand baroballi (*Catostemma fragrans*) and Ituri wallaba (*Eperua grandiflora*).

**Plot 8** was in a mixed wallaba forest on white sand. Eight species were documented in the canopy layer of the plot. The dominant species were toronario (*Humiria balsamifera*), banya (*Ficus benghalensis*), soft wallaba (*Eperua falcata*), and manobodin (*Emmotum fagifolium*), kakairio (*Calycolpus goetheanus*), ketete silverballi (*Ocotea canaliculata*) and sand mora (*Talisia squarrosa*).

The most abundant species in **plot 9** were toronario (*Humiria balsamifera*) and madaburi (*Clusia memorosa*). Other species in the canopy include manni (*Symphonia globulifera*), kamakuti (*Bombax flaviflorum*) and baromalli (*Catostemma commune*). Species in the subcanopy are madaburi (*Clusia memorosa*), kamakuti (*Chromolaena odorata*) and manobodin (*Emmotum fagifolium*). Seedling species colonising the area were sand baromalli (*Catostemma fragrans*), madaburi (*Clusia memorosa*) and silverballi (*Ocotea* sp).

**Plot 10** was established in a part of the forest that was impacted by fire. Seventeen canopy species were documented in this plot. The most dominant species were manobodin (*Emmotum fagifolium*), kokerite Palm (*Pouteria reticulata*), baromalli (*Catostemma commune*), burara (*Parinari anamensis*), red kulishiri (*Matayba oliganda*) and hiawa (*Portium guianense*). Seedlings were scared in the burnt area. This condition can be interpreted as the result of the effect of fire on vegetation in the concession area. There was a high percentage of dead-standing trees (60%) in the survey plot.





Figure 26: The burnt area sampled in the concession

The muri scrub area was dominated by scrub vegetation. This area could potentially be used for sand mining and hence it is essential to monitor this vegetation type to ensure they are not cleared for this purpose. Although the area has been previously logged, several species that are of commercial importance to the timber industry were documented in the concession. For example, kerete silverballi (*Ocotea canaliculata*), *Eperua falcata*, baromalli (*Catostemma commune*), and toronario (*Humiria balsamifera*) are some of the species that are very important to the timber industry. Duka is used in the construction industry as T Shore.

## 4.2.2 Fauna

### 4.2.2.1 Mammals

During the rapid field survey conducted in October 2024 (survey period = 2 days) historical and current information on the faunal diversity of Ebini was gathered from persons familiar with the area. Interviews were held with Dennis Taylor, a resident of Ebini and workers

attached to FGI. Twenty-five species of large to medium-sized were documented in the concession area.

The reports indicate that several species of primates including the squirrel monkey (*Saimiri sciureus*), white front capuchin (*Cebus albifrons*), marmoset (*Saguinus midas*), red howlers (*Alouatta seniculus*), wedge-capped capuchins (*Cebus olivaceus*) and white-faced sakis (*Pithecia Pithecia*) have been spotted in the area. Additionally, while walking along the road checks were made for indirect evidence of mammals including prints, dropping and feeding grounds. Checks were also made for direct evidence of mammals. One primate, the howler monkey, was heard during the field surveys.

During the survey, one primate, the wedged-capped capuchin, was spotted in a Kokerite tree in the forest edge in the vicinity of Wikki Creek (the lone primate was spotted at 14:15 hrs moving through the canopy). Footprints of the savannah fox were also detected near Wikki Creek. The capybara is reported to be abundant near Wikki Creek, but there was no direct or indirect evidence of their presence during the survey period. The footprints of several medium-sized mammals were detected on the soft parts of the road. The prints most commonly encountered were those of the red-rumped agouti (figure 27) and the savannah fox.



Figure 27: Footprint of the Red-rumped Agouti

The footprint of the giant armadillo (GPS Coordinates: 21N 0402405 UTM 0614643) was also detected along the road during the survey (figure 28).



Figure 28: Footprint of the Giant Armadillo

The feeding ground of the white-lipped peccary (reports indicate that this species of peccary is often spotted in the area) was also seen during the survey. The footprints of the three species of deer known to occur in Guyana were also detected.

Reports from persons attached to FGI indicated that jaguars are seen near the accommodation block and sometimes capture their dogs. The armadillo burrow was observed in the savannah area near the campsite. Peccaries were heard near a burnt portion of the forest (21N 0403667 UTM 0614627).

The white deer (*Odocoileus virginianus*) is reported to be abundant in the concession area. This species consumes the fruits from the jamoon trees in the experimental plot (GPS coordinate: 0411158 UTM 0612979) that NAREI established and is thus abundant in this area during the fruiting season. Footprints of the white-tailed deer are also frequently observed at 0411246, UTM 0612146).





Figure 29: Footprints of the white-tailed deer

Footprints of the red brocket deer were detected at 21N 0403805 UTM 0614687 (figure 30).



Figure 30: Footprint of the Red-brocket Deer

Published work on the faunal diversity of the Berbice area is scarce. However, a study published in 2020 on the diversity, abundance and species richness of large to medium-sized mammals in the Upper Berbice River area documented fourteen (14) species of large to medium-sized mammals. The diversity included the giant anteater (*Myrmecophaga tridactyla*), giant armadillo (*Priodontes maximus*), puma (*Puma concolor*), jaguar (*Panthera onca*), tapir (*Tapirus terrestris*) and the white-lipped peccary (*Tayassu pecari*) and collared peccary (*pecari tajacu*). The three primates documented in the study were the Guianan red howler monkey (*Alouatta macconnelli*), the Guianan spider monkey (*Ateles paniscus*) and the Guianan brown capuchin (*Sapajus apella*).

Table 7 below shows the mammals that were documented during the field survey and their identification methods. Mammals were mainly documented through interviews (I), vocalization (V) and footprints (FP), their feeding ground (FG) and burrow (B), In one instance, the mammal was seen.

Table 7: Mammals documented in the Ebini area

| Common Name          | Family          | Scientific name                  | Identification Method |
|----------------------|-----------------|----------------------------------|-----------------------|
| Capybara             | Hydrochaeridae  | <i>Hydrochaeris hydrochaeris</i> | I                     |
| Red Rumped Agouti    | Agoutidae       | <i>Dasyprocta leporina</i>       | FP                    |
| Paca                 | Agoutidae       | <i>Cuniculus paca</i>            | I                     |
| Giant Armadillo*     | Dasipopidae     | <i>Priodontes maximus</i>        | I, FP, Burrow         |
| Giant Anteater*      | Myrmecophagidae | <i>Myrmecophaga tridactyla</i>   | FP, I                 |
| Southern tamadua     | Myrmecophagidae | <i>Tamadua tetradactyla</i>      | I                     |
| White-lipped peccary | Tayassuidae     | <i>Tayassu pecari</i>            | I, Feeding Ground     |
| Collard peccary      | Tayassuidae     | <i>Tayassu tajacu</i>            | I                     |
| Savannah Fox         | Canidae         | <i>Cerydocon thous</i>           | FP (on-road), I       |
| Jaguarundi           | Felidae         | <i>Herpailurus yagouaroundi</i>  | I                     |
| Jaguar               | Felidae         | <i>Panthera onca</i>             | I                     |
| Puma                 | Felidae         | <i>Puma concolor</i>             | I                     |
| Ocelot               | Felidae         | <i>Leopardus pardalis</i>        | I                     |
| Red brocket deer     | Cervidae        | <i>Mazama americanus</i>         | FP, I                 |
| Grey brocket deer    | Cervidae        | <i>Mazama nemorivaga</i>         | FP, I                 |
| White-tailed deer    | Cervidae        | <i>Odocoileus virginianus</i>    | FP, I                 |
| Tayra                | Mustelidae      | <i>Eira barbara</i>              | I                     |

|                                |             |                             |         |
|--------------------------------|-------------|-----------------------------|---------|
| Brazilian tapir                | Tapiridae   | <i>Tapirus terrestris</i>   | I       |
| Southern two-toed sloth        | Bradypoidae | <i>Choloepus didactylus</i> | I       |
| Pale-throated three-toed sloth | Bradypoidae | <i>Bradypus tridactylus</i> | I       |
| Red howler monkey              | Cebidae     | <i>Alouatta macconnelli</i> | V,I     |
| Wedge-capped Capuchin          | Cebidae     | <i>Cebus olivaceus</i>      | I, Seen |
| White-faced saki               | Cebidae     | <i>Pithecia pithecia</i>    | I       |
| Golden hand tamarind           | Cebidae     | <i>Saguinus midas</i>       | I       |
| Black spider monkey            | Cebidae     | <i>Ateles paniscus</i>      | I       |

The Jaguar (*Panthera onca*) is listed as Near Threatened while the tapir (*Tapirus terrestris*), giant armadillo (*Priodontes maximus*) and black spider monkey (*Ateles paniscus*) are all listed as vulnerable on the IUCN Red list of Threatened Species.

#### 4.2.2.2 Birds

In 2018, O'Shea et al. documented 271 species of birds, including 38 Guiana Shield endemics and 15 species on the IUCN Red List of Threatened Species in the Upper Berbice River area. Some of the Guiana shield endemics included the marail guan (*Penelope marail*), black curassow (*Crax alector*), crimson topaz (*Topaza pella*), guianan trogon (*Trogon violaceus*) and the blue-cheeked parrot (*Amazona dufresniana*).

Birds were documented opportunistically while conducting the vegetation survey through direct sighting and vocalization. Additional information on bird diversity in the area was gathered from the workers attached to FGI, and persons familiar with the area. Nineteen (19) species of birds were confirmed by these methods. Three mockingbirds (and nests belonging to this bird species) and two kingfishers were spotted at the Wikki Creek area. Three ground/burrowing owls were seen in holes in the ground. One of the owls was in a pit that was reportedly excavated in 2019. The other two owls were spotted near the accommodation block area. Excavated pits provide valuable habitats for this species. Burrowing owls are known to inhabit open landscapes including savannahs.





Figure 31: Holes in the ground used by burrowing owls

The bird species heard, seen or documented via interviews are in table 6 below.

Table 8: Birds in the Concession

| Common Name                           | Family        | Scientific Name                |
|---------------------------------------|---------------|--------------------------------|
| Tropical Mockingbird                  | Mimidae       | <i>Mimus glivus</i>            |
| Ringed Kingfisher                     | Alcedinidae   | <i>Megaceryle torquata</i>     |
| Red neck woodpecker                   | Picidae       | <i>Campephilus rubicollis</i>  |
| Ruddy Pigeon                          | Columbidae    | <i>Patagioenas subvinacea</i>  |
| Blue saki                             | Thraupidae    | <i>Thraupis episcopus</i>      |
| Kiskadee                              | Tyrannidae    | <i>Pitangus sp</i>             |
| Towa Towa/chestnut bellied seed finch | Thraupidae    | <i>Oryzoborus angolensis</i>   |
| Screaming piah                        | Cotingidae    | <i>Lipangus vociferans</i>     |
| White-tailed hawk                     | Accipitridae  | <i>Elanus leucurus</i>         |
| House wren                            | Troglodytidae | <i>Troglodytes sp.</i>         |
| Red-billed toucan                     | Ramphastidae  | <i>Ramphastos tucanus</i>      |
| Burrowing owl                         | Strigidae     | <i>Athene cunicularia</i>      |
| Common ground dove                    | Columbidae    | <i>Columbina passerina</i>     |
| Grey-headed dove                      | Columbidae    | <i>Leptotila plumbeiceps</i>   |
| Marail Guan/Marudi                    | Cracidae      | <i>Penelope marail</i>         |
| Black Curassow/Powis                  | Cracidae      | <i>Crax alector</i>            |
| Common black Hawk                     | Accipitridae  | <i>Buteogallus anthracinus</i> |
| Blue and Yellow macaw                 | psittacidae   | <i>Ara ararauna</i>            |
| Red and green macaw                   | Psittacidae   | <i>Ara chloropterus</i>        |

#### 4.2.2.3 Ichthyofauna (Fishes)

There is no published literature on the fishes of Ebini. However, 92 fish species have been documented in the Upper Berbice River (No aquatic surveys were conducted at the proposed concession). Information on the fish fauna was obtained through discussions with persons familiar with the area. Some of the species in the area include patwa (*Guianacara sphenozona*), haimara (*Guianacara sphenozona*), lukanani (*Chichla sp*), houri (*Hoplias marabalicus*), pirahan (*Serrasalmus sp*), yarrow (*Hoploerythrinus unitaeniatus*), daray (*Leporinus friderici*), and sunfish (*Crenicichla sp*). The fish mentioned above are used primarily for subsistence and commercial purposes. Fish caught are sold at Aoraima and Kwakwani.

### 4.3 Socio-economic Environment

The information captured in the socio-economic component of this EAMP was garnered through extensive research and a comprehensive stakeholder consultation process. This section of the report will highlight the approach to stakeholder engagement, provide a summary of the information garnered including key issues and developmental trajectory of the communities. A synopsis of the socioeconomic activity and demography of the project area are also included in this section.

The project team interacted with approximately sixty (60) stakeholders in various capacities. This accounted for approximately 75% of the targeted key and primary stakeholders. The engagements were guided by a comprehensive Stakeholder Engagement Plan (SEP). The stakeholders were engaged through key knowledge holder interviews; community consultation, focus group meetings; and the use of questionnaires. Each method of engagement targeted a specific category of stakeholders. The stakeholders were afforded the opportunity to learn about the project and share valuable information on the socioeconomic, cultural and environmental dynamics of the project area and their respective communities.



The stakeholder engagement for Ebini, however, focused specifically on the farmers who reside in the community and have established farms within the Ebini Intermediate Savannahs. The other stakeholders as identified by the stakeholder analysis were operations within the project area of influence. Therefore, the consulting team sought to engage all key and primary stakeholders within the project's area of influence. However, efforts to contact some stakeholders were futile. Please refer to the stakeholder consultation report in Annex 4 for additional details.

#### 4.3.1 Community Demographics

The FGI crop production project is located in the Ebini Intermediate Savannahs, region 10. The catchment area comprises mostly of open savannah lands surrounded by dense forest. The project site is located in rural parts of region 10. In this regard, most of the surrounding communities are unpopulated or sparsely populated. Given the nature of the project and stakeholder analysis, the Wikki and Ebini communities are among major stakeholders who would be impacted by and can benefit from the project. The additional stakeholders within the project area of influence are agriculture-based organisations involved in crop farming, poultry and cattle rearing. The information gathered from these organisations is elaborated in the stakeholder consultation report (Annex 4).

According to the 2012 Population and Housing Census the Wikki Creek community has a population of 191 persons, 59% males and 31 % females. Furthermore, the census indicated that the Ebini and Ebini Ranch communities have a combined population of 26 persons, 73% males and 27% females. Consultations with the stakeholders indicated that Wikki community has approximately 280 residents, while Ebini community and its environs is approximately 250. Additionally, there are approximately 25 farmers operating in the Ebini Intermediate Savannahs.

According to the Population and Housing Census 2012, 80% of the Ebini population was categorised as mixed, while the Wikki community comprised of 58% indigenous peoples and 37% as mixed. In 2012 census there were no recorded cases of disabilities in Ebini, however, there were 2 cases of talking/speaking challenges recorded in the Wikki

settlement, but no cases of mobility challenges. However, consultation with the stakeholders indicated there is currently one (1) resident who has challenges with mobility and one (1) who has a speech impediment in the Ebini community and none in the Wikki community.

#### 4.3.2 Socioeconomic Activities

There are limited options for employment within both the Ebini and Wikki communities. While the FGI project has been instrumental in addressing the unemployment issue through the employment of locals, unemployment still remains a major challenge. Some residents are employed in the government sector as Teachers, Community Health Workers, Caretakers or Administrators. Additionally, other residents (mainly males) seek employment in the mining and forestry sectors outside of the communities; therefore, many of the households are managed by females.

Both communities have one (1) nursery and one (1) primary school, respectively, along with health and community centres. The Ebini nursery school has a current population of four (4) students (3 girls & 1 boy) and 1 teacher; the primary school has a population of 13 students (62% girls) and five (5) teachers. The Wikki community has seven (7) students at the nursery level, 57% are girls, and thirty (30) students within the primary school, 67% of which are girls. There is a total of seven (7) teachers distributed between the nursery and primary schools. Both communities have access to internet service, but no direct telephone or radio service. The Ebini community once had a telephone booth provided by then GTT, now One Communications; however, it has been inoperable for many years.

There are no police stations, hospitals, commercial banks, supermarkets, secondary schools and other social services such as markets, sports facilities etc. within these communities. The main economic activities are farming, hunting and fishing. A few residents operate small shops on their premises or mobile boat shops. Others operate transportation services for school children within the community, providing public transport to New Amsterdam, or private hire. There are no systems for sustainable trade,

therefore farming is done mainly on a subsistence basis and the market for commercial produce must be sourced independently.

The Berbice River and Wikki Creek are the main modes of transportation for the respective communities. The cost of accessing farming materials and transport produce is very high. Fossil fuel is the main source of energy. While residents have opted to acquire modern amenities, traditional methods such as the use of firesides are still practiced. The main social services, such as the Health Centres, have black tanks for storage of water and pipes within the compounds. Additionally, some residents within both communities collect and store rainwater and have independently set up pipes and indoor toilet facilities. However, some residents still utilise the traditional pit latrines. The Berbice river, Wikki and adjoining creeks are the main sources of freshwater for the communities. However, the Ebini farmers depend on the spring in the savannahs and rain as their main source of fresh water.

There is no company supplying electricity, therefore residents use solar panels, generators, batteries or various types of lamps. There are no waste disposal services available in the intermediate savannahs nor the surrounding communities. Residents burn or bury their waste and compost the organic waste. There are no major systems in place to meet the needs of vulnerable groups such as senior citizens and persons with disabilities. Basic health services are available and persons requiring specialized care need to access that outside of the communities. The use of paddle or engine boats are the main forms of transportation. Some areas can also be accessed via trail using tractor, motorcycles, pick up vans, trucks or walking.

## 5. Stakeholder Engagement

The project team interacted with approximately sixty (60) stakeholders in the various capacities. This accounted for approximately 75% of the targeted key and primary stakeholders. The engagements were guided by a comprehensive Stakeholder Engagement Plan (SEP). The stakeholders were engaged through key knowledge holder interviews; community consultation, focus group meetings; and the use of questionnaires. Each method of engagement targeted a specific category of stakeholders. The stakeholders were afforded the opportunity to learn about the project and share valuable information on the socioeconomic, cultural and environmental dynamics of the project area and their respective communities.

The stakeholder engagement for Ebini, however, focused specifically on the farmers who reside in the community and have established farms within the Ebini Intermediate Savannahs. The other stakeholders, as identified by the stakeholder analysis, were operations within the project's area of influence. Therefore, the consulting team sought to engage all key and primary stakeholders within the project's area of influence. However, efforts to contact some stakeholders were futile. Refer to the stakeholder consultation report in Annex 4 for additional details.

### 5.1 Community Engagement

Consultations were conducted with the Wikki Creek community; and a focused group meeting with the Ebini Farmers group in the Ebini community. The Ebini farmers were engaged rather than the community because of their active farmlands within the Ebini Intermediate Savannahs. Moreover, all of the farmers within the savannahs reside in the community of Ebini and its environs.

The majority of the persons engaged have been living or working in their respective communities for between 10-60+ years. Some of the major areas of concerns raised by the stakeholders are:

- ✚ Extreme weather events such as flooding and drought
- ✚ Dust from road
- ✚ Limited access to freshwater
- ✚ Limited options for transporting produce and materials
- ✚ Limited access to advanced health care and social services
- ✚ Inadequate tools, equipment or machinery to enhance work
- ✚ Pests and diseases damaging crops
- ✚ High rate of unemployment
- ✚ Invasion of farms and communities by wild animals
- ✚ Inadequate systems for sustainable livelihood activities
- ✚ Inadequate market for produce

The major areas for development highlighted by stakeholders are:

- ✚ Transporting or purchasing of produce from the farmers
- ✚ Assistance with land clearing and preparation
- ✚ Harvesting of the produce
- ✚ Access to alternative freshwater sources on Ebini farm since the spring water gets very low in the dry season and farmers are required to fetch water for long distances. Wikki also has a well at the Community Centre which is inoperable and can aid in aid in boosting the supply of fresh water if its function is restored.
- ✚ Chainsaw for the group
- ✚ Access to limestone
- ✚ Processing facility

- 🚧 Partner with community to harvest viable wood species
- 🚧 Provide sand as may be required for construction and other activities

The Wikki community is in the process of establishing a sawmill as part of its Community Development Plan and is seeking assistance to acquire a Locus Mill to process logs. This venture aims to provide job opportunities and sustainable income for residents. The residents are also exploring rice planting and coconut farming. There are also plans to develop tourism products within the community. The residents expressed the need for a tractor and harrow, as well as farming tools and insecticide.

## 5.2 Key Knowledge Holder Interviews

Key knowledge holder interviews were conducted with FGI English-speaking employees based on the farm, and two (2) of the four (4) organisations operating within the Ebini Intermediate Savannahs which opted to participate. Additionally, interviews were conducted with (4) secondary stakeholders, i.e. the Headteachers, and Community Health workers from Ebini and Wikki, given the importance of the data to the EAMP. These interviews also provided invaluable, and current demographics data. The consulting team also engaged the Hydrometeorological department of the Ministry of Agriculture for weather data within the Ebini Intermediate Savannahs.

## 6. Assessment of Potential Social and Environmental Impacts

FGI is establishing a crop farm initially of 1500 acres, eventually to expand to 24,209 acres located in Ebini, Berbice, Region 10. The landscape of the farmland consists of a gallery or riverine forest abutting the Berbice River on the west side of FGI, Savannah grassland which is being developed into crops of corn, soya and sorghum, a creek, (Wikki Creek) abutting the southern border of FGI, with a riverine community, Wikki community, also on the southside on the intersection of the Berbice River and Wikki Creek. The Wikki community is inhabited by 280 persons on the southeast edge of FGI. The zone of influence, is an area of 10 km surrounding the FGI landscape described above and includes the Wikki community.

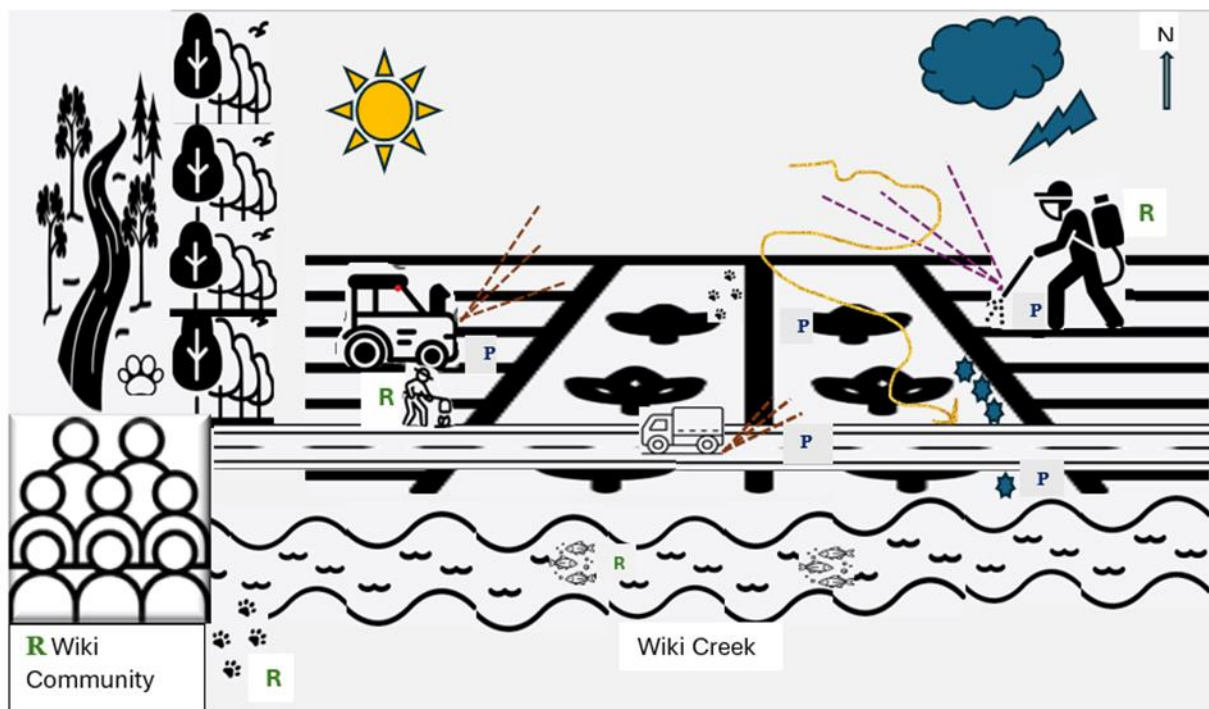
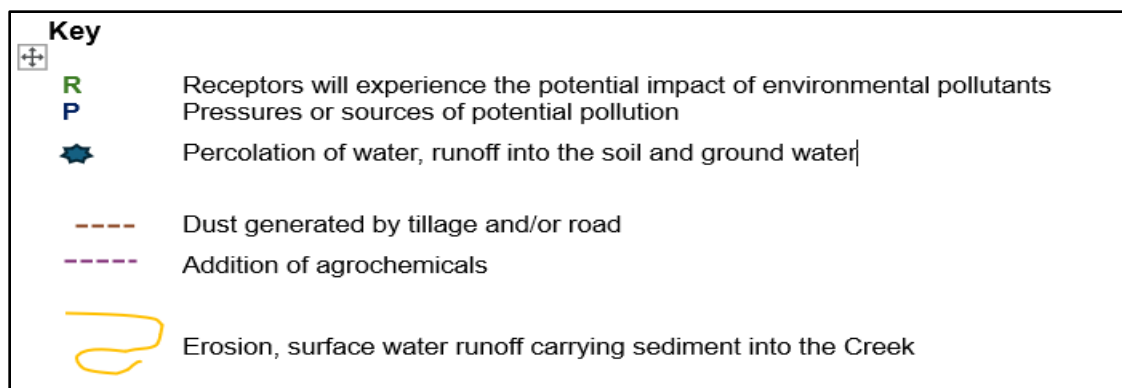


Figure 32: Schematic, adapted from the DPSIR framework to assess the biophysical system of FGI, to identify the potential impact of the farm on the environment.





The Drivers-Pressures-State-Impact-Response (DPSIR) is based on evidence-based risk assessment and is a wholistic conceptual framework designed to inform the environmental management of river basins. DPSIR would typically consider all anthropogenic activities (Drivers) which could influence a river basin ecosystem, e.g. industries such as mining, agriculture and others (Salomons et al., 2014); the Pressures applied by the industries to the ecosystem, the State, (that is changes to the ecosystem resulting from the Drivers), Impact(s) they will have, which are the risks, quantified and measured against established thresholds or epidemiological studies and Responses designed to manage the impacts.

In this assessment, the FGI farm is considered as the only Driver within the zone of influence. The Pressures consider several stressors, including clearing the land for crop development, tillage, use of agrochemicals and all other farm activities. The State describes the environmental changes resulting from the farm activities; while Impact considers measured and quantified risks to receptors such as the Wikki Community, Wikki Creek, fauna and soil while also stating the uncertainties. Several Response measures implemented at any of the Pressure-State or Impact phases could mitigate potential impacts to a tolerable level. The Responses will form the recommendations which should align with good agricultural practices, Integrated Pest Control management and Health and Safety practices described under Mitigation Measures in section 7.1 below.

## 6.1 Impact Assessment Methodology

The farmland is the **Driver**, which increases the **Pressures**, e.g. application of agrochemicals on the natural environment resulting in emissions released to the ground/soil. These emissions may potentially change the **State** of the environment in quantity and quality. The State of the health and social well-being of the community or FGI farm workers may also be changed. Above a certain level of change **Impacts** may occur such as depletion of soil (erosion) and water quality, and/or loss of biodiversity resulting from a change to the ecosystem.

This environmental impact assessment follows the traditional risk assessment format through the lens of the DPSIR framework of defining the problem and identifying the hazards (Pressures ), examining exposure routes, characterising the resulting hazard and exposure (the State), to determine the probability/potential of a given risk, that is the (Impact) the farm may have within the environment, landscape or zone of influence where it is located.

### Objective

The objective of the risk assessment is to assess the potential environmental and human health risks resulting from farming activities conducted in Ebini by FGI.

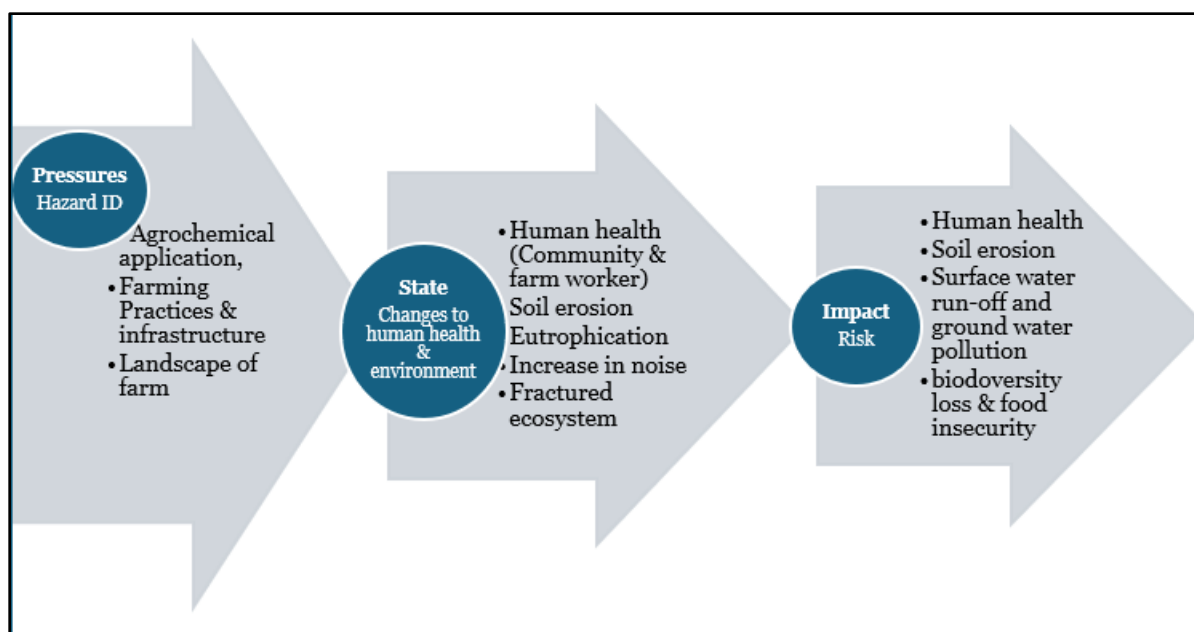


Figure 33: Process of Environmental Assessment of FGI Farmland using DPSIR Framework

The Wikki community is under consideration as it lies to the southwest of FGI receiving wind currents from the farm as the prevailing wind is from the northeast, and borders Wikki creek which runs from east to west of FGI, discharging into the Berbice River. Farm workers are also included under the health assessment because of their direct contact with emissions from farm activities.

The Wikki Community consists of 280 individuals, 31 % are females and 59% male. The range in age is from under one year to 84 years of age. The majority 19%, are below 19 years of age. Two schools, a nursery and primary school are located in the community with 4 and 13 pupils respectively. Community members most vulnerable to environmental stressors would be children and young adults under the age of 19 years and adults aged 45 years and over.<sup>1</sup>

Biodiversity within the Ebini landscape is extensive, see Section 6.2.6 *Impacts on the Biological Environment* and Appendix 5 consisting of large mammals such as the tapir and jaguars, listed in the International Union for the Conservation of Nature (IUCN), to

<sup>1</sup> Hypertension is the most prevalent disease in the community as reported in section 5.2 of the stakeholder consultation report and (Sokalingam et al., 2021) report that in Guyana hypertension is evident within the population from age 45 years.

large rodents such as the capybara which although not on the IUCN list are valuable to the Ebini ecosystem. Animals such as the wild hog (*sus scrofa*) and fishes such as Lukanani and himara are of value to Wikki community as food sources and therefore important to food security.

## 6.2 Impacts on Health and the Physical Environment

### 6.2.1 Noise

Noise as defined<sup>2</sup> as the,

*“Unwanted or disturbing sound that affects the health and well-being of humans and other organisms”<sup>3</sup>.*

The health of humans and animals are potentially affected by noise. Field machinery in operation is potentially the source of unwanted noise on a farm. Noise measurements were therefore taken at the maintenance building where machinery is serviced and repaired. Noise measurements were also taken both upwind and downwind within the farm over 16 hours to estimate the usual operating noise of FGI during the day. The Wikki Community is located downwind of FGI, so resulting noise measurements downwind estimate exposure to the community. Noise measurements were also taken down-wind with the generator operating as generators are responsible for the majority of community noise complaints received by the Environmental Protection Agency Guyana<sup>4</sup>. FGI employees will also be exposed to noise as a function of farming tasks so occupational exposure to noise was included and described in section 6.2.7- *Impacts on Occupational Health and Safety*.

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<sup>2</sup> Definition by National Geographic <https://education.nationalgeographic.org/resource/noise-pollution/>

<sup>4</sup> Generator noise and community complaints, personal communication

#### 6.2.1.1 State and Potential Change due to Community Exposure to Noise

The impact of noise on human health has been associated with Noise Induced Hearing Loss (NIHL), neurological and psychological impairment. Community members exposed over a lifetime to daily noise levels averaging 70dB or above, are considered at risk of NIHL (Berglund Birgitta et al., 1999; Basner et al., 2017). Increased hospitalisations for cardiovascular diseases in adults over 65 years of age were linked to noise exposure over 55dBA and WHO guidance of 1999, reported noise and cardiovascular disease association at noise levels of 63 dB  $L_{Aeq16hours}$ . The effect of noise on cardiovascular disease was found to be cumulative, becoming increasingly worse with exposure over time (Andrew et al., 2013a; Basner et al., 2017).

Impaired cognitive development among children due to noise has been well documented (Ghaderi et al., 2019; Raess et al., 2022). Cognitive development diminishes among children living within and attending school in environments of noise pollution. Reduced reading comprehension, and poor performance in standardised tests, hyperactivity and inattention have been linked to the effects of noise and children (Clark & Paunovic, 2018; Raess et al., 2022).

Noise induced sleep disturbance, has been reported and involves physiological changes to the body; however sleep disturbances were not considered in this assessment as farming activities are unlikely to be occurring during the night.

#### 6.2.1.2 Community Noise Exposure

Downwind measurements of noise were used as the indicator of community noise exposure. Downwind noise was more prevalent at levels ranging between 30 to 39 and 50 to 59 dB than upwind noise. Of note is that at levels between 40 to 49 dB, up wind noise is more prevalent than downwind, this may be due to the number of loud noise events occurring during measurement, for example noise such as tractors moving with trailers. Twenty-five noise events occurred during upwind measurements while 17 occurred during downwind measurements.

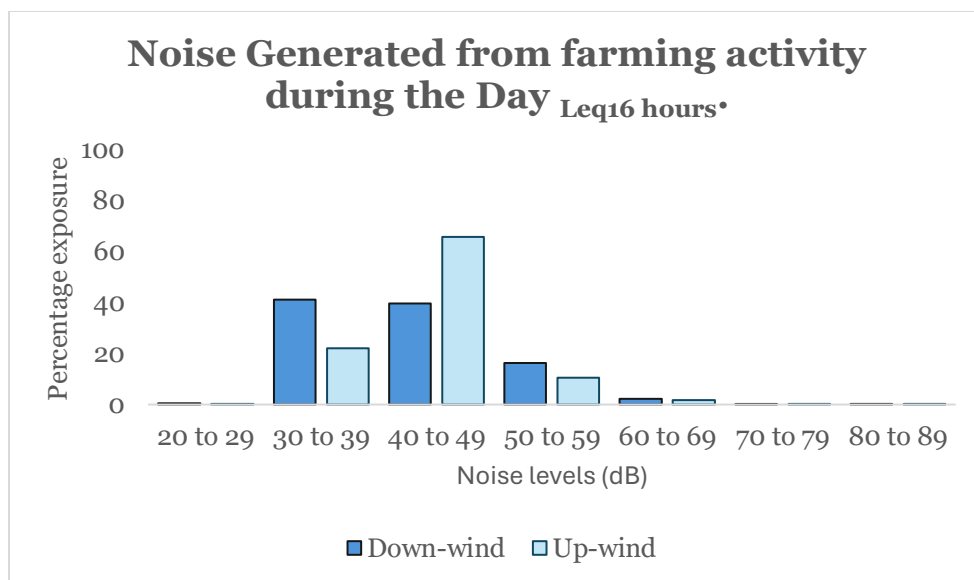


Figure 34: Chart showing community noise exposure from farm activities

## Generator Noise

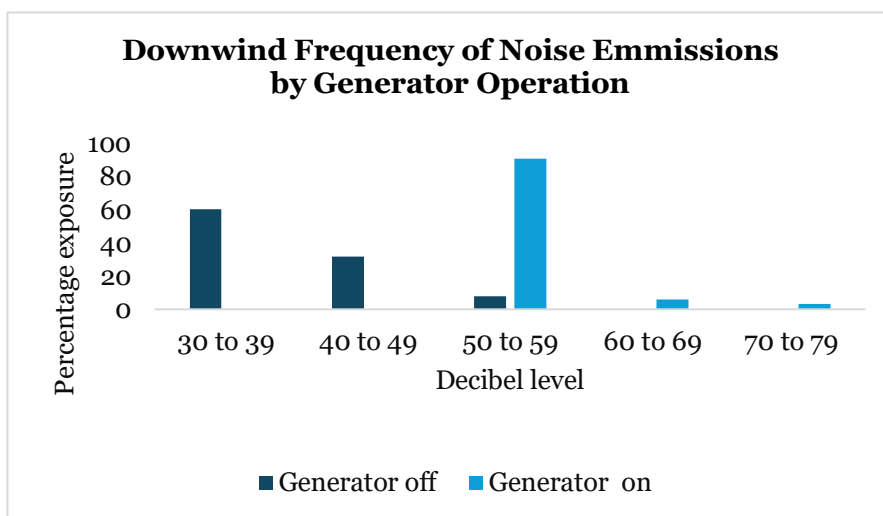


Figure 35: Chart Showing Community Noise Exposure from Farm Generator

Generator noise was measured downwind (estimating community exposure). A clear difference in noise exposure exists when the generator was in operation, (greatest noise frequency of between 50 to 59 dB) and when the generator was not operating where the greatest frequency of noise was 30 to 39 dB.



### 6.2.1.3 Impact of Noise on the Community

The World Health Organisation (WHO) has set guidelines for noise pollution with regard to human health. These guideline values were compared to the measurements taken at FGI (tables 9 and 10).

Table 9: WHO Guidelines on Noise and Community Exposure

| Exposure to Noise  | Guidance Threshold levels    |                   | Wikki Community Consistent Noise downwind greater than 50db L <sub>Aeq, 16 hrs</sub> | Wikki Community downwind with Generator on; Noise greater than 50db          |
|--|------------------------------|-------------------|--|--|
| WHO Guidelines for Community Noise 1999<br><br>L <sub>Aeq, 16 hrs</sub>  | <b>Annoyance<sup>5</sup></b> |                   | Noise levels exceeded moderate annoyance for 19% of the day                          | <b>Noise levels were consistently above moderate-100% while in operation</b> |
|  | <b>Moderate</b>              | <b>Serious</b>    |  |  |
|  | 50dB                         | 55dB              |  |  |
| WHO Guidelines for Pre-school Noise 1999<br><br>L <sub>Aeq, 16 hrs</sub> | <b>Day</b>                   | <b>Playground</b> | Noise levels exceeded the pre-school guideline of 45 dB for at least 36% of the day. |  |
|  | 45 dB                        | 55 dB             |  |  |

The community is exposed to noise pollution, which is potentially adverse to health, particularly when the generator is in operation. Exposure of children during more than a third of the day presents a significant risk to their developing cognitive abilities. This

<sup>5</sup> Annoyance in this context is not just a mild irritant but has physiological consequences, eg effects on the brain, cognitive impairment in adults and children (Thompson et al., 2022).

however is not a cause for concern since the Wikki Community is far removed from the noise assessment location.

Table 10: Impact of Noise Pollution on Community Members most at Risk

| <b>Community exposure to noise pollution above 50db</b> <small>Leaq 16 hours</small> |                  |                   |   |  |   |
|--|------------------|-------------------|---|--|---|
| <b>Location of measurement</b>   | <b>Community</b> | <b>population</b> | <b>Sensitive/vulnerable community members</b> |  | <b>Sensitive locations within the community</b> |
|  |                  |                   | <b>0 to 9 years</b><br><b>Cognition</b>       | <b>≥ 45 years</b><br><b>Cardiovascular disease</b> |   |
| Downwind   | Wikki            | 280               | 64  | 71   | Two schools, nursery and primary                |

#### 6.2.1.4 Noise and Biodiversity

It is uncertain if and how unwanted noise affects the fauna within the landscape of FGI, as much of the information on noise and animals is inconsistent and has been conducted on taxa outside of the Guianas. Further, the majority of information on noise has been conducted on birds so extrapolating to rodents and mammals, would be weak.

Evidence suggests that birds become stressed by noise, their hormonal stress levels increase, and behaviour changes as they become hypervigilant. Sensing danger from noise, the mother is not sure whether to find food or stay with fledgelings (Kleist et al., 2018). Evidence also suggests some birds become habituated to noise and change their behaviour to adapt to the situation, in call patterns and noise levels such as by raising its minimum call frequency in the presence of noise pollution. However, even among habituated birds hatching rates decline.

Among wildlife, noise pollution is thought to cause fear and just as in birds described above, some wildlife adapt to noise and habituate (Kight & Swaddle, 2011). Among ducks, noise occurring during key developmental stages may not only reduce progeny but change the gender ratio to the extent that fewer eggs hatch and more female progeny are produced than prior to the introduction of noise pollution in their habitat (Kight & Swaddle, 2011). Other evidence suggests that physiological and behavioural responses to noise may not be permanent, and over time return to behavioural patterns prior to noise pollution (e.g. Beckers & Schul 2008) resulting in the long-term consequences of noise possibly being minimal. In addition, reaction to noise within the same species may also vary (Harding et al., 2019).

Noise pollution is also considered to increase the susceptibility of wildlife to diseases, in addition to noise suppressing the immune system. To avoid noise some wildlife seek other habitats, for example mule deer relocate up to 800 m from their usual habitat where the availability of food may be reduced and puts the animal at greater risk of contact with disease causing parasites and predators (Berkhout et al., 2023).

Overall, a large body of evidence has shown that noise pollution from a variety of sources, road, airports, oil fields and gas installations disrupt wildlife, amphibians, birds and mammals. The effects shown include disruption to vocal communication between animals, foraging, antipredator responses and parental care (Harding et al., 2019).

Table 11: Potential Effects of Noise on Wildlife

| Animal Species      | Noise level                           | Noise Effect                                   | Potential Risk<br>dBA <sub>LeAq, 16 hours</sub>  |
|---------------------|---------------------------------------|--|--|
| Birds               | Single noise event<br>140 dBA         | Hearing loss                                   | The maximum noise event recorded within FGI was 83.5db.<br><br>Risk to birds and small mammals on FGI is highly unlikely |
|                     | Multiple noise events<br>125 dBA      | Hearing loss                                   |  |
|                     | Continuous noise<br>>72 hours 110 dBA | Hearing loss                                   |  |
| Small mammals       | 110 dBA                               | Hearing loss and decline in reproduction rate. |  |
| Terrestrial animals | 55-60 dBA                             | Behaviour change starts to appear              | Risk to terrestrial animals within the FGI landscape is likely.  |

## 6.2.2 Soil Quality

### 6.2.2.1 Impact of Soil Quality on Health and the Physical Environment

As Agriculture Drives, referring to the DPSIR framework, multiple Pressures are applied to soil quality with implications for air and water quality. Soil erosion is a process which occurs naturally in the environment, whereby topsoil is lost in undisturbed landscapes and reforms (Osman, 2014; Toy et al., 2002). A tolerable loss of soil is possible with good agricultural practices where a high level of productivity can be sustained indefinitely (Toy et al., 2002). However, poor agricultural practices have accelerated soil erosion to the extent that farmlands have become unproductive due to a loss of fertile soil. Infertile land may be accompanied by polluted waters and air, presenting a substantial risk to both human and ecological health.

Soil erosion, defined as '*the detachment and movement of soil particles from the point of origin through the action of water and wind*'<sup>6</sup>, places multiple pressures on water and air. Soil particles dislodged by water, may flow across the land moving topsoil particles (sediment) on the ground. Sediment adsorbs and the water absorbs soil nutrients, pesticides, herbicides and other agrochemicals as the water and sediment either percolate into the ground or flow along the surface (surface run-off) to freshwater sources.

Sediment and surface water laden with nutrients and agrochemicals have been shown to diminish water quality and pollute freshwater ecosystems. Sediment flowing across land with surface run-off, achieve the change in water quality either by altering the physiochemical attributes, that is reducing dissolved oxygen, increasing turbidity etc, and/or depositing agrochemicals in the freshwater bodies. Agrochemicals in fresh water are able to adversely affect aquatic life such that the ecosystem is negatively changed.

Volatilised agrochemicals adhere to fertile topsoil, dislodged by wind, and become airborne. The physical particles of airborne soil cause a decline in air quality with the capacity to harm human and ecological health. The adherence of agrochemicals to soil particles, increases the ability to harm.

Improper use of agrochemicals applies pressure to the environment, via soil, air and water in multiple forms. Agrochemicals applied in excess of the plant's needs are an adverse risk to the ecosystem and human health(Aneja et al., 2008; Elumalai et al., 2025). As well as the adverse role the overuse of agrochemicals play in soil erosion, they can also reduce crop yield by acidification or alkalisiation of soil (Aneja et al., 2008; Ganguly et al., 2020a; Uddin, 2018).

### ***Poor agrochemical use and human health***

The presence of agrochemicals has been found in the bodies of Community members, for example Glyphosate, a herbicide has been found in the urine of pregnant women living in close proximity to farmland within the season of spraying but absent in urine during non-seasonal spraying periods(Curl et al., 2023). The exposure of children to insecticides

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<sup>6</sup> Iowa State University definition: <https://crops.extension.iastate.edu/encyclopedia/soil-erosion-agricultural-production-challenge> Downloaded December 2024.

has been linked to asthma (Perla 2013). Pesticides are also associated with altering the growth and reproductive mechanisms of birds leading to a decline in population (Uddin, 2018)

Agrochemicals are used to improve crop productivity, preventing and killing pests and diseases, and improving plant growth. The by-products of fertilizers and soil nutrients were measured in this assessment as an indicator for agrochemicals, for example Urea ( $\text{CO}(\text{NH}_2)_2$ , commonly used throughout the world and intended for use by FGI, is a nitrogen fertiliser. Urea forms nitrates, and/or nitrous oxide ( $\text{NO}_x$ ), and ammonia when applied to the soil.

Nitrogenous fertilisers are not totally absorbed by the soil. Crops utilise 50% of nitrogenous fertilizers applied to the soil, 2%–20% evaporate, therefore available for volatilisation<sup>7</sup>, 15%–25% undergo reactions with organic compounds, and the rest (2%–10%) leach into ground water and are transported to surface water over the soil or via ground water (Ganguly et al., 2020). Nitrate is the most common form of dissolved nitrogen in water but just as in air and soil, may also be found as nitrite ( $\text{NO}_2^-$ ), Nitrogen oxide ( $\text{N}_2\text{O}$ ), and organic nitrogen. Suspended sulphates generally adhere to small particles which are deposited very slowly (Garland 1974).

Soil nutrient compounds containing sulphates as a base are combined with elements in commercial soil enhancers, for example ferrous, manganese, Boron and magnesium are all combined with sulphate. To assess possible impact, nitrogen and sulphur dioxide were measured in air and nitrates and sulphates measured in fresh water.

The following three sections, consider whether FGI's farmland is at risk of erodible soil, and whether such a risk affects the air and water quality. The impact of soil erosion is considered using the addition of soil nutrients, as an indicator for exposure to agrochemicals.

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<sup>7</sup> Volatilization, loss of Nitrogen through the conversion of ammonium to ammonia gas released to the atmosphere.



#### 6.2.2.2 Soil Erosion Risk at FGI

Soil erosion is a major risk to soil quality. Erosion degrades soil, by a reducing the nutrient content and ability to retain moisture, resulting in reduced soil biodiversity and crop yield (Wang et al., 2023). Good farming practices can contain erosion at a tolerable rate, and produce crops at the chosen yield without unduly changing the state of the environment.

Factors of erosion include climatic conditions, (that is intense kinetic energy of wind and rain to dislodge soil susceptible to erosion, on collision) and the topography/sloping land assists the rain to carry the dislodged soil (sediment) over the ground. Soil susceptible to erosion is small in size and lacks the ability to retain moisture. (Fullen & Catt, 2004). Organic matter protects soil from erosion and has been shown to offset erosion even under susceptible conditions (Fullen & Catt, 2004; Lal, 1993).

Factors affecting soil erosion, resulting in soil particles to become dislodged and then transported by wind or water include:

1. **Erosivity:** Dislodging, with kinetic energy of rain and wind which strikes the surface of the soil with enough energy to dislodge the topsoil. Wind erosion reduces the ability of soil to hold nutrients and water.
  - a. Wind speeds over 6m/s over dry soil, where less than 600mm of rain has fallen for months increases the tendency for soil erosion.
2. **Erodibility:** The inherent resistance of the soil to detach and become transported by wind.
  - a. The size of the soil particles influence soil movement. Coarse silts between 50 to 150µm are susceptible to erosion (Fullen & Catt, 2004). Fine soil particles of 0.1 -0.5 µm in diameter roll over the surface by direct wind pressure and bounce travelling up to five times the height in distance up to a height of 30cm strike the surface and rebound, Approximately 50 to 75% of soil is carried in this way and deposited as sediment (Osman, 2014). Rain flowing over the surface (surface runoff) then carries the sediment with adhered agrochemicals, as the ground slopes depositing the sedimented

water in ditches, surface water sources or pools in ground surface fissures, e.g. gully or rill erosion.

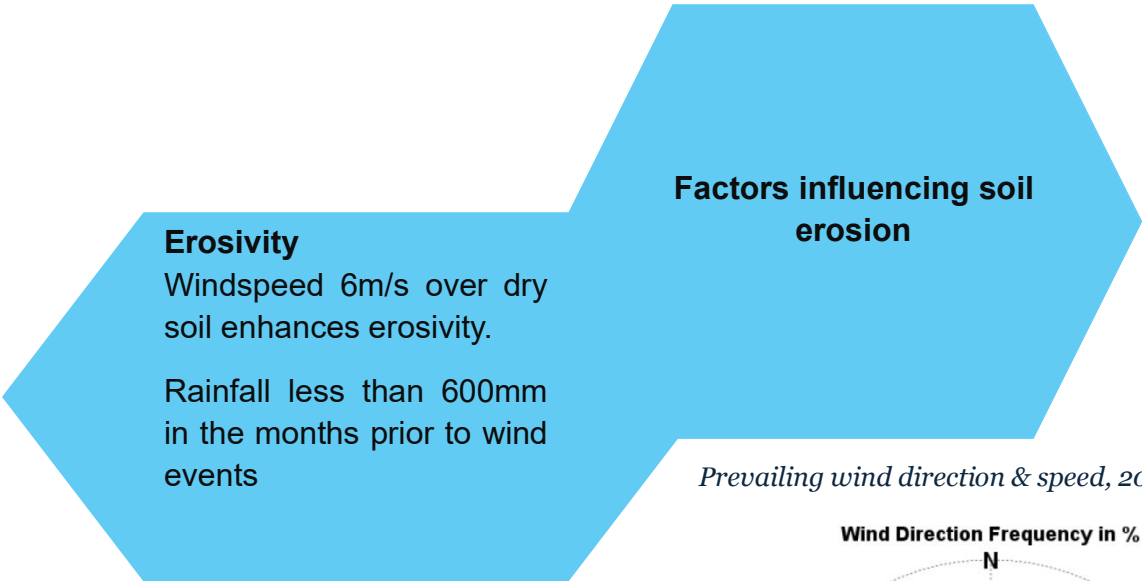
3. **Protective factor:** Organic matter is protective: in general, the greater the percentage of organic matter in the soil the less erodible and erosive.

Organic matter consists of decomposed plant and animal residues. Organic matter in the right proportion, dependent on the soil type, positively influences the soils' chemical, physical and biological properties. For example:

- a. The retention of adequate soil moisture is an important aid in preventing wind erosion. Organic matter has the ability to hold moisture (absorb water), which is protective of erosivity, reducing surface run-off. Soil rich in organic matter is also a better environment for root growth which anchors the soil and also prevents erosion. Soil with less than 2% organic matter are subject to erosion (Fullen & Catt, 2004). Increasing organic matter in soil from 2 to 5.9% increases water content by 65%(Buck, 1993).
- b. Organic matter can also protect against pollutants of water erosion as they infiltrate the soil. Organic matter has the ability to adsorb agrochemicals and sorb gases such as NO, NO<sub>2</sub> and CO. However, the capacity for organic matter to ameliorate pollutants is finite, since too much organic matter inhibits soil drainage.

FGI Soil – Potential Vulnerability to Soil Erosion

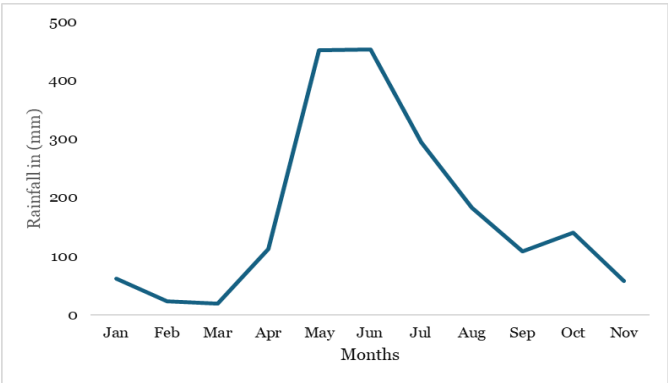
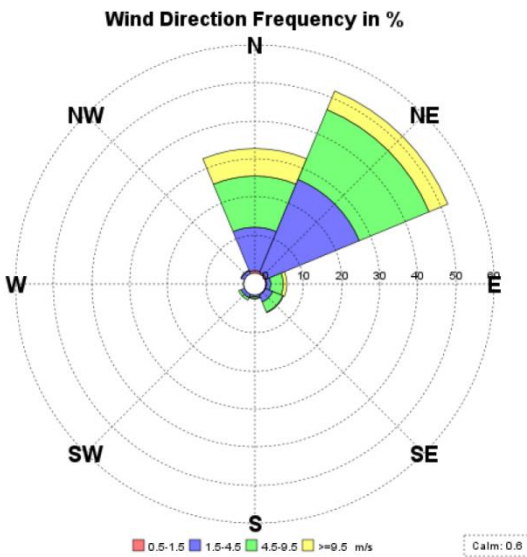
Soil samples and meteorological information suggest that soil on FGI is susceptible to erosion.

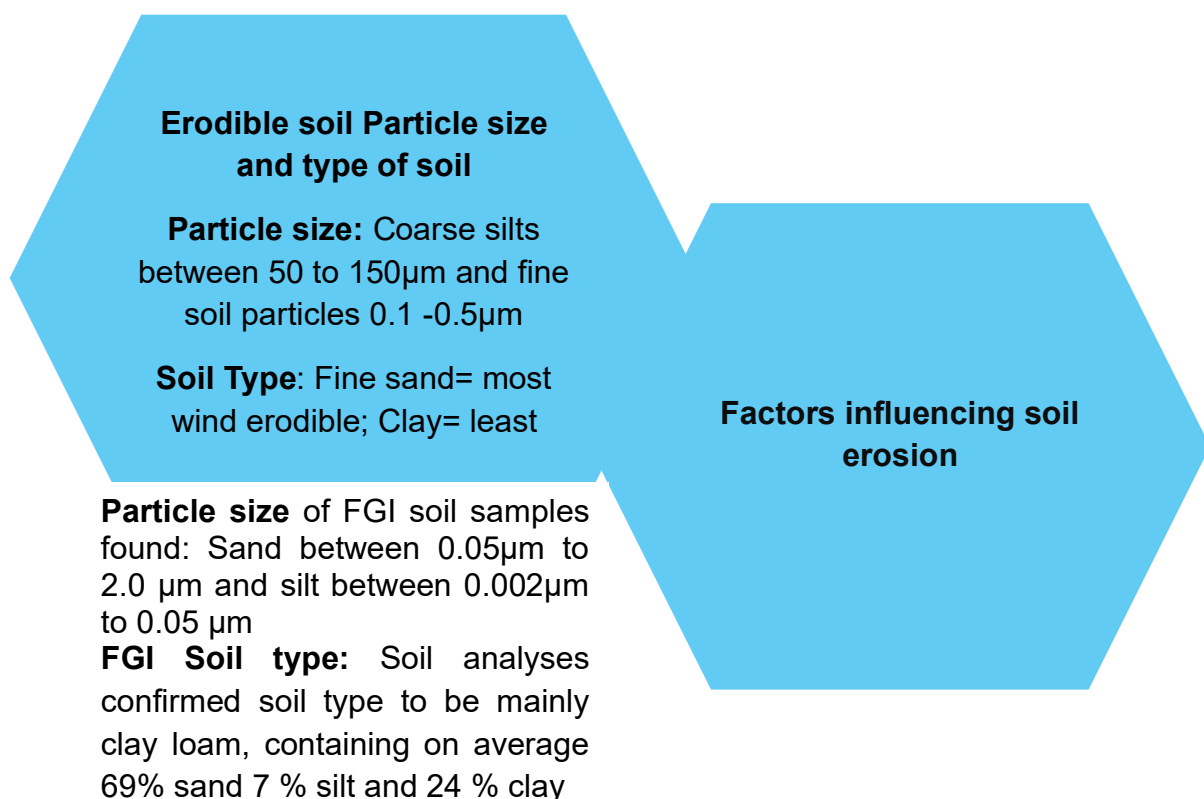


**Prevailing wind** over the landscape is from the north, and northeast at speeds above 9.5m/s for almost half of the year.

**Rainfall** less than 600mm/ month for many months prior to the rainy season.

Prevailing wind direction & speed, 2024<sup>5</sup>





**Organic Matter is protective against soil erosion.** FGI intends to add mulch to the soil as a protective measure(FGI, 2024). Mulching protects the soil from loss of moisture, reduces the velocity of runoff, minimises the loss of soil aggregates (which may be dislodging from rain striking the surface), and increases infiltration of water thereby reducing runoff and depending on the type of mulch, improve soil structure(Osman, 2014).

## 6.2.3 Air Quality

### 6.2.3.1 Pressures of Air Quality

In addition to reduced air quality caused by erosion, a variety of farming practices may increase the effects of erosion and/or on their own emit particulate matter, leading to depleted air quality. Dust or fine particulate matter from dislodged soil may be released into the atmosphere during land clearing for the development of crops. Fallow fields, tillage and vehicles travelling across the farm on the unpaved road also release fine particles of displaced soil, that is dust/particulate matter into the atmosphere. The application of agrochemicals by crop spraying, and farm activities such as, tilling, ploughing, operating the generator, maintaining and repairing farm machinery, potentially generate volatilised air emissions. Agrochemicals used on FGI include elements and complex compounds containing sulphates ( $\text{SO}_4^{2-}$ ), Potassium, phosphates ( $\text{PO}_4^{3-}$ ) ammonia ( $\text{NH}_3\text{-N}$ ) and nitrates ( $\text{NO}_3^-$ ) etc, all of which are capable of volatilisation and travelling beyond the distance of the intended target crops.

Dust or fine particles dislodged from landscapes without plant cover are also released into the atmosphere as particulate matter, with a diameter of  $2.5\mu\text{m}$  ( $\text{PM}_{2.5}$ ) or less, and particulate matter with a diameter of  $10\mu\text{m}$  ( $\text{PM}_{10}$ ) or lower. The potential exists for emissions from the application of agrochemicals and farm practices to diminish air quality to intolerable levels for community members and FGI employees. It should also be noted that an unpaved road transects FGI. Unpaved roads are also known to generate dust ( $\text{PM}_{2.5}$  and  $\text{PM}_{10}$ ) with the same potential health concerns as a farm of field crops (Khan & Strand, 2018; Parvej et al., 2021).

$\text{NO}_x$ ,  $\text{SO}_x$ ,  $\text{CO}$ ,  $\text{PM}_{2.5}$  and  $\text{PM}_{10}$  have been linked to cardiovascular and respiratory morbidity and mortality particularly among children and adults aged 65 and over (Parvej et al., 2021; Perla et al., 2015). Children are vulnerable to air pollution as their lungs are still developing and they breathe a greater volume of air per minute than adults relative to their size. Children are also more active than adults and spend a significant proportion of time at school (25%), where they would also be more exposed to the ambient environment than adults. (Chalvatzaki et al., 2020; Osborne et al., 2021).

PM2.5 and smaller particles, Ultra Fine Particles (UFP) are problematic to health. PM2.5 and UFP's are inhaled into deeper areas of the lungs than other particles. These particles get into gas exchanging regions, where they enter the circulatory system and diffuse into organs including the brain, heart and respiratory system. Agrochemicals have been found in house dust in communities close to farms (Kuiper et al., 2022). Field preparation activities and tillage are thought to generate more PM10, as seen in dust bowls, than wind erosion (Funk et al., 2008; Schenker, n.d.).

### Change in State - Potential human exposure to Pollutants of Potential Concern (POPC)

When inhaled, all the compounds sampled during the site field visit, i.e. pollutants of Potential Concern (POPC), NO<sub>x</sub>, SO<sub>x</sub>, CO, PM2.5 and PM10 may adversely affect health.

Table 12: Results of POPC by Air Emissions, Compared to the WHO Thresholds

| Sample location<br><i>population</i>                             | Nitrogen dioxide     |     | Carbon monoxide         |       | Sulphur dioxide       |     |
|--|----------------------|-----|-------------------------|-------|-----------------------|-----|
|  | Mean<br>(range)      | Max | Mean<br>(range)         | Max   | Mean<br>(range)       | Max |
| WHO Threshold  | 200µg/m <sup>3</sup> |     | 35000 µg/m <sup>3</sup> |       | 500 µg/m <sup>3</sup> |     |
| Generator-on; Downwind<br><i>Wikki Community</i><br>Location 2a  |                      |     | 1813<br>(1769-5394)     | 13605 |                       |     |
| Generator-off; Downwind<br><i>Wikki Community</i><br>Location 2b |                      |     | 78.6<br>(270-427)       | 2036  |                       |     |
| Downwind<br><i>Wikki Community</i><br>Location 4                 | 29<br>(18-40)        | 47  | 248<br>(358-854)        | 2254  | 281<br>(9-553)        | 891 |



Table 13: Particulate Matter Compared to WHO Thresholds

| Sample location<br><i>population</i>                               | PM <sub>2.5</sub> µg/m <sup>3</sup> |           | PM10                    |            |
|--|-------------------------------------|-----------|-------------------------|------------|
|  | Mean<br>(range)                     | Max       | Mean<br>(range)         | Max        |
| WHO Threshold  | WHO 15µg/m <sup>3</sup>             |           | WHO 45µg/m <sup>3</sup> |            |
| Generator-on<br>Downwind<br><i>Wikki Community</i><br>Location 2a  | 5<br>(5-6)                          | 7         | 16<br>(13-19)           | 29         |
| Generator-off<br>Downwind<br><i>Wikki Community</i><br>Location 2b | 5<br>(4-6)                          | 10        | 14<br>(6-22)            | <b>100</b> |
| Upwind<br><i>Farm workers</i><br>Location 3                        | 5<br>(2-7)                          | <b>19</b> | <b>20</b><br>(0-51)     | <b>243</b> |
| Downwind<br><i>Wikki Community</i><br>Location 4                   | 5<br>(1-9)                          | <b>22</b> | <b>43</b><br>(0-108)    | <b>309</b> |

### 6.2.3.2 Impact on Air Quality

#### Sulphur Dioxide, PM10 and PM2.5

Comparing POPC to WHO thresholds found that nitrogen dioxide and carbon monoxide fell below the WHO threshold which suggests they are not a concern to health. However,

the average ranges of SO<sub>2</sub>, and PM<sub>10</sub> are above the WHO thresholds and in the case of PM<sub>2.5</sub>, the maximum emission was above the WHO threshold, suggesting that PM<sub>2.5</sub>, PM<sub>10</sub> and SO<sub>2</sub> are potentially a hazard to health. To determine whether SO<sub>2</sub>, PM<sub>2.5</sub> and PM<sub>10</sub> are a risk to health of the community, the health Hazard Quotient (HQ) was applied.

The Hazard Quotient is used to determine the impact POPC may have on the community's health. See figure 36 for the formula used to derive the HQ. The HQ is a ratio of the potential exposure to pollutants of potential concern (POPC) and the level at which no adverse effects are expected during a lifetime. In this case the HQ is being used to assess whether the exposure of the community to SO<sub>2</sub>, PM 2.5 and PM 10 is a risk to health.

$$\text{Hazard Quotient} = \frac{\text{Air Concentration } (\mu\text{g}/\text{m}_3) \times \text{Fraction of Time Exposed}}{\text{Tolerable Air Concentration } (\mu\text{g}/\text{m}_3)}$$

Figure 36: Formula for Hazard Quotient

Table 14: Health hazard ratios of Pollutants of Potential Concern

| Pollutants of potential Concern (POPC)  | Receptor                                | Hazard Quotient (HQ) |
|---|---|----------------------|
| PM <sub>10</sub>  | Infant and toddler 0 to 4 years         | 1.23                 |
|   | Child (5 to 11 years inclusive)         | 1.96                 |
|   | Teenager (12 to 19 years)               | 2.45                 |
|   | Adult <sup>1</sup> (20 years and older) | 1.23                 |
|   | <b>Community</b>                        | <b>6.87</b>          |
| PM <sub>2.5</sub>   | Infant and toddler                      | 0.26                 |
|   | Child                                   | 0.42                 |
|   | Teenager                                | 0.52                 |
|   | Adult                                   | 0.26                 |
|   | <b>Community</b>                        | <b>1.47</b>          |
| Cumulative Hazard Quotient or Hazard Index for particulate matter   | Infant and toddler                      | 1.49                 |
|   | Child                                   | 2.38                 |
|   | Teenager                                | 2.97                 |
|   | Adult                                   | 1.49                 |
|   | <b>Community</b>                        | <b>8.33</b>          |
| SO <sub>2</sub>   | Infant and toddler                      | 0.16                 |
|   | Child                                   | 0.25                 |
|   | Teenager                                | 0.38                 |
|   | Adult                                   | 0.16                 |
|   | <b>Community</b>                        | <b>0.95</b>          |
| Notes: A hazard quotient less than or equal to 1 indicates that adverse effects are not likely to occur and therefore considered to be of negligible risk. HQs greater than 1 are not a statistical probability of harm occurring but a statement of risk whether (and by how much) an exposure concentration exceeds the reference concentration, in this case the threshold level set by the WHO. |   |                      |

Community members of all age are at risk of PM<sub>10</sub>, that is health related issues because of poor air quality. As a collective community the hazard Index is above 1 at 1.47 and establishes that the community risk of PM<sub>2.5</sub> is present. Neither the Wikki Community or any individuals, are at risk of SO<sub>2</sub> at the levels recorded during the field visit. A cautionary note: *airborne emissions are greatly influenced by weather conditions; Ebini like the rest of Guyana is subject to rainy and dry seasons where exposure to POPC could correspondingly vary.*

It is likely that road dust has influenced the results, since estimates suggest that up to 34% of particulate emissions can be attributed to road dust, which identifies the roads as a concern for dust emission but does not alter the conclusion above pointing to a risk to human health resulting from dust exposure, particularly PM<sub>10</sub> (-Palma et al., 2014).

#### 6.2.4 Water Quality

Water is essential to the health and sustainability of both humans and ecosystems. Referencing the DPSIR framework, both surface water and ground water are subject to pressures and changes in state, driven by agricultural activities. The intention is to replace savannah grasslands which slope towards Wikki Creek with cropped fields. Particulates (described under 6.2.3, *Air quality*) may become suspended in surface runoff and through soil, converging in freshwater systems such as the Wikki Creek and the Berbice River (Hughes, 2019).

Pesticide residues found in freshwater systems; neither organophosphates nor chlorpyrifos, should persist in the environment, yet studies have shown pesticides e.g. chlorpyrifos surviving for up to seven days adsorbed to soils after application and with heavy rainfall transported downstream to freshwater ecosystems. Pesticide residues in fresh water are likely to cause significant effects on non-target aquatic organisms (Cabrera et al., 2023; Ramírez-Morales et al., 2021).

#### 6.2.4.1 Groundwater

Flowing through the soil, gases and particulates of agrochemicals in their pure or attenuated forms may reach the ground water table in low, nanograms per Liter (ng/L) but significant concentrations (Sanchez-Vila et al., 2016). Leaching of nitrates through groundwater, for example, is a worldwide issue, as the ground water via aquifers supply wells used for drinking water and recharge wetlands, rivers and lakes. This activity is important to the survival of flora and fauna and preservation of human health (Fetahi, 2019; Smolders et al., 2010). The potential therefore exists for rainwater to carry agrochemicals which percolate into the ground water and aquifers, potentially ending in surface waters such as Wikki Creek and/or Berbice River. Established farms to the east of FGI, also have the potential to impact the ground water, so the exact impact of FGI activities on the ground water is uncertain.

Other potential sources of ground water pollution exist on FGI, such as leachate from waste disposal, which is discussed in *Section 6.2.5, Waste Management*.

The risk of polluting the ground water whether from the over application of agrochemicals, solid waste or effluent is dependent on the porosity and permeability of the soil through which the pollutants travel. The soils on which the effluent and solid waste cells are located is sandy loam. Sandy loams can be porous and permeable, if they are not compacted, facilitating easy transport of leachate and effluent pollutants to the ground water aquifer (Bruand et al., 2005). The well located at FGI is 100 feet deep, sourced from an aquifer of unknown origin. Overtime the leachate and effluent from poorly managed waste streams will end in an aquifer and potentially the surface waters of Wikki Creek and the Berbice River. Over-application of agrochemicals and improperly constructed solid waste and effluent disposal cells present a long-term risk to the ground water.

#### 6.2.4.2 Surface Water

Surface run-off, a result of water erosion is composed of sediment (soil particles dislodged by wind erosion), nutrients such as nitrates and phosphorous, as well as other agrochemicals, pesticides, herbicides etc which are surplus to crop requirements. Surface run-off flows along the ground, and although some will infiltrate the ground, the majority

flows to the lowest point such as a creek or river (in this case the cropped fields flow towards Wikki Creek.) causing eutrophication (Aneja et al., 2008; Hughes, 2019; Sanchez-Vila et al., 2016; Uddin, 2018). Eutrophication, commonly associated with agricultural run-off is caused by the excessive addition of nutrients to a freshwater body. The physical characteristics of eutrophication include murky water, odour, episodes of ‘fish kill’<sup>8</sup> and algal blooms which can be toxic. (Carpenter et al., 1999). Chemically, eutrophication reduces oxygen levels and disturbs photosynthesis. Aquatic and terrestrial ecosystems have been severely disturbed by the physiochemical changes of water affecting flora and fauna, leading to a depletion in diversity and disturbance to the food chain from phytoplankton to fishes and ultimately humans (Dudgeon et al., 2006; Macdonald et al., 2015). The impact of reduced water quality whether ground or surface water adversely affect both human and ecological health.

The human body on average consists of 60% of water which is essential to the functioning of all organs. The average body weight in water is closer to 75% in children, who are therefore at greater risk of waterborne diseases along with pregnant women and immunocompromised persons. Exposure to water borne diseases most often occur by ingestion, but dermal and ocular entry may also occur either from household use or recreationally. The Wikki Community reported obtaining drinking water from rainwater collection, but a well which is not functioning is also located within the community. The creek/river is used for household purposes including bathing and as a food source; yarrow, himara and lukanani fishes are caught for consumption.

#### 6.2.4.2.1 Surface Water Impact

### **Sampling of Surface Water within the FGI Landscape**

Non-point source emissions are difficult to define but sample sites were selected to explore the potential impact of FGI farmland on the Wikki Creek, the direction the crop fields flow towards and within the boundaries of the FGI Landscape; see figure 37

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<sup>8</sup> Fish kill –an environmental event where a mass of fishes die in a localized area, the cause is usually pollution.



- ✚ Sample site 2 (EB2), is located on the southeastern border of FGI where the Wikki Creek enters FGI's landscape
- ✚ Sample site 1 (EB1), is on the western boundary of FGI - where the Wikki Creek leaves FGI's landscape
- ✚ Sample site 3 (EB3), is on the Berbice River, within the Wikki Community. The community resides on each side of the river,
- ✚ Sample site 4 (EB4), the Wikki Creek meets the Berbice River, and
- ✚ Sample site 5 (EB5) on the Berbice river to the northwest, where FGI's landscape ends.

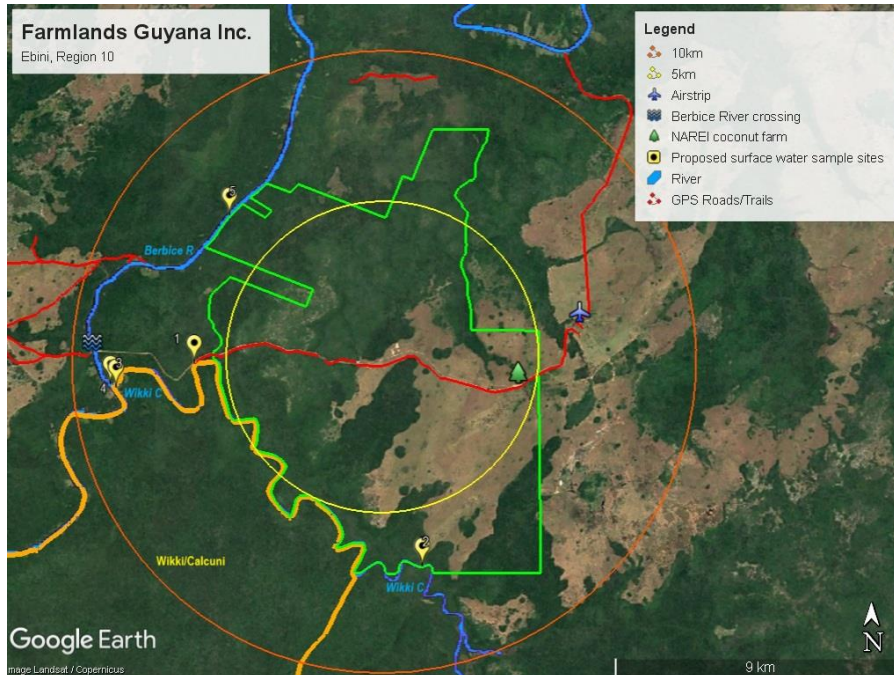


Figure 37: Surface Water- Wikki Creek and Berbice river sample sites

The sample parameters were chosen to reflect agrochemical use, specifically fertiliser influence (ammonia and nitrate) and the base used in soil nutrients (sulphates). In addition, key water quality indicators were tested, such as dissolved oxygen (DO), pH, Total dissolved solids (TDS) and bacteria (total coliform and *E. coli*).

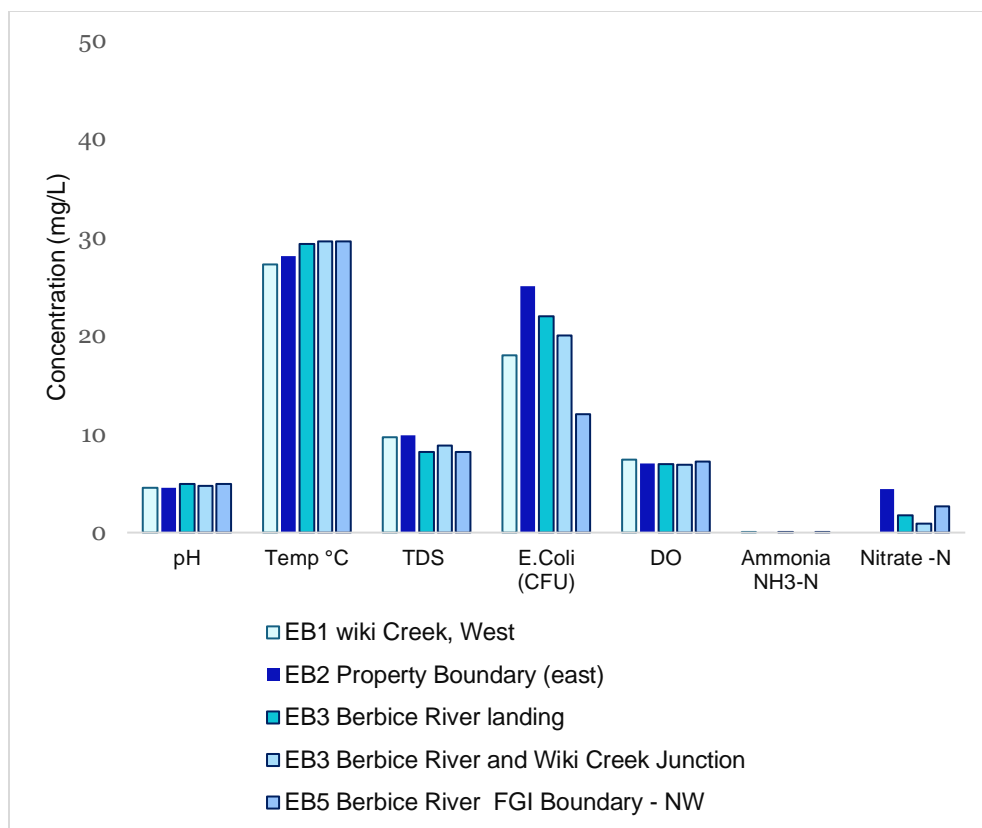


Figure 38: Impact of Farm on Surface Water- Results of Water Samples

Notes: CFU - Colony forming units

TDS – Total dissolved solids

DO – Dissolved oxygen

Temp – Temperature in degrees Celsius (°C)

Sulphates were not detected at any of the sample locations. Coliform bacteria were too numerous to count. The dissolved oxygen levels were all at approximately 7. In general, adult fishes and fingerlings live and function in waters of DO from 7-9 (Alabaster & Lloyd, 1982). The pH of between 4.5 and 5 leans towards acidity but given the Wikki Creek is a black water creek with dense vegetation on the banks, it is expected that organic matter

would decay forming humic acid. Fishes of amazonian waters habituate to pH levels of 4-5.

Human exposure to the Wikki Creek by the Wikki Community is limited to harvesting fishes, which are cooked and therefore unlikely to impinge on health. According to threshold set by the WHO and Drinking water standards in Guyana, Wikki Creek water should not be used for drinking as the coliform count is too high to be counted and E. Coli indicative of faecal contamination which should not be detected was measured above zero at every sample location. Wikki community members collect rainwater for drinking and do not use surface water from the Wikki Creek or the Berbice River.

In addition, algal blooms were not observed on the surface of the creek or river during the field visit. Agricultural practices giving rise to high dissolved nutrient concentrations in surface run-off which ends in a surface water source, eutrophication often result in negative consequences, such as: (i) the increase of particulate organic matter and water turbidity; (ii) the occurrence of phytoplankton and microphyte blooms, the characteristic algae mats on the surface of rivers and creeks. A reduction in the concentrations of dissolved oxygen in the water also occurs, inducing the mortality of some organisms. (Roberts and Pierce, 1974; Anderson et al., 2002; Karlson et al., 2002; Burford et al., 2012).

The State of the surface water within FGI boundaries have not been altered, see table 5.2.4. Therefore, the agricultural practices of FGI are not impacting the water quality of Wikki Creek or the Berbice River, as there is no significant difference in water quality between the water flowing into the creek and FGI landscape from eastern offsite locations Sample EB2 (darkest blue column on the chart, see figure 5.2.4.1 , and the other samples taken where the creek flows through and out of the FGI landscape (sample sites EB1, 3,4 and 5).

Table 15: Physiochemical Surface Water Results Compared to Human and Ecological Health Thresholds

| Variable                         | WHO<br>Guidelines<br>for the<br>protection<br>of human<br>health | GNBS<br>Guidelines<br>for<br>protection<br>of the<br>environment | CCME<br>Guidelines<br>for the<br>protection<br>of aquatic<br>life<br>(Longterm) | Water Quality sample locations |                                       |                             |  |  |
|----------------------------------|--|--|---|--------------------------------|---------------------------------------|-----------------------------|--|--|
|                                  |  |  |   | EB1                            | EB2                                   | EB3                         | EB4  | EB5                                    |
|                                  |  |  |   | Wikki<br>Creek<br>bridge       | FGI<br>boundary<br>(east<br>entrance) | Berbice<br>River<br>landing | Berbice<br>R &<br>Wikki<br>creek<br>junction | Berbice<br>river on<br>FGI<br>boundary |
| pH                               | 6.5-8.5 <sup>a</sup>   | 5-9  | 6.5-9   | 4.6                            | 4.6                                   | 5.0                         | 4.7  | 4.9                                    |
| Temp °C                          | <25 -<br>>50   | <40  | No data   | 27.3                           | 28.1                                  | 29.3                        | 29.6   | 29.55                                  |
| TDS mg/L                         | <600 <sup>a</sup>  | No data  | No data   | 9.7                            | 9.9                                   | 8.2                         | 8.9  | 8.17                                   |
| Total<br>Coliform                | 0<br><br>Must not<br>be<br>detected                              | No data  | No data   | TNTC                           | TNTC                                  | TNTC                        | TNTC   | TNTC                                   |
| E.Coli                           | 0<br><br>Must not<br>be<br>detected                              | No data  | No data   | 18                             | 25                                    | 22                          | 20   | 12                                     |
| DO mg/L                          | No data  | No data  | <5 <sup>c</sup>   | 7.4                            | 7.0                                   | 7.0                         | 6.90   | 7.23                                   |
| Ammonia<br><br>NH3-N<br><br>Mg/L | b  | <10  | 0.019   | 0.016                          | 0.01                                  | 0.016                       | 0  | 0.013                                  |
| Nitrate -N<br><br>Mg/L           | 50   | No data  | 13  | 0                              | 4.4                                   | 1.8                         | 0.89   | 2.656                                  |
|                                  |  |  |   |                                |                                       |                             |  |  |

**Notes:**

WHO – World Health Organisation Guidelines for drinking water quality 2008 Health thresholds

<sup>a</sup>PH, TDS are not of health concern at levels found in drinking-water so, health-based guideline values were not determined, but they may affect the palatability/aesthetic of drinking water.

<sup>b</sup> Ammonia health-based threshold is not set as one would smell it before drinking at levels of health concern

TNTC – Too numerous to count

GNBS – Guyana National Bureau of standards - *Interim guidelines for Industrial effluent discharge into the environment*- page 4 General environmental guidelines (GYS 207: 2002)

Mpn – most probable number

CCME (Ecological thresholds where available) Canadian Council of Ministers for the Environment. Guideline for the protection of aquatic life.

DO<sup>c</sup> Dissolved Oxygen -value came from literature (Alabaster & Lloyd, 1982)

*A cautionary note:* Agricultural surface run-off is only measurable for a limited time and only if heavy rainfall follows soon after application of agrochemicals (Macdonald et al., 2015). These samples were taken during the dry season of October 2024, after the farm was established during the previous May 2024. Agrochemical use was limited to one crop of soya. To better determine whether agricultural practices within the FGI landscape are not adversely affecting surface water sources, monitoring that is sampling should be repeated regularly during and after rainy seasons when agrochemicals are in use and crops are actively in development, as referenced in the water quality mitigation section of this document.

### 6.2.5 Waste Management Impacts

The operating activities at FGI generate specific streams of waste. Activities within the maintenance building and generator area for example, produce used oil, grease, batteries, brake pads, and solvent waste etc while empty agrochemical containers are produced during farming activities. The administrative building and accommodation

generate paper, food and effluent from the kitchen. Effluent is also discharged from the washroom and shower areas.

FGI has constructed an open pit for solid waste disposal to contain all waste except effluent. Effluent is directed to a septic tank system. The septic tank system consists of a septic tank to contain solids with liquid waste directed to a soak-away. Both solid waste and effluent waste systems present long term pollutant risks to ground water<sup>9</sup> (Sanchez-Vila et al., 2016).

Leachate common to both solid and effluent streams is wastewater formed by the waste in the solid waste pit or soakaway. Rainwater, deposited waste moisture and moisture formed during the waste decomposition process percolate through solid waste into the ground water carrying decomposed products of the original waste (Rajoo et al., 2020).

Poorly managed solid waste disposal sites where deposition of waste is indiscriminate, results in leachate which is toxic to human health and the environment (Alao et al., 2023; Ayoola Nike Daniel et al., 2021; Koliyabandara et al., 2020; Rajoo et al., 2020; Parvin & Tareq, 2021). For example, depositing lead acid batteries from a tractor for example, in a waste pit would release during decomposition, among other substances, heavy metals, lead, cadmium and others, petroleum by-products, aldehydes and organic acids into the leachate. Leachate, steadily becomes a toxic mixture of wastewater which percolates into the soil surrounding the waste pit, migrating through the soil, polluting the ground water, and ultimately the aquifer(s). Aquifers are the sources of ground water wells, and possible surface water sources, if the aquifers are part of recharge zones for creeks, rivers and lakes. The content of leachate is a major threat to human and aquatic health in terms of cognitive, and nervous system development, cancers, and organ damage (Ayoola Nike Daniel et al., 2021). Leachate also reduces the soil quality leaving trace amounts of complex chemicals and heavy metals which are non-biodegradable (Parvin & Tareq, 2021).

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<sup>9</sup> The importance of ground water to human health and the environment has also been described with regard to agrochemical use under *section 5,2,4 water quality*.



Effluent waste, such as soakaways discharge substantial microbial pathogens into groundwater (Tachere et al., 2024). Pathogenic microbes found in drinking water such as *Escherichia. coli*, *Vibrio cholera*, and *shigella sp*, are known to cause enteric diseases in humans which have led to morbidity and mortality throughout the world, especially among children (Tachere et al., 2024).

Improperly designed soakaways are known to contaminate ground water (Doku & Antwi-Agyei, 2023; Mondal et al., n.d.). Soak-aways are designed to allow the effluent to infiltrate the soil surrounding the pit gradually (Mondal et al., n.d.). Acting as a filtration medium, microbes naturally occurring in the soil of the soak-away reduce potential pathogenic microbes to non-pathogenic forms. To complete this action of pathogenic to non-pathogenic, the composition of the subsoil must be permeable, i.e. porous, and the soakaway designed to allow enough time for the naturally occurring microbes to filter the quantity of effluent discharged (Keegan et al., 2014). The soakaway must also be at least two meters above the ground water table (Mondal et al., n.d.). The soak-away in FGI is constructed within clay-loam soil, the depth of ground water table and the percolation capacity for which the soakaway was constructed is not known, therefore the soakaway's ability to contain effluent for filtration and prevent the contamination of ground water is uncertain.

Groundwater is a subsurface resource where many factors influence the movement of water within ground including hydraulic characteristics, physical structure of the soil and geological structures of rocks, fractures and faults, which makes it difficult to comprehensively predict the risk from solid and effluent waste. However, it is clear from the many studies conducted around world that a poorly constructed soakaway and indiscriminate deposit of solid agricultural waste would place an increased the risk of contamination of the groundwater within FGI's landscape and beyond, which would accordingly be detrimental to human and ecological health. FGI therefore will implement the required mitigation measures to ensure this situation is not realised.

### 6.2.6 Impacts on the Biological Environment

The map below, in figure 39, shows the landscape delineating FGI farmland and the composition of landcover. Developing the farm involves converting the savannah landcover to cropped fields. The Dakama, Marsh and white sand forests along with the swamps are expected to remain intact (FGI, 2024). The savannah landcover will be reconfigured gradually from 1,500 acres in the first year, then doubling in crop cover annually for five years until the crop covers a total of 24, 209 acres, the entirety of the savannah (FGI, 2024). The landscape therefore becomes fragmented<sup>10</sup> during the first four years until year five when the savannah landcover will be lost, entirely converted to agricultural use. The effect of fragmentation on biodiversity can be positive, negative or remain the same, however the loss of natural landcover replacing it with landcover that differs from any previous landcover is invariable negative (Martin Amanda E et al., 2021; Parent Chad. J & Hernandez Fidel, 2021; Martin & Yeiser, 2021).

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<sup>10</sup> Fragmentation defined as the reconfiguration of landcover over time (Martin Amanda E et al., 2021).

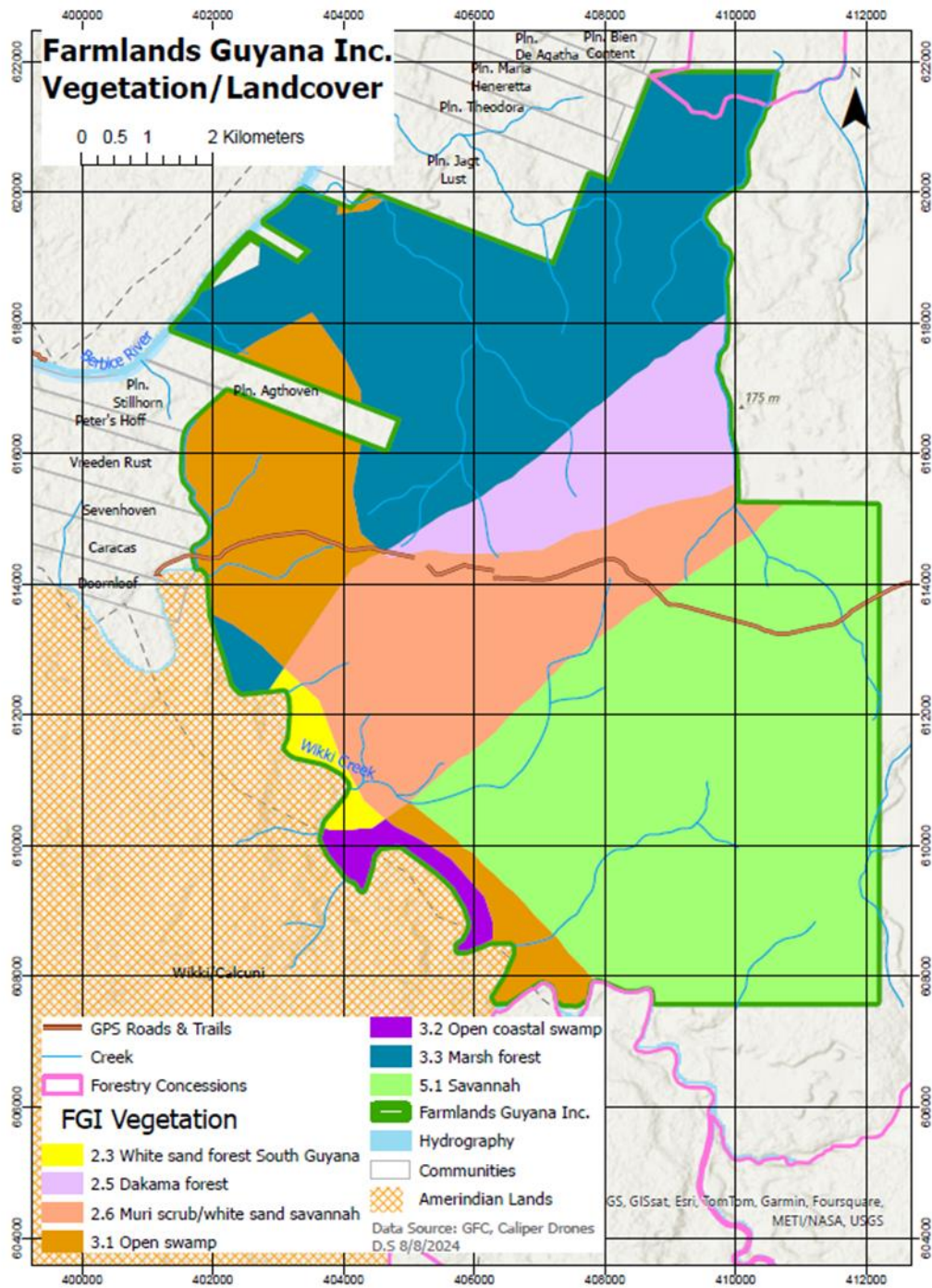


Figure 39: Map of FGI Farm Landscape showing heterogeneity of landcover

An increased risk of extirpation and extinction of wildlife is associated with a reduction in available habitat<sup>11</sup>. Habitat fragmentation is thought to have a weaker effect than habitat loss (Martin Amanda E et al., 2021). The amount and heterogeneity of available habitat is key to animal abundance and persistence, not the configuration of landscape. It should be noted that the availability of a suitable habitat may not necessarily infer the presence of a species, as local extinction, caused by hunting, for example, may have occurred. This was observed where Capybara were prized for their leather and hunted to extinction in a Region of Bolivia (Lord, 2009; Martin & Yeiser, 2021).

The wildlife recorded within the FGI landscape is richly diverse, see appendix 5. In addition to heterogeneity and available habitat, other factors are important to wildlife's persistence. Other proposed factors include an environment that is largely undisturbed, a threshold of required natural vegetation, animals with the capacity to consume a varied diet, reproduce aseasonally and inhabit many different landcovers. The current FGI landscape is undisturbed, as where black spider monkeys and anteaters are detected, the level of disturbance is considered low. (Pierre et al., 2020). The success of the grey brocket deer and savannah fox, in human modified environments are attributed to their adeptness in inhabiting varied landcover and consuming a varied diet; and both are present in the FGI landscape. (Dutra-Vieira et al., 2024)

The gradual conversion of savannah results in less habitat to support wildlife's opportunity for breeding, foraging and dispersal success (Martin Amanda E et al., 2021). Threshold levels of available habitat below which species cannot persist have been proposed by many wildlife experts at between 10 and 30% (Martin Amanda E et al., 2021). The grey brocket deer, requires 20% of natural vegetation to persist (Rodríguez et al., 2024).

To assess the agricultural impact on biodiversity, the ecology of wildlife recorded within the landscape, was explored (table 16). The use, availability, variety of habitat, preferred habitat and wildlife's role within the ecosystem were the parameters used to assess the potential impact of farming on biodiversity. The potential reaction of wildlife to the farm

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<sup>11</sup>. Habitat is the ability of the environment to provide the resources, to secure food, and shelter to maintain life as an individual or population and reproduce, sustaining life in the form of future generations (Morrison & Block, 2021).

infrastructure, roads, solid and effluent disposal were also considered. Measures of impact were first applied to animals classified as vulnerable and threatened under the International Union for the Conservation of Nature (IUCN) or the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Secondly animals whose habitat is predominantly the savannah were considered against the same factors as the vulnerable group and lastly interactions and interdependence between wildlife were reviewed for any connections which may have a negative influence on their survival due to the anticipated loss of savannah.

Referring to the DPSIR concept of impact, The Driver is agriculture; Pressures refer to the conversion of savannahs to crops and farm infrastructure; while the State of change under assessment, is biodiversity/wildlife.

### **Wildlife – vulnerable or under threat of extinction**

The giant armadillo, giant anteater, white lipped peccary, jaguar, tapir and red footed tortoise are either vulnerable or under threat of extinction. Giant armadillos occupy forest and spend approximately 5% of their time within the savannah. It is uncertain how crucial the 5% is to the armadillo lifecycle but their depletion results from loss and degradation of habitat including the increase in intensive farming. Armadillos are also vulnerable to agrochemicals, which intuitively makes sense as armadillos live primarily underground within burrows which they excavate and vacate every two days.

Giant anteaters inhabit the savannah foraging for ants and termites, a limited diet. White lipped peccaries are forest dwelling frugivores but will expand their diet if required. Jaguars are top predators within the ecosystem, frequenting savannahs but are mainly forest dwellers. Jaguars consume a wide and varied diet consuming between 85 and 111 different species, although their preferred diet is peccaries, armadillo and deer. Tapirs are severely hunted, whose demise is also associated with loss of habitat due to intense agriculture. The preferred habitat of herbivorous red footed tortoise is tall grasslands/savannah.

Table 16: The ability of threatened or vulnerable wildlife to persist in an agricultural landscape

| Threatened or vulnerable wildlife   | Ability to persist in conversion landscape<br>Yes $\checkmark$ No X                                    | Predicted potential population abundance |                          |                               |
|---|--|--|--------------------------|-------------------------------|
|   |  | Increase<br>$\uparrow$                   | Decrease<br>$\downarrow$ | Same<br>$\longleftrightarrow$ |
| <sup>a</sup> Giant Armadillo<br>( <i>Priodontes maximus</i> )   | X Vulnerable to agrochemicals & abundance is low.  |  | $\downarrow$             |                               |
| <sup>a</sup> Giant Anteater<br>( <i>Myrmecophaga tridactyla</i> )   | X Specific diet of termites, feed in grasslands preferring undisturbed habitats                        |  | $\downarrow$             |                               |
| <sup>a</sup> Jaguar<br>( <i>Panthera onca</i> )   | $\checkmark$ Wide variety of food and range  |  |                          | $\longleftrightarrow$         |
| <sup>a</sup> White lipped Peccary<br>( <i>Tayassu peccari</i> )   | $\checkmark$ Wide diet, adaptable will consume insects' & invertebrates when fruit is scarce.          |  |                          | $\longleftrightarrow$         |
| <sup>b</sup> Red Tortoise<br>( <i>Geocholone carbonaria</i> )   | $\checkmark$ Specific grassland habitat & diet   |  | $\downarrow$             |                               |
| <sup>a</sup> Tapir<br>( <i>Tapirus terrestris</i> )   | X Habitat loss due to intensive farming is instrumental in their demise.                               |  | $\downarrow$             |                               |
| <sup>a</sup> Black spider monkey<br>( <i>Ateles paniscus</i> )  | X frugivores with an adaptable diet. Hunting & agricultural habitat loss associated with their decline |  | $\downarrow$             |                               |
| Notes: Criteria used to assess persistence –<br><br><sup>a</sup> According to IUCN-<br><br><sup>b</sup> According to CITES, |  |  |                          |                               |

**The persistence of wildlife involves the savannah:** The presence of top predators such as the jaguar and boa in a landscape is suggestive of an abundance of food and according to Leopald's law, a positive association exists between animal density and the



heterogeneity of the environment (Pierre et al., 2020; Parent Chad. J & Hernandez Fidel, 2021). The majority of wildlife present in the FGI landscape are mainly forest dwelling seed predators and dispersers who also to some extent, frequent the savannah and rely on the water sources. The brocket deer and tapir for example are seed dispersers, predators, and prey for carnivores such as jaguars and pumas. The exact nature of the forest dwellers' reliance on the savannah is not completely understood but the value they add to the sustainability of the forests as seed predators, dispersers and prey for large carnivores highlights their importance to the ecosystem and the importance of the heterogeneity of the landscape (Melo-Dias et al., 2024). Removing the savannah in its entirety may present a risk to current ecosystem.

**Interaction and interdependence:** The savannah dwelling capybaras are prey of carnivores, including jaguars, pumas, and ocelots as well as reptiles such as boas. Pacas and pumas occur together both as a result of food availability (pacas for the fruits and seeds of their preference and pumas because pacas are their favoured food). Peccaries and birds occupy abandoned armadillo burrows. Where ocelots and jaguarundi co-exist, part of their habitat is the savannah, where they consume small mammals and rodents.

**Adaptability to human disturbance:** Some wildlife within the FGI landscape, for example the tayra, burrowing owl and grey brocket deer are not sensitive to human modified areas and as in the case of the Savannah fox, may even thrive and increase in numbers (Santos et al., 2024; Cavalli et al., 2014). Jaguars and tapirs prefer an undisturbed environment and specific to agriculture the extirpation of the two toed sloth and tapir is negatively associated with intense agriculture (Trinca et al., 2006; Wingert, 2012; Perotto-Baldivieso, 2021). As well as the development of crops, infrastructure to support farming will be developed, such as roads, solid waste and effluent disposal. Roadkill can be an added pressure on wildlife. The savannah fox for example, is particularly susceptible to vehicular death (Santos et al., 2024; Dutra-Vieira et al., 2024). Poorly managed waste disposal may increase the population of rodents, the savannah fox and wild boar as they scavenge through solid waste (Santos et al., 2024). Capybaras have been known to climb into latrines to obtain the mineral content from urine (Lord, 2009).

**Savannah conversion to soy, corn and sorghum** offer new resources, that is food and habitat to the landscape which may favour some species such as rodents and wild boars. Capybaras, the brocket deer and savannah fox already documented, adjust well to agricultural modifications and other wildlife which have no difficulty varying their diet. Sensitivity to agrochemicals places some wildlife in a precarious position especially those with a preference for the savannah and come into close contact with the soil through burrowing or geophagy, for example the giant armadillo and the burrowing owl. Elephants in Madhya Pradesh state, India died as a result of feeding on a crop of fungally infected millet. In the case of FGI, fungicides will be used to prevent fungal diseases of crops, and the intended crops have no known toxic effects to the identified wildlife.

**Hunting is the confounder in agricultural development:** Hunting wildlife is an added pressure capable of destabilising an ecosystem by removing seasonal breeding animals at critical times in the life cycle, threatening food security and can have declining effects on other animals (Morrison & Block, 2021). Hunting pacas during reproductive seasons, usually rainy season when fruits are plentiful, will remove pregnant pacas in effect depleting the population (El Bizri et al., 2018). Pierre et al (2020) referred to commercial hunters moving into the upper Berbice as the region became more accessible and removing IUCN animals such as the Tapir in large numbers.

The Wikki community hunt wildlife, including pacas, deer, capybaras (watusi) and bush hogs for subsistence, which for a community of 280 persons, with sustainable hunting practices provided the required food security. The Wikki community may experience a decline in Tapirs and capybara but an increase in bush hogs as a result of the savannah's conversion to crops.

**Seed predation, dispersal and rain<sup>12</sup>:** many of the forest dwelling animals, frugivores identified in the landscape are important to the sustainability of the forests as seed predators and dispersers. They are responsible for seeding the forests and adding nutrients to the forest floor; for example monkeys, ensure growth of new trees and

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<sup>12</sup> Seed rain refers to a large quantity of seeds and seed species applied to the forest usually by frugivores.

sustenance of established trees. Is there a risk of forest encroaching in the cleared savannah, cultivated land? Seed rain below a tree is not correlated with seed dispersal, i.e. distance from the trees is minimal (Duncan & Chapman, 1999; De Mazancourt et al., 1999). Seed predators and dispersers have very little interest in cultivated land as food availability is low and without trees, and they are open to predators (Duncan & Chapman, 1999; De Mazancourt et al., 1999). Forest succession in deforested areas is very low (Duncan & Chapman, 1999). The risk therefore of forest encroaching into cultivated areas is very unlikely.

In summary, it is a challenge conserving biodiversity in a managed landscape with confounders such as hunting. The abundance of animals is largely unknown so one can only use their behaviour patterns from ecological information applied to the changing landscape to describe the impact. Given the known entities such as the negative effects of habitat loss, the uncertainties of availability of suitable habitats but the absence of animals, and hunting playing a part in removing animals, perhaps at the wrong time in their lifecycle, the ecosystem/state of biodiversity will change.

The composition of the landscape will change as the savannah is converted to crops. Habitat loss at year five has the potential for taxa loss such as tapirs, red tortoise, the giant armadillo and anteater, wildlife that are vulnerable to expiration in this region as they are savannah dwellers, with limited diets. Other animals such as the brocket deer may fare better as although they are mainly forest dwellers, their savannah interest is limited to the forest edges and are aseasonal reproducers with adaptable diets. All the evidence points to the Savannah fox and wild hog/boar increasing in abundance with new resources. The current heterogeneity of the landscape supports the complex ecosystem of interdependence among animals and the health of the forest. The part the conversion of the savannah will play in the ecosystem depends on how well wildlife adapt to the change caused by human -mediated disturbance and new resources. As such, the animals which will increase in abundance, and which will expire are all uncertain.

*‘Wildlife have no ecological boundaries and with the best management actions to mitigate the disturbance of appropriate habitats, wildlife may enter and leave the landscape.’*

(Veech Joseph. A, 2021)

### 6.2.7 Occupational Health and Safety Impacts

Farming poses a considerable risk to health. In the United States, farmworkers form 3% of the workforce but account for 8% of all work-related injuries. In the United Kingdom, farm workers are 1% of the working population but 20% of workplace deaths. The developing world consumes less than 20% of the world's production of agrochemicals but account for 70% (1.1 million) of acute agrochemical-borne illnesses (Magauzi et al., n.d.).

Fifteen farm workers<sup>13</sup> are currently employed by FGI. This number is likely to increase as the farm expands. FGI farm workers are tasked with maintaining and operating agricultural machinery, applying agrochemicals, as well as cooking, cleaning and maintaining the waste stream. Farm activities expose farm workers to dust, fuels, oils, engine exhaust, agrochemicals and noise, which enter the body through the skin, eyes, nose, mouth and ears.

#### 6.2.7.1 Farm Workers' Exposure to Agrochemicals

Farm workers' exposure to agrochemicals are a major occupational risk. Farm workers are at increased risk of malignant and non-malignant diseases because of their exposure to pesticides, insecticides, herbicides and fertilisers through transporting, mixing, loading and application (Dhananjayan & Ravichandran, 2018). The duration, type of agrochemical, and route of exposure determine the risk to health. Throughout the world, farmers are at greater risk of non-Hodgkin lymphoma than other occupational groups and at increased risk of leukaemia, multiple myeloma, lip, stomach and prostate cancers (Alavanja et al., n.d.; Dhananjayan & Ravichandran, 2018). Non-malignant diseases common to farm workers include nervous, renal, respiratory and reproductive systems disorders (Alavanja et al., n.d; Cremonese et al., 2017; Dhananjayan & Ravichandran, 2018; Puvvula et al., 2022).

Studies in Brazil found increased deaths from non-Hodgkin Lymphoma associated with farmers and an association between reduced reproductive hormones, semen quality and pesticide use among young men (Boccolini et al., 2017; Cremonese et al., 2017). In a study conducted in Guyana, 46% of small farmers reported experiencing acute episodes

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<sup>13</sup> Farm worker: Person regularly involved in agricultural activities.

of illness after handling agrochemicals, which included Manzate, Gramoxone, Fas-tac and rogor; however, only 11% sought medical care (Spiller & Aleguas, 2008). Similar scenarios have been reported around the world where farmers in Zimbabwe who became ill as a result of commonly applied agrochemicals such as Gramaxone and karate; while 40% visited a health facility, 23% did nothing (Magauzi et al., n.d.).

#### 6.2.7.2 Exposure to Noise



Noise induced hearing loss (NIHL) is most often associated with occupational exposure to loud and persistent noise in the workplace. The National Institute for Occupational Safety and Health (NIOSH) have set Recommended exposure limits (RELs), which are dose dependent. Therefore, the higher the noise level, the shorter the time of recommended exposure for the employee. NIOSH recommends reducing the amount of time a worker is exposed to noise as the noise level increases, so while a worker can be exposed to 85dBA over an 8-hour shift, exposure at 100dBA should be 15 minutes (see table 17). NIOSH further advocates that for every 3 dBA increase the exposure time should be halved.

Agricultural workers rank second in the world among all workers who experience the negative effects of occupational noise. In Japan and the USA construction workers lie in first place. In Thailand agricultural are first above construction workers in experiencing the effects of occupational noise (Aybek et al., 2010; Choochouy et al., 2019).

Table 17: NIOSH recommended occupational noise thresholds

| Time to reach 100% noise dose                                 | Exposure level per NIOSH REL |
|---|------------------------------|
| 8 hours   | 85 dBA                       |
| 4 hours   | 88 dBA                       |
| 2 hours   | 91 dBA                       |
| 1 hour  | 94 dBA                       |
| 30 minutes  | 97 dBA                       |
| 15 minutes  | 100 dBA                      |
| REL – recommended exposure level                              |                              |
| NIOSH – National Institute for Occupational Safety and Health |                              |

Throughout the world the risk of occupational noise to agricultural workers has been steadily increasing. In 1969, 50% of agricultural workers were thought to be affected by NIHL, by 1990, twice the number of agricultural workers were affected by hearing loss as compared to other workers. In 2000 an estimated 72% of agricultural workers were thought to be affected by NIHL and by 2019 NIHL among farmers was higher than the general public (Aybek et al., 2010; Cecchini et al., 2024).

Often forgotten is that NIHL more often results from cumulative noise and rarely due to one event of noise such as a firearm discharge. Harvesting is reported to release the greatest noise of all farm activities, probably due to heavy machinery, sometimes multiple units of heavy machinery in operation. Other contributing factors to NIHL include seasonal exposure for example, during harvesting (Cecchini et al., 2024). Accumulating seasonal exposure, without hearing protection during harvesting for a number of years puts a farm worker at risk of NIHL.

Occupational noise is increasingly being linked to other adverse health outcomes. While NIOSH established noise safety limits of daily exposure at 85dB during an 8-hour shift, International Labour Organisation (ILO) established consistent occupational noise at 85db as a warning level and 90 dB as dangerous. Dangerous noise levels are thought to increase blood pressure, accelerate the pulse and breathing, decrease brain fluid pressure, and cause tension in muscles, which could in turn be the cause of the rise in the association between unintentional injuries and noise on the farm (Aybek et al., 2010; Cecchini et al., 2024).

The operation of heavy machinery, tractors, and combines on the farm is an established link to NIHL. Evidence from agricultural hearing programs across Australia indicate that

hearing damage is due to the prolonged exposure to on-farm noise hazards such as tractors, and chainsaws (Challinor et al., 2000; Williams et al., 2002). The examination of tractors has identified the cabin as key to preventing NIHL. Tractors with original cabins from the manufacturer are least problematic in exposing the operators of the machinery to noise while tractors without cabins as the most unsafe for noise (Aybek et al., 2010; Cecchini et al., 2024; Depczynski et al., 2005).

The heavy machinery of FGI contain original cabins. However, farm workers working in the vicinity (2 to 10 meters), of heavy machinery during farming activities are fully exposed to machinery noise and should also be considered at risk of NIHL (Depczynski et al., 2005).<sup>14</sup>

#### 6.2.7.3 The Impact of Noise on Occupational Health and Safety

The maintenance area was used as an indicator of farm worker exposure to noise on FGI, where measurements were taken over a typical 8-hour day. The average noise level was 47dB, and the maximum was 85dB, occurring less than 1% of time during the shift. Cumulative noise over time puts the farm worker at risk of NIHL and other adverse health outcomes. The measurement was one shift out of 330 days a farm worker may work per year. Also, the generator in operation downwind produced sound levels in excess of 50dB; within the generator room that noise would be considerably higher (figure 40). The farm worker responsible for starting and conducting minor maintenance work on the generator on a regular basis is at increased risk of adverse health outcomes.

Farm workers operating heavy machinery within the cabins are unlikely to be adversely affected by noise. Farmworkers workers, working within the generator room when it is on and farmworkers in the vicinity of the heavy machinery in operation without Hearing Protective Devices are very likely to be at risk of noise related occupational health outcomes.

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<sup>14</sup> NB Confirming Depczynski's findings, measurements recorded on FGI site by the field team recorded levels of dB between 60 and 82db when heavy farm machinery was travelling around the farm.



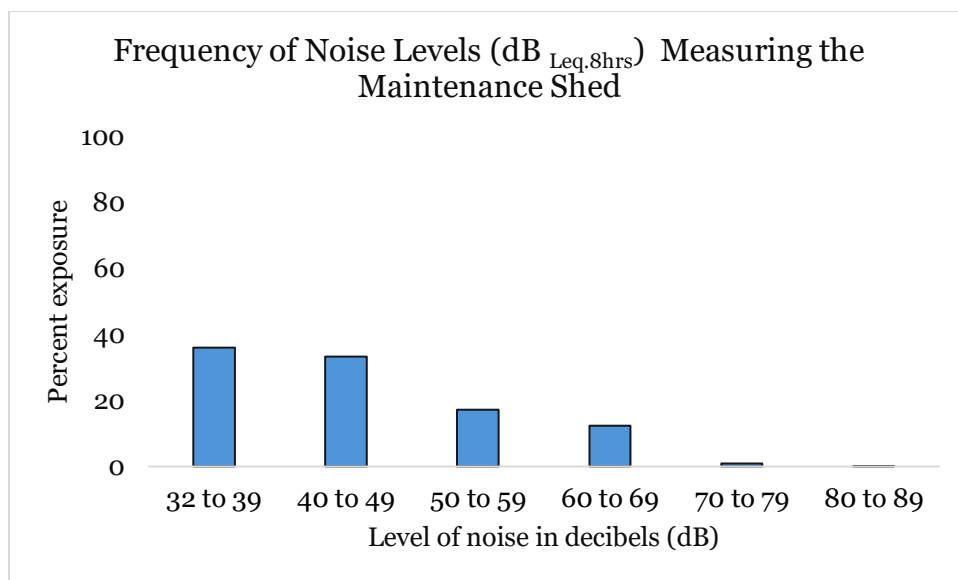


Figure 40: Occupational noise within the maintenance building

#### 6.2.7.4 Impact of Air Quality on occupational Health and Safety

Farm workers working in the fields, as well as indoors within the maintenance building and generator room will be exposed to airborne hazards, such as aerosolised agrochemicals, solvents, petroleum products, and dust (dislodged soil from land preparation and tillage, also possible soil erosion). Airborne hazards generate particulate matter, vapours gases and fumes of which several studies have linked to adverse health outcomes. The adverse health related occupational outcomes include impaired lung function and chronic respiratory diseases for example, chronic bronchitis, emphysema and chronic obstructive pulmonary disease (COPD) (O' Brien et al., 2023; Schenker, n.d.).

As described in section 6.2.3, air quality parameters were chosen on the basis of being by-products of farm chemicals such as fertiliser (Nitrogen dioxide-NO<sub>2</sub>) and compounds of soil nutrients which are sulphate based (Sulphur dioxide-SO<sub>2</sub>) and emissions from farm machinery and the generator (Carbon monoxide-CO) as well as representatives of dust, i.e. particulate matter less than 10µm in diameter and less than 2.5 µm in diameter (PM10 and PM2.5). The locations of the measurements were considered representative of farm workers worksites.

The results of the measurements taken are shown in Tables 18 and 19. Neither NO<sub>2</sub>, SO<sub>2</sub> or CO, exceeded the World Health Organization's (WHO) threshold for health.

Table 18: Results of Pollutants of Potential Concern (POPC) air emissions, compared to the WHO thresholds

| Sample location<br><i>population</i>                      | Nitrogen dioxide<br>µg/m <sup>3</sup> |     | Carbon monoxide<br>µg/m <sup>3</sup> |      | Sulphur dioxide<br>µg/m <sup>3</sup> |     |
|---|---------------------------------------|-----|--------------------------------------|------|--------------------------------------|-----|
|   | Mean<br>(range)                       | Max | Mean<br>(range)                      | Max  | Mean<br>(range)                      | Max |
| WHO Threshold   | 200 µg/m <sup>3</sup>                 |     | 35000 µg/m <sup>3</sup>              |      | 500 µg/m <sup>3</sup>                |     |
| Maintenance building<br><i>Farm workers</i><br>Location 1 | 2.3<br>(0 – 7)                        | 111 | 4.6<br>(22-31)                       | 196  | 207<br>(92-323)                      | 341 |
| Upwind<br><i>Farm workers</i><br>Location 3               | 13<br>(2 -24)                         | 65  | 109<br>(262-480)                     | 2059 | 0                                    | 0   |

Table 19: Particulate matter compared to WHO Thresholds

| Sample location                             | PM <sub>2.5</sub> µg/m <sup>3</sup> |     | PM <sub>10</sub> µg/m <sup>3</sup> |     |
|---|-------------------------------------|-----|------------------------------------|-----|
|   | Mean<br>(range)                     | Max | Mean<br>(range)                    | Max |
| WHO Threshold                               | WHO 15µg/m <sup>3</sup>             |     | WHO 45 µg/m <sup>3</sup>           |     |
| Upwind<br><i>Farm workers</i><br>Location 3 | 5<br><br>(2-7)                      | 19  | 20<br><br>(0-51)                   | 243 |

In the case of particulate matter the maximum of PM<sub>2.5</sub> (19 µg/m<sup>3</sup>) emitted exceeded the WHO threshold of (15 µg/m<sup>3</sup>). The range around the mean and the maximum emissions of PM<sub>10</sub>, 0 to 51µ, and 243µg/m<sup>3</sup> respectively exceeded the 45µg/m<sup>3</sup> WHO threshold for health, suggesting that exposure to particulate matter are potentially a concern to the health of farm workers.

Table 20: Health hazard ratios of Pollutants of Potential  $45\mu\text{g}/\text{m}^3$  Concern

| Pollutants of potential Concern (POPC)  | Hazard Quotient (HQ) |
|---|----------------------|
| PM10  | <b>2.30</b>          |
| PM2.5   | 0.54                 |
| SO <sub>2</sub>   | 0.15                 |
| <p>Notes:</p> <p>A hazard quotient less than or equal to 1 indicates that adverse effects are not likely to occur and therefore considered to be of negligible risk. HQs greater than 1 are not a statistical probability of harm occurring but a statement of risk whether (and by how much) an exposure concentration exceeds the reference concentration, in this case the threshold level set by the WHO.</p> |                      |

To determine whether SO<sub>2</sub>, PM2.5 and PM10 are an occupational risk to farm workers, the health Hazard Quotient (HQ) was applied, see Table 20. The HQ fell below one for PM2.5 suggesting PM2.5 is not hazardous to the health of Farmworkers. The HQ for PM10 was 2.3 indicating that the farm workers exposure to PM10 is hazardous to their health.

#### 6.2.7.5 The Impact of Water Quality

The bacterial levels found in the surface waters surrounding FGI are above the WHO guideline for drinking water, see section 6.2.4. FGI employees will not be exposed to that water during any part of employment. The crops will not be watered by irrigation but by rainfall. Drinking water is purchased and the water source for bathing, cleaning, cooking and other environmental needs is from a well located within the FGI landscape. The risk to farm workers from water sources within the FGI landscape is very low.

#### 6.2.7.6 The Impact of Waste Disposal

Farm workers responsible for maintaining the solid waste and effluent disposal facilities on FGI who directly handle the waste will potentially be exposed to microbial and sharp objects. Direct handling of waste can result in various types of infectious and chronic diseases (Ayoola Nike Daniel et al., 2021).

#### 6.2.7.7 The Impact of Agricultural Injury

Unintentional injuries and fatalities experienced by farm workers throughout the world has been well documented. In Australia the leading fatality among occupations is agriculture with 1271 fatalities between 2010 and 2016, most (644) involved farm vehicles, tractors and ATV's (Lower & Temperley, 2018). In the farming province of Saskatchewan, Canada where there are over 34,000 farms, the work-related fatalities recorded was 166 between 2005 and 2019 (Karunanayake et al., 2023). The causes of death involved farm machinery, vehicle collisions, entanglement or entrapment. Unintentional agricultural injuries exceed all other occupations throughout the world, which is no different in Guyana, see figure 41. From 2000 to 2007, the highest proportion of all industrial injuries in Guyana was from agriculture, from 93% (2346) in 2000 declining to 79% (1600) in 2007 (Richards & Stone, 2009).

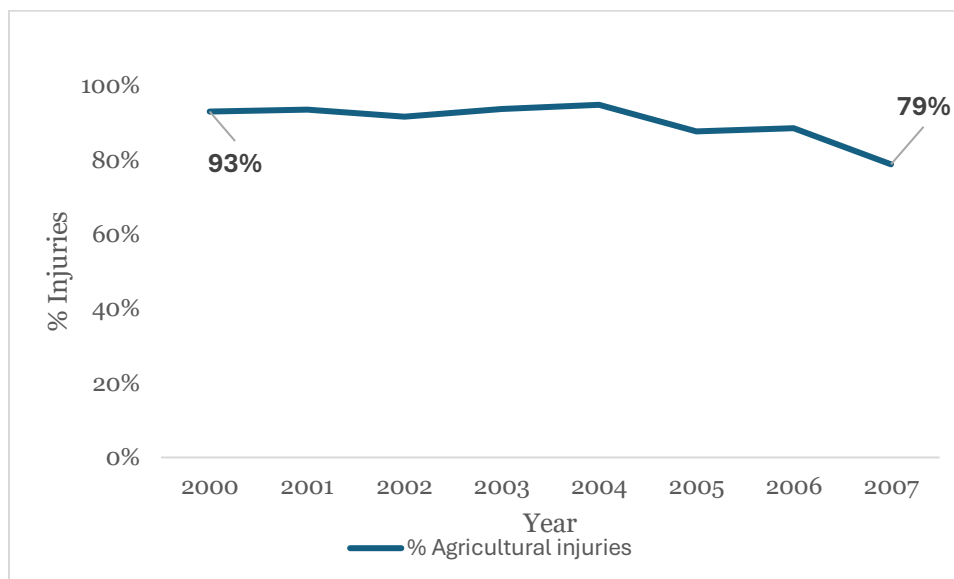


Figure 41: Proportion of unintentional agricultural injuries in Guyana (2000 to 2007)

#### 6.2.7.8 Occupational Health and Safety of Farm Workers

Occupational risk of farm workers can be reduced by the correct use of PPEs which are task specific. PPEs can reduce the maximum risk to workers by 44% (Yarpuz-Bozdogan, 2018). The supply of PPEs must be reinforced by farm workers' understanding of the potential risks the tasks present, how to complete the task safely and how to use the PPEs correctly for their safety and protection (Damalas & Koutroubas, 2018; Damalas & Eleftherohorinos, 2011; Dhananjayan & Ravichandran, 2018; Cremonese et al., 2017).

### 6.2.8 Socio-economic Impacts

#### 6.2.8.1 Socio-economic Impacts of Agriculture

The agricultural sector of Guyana contributed 16.85 % to the GDP, in 2020 and represented 15.44 % of total employment in 2019, therefore being considered an important source of income (FAO, 2022). Rice was the largest agricultural commodity export in Guyana in 2017, standing at 45% followed by fish and Sugar at 13% and 11% respectively (FAO, 2022). The GoG recognised that diversification of the economy was required for many reasons and would allow agriculture to play a vital role for the sustainable development of the country (MOA, 2021; FAO, 2022). Further, for diversification including agriculture to be successful a sound resilient agricultural system, focused on growth and sustainability was required and must consider the following:

1. The fast-paced increase of GDP resulting from oil, required the country to diversify commodities to prevent economic instability.
2. Within agriculture, diversification of crops was required to ensure robust exports, food security<sup>15</sup> within Guyana and the Caribbean region; as if there was a sudden market fluctuation in rice, then the agricultural contribution to the GDP would falter.
3. Agriculture had to diversify within the country and could not remain the domain of the coast due coastal climate change vulnerabilities and disparities between

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<sup>15</sup> Food security meaning availability, access to food and the quality of nutrition (MOA, 2021).

coastal and hinterland communities in terms of economic development such as access to local and export markets.

- a. Rural and hinterland communities and farmers experienced greatest difficulties during times of world crisis, such as during COVID-19 (MOA, 2021)

As a result, the GoG committed to transforming the agricultural system to a resilient, sustainable, diversified food system of rapid growth with the ability to withstand international market instabilities, reduce poverty, ensure food security and as a consequence improve community health and social well-being. (MOA, 2021). The agri-food system would ensure a stable supply of food throughout Guyana and support the Caricom member states

Guyana is a signatory of the 25 X 2025 initiative, to reduce the Regional food importation bill of *US\$13.76 billion*<sup>16</sup> by 25% by 2025.

Guyana's strategy to achieve the new agri-food system involves building strong Public Private partnerships (PPP), Prioritizing agricultural commodities including, corn soya, cattle, sheep and goats as well as improving the availability and access to land.

#### 6.2.8.2 Socio-economic Impacts of FGI's Agricultural Development

By developing a farm totalling 24,975 acres, within the intermediate savannahs of Berbice, cultivating crops of corn, soya and Sorghum, and using advanced farming techniques, FGI is positively contributing to GoG's transformational agri-food system (FGI, 2024).

The Intermediate Savannahs of Berbice contain existing farm operations including NAREI, GLDA and small-scale farms of between 2 and 10 acres as well as the Wikki indigenous community, some of whom also farm. Small scale farms are often family operated and resource-poor and is a source of food and a source of income, though

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<sup>16</sup> *US\$13.76 billion* for the period 2018 -2020  
[https://crfm.int/index.php?option=com\\_k2&view=item&id=819](https://crfm.int/index.php?option=com_k2&view=item&id=819)



frequently experiencing difficulties finding markets for their produce (Borychowski et al., 2020; Dolly et al., 2017; MOA, 2011).

**Knowledge Transfer:** The small-scale farmers interviewed during the Knowledge holder consultation stated their difficulties with accessing markets and transporting produce, as well as challenges with pest and diseases such as army worm, paddy bug, white fly etc. FGI have stated their intention to introduce new farming techniques and absorb local labour, but the mechanism of knowledge transfer to local intermediate savannah farmers to obtain information on current farming technologies' from FGI is still to be formalised (FGI, 2024). The transfer of knowledge, especially in the realm of new farming techniques will add value to the socio-economic well-being of local farmers and the community. However, new techniques also risk the loss of traditional farming knowledge and species of crops; and therefore, must also be considered.

**Employment:** Stable employment generates income opportunities especially among vulnerable individuals (MOA, 2011). Quite often family members from small scale farms working off the farm use their resources to improve the family farm (Dolly et al., 2017). FGI stated that employment opportunities would be offered by 'absorbing local labour' (FGI, 2024). The current number of employees on FGI sits at 12 of whom 8 are local. The employment of local persons is a positive economic impact. During the knowledge holder interviews, Community members stated that youth face considerable challenges in finding employment, and women are farming within the intermediate savannah (33% of the *Ebini farming group* membership are women -farmers however, the two female staff of FGI are employed as caretakers). Therefore, FGI should consider for future employment, youth and women who strengthen participation in rural life (Muhammedov et al., 2023; Dolly et al., 2017).

*'Weak sustainability justifies damage of nature to reach economic growth. Strong sustainability highlights the importance of harmony between nature and economic growth'*

(Quintero-Angel & González-Acevedo, 2018)

**Sustainability and socio economics:** The demand for greater growth in agriculture and the new paradigm that changes agriculture criteria described above applies strong pressures on the sustainability of the environment, for example factors such as soil erosion and biodiversity.

**The control of soil erosion** is important in terms of crop yield and the sustainability of land, for the life of the FGI farm and beyond. However, if measures to reduce and prevent soil erosion are not integral to FGI farming practice, both Community food security and well-being are harmed. Soil erosion through eutrophication pollutes the freshwater system, where the community harvest fishes for subsistence and use for recreation, bathing and housekeeping.

**Biodiversity** and well-being have been well documented (Li et al., 2024). In this project, biodiversity associated with food and nutrition is a concern. The loss of savannah within the FGI landscape will change the biodiversity and abundance of wildlife. While an increase in the abundance of wild hogs (*sus Scrofa*) is expected, decreases of watrush (*Capybara*) and labbas are also predicted. Both farmers and Community consume wildlife, such as wild hogs, watrush and labba which is a significant protein source in the maintenance of a balanced, varied and nutritious diet. Changes in biodiversity may cause a decline in the socio-economic situation.

Changes to current agricultural practices are required if diversification of crops and increased productivity is required. Increased productivity would overall improve the socio-economic situation of the Nation of Guyana in terms of export, GDP and wealth. The socio-economic situation of farmers and Community could also increase with better farming practices and the opportunities that complement stable employment and better resources. However, safeguards should be implemented to ensure the transformation of the agri-food system does not imbue long term negative socio-economic situations through, the permanent loss of fertile land to soil erosion, eutrophication of rivers and creeks as well as extirpation and extinction of wildlife.

Table 21 outlines the positive and negative socio-economic impacts of FGI's development.

Table 21: Potential positive and negative socioeconomic impacts of FGI's agricultural development

| <b>Socioeconomic Impact of Agricultural Development - Ebini Intermediate Savannah</b>   |   |
|---|---|
| <b>Positive Socioeconomic Impacts</b>   | <b>Negative Socioeconomic Impacts</b>   |
| <b>National Level</b><br><b>Contributor to the National strategy on agricultural development, towards an economy which is not entirely reliant on oil. Improving the agricultural sector -rapid growth of priority crops including Soya and Corn (two of FGI crops), will ensure the following:</b> |   |
| Stable economic development which can withstand market fluctuations   |   |
| Food security: agricultural industry which can supply food during world crisis.<br>Cultivation of priority crops including corn and soya  | The propulsion of priority crops risk loss or reduction of crop species, for example the many varieties of sweet potatoes or cassava.   |
| Modernisation- New farming techniques which will increase yield hence productivity.   | New farming techniques risk the loss of traditional knowledge.  |
| A contributor to the Caricom food import reduction Bill initiative 25% by 2025  |   |
| <b>At the local level, FGI Landscape and zone of influence</b>  |   |
| Job creation<br>Employment Income Opportunities<br>Opportunity to reduce poverty.<br>Opportunity to employ youth and women, thereby strengthening the farming and Wikki communities.  |   |
| Knowledge Transfer: Increase in knowledge on farming techniques including best practices/methods to ameliorate pests, application of agrochemicals etc. Wikki community has drawn up a list of knowledge areas that they would like addressed.  | Potential for soil erosion:<br>Potential permanent loss of fertile topsoil, leading to desertification.<br>Potential for eutrophication of river and creek and demise of fishes which are a part of the balanced diet of the farmers and Wikki community.<br>Potential for over-use of agrochemicals<br>Reduction in the quality of life for farmers and Community, polluted waters would also reduce freshwater availability for housekeeping, bathing and recreational activities |
| Maintaining the forest areas within the FGI landscape   | Loss of savannah within the FGI landscape leading to potential changes in the biodiversity ecosystem and the potential for extirpation and extinction of wildlife. Wildlife that forms a necessary part of the balanced and nutritious diet of farmers and Wikki Community, could lead to a decline in health and well-being.   |

#### 6.2.8.3 Impact Assessment Conclusion

Referring to the DPSIR conceptual framework with agriculture as the **Driver**; for those **Pressures** with the potential to cause a change in the **State** of the environment, human or ecological health, such that they are **Impacted** by agricultural activities were entered in the risk matrix. Pressures were used to identify the risk, which was given a rating score in terms of likelihood and consequence. The criteria for likelihood and consequence are in tables 22 and 23 respectively. The combination of the rating score determined the Risk Rating for each risk (table 24)

Table 22: Criteria to define likelihood.

| Qualitative measure of likelihood | Score | How likely is it that this event /issue will occur after control strategies have been put in place? |
|-----------------------------------|-------|---|
| Highly likely                     | 5     | Is expected to occur in most circumstances  |
| Likely                            | 4     | Will probably occur during the life of the project  |
| Possible                          | 3     | Might occur during the life of the project  |
| Unlikely                          | 2     | Could occur but considered unlikely or doubtful   |
| Rare                              | 1     | May occur in exceptional circumstances  |

Table 23: Criteria to define consequences

| Qualitative measure of consequences | Score | Health Consequences   | Environmental Consequences   |
|-------------------------------------|-------|---|--|
|                                     |       | What will be the consequence/result if this issue does occur? | What will be the consequence/result if this issue does occur?  |
| Minor                               | 1     | Insignificant, no injury/illness or health impact expected    | Minor incident of environmental damage that can be reversed  |
| Moderate                            | 2     | Minor first aid required- potential to cause illness          | Isolated but substantial instances of environmental damage that can be reversed with intensive efforts |
| High                                | 3     | Significant health outcome, medical attention required        | substantial instances of environmental damage that could be reversed with intensive efforts.           |
| Major                               | 4     | Major long term chronic disease/illness or injury             | Major loss of environmental amenity and real damage of continuing                                      |
| Critical                            | 5     | Severe permanent injury, cancer leading to death              | Severe widespread loss of environmental amenity and irrecoverable environmental damage                 |

Table 24: Risk Rating

| Risk Rating |       |
|-------------|-------|
| Low         | 1-4   |
| Medium      | 5-9   |
| High        | 10-16 |
| Severe      | 17-25 |

After assessing the agricultural impact using the DPSIR concept, the FGI operation of crops **without** any interventions would be high to severe risk to the human and ecological health (Annex 6). By actively employing good agricultural practices such as taking steps to minimise erosion, the over-use of agrochemicals, protection of groundwater and health and safety measures, the risk would decrease from high- severe to low-medium.



## 7. Environmental Management Plans

Engaging in an agricultural operation requires the management of many risks simultaneously. As a result, it is recommended that plans outlining best practices in all streams of the farm's activities should be developed, implemented and integrated into one master plan of good agricultural practices. Such plans would include, for example an integrated pest control plan, Health and Safety Plan, Biodiversity and forest management plan, Erosion prevention strategy, and Good Agricultural Practice's plan which would include a strategy on the sustainable application of agrochemicals. Guidance, regulations and standards for many facets of the farm fall under many Governments of Guyana ministries and commissions. Collaboration is therefore recommended with the Ministry of Labour (health and safety of employees), Guyana Forestry Commission, (regarding the forests within the FGI landscape), The Guyana Wildlife Commission (biodiversity within the landscape), Guyana Water Inc, (regarding the water table, ground water and well) as well as close liaison with the farming and indigenous communities in the vicinity of FGI.

### 7.1 Mitigation Measures on Physical Components

#### 7.1.1 Air Quality Mitigation Measures

As described in section 6.2.3, the impact of air quality on health and the environment, in addition to soil erosion, volatilised agrochemicals and fugitive dust emissions are Pressures on air quality in a cropped agricultural landscape. To reduce the potential to generate dust emissions and control fugitive dust emissions, the following are proposed as guidance:

-  The cropped area should not be left fallow to allow vegetation cover to provide surface protection from the forces of wind and rain. Recommendations for the control of soil erosion above are also applicable to mitigating dust emissions
-  Plant trees at height and configuration along the downwind southern border with Wikki community to protect the community. In addition to blocking corrosive winds, this will assist in protecting the community from particulate matter/dust (Morgan R.P.C, 2005)

- ✚ Enact a speed limit within the landscape of FGI which minimises dust emissions. Especially for heavy machinery, reducing the speed of tractors and other heavy machinery and minimising tillage and other activities on cropped land during high winds and dry periods is also important in minimising dust emissions
- ✚ Agrochemicals should be administered to enhance crop growth and maximise agricultural production in accordance with Good Agricultural Practices. Agrochemical applications would also be conducted in a manner to minimise the opportunity for aerial drift during agrochemical applications. Additionally, practices such as employing the use of drift reduction technologies, matching nozzles to droplet size, maximising deposition on crops, minimising off-target deposition and the ability to change methods in the event of changing wind direction would also be advantageous and implemented by FGI
- ✚ Reduce road emissions of particulate matter emitted by the unpaved road that transects the farm: Options include the use of water to add moisture to the road and/or synthetic dust suppressants during seasonally dry conditions.

### 7.1.2 Noise Emission Mitigation Measures

Guyana National Bureau of Standards (GNBS) guidance specifies that noise experienced by a community should be 75 dB or lower during the day and 60 dB or lower during the night. In an effort to minimise noise emissions, FGI will ensure that the noise generated from all noise producing equipment is controlled. Therefore, in the general sense, all farm machinery, tractors, ATVs, motorcycles and the generator will be maintained and operated so that they comply with the GNBS guidelines. This would therefore include, but not limited to the following:

#### **Generator:**

- ✚ Ensure the generator is sitting on a solid surface which acts as a dampener to absorb sound
- ✚ Install mufflers on the generator to reduce the noise to acceptable levels



- ✚ Ensure the housing of the generator is such that it contains sound and does not act as a conduit for noise pollution

### **Operation of heavy machinery:**

- ✚ The speed of the tractor and trailers, and other heavy machinery , and their hours of operation will be considered when conducting farm activities such as ploughing, tillage, land clearing and harvesting, since noise increases with speed

## **7.1.3 Water Quality Mitigation Measures**

### **Ground water**

To reduce the potential risk of ground water and aquifer contamination, preventing hazardous chemicals from entering groundwater due to spills, leaks and discharges is important. Hazardous substances include pesticides, oils, petrol, gasoline and diesel, solvents, heavy metals and agrochemicals. Therefore, the following measures will be implemented to protect groundwater:

- ✚ The area of agrochemical and fuel storage will be on a concrete base and will not be stored directly on the ground.
- ✚ A permanent concrete bund will be constructed around the fuel storage tank, so that it can contain 1.5 times the amount of the largest fuel container.
- ✚ All fittings and fixtures used to mix and/or fill agrochemical containers from the well whether directly or indirectly are fitted with a back-flow prevention device, such that water flows from the well in one direction and backflow from the contents of the container being filled is prevented in the event of a pressure drop or some other disturbance.
- ✚ Back flow (i.e. hazardous substance backing -up/flowing back into the well) will also be prevented by ensuring there is an adequate air gap between the container and tap from well water (see figure as an example). see figure 6.1.4



Figure 42: Chemical container with back flow prevented by an adequate airgap between the tap and the container.

- FGI will examine the possibility of installing a backflow device on the pipe system, at least 30 meters from the well (figure 43)

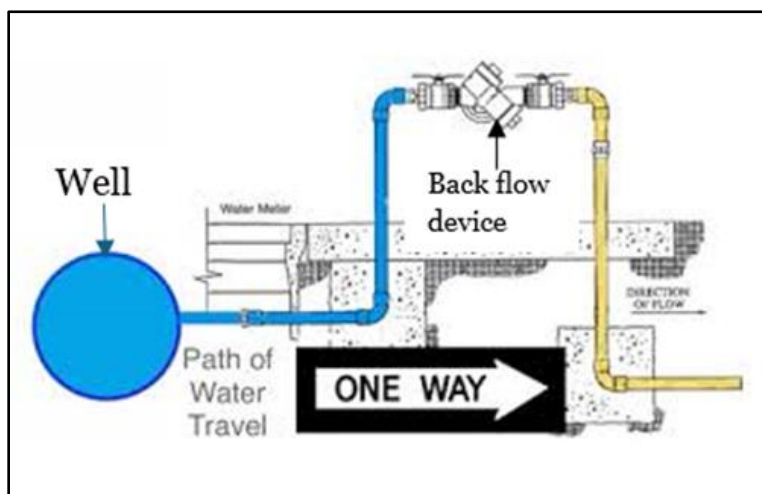


Figure 43: Back flow prevention device on the waterline from the well prevents any fluid backing up into the well.

- ✚ **Protect the well head<sup>17</sup>:** Mixing of agrochemicals or any other chemical or fluid will be conducted at least 30 meters from the well. Containers of any sort should not be stored within 30 meters of the well.
- ✚ Additional ground water protection recommendations are described under the waste management mitigation measures outlined in section 7.1.5 below

## Surface Water

- ✚ To prevent the contamination Wikki Creek from agricultural (surface water) run-off into Wiki creek, specific soil mitigation measures, outlined in section 7.1.4 will be implemented.
- ✚ Monitoring of surface water would also be conducted at specific periods throughout the farm's lifespan. Since the intention is to increase the farming intensity and size of the farm from the current 1,500 acres to 24,209 acres, it would be advantageous to repeat sampling of surface water on an ongoing basis to examine potential seasonal changes of water quality. Samples should be taken from Wikki Creek, Berbice River and adjacent wetlands, at the same sample points previously used. Sampling may be done before, during and/ or after crop production, during or after the rainy season to determine whether agriculture surface run-off is occurring and whether adjustments should be made to the addition of soil nutrients and other agrochemicals. In addition to the parameters sampled previously, Phosphates, Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Total suspended solids (TSS) and conductivity will also be included.

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<sup>17</sup> Well head is the physical structure of the well above the ground.

#### 7.1.4 Soil Quality Mitigation Measures

As part of Good Agricultural Practices, a documented erosion prevention plan should be developed and implemented. Annual soil erosivity varies as rainfall varies from year to year and season to season. High intensity rainfall is very erosive, therefore the erosion plan should be reviewed annually along with meteorological information and the annual measurements of physiochemical constituents of soil, to determine the best approaches to erosion prevention for that crop year.

In addition to the application of mulch if required, when developing the erosion prevention plan the following practices would also be considered:

✚ Agrochemicals will be added at a rate that meets but does not exceed the requirements for plant growth and production yield. This will therefore consider the following:

- The type of soil nutrients, pesticides, herbicides etc,
- Time in the crop's development,
- Concentration, that is at what dose of agrochemical and
- The type of weather conditions under which they would be applied.

✚ Wind and Water Erosion Control measures will be implemented such as:

- Planting cover of growing vegetation, to prevent periods of bare land, i.e., fallow ground on fields for crops. Continuous cover helps to ensure soil is bound to roots, reducing the effects of both wind and water soil erosion. Vegetative cover will assist in taking-up nutrients, e.g. nitrogen fertilisers not used by the focal crop which if left in the ground would be lost to leaching and denitrification. Vegetation cover close to the ground intercepts rain drops, reducing the force of rainfall and facilitates the infiltration of rain/water into the soil which in turn reduces surface run-off (Freire et al., 2017; Fullen & Catt, 2004; Toy et al., 2002).

- Plant residue will be retained after harvesting. Increasing plant matter in the soil by 1-3% can reduce erosion by up to 33%, as the presence of plant matter increases the water-holding capacity of the soil.
- Development of buffer strips of dense grass, trees, and shrubs along the edge of the fields. Buffer strips have the capacity to trap between 41-100% of sediment (Freire et al., 2017; Helmers et al., n.d.). Buffer strips can also help to prevent nutrient loss from fields by absorbing or filtering out nutrients before they reach surface water bodies.
- Implement Conservation Tillage: In correlation with the depth and type of soil, the frequency, intensity and type of tillage administered can help to improve soil health. Minimal tillage and tillage of the type that grooms the soil for retention are recommended.

### 7.1.5 Waste Management Mitigation Measures

#### **Solid Waste Management**

The solid waste management measures are geared towards upkeeping the aesthetics of the farm, and preventing the proliferation of rodents and malodour. All solid waste will be disposed in a covered receptacle prior to discharge at the landfill. One of the major objectives of proper solid waste management at the site, is the control of leachate so as to avoid the contamination of ground water. As such, the following will be implemented:

- ✚ An employee will be identified and assigned to manage the solid waste disposal site and keep records which include the materials deposited in the cell, details of rainwater and leachate capture, as well as the cover and compacting schedule.
- ✚ The current solid waste disposal pit and all future pits will be identified by GPS and the FGI map will be updated accordingly.

- ✚ The base of the pit used to dispose of solid waste should be at least two meters above the ground water table
- ✚ The pit should be lined with clay, at the base and sides, at least 2 feet (0.61 meters) of clay in thickness followed by geotextile material
- ✚ Design and install rain-proofing structure or system to capture rain to prevent excessive rainwater from entering the pit, which in turn reduces the generation of leachate
- ✚ Design and implement a leachate collection system that will prevent pooling of leachate in the pit and potential contamination of the ground water. Leachate should be directed to the effluent waste collection cell for evapotranspiration,
- ✚ One side of the cell should be sloped to allow machinery to enter to spread and compact the refuse and cover soil, of at least 15cm of soil on garbage collection and disposal days without injury.
- ✚ No burning of waste at or in the solid waste pit is allowed
- ✚ Compost to manage food waste, where possible. Composted material can then be used to fertilise FGI's kitchen garden.
- ✚ Manage the use of agrochemicals and other hazardous chemicals in a manner than minimises waste generation. Where unused chemicals exist, they will be disposed in accordance with the guidance provided by the EPA
- ✚ Pest control measures should be taken to prevent rodent and other animals gaining access to the pit for example, fencing and covering the refuse with soil (at least 15cm in depth) and compacting on a regular basis to assist in preventing infestations

## **Effluent Waste Management**

- ✚ The holding cell/ soak away /settling pond for effluent discharge will be redesigned to contain effluent flowing from the septic tank and rainwater without contaminating the ground or surface water
- ✚ The soakaway will be redesigned to ensure that the infiltration rate is capable of filtering the effluent, that is effluent waste produced has enough time to infiltrate the ground
- ✚ Just as in solid waste above the base of the soakaway should be at least two meters above the ground water table
- ✚ The pond will be fenced with clear signage for example “No Trespassing Soakaway”
- ✚ The pond will be surrounded by a berm to prevent effluent over-topping during normal operation and especially during rainfall
- ✚ The Berm will be constructed of material that prevents access to burrowing animals
- ✚ The soakaway will be regularly inspected to ensure that all sewage effluent is contained, vegetation around the soakaway is controlled and burrows are not present in the berms.

## **Hazardous Waste Management**

- ✚ Used oil, unused agrochemicals or empty agrochemical containers will not be disposed at the solid waste site
- ✚ All hazardous waste will be disposed of in accordance with the guidance provided by the EPA in the permit and via future communication.



## 7.2 Mitigation Measures for Biological Components

To achieve the balance of wildlife perseverance and crop production and yield, FGI will engage the Guyana Wildlife Conservation and Management Commission (GWCMC) early in the planning of the conversion of savannah to cropped fields, where it may be necessary to consider the ecosystem process and integrate wildlife management with landscape ecology. Apart from this, FGI will do the following:

- ✚ Ensure employees are aware of the prohibition against hunting of IUCN or CITES wildlife within the boundaries of FGI landscape, including the forest, marshes and cropped fields
- ✚ Communicate with the Community Representatives to highlight the importance of fostering sustainable hunting for other wildlife to ensure a viable population is able to fulfil their ecological role in the ecosystem
- ✚ Seek guidance from the GWCMC regarding the best management strategy for wildlife that interacts with the farm ecosystem
- ✚ Plan the expansion of the crop fields to ensure species that interact with the savannah remain viable
- ✚ Control marauding animals, especially IUCN or CITES wildlife on FGI farmlands; FGI will liaise with the GWCMC on possible options
- ✚ Develop an integrated pest management system to control rodents which may feed excessively on the crops or become a nuisance around employee accommodation and solid waste areas.

Maintenance of the large biodiverse fauna is dependent on the forest, which requires careful management to prevent loss of habitat and other resources. Guyana Forestry Commission (GFC) and The GWCMC will be integrally involved in the management of the forested area and fauna within FGI farmlands, as required.

### 7.3 Mitigation Measures for Occupational Health & Safety

The number of days of farming or reduced worker capacity lost to illness, results in reduced efficiency and productivity (Ulimwengu, 2009). Farmworkers are considered a major risk group that receives the greatest exposure to pesticides (Dhananjayan & Ravichandran, 2018).

To maintain the health and safety of farm workers, a health and safety protocol will be developed and implemented, which will include but not be limited to the following:

- ✚ Only agrochemicals licensed for use in Guyana by the Pesticide and Toxic Chemicals Control Board will be imported and/or used on FGI farmlands.
- ✚ All agrochemicals will be stored in a secure area, accessible only to employees responsible for their use.
- ✚ SDS sheets will be in place on site for all agrochemicals and hazardous materials in use on the farm.
- ✚ SDS will be stored in a location that is known to all staff and available to all staff for reference and in the case of an emergency.
- ✚ SDS for all the agrochemicals will be used to ensure staff have all the necessary Personal Protective Equipment (PPE).
- ✚ SDS will be reviewed and updated from the manufacturer at least every two years.
- ✚ FGI will develop and implement protocols for the safe use of each agrochemical, based on the SDS
- ✚ All farm workers will be trained, at the literacy level of their comfort, on:
  - The use and understanding of SDS especially about the use of PPEs, handling the agrochemicals safely and emergency measures e.g., in case of a spill.
  - The safe handling of agrochemicals, for example correctly transporting, measuring, mixing, loading, and application of pesticides
  - The correct storage and disposal practices to be employed at FGI

- Correct examination of the signs and labels to identify the correct PPE to wear to minimise acute and chronic toxicity of the products, and
  - The consequences to humans and the environment if agrochemicals are improperly applied.
- ✚ All staff should take and pass the Guyana Red Cross first aid course, with at least two staff members also qualified as first responders.

## **Health and Safety of Noise**

To ensure that farm workers are protected from noise, FGI will do the following:

- ✚ Continue to use heavy machinery with factory provided cabins. Cabins of heavy machinery should be measured for noise to ensure the levels and time of work comply with NIOSH guidance as well as Hearing Protection Devices, (HPD) used if required
- ✚ Provide HPDs for farm workers working in the vicinity of heavy machinery, where the potential exists for noise levels to exceed NIOSH Occupational health and safety standards for noise
- ✚ Maintain all machinery according to manufacturer's instructions including noise attenuating parts and functions
- ✚ Provide training on the use of HPDs
- ✚ Ensure hearing tests are included in the agricultural workers annual health checks where possible.

## **Health and Safety and Air Quality**

- ✚ Farm workers will ensure appropriate dust masks are worn to prevent inhalation of dust when working in the field along tractors working within the field during tillage and clearing. This is particularly essential when working on dry, hot and windy days

- ✚ Tractor speed will be reduced during activities such as tillage, which will produce less dust for farmers working in the field

## **Fire Safety**

- ✚ All fire protection measures will be implemented in accordance with the Guyana Fire Service's guidance
- ✚ All employees will be trained on the use of fire extinguishers.
- ✚ All fire extinguishers will be serviced annually.

## **Injury Prevention**

- ✚ A designated health and safety officer will be identified to oversee the implementation of all safety mitigation measures; and prevent or minimise injuries on site.

## **7.4 Socio-economic Mitigation Measures**

The measures recommended to address the socio-economic concerns of the project are as follows:

- ✚ FGI will liaise with the PTCCB, in collaboration with other crop farmers to conduct training for on the use of agrochemicals. During stakeholder consultation, farm groups reported injuries related to agrochemicals. Farm injuries were categorised as high risk, within FGI, with training led by PTCCB as a mitigation measure. Joint PTCCB training sessions may be useful in building local relationships as well as a knowledge transfer event
- ✚ Gender Equity, youth and Empowerment: FGI will consider gender equity and youth when offering local employment and training. The inclusion of youth and

women, (33% of the Ebini farming group are women farmers) strengthens rural life.

- ✚ Development of a reciprocal communication process- As suggested in the Stakeholder consultation, this will provide a mechanism through which regular communication can be made between FGI, local farmers and Wiki community.

- ✚ Implementation of a grievance redress mechanism (GRM)

‘Strong sustainability highlights the importance of harmony between nature and economic growth.’ (Quintero-Angel & González-Acevedo, 2018)

#### 7.4.1 Grievance Redress Mechanism

The GRM (or complaints-handling mechanism) is a system by which queries or clarifications about the project are responded to, problems with implementation are resolved, and complaints and grievances are addressed efficiently and effectively.

The current GRM utilised by FGI includes reporting directly to the Farm Supervisor, telephone calls, writing emails or letters to management. This system, however, needs to be properly documented and communicated. It also needs to consider the language barrier with the Brazilian and Guyanese employees as well as the Indigenous stakeholders such as the Wikki Community.

The complaints procedure along with the complaints/incident form can be found in Annex 7. The recommended complaints procedure, although intended primarily for internal complaints, may be adapted to handle external complaints from stakeholders. However, the method of communicating this procedure should be shared in accordance with the desired communication channels expressed in the Stakeholder Consultation Report. Once the protocol is established FGI will do the following:

- ✚ Create a flyer/poster which outlines the grievance procedure and share with staff and stakeholders;

- 🚧 Ensure all materials are available in both English and Portuguese
- 🚧 Track grievances using a QR code;
- 🚧 Establish a grievance tracking database.

Implementing systems to mitigate some of the potential grievances highlighted in this section can improve productivity, promote inclusivity, as well as boost worker and stakeholder satisfaction. Therefore, in addition to establishing a clear GRM, FGI can mitigate these potential issues by establishing and implementing clear policies for communication, remuneration, compensation, and training. The company also needs to establish a clear Corporate Social Responsibility (CSR) policy which should be accounted for in its annual budget. The components of the CSR should be informed by the findings of the stakeholder consultations.

## 7.5 Mitigation Implementation Plan

The table below outlines a plan of action primarily for the mitigation measures which are yet to be implemented.

Table 25: Mitigation Implementation Plan

| Mitigation Action/ Measure   | Timeline for Implementation  | Responsible Party |
|--|------------------------------|-------------------|
| <b>Water Quality</b>   |                              |                   |
| Concrete the base of the chemical and fuel storage areas and ensure there is no direct storage on the ground to reduce the potential for groundwater contamination.                | December, 2025               | FGI               |
| Ensure the fuel storage is contained in a <b>concrete</b> bund capable of holding at least 1.5 times the amount of the largest fuel container.                                     | December, 2025               | FGI               |
| <b>Soil Management (Wind and Water Erosion Control)</b>  |                              |                   |
| <b>Plant cover crops</b> to prevent periods of bare (i.e. fallow) ground on farm fields, thereby, reducing the potential for generating dust (particulate matter)                  | Within 1 month of harvesting | FGI               |
| <b>Retain plant residue</b> in the soil of croplands of at least 30%   | After harvesting             | FGI               |
| Implement Conservation Tillage as required   | Immediate                    | FGI               |
| <b>Solid Waste Management</b>  |                              |                   |
| Prepare and line solid waste disposal cell as identified by GPS on the FGI map. The cell should be lined with clay, at the base and up the sides, followed by geotextile material. | September, 2026              | FGI               |

|   |  |         |
|---|--|---------|
| Assign an employee to manage the site keeping records which include the material deposited in the cell, details of the leachate capture and the cover schedule. Ensure the employee is adequately trained in this regard.   | July, 2025   | FGI     |
| Slope one side of the cell to allow machinery to enter to spread and compact at least 15cm of soil on garbage collection and disposal days without injury.  | September, 2026                                      | FGI     |
| Design and implement a leachate collection system that will prevent pooling and potential contamination of the ground water. Leachate should be directed to the effluent waste collection cell for evapotranspiration   | December, 2026                                       | FGI     |
| <b>Effluent Waste Management</b>  |  |         |
| Design the holding cell/settling pond for effluent discharge to contain effluent flowing from the septic tank without contaminating the ground water. The pond should be surrounded by a berm, constructed of material that prevents access to burrowing animals, to prevent effluent over-topping during normal operation and especially during rainfall. Fence pond with clear signage, for example "No Trespassing Wastewater Pond". | September, 2026                                      | FGI     |
| Inspect the lagoon to ensure that all sewage is contained, vegetation around the pond is controlled and burrows are not present in the berms.   | Weekly (after settling pond is designed as required) | FGI     |
| <b>Biodiversity</b>   |  |         |
| Prohibit hunting of any type within the boundaries of FGI, including the forest, savannah and marsh areas. Install no hunting signs.  | May, 2025  | FGI     |
| Develop and implement a pest management system to control rodents   | May, 2025  | FGI     |
| Consult with Guyana Forestry Commission (GFC) and manage forested areas in accordance with Guyana Forestry Commission guidelines.   | April, 2025  | FGI     |
| <b>Occupational Health and Safety</b>   |  |         |
| Place all Safety Data Sheets (SDS) in a well-known, available area for all staff to easily access and reference and in case of an emergency.  | May, 2025  | FGI     |
| Review and update SDS from the manufacturer at least every two years.   | 2027   | FGI     |
| Train all staff in first aid, with at least two staff members also qualified as first responders.   | December, 2025                                       | FGI     |
| Store all agrochemicals in a secure area, accessible only to employees responsible for their use.   | Immediate  | FGI     |
| Train staff in the use and understanding of SDS especially with regard to the use of PPEs, handling the agrochemicals safely and emergency measures e.g. in case of a spill.  | August, 2025   | FGI     |
| Provide sound attenuating devices (ear muffs, etc.) to employees responsible for the maintenance of machinery.  | April, 2025  | FGI     |
| Train all employees on the use of fire extinguishers.   | May, 2025  | FGI/GFS |



## 7.6 Environmental and Social Impacts Monitoring and Compliance

The primary objective of environmental and social monitoring is to verify that the mitigation measures proposed are implemented and effective in reducing identified impacts. Monitoring throughout the lifetime of the project will enable FGI to highlight any new or previously identified impacts which persist and allow for an appropriate response/ corrective action to be taken. In short, monitoring environmental and social impacts is one step the Company will take to ensure all project activities adhere to environmental provisions outlined in this EAMP, the Environmental Permit, and any other directive issued by the EPA. As part of an effective monitoring programme, the results of monitoring will be recorded and maintained so that trends can be observed overtime.

Generally, the responsibility for environmental and social monitoring will lie with FGI; however, the EPA will play a critical role in auditing the operation's implementation with the terms and conditions of the environmental permit, via annual reports submitted and/or site visits.

The table below outlines the proposed monitoring plan for the project.

Table 26: Proposed monitoring plan for FGI's operation

| Impacts Summary  | Parameters Monitored  | Monitoring Indicator   | Frequency | Responsible Party |
|--|---|--|-----------|-------------------|
| <b>Air Quality</b>   |   |  |           |                   |
| Emissions from operations and fuel burning activities occurring on project site and releases during refueling of machinery and generator | PM10<br>PM 2.5<br>Carbon Monoxide<br>Nitrogen Dioxide<br>Volatile Organic Compounds | Results of PM10, PM2.5, CO, NO2 and VOC monitoring received, documented and monitoring report prepared | Annually  | FGI               |
| <b>Noise</b>   |   |  |           |                   |
| Noise emissions from operation of generator; vehicles and machinery  | Sound Pressure Levels (decibels)  | Results of noise assessment received, documented and noise   | Annually  | FGI               |

|   |   |  |   |     |
|---|---|--|---|-----|
|   |   | assessment report prepared   |   |     |
| <b>Water Quality</b>  |   |  |   |     |
| Contamination of ground water, Wikki Creek due to discharges of agricultural runoff, fuel, waste or chemicals | pH, Temperature, Total suspended solids Nitrates Sulphates Ammonia Oil and Grease E. Coli | Results of water quality monitoring received, documented and water quality assessment report prepared  | Bi-Annually   | FGI |
| <b>Waste Management</b>   |   |  |   |     |
| Improper disposal of hazardous and non-hazardous waste  | -   | All wastes managed in accordance with the guidelines stipulated by EPA<br>Inspection reports prepared and waste disposed weekly  | Daily (observations)<br>Weekly (inspections)                                    | FGI |
| <b>Social Issues</b>  |   |  |   |     |
| Health and Safety - Accidents or injuries to employees, visitors and subcontractors                           | Health and Safety KPIs  | Monthly reporting of statistics relative to health and safety  | Weekly  | FGI |
| Complaints about operation received from stakeholders   | -   | Grievance redress mechanism implemented<br>Complaints investigation form completed, and Corrective actions taken if deemed valid<br>Stakeholder Engagement report prepared | Weekly (review of complaints register)<br><br>Annually (Stakeholder engagement) | FGI |

## 7.7 Reporting and Record-Keeping

Effective reporting and record-keeping are critical components of any EAMP. These activities will ensure compliance with the environmental permit, industry best practices, and internal project operational plans. To facilitate monitoring and evaluation of environmental performance throughout the life of this project, data will be reported and recorded for compliance and continuous improvement of environmental management practices.

### 1. Objectives

The objectives of this section are to:

- ✚ Ensure compliance with the EPA's environmental monitoring and reporting guidelines.
- ✚ Facilitate tracking of environmental performance and mitigation measures.
- ✚ Maintain transparency and accountability in FGI's environmental management practices.
- ✚ Provide evidence for audits, inspections, and performance evaluations.

### 2. Types of Records to be Maintained

The following records will be maintained:

#### a) Environmental Monitoring Records:

- ✚ Air quality, noise levels, and water quality monitoring data.
- ✚ Biodiversity monitoring
- ✚ Waste management and disposal records.

#### b) Incident Reports:

- ✚ Records of environmental and safety incidents, spills, or emergencies, including corrective actions taken.

c) **Training and Awareness Records:**

- Attendance sheets and content of training sessions for employees.

d) **Maintenance Logs:**

- Records of maintenance activities for equipment to minimise environmental risks (e.g., heavy-duty equipment, machinery, irrigation systems).

e) **Complaints and Grievances:**

- Records of stakeholder concerns and actions taken to address them.

f) **Permit Compliance Records:**

- Copies of permits and licenses issued by the EPA and other authorities, along with documentation of compliance activities.

### 3. Reporting Frequency

| Activities   | Frequency | Responsibility   |
|--|-----------|--|
| <p>Project Management Report</p> <ul style="list-style-type: none"><li>- Project Milestones</li><li>- Health and Safety Activities and Incidents</li><li>- Environmental Management Activities and Incidents</li><li>- Site Inspections</li><li>- Equipment Maintenance and Inspection</li></ul> | Monthly   | <ul style="list-style-type: none"><li>- Project Management Team</li><li>- H&amp;S Representative</li><li>- Environmental Representative</li><li>- Lead Maintenance Representative</li></ul>                  |
| <ul style="list-style-type: none"><li>- Environmental Monitoring (<i>of a designated parameter or as advised by the EPA</i>)</li><li>- Waste Management activities and compliance</li><li>- Training and Development</li></ul>   | Quarterly | <ul style="list-style-type: none"><li>- Project Management Team</li><li>- H&amp;S Representative</li><li>- Environmental Representative</li><li>- Community Liaison</li><li>- Training Coordinator</li></ul> |

|   |                        |  |
|---|------------------------|--|
| <ul style="list-style-type: none"> <li>- Environmental Report</li> <li>- Stakeholder Engagement Activities</li> </ul> | Annual<br><br>Annually | <ul style="list-style-type: none"> <li>- Project Management Team</li> <li>- Environmental Representative</li> <li>- Community Liaison</li> </ul> |
|---|------------------------|--|

#### 4. Records Storage and Access

- ✚ All records will be stored in digital and hard copy formats in a secure location at the project site office and will also be kept at the head office in Georgetown.
- ✚ Records will be maintained for a minimum of five years.
- ✚ Access to records will be restricted to authorised personnel, ensuring confidentiality while allowing accessibility during inspections or audits.
- ✚ Records will be made available to the EPA or other regulatory bodies upon request for audits or inspections.
- ✚ The Environmental Management Team will ensure records are up-to-date and accurately reflect the project's compliance status.

#### 5. Review and Improvement

The reporting and record-keeping processes will be reviewed annually as part of FGI's continuous improvement strategy. Adjustments will be made to enhance efficiency and ensure alignment with regulatory updates or operational changes.

### 7.8 Training and Environmental Awareness

FGI conducts training (primarily on the job training), however, based on feedback during stakeholder engagement, the company needs to establish a training schedule on an annual basis, to address the training needs of staff and key stakeholders (see table 27). Most of the senior staff have extensive experience in agriculture and maintenance of

machinery/equipment and have been mentoring the newer employees in this regard. Given that the company has a small staff complement, training should be conducted to cater to the current staff, as well as any additional staff based on the strategic plan of the company.

FGI can also collaborate with NAREI to conduct some of the training, specifically in the area of agronomy. Given that farming is one of the most common livelihood activities in the catchment area, small farmers within the Ebini Intermediate savannahs and selected farmers from the Wikki Community can also benefit from some of these trainings. The table below highlights some of the key recommended training, target groups and frequency.

Table 27: FGI's training schedule

| <b>Type of training</b>  | <b>Target groups</b>   | <b>Frequency</b>                                  |
|--------------------------|--|---|
| Driving of lorry, trucks | Staff with little driving experience/those requiring a refresher | Bi annually – stagger staff                       |
| Heavy duty operator      | Staff who are employed as Operators                              | Annually (once)                                   |
| Portuguese               | Guyanese staff   | Bi-annually – based on the duration of the course |
| English                  | Brazilian staff  | Bi-annually – based on the duration of the course |
| First Aid                | 2 Guyanese, 1 Brazilian staff                                    | Re-occurring every 24 months                      |
| Fire Safety              | All FGI staff  | Re-occurring every 12-months                      |
| Agronomy                 | 2-3 staff  | On a needs basis                                  |
| Mechanical skills        | 1-2 staff  | Re-occurring every 24 months/as required          |

|  |   |   |
|--|---|---|
| Fertilizer application                             | All field staff/temporary staff, Ebini small farmers, Wikki small farmers | Re-occurring every 12 months/as required    |
| Sustainable farming practices                      | All field staff   | Annually (based on new practices available) |
| Advanced irrigation and water conservation         | All field staff/temporary staff, Ebini small farmers, Wikki small farmers | Annually                                    |
| Agriculture technologies (use of GPS, drones etc.) | Supervisory staff   | Annually                                    |
| Farm management                                    | Supervisory staff, Ebini small farmers, Wikki small farmers               | Re-occurring every 24 months/as required    |
| The Grievance Redress Mechanism                    | Supervisory staff   | Once  |
| Safe use of farm machinery/equipment               | All staff, Ebini small farmers, Wikki small farmers                       | Re-occurring every 24 months/as required    |

## 7.9 Emergency Response Plan

An emergency response plan (ERP) has been developed and is included in Annex 8. This plan is essential to ensure minimal to no loss or injuries occur during an emergency. This is especially important, considering the distance of health services from the farm, and challenges with accessing them in a timely manner.

## 7.10 Traffic Management Plan

This Traffic Management Plan (TMP) outlines the measures to be implemented to manage vehicular traffic and pedestrian movements at the site. While traffic is expected to be primarily low and manageable throughout the life of the project, this plan also makes considerations for high volumes of traffic should it arise. It is therefore important to ensure that traffic is managed in a manner that facilitates efficiency and ensures the safety of personnel and the local community.



## 1. Purpose

This plan was created to ensure the following objectives are achieved: -

- ✚ To minimise the risk of vehicular accidents and ensure the safety of workers and the road users of the Ebini Community
- ✚ To reduce environmental impacts from vehicular emissions such as dust and noise
- ✚ To ensure efficient and controlled movement of vehicles and equipment within and around the project site

## 2. Scope

This TMP applies to all vehicles and equipment used for the farming operations of the Ebini site, such as:

- ✚ Transport of agricultural inputs (e.g., fertilizers, pesticides, seeds).
- ✚ Harvest transportation and distribution.
- ✚ Movement of construction and maintenance equipment.
- ✚ Personnel transportation to and from the project site.

## 3. Traffic Management Measures

The following lists the guidelines to be implemented to ensure traffic safety at the project site.

### a) Speed Limits:

- ✚ All vehicles must maintain a maximum speed limit of 40 km/h within the farming site.
- ✚ Speed limit signage will be placed at strategic intervals along the farm roads and access points.

**b) Vehicle Maintenance:**

- ✚ Regular maintenance and inspection of all vehicles and equipment will be conducted to ensure roadworthiness and reduce vehicular emissions. This activity will be guided by the Equipment Maintenance Form (Annex 9) to ensure compliance with the recommended manufacturers' guidelines.

**c) Driver Training:**

- ✚ All drivers will be fully licensed and trained in defensive driving techniques.
- ✚ Additionally, drivers will be trained in applicable emergency response procedures for scenarios that are likely to occur on-site
- ✚ Drivers will be briefed on local road conditions and potential hazards related to weather and physical road conditions.

**d) Load Management:**

- ✚ Vehicles transporting materials must not exceed weight limits designated for that specific vehicle. Supervisors must ensure that the right vehicle is selected to carry specific loads.
- ✚ All loads must be securely fastened and covered to prevent spillage or dust emissions.

**e) Parking and Staging Areas:**

- ✚ Designated parking and staging areas will be provided within the project site for staff and visitors.
- ✚ Staging areas are also identified and designated for the parking of heavy-duty vehicles and other mobile farm equipment.

**f) Signage and Traffic Safety Controls:**

- ✚ FGI's HSE Representative will ensure strategic placement of warning signs, speed limit signs, and directional signs along internal traffic routes. Signs will be provided,

as needed, to indicate any exclusion and safety zones, parking areas, speed limits, vehicle crossings, hazards like blind corners, and where forklifts are in use.

- ✚ If any farm construction is likely to obstruct the local roadway, temporary signs will be placed to advise residents on roadworks, detours, or special activities.
- ✚ FGI shall take all necessary measures for the safety of traffic during construction and provide, erect, and maintain such barricades, including signs, markings, flags, lights, and flagmen as may be required.

**g) Dust and Noise Control:**

- ✚ Vehicle movements will be scheduled during daytime hours to reduce noise impacts on nearby communities.
- ✚ When necessary, we will wet unpaved roads around the site to minimise dust being generated during dry periods. This will minimise the occupational risk to our workers.

## **4. Emergency Response Plan**

**a) Accident Reporting:**

- ✚ All traffic-related incidents/accidents must be reported immediately to the Site Supervisor or the HSE Representative and documented in an incident report.

**b) Emergency Vehicle Access:**

- ✚ Clear access routes will always be maintained for the free flow of farm vehicles and any emergency vehicles.

**c) Spill Containment:**

- ✚ When vehicles are transporting hazardous materials, spill kits must be carried on hand, and drivers will be trained in spill response procedures.

**d) First Aid:**





- ✚ All project vehicles will be equipped with basic first aid kits.

## 5. Roles and Responsibilities

The following personnel are responsible for the implementation and monitoring of this TMP.




### a) HSE Representative:

The HSE Representative will be responsible for:

-  Overseeing the implementation of the TMP
-  Coordinating any traffic activities with the community and regulatory authorities
-  Monitor the environmental and safety impacts of traffic activities.
-  Conduct regular training and awareness sessions for drivers and workers.

### b) Drivers:

Designated Drivers will be responsible for:

-  Gaining applicable licensing and registration
-  Complying with traffic regulations and the above TMP requirements.
-  Reporting any traffic-related issues to the HSE Representative.

## 6. Review and Improvement

The TMP will be reviewed annually by the Project Management Team and updated based on any physical changes to the site and farm activities.

## 7.11 Monitoring Schedule & QA/QC Programme

### 7.11.1 Environmental Monitoring Schedule & QA/QC Program

This section outlines the company's ongoing commitment to using quality assurance and periodic monitoring as a tool for environmental management and compliance. The objectives of the QA/QC programme are to:

- ✚ Assess the effectiveness of mitigation measures outlined in the EAMP.
- ✚ Ensure compliance with environmental regulations and the project's environmental permit.
- ✚ Maintain the integrity, reliability, and accuracy of monitoring data through QA/QC procedures.

The monitoring schedule is outlined in table 28 below.

Table 28: FGI's environmental monitoring schedule

| <b>Environmental Parameter</b> | <b>Frequency</b> | <b>Methodology/Standard</b>  | <b>Responsibility</b>                          |
|--------------------------------|------------------|--|--|
| <b>Air Quality</b>             | Annually         | -Portable air quality monitors<br>-EPA Standards<br>-WHO Standards                           | -Project Lead<br>-Environmental Representative |
| <b>Water Quality</b>           | Bi-Annually      | -Portable water quality monitors<br>-Laboratory analysis<br>-EPA Standards<br>-WHO Standards | -Project Lead<br>-Environmental Representative |
| <b>Noise Levels</b>            | Annually         | -Portable sound level meters<br>-GNBS Standards  | -Project Lead<br>-Environmental Representative |

|                             |          |   |  |
|-----------------------------|----------|---|--|
| <b>Soil Quality</b>         | Annually | -Soil Sampling<br>-Laboratory analysis                              | -Project Lead<br>-Environmental Representative |
| <b>Biodiversity</b>         | Annually | -Visual Surveys/Reports<br>-Species Inventory                       | -Project Lead<br>-Environmental Representative |
| <b>Community Engagement</b> | Annually | -Community Feedback<br>-Community Complaints<br>-Community Meetings | -Project Lead<br>-Community Liaison            |

### **QA/QC Program**

The following Quality Assurance measures will be implemented to ensure the accuracy and reliability of all monitoring activities and related data collected.

#### **a) Training and Competency:**

- ✚ All personnel involved in or subcontracted to facilitate air, water, and noise assessments and monitoring must be duly trained in proper sampling, measurement techniques, and the use of equipment.
- ✚ Competency assessments will be included in the subcontractor procurement exercise to verify the training and competency of the team.

#### **b) Calibration of Equipment:**

- ✚ All monitoring equipment must be calibrated in accordance with manufacturers' recommendations and international standards. Calibration certificates will be requested and kept on file.
- ✚ Lab analysis will be done by laboratories that are certified in accordance with applicable GNBS Standards.

**c) Standard Operating Procedures:**

- ✚ Standard Operating Procedures (SOPs) will be developed as needed for various aspects of FGI's operations. These procedures will be strictly followed and periodically updated to reflect operational changes.

**d) Documentation and Record Keeping:**

- ✚ All data will be logged in standardised forms, reviewed for completeness and accuracy, and stored in a secure database.
- ✚ All reporting and record-keeping activities will be guided by the 'Reporting and Record-Keeping' section of this document.

**e) Reporting**

- ✚ Monitoring results will be compiled based on the frequency outlined in the table above. When necessary, these reports will be submitted to the EPA and other stakeholders as required.
- ✚ Reports will include raw data, analyses, and the relevant corrective actions implemented if needed.

**f) Continuous Improvement**

- ✚ Findings from the monitoring activities and QA/QC data will be used to update the EAMP and continually improve our environmental management practices.
- ✚ All community and stakeholder feedback will be incorporated into the continuous improvement process.

**g) Audits and Reviews**

- ✚ Internal audits will be conducted annually to evaluate the effectiveness of this monitoring program and the implemented QA/QC measures.
- ✚ External audits by the EPA (or other regulatory bodies) will be facilitated as needed, for which the related information will be provided to support such an exercise.



### 7.11.2 Environmental Monitoring & QA/QC for Crop Management

This section of the document provides general guidance for the monitoring and quality management of the crops intended to be planted and seeds stored at the facility. It focuses on tracking, recordkeeping, testing, and other measures that provide oversight management systems essential for consistently generating a quality product. It should be noted, that while this appears to mirror section 7.12.1, the objective in this case is to ensure the most optimal environment and quality assurance/quality control programme to support crop growth. The details of this approach are outlined in the tables below.

Table 29: Environmental monitoring required to support crop growth and development















| Parameter   | Frequency  | Methodology  | Responsibility                                   |
|---|--|--|--|
| <b>Soil Quality</b><br><ul style="list-style-type: none"> <li> pH levels</li> <li> organic matter content</li> <li> nutrient composition</li> <li> compaction</li> </ul>  | Bi-annually<br>(before seasonal planting and after harvesting) | <ul style="list-style-type: none"> <li> Soil Sampling</li> <li> Laboratory analysis</li> </ul>  | Farm Manager<br><br>Environmental Representative |
| <b>Water Quality</b> ( <i>High-quality irrigation water is essential for abundant crop yields, improved crop health, and the cultivation of good-quality soil</i> )<br><ul style="list-style-type: none"> <li> pH levels</li> <li> salinity</li> <li> water temperature</li> <li> Hardness</li> </ul> | Bi-Annually  | <ul style="list-style-type: none"> <li> Portable water quality monitors</li> <li> Laboratory analysis</li> <li> EPA Standards</li> <li> WHO Standards</li> </ul> | Environmental Representative                     |

Table 30: Crop and seed monitoring requirements

| Parameter  | Frequency   | Methodology   | Responsibility             |
|--|---|---|----------------------------|
| <b>Plant Health</b> <ul style="list-style-type: none"> <li>Signs of Pests</li> <li>Disease outbreak</li> <li>Growth rate</li> <li>Nutrient deficiencies</li> </ul>                 | <ul style="list-style-type: none"> <li>During the growing season</li> <li>As needed depending on the growth rate of the crop</li> </ul> | <ul style="list-style-type: none"> <li>Visual Spot checks</li> <li>Random crop sampling</li> <li>Comparisons against standard growth rates</li> </ul> | Agronomist                 |
| <b>Crop Yield</b> <ul style="list-style-type: none"> <li>Crop Yield per acre/hectare</li> </ul>  | At harvest  | <ul style="list-style-type: none"> <li>Comparisons against standard yield rates</li> </ul>  | Agronomist                 |
| <b>Seed Health</b> <ul style="list-style-type: none"> <li>Signs of Pests or pathogens</li> <li>Disease outbreak</li> <li>Proper storage and prevention of contamination</li> </ul> | Monthly   | <ul style="list-style-type: none"> <li>Visual Spot checks</li> <li>Random seed sampling</li> <li>Assessment of storage facility</li> </ul>            | Farm Manager<br>Agronomist |

Table 31: Quality control in crop production

| Parameter   | Frequency   | Responsibility               |
|---|---|------------------------------|
| <b>Seed Quality Testing</b> <ul style="list-style-type: none"> <li>Seed preparation, including the handling, packaging, and identification of the seed</li> <li>Verify germination rates and seed purity</li> <li>Pest prevention strategies</li> <li>Contained facility maintenance</li> </ul> | <ul style="list-style-type: none"> <li>Before planting each season</li> </ul>                                     | Farm Manager                 |
| <b>Fertilizer and Agrochemical Use</b> <ul style="list-style-type: none"> <li>Ensure correct application rates based on soil test results.</li> </ul>   | <ul style="list-style-type: none"> <li>During planting season</li> <li>Periodic scheduled applications</li> </ul> | Farm Manager                 |
| <b>Irrigation Water Testing</b> <ul style="list-style-type: none"> <li>Ensure water meets quality standards for irrigation.</li> </ul>  | <ul style="list-style-type: none"> <li>During planting season or monthly</li> </ul>                               | Environmental Representative |
| <b>Record Keeping</b> <ul style="list-style-type: none"> <li>Maintain logs of various tests and inspections conducted</li> <li>Securely store records for future reference</li> </ul>   | <ul style="list-style-type: none"> <li>When tests are conducted</li> </ul>  | Environmental Representative |
| <b>Training Programmes for Staff</b> <ul style="list-style-type: none"> <li>Provide training for farm workers on sustainable farming practices and pesticide management</li> <li>Provide training for farm workers on monitoring and record-keeping</li> </ul>                                  | <ul style="list-style-type: none"> <li>Annually</li> </ul>  | Representative from NAREI    |

## 7.12 EAMP Implementation Cost Estimates

Based on the potential Impacts identified above, there will be several areas that will require constant monitoring during the life cycle of the operation. This includes air, noise and water quality monitoring, as well as training, construction, repair and maintenance activities, as well as the acquisition of annual licences. The table below provides an estimated cost for implementation of this EAMP.

| Area to be monitored or developed                              | Estimated Cost (GY \$) |
|--|------------------------|
| Air Quality  | 1,500,000              |
| Water Quality  | 585,000                |
| Noise Quality  | 320,000                |
| Training and Environmental Awareness                           | 1,000,000              |
| Provision of PPEs and Safety Signage                           | 1,500,000              |
| Construction of concrete bunds for fuel and chemical storage   | 3,000,000              |
| Upgrade of solid waste disposal cell                           | 2,300,000              |
| Design and construction of leachate collection system          | 3,500,000              |
| Design and construction of holding pond for effluent discharge | 1,500,000              |
| Hazardous waste disposal                                       | 1,200,000              |
| Licencing  | 500,000                |

The annual cost for implementation of the EAMP is estimated roughly at 16,905,000. It should be noted, however, that this cost is likely to change based on the project dynamics, the requirements of EPA permit and the implementation of one-off actions which will not be repeated. As such this estimate will be re-examined and revised every 2 years.

## 8. References

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## 9. Annexes

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9.8 FGI Emergency Response Plan

9.9 Equipment Maintenance Form

# **Annex 1:**

## **HSE Policy Statement**

# Health Safety & Environmental Policy

Farmlands Guyana Inc. is committed to environmental protection, promoting stewardship, and ensuring the health and safety of our employees. Our focus is also on delivering quality products to our clients. Our policy is designed to help the company achieve the highest standards in all its activities while safeguarding the environment and our workforce.

We recognize that conducting commercial activities sustainably is essential to protect the environment. Therefore, all managers, employees, and contractors have specific duties and responsibilities outlined in this policy, ensuring we fulfil our commitments.

Our company aims to achieve these commitments through the following promises:

- Provide visible leadership in implementing and adhering to this policy within the organization.
- Ensure all employees are aware of and understand this policy.
- Maintain the natural ecosystem on parts of the farm by creating land islands.
- Implement a pollution prevention program, including proper storage of chemicals and fuel within our facility.
- Develop clear and attainable Health, Safety, and Environmental (HSE) objectives, revising them regularly.
- Establish a comprehensive Environmental Management System that complies with all local environmental legislation, codes of practice, company objectives, and any other applicable standards.
- Regularly monitor environmental conditions to ensure all activities meet established environmental standards.
- Implement a training and communication program that provides employees and contractors with the necessary knowledge and tools to perform their tasks safely.

We acknowledge that our activities can impact the environment, particularly in areas such as energy use, waste management, water usage, and soil management. To effectively manage these impacts, we are committed to:

- Regularly assessing our activities and exploring innovative ways to improve them.
- Keeping our farm cultivated and vegetated to minimize soil erosion.
- Applying the Best Available Technology whenever possible.
- Utilizing eco-safe products in our operations when feasible.
- Monitoring our energy consumption and incorporating alternative energy sources into our operations.
- Tracking our water usage and identifying opportunities to reduce consumption as necessary.

*A.A. Welch*

**Project Consultant**

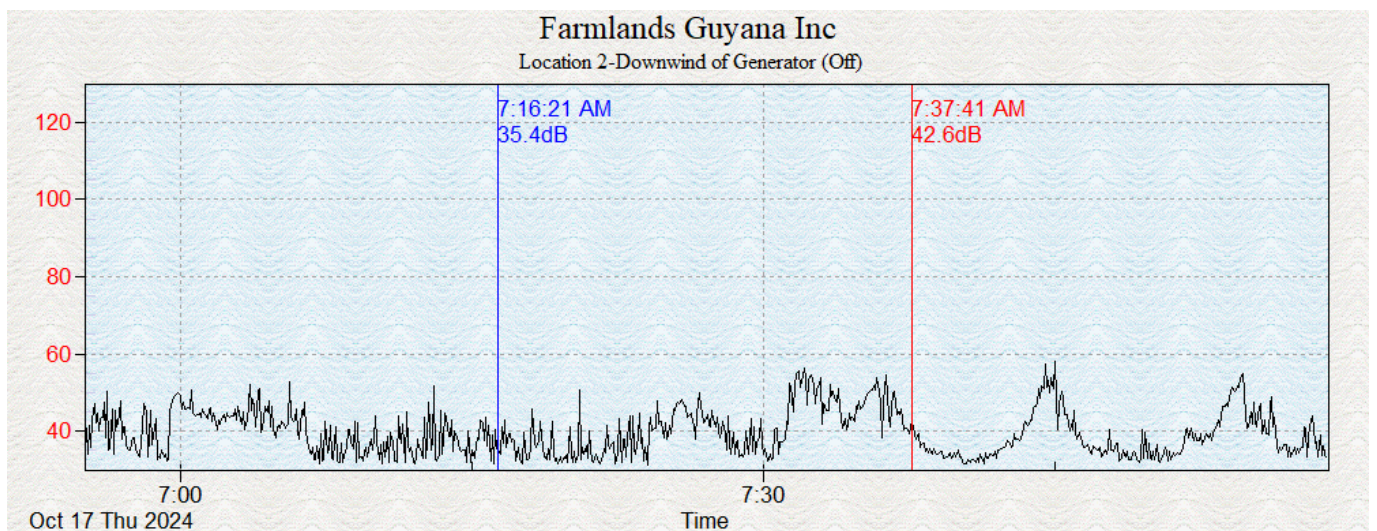
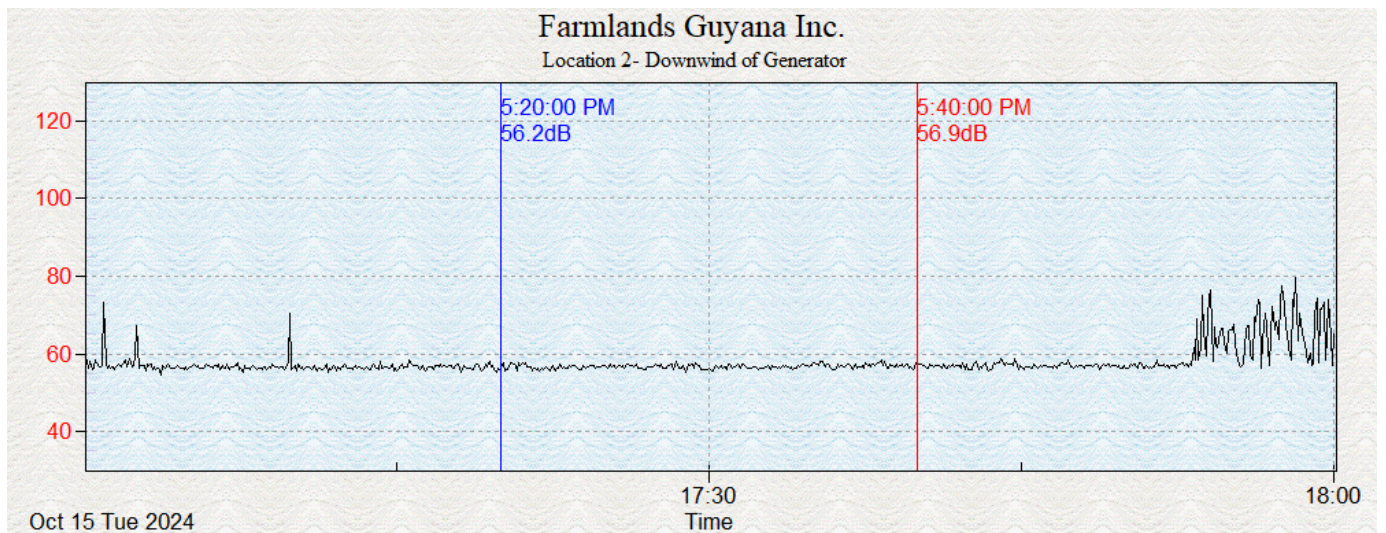
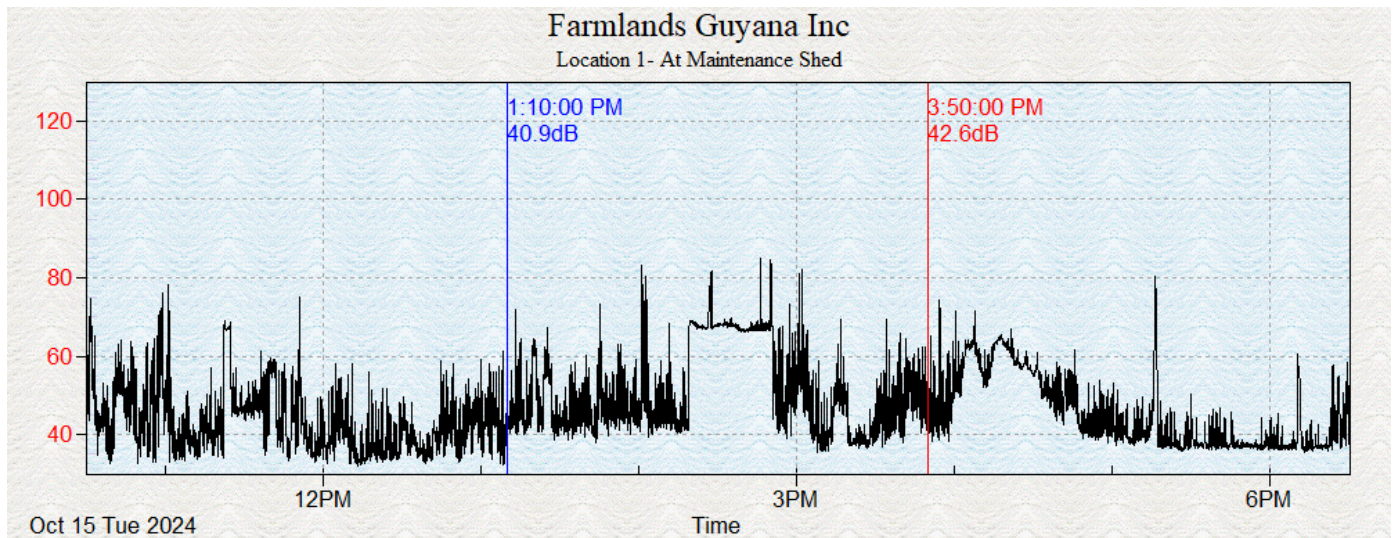
July 1, 2024

**Date**

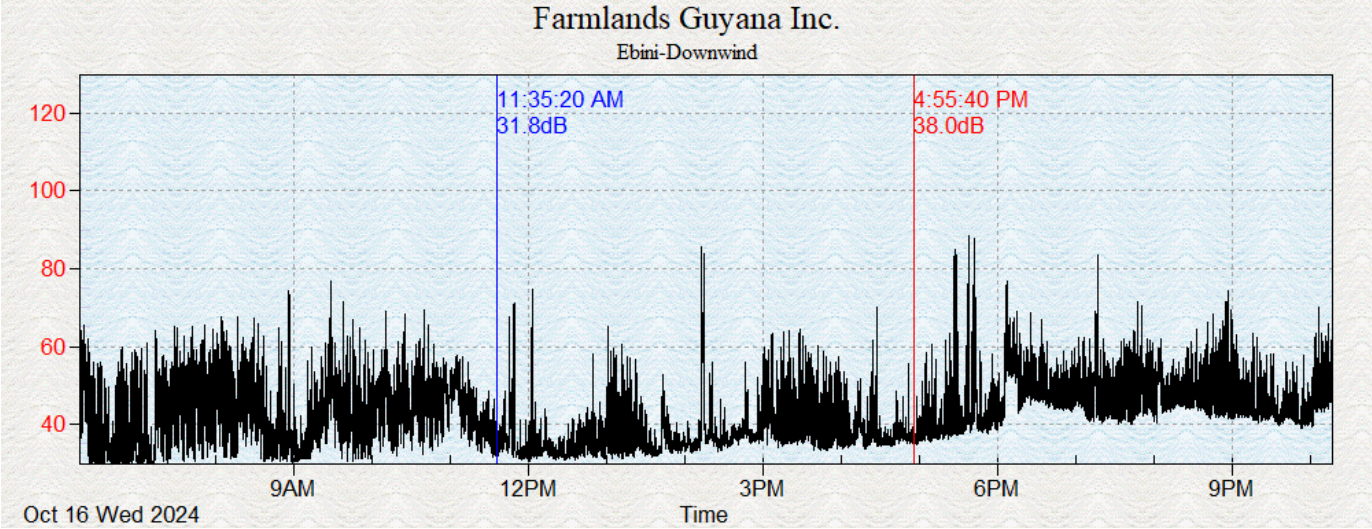
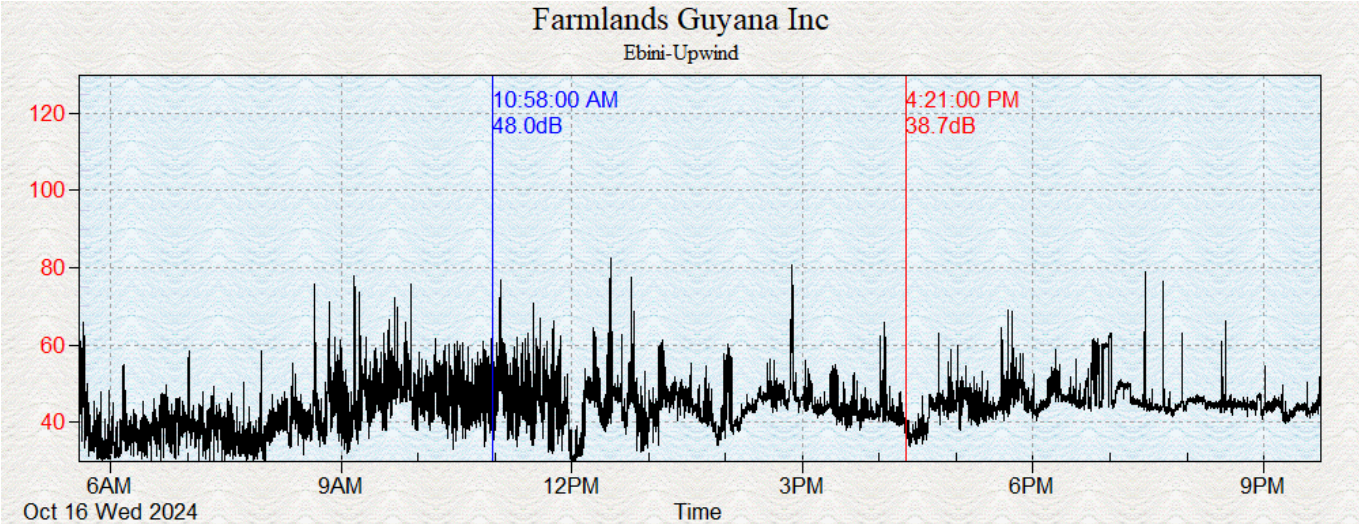


## **Annex 2:**

# **Graphical Presentation of Noise Assessment Results**







## **Annex 3:**

# **Water Quality Reports**

## Water Sampling Results Sheet

|  |  |
|--|--|
| <b>Sample ID(s)</b>                                    | <b>See description(s) below</b>  |
| <b>Customer</b>  | Farmlands Guyana Inc.  |
| <b>Contact Person (s)</b>                              | Abigail Lawrence (Farmlands Guyana) and Melinda Franklin-Lynch (Franklin-Lynch Environmental and Engineering Services) |
| <b>Primary Location</b>                                | Ebini, Region 10 (Upper Berbice River)   |
| <b>No. (#) Samples Collected, Retrieved, or Tested</b> | Five (5)   |
| <b>Date of Retrieval</b>                               | 12/November/2024   |
| <b>Date of Analysis</b>                                | 12/November/2024   |

| Results  |           |           |                 |         |
|--|-----------|-----------|-----------------|---------|
| Location   | Sample ID | Parameter |                 | Time    |
|  |           | pH        | Temperature     |         |
| <b>Berbice River Property Boundary 1 (21N 0408443 UTM 0607823)</b> | Eb-01     | 4.56      | 81.08F (27.26C) | 5:52 am |
| <b>Wiki Creek Bridge (21N 0401169 UTM 0614188)</b>                 | Eb-02     | 4.56      | 82.5F (28.05C)  | 7:58 am |
| <b>Landing Community Meeting (21N 0398593 UTM 0613400)</b>         | Eb-03     | 4.95      | 84.8F (29.33C)  | 8:45 am |
| <b>Berbice River, Wiki Junction (21N 0398645 UTM 0613517)</b>      | Eb-04     | 4.74      | 85.2F (29.55C)  | 8:55 am |
| <b>Berbice River Property Boundary 2 (21N 0400487 UTM 0617213)</b> | Eb-05     | 4.91      | 85.2 (29.55C)   | 9:12 am |

### Notes:

- All sampling/testing was done in situ. The results reflect actual in-field environmental conditions.
- The primary environmental conditions observed during sampling/testing were notably overcast and intermittently sunny.

# Water Sampling Results Sheet

## Parameters

| Unit      | Description   | Scale/Range  |
|-----------|---|--|
| <b>pH</b> | <ul style="list-style-type: none"> <li>- <math>\text{pH} = -\log [\text{H}^+]</math></li> <li>- pH is the negative logarithm of the hydrogen ion concentration)</li> </ul>  | <ul style="list-style-type: none"> <li>- Complete Scale: 0pH – 14pH</li> <li>- Acidic: 0pH – 6pH (0 being the most acidic on the scale)</li> <li>- Neutral: 7pH</li> <li>- Alkaline (Basic): 8pH – 14pH (14 being the most alkaline on the scale)</li> </ul> |
| <b>°C</b> | <ul style="list-style-type: none"> <li>- <b>The degree Celsius</b> (°C) scale divides the range of temperature between the freezing and boiling temperatures of pure water at standard atmospheric conditions</li> </ul>  | <ul style="list-style-type: none"> <li>- Complete Scale: 0°C - 100°C</li> <li>- Freezing Point: 0°C</li> <li>- Boiling Point: 100°C</li> </ul>   |
| <b>°F</b> | <ul style="list-style-type: none"> <li>- <b>The degree Fahrenheit</b> (°F) scale sets the freezing point of water at 32 degrees Fahrenheit and the boiling point at 212 degrees, placing the boiling and freezing points of water exactly 180 degrees apart.</li> </ul> | <ul style="list-style-type: none"> <li>- Freezing Point: 32°F</li> <li>- Boiling Point: 212°F</li> <li>- Absolute Zero: -459.67 °F</li> </ul>  |

## Conversions:

- Celsius – Fahrenheit =  $T (^{\circ}\text{F}) = 9/5 T (^{\circ}\text{C}) + 32$
- Fahrenheit – Celsius =  $T (^{\circ}\text{C}) = 5/9 (T (^{\circ}\text{F}) - 32)$

## Equipment

|                         |  |
|-------------------------|--|
| <b>Name</b>             | <b>ExStik Waterproof pH Meter</b>  |
| <b>Manufacturer</b>     | Extech Instruments   |
| <b>Description</b>      | The Extech ExStik pH Meter uses a flat surface electrode to measure pH in liquids, semi-solids, and solids. The Extech ExStik pH Meter simultaneously displays pH and temperature, as well as an analog bar graph for sample trends  |
| <b>Range</b>            | <p>pH: 0.00 to 14.00 / <math>\pm 0.01\text{pH}</math> typical</p> <p>Temp: 23 to 194o F (-5 to 90o C)</p> <p>Temp Accuracy:</p> <p><math>\pm 1\text{o C}/1.8\text{o F}</math> [from -5 to 50o C (23 to 122o F)]</p> <p><math>\pm 3\text{o C}/5.4\text{o F}</math> [from 50 to 90o C (122 to 194o F)]</p> |
| <b>Calibration</b>      | Calibration is done 24 hours before field testing. The electrode is soaked in a pH 4 solution for about 10 minutes, during which time it stabilizes.   |
| <b>Last Calibration</b> | 11/November/2024   |

**Field Technician:** Jenell Williams-Pinder

**Field Technician's Signature:**







PESTICIDES AND TOXIC CHEMICALS LABORATORY  
CERTIFICATE OF ANALYSIS- RESIDUE

Naree Compound ECD, +592(220)8836 pestlabguyana@gmail.com



Certificate of Analysis #: PTCLRU/2024-031

Date: 15<sup>th</sup> November, 2024

CLIENT'S INFORMATION

|                    |  |
|--------------------|--|
| Client's name      | Brinsjen Systems Development Specialists   |
| Client's address:  | Latchmansingh Street, Tucville, Georgetown |
| Contact person:    | Ms. Jenell Williams-Pinder                 |
| Client's contact:  | (592)-621-3170/629-0758                    |
| Client's order no: | 24/11-033                                  |

Analysis Information

|                                  |   |
|----------------------------------|---|
| Date & time of sample collection | 12 <sup>th</sup> November, 2024 @ 5:52AM-9:12AM |
| Collected by                     | Ms. Jenell Williams-Pinder                      |
| Date and time received           | 12 <sup>th</sup> November, 2024 @ 3:10PM        |
| Sample received by               | Ms. S. Mohabir                                  |
| Department                       | Residue Unit                                    |
| Analysis requested               | Water Quality Analyses (Ammonia)                |
| Date of analysis                 | 14 <sup>th</sup> November, 2024                 |
| Analysis performed by            | Ms. S. Mohabir & Ms. D. Chuniram                |

ANALYSIS RESULTS

| Sample ID                | Lab ID          | Description  |        |             | Active/Parameters Detected   | Quantity Detected |
|--------------------------|-----------------|--------------|--------|-------------|------------------------------|-------------------|
|                          |                 | Quantity (L) | Matrix | Type        |                              |                   |
| Eb-01<br>(Wikki Creek)   | PTCLRU/2411-001 | 1            | Water  | Fresh Water | Ammonia (NH <sub>3</sub> -N) | 0.016 mg/L        |
| Eb-02<br>(Wikki Creek)   | PTCLRU/2411-002 | 1            | Water  | Fresh Water | Ammonia (NH <sub>3</sub> -N) | 0.010 mg/L        |
| Eb-03<br>(Berbice River) | PTCLRU/2411-003 | 1            | Water  | Fresh Water | Ammonia (NH <sub>3</sub> -N) | 0.016 mg/L        |
| Eb-04<br>(Berbice River) | PTCLRU/2411-004 | 1            | Water  | Fresh Water | Ammonia (NH <sub>3</sub> -N) | 0.000 mg/L        |
| Eb-05<br>(Berbice River) | PTCLRU/2411-005 | 1            | Water  | Fresh Water | Ammonia (NH <sub>3</sub> -N) | 0.013 mg/L        |

Test Methods

- Hach Methods for Water Quality

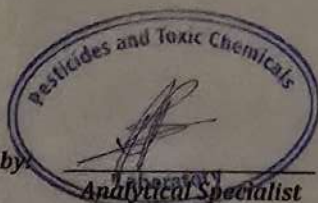


Comments

*Approved*  
*15/11/2024*



Authorized by:



Date: NOV 15 2024

The results reported herein are only for the samples specified and as tested according to the methods specified.  
This test report shall not be reproduced in full without written approval of the laboratory.  
This document is intended only for the use of the party to whom it is addressed and may contain information that is privileged and confidential. If you are not the addressee, you are hereby notified that any review, dissemination, reproduction or other action based on the content of this document is not authorised. If you have received this document in error, please notify us immediately by phone and return to us by mail at the address listed above.



# GUYANA WATER INC.

Water Quality Department: 255 Da Silva St. Newtown Kitty, Georgetown

## RESULTS SHEET

Document ID: GWI-REC-Cust-24/11/003

Customer: Forrester Lumber yard and building complex

Contact Person: Jenell Williams- Pindar

Contact Number: 592-662-9060

Number of Samples: 5 samples (5 bottles)

Sample type: Water

Sampler(s): -

Sample(s) taken on: -

Date of Analysis: -

| Location | Batch #  | Sample #<br>(Chemistry) | Dissolved<br>Oxygen (mg/L) | Total<br>dissolved<br>solids<br>(mg/L) | Sulphate<br>(mg/L) | Nitrate -<br>Nitrogen (mg/L) | Sample #<br>(Microbiology) | Total<br>Coliform<br>(CFU) | E.coli<br>(CFU) | Comments |
|----------|----------|-------------------------|----------------------------|--|--------------------|------------------------------|----------------------------|----------------------------|-----------------|----------|
| Eb - 01  | B-24-465 | 2411/3953               | 7.43                       | 9.66                                   | 0                  | 0.000                        | 2411/3241                  | TNTC                       | 18              | -        |
| Eb - 02  | B-24-465 | 2411/3954               | 7.04                       | 9.88                                   | 0                  | 4.427                        | 2411/3242                  | TNTC                       | 25              | -        |
| Eb - 03  | B-24-465 | 2411/3955               | 6.98                       | 8.20                                   | 0                  | 1.770                        | 2411/3243                  | TNTC                       | 22              | -        |
| Eb - 04  | B-24-465 | 2411/3956               | 6.91                       | 8.85                                   | 0                  | 0.885                        | 2411/3244                  | TNTC                       | 20              | -        |
| Eb - 05  | B-24-465 | 2411/3957               | 7.23                       | 8.17                                   | 0                  | 2.656                        | 2411/3245                  | TNTC                       | 12              | -        |

**Notes:** The results shown above are based exclusively on the samples received. All samples analyzed are water samples and have been submitted in acceptable condition to the laboratory (except where otherwise stated).





# GUYANA WATER INC.

Water Quality Department: 255 Da Silva St., Newtown Kitty, Georgetown

| Parameters             | Method used                           |
|------------------------|---------------------------------------|
| Dissolved oxygen       | HACH Method 8166                      |
| Total dissolved solids | HACH Direct Measurement Method        |
| Sulphate               | HACH SulfaVer 4 Method 8051           |
| Nitrate-Nitrogen       | HACH Cadmium Reduction Method 8039    |
| Total coliform         | HACH Membrane Filtration Method 10029 |
| <i>E. coli</i>         | HACH Membrane Filtration Method 10029 |

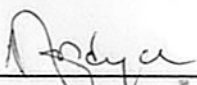
mg/L – milligrams per litre

NTU – Nephelometric Turbidity Units


CFU – Colony Forming Units

TNTC – Too Numerous To Count

## Comments:

  
\_\_\_\_\_  
Laboratory Manager

21-11-2024  
Date

  
\_\_\_\_\_  
Head of Water Quality (aj)

21/11/24  
Date

# **Annex 4:**

## **Stakeholder Consultation Report**

**Farmlands Guyana Inc.**

**Environmental Assessment & Management  
Plan (EAMP)**

**Stakeholder Consultation Report**

**January 2025**

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**References** ..... Error! Bookmark not defined.

## 1.0 Context




This Stakeholder Consultation Report (SCR) was compiled by Franklin-Lynch Environmental and Engineering Services (FLEE Services) for the operation of Farmlands Guyana Inc. (FGI), located in the Ebini Intermediate Savannahs. FLEE Services has been contracted to conduct the Environmental Assessment and Management Plan (EAMP) for FGI. Furthermore, stakeholder consultation forms part of the EAMP for the project and outlines the major issues, as well as the benefits of the project highlighted by some of the key stakeholders.

This SCR will guide engagement with stakeholders by FGI throughout the project's life cycle. The report provides an analysis of feedback from stakeholders who may be impacted whether positively or negatively or influenced by the project. The information was garnered through stakeholder consultations, the review of the supporting project documents provided by FGI and extensive research.

### 1.1 Purpose and Scope

This SCR is based on a Stakeholder Engagement Plan (SEP) developed for the project and includes ways for interacting with stakeholders at this stage of the project. This SEP initially mapped and classified project stakeholders as key, primary, and secondary stakeholders. Furthermore, a SEP was also developed for FGI to guide how different types of stakeholders might interact and impact decision-making throughout the project's life cycle. A Grievance Redress Mechanism, which is an essential component of that plan, was also prepared (refer to appendix 1).

The main objectives of the SEP which guided the consultations were to:

-  Identify potential hazards and reduce risks in the project area of influence (FGI);
-  Leverage stakeholders' knowledge of the project area to identify skills and obtain baseline data for informed decision-making; and
-  Ensure compliance with the legal and institutional framework for large farms in Guyana.

## 1.2 Objectives of stakeholder consultation for FGI's EAMP

The Specific objectives governing the stakeholder consultation for FGI were to:

- ✚ Inform stakeholders of the project's present and expected scope
- ✚ Establish a transparent and open dialogue with stakeholders to clarify the proposed project's nature, scope, and activities
- ✚ Gather baseline information on socioeconomic and environmental conditions affecting FGI operations
- ✚ Gather feedback from stakeholders on environmental and social concerns
- ✚ Document stakeholder comments to verify that the project's EAMP addresses all issues and concerns.

## 2.0 Main Principles of Stakeholder Engagement

This SEP adopted the World Bank's Standards for Stakeholder Engagement; thus, the basic principles are:

- Ensuring inclusiveness by bringing together varied capabilities, experience, and expertise, especially in gender and diversity sectors.
- Supporting Guyana's economic and social growth by working with the government, corporate sector, and stakeholders on sustainability.
- Flexibility: The plan is tailored to FGI's unique local elements.

## 3.0 Project Background

Farmlands Guyana Inc. aims to develop 10,100 hectares or 24,975 acres of land for the cultivation of selected crops in the Ebini Intermediate Savannas. Since operations commenced in May 2024, soybeans were planted on 1500 acres of land. The project saw infrastructural development such as the construction of an office and living quarters, storage facilities and a water well. The company is utilizing Brazilian expertise to aid in management and crop production, given most of the farming materials such as seeds,






pesticides and fertilizers are being sourced from Brazil. Additionally, 75% of the current staff complement are locals while 25% are Brazilian nationals.

#### **4.0 Approaches to Stakeholder Engagement**

The EAMP's effectiveness, truthfulness, and efficacy are critically important to the project's successful execution. Furthermore, stakeholder input supports the identification and management of project risks, and the feedback gained is critical for identifying potential project impacts and developing appropriate mitigation strategies to alleviate such consequences. Given the project risk was considered moderate, stakeholder consultation was the most appropriate way to engage with the project stakeholders. There are numerous advantages to stakeholder consultation, including the detection of early warning signals, creating a mutual understanding of the project, improving an understanding of the dynamics of the project site, and minimizing opposition and boosting buy-in.




The process involves:

-  Identifying and categorizing stakeholders,
-  Conducting consultations, and
-  Documenting and analyzing stakeholder feedback.

The stakeholder consultations offered firsthand invaluable baseline data to inform the EAMP.

##### **4.1 Stakeholder Identification**

Stakeholder identification is relevant to stakeholder consultation. As a result, choosing the appropriate people to connect with is critical to the project's success and objectives. Stakeholders were therefore mapped and classified according to whether they:

-  Are affected by the project, whether positively or negatively;
-  Are interested in the project; or
-  Can affect project's outcome.

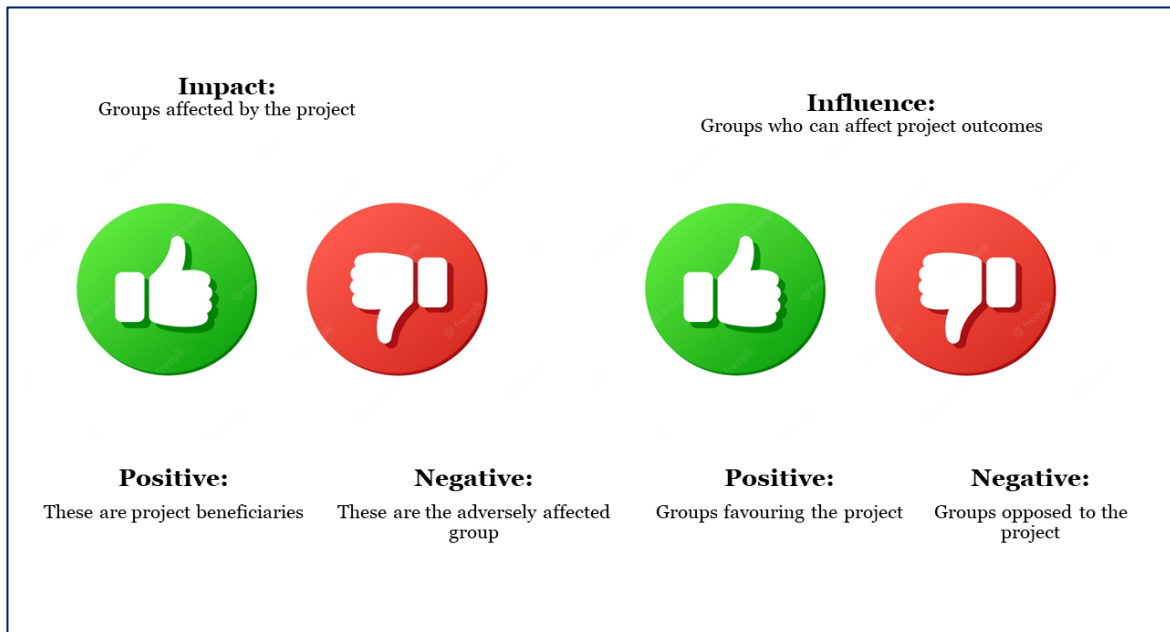


Fig 1: stakeholder mapping model

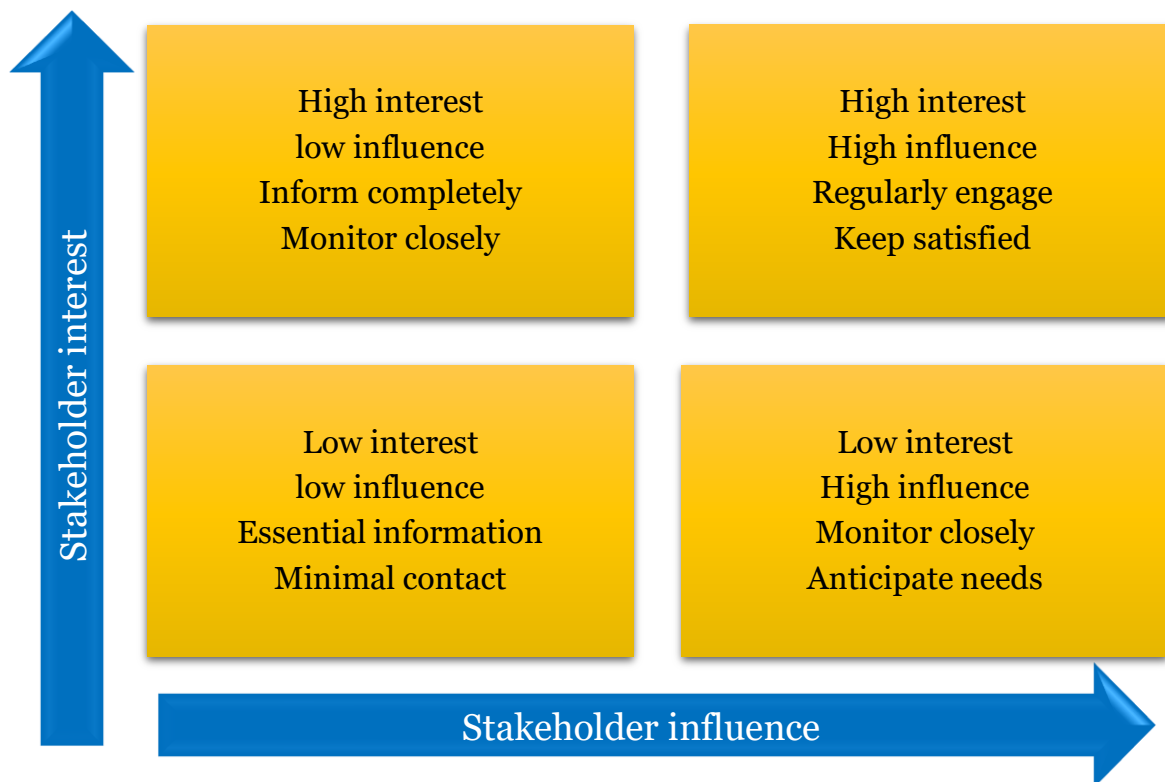


Fig 2: Characteristics of stakeholder mapping model

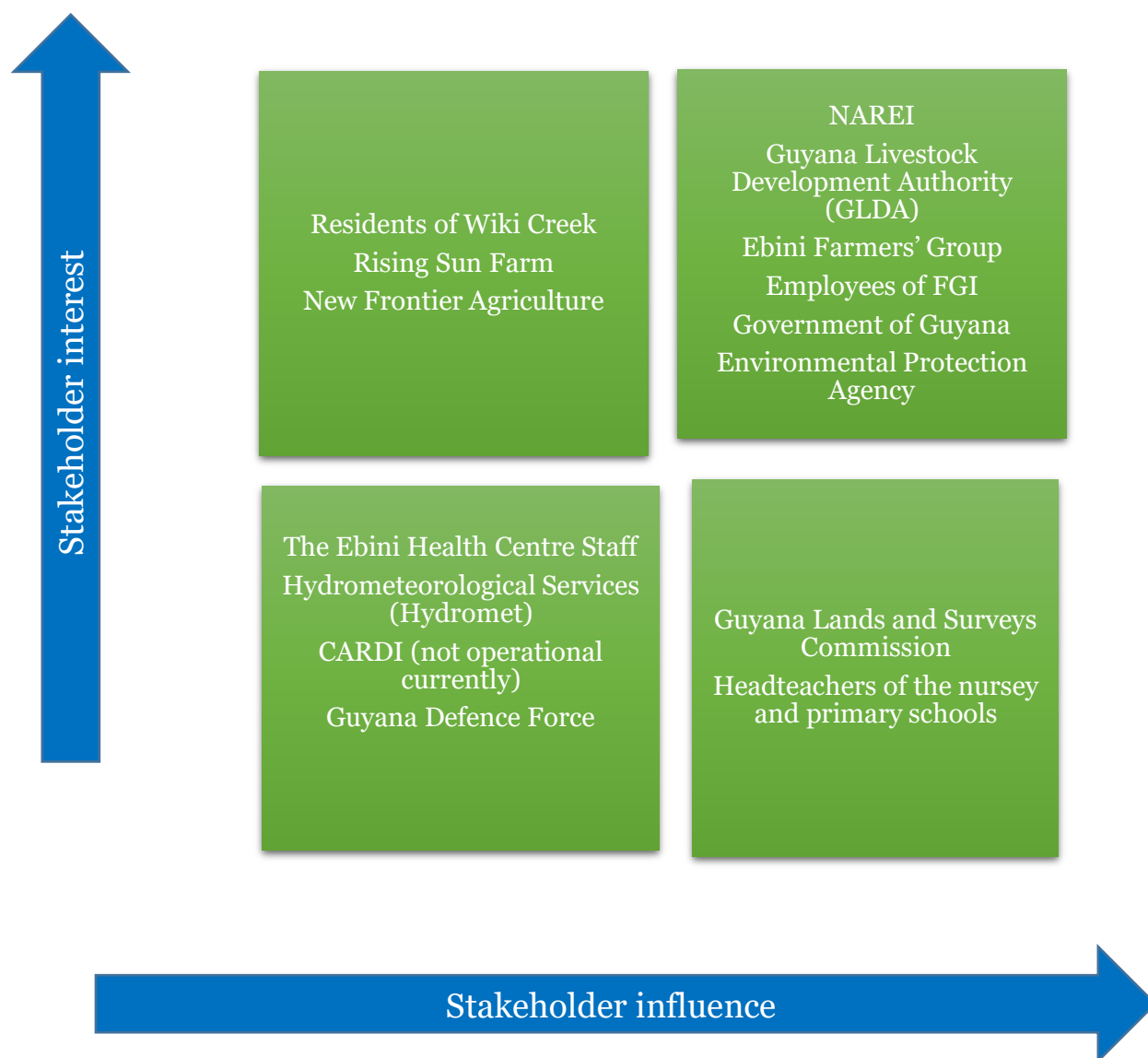


Fig 3: Mapping of FGI stakeholders

## 4.2 Stakeholder Analysis

Three (3) major stakeholder groups identified to be engaged with during various phases of the project<sup>1</sup> are:

<sup>1</sup> Source: Hooper-Box et al. (2020). National Communication Strategy and Implementation Plan 2020-2032: Guyana-EU FLEGT VPA Implementation Phase

- ✚ **Key stakeholders** – Those who significantly influence or are important to the success of the project.
- ✚ **Primary Stakeholders** – Those who are affected by the agriculture project.
- ✚ **Secondary stakeholders** – Individuals or institutions not directly involved in or impacted by the project but have an interest in the overall management of the catchment area.

### **Key stakeholders**

- ✚ National Agricultural Research and Extension Institute (NAREI)
- ✚ Guyana Livestock Development Authority (GLDA)
- ✚ Ministry of Agriculture
- ✚ Ebini Farmers' Group
- ✚ Employees of FGI

### **Primary stakeholders**

- ✚ Residents of Wiki Creek
- ✚ Rising Sun Farm
- ✚ New Frontier Agriculture
- ✚ CARDI (not currently operational)

### **Secondary stakeholders**

- ✚ Ebini Health Centre staff
- ✚ Wikki Health Centre staff
- ✚ Headteachers of the nursery and primary schools
- ✚ Hydrometeorological Services (Hydromet)
- ✚ Guyana Lands and Surveys Commission
- ✚ Guyana Defence Force

### 4.3 Approaches to Stakeholder Consultation

There is no one standard method of engaging stakeholders; however, for the purpose of this project, the following approaches were utilized:

- ✚ Key knowledge holder Interviews
- ✚ Community meeting
- ✚ Focus group meetings; and
- ✚ The administration of questionnaires

## 5.0 Summary of Stakeholder Feedback from EAMP Consultation

The summary of stakeholder consultation in this document provides information on feedback from the key, primary, and secondary stakeholders. Stakeholder consultation was conducted with 75% of the key and primary stakeholders.

### 5.1 Feedback from the Guyana Livestock Development Authority (GLDA)

Table 1: Summary of feedback from the Guyana Livestock Development Authority (GLDA)

| Focus Area          | Stakeholder Response   |
|---------------------|--|
| Nature of operation | GLDA is a semi-autonomous agency which falls under the purview of the Ministry of Agriculture. The organization focuses on delivering public services associated with animal production, animal health, genetics, marketing, training, regulatory and extension services. <sup>2</sup> GLDA commenced operation in the Ebini Intermediate Savannah in 2012. The organization has five thousand (5000) acres of land of which three thousand (3000) is being utilized for livestock |

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<sup>2</sup> This information was extracted from the Ministry of Agriculture website, [www.agriculture.gov.gy](http://www.agriculture.gov.gy)

production. The Ebini operation has nine (9) full-time staff who work from Monday to Friday during regular working hours to provide animal husbandry services for the cattle and Sunday to Sunday for the sheep. Approximately 89% of the staff are from the local community. The organization rears both imported and local breeds of cattle, which includes Brahman, Angus, Beef Master, Mixed Breeds, and the Barbados Blackbelly.

GLDA utilizes natural breeding, artificial insemination, and embryo transfer for their animals. Breeding season is usually in November/December. The organization utilizes mainly tractor, motorcycle and ATV for the day-to-day operation of the farm. The transportation of produce and materials to and from region 4 is done overland (tractor-trailer, canter, truck) and over water then land (barge, tractor-trailer, canter, truck).

|  |   |
|--|---|
| <b>Major challenge</b>                               | Animals' inability to access water during dry seasons.          |
| <b>Grievance Redress</b>                             | Grievances are reported to the supervisor then to HR and or CEO |
| <b>Means of communication</b>                        | Internet (WhatsApp)   |
| <b>Person designated to environmental monitoring</b> | No  |
| <b>Knowledge of FGI operation</b>                    | No  |
| <b>Interest in FGI project information</b>           | Yes   |

## 5.2: Interview with stakeholder National Agricultural Research and Extension Institute (NAREI)

Table 2: Summary of feedback from NAREI

| Focus area          | Stakeholders' questions/ concerns/comments   |
|---------------------|--|
| Nature of operation | <p>The National Agricultural Research and Extension Institute (NAREI) has its Head Office located in region 4 with several regional branches throughout Guyana. The organization focuses on optimizing agriculture development through research, technology development, dissemination and commercialization of research results. The Ebini branch operates a coconut germ plasm on eight 8 acres of land in the Ebini Intermediate Savannahs. Planting commenced in 2010 and there are approximately three hundred (300) plants. The organization also has eighty (80) acres of land used as a mixed orchard comprising of orange, lemon, lime, tangerine, soursop, avocado and mango. The institution also tests the viability of seedlings and provides seedlings to local farmers. The produce from the farm are transported via road to NAREI's Head Office in Mon Repos, East Coast Demerara, for marketing. There is a current staff complement of eleven (11) persons who work from Monday to Friday during regular working hours.</p> <p>Two crops are also planted per year, these comprise of red peas, sorrel and passion fruit using crop rotation on 200-500 acres of land. Crops are harvested manually. The creek is the major source of fresh water for the farm.</p> <p>The Ebini station also conducted experiments on 5 varieties of cassava, and the results were sent to the Head Office. Soil testing</p> |



|                                   |  |
|-----------------------------------|--|
|                                   | is conducted every three (3) months. The major machinery are one Tractor and Trailer as well as a Trusser.   |
| Challenges                        | <p>The major challenges are:</p> <ul style="list-style-type: none"> <li>✚ Unpredictable and extreme weather conditions</li> <li>✚ Inadequate machinery to support the expansion of NARIE's operation</li> <li>✚ Inadequate maintenance of fence by some surrounding private farms/operators which results in conflict with cattle accessing NAREIs premises and destroying crops.</li> </ul> |
| Training                          | Training for staff is conducted in grafting, budding, planting, and seedling preparation.  |
| Concerns about FGI operations     | Types of seedlings being planted, cultivar, pollen transfer from possible genetically modified crops (GMOs)  |
| Communication                     | WhatsApp, direct communication   |
| Knowledge of FGI operation        | Yes  |
| Interest in FGI project operation | Yes  |

### 5.3 Summary of consultation with the residents of Wiki Creek

The consultation with the residents of Wikki followed the procedure for Free Prior and Informed Consent (FPIC) as required for indigenous communities. The meeting was coordinated by the Toshao and saw participation of approximately 25 residents.

Table 3: Summary of consultation with the residents of the Wikki community

| Focus area | Comments/questions/recommendations  |
|------------|---|
| Background | <p>The community was established in July 1931 by the Congregation Missionary Church. All operations of the first settlement were governed by the church. The community has since evolved and now has a population of approximately 280 residents, inclusive of babies and senior citizens. The oldest resident is approximately 84 years old.</p> <p>The community has a Health Centre, ICT hub, a Nursery and primary school and teaching quarters. The Health Centre is managed by a Community Health Worker. The most common illnesses treated by the Health Centre are diabetes and hypertension. The facility is currently catering to approximately 15 elderly patients and providing post-natal care to 15 children, ages 0-5 years. Basic outpatient services are also offered at the facility. The nursery school has a population of seven (7), 57% girls, while the primary school has thirty (30) students, 67% girls. There are seven (7) teachers in total for both nursery and primary school.</p> <p>The residents are dispersed along the Wikki creek in a linear settlement pattern. The creek is a boundary operation with a constant flow of water; however, it overtops during the rainy seasons which results in flooding within the community. The</p> |

|                                   |   |
|-----------------------------------|---|
|                                   | <p>weather patterns have become unpredictable, however, most of the rainfall is experienced from April to June.</p> <p>There is no system for collecting garbage, hence, it is usually burnt. The main jobs available in the community are government related jobs such as teacher, health worker and security guard. Most males leave the community for work either in the forestry or mining sectors.</p> <p>The Wikki Creek is a repository for smaller surrounding creeks which empties into it. The smaller creeks are seasonal. During the rainy season, the run-off from the savannah also drains into the Wikki Creek.</p> <p>The main community centre has tanks for harvesting rainwater; however, the Well is not operational. Some residents also harvest rainwater and store in buckets, barrels, and tanks. Well water is also accessible to some residents.</p> <p>The main forms of communication are WhatsApp, cellular phone. The community has access to some social services such as education and health. The school children receive text and exercise books on an annual basis. Most major vaccines are available and there are visiting doctors to complement the health services. High risk medical conditions and emergencies are referred to the Linden Hospital and most babies are delivered either at home or at a hospital out of the community.</p> |
| Main economic activities          | Farming, fishing, hunting, forestry   |
| Communication services            | Starlink Guyana established WIFI services in 2017/2018 through the Office of the Prime Minister   |
| Heritage land leading through FGI | Bamboo land/Old Calcuni   |

|  |  |
|--|--|
| Active groups/NGOs/Activist in the community | There is a cricket club  |
| Use of the Wiki creek                        | Domestic purposes such as bathing, washing. It is also used for fishing, transport and recreational purposes   |
| Source of food                               | Community members hunt for daily sustenance. Some of the main animals caught include deer ( <i>Cervidae</i> ), Labba ( <i>Cuniculus paca</i> ), wild hog ( <i>Sus scrofa</i> ), bush cow ( <i>Tapirus terrestris</i> ) and water rat   |
| Challenges                                   | <ul style="list-style-type: none"> <li>✚ The community has no sustained supply of electricity. There are solar panels at the community centre and some residents have solar panels.</li> <li>✚ There is a structure for the installation of a well, however, it is incomplete.</li> <li>✚ There are issues with monkeys and wild hogs destroying the plants including cassava, and rice.</li> <li>✚ The birds eat out the mangoes. Jaguars have also been invading the community; they come under the house and eat the cattle.</li> </ul> |
| Needs of the Community                       | <p>The community is in the process of setting up a sawmill as part of its Community Development Plan and is seeking to acquire a Locus Mill to process logs. The residents are exploring planting rice and coconut farming. There are also plans to develop the tourism product in the community. The community needs a tractor for logging, harrow, farming tools and insecticide</p> <p>There is a need for more job opportunities for the youths in the community.</p>  |

|       |   |
|-------|---|
|       | There are 18 acres of land to be developed for which assistance with land clearing is required. |
| Other | The community was advised to send a letter to the company with their specific needs.            |

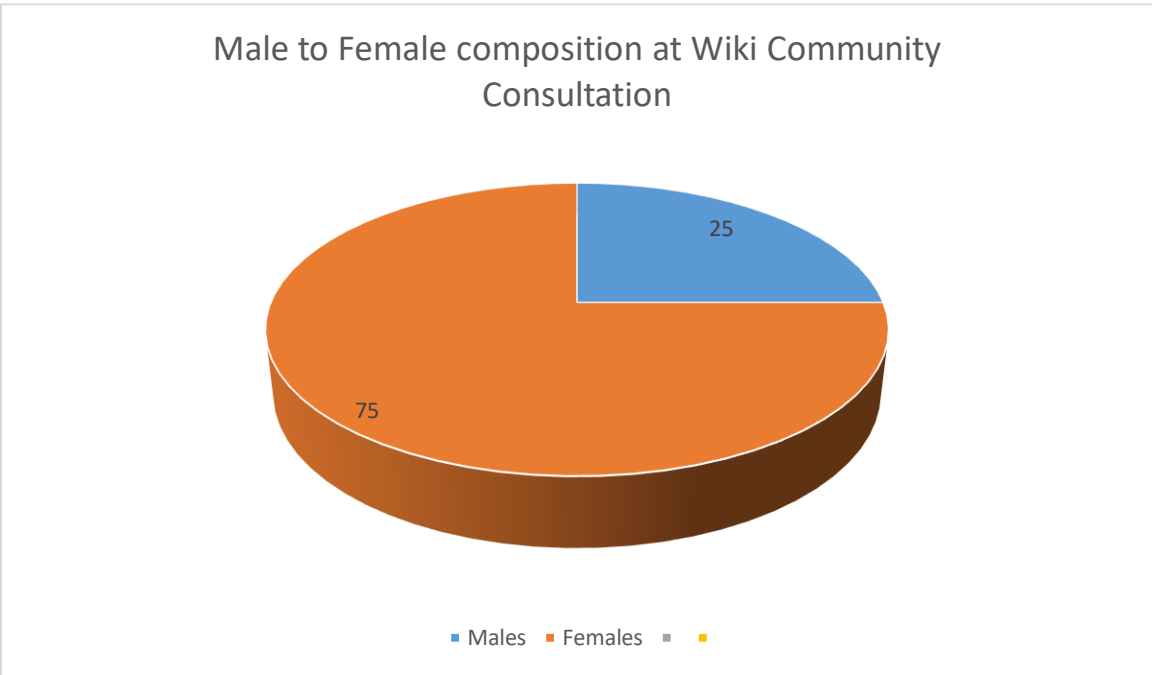


Fig 4: Male-female composition of Wikki Community Consultation

#### 5.4 Feedback from FGI Employees

The company helped to alleviate unemployment in the community by providing direct employment to locals. The current staff complement is twelve (12) persons, 4 of whom are non-nationals (Brazilians). They range from ages 16-50 years and comprise of 10 males and 2 females, both females are caretakers. The role of the staff includes operators, caretakers and labourers. In addition, labourers and operators play an integral role in land preparation, planting and harvesting. The staff work for a maximum of eight (8) hours; however, more time was invested during construction of the buildings for the

operation of the farm. There are currently cultural and language barriers which FGI will have to address in its Stakeholder Engagement Plan (SEP).

The farm utilizes advanced technology (Ambient weather system) for monitoring weather conditions which aid in the operations at the farm. Information relative to FGI's operations is communicated through periodic meetings and direct messages. There is 24-hours internet service but no direct telephone signal. The employees currently operate a small kitchen garden and plant crops such as watermelon and sorrel on a subsistence basis.

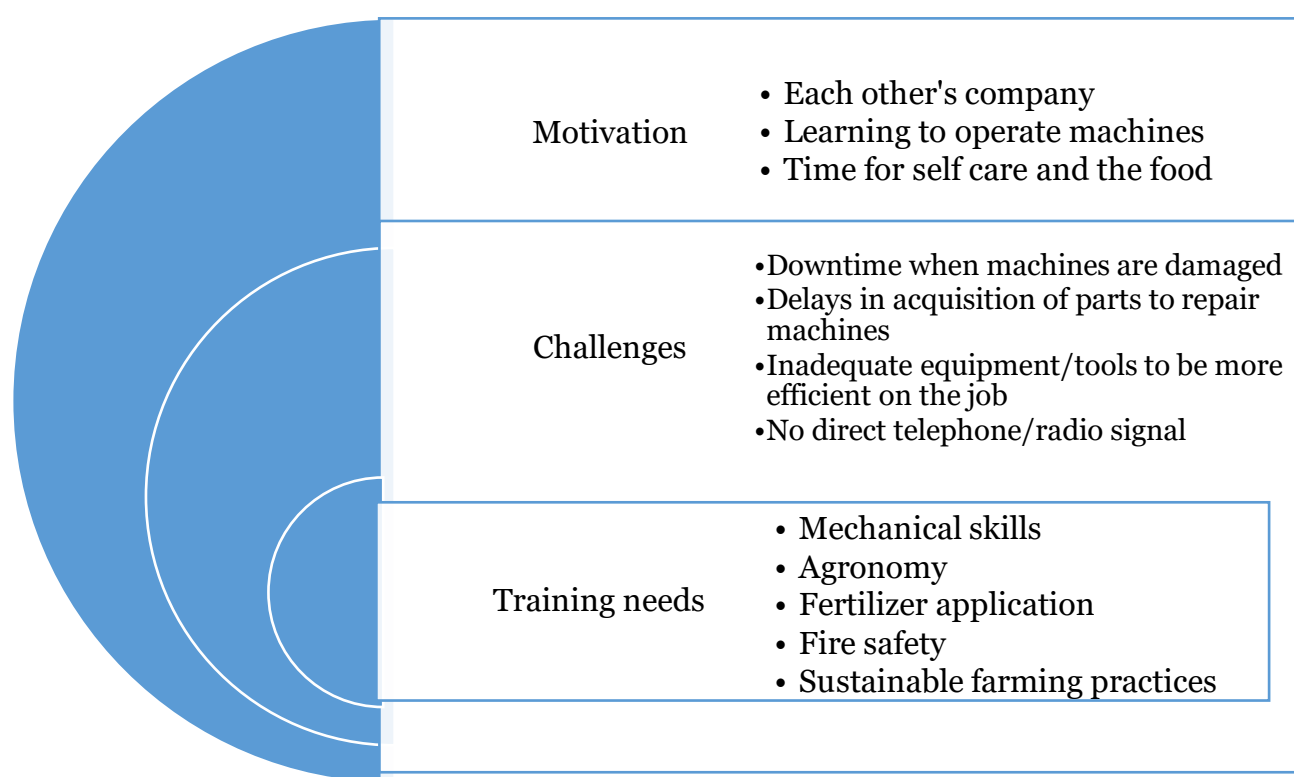


Fig. 5: Feedback from FGI employees

### 5.5.1 Focused Group Meetings

#### 5.5.1.1 Ebini Farmers Association

This sector summarizes the salient points from the focused group meeting with the Ebini Farmers group. There were 21 farmers who participated in the meeting. This group of

stakeholders is critical to the project as they operate small farms within the Ebini Intermediate Savannah.

Table 5: Focused group meeting with Ebini Farmers Group

| Focus area | Comments/questions/recommendations   |
|------------|--|
| Background | <p>The Ebini Farmers Group was established in 2024. It comprises approximately 25 farmers of which 30% are women. Production varies based on husbandry practices. Each farmer has their separate plot of land within the savannah with the smallest being 2 acres and the largest 10 acres. Each farmer follows a similar procedure for land preparation, fallowing and crop rotation. Seedlings are either produced or purchased. NAREI sometimes provides assistance with seeds and seedlings.</p> <p>Plants generally produced are legumes, peas, peanuts, watermelon, sorrel, and ground provision. Yield varies from farmer to farmer based on husbandry practices; however, there are usually two cropping seasons.</p> <p>One farmer has experimented with rice farming on clayey soil on approximately 3 acres of land and the yield has proven to be good. Farmers also utilize the Awara and Crabwood trees within the savannah. The produce is harvested manually and sold mostly within the community. There is limited commercial market for some produce.</p> <p>Some farmers plant close to the Cassarama Creek.</p> <p>The furthest farm is approximately 6 miles from the community. Farmers access by bike, tractor and walking.</p> <p>The area is a biodiversity hub, with approximately 40-50 species of parrots and other birds, including the national bird Canje Pheasant commonly known as Hana. Most farmers apply the common brands of synthetic fertilizers and pesticides to increase</p> |



|                          |  |
|--------------------------|--|
|                          | <p>yields and reduce pest. There is a freshwater spring in the savannah which is the main source of water for the crops.</p> <p>The community has 2 planters, 1 tractor and 7 harrows</p>  |
| Communication services   | Most of the community has internet access, however, there is no direct telephone service. The farmers utilize cellular phone internet service.   |
| Use of the Berbice River | The Berbice River is the main means of transporting the produce, farming materials and equipment. However, the main access road to the savannah was recently renovated, hence, some farmers use the tractor and some off road vehicles.  |
| Other sources of food    | Fishing and hunting are conducted on a subsistence basis. Some of the common fish species include Himara ( <i>Hoplias Aimara</i> ), Lukani ( <i>Cichia ocellaris</i> ), Yarrow ( <i>Hoplerhythrinus thrinus</i> ). The animal species commonly hunted are Wild hog, Tapir, Giant ant eater, Labba, Capybara, Quail, Pigeon, Powis, wild ducks. Three of the farmers are engaged in poultry farming.    |
| Challenges               | <ul style="list-style-type: none"> <li>✚ Lack of market for produce</li> <li>✚ Limited access to resources to enable expansion</li> <li>✚ Low market price for produce</li> <li>✚ Lack of vehicles to transport produce</li> <li>✚ Challenges with pest and diseases such as army worm outbreak, white fly, aphids, paddy bug etc.</li> <li>✚ Extreme drought which adversely impacts crops</li> </ul> |
| Needs of farmers         | <ul style="list-style-type: none"> <li>✚ Transporting or purchasing of produce from the farmers</li> <li>✚ Assistance with land preparation</li> <li>✚ Harvesting of the produce, the community needs a combine</li> <li>✚ Access to alternative freshwater source since the spring water gets very low in the dry season and farmers are required to fetch water for long distances</li> </ul>        |

|  |  |
|--|--|
|  | <ul style="list-style-type: none"> <li>✚ Chainsaw for the group</li> <li>✚ Access to limestone</li> <li>✚ Processing facility</li> <li>✚ Partner with community to harvest viable wood species</li> <li>✚ Provide sand as may be required for construction and other activities</li> </ul> |
|--|--|

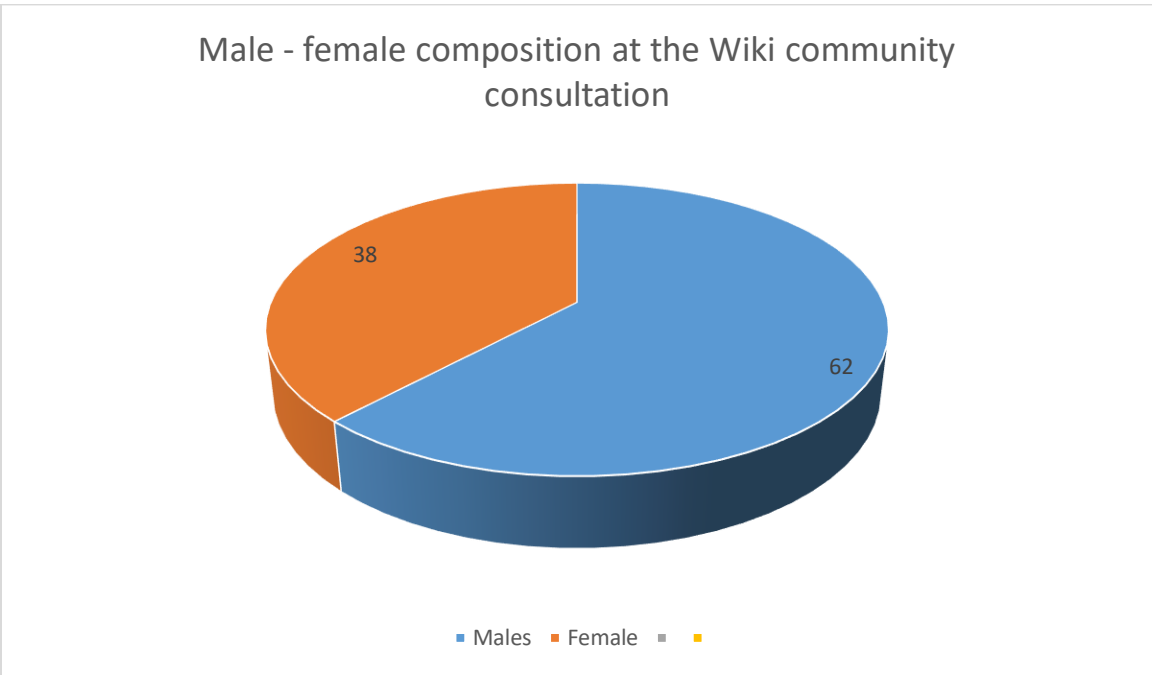


Fig. 6: Male- female ratio of the Ebini Farmers Group

5.5.1.2 Key knowledge holder Interviews - Community Health Workers

**Ebini**

The Ebini Health Centre was constructed in 2004 and serves the communities of Ebini, Ebini Ranch and Juliana with an estimated population of 250 people, ages 0 to 85 years.




The facility provides education and basic primary health care services to all community residents and non-residents. All basic vaccines are available at the Health Centre. There is a visiting doctor once per quarter to address serious illnesses. There are currently two residents (1 adult,1 child) with mobile and speech related disabilities, respectively. The main health challenge to farmers are illnesses related to exposure to chemicals. One major barrier to health care in the community is transporting patients to the hospital for further health care. The institution has an open policy for people to provide feedback on services offered as well as make recommendations to improve the quality of healthcare administered. The table below outlines the services offered and the most common health issues. There have been no recent cases of malaria recorded in the community.

### Wikki/Calcuni

The services provided by the Wikki/Calcuni Health Centre are similar to those provided by the Ebini Health Centre. The most common health issues are diabetes and hypertension. The Health Centre has 15 clients over the age of 65 years, and 15 patients between 0-5 years. It also provides There are currently no reported cases of disabilities.

| Services offered   | Most common health issue   |
|--|--|
| <div> <div></div> <div></div> </div> <div> <input type="checkbox"/> Prenatal/post natal care         </div> <div> <input type="checkbox"/> Child/elderly health         </div> <div> <input type="checkbox"/> Outpatient services         </div> | <div> <div></div> <div></div> </div> <div> <input type="checkbox"/> Common cold and flu         </div> <div> <input type="checkbox"/> Diabetes         </div> <div> <input type="checkbox"/> hypertension         </div> |

### Needs of the Healthcare facility














-  Consistent water and electricity
-  Septic tank needs fixing (Ebini)
-  Clearing of bushes in front of the building (Ebini)

## Headteachers

The Headteachers of the primary schools within the respective communities provided the data for both nursery and primary schools. Each community has one (1) nursery and one (1) primary school. There are currently four pupils (three girls and one boy) and one teacher at the Ebini nursery school, whereas there are thirteen students (sixty-two percent girls) and five (5) teachers at the primary school. Thirty (30) primary school students, 67% of whom are female, and seven (7) nursery school pupils, 57% of whom are female, are part of the Wikki community. The nursery and primary schools are taught by a total of seven (7) teachers.

## 6.0 Identification of priority issues affecting stakeholders

The priority as highlighted by stakeholders includes:

-  Flooding
-  Drought
-  Dust
-  Access to freshwater
-  Transportation of produce and materials
-  Access to advance healthcare and social services
-  Inadequate tools, equipment or machinery enhance work
-  Use of synthetic fertilizers
-  Pest and diseases
-  Improper use or lack of PPEs
-  High unemployment level
-  Inadequate systems for sustainable livelihood activities
-  Inadequate market for produce

## 7.0 Conclusion

The stakeholder consultations conducted for FGI crop farm in the Ebini Intermediate Savannahs highlighted major concerns, as well as recommendations for collaboration with stakeholders. This report will inform the development of FGI's Corporate Social

Responsibility (CSR) Plan. The operations surrounding FGI's farm are compatible and complement each other. They are either involved in crop farming, or some form of animal husbandry.

Environmental issues such as droughts, floods, dust, fertilizer use and depletion of freshwater sources require special attention. Furthermore, the company needs to improve communication with farmers within the savannah as well as surrounding operations and the Wikki Community. The majority of stakeholders do not think the operations of FGI will adversely impact them, however, the company needs to utilise various communication tools including fact sheets, poster, signage etc., and employ methods recommended by the stakeholders to promote transparency, accountability and buy in. Given the language and cultural differences of employees, considerations should also be given to address these in the SEP.

Furthermore, the employees need to be updated regularly on the progress and plan of the project and language training needs to be provided to both categories of employees. FGI should explore having someone designated to oversee and monitor environmental, as well as health and safety matters.

The Environmental Management Plans of the EAMP will address the priority matters highlighted by the stakeholders and ensure the environmental and social safeguards are in place identify risks, mitigate adverse impacts and amplify benefits.

## 8.0 Appendices

## Appendix 1: Stakeholder Engagement Plan for FGI

### 8.1 FGI's draft Stakeholder Engagement Plan

The consulting team is recommending that this Stakeholder Engagement Plan (SEP) guides the interaction between FGI and stakeholders within the project area of influence throughout the project's life cycle. This section provides a draft plan which should remain active and be updated as stakeholder dynamics change. An important component of the SEP is ensuring it is prioritized in FGI's annual budget.

The SEP should capture but is not limited to the following areas:

**8.1.1 Purpose and Scope** – This Stakeholder Engagement Plan aims to guide FGI's interactions with stakeholders identified through the stakeholder analysis captured in FGI's EAMP. The interaction with the various stakeholders throughout the project's lifecycle will be guided by the purpose of the engagement as highlighted in section 8.2.

**8.1.2. Summary of previous stakeholder activities** – Section 5.0 of the Stakeholder Consultation Report captures the summary of the engagements conducted and recommendations for follow up actions to be taken by FGI.

**8.1.3 Identification of priority issues** - the priority issues identified by the stakeholders which require FGI's attention are captured in section 6.0 of the Stakeholder Consultation Report.

**8.1.4 Approaches to stakeholder engagement** – this is influenced by the purpose as posited in section 4.0 of this SCR.

**8.1.5 Implementation schedule** – FGI will have to formulate an implementation schedule to ensure stakeholders' priority issues are addressed strategically.

**8.1.6 Resources and responsibilities** – FGI's implementation schedule will clearly identify the responsibilities for stakeholder engagement and assign adequate resources, including financial resources where required.

**8.1.7 Documenting engagement activities** – as highlighted in the EAMP's Stakeholder Consultation Report, section 5.0, each engagement activity with stakeholders regardless of the magnitude, should be documented through documentation of participants, meeting minutes, photographs etc.

**8.1.8 Grievance Redress Mechanism (GRM)** – The GRM forms part of this SEP; the complaints/incidence form and procedures outlined forms part of this plan.

**8.1.9 Monitoring and reporting** - This outlines information pertinent to monitoring and reporting on the status of the SEP.

Important to note are the following considerations when continuing to engage with the project stakeholders.

- ✚ Cultural context of the project area;
- ✚ Stakeholders' expectations of the engagement;
- ✚ Level of influence of stakeholders;
- ✚ Stakeholders' capacity to engage (language barriers, disability, gender etc.)

Please refer to Stakeholder Consultation Report and the socioeconomic section of the EAMP for details regarding the project stakeholders and the baseline data collected.

Within FGI's Project Area of Influence, the vulnerable groups are

- ✚ Elderly people;
- ✚ Persons living with disabilities
- ✚ Persons with basic education
- ✚ Low-income families;
- ✚ Women-headed households or single mothers with underage children; and
- ✚ Unemployed persons

Hence, this group of stakeholders should receive extra consideration.

## **8.2. 0 Determining the level of influence**

Access to information alone is insufficient for effective stakeholder engagement; instead, an efficient feedback system is necessary to satisfy stakeholders' expectations for the change brought about by their participation and contributions, which will enhance development results.



- ✚ **Inform** – provide stakeholders with balanced and objective information to assist them in understanding the dynamics of the FGI project
- ✚ **Consult** – Obtain feedback on analysis, alternatives and decisions
- ✚ **Collaborate** – Partner with some key stakeholders in all decision-making
- ✚ **Empower**- Final decision-making in the hands of people

### 8.2.1 Levels of stakeholder engagement

It is crucial to remember that the degree of stakeholder engagement may vary depending on the risks the project poses to the different stakeholder categories at different stages of the project.

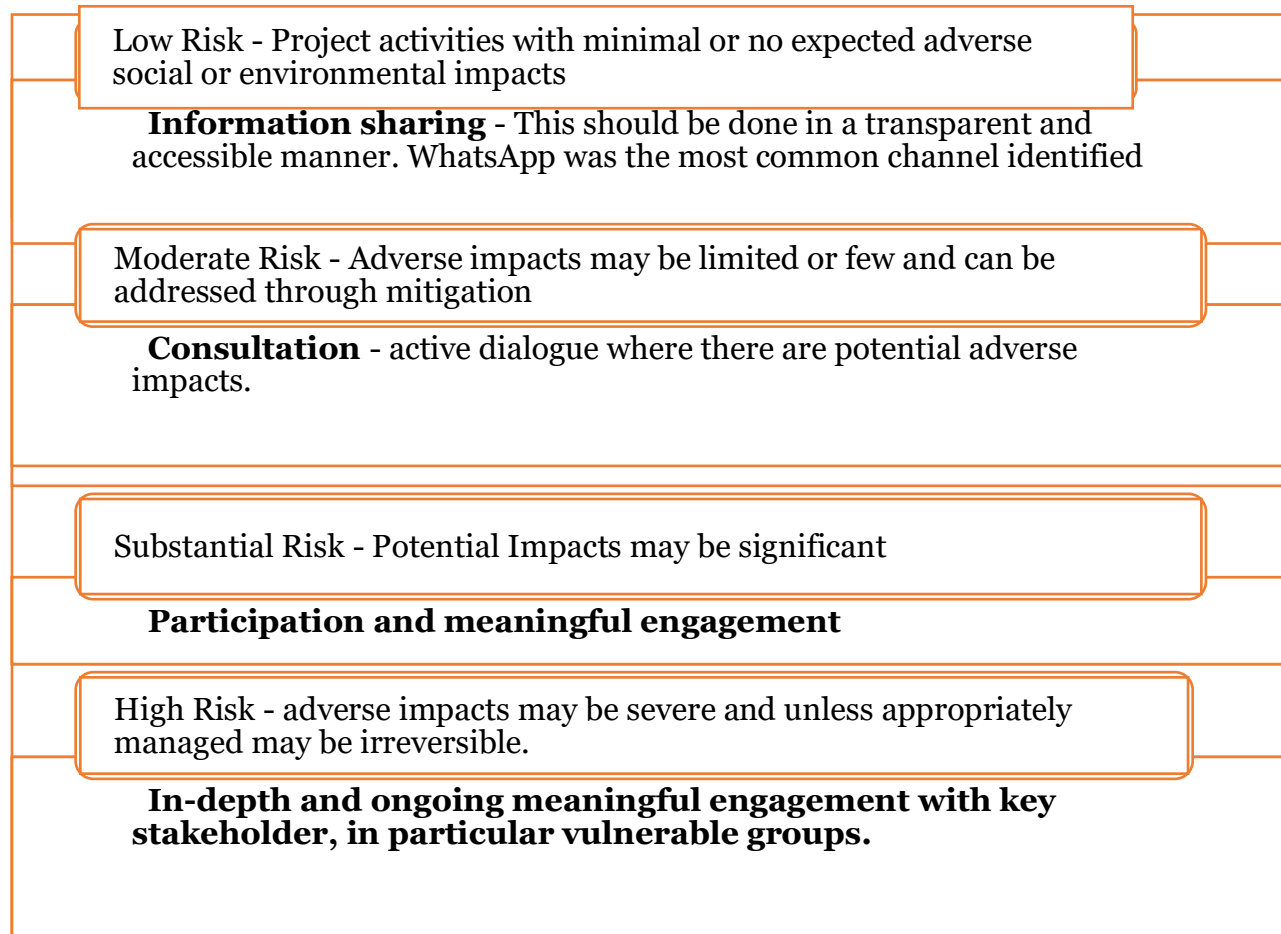


Fig 7: The relationship between levels of engagement and project risks

### 8.3 Dissemination of project information

The platforms that the stakeholders identified during the stakeholder engagement process should be used to distribute pertinent project documents. The stakeholders' needs should be satisfied by the information offered. Posters, flyers, infographics, fact sheets, and brochures are examples of printed products that should contain good illustrations and be straightforward, understandable, and educational. Project impacts, mitigation strategies, design solutions and technologies, project accomplishments, advantages, planned activities, activity timetable, etc., should all be the main topics. Contact information for follow-up should be included in all materials.

### 8.4 Guidelines for stakeholder engagement in the Ebini Intermediate Savannahs

- ✚ Give enough notice to the stakeholders (at least 7-14 days in advance), including the day, time, and venue. This notice should be presented in a way that will allow as many people as possible to respond.
- ✚ Use the approaches identified in the SCR.
- ✚ Give stakeholders the opportunity to designate one or two individuals from the local authority or project area of influence to serve as the point of contact and liaison for project information
- ✚ For indigenous communities such as Wikki, follow the procedure for FPIC.<sup>3</sup>
- ✚ Provide sufficient information so that the stakeholders are equipped to give careful consideration and intelligent responses.
- ✚ Allow sufficient time for the consulted parties to provide well thought out responses and advice.
- ✚ Provide an attendance sheet and make sure all participants fill it out with their basic contact details so that feedback may be obtained.
- ✚ Pay attention to the remarks stated and honestly think about how the project might address them.

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<sup>3</sup> Mean Free Prior and Informed Consent in accordance with the 2006 Amerindian Act.

- ✚ Utilize the recommended grievance and complaint resolution process (see Grievance Redress Mechanism in section 8.6).

## 8.5 Documentation of stakeholder engagement activities<sup>4</sup>

The documentation of the stakeholder engagement activities includes:

- ✚ Methods of engagement,
- ✚ Records of who participated and who did not
- ✚ Timeframe of consultation activity
- ✚ Summary of major concerns, expectations and perceptions
- ✚ Summary of key discussions and interventions; and
- ✚ Key actions and decisions

## 8.6 Grievance Redress Mechanism (GRM)

The World Bank (2022) states that GRMs are successful when people are dedicated to using them in accordance with good practice guidelines, which include:

- ✚ Providing appropriate channels for recording complaints;
- ✚ Registering complaints in a log;
- ✚ Assessing and acknowledging complaints in a timely manner;
- ✚ Responding and resolving matters; and
- ✚ Ensuring transparency in the grievance procedure as well as options for mediation and appeal.

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<sup>4</sup> Guidance extracted from World Bank (2018). Environmental & Social Framework for IPF Operations, ESS10: Stakeholder Engagement and Information Disclosure

## 8.7 Recommended GRM for the FGI

Table 7: Outline for the FGI GRM

| Activity                          | Comments   |
|-----------------------------------|--|
| <b>Establish and share GRM</b>    | Ensure stakeholders are aware of the GRM and complaint/incident form, including how to access it   |
| <b>Contact details</b>            | <p>Information about grievance reporting should be included in the GRM. Phone numbers, WhatsApp numbers, email addresses, text messages, social media accounts, mailing addresses, and so on should all be included. It should include the governing structure, including the grievance method, decision-makers, waiting time, contact personnel details, and the availability period for submitting grievances.</p> <p>Establish a dedicated WhatsApp number that stakeholders can utilize to ask questions, get information, or offer comments on the project.</p> |
| <b>Establish Grievance system</b> | <p>A system for receiving, evaluating, discussing, and resolving complaints should be in place. As the project progresses, this system should be evaluated and adjusted as needed.</p> <p>For all outside parties, the grievance</p>   |

|                                 |  |
|---------------------------------|--|
|                                 | <p>resolution mechanism should be an easy, equitable, and transparent procedure. Grievances ought to:</p> <ul style="list-style-type: none"> <li>+ Be dealt with promptly and consistently</li> <li>+ Show concern for stakeholders' well-being and work to reduce project-related risks and effects.</li> <li>+ Create a culture of goodwill and trust.</li> <li>+ Recognize new problems and trends and help with remedial measures.</li> <li>+ If required, schedule trips to the project site to discuss the effects.</li> </ul> |
| <b>Record keeping</b>           | Accurate records must be kept and maintained for all aspects of the grievance management process.  |
| <b>Training</b>                 | The personnel who will be responsible for handling concerns relating to this project must be familiar with the GRM in place and have an understanding of the project and main problems of concern.   |
| <b>Monitoring of grievances</b> | It is important to keep track of and monitor grievance data, as well as the activity of contractors and impacted stakeholders.   |
| <b>Reporting</b>                | Project reporting whether on a monthly, quarterly, or annual basis should include information about grievances addressed, if applicable.   |

## 8.8 Monitoring and Reporting

Throughout the project life cycle, the SEP should be tracked and reported on.

It should reflect any delays, changes or modification of project activities. Additionally, a summary of the monitoring reports consistent with the project's performance indicators for stakeholders should be published on a monthly, quarterly or annual basis. These can include<sup>5</sup>:

- ✚ Any updates of the stakeholder list;
- ✚ Records of all engagements conducted;
- ✚ Any changes to stakeholder procedures;
- ✚ Any assistance given to stakeholders
- ✚ Frequency of engagement activities,
- ✚ Changes in the dynamics of surrounding communities (if applicable); and
- ✚ Status of all grievances received and dealt with (this information should be entered into a grievance log physically or on a computer), etc. The information on the complaints form can be transferred to a log or digital database.

## 8.9 Information management

The ability to maintain precise and instructive records of engagement activities, such as a stakeholder list and a grievance mechanism log, is crucial to guaranteeing the effectiveness of the SEP. Other important records include:

- A log of complaints;
- Meeting minutes;
- Meeting recordings; and

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1. <sup>5</sup> Components of this section were extracted from SNNP IAIP and RTC (2017). Stakeholder Engagement Plan.

- Attendance records.

## **Appendix 2: Instrument used for stakeholder organisations**



**Environmental Assessment and Management Plan**  
**Farmlands Guyana Inc**  
**Stakeholder Engagement Questionnaire for Organisations**  
**October 2024**

| Questions  | Responses |
|--|-----------|
| <b>Stakeholder organisation</b>  |           |
| <b>Interviewee (name and designation)</b>  |           |
| <b>Nature of operation</b> <ul style="list-style-type: none"> <li>✓ When did the operation commence</li> <li>✓ Area of the land</li> <li>✓ Area under cultivation/livestock production</li> <li>✓ # of staff (full-time/part-time)</li> <li>✓ Working days/times</li> <li>✓ Source of seedlings/livestock</li> <li>✓ Varieties/species of crops being planted</li> </ul> |           |
| <b>What percentage of staff are locals?</b>  |           |
| <b>Where is the market for the produce?</b>  |           |
| <b>How are the crops/livestock marketed?</b>   |           |
| <b>What's the method and frequency of planting/growing seasons?</b>  |           |
| <b>What's the method of harvesting?</b>  |           |
| <b>How is the produce transported to the market?</b>   |           |
| <b>What type of equipment/machinery is used on the farm/operation?</b>   |           |

|  |  |
|--|--|
| <b>What are some major challenges you have had since operating at this location?</b>                         |  |
| <b>What type of training is provided to staff and what's the frequency?</b>                                  |  |
| <b>Is there an assigned staff to oversee environmental monitoring, occupation safety and health?</b>         |  |
| <b>Are you aware of activities of FGI? If yes, how were you made aware?</b>                                  |  |
| <b>What system do you have for addressing grievances within your operations</b>                              |  |
| <b>Do you have any questions/ concerns/recommendations about o the FGI project?</b>                          |  |
| <b>Would you like to have additional information concerning the FGI project?</b>                             |  |
| <b>What is the most effective method of communicating information with your operation?</b>                   |  |
| <b>Have you had any accidents /incidents within your operation over the last 3-5 years? Briefly describe</b> |  |
| <b>Other comments?</b>   |  |

### Appendix 3: Instrument used for the Wikki Creek community consultation

#### Environmental Assessment and Management Plan

#### Farmlands Guyana Inc

#### Stakeholder Engagement Questionnaire for Wiki/Calcuni Community

October 2024

| Questions   | Responses |
|---|-----------|
| 1. A background of the community<br>When and how was it established? How has it changed over the years? What facilities/services are available?<br>Demographics (age range, gender, size (est. # of persons residing in the community), education, the longest that living resident |           |
| 2. Main economic activities   |           |
| 3. Communication services available   |           |
| 4. Amerindian heritage land –road ways leading through Ebini farm to Amerindian villages?   |           |
| 5. Are there local ‘activist’/NGO group that is active in the area.   |           |
| 6. Does the community use the Wikki creek for domestic purposes – drinking, bathing etc.?   |           |

|   |  |
|---|--|
| <b>7. Do the community members hunt for fun or food?</b>                  |  |
| <b>8. What is the main source of fresh water for the community?</b>       |  |
| <b>9. Does any fishing for fun or food take place in the Wikki creek?</b> |  |
| <b>10. Is the Wikki creek seasonal</b>                                    |  |
| <b>11. What's the rainfall pattern?</b>                                   |  |
| <b>12. What health services are available?</b>                            |  |
| <b>13. What are some major challenges you have in your community?</b>     |  |
| <b>14. What recommendations do have to overcome those challenges?</b>     |  |
| <b>15. Has there been any flooding in the community?</b>                  |  |
| <b>16. What's the general weather pattern?</b>                            |  |

## Appendix 4: Instrument used for the Ebini famers focus group meeting

Farmlands Guyana Inc

Stakeholder Engagement Questionnaire for Ebini Farmers Association

October 2024

| Questions  | Responses |
|--|-----------|
| <b>1. Nature of operation</b> <ul style="list-style-type: none"><li>○ Area under cultivation</li><li>○ What type of farming do you do i.e. subsistence, commercial</li><li>○ Working days/times</li><li>○ Source of seedlings</li><li>○ Varieties/species of crops being planted</li></ul> |           |
| <b>2. How long have the land been cultivated?</b>  |           |
| <b>3. How far away from your farm do you live?</b>   |           |
| <b>4. How do you access your farm?</b>   |           |
| <b>5. What's your method of farming?</b>   |           |
| <b>6. Where is the market for the produce?</b>   |           |
| <b>7. How is the produce transported to the market?</b>  |           |
| <b>8. What is the planting /harvesting seasons?</b>  |           |
| <b>9. What's the method of harvesting?</b>   |           |
| <b>10. What is your source of water for your crops?</b>  |           |
| <b>11. Do you fish or hunt for food or recreationally?</b>   |           |
| <b>12. Do you rear poultry or any other animals for food?</b>  |           |
| <b>13. What type of fertilizer do you use?</b>   |           |

|  |  |
|--|--|
| <b>14. Have you seen any new pests/diseases infecting your crops over the past 2 years? Are there any wild animals to interfere with your crops?</b> |  |
| <b>15. Have you experienced any unusual climatic events over the past year? Floods, droughts etc.</b>  |  |
| <b>16. What type of equipment/machinery is used on the farm?</b>   |  |
| <b>17. What are some major challenges you have had since operating at this location?</b>   |  |
| <b>18. Has anyone from FGI met with you?</b>   |  |
| <b>19. Have there been any changes in water availability or quality since the large farm began operations?</b>                                       |  |
| <b>20. Is there any noticeable impact on local biodiversity, such as changes in wildlife, beneficial insects, or pollinator populations?</b>         |  |
| <b>21. Are you aware of activities of FGI? If yes, how were you made aware?</b>  |  |
| <b>22. Are there any collaborative efforts with the FGI to access shared resources (e.g., machinery, technology, or transportation)?</b>             |  |
| <b>23. Have there been any disputes over land boundaries, access to water, or other shared resources between you and the FGI?</b>                    |  |
| <b>24. Has the FGI offered any training, workshops, or knowledge-sharing opportunities that could benefit small farmers?</b>                         |  |
| <b>25. Have any local farmers or their families been employed by the FGI? If so, how has this impacted the community or individual livelihoods?</b>  |  |
| <b>26. Has FGI contributed to local community development (e.g.,</b>   |  |

|   |  |
|---|--|
| through infrastructure, educational programs, or financial support)?                                      |  |
| 27. Do you feel that the presence of FGI has had a positive or negative impact on your community?         |  |
| 28. Do you have any questions/ concerns/recommendations about the FGI project?                            |  |
| 29. Would you like to have additional information concerning the FGI project?                             |  |
| 30. How would you prefer to receive information on the project?   |  |
| 31. Have you had any accidents /incidents within your operation over the last 3-5 years? Briefly describe |  |
| Other comments?   |  |

## Appendix 5: Instrument to collect health related information

### Environmental Assessment and Management Plan

#### Farmlands Guyana Inc

#### Stakeholder Engagement Questionnaire for Health Care Provider

October 2024

| Questions  | Responses |
|--|-----------|
| 1. Name and designation  |           |
| 2. What's the estimated size of the population you serve/which communities?                                      |           |
| 3. What's the age range of the persons you serve?  |           |
| 4. Can you describe your role as a community health worker   |           |
| 5. How long has the Health Centre been operational?  |           |
| 6. What specific health issues do you encounter frequently? Any recent cases of malaria?                         |           |
| 7. Are there any clinics, prenatal, children, elderly etc.?  |           |
| 8. What barriers do farmers/community members face in accessing healthcare services?                             |           |
| 9. Have you provided any service to Farmlands Guyana Inc. employees, if yes, what was the nature of the service? |           |
| 10. How do you gather feedback from the community members about their health needs?                              |           |
| 11. What do you see as the biggest health challenges facing farm workers in the future?                          |           |



|   |  |
|---|--|
| <b>12. How can the community and organisations better support the health care system?</b> |  |
| <b>13. Comments/Questions/recommendations</b>   |  |

## Appendix 6: Instrument used for FGI employees focus group meeting

### Environmental Assessment and Management Plan

#### Farmlands Guyana Inc

### Stakeholder Engagement Questionnaire for FGI Employees

October 2024

| Questions   | Responses |
|---|-----------|
| <b>Background</b><br><b>Demographics</b><br>What is your role on the farm, and how long have you been working here?<br>What motivated you to work with FGI?<br>Can you describe a typical day in your position? |           |
| What do you enjoy most about your job?  |           |
| What are some of the biggest challenges you face?   |           |
| How do you think the farm's operations could be improved?   |           |
| What are the most important skills needed to succeed in your position?  |           |
| How does your team communicate and collaborate during busy seasons?   |           |
| What technological advancements have you seen on the farm recently?   |           |
| What safety measures are in place at FGI?   |           |
| Have you noticed any different weather patterns over the past year?   |           |
| How do you stay informed about regulations and best practices in agriculture?   |           |
| How does the farm engage with the local community?  |           |
| What sustainable practices are implemented on the farm?   |           |
| Would you like to receive additional information on the FGI project?  |           |

|  |  |
|--|--|
| <b>Where do you see the future of FGI heading in the next few years?</b> |  |
| <b>Comments/Questions/recommendations</b>                                |  |

## Appendix 8: Sample registration form

### Farmlands Guyana Inc. Environmental Assessment and Management Plan (EAMP)

#### Stakeholder Engagement Registration Form

#### Ebini Farmers Association

**Date: October 16, 2024**  
**Waterfront**

**Time: 09:30h**

**Venue: Ebini**

| <b>Name</b> | <b>Gender</b> | <b>Occupation</b> | <b>Contact<br/>number</b> | <b>Email address</b> |
|-------------|---------------|-------------------|---------------------------|----------------------|
|             |               |                   |                           |                      |
|             |               |                   |                           |                      |

### 8.1: List of participants from Ebini Farmers Association stakeholder consultation

| <b>Name</b>       | <b>Occupation</b>       | <b>Gender</b> |
|-------------------|-------------------------|---------------|
| Dennis Taylor     | Farmer                  | Male          |
| Sandra Taylor     | Farmer                  | Female        |
| Everton DaSilva   | Farmer                  | Male          |
| Sylvester Taylor  | Farmer                  | Male          |
| Sigmond Donnette  | Farmer                  | Male          |
| Kerwin Gonsalves  | Farmer                  | Male          |
| Orris Sinclair    | Chairman                | Male          |
| G. Lyte           | Supervisor FGI          | Male          |
| Elizabeth Taylor  | Farmer                  | Female        |
| Shemika Miller    | Community Health Worker | Female        |
| Ryan Taylor       | Farmer                  | Male          |
| Hilary D'Andrade  | Farmer                  | Male          |
| Cleveland DeJonge | Farmer                  | Male          |
| Akella Richards   | Farmer                  | Female        |
| Occila Jones      | Farmer                  | Female        |
| Gonsalves         | Farmer                  | Female        |
| Curtis Leacock    | Farmer                  | Male          |
| Nicola Sears      | Farmer                  | Famale        |
| Deon Taylor       | Farmer                  | Male          |
| Kimton Richards   | Farmer                  | Male          |

## 8.2: List of participants from Wikki/Calcuni community consultation

| <b>Name</b>       | <b>Occupation</b>     | <b>Gender</b> |
|-------------------|-----------------------|---------------|
| Rose Allicock     | Housewife             | Female        |
| R. Johnson        | Not stated            | Male          |
| Eve Tobin         | Housewife             | Female        |
| Zinne Rogers      | Not stated            | Female        |
| Zaheer France     | Not stated            | Male          |
| Alana Hartman     | Part-time worker      | Female        |
| Emelda Daniels    | Farmer                | Female        |
| Issac Miguel      | Farmer                | Male          |
| Dean Lambert      | Farmer                | Female        |
| Nikita Rogers     | Clinic Attendant      | Female        |
| Renita Reece      | Headteacher           | Female        |
| Garfield Johnson  | Medex                 | Male          |
| W. Soogrim        | Labourer              | Male          |
| Rawk Johnson      | Labourer              | Male          |
| Gavin Jessamy     | Not stated            | Male          |
| Natalie Johnson   | Pensioner             | Female        |
| Kevin Seegolam    | Toshao                | Male          |
| Shamar Corlette   | Teacher               | Male          |
| Akeisha Allicock  | Health worker         | Female        |
| Fay John          | Part-time worker      | Female        |
| Trudie John       | Part-time worker      | Female        |
| Sharon Johnson    | Housewife             | Female        |
| Asha Norton       | Not stated            | Female        |
| Elizabeth Charles | Not stated            | Female        |
| G. Lyte           | FGI farmer Supervisor | Male          |

# **Annex: 5**

## **Wildlife present within FGI landscape<sup>1</sup> and zone of influence**

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<sup>1</sup> Table adapted from the biological baseline and community engagement reports

| Common Name       | Scientific name                  | IUCN <sup>2</sup><br>CITES <sup>3</sup><br>√ Yes/No X | Preferred Habitat   | Abundance/ Ecological Role in Ecosystem  | Predators  |
|-------------------|----------------------------------|---|---|--|--|
| Capybara          | <i>Hydrochaeris hydrochaeris</i> | X   | Combination of grassland and freshwater areas, streams & marshes but never brackish waters. Forest is used least. Herbivorous grazers of grasses & some aquatic vegetation (Lord, 2009)<br>Live in social groups with a dominant male leading the group.<br>Home range averages 10 to 15 ha | Largest living rodents in the world Classified by IUCN as of least concern, however abundance is a concern as where habitat is suitable and they were once abundant, they have been extirpated due to hunting. (Lord, 2009)<br>Tolerant of humans, and practice geophagy in soils where agrochemicals have been added. Reported climbing into latrines to obtain minerals produced by urine (Lord, 2009) | Hide from prey in dense vegetation, forest galleries or make their escape by diving into water and swimming away. (Lord, 2009)<br>Humans are their greatest predators as well as Pumas, Jaguars, Anacondas Boas, Savannah foxes & Ocelots. |
| Red Rumped Agouti | <i>Dasyprocta leporina</i>       | X   | Forest dwellers with a sizable range. Range 2.9 – 8.5 ha 40 agouti per km <sup>2</sup>  | Highest abundance (Pierre et al., 2020)<br>Seeds, pulp, leaves & invertebrates, short distance & very important seed dispersers (Silvius & Fragoso, 2003)  | Main predator – Ocelot   |
| Paca              | <i>Cuniculus paca</i>            | X   | Forested areas. A frugivore that forages at night – fruit and seeds from the forest floor. Water courses provide the escape route from predators  | Abundant in Colombian savannah (Mosquera-Guerra et al., 2024) Large rodent frugivore – Availability of food resources predicts paca habitat use (Melo-Dias et al., 2024).  | Jaguar & puma's are predators. positive relationship between puma occurrence and paca habitat use. T (Melo-Dias et al., 2024)<br><br>Both pacas and pumas are distributed according to their   |

<sup>2</sup> IUCN International Union for the Conservation of Nature

<sup>3</sup> CITES Convention on International Trade in Endangered Species of Wild Fauna and Flora



| Common Name      | Scientific name                | IUCN <sup>2</sup><br>CITES <sup>3</sup><br>√ Yes/No X | Preferred Habitat  | Abundance/ Ecological Role in Ecosystem  | Predators   |
|------------------|--------------------------------|---|--|--|---|
|                  |                                |   |  |  | food source. Pumas have a large home range(Melo-Dias et al., 2024)  |
| Giant Armadillo* | <i>Priodontes maximus</i>      | √ <b>Vulnerable</b>                                   | <p>Burrows found on sloped areas &gt; 25° in forest near water source<br/>Inhabits forests mainly and natural savannahs (5% )(Aya-Cuero et al., 2017).<br/>Lives primarily (75% of time) underground, changes burrow every 2 days (Desbiez &amp; Kluyber, 2013).</p> <p>Conservation of riparian forests is fundamental for the persistence of <i>P. maximus</i> populations and the ecological community that is associated with its burrows.(Aya-Cuero et al., 2017)</p> | <p>Provides burrows and wallows for other wildlife eg birds forage with chicks in burrow entrances and peccaries use abandoned burrows.(Desbiez &amp; Kluyber, 2013)</p> <p>Lowest abundance (Pierre et al., 2020)</p>   | <p>Hunters are the main predators, also jaguars.</p> <p>Depleted population due to habitat loss, degradation and fragmentation, (agriculture)and vulnerable to agro-chemicals(Aya-Cuero et al., 2017; Mosquera-Guerra et al., 2024)</p>   |
| Giant Anteater*  | <i>Myrmecophaga tridactyla</i> | √ <b>Vulnerable</b>                                   | <p>Terrestrials rarely use their ability to climb trees, they forage in many types of habitats including scrub savannah, grasslands, forest patches, gallery forests near water. Extirpated from central America.(Gaudin et al., 2018)</p>   | <p>low abundance (Pierre et al., 2020)<br/>Solitary animals except in breeding season. One offspring/9 months lives up to 15 years in the wild. Females tend to return to their area of origin to breed.<br/>Low reproductive rate &amp; specialized diet contribute to their decline but also fragmentation and loss of habitat involved. Uncertain any cultural reasons in Guyana to hunt the AE, in Venezuela hunted for claws, other parts of SA for their hide.</p> | <p>Predators-Hunters, Jaguars. Prey. Prefers ants and termites.<br/>Feeding depends on the season and location. Will feed in grasslands with a high density of termite mounds preferred but will make use of cropped areas if mounds of termites/ants are present (Gaudin et al., 2018)</p> |

| Common Name          | Scientific name                 | IUCN <sup>2</sup><br>CITES <sup>3</sup><br>√ Yes/No X | Preferred Habitat  | Abundance/ Ecological Role in Ecosystem   | Predators  |
|----------------------|---------------------------------|---|--|---|--|
| Southern tamadua     | <i>Tamadua tetradactyla</i>     | X   | Forest, savannah & crop lands. Climb trees. Prefer dry areas but have also been captured near streams (Hayssen, 2011)  | Hunted for body parts throughout South America. (Hayssen, 2011)   | Prey, ants & termites from both on the ground & in trees.<br>Predator Harpy Eagle (Hayssen, 2011)  |
| White-lipped peccary | <i>Tayassu peccari</i>          | √<br>Vulnerable                                       | Forest (Fragoso, n.d.)   | Abundant in Columbian savannah (Mosquera-Guerra et al., 2024)   | Frugivore (Fragoso, n.d.)<br>Predator. hunters (Fragoso, n.d.; Vieira et al., 2022)  |
| Collard peccary      | <i>Tayassu tajacu</i>           | X   | Forest, enter/use abandoned armadillo burrows individually or in groups (Aya-Cuero et al., 2017)   |   | Less selective diets, aseasional breeders also consume small insects and vertebrates when fruit is less available (El Bizri et al., 2018)  |
| Savannah Fox         | <i>Cerydocon thous</i>          | X   | A flexible generalist in terms of habitat use, recorded in deciduous and semideciduous forests, gallery forests, dry forests, savannas, floodplains, mangroves, and agricultural areas. (Santos et al., 2024)  | Recent expansion in its range possible due to expropiation of large carnivores & agricultural expansion. (Santos et al., 2024)<br>Long distance seed disperser (Dutra-Vieira et al., 2024)                        | An omnivore, consuming mainly grasses but also a variety of animals including mammals, reptiles, birds and amphibians (Dutra-Vieira et al., 2024)  |
| Jaguarundi           | <i>Herpailurus yagouaroundi</i> | X   | Terrestrial but moves to trees if threatened. Moist, dense forest, swamps, and dry open areas (Castelló, n.d.).  | Low Abundance (Pierre et al., 2020)<br>Thought to be in near threatened (Castelló, n.d.)<br>Associated with Ocelots, where Ocelots are – also Jaguarundi. (Castelló, n.d.)  | As a predator hunts on the ground or climbs trees (Castelló, n.d.)<br>Preys on small mammals /vertebrates weighing less than 1 kg, such as birds and medium-sized rodents (Castelló, n.d.) |
| Jaguar               | <i>Panthera onca</i>            | √ Near threatened                                     | Inhabit all vegetation types including mangrove, swamp, white sand & rock savannahs with individuals selecting forest fragments and gallery forest over urban and agricultural areas along the coast (Hallett et al., n.d.) jaguar density is highly correlated with | Land conversion, fragmentation, hunters & deforestation are threats to jaguars (Hallett et al., n.d.)<br>Hallett estimates 4,100 jaguars in the wild.<br>and puma prey on domestic animals (poultry, dogs, sheep, | Jaguars prey on a diverse range of animals – whatever is available in their habitat. Jaguar's reportedly consume between 85 and 111 species. They also prey on domestic animals,           |

| Common Name      | Scientific name           | IUCN <sup>2</sup><br>CITES <sup>3</sup><br>√ Yes/No X | Preferred Habitat  | Abundance/ Ecological Role in Ecosystem   | Predators  |
|------------------|---------------------------|---|--|---|--|
|                  |                           |   | forest cover, & higher in areas with restricted hunting. A change in their behaviour has been observed shifting their behaviour to nocturnal to adapt to open habitats. (Hallett et al., n.d.)   | and cattle).(Chapter Author et al., 2004)   | including cattle, poultry, dogs, and sheep. (Hallett et al., n.d.)<br>Mammals form 80% of diet followed by their preferred food, peccaries, armadillos and deer. (Chapter Author et al., 2004)   |
| Puma             | <i>Puma concolor</i>      | X   | All kinds of forest, woodland preferred as well as some scrubland, wet or dry, well-vegetated grassland savannas. Croplands but move away from human areas(Bianchi et al., 2021; Castelló, n.d.) | Co-exist with jaguars. Threatened by habitat loss and fragmentation   | Paca are essential prey for the puma as well as small birds, large herbivores, peccaries and armadillos (Melo-Dias et al., 2024)<br>Pumas hunt on the ground & climb trees. Hunt large deer except when in the same landscape as jaguars then eat small rodents, agoutis/paca, also armadillo. Range of prey, reflects their wider geographic distribution, (Castelló, n.d.) |
| Ocelot           | <i>Leopardus pardalis</i> | X   | humid forests, marshy areas, along riverbanks, & in swampy savannas. Preferred habitat seems to be gallery (riverine) forests, grasslands (Murray & Gardner, 1997)                               | Mammals account for 88% of their diet(Murray & Gardner, 1997) small mammals and large rodents<br>Range 2-7km                    | Harpy eagles, large snakes, Pumas and Jaguars  |
| Red brocket deer | <i>Mazama americanus</i>  | X   | Highly frugivorous forest dwellers with relatively small antlers compared to other cervid species, (Bodmer, 1989; Duarte et al., 2010)   | Seed dispersers (Griffiths et al., 2024)<br><br>Aseasonal breeder will consume green leaves, small insects and vertebrates when | a large-bodied ruminant frugivore and seed predator.(Griffiths et al., 2024)   |

| Common Name       | Scientific name           | IUCN <sup>2</sup><br>CITES <sup>3</sup><br>√ Yes/No X | Preferred Habitat  | Abundance/ Ecological<br>Role in Ecosystem  | Predators   |
|-------------------|---------------------------|---|--|---|---|
|                   |                           |   | Practice geophagy, suggestion that Mg may influence habitat selection as they eat soil high in Mg.(Griffiths et al., 2024)   | fruit is less available.(El Bizri et al., 2018)   |   |
| Grey brocket deer | <i>Mazama nemorivaga</i>  | X   | Require abundant forest , prefers forest edge but is considered the most ecologically flexible Neotropical deer, potentially able to adapt to agricultural disturbance (Rodríguez et al., 2024). They have been recorded in human-modified landscapes, including plantations, sugarcane crops, and isolated forest remnants immersed into agricultural matrix(Rodríguez et al., 2024) deer is "Least Concern," but | Low abundance (Pierre et al., 2020)<br>Population is in decline & Considered vulnerable in regions of some countries where landscapes more severely depleted of natural vegetation (< 20% at the landscape level (Rodríguez et al., 2024)<br><br>seed predation, which affects forest dynamics and regeneration | Predators: Hunters & large carnivores   |
| Tayra             | <i>Eira barbara</i>       | X   | Forest dwellers habitat dry and flooded forests (Bezerra et al., 2009; Bianchi et al., 2021). Tolerant of some human disturbance(Bianchi et al., 2021) Similar species to the Jaguarundi (Castelló, n.d.) Where Tayra, ocelot, jaguarundi are negatively affected by poaching, intraguild interactions <sup>4</sup> .  | Lowest abundance (Pierre et al., 2020). Large home range. & variety of prey an Opportunistic carnivore/omnivore (Bezerra et al., 2009)  | Prey includes sloths, small rodents , deer and birds (Bezerra et al., 2009) Predator Interaction with puma (Bianchi et al., 2021) |
| Brazilian tapir   | <i>Tapirus terrestris</i> | √ <b>Vulnerable</b>                                   | Adaptable to almost every habitat in South America, they are most abundant in forests, near water bodies and other, moist habitats.  | Anthropogenic pressure, especially habitat degradation and conversion, negatively affects species abundance,  | Human avoidance – hunting Eat fruit, stems and leaves in lower strata of forest( <i>Tapir Feeding</i> , n.d.)                     |

<sup>4</sup> Intraguild predation is a complex, multispecies interaction simultaneously combines predation and competition among a minimum of 3 individuals

| Common Name                    | Scientific name             | IUCN <sup>2</sup><br>CITES <sup>3</sup><br>√ Yes/No X | Preferred Habitat   | Abundance/ Ecological Role in Ecosystem  | Predators  |
|--------------------------------|-----------------------------|---|---|--|--|
|                                |                             |   | Also inhabit grasslands and Savannahs.<br>(Burs et al., 2023; Medici et al., 2014)  | occurrence, and movement behavior. Habitat loss, due to intensive agriculture, is the most significant threat (Burs et al., 2023)<br>Seed dispersers in forests (Burs et al., 2023)                                |  |
| Southern two-toed sloth        | <i>Choloepus didactylus</i> | X   | Forest galleries along rivers (Trinca et al., 2006)   | Forest loss & increase in agriculture thought to be responsible for extirpation.(Trinca et al., 2006)  | Ocelots  |
| Pale-throated three-toed sloth | <i>Bradypus tridactylus</i> |   | Forest & along rivers<br>Estimated range 2 to 20 animals/ha(Pool et al., 2016)  | Widely distributed<br>Arbooreal leaf eaters come to the ground for soil and minerals (Gilmore et al., 2001)  | Arboreal cats, large snakes, and tayra (Bezerra et al., 2009; Gilmore et al., 2001)Bezerra et al., 2009)   |
| Red howler monkey              | <i>Alouatta macconnelli</i> | X   |   | Widespread seed disperser.(Dos Santos Neves et al., 2010; Pierre et al., 2020)<br>Latrines of the monkeys produce minerals used by the trees essential part of the forest ecosystem(Dos Santos Neves et al., 2010) | feeding on ripe, fleshy fruits, but also on leaves and flowers in the tree canopy, depending on fruit availability(Dos Santos Neves et al., 2010)<br>Puma. Ocelots & Jaguar (Bezerra et al., 2009) |
| Wedge-capped Capuchin          | <i>Cebus olivaceus</i>      | X   |   | Seed disperser(Pierre et al., 2020)  |  |
| White-faced saki               | <i>Pithecia pithecia</i>    | X   |   | Seed disperser(Pierre et al., 2020)  | Fruits leaves and insects(Norconk & Conklin-Brittain, 2004)  |
| Golden hand tamarind           | <i>Saguinus midas</i>       | X   |   | Seed disperser(Pierre et al., 2020)  |  |
| Black spider monkey            | <i>Ateles paniscus</i>      | √ <b>Vulnerable</b>                                   | Wet rainforest travels in upper canopy. Frugivorous eating whole ripe fruit. Consume flowers and leaf flushes when fruit is scarce (Youlatos, 1999) | Seed disperser(Pierre et al., 2020) Food<br>Disperse at least 138 species  | Hunting and habitat loss due to agriculture are associated with decline.   |

| Common Name         | Scientific name              | IUCN <sup>2</sup><br>CITES <sup>3</sup><br>√ Yes/No X                  | Preferred Habitat   | Abundance/ Ecological Role in Ecosystem   | Predators   |
|---------------------|------------------------------|--|---|---|---|
|                     |                              |  | shift habitat as relative fruit abundance changes. (Wallace, 2006)  |   |   |
| Red-footed tortoise | <i>Geochelone carbonaria</i> | √ <b>Appendix II of CITES</b><br>Cannot be exported without a license. | Tall grasslands, savannah. They will live in landscapes converted to agriculture but at a lower abundance (Speiss, 1997)  | Herbivorous & Seed dispersers throughout their range(Strong, 2005)  | Hunters for the pet trade and as a delicacy, (Speiss, 1997; Strong, 2005)   |
| Burrowing owl       | <i>Athene cunicularia</i>    |  | Burrows – occupy a wide niche range. Subterranean burrows, within grasslands and/or small scattered shrubs.(Wingert, 2012)Inhabit a variety of human – altered landscapes, dense agricultural areas and urban sites. (Cavalli et al., 2014; Wingert, 2012) Burrows provided by other animals eg foxes and large rodents but they are capable of digging their own burrow. | Occupy burrows where a plentiful supply of food exists, especially nesting burrows.<br><br>fragmentation, and degradation of habitat & reduction in mammal populations that provide open habitat and burrows for owls<br>Habitat quality and landscape structure(Villarreal et al., 2005) | Prey Insects - a highly variable diet ground insects and small mammals throughout all seasons. Eat insects – abundance of insects do not need specific strategies obtain food in human modified habitats – therefore has no limitations colonizing and adapting to new human modified habitats (Cavalli et al., 2014; Wingert, 2012) sensitive to agrochemical contamination. |
| Boa                 | <i>Boa constrictor</i>       | X  |   | Top predator and potentially also a seed disperser (Cabral et al., 2019)  | Top predator, birds mammals, birds reptiles rodents &. many other wildlife. Related to availability in landscape. Capable of adapting to different landscapes. .(Cabral et al., 2019)   |
| Red-and-green Macaw | <i>Ara chloropterus</i>      | X  | Forests and savannahs (Ragusa-Netto, 2024) Habitat associated with prevalence of food<br>Far ranging habitat. Large seeds are their preferred diet but eat  | Population is in decline. Brazil due to loss of habitat, hunting- loss to the pet trade. Large seed feeders (Ragusa-Netto, 2024)  | Feed in human centered areas, during wet season (Ragusa-Netto, 2024)  |

| Common Name        | Scientific name            | IUCN <sup>2</sup><br>CITES <sup>3</sup><br>√ Yes/No X | Preferred Habitat   | Abundance/ Ecological Role in Ecosystem  | Predators  |
|--------------------|----------------------------|---|---|--|--|
|                    |                            |   | seeds from watercourse vegetation during wet and dry season(Ragusa-Netto, 2024) |  |  |
| Canje Pheasant     | <i>Opisthocomus hoazin</i> | X   | Forest dweller nests in trees near watercourses (Dom, 1994)                     |  | Predators, boa, capuchin monkeys, & Tayra. Folivores, consuming young shoots and leaves .(Dom, 1994) |
| Wild Boar/Bush hog | <i>Sus Scrofa</i>          | X   | Attracted to cultivated crops for food and shelter (Morelle et al., 2015)       | Display constant explorative behavior and react to stimuli, suggested reason for their adaptation to change. Rely on memory, & return to places of abundant food of high quality, water and shelter (Morelle et al., 2015) | Avoid hunters by hiding in cropped fields and forests(Morelle et al., 2015)                          |

# **Annex 6:**

## **Risk Assessment Matrices**



## Risk Assessment Matrix -Potential Health and Environmental Risks

| Risk Identification  |  |   | Risk Analysis   |                   |                   |             | Risk Treatment  |                               |                                |                                     |
|--|--|---|---|-------------------|-------------------|-------------|---|-------------------------------|--------------------------------|-------------------------------------|
| Source of Risk   | Identified Risks/Hazards   | Leading to .....  | Existing Controls of Identified Risk/Hazard if any  | Likelihood (1-5 ) | Consequence (1-5) | Risk Rating | Recommended Action  | Likelihood with Action (1-5 ) | Consequences with Action (1-5) | Risk Rating with Recommended Action |
| Generator and heavy machinery in operation   | Noise pollution  | Adverse health effects to the community > 45 years cardiovascular disease   | Generator is in a metal corrugated housing.   | 4                 | 3                 | 12          | Heavy machinery serviced to ensure operate below recommended noise levels. Generator to be contained within noise attenuated housing, on a surface where noise is dampened & heavy machinery driven/operated at speed that minimises noise.               | 3                             | 2                              | 6                                   |
|  |  | Adverse health effects vulnerable community members e.g. cognitive function of children   | Heavy machinery - None  | 4                 | 4                 | 16          |   | 3                             | 2                              | 6                                   |
|  | Ecological health- behavioural changes in avian & some terrestrial animals. Uncertainties exist  | Changes in foraging, mating and communicating within the group. Potentially: ducks are affected by changes in progeny.  | None  | Uncertain         | Uncertain         | Uncertain   | Noise reduction measures described above  |                               |                                |                                     |
| Soil Erosion   | Increased vulnerability of soil to erosion   | The permanent loss of topsoil lack of sustainability of land for agriculture<br>Reduced yield in crops  | Addition of mulch to the soil. Soil tests were conducted measuring the physiochemical constituents of the soil. This assists in nutrient application- only the nutrients required by the soil to develop crops are added to the soil at the correct dose. | 5                 | 4                 | 20          | Applying information gained from the annual physiochemical attributes of soil, to apply organic matter to meet shortfalls in moisture, practicing conservation tillage and other good agricultural practices to prevent erosion.                          | 3                             | 2                              | 6                                   |
| Soil erosion and poor farming practices, e.g. poor tillage, fallow fields& and over use of agrochemicals. Unpaved roads<br>Spray drift | Poor air quality inhalation and deposition of particulate matter PM2.5, PM10, matter on which agrochemicals and volatilised gases may be adsorbed, e.g. SOx and NOx. | Sediment carried in surface run-off to surface water sources  | Addition of mulch   | 5                 | 4                 | 20          | Implementing the erosion prevention plan. Enact speed limitations on the roads & dust suppression methods for the roads. Planting trees on southern borders to contain dust and introduction of crop spraying technologies .                              | 3                             | 2                              | 6                                   |
|  |  | Adverse health - respiratory outcomes to the downwind community<br>Eutrophication<br>Contaminated sedimented surface water with agrochemicals and agrochemical by-products ending in Wiki Creek and Berbice River. Anoxic areas of the surface water system & corresponding ecosystem demise. | Addition of mulch to the soil, which will add moisture and increase soils ability to absorb rain and other moisture thereby reducing surface run-off.   | 5                 | 4                 | 20          |   | 3                             | 2                              | 6                                   |
| Surface run-off  | Water erosion and the over-application of agrochemicals  |   |   | 4                 | 3                 | 12          | Applying agrochemicals at the right dose and manner. Following the recommendations for soil erosion and installing a buffer strip. NB: Removing nutrients from surface water sources does not automatically mean water source returns to previous health. | 3                             | 3                              | 9                                   |
| Leachate   | Storage of agrochemicals, fuel and waste oil directly on the ground. Risk of contaminating the ground water well on site.  | Ground water and aquifer contamination. If the aquifer is part of the Berbice reiver recharge zone, then the Berbice River could also become contaminated.  | Solid waste and effluent waste systems have been installed.   | 4                 | 4                 | 16          | All hazardous chemicals and waste to be stored on an impervious surface. Fuel to stored in a bunded area which can contain any spills or discharges.  | 2                             | 2                              | 4                                   |
| Waste management   | Solid waste disposal<br>Indiscriminate disposal of solid waste in the open pit   | Contamination of ground water by leachate   | A solid waste pit is place for the disposal of solid waste  | 4                 | 5                 | 20          | Managed solid waste disposal such that items of great risk of polluting ground water are disposed of by EPA approved hazardous waste companies, e.g. used oil, vehicular batteries and empty pesticide containers.  | 3                             | 3                              | 9                                   |
|  | Effluent waste disposal<br>Improperly constructed and maintained soakaway such that cannot contain or filter effluent discharge from the septic tank                 | Contamination of ground water by effluent leachate  | A septic system consisting of a septic tank and soakaway is in place for effluent disposal  | 5                 | 4                 | 20          | Engineered soakaway established, such that percolation tests are conducted, water table determined, soil composition and anticipated volume determined to ensure filtration and berm to prevent over topping  | 3                             | 3                              | 9                                   |
| Impacts of the Biological Environment. Conversion of savannah to crops within the FGI landscape.                                       | Destabilising wildlife ecosystem within the FGI landscape  | extirpation and aiding extinction of some wildlife from the FGI landscape. Reduction in food sources for the Wiki community.  | The intention to leave the forest and marsh landscapes undisturbed.   | 5                 | 4                 | 20          | Liaison with GCMA and GFC to determine whether to leave some of the savannah in place and given the interdependence of wildlife within the FGI landscape - how to best manage wildlife and the landscape to minimise extirpation.                         | 3                             | 3                              | 9                                   |

## Risk Matrix Assessment of Occupational Health and Safety

| Risk Identification   |   |  | Risk Analysis                                      |                   |                   |             | Risk Treatment   |  |                                |                                     |
|---|---|--|--|-------------------|-------------------|-------------|--|--|--------------------------------|-------------------------------------|
| Source of Risk  | Identified Risks/Hazards  | Leading to .....   | Existing Controls of Identified Risk/Hazard if any | Likelihood (1-5 ) | Consequence (1-5) | Risk Rating | Recommended Action   | Likelihood with Action (1-5 )  | Consequences with Action (1-5) | Risk Rating with Recommended Action |
| Impacts of Occupational Health and Safety   |   |  |  |                   |                   |             |  |  |                                |                                     |
| Noise   | Noise in excess of accepted occupational thresholds while working the fields and potentially in the generator room, and maintenance shed. | Farm workers experiencing adverse health including NIHL and increased blood pressure.  | None   | 5                 | 5                 | 25          | Hearing Protection Devices (HPD) for all service staff who service heavy equipment including the generators and crop field workers. Health and Safety (H&S) training on noise and HPD.                                   | 3  | 1                              | 3                                   |
| Poor Air quality  | Exposure to dust/ particulate matter in the fields and potentially  | Adverse health outcomes of farm workers including chronic bronchitis and COPD particularly among those tasked to work in cropped fields. | Some PPEs have been provided.                      | 4                 | 5                 |             | 20   | H & S training on air quality, application of agrochemicals and PPEs including the use of masks. Respiratory masks P100/N99 supplied to employees for working in the fields during the dry season as well as part of PPEs when applying agrochemicals. | 2                              | 3                                   |
| Application of agrochemicals  | Improper handling of agrochemicals while loading, filling, mixing, transporting and applying.   | Acute effects health effects such as chemical burns, skin irritants and vomiting , also chronic diseases such as non-Hodgkin's lymphoma  | Some PPEs have been provided.                      | 5                 | 4                 | 20          | Provision and training in the use of PPEs, the risks of agrochemicals and best practices on handling, mixing, transporting and applying agrochemicals on an ongoing basis.   | 2  | 2                              | 4                                   |
| Operation and maintenance of agricultural machinery. Heavy machinery, ATVs and vehicles | Farm workers are at increased risk of machinery and vehicular roll overs, entrapment, and entanglement.                                   | Injuries and fatalities  | None   | 5                 | 5                 | 25          | Employee assigned to Health and safety on FGI responsible for developing and monitoring standard operating procedures for the maintenance and operation of farm vehicle as well as H & S training on a continuous basis. | 3  | 3                              | 9                                   |

## **Annex 7:**

# **FGI Complaints Procedure & Complaints Form**

|  |  |               |
|--|--|---------------|
|  | <b>Internal Incidents and Complaints Procedure</b> | Approved by:  |
|  |  | February 2025 |

## 1.0 Definition of terms

- **Complainant** – an individual or group that expresses dissatisfaction or concerns regarding an issue, event or situation.
- **Incident** – An incident is any unanticipated event or occurrence that interferes with regular working operations, injures others, or puts people, property, or systems at danger.
- **Complaint** - report of dissatisfaction or concern by an individual or group with an issue, event or situation.

## 2.0 Table showing procedure for recording and investigating incidents/complaints.

| STEPS                                   | ACTIONS  |
|---|--|
| <b>STEP 1: Receipt of Complaints</b>    | <ol style="list-style-type: none"> <li>1. Complaint form is filled out and received by immediate Supervisor</li> <li>2. Complaint form is forwarded to the Project Manager</li> <li>3. Form should be transferred immediately or not more than 24-48 hours after receipt.</li> </ol>   |
| <b>STEP 2: Processing of Complaints</b> | <ol style="list-style-type: none"> <li>4. The form is documented into a database and assigned a reference number.</li> <li>5. A physical or digital file is made for the grievance.</li> <li>6. The details of the form are analyzed within 24 hours of receipt.</li> <li>7. The Complainant is contacted by the Project Manager for additional information/clarification if required.</li> <li>8. The Project Manager coordinates with the relevant technical expert/s to investigate the complaint.</li> </ol> |

|   |  |               |
|---|--|---------------|
|  | <b>Internal Incidents and Complaints Procedure</b> | Approved by:  |
|   |  | February 2025 |

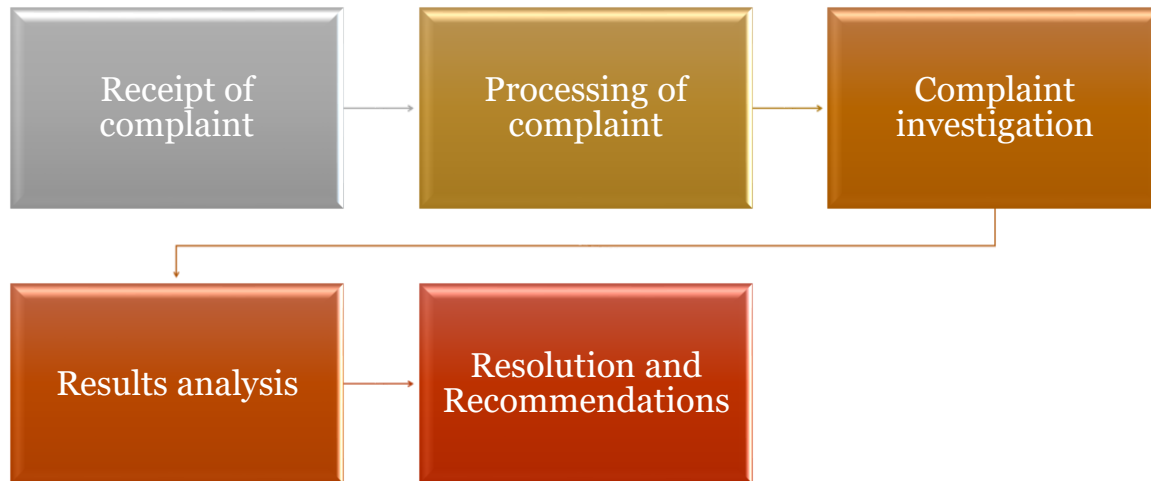
|   |  |
|---|--|
|   | 9. An investigation is conducted to investigate the accuracy of the complaint.   |
| <b>STEP 3: Complaint Investigation</b>  | 10. The complaint is investigated within 3-5 days of receipt of form.<br>11. The investigation will seek to ascertain the severity of the perceived impact and whether any of the project procedures/policies were breached.<br>12. The investigation may also entail physical assessments and interviews. |
| <b>STEP 4: Analysis of Investigation results</b>  | 13. The results of the investigation are analysed and recommendations are made to address the complaint.<br>14. Results are documented and filed for future reference.   |
| <b>STEP 5: Resolution and Recommendation</b>  | 15. The outcome of the investigation is communicated to the complainant and relevant personnel.<br>16. Recommendations are made based on the outcome of the investigation.<br>17. Grievances are reported in the monthly, quarterly or annual project reports  |
| <b>Other Comments:</b> If it is a recurring complaint, this information <b>MUST</b> also form part of the investigation. All forms must be translated in native language of the complainant i.e. English, Portuguese or any other language. Results must also be communicated in the Complainant's native language. |  |

### 3.0 Schematic of Procedure *for* internal incidents and complaints



## Internal Incidents and Complaints Procedure

Approved by:  
February 2025



|   |   |               |
|---|---|---------------|
|  | <h2 style="margin: 0;">Complaint/Incident Form</h2> | Approved by:  |
|   |   | February 2025 |

This form has to be submitted within 24-48 hours of an incident and **MUST** adhere to the FGI's complaints procedures.

Complete all sections with relevant details to ensure the incident/complaint is adequately addressed.

| General Information   |  |
|---|--|
| Complainant name  | Date form submitted  |
|   |  |
| Job title   | Location of complainant  |
|   |  |
| Nature of Complaint/incident – tick all that applies  |  |
| <input type="checkbox"/> Health and safety (vehicle and other accidents etc.)<br><br><input type="checkbox"/> Emissions to air of particulate matter, gas, fumes and other pollutants<br><br><input type="checkbox"/> Pollution of waterways (rivers, creeks, wells)<br><br><input type="checkbox"/> Impact to soil/contamination of land<br><br><input type="checkbox"/> Human-wildlife conflict<br><br><input type="checkbox"/> Nuisances (noise, odour, vibration etc.)<br><br><input type="checkbox"/> Fire and explosion | <input type="checkbox"/> Spillage/leakage of non-hazardous substances<br><br><input type="checkbox"/> Spillage/leakage of hazardous substances<br><br><input type="checkbox"/> Waste management issues (improper storage or disposal)<br><br><input type="checkbox"/> Damage to farm/crops/machinery<br><br><input type="checkbox"/> Environmental hazards<br><br><input type="checkbox"/> Land disputes<br><br><input type="checkbox"/> Disturbance to vegetation/wildlife<br><br><input type="checkbox"/> Personal grievance<br><br><input type="checkbox"/> Other _____ |
| Details of events leading to incident/complaint (Date, time, location, witnesses if applicable)   |  |
|   |  |

|   |                                  |               |
|---|----------------------------------|---------------|
|  | <h2>Complaint/Incident Form</h2> | Approved by:  |
|   |                                  | February 2025 |

| Responsible parties  | Response time – Immediate actions taken |
|--|---|
| Name:<br><br>Contact number:<br><br>Email:<br><br>Company name:  |   |
| A detailed account of the incident including the names of witnesses, photos etc. (if applicable)                                 |   |
|  |   |
| Employee signature   | Date                                    |
|  |   |
| To be completed by Project Manager/Supervisor – Means of verification  |   |
| Provide details on the verification process, include details of any checks carried out, and reference any audit checklists used. |   |
|  |   |



|   |   |               |
|---|---|---------------|
|  | <h2 style="margin: 0;">Complaint/Incident Form</h2> | Approved by:  |
|   |   | February 2025 |

|  |                      |
|--|----------------------|
|  |                      |
| Signature  | Date of verification |
|  |                      |
| To be completed by Project Manager/Supervisor – Preventative or corrective actions identified and agreed |                      |
|  |                      |
| Follow up action   |                      |
|  |                      |
| Closure of Incident/Complaints   | Date of closure      |
|  |                      |
| Signature of complainant   | Date                 |
|  |                      |
| Signature of Supervisor  | Date                 |
|  |                      |

***NB. Please retain a copy for your records. As a complainant, your signature indicates that the information you have provided on this form is truthful. Forms should be completed in native language of complainant.***

## **Annex 8:**

# **Emergency Response Plan**

|  |                                |               |
|--|--------------------------------|---------------|
|  | <b>Emergency Response Plan</b> | Approved by:  |
|  |                                | February 2025 |

## 1. Introduction

An Emergency Response Plan (ERP) reflects a company's commitment to safety and demonstrates its desire to foster a culture where safety is a priority. A lack of emergency preparedness can lead to significant losses in property and lives, something no organization wants to face.

Farmlands Guyana Inc (FGI). recognizes that various hazards can affect its operations and endanger the lives of its employees. To ensure the safety of its workers, and protect its investments, the company has developed this plan.

## 2. Scope

This Emergency Response Plan has been developed for FGI's farm located in Ebini. It specifically addresses potential hazards, such as fires and spills, that may affect farm operations. The plan outlines the actions that will be taken to manage these emergencies. This plan, however, does not encompass any other company operations at our other locations.

## 3. Authority

- ✚ **General Manager:** Has the authority to implement the plan and will allocate all necessary resources needed for its success.
- ✚ **Farm Manager:** Responsible for ensuring the plan is executed on the farm. Works with management and the HSE team to secure all necessary materials for success and identifies individuals to serve as wardens.
- ✚ **HSE Officer:** Monitors and audits the plan as needed, including any required updates. Responsible for managing emergencies and collaborating with management to notify all relevant authorities in case of an emergency.
- ✚ **Wardens:** During emergencies, responsible for assisting individuals in reaching the muster point.

|   |                                |               |
|---|--------------------------------|---------------|
|  | <b>Emergency Response Plan</b> | Approved by:  |
|   |                                | February 2025 |

## 4. Farm Information

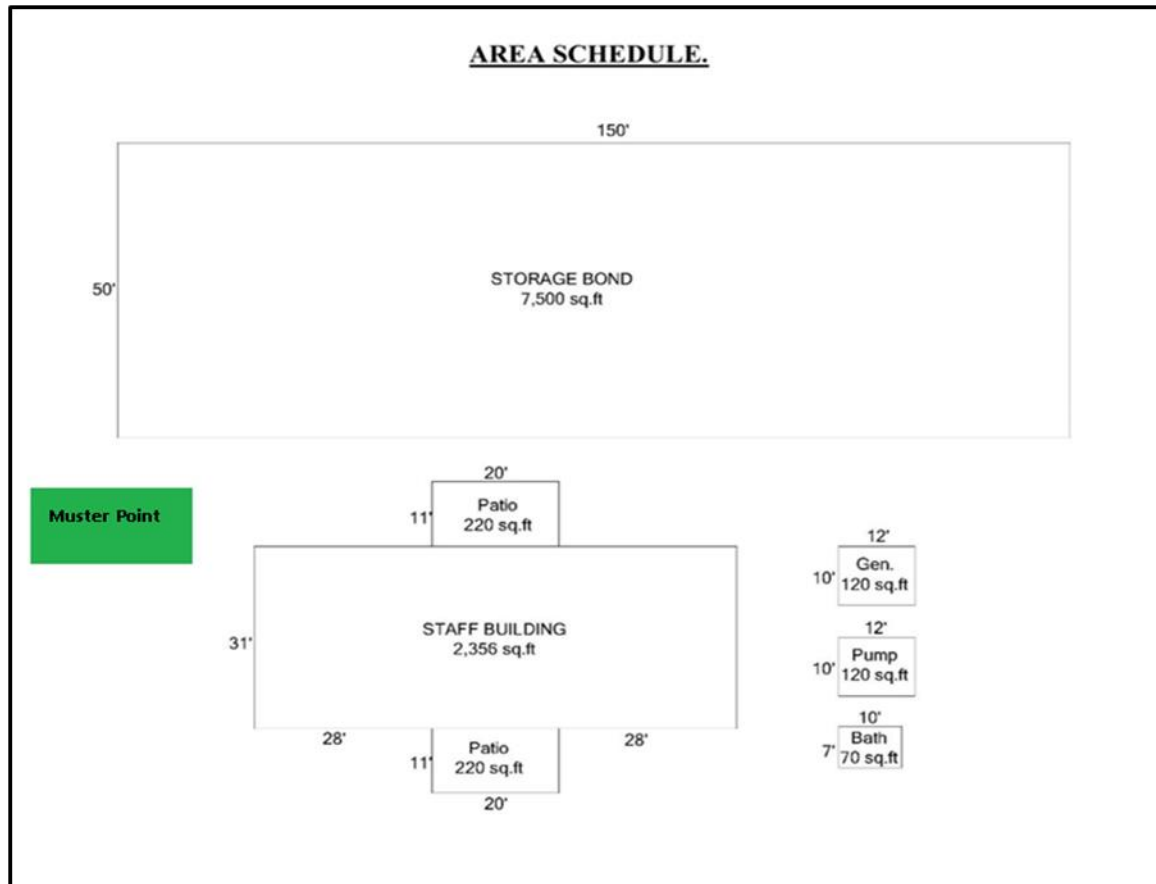
| Name of Farm: Farmlands Guyana Inc            |                   |                  |
|---|-------------------|------------------|
| Physical Address of Farm: Tract 'BWPI', Ebini |                   |                  |
| Director's Name: Dean Hassan                  |                   |                  |
| Persons normally on the Farm                  |                   |                  |
| Name  | Designation       | Staff/Contractor |
| Glenrick Lyre                                 | Farm Manager (ag) | Staff            |
| Leron Lindie                                  | Labourer          | Staff            |
| Irving Lyte                                   | Operator          | Staff            |
| Dameion Leacock                               | Operator          | Staff            |
| Lotoya Taylor                                 | Care-taker        | Staff            |
| Roberto Lyte                                  | Operator          | Staff            |
| Glen Gladstone                                | Labourer          | Staff            |
| Amanda Desouza                                | Care-taker        | Staff            |
| Adriano Biu                                   | Operator          | Staff            |
| Junior DaSliva                                | Operator          | Staff            |



# Emergency Response Plan

Approved by:  
February 2025

## 4.1. Layout of Farm



|   |                                |               |
|---|--------------------------------|---------------|
|  | <b>Emergency Response Plan</b> | Approved by:  |
|   |                                | February 2025 |

## 5. Emergency Contacts




| Contact                                       | Contact Number*    |
|---|--------------------|
| Farm Manager                                  | (592)603-5060      |
| Main Office Contact                           | (592)703 9924      |
| Relocation and Support Contact                |                    |
| Nearby Farm (New Frontier Agriculture)        | (554) 199-775-7470 |
| Nearby Farm (Rising Sun Farm)                 | (592) 703-0833     |
| Nearby Community (Wikki Toshao)               | (592) 701-0230     |
| Guyana Livestock Development Authority (GLDA) | (592) 679-6215     |
| Ministry of Agriculture                       | (592) 617 3598     |
| Ebini (Community Health Worker)               | (592) 611-5723     |
| Calcuni/Wiki Health Post                      | TBC                |
| Police Station                                | TBC                |
| Linden Regional Hospital                      | 444-3002-5         |

\*Contact primarily via WhatsApp

## 6. Classes of Emergencies

The two (2) classes in Emergencies addressed in the ERP are as follows:

**Class 1 Emergencies:** These are emergencies caused by the farm's operations. Types of emergencies that fall into this class are:

-  Fires
-  Medical Emergencies (e.g, Snakebite, Wildlife Attack)
-  Spills (e.g. Fertilizer, Fuel).

**Class 2 Emergencies:** these are emergencies that are not under the control of the Company but may affect the Farm's operations. Types of Emergencies that fall into this class are:

|   |                                |               |
|---|--------------------------------|---------------|
|  | <b>Emergency Response Plan</b> | Approved by:  |
|   |                                | February 2025 |

- ✚ Forest Fires
- ✚ Earthquakes
- ✚ Excessive Heat

## 7.Preparation for Emergencies

To prepare for the potential emergencies outlined in this document, the company will take the following measures:

- ✚ Conduct drills at least twice a year.
- ✚ Ensure employees receive appropriate training in First Aid, fire safety and spill response.
- ✚ Prevent the forest from encroaching on the farm boundary by thinning the forest around the farm to reduce the risk of wildfire spread.
- ✚ Create a fire trench around the farm to prevent any fire from entering the property.
- ✚ Maintain an inventory of all chemicals and fertilizers used on the farm.
- ✚ Ensure SDS is present for all chemicals/fertilizer stored on site.
- ✚ Post emergency contact list on notice board.
- ✚ Ensure first aid kits, eyewash stations and emergency showers are present and functional.
- ✚ Create a good relationship with nearby farms/Companies.
- ✚ Designate a vehicle to be used in the event of an emergency.
- ✚ Create a “go bag” in the event of an emergency.

|   |                                |               |
|---|--------------------------------|---------------|
|  | <b>Emergency Response Plan</b> | Approved by:  |
|   |                                | February 2025 |

## 8. Emergency Response Equipment

The Farm will have the following equipment that will be used for any Emergency Response:

| Vehicle/Equipment Type  | Quantity | Identification Number |
|-------------------------|----------|-----------------------|
| Fire Extinguishers      | 5        | TBA                   |
| Tractors                | 3        |                       |
| First Aid Kits          | 1        |                       |
| Passenger Car / Pick Up | 1        |                       |
| Fire Hose               | 1        |                       |
| Dust Masks              | 2 boxes  | N/A                   |
| Water Pumps             | 1        | TBA                   |

\*TBA (To be assigned)

Irrigation sprinklers, disposable PPE, respirators and additional water storage tanks will be acquired as part of FGI's plans for emergency preparedness.

## 9. Procedure

### 9.1. Class 1 Emergencies

#### 9.1.1. Fires

When a fire is detected, the alarm must be sounded immediately. At the same time, the Fire Service should be contacted.

- ✚ Once the alarm has been activated, all activities **MUST STOP**, and everyone must proceed to the nearest muster point
- ✚ Designated fire wardens will sweep the area to ensure that no one remains in the danger zone



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- ✚ Depending on the size of the fire and if trained to do so, the fire warden may attempt to extinguish the fire using the available firefighting equipment
- ✚ At the muster point, the designated individual must conduct a headcount of all individuals present at the facility
- ✚ No one is allowed to leave the muster point until given specific instructions to do so.

## 9.1.2.Spills

### 9.1.2.1. Chemicals/Fertilizers

#### Small Spill

- ✚ Less than 25 Gallons and is within the boundaries of the property
- ✚ Clean-up does not pose a safety or health hazard
- ✚ Discharge can be easily contained
- ✚ The spill response equipment is readily available to clean up the spill.

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| Procedure for small spills   | Who to contact   |
|--|--|
| <ul style="list-style-type: none"> <li>If persons are working in the area of the spill, evacuate the area.</li> </ul>  | <ul style="list-style-type: none"> <li>Immediate Supervisor</li> <li>Farm Manager</li> <li>HSE Officer</li> <li>Head Office</li> </ul> |
| <ul style="list-style-type: none"> <li>Cordon off the area to prevent persons from accessing the area.</li> </ul>  |  |
| <ul style="list-style-type: none"> <li>If possible, stop the flow of the chemical/fertilizer</li> </ul>  |  |
| <ul style="list-style-type: none"> <li>Notify the relevant personnel. This can be done verbally or via whatsapp/ email.</li> </ul>   |  |
| <ul style="list-style-type: none"> <li>Follow the instructions on the SDS for the safe handling of the chemicals/Fertilizers.</li> </ul>   |  |
| <ul style="list-style-type: none"> <li>Clean up the spill (All waste generated from the cleanup must be placed in airtight containers/plastic bags and be appropriately labelled.). Contact the EPA on disposal Methods</li> </ul> |  |
| <ul style="list-style-type: none"> <li>Complete the Incident/Complaint Form. This should be completed within 24 hours of the incident.</li> </ul>  |  |

## **Large Spills**

- More than 25 gallons and/or have spilt beyond the boundaries of the property.
- Has the potential to enter nearby waterways.
- The discharge cannot be easily contained.
- The discharge requires the responding person to have specialized training and equipment.
- It poses a hazard to human health and the environment.
- Someone has been injured.



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| Procedure for large spills   | Whom to Contact   |
|--|---|
| <ul style="list-style-type: none"><li>If persons are working in the area of the spill, evacuate the area and verify if anyone has been injured within the area.</li><li>Cordon off the area to prevent persons from accessing the area.</li><li>Call the Emergency Response Team for the Area (Fire Service/EMT, police)</li><li>Notify the Immediate supervisor and all other necessary Farm Employees.</li><li>Notify the Environmental Protection Agency (EPA) of the Incident.</li><li>Control and contain the spill. When the responders arrive, be prepared to provide them with the following information:<ul style="list-style-type: none"><li>Location of the spill</li><li>Time the spill was observed</li><li>Type of material spilled (solid, liquid, gas)</li><li>Prevailing wind direction</li><li>Any injuries or property damage</li><li>If any other chemicals are stored near the spilled material</li><li>Any additional information that may be useful to responders</li></ul></li></ul> | <ul style="list-style-type: none"><li>Immediate Supervisor</li><li>Farm Manager</li><li>HSE Officer</li><li>Head Office</li><li>EPA Office</li><li>Relevant Government Agency</li></ul> |
| <ul style="list-style-type: none"><li>Clean up the spill. All waste generated from the cleanup must be placed in airtight containers/plastic bags and be appropriately labelled.). Contact the EPA on disposal Methods</li></ul>   |   |
| <ul style="list-style-type: none"><li>Complete the Incident/Complaint Form within 24 hours of the incident. A copy of the incident report must be sent to EPA. If anyone was injured the Ministry of Labour must also be informed.</li><li>Within one week, the incident should be investigated, and a copy of the investigation report should be sent to the relevant authorities.</li></ul>  |   |
|  |   |

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## 9.1.2.2. Oil Spill

An oil spill will follow procedures similar to those for a chemical spill. Once an oil spill is detected:

- ✚ The area must be cordoned off.
- ✚ Depending on the capacity and magnitude of the spill, the company will determine whether external assistance would be required to contain and clean up the oil spill.
- ✚ Using equipment from the spill kit, control the oil by creating a berm around the spill. The priority at this stage is preventing the oil from entering the groundwater system or nearby waterways.
- ✚ Once possible, the source of the oil should be identified and the spill stopped.
- ✚ Any potential ignition sources near the spill should be shut off.
- ✚ The responder will use the necessary personal protective equipment (PPE) and begin the cleanup process. Some Techniques that may be applied to clean up the oil are mechanical removal of the contaminated soil, in-suit burning, using absorbents and bioremediation.
- ✚ Once cleanup is complete, all waste generated will be placed in containers for disposal.
- ✚ The Environmental Protection Agency (EPA) will be consulted on appropriate disposal methods.
- ✚ All individuals involved in the spill must be decontaminated.
- ✚ An Incident report followed by an investigation must be completed.

A chemicals inventory will be maintained, so that in the event of a spill, a quick estimation of the quantities spilled can be made. The inventory will be completed in the format outlined below, and will be updated on a weekly basis

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| List of Chemicals                      | Quantity |
|--|----------|
| Herbixzone (aka gramaxone)             |          |
| HY Gard Transmission and Hydraulic Oil |          |
| Diesel                                 |          |
| Gasoline                               |          |
| Keyplex 350 DP Formula                 |          |
| Liquid Urea                            |          |
| Starfix Liquid Inoculant               |          |
| Calcium-Magnesium Boron Plus           |          |
| Jumpstart 5-20-4                       |          |
| Metal Man 72 WF                        |          |
| Line-8                                 |          |
| Glyphosate-48%                         |          |
| Glory 75 WG                            |          |
| Muriate of Potash                      |          |
| SSP                                    |          |
| Purple blaster degreaser               |          |
| Crystal Products Wash and Wax          |          |
| PineSol                                |          |
| Marvex Bleach                          |          |
| 15-WD 40 (Mobil Del Vac)               |          |

### 9.1.3. Medical Emergency

If someone is injured on-site, it's important to assess the severity of the injury.

- ✚ For minor injuries, a trained first aider on-site can provide treatment.
- ✚ For serious injuries, the first aider should stabilize the patient until emergency medical services (EMS) arrive or before transporting the injured person to the

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nearest medical facility. If stabilization is not possible, the first aider should monitor the patient and provide detailed information when called upon.

- ✚ In the event of an injury, call the nearest Health Centre for assistance. If transporting the patient to the nearest health Centre/hospital, the first aider should call ahead so that they can be prepared to receive the patient.

### 9.1.3.1. Snake Bite

#### **Non-venomous snake bite**

##### **Symptoms:**

*Pain, Injury and scratches at the bite site.*

- ✚ If bitten by a non-venomous snake go to the first aider for assistance.
- ✚ Clean the bite area with soap and water and cover with a clean bandage.
- ✚ Where possible, monitor to ensure the wound does not become infected.

#### **Venomous snake bite**

##### **Symptoms:**

*Serious pain, tenderness at the site, swelling at the area and limb, nausea, hard time breathing, toes and fingers tingling, change of taste in the mouth.*

- ✚ If bitten by a venomous snake call the emergency team for assistance immediately.
- ✚ Ensure the person does not move but lies and sits in a position where the bite is in a neutral position.
- ✚ Apply a bandage on the bite, it may be tight but not so tight that it restricts blood flow. Wait for medical assistance.
- ✚ If possible, take a picture of the snake that bit the employee.
- ✚ Write down the time of the incident and when the bandage was applied.
- ✚ If the employee becomes unconscious apply CPR.
- ✚ Do not wash off the venom since it may assist in treatment

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- ✚ Do not cut the wound in an attempt to remove the venom.
- ✚ Do not drink alcohol or caffeinated drinks

### 9.1.3.2. *Attack by Wild Animals*

Never walk alone; create a buddy system when moving about the farm.

- ✚ If you encounter a wild animal, back away slowly and avoid making direct eye contact with it.
- ✚ Do not run; instead, stand your ground and try to appear larger than the animal.
- ✚ If the animal continues to charge, protect your vital areas.
- ✚ If an animal injures you, call for help using your voice or your radio.
- ✚ Once you are in a safe place, the first aider should clean the wound and assess its severity.
- ✚ Call the Health Centre or Hospital for assistance.
- ✚ Monitor the victim until help arrives or until transported to the nearest health facility.

## 9.2. Class 2 Emergencies

### 9.2.1. Forest Fires

If a fire is observed near the boundary of the farm, the following steps should be taken immediately:

- ✚ Evacuate the farm and contact the fire service.
- ✚ If smoke is present, distribute N95 masks to employees.
- ✚ If the fire is small, trained staff may attempt to extinguish it until the fire service arrives.
- ✚ Where possible, the forest surrounding the farm should be cleared of underbrush to help reduce the spread of fires.
- ✚ If a fire spreads faster than employees can evacuate, they should pay attention to the wind direction and seek shelter in a nearby building to avoid the worst of the fire. If no building is present, they should find an open space with no vegetation,

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lie face down on the ground, and call the Farm Manager or the Fire Service for assistance.

- ✚ When safe to do so, the main office must be notified of the incident.

### 9.2.2. Extreme Heat

Due to the potential for high temperatures at the farm location, the following guidelines should be followed:

- ✚ Employees should wear loose, lightweight, and light-coloured clothing.
- ✚ Whenever possible, avoid working in direct sunlight and wear wide-brimmed hats. It is especially important to stay out of the sun during midday hours.
- ✚ Ensure that employees remain properly hydrated by drinking plenty of fluids.
- ✚ If an employee is suspected of heat exhaustion, move the person out of the sun/heat to a location with shade.
- ✚ Lay the person down with their feet slightly elevated and remove any heavy or tight clothing.
- ✚ Cool the person down by providing them with plenty of water and air. Sprinkle water on the person if necessary.
- ✚ Monitor the person's condition. If their condition gets worse (fainting, confusion, fever), call the nearest health centre or hospital for assistance.

### 9.2.3. Earthquakes

If an earthquake strikes while you are inside a building, it is essential to stay inside.

- Find a Safe Place: Look for a sturdy table, desk, bookcase, or tall piece of furniture. Avoid doorways if possible.
- During the Earthquake: Drop under the desk or table, hold on to one of its legs, and protect your eyes by tucking your head down.
- Stay Put: Remain in your safe position until the shaking stops and you've assessed that you have no injuries.



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- After the Shaking Stops: Before coming out, check for unstable objects, loose or broken electrical wires, and other potential hazards.
- Proceed to the Muster Point: Once the area is clear, head to your designated muster point and wait for further instructions.
- If you are outdoors when an earthquake occurs, stay outside and do not enter any buildings.
- Find a Safe Area: Move to a location away from buildings, trees, and overhead wires. Crouch down and cover your head to protect yourself.
- Allow the shaking to stop before moving.

## 10. Post Emergency Response

A comprehensive investigation shall be conducted to determine the root causes of the incident in question. The entire investigation process must be thoroughly documented by the Company to uphold standards of accountability and transparency.

All findings resulting from the investigation will undergo a detailed review by the Health, Safety, and Environment (HSE) Team, along with management personnel. Subsequently, the Emergency Response Plan will be revised to incorporate any necessary amendments identified during the investigation.

The main findings of the investigation will be communicated to all employees to enhance their understanding and awareness of the issues at hand. A summary of these findings will be displayed prominently on the HSE noticeboard to ensure accessibility and encourage a culture of safety and continuous improvement within the organization.

# **Annex 9:**

## **Equipment Maintenance Form**



## Equipment Maintenance Form

| General Information  |                  |
|--|------------------|
| Location   |                  |
| Date   |                  |
| Equipment ID/Serial Number   |                  |
| Equipment Type/Name  |                  |
| Department/Area of Use   |                  |
| Operator's Name  |                  |
| Supervisor   |                  |
| Maintenance Type   |                  |
| Scheduled Preventative Maintenance                                     |                  |
| Corrective Maintenance   |                  |
| Emergency Maintenance  |                  |
| Technical – Manufacturer's Maintenance                                 |                  |
| Maintenance Details – Tasks Completed                                  |                  |
| Oil and Filter Change  |                  |
| Lubrication of moving parts  |                  |
| Cleaning of Equipment  |                  |
| Inspection of belts, hoses seals, etc.                                 |                  |
| Electrical System check  |                  |
| Hydraulic System Check   |                  |
| Calibration (specify details)  |                  |
| Replacement of parts - <i>List (Include part number and quantity):</i> |                  |
|  |                  |
| Other (specify)  |                  |
| Performance Test Results   |                  |
| Passed   | Failed(specify): |
| Issues Identified:   |                  |
|  |                  |
| Corrective Actions Taken   |                  |
|  |                  |
| Approval and Sign-Off  |                  |
| Maintenance Performed by   |                  |
| Date   |                  |
| Reviewed and Approved by   |                  |
| Date   |                  |
| Remarks/Additional Notes   |                  |